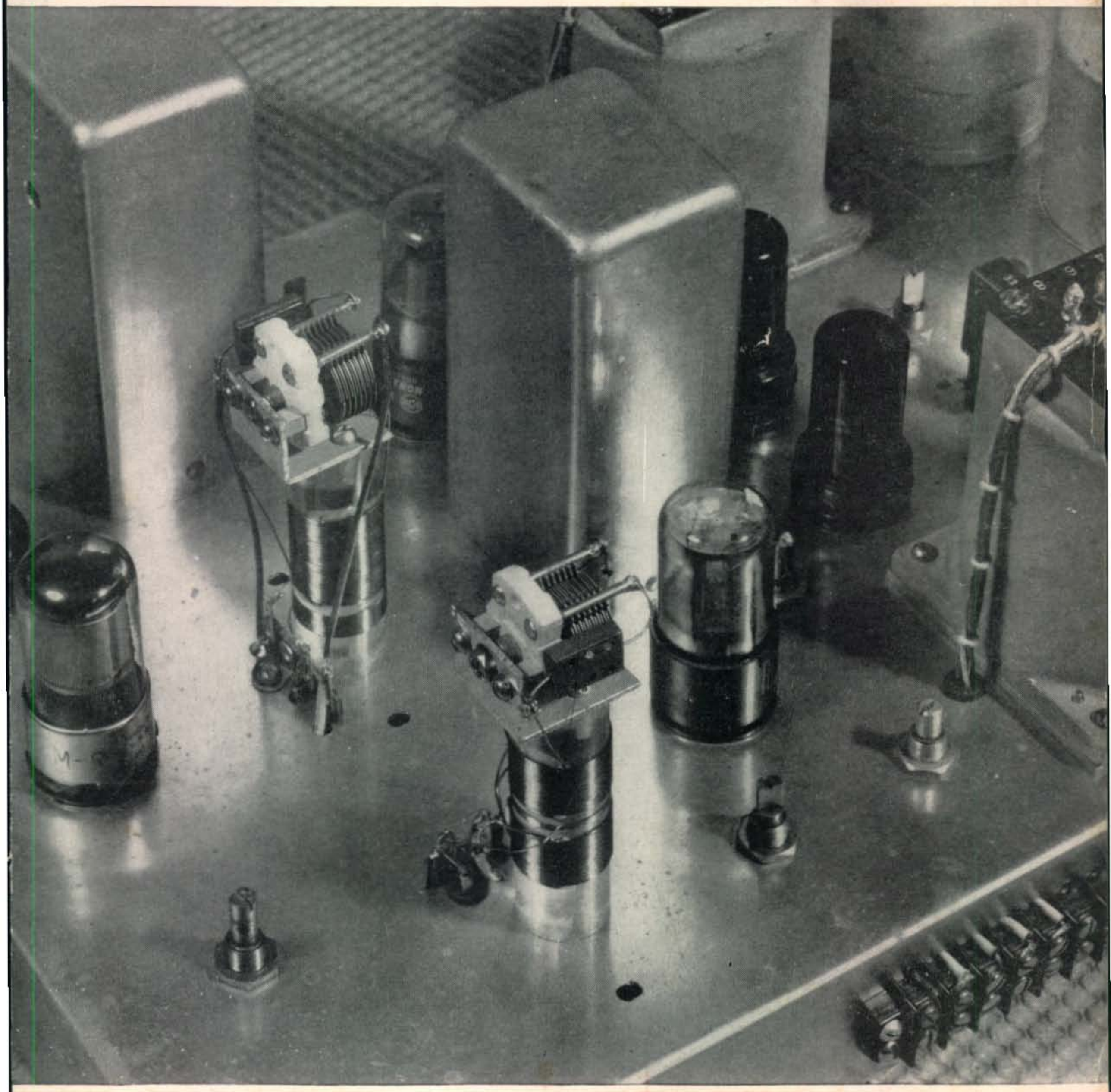
CQ

NOVEMBER, 1948

The Radio Amateurs' Journal

35¢



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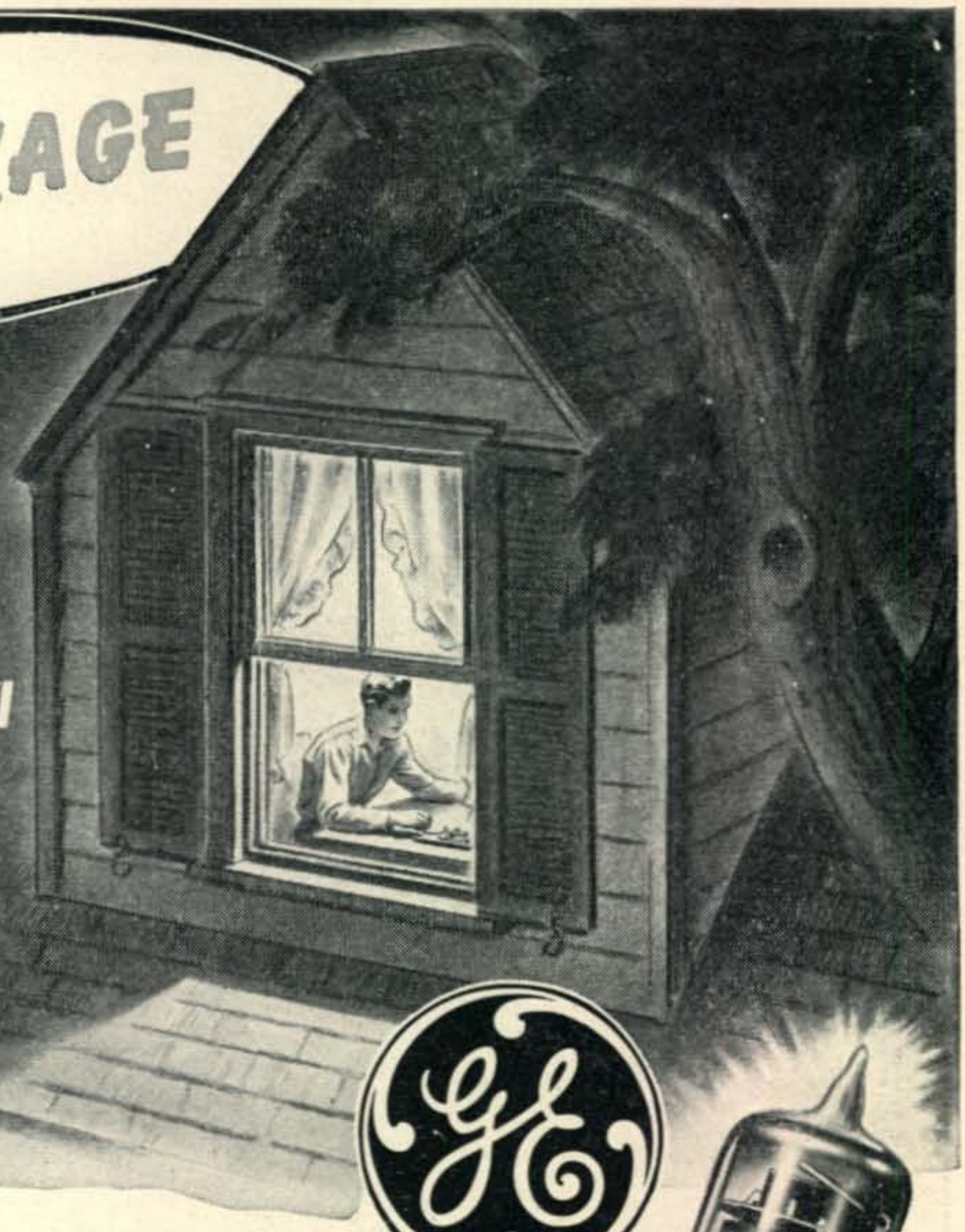
BEGINNER'S CW RIG

Streamlined Model

Using one G-E 6AR5 miniature pentode as a crystal-controlled oscillator



NO, larger old-style tubes aren't a "must" for the transmitter of the novice ham. From the start, he can take advantage of ultra-modern, compact design.

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Tube and plus-package transmitter are small, taking up minimum space on your table that one day will be crowded. Visit your G-E tube distributor today. He'll give you the complete, helpful story! *Electronics Department, General Electric Company, Schenectady 5, New York.*

TYPE 6AR5

CHARACTERISTICS

Heater voltage	6.3 v
current	.40 amp
Plate voltage	250 v
Screen voltage	250 v
Max plate dissipation	8.5 w

S.S.S.C.... *Ham News* continues to break new ground for amateurs! See the November-December issue for full details on how to build a single-sideband receiver. Ask your G-E tube distributor *now* to reserve your free copy for you —this issue will go fast when received in your area.

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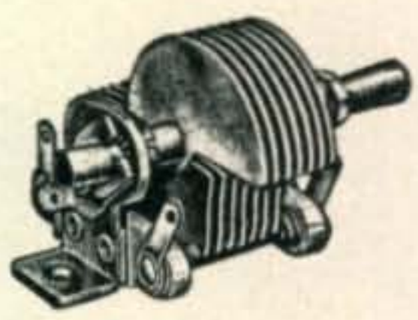

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CQ The Radio Amateurs' Journal

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Vol. 4 **NOVEMBER, 1948** No. 11

In This Issue

COVER—Starting on page 17, W3LOE describes a single-sideband exciter unit that is guaranteed not to scare away the average amateur. The cover photograph is a close-up of the modulator output and sideband amplifier grid tank coils with shield cans removed. The air trimmers are mounted on homemade aluminum brackets. The ends of the various windings are terminated on terminal lug strips. The entire assembly is enclosed by the shield cans, which have access holes for screw-driver tuning of the trimmers.

It's Always a "Gold-Plated Special"

with **KENYON**

"T" LINE TRANSFORMERS

for

- DEPENDABILITY
- RELIABILITY
- QUALITY
- ECONOMY
- PERFORMANCE

Yes, the "Gold-Plated Special" featured in the October issue of CQ is really a "honey" of a rig. It took a great deal of engineering and ingenuity to design the "Special." And it takes top-flight equipment and component parts, such as KENYON "T" Line Transformers to "gold plate" any special!

Hams *everywhere* specify KENYON "T" Line Transformers! Manufactured under rigid standards, all KENYON transformers are constructed of the finest grades of material plus the skill and long experience of a highly trained competent operating staff.

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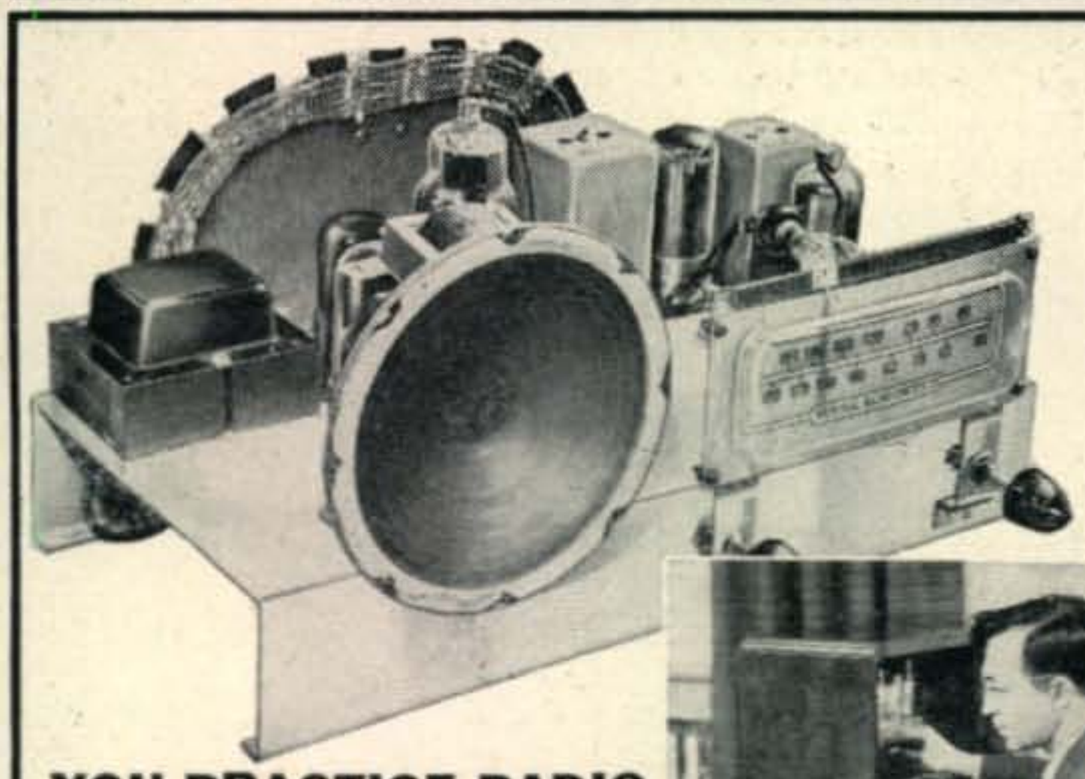


YOU PRACTICE RADIO SERVICING

You build this modern Radio as part of my Servicing Course. I send you the speaker, tubes, chassis, transformer, loop antenna, EVERYTHING you need to build this modern Radio Receiver. Use it to make many tests, get practical experience.

YOU PRACTICE RADIO COMMUNICATIONS

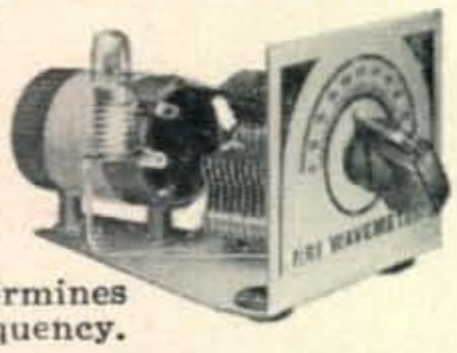
I send you parts to build this Transmitter as part of my new Communications Course. Conduct actual procedure demanded of Broadcast Station Operators, practice interesting experiments, learn how to put a transmitter on the air.

YOU BUILD THIS TESTER

as part of my Servicing Course. It soon helps you EARN EXTRA MONEY fixing neighbors' Radios in spare time.

BUILD THIS WAVEMETER

as part of my NEW Communications Course. Use it with Oscillator you also build that furnishes basic power to transmitter and determines transmitter frequency.



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92105

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"SSSR"

Single Sideband Selector

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* * * Letters * * *

Down with Progress!

166 North Main St., Southington, Conn.

Editor, *CQ:*

Although I disagree with some of your precepts, your "no fear no favor, the hams' paper" approach keeps your scribing sparkling. However, the articles in September *CQ* on SSSC were surprising in that the introduction to one claimed that was *the* type of phone transmission to be used. Shades of ham radio!!! Is our present investment to be thrown in the waste can? We have been threatened with NBFM, pulse transmission, TVI, and now SSSC!

If SSSC is so potent, why do not the broadcast stations use it? Why don't the short-wave stations use it—phone, commercial, Army, et al!

Don't we hams have enough troubles keeping ahead of the F.C.C. and the general public without giving them more ideas? If some of the boys want to use SSSC or what, let them go to it. But please don't try to reform everybody else—particularly when the other 99¾ per cent of the hams do not have the money—least of all the technical knowledge—to get an SSSC transmitter and a *receiver* that will work.

Let's advance the art, but let's not deal ourselves a body blow while doing it!

Kurtz A. Fichthorn, W1BGJ

All joking aside, if the response from many amateurs we've talked to is typical, it will be a long time before SSSC replaces anything. But it may well have an important place in ham radio and we owe it to ourselves to give it every test. W6CEM and now W3LOE have made real progress in simplification and it may not be long before the 99¾% mentioned by W1BGJ will think otherwise about single sideband.—*Ed.*

Keying the 274N Transmitters

605 West Martin, Abingdon, Ill.

Editor, *CQ:*

. . . After looking at some of the power supplies the boys are attempting to use on the 274 series transmitters, I can well see why there are so many poor notes emitting from them.

Please, somewhere in *CQ*, tell all interested in obtaining an xtal note to use condenser input only and to throw away all the VR tubes. In addition, key the cathodes of the 1625s and install a simple key click filter consisting of a 100-ohm 10-watt wire-wound resistor, a 2.5-mh r-f choke by-passed by a .005 mica. The original cathode resistor should be left in the circuit.

You can't work break-in with this system but nine out of ten reports will be "X." Not many of the boys seem to know that the 274N series transmitters thrive on a poorly regulated supply, and there are few regulated supplies on the air that ever approach clean keying without some kind of a yoop or a chirp. Repeating again, a condenser input supply is the answer to the problem and the input condenser can be either one or two μf.

The writer has one of the 459s on the air running at 50 watts input and the reports are usually 9X. The power supply is made of cheap stuff and the regulation is very poor. Full voltage under no load is 800 and under a load of 110 mills the operating voltage drops to 475 volts.

(*Continued on page 8*)

QSY WITH PR

The old refrain on phone bands these days: "Sorry, old man, an S9 plussity-plus from Barbwire, Nebraska, is kicking you all over the place. Can you move a few kay-cees lower?" The answer to that is: "Sure can!" You will enjoy *all* the advantages of having "your spot" with crystal control, and yet dodge QRM if you buy *three PRs.* Spot your main frequency . . . get PR Precision CRYSTALS, say 7 kcs. each side of your spot. Your QSO will not lose you when you move. You will know where you are, and your friends will too! You can get PRs for the EXACT FREQUENCY YOU WANT (INTEGRAL KILOCYCLE) WITHIN AMATEUR BANDS, AT NO EXTRA COST. See your jobber! All PRs are unconditionally guaranteed. — Petersen Radio Company, Inc., 2800 West Broadway, Council Bluffs, Iowa. (Telephone 2760).

SINCE 1934

PR Precision CRYSTALS

10 METERS PR Type Z-5.	Harmonic oscillator. Ideal for "straight through" mobile operation. High activity. Heavy drive without damage in our special circuit $5.00
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Compare these features

•Band Switching — Six position shielded turret. 10, 11, 15, 20, 40 and 80 meter bands. Blank position for additional band. **•Single Tuning Control •Self-Contained Power Supply •Osc. or Amp-doubler Keying •Magic Eye Tuning Indicator •Output, Six Watts with 807 Loafing •Crystal Control on any Band •Stability** — Achieved by high quality components, efficient design. **•Voltage Regulation •Zero Temperature Coefficient Capacitors •Turret Mounted Inductors •Exclusive MEISSNER Stand-By Circuit.**

Amateurs! Here's your opportunity to own a high quality Signal Shifter at a real saving!

HERE'S MORE GOOD NEWS FOR HAMS!
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The new MEISSNER FMX PHASE MODULATOR is designed for quick conversion of the Signal Shifter to NBFM phone. The deviation control allows a swing of 5 to 10 KC at 28 mc. Input for high impedance crystal or dynamic mike is provided. Any Class C amplifier that the Signal Shifter is capable of driving becomes a phase modulated amplifier.

The FMX MODULATOR is installed in the position normally occupied by the power supply, the latter becoming a remotely located unit. Plate and filament voltages for the FMX are secured from the SIGNAL SHIFTER power supply. Tubes required: 6SJ7, 6SG7 and VR-150.

Model FMX PHASE MODULATOR, complete, less tubes, Amateur Net. **$12.00**

ORDER AT YOUR DEALER TODAY!

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For those desiring more power, the same type supply applies and the writer has used as much as 120 watts input with the same good results.

George E. Bidwell, W9FIS

Pink Tickets for Commercials

324 Frederick St., Cumberland, Md.

Editor, *CQ:*

I thought I'd write this to *CQ* because I felt it would likely be effective.

No more will I stay up late trying to work DX when conditions are good on the extremely low end of 7 mc. Every night "key clicks" extending 20 kc inside of the 40-meter band are noticed from the frequency of radio station WEK. The clicks do not appear until approximately 11 p.m. and persist till skip fades away near morning. These clicks range from S8 to S6 depending upon conditions, which I may add are very annoying and usually do a good job of messing up weak signal QSOs for me. This commercial station can readily be recognized as it is taped about 40 or 45 wpm (c.w.).

I would sincerely appreciate any correspondence from any amateur who has been troubled by this station, or who has even heard it. I am not a judge by any means, and will admit that there are some pretty bad signals from amateur stations on 40 c.w., but key clicks from a commercial station, especially when they extend for a number of kc, is a story of a different color.

Leo H. Kenney, W3MLQ

With this letter goes a short story. The matter was taken up with the F.C.C. and promptly attended to. Amateurs are afforded the same protection of their frequencies as commercials. There are already far too many unauthorized services (although almost exclusively foreign) within the ham bands. But bear in mind that it is perfectly possible for a commercial station to have transmitter trouble. It might not hurt to contact them first. If the results of direct communication prove unsatisfactory we urge you to contact either A.R.R.L., ourselves, or the F.C.C.—*Ed.*

BCI—A Suit for Slander

7633 S. Union Ave., Chicago 20, Ill.

Editor, *CQ:*

Yesterday, my loving neighbor, a lady who weighs 250 pounds all in the rumble seat, abruptly accosted me and without preamble spurted right into my face: "It is about time you stop that darn foolishness. My husband who knows quite a lot about radio says that you are not broadcasting in the frequency they allowed you." "Where am I?" hesitatingly said I. "Too darn close to 'The Voice Of The People' on WGN—so darn close that sometimes you miss and come right on top of it and all I hear is 'K9AAB CQ CQ K9AAB' . . . And another thing, my husband who knows quite a lot about the law, says that he is going to sue you for *slander.* My husband can witness what I am saying is true. Both of us, we plainly heard *you* last night telling a fellow in the radio you've got BCI next door. I won't stand that insult. My name ain't BCI . . . and furthermore we're good religious people, we ain't got no 'Baker, Charlie, Ida' living with us. You're a darn liar . . . and my husband can witness that too!"

Now folks, how about another name for BCI—and avoid that suit for slander?

Raoul Du Chatellier, K9AAB

FACTS YOU'LL WANT ON

Sylvania Transmitting Tubes

IN ONE HANDY BULLETIN

Here's the full story on Sylvania's comprehensive line of transmitting tubes for the radio amateur! New bulletin gives detailed specifications on a total of 20 types—triodes, beam power tubes, rectifiers. Of course, these tubes are designed and built to the same exacting standards that have made Sylvania receiving tubes the leaders with Ham operators all over the country.

You'll want to know more about these Sylvania transmitting tubes—and the information is yours for the asking!

GET YOUR *FREE* COPY *NOW*...

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Gentlemen:

Please send me your bulletin, "Sylvania Transmitting Tubes."

Name .....

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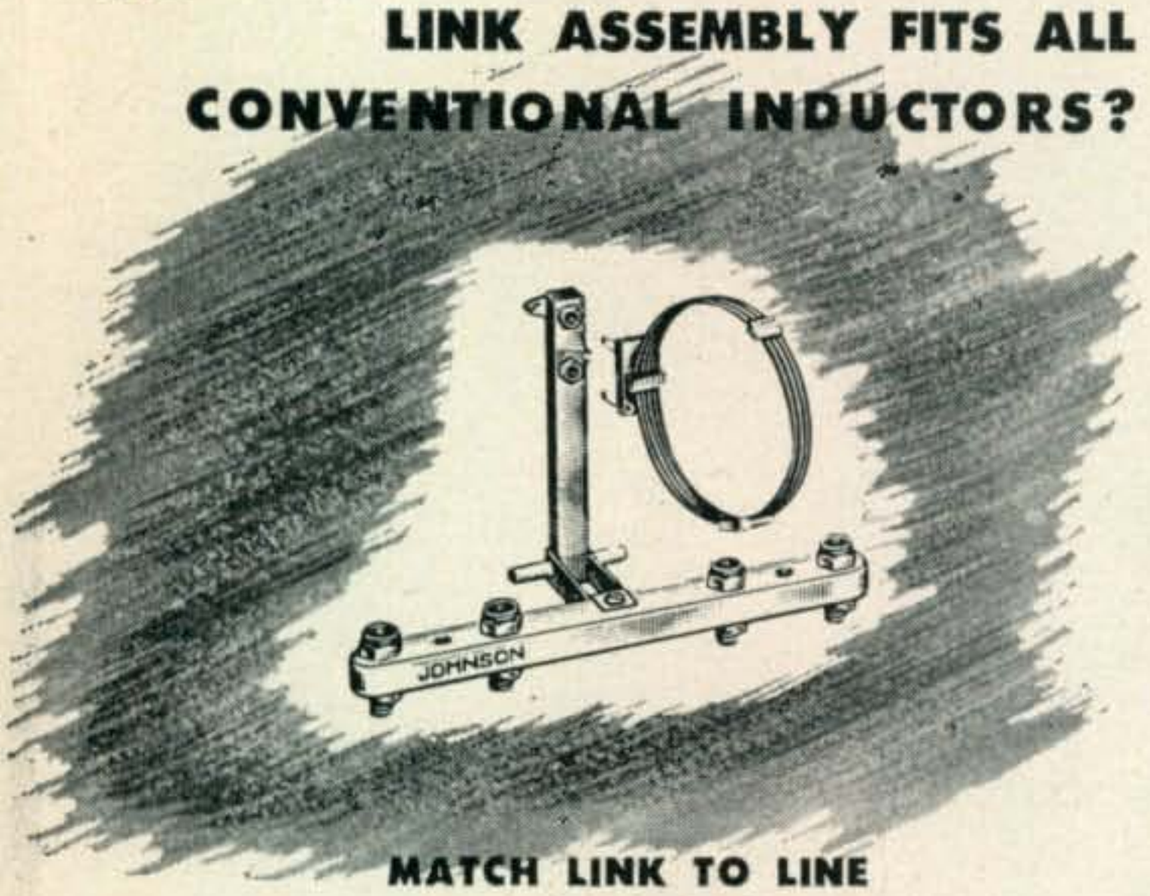
Did You Know-

THE NEW JOHNSON PLUG-IN LINK ASSEMBLY FITS ALL CONVENTIONAL INDUCTORS?



MATCH LINK TO LINE FOR GREATER EFFICIENCY

Add new versatility and efficiency to your present RF amplifier with the new JOHNSON Plug-In Swinging Link Assembly. With it you can eliminate inefficient compromise — when attempting to match an inductor to any transmission line regardless of frequency or impedance with but a single pick-up link. The new JOHNSON Plug-In Link Assembly permits instant impedance matching — not only with JOHNSON inductors but with all conventional, present-day inductor assemblies. Simply plug in a link with the necessary turns to match your line — whether impedance is as low as 50 ohms or as high as 600.

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LOADED WITH FACTS

The new JOHNSON "Air Wound Ham Inductor Catalog" contains information and tables which will enable you to select the correct link or links for your individual application. The booklet is a virtual storehouse of information on Q considerations, tube-inductor matching, link-line impedance matching, antenna coupling, etc. Get it at your dealer or write JOHNSON for a copy of this important reference manual today. It's yours for the asking!

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Deer Hon. Ed:

Most peeples are not reely understanding what hams are and how they are getting that way. Of course I are knowing that all hams would be liking to being better understood, especially by the YL's and the XYL's. One reason we hams are being misunderstood is that we are speaking practikally a foreign language instead of the English language, which are what I are writing this letter in.

For examples, I are dropping in on local ham here recently while he are entertaining his most recentest young lady. He are asking me to stay, so I are getting in long chat with them. During lull in conversation I are asking ham what he are working on now, and he are telling me he are working on ten meters. This are causing most recentest to ask him how comes he are happening to break ten of his meters all at once so that he are now working on ten meters This are bring out long and involved reply on part of ham as to how ten meters is a place and not a bunch of instruments. So you are seeing, Hon. Ed., that if even our closest and dearest are not understanding us, how can ordinary peeples?

This are all resulting in Scratchi getting in high gear with Hon. Noggin, and I are deciding that hams are going to have to pursuing one of two courses. Either we should talk in language what are easily understood or we should be getting reel scientifick and confusing. The Wheather Bureau are always being scientific and confusing. They are giving air pressures in inches of mercury, just so no ones is able to figure them out. Of course, they could get reel confusing and be giving air pressures in mega-mega tons per square light year.

If we are wanting to get simple, we could be calling each band by a letter, so that 3.5 to 4.0 megacycles is band A, 7.0 to 7.3 megacycles is band B, 14.0 to 14.35 (are we still having this much on twenty meters?) megacycles is band C and so forthy. I are thinking that maybe we are needing two letters for 3.5 to 4.0 megacycles, to corresponding to 75 and 80 meters, but this are seeming like unnecessary, especially when ham on high end of 80 are sending key clicks over in low end of 75 meter band cause ham in low end of 75 meter phone band are putting sidebands over on first ham.

This sistem should be working slick as newly purchased commercial transmitter, so in calling seek-you we are saying "calling seek-you, calling seek-you band D, all broadcast listeners please tuning to 28 to 30 megacycles if wishing to heer me better." Of course, if we reely wanting to get simple so everybuddys understanding, we should also be cutting out all abbreviations such as seek-you, and QTH, and QRK and R's and S's. This would be having to be done only by phones men, as anybuddy what understanding see-w are probably getting ham license soon anyways.

(*Continued on page 12*)

NBFM *or* CW
VFO *or* CRYSTAL!

$350.00
Slightly Higher
West of Rockies

...the New HT-19 transmitter

• Designed for the modern-minded Ham. Maximum flexibility on 5 Bands—3.5, 7, 14, 21, and 28 MC. High stability, low FM distortion (measured at less than 5%). Provisions for applying AM from external modulator. 125 watts output.

Oscillator—reactance modulator with speech amplifier—buffer—and final. The 4-65A in output stage is air-cooled by a 3000-rpm fan! 5 Tubes plus 2 Voltage Regulators and 3 Rectifiers.

See it at your Hallicrafters Dealers!

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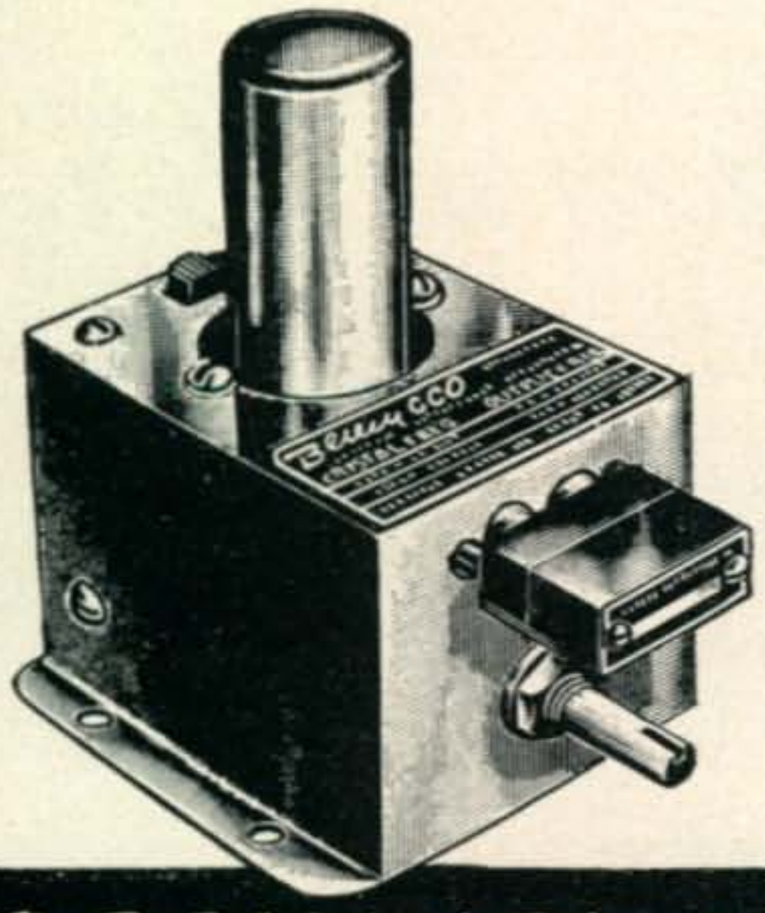


OSCILLATORS

Ask your Bliley distributor for Bulletin 35

BLILEY ELECTRIC CO.· UNION STATION BLDG.· ERIE, PA.

On second thought, if phones men are having to stopping using all such abbreviations and see-w men are going to still be using them, ham radio probably being in midst of 1/c civil war. So Hon. Noggin are going in reverse gears and deciding maybe all us hams should be getting reel complicated in our nomenclatures (Hon. Ed, please excoosing big word, but I are having just bought new dictionary).

Here then are Scratchi's suggested sistem for getting reel tecknical so ham radio are all big, big mistery to everybuddys. First of all we are having to stop calling our bands by meters, as for examples 20 meters or ten meters. Instead we are going to good-old American sistem of feets. This is making the old 80 meter band the 280 feet band, 40 the 140 feet band, 20 the 70 feet band, 10 the 35 feet band and 6 the 20 feet band and so forthy. While this are gibberish to layman it are helping hams like all sixty, on acct. it are the number of feets in a full waves on that partikular band. Also this sistem are being expanded to the u-h-f bands and we are calling them by 100 inch band (2 meters), and 5 inch band (2450 mc) etc.

Next, all see-w men are to be using more abbreviations so in case anybuddy listening who understanding code, it are reel confusing. For this Scratchi are instituting a new SN sistem. For examples, SN1 (Scratchi Number 1) when sent by see-w man means "r, r, r, om, solid on your last transmission"; SN2 means "fb om ur sigs here 599X" and SN3 means "fb om ur sigs here 579X". I are not using any more numbers for reports as are finding these two plenty good for all contacts.

Phone men can also be using more abbreviations, as that way are having lots more qso's and also BCL not finding out what goings on. I are not yet making up set of abbreviations, but I are definitely going to have one for "sorry old man but qrm had you pretty well covered up that time but thanks for the very nice chat and I'll definitely call you when I hear you on the band again and you do the same for me 73 and see you later."

So what say, Hon. Ed., are you thinking the Scratchi sistem for getting complicated are all ok? Be seeing you on 70 feet see-w.

Respectively yours,
Hashafisti Scratchi

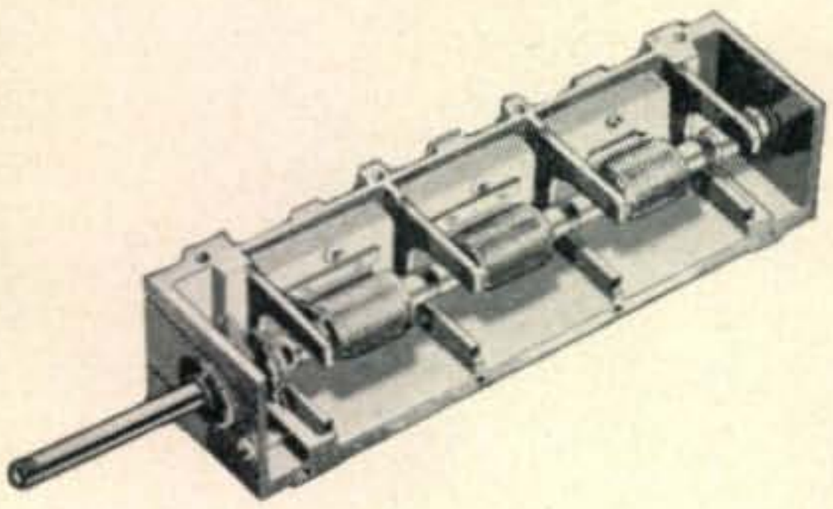
We're Sorry OM!

If you were wondering why your copy of **CQ** didn't look quite right last month we'd like to give a word of explanation. It wasn't due to unusual DX conditions keeping the staff away from the job. As a matter of fact a rather serious labor controversy in New York City tied up all our paper in the warehouse and freight yard. All trucks except those carrying food and medicine were strike-bound. There was no chance of moving any substantial quantity of paper. The alternative to being weeks late was to substitute the only available paper. Things are back to normal now and we're mighty sorry October wasn't up to snuff.—**W2IOP**

MALLORY HAM BULLETIN

Inductuner* Wins Acceptance—

Amateurs Find New Uses



Thousands of television receivers now equipped with the Mallory Inductuner tuning device in their RF circuits, give ample proof of the whole-hearted acceptance this inductance tuning device has had by top-flight television engineers the country over.

In the March 1948 issue of this magazine, the Mallory Inductuner was introduced to the amateur with the announcement of details of a 50 to 240 megacycle converter. The response to this announcement was extremely gratifying and indicated quite conclusively the avid interest the average amateur has in new technical developments in the radio field.

However, we have discovered that the naturally inventive mind of the amateur has not been content with such a "limited" field for Inductuner application. Almost every mail contains requests from amateurs for circuit information and data for incorporating the Inductuner in television signal boosters, signal generators, single dial VFO exciters and many other applications where precise tuning is required.

As an aid to those amateurs who like to design their own equipment, we have available, for the asking, an informative engineering booklet describing in detail the electrical and physical characteristics of the Inductuner. Such items as equivalent electrical circuit, inductance, representative tuning curves, physical dimensions and other interesting bits of information are included. Simply address a letter or postal card to Box 1558, P. R. Mallory & Co., Inc., Indianapolis 6, Indiana, and ask for the Technical Information Booklet on the Inductuner.

**Registered trademark of P. R. Mallory & Co., Inc. for inductance tuning devices covered by Mallory-Ware patents.*

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Each tube is backed by the combined engineering resources of Eitel-McCullough plus over a million hours of proven field-service. It's Pyrovac* plate is highly resistant to momentary overloads and contributes to the tube's long life. Processed grids control primary and secondary emission, providing a high degree of operational stability. The tube is ruggedly designed to withstand abnormal physical as well as electrical abuse.

Detailed data and application notes are immediately available and statistics for unusual applications will be supplied on request.

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Filament: Thoriated tungsten
Voltage 5.0 volts
Current 6.5 amperes
Grid-Screen Amplification Factor (Average) 6.2

RADIO FREQUENCY POWER AMPLIFIER AND OSCILLATOR		HIGH-LEVEL MODULATED RADIO FREQUENCY AMPLIFIER		AUDIO FREQUENCY POWER AMPLIFIER AND MODULATOR	
Class-C Telegraphy or FM Telephony Maximum Ratings (Key-down conditions, 1 tube)		Class-C Telephony (Carrier conditions unless otherwise specified, 1 tube)		Class AB,[1] (Sinusoidal wave, two tubes unless otherwise specified)	Class-AB,[2] (Sinusoidal wave, two tubes unless otherwise specified)
D-C PLATE VOLTAGE	3000 MAX. VOLTS		2500 MAX. VOLTS	MAXIMUM RATINGS	
D-C SCREEN VOLTAGE	400 MAX. VOLTS		400 MAX. VOLTS	D-C PLATE VOLTAGE 3000 MAX. VOLTS	3000 MAX. VOLTS
D-C GRID VOLTAGE	-500 MAX. VOLTS		-500 MAX. VOLTS	D-C SCREEN VOLTAGE 600 MAX. VOLTS	400 MAX. VOLTS
D-C PLATE CURRENT	275 MAX. MA.		200 MAX. MA.	MAX-SIGNAL D-C PLATE CURRENT, PER TUBE 225 MAX. MA.	225 MAX. MA.
PLATE DISSIPATION	125 MAX. WATTS		85 MAX. WATTS	PLATE DISSIPATION, PER TUBE 125 MAX. WATTS	125 MAX. WATTS
SCREEN DISSIPATION	20 MAX. WATTS		20 MAX. WATTS	SCREEN DISSIPATION, PER TUBE 20 MAX. WATTS	20 MAX. WATTS
GRID DISSIPATION	5 MAX. WATTS		5 MAX. WATTS		

Typical Operation (Frequencies below 120 Mc.)						TYPICAL OPERATION						
D-C Plate Voltage	2500	3000	volts	2000	2500	volts	D-C Plate Voltage	2000	2500	volts	2000	2500	volts
D-C Screen Voltage	350	350	volts	350	350	volts	D-C Screen Voltage	600	600	volts	350	350	volts
D-C Grid Voltage	-150	-150	volts	-220	-210	volts	D-C Grid Voltage	-94	-96	volts	-45	-43	volts
D-C Plate Current	200	167	ma.	150	152	ma.	Zero-Signal D-C Plate Current	50	50	ma.	72	93	ma.
D-C Screen Current	40	30	ma.	33	30	ma.	Max-Signal D-C Plate Current	240	232	ma.	300	260	ma.
D-C Grid Current	12	9	ma.	10	9	ma.	Zero-Signal D-C Screen Current	-0.5	-0.3	ma.	0	0	ma.
Screen Dissipation	14	10.5	watts	11.5	10.5	watts	Max-Signal D-C Screen Current	6.4	8.5	ma.	5	6	ma.
Grid Dissipation	2	1.2	watts	1.6	1.4	watts	Effective Load, Plate-to-Plate	13,400	20,300	ohms	13,600	22,200	ohms
Peak R-F Grid Input Voltage (approx.)	320	280	volts	375	360	volts	Peak A-F Grid Input Voltage (per tube)	94	96	volts	105	89	volts
Driving Power (approx.)	3.8	2.5	watts	3.8	3.3	watts	Driving Power	0	0	watts	1.4	1	watts
Plate Power Input	500	500	watts	300	380	watts	Max-Signal Plate Dissipation (per tube)	125	125	watts	125	122	watts
Plate Dissipation	125	125	watts	75	80	watts	Max-Signal Plate Power Output	230	330	watts	350	400	watts
Plate Power Output	375	375	watts	225	300	watts	Total Harmonic Distortion	2	2.6	per ct.	1	2.2	per ct.

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ZERO BIAS

EDITORIAL

KENNETH B. WARNER, W1EH

ON SEPTEMBER 2ND we were unpacking our suitcase in the Schroeder Hotel, Milwaukee, looking forward, as were thousands of other hams, to the ARRL National Convention, when word of the untimely passing of Kenneth B. Warner, W1EH, first reached us. Our reaction was sheer disbelief, then a heartfelt sadness. It was truly as if we had lost a close friend—and yet we had never even met "KBW."

It is odd that a man should head an organization like ARRL and yet be such an utter stranger to most of its members. Many are the people, like ourselves, active amateurs for many years, vitally concerned with the welfare of our hobby, who never even met KBW. Still we knew this man and what he stood for. KBW was an enigma. He was single-minded in his ideas and in his resolution left little room for critics—and so, as it must, both good and bad emerged from the work of this man. But the true measure gives the balance to the good—for that measure is the solid growth of the ARRL.

What about KBW, the man? It is difficult to write about a man one has never met and about whom little information is readily available. Born at Cairo, Ill., October 3, 1894, his formal education terminated in business school. Following business school, he worked as an accountant and then with a local railroad. In 1920 he married Anita Zimmer. They had two children, now grown, Betty Jean and Richard Warner. Almost 30 years ago Kenneth B. Warner went to ARRL, one of its first salaried employees. He was singularly devoted to amateur radio and its improvement and he spared no effort toward this end. Perhaps it was this intense preoccupation with his work that prevented his becoming better known as an amateur. But W1EH was a good amateur. On the air, in almost any ARRL operating affair, you could run across W1EH—the methodical fist of a methodical man. In KBW you could find an amateur who devoted not only his spare time to the hobby, but his entire life.

In writing about KBW it is impossible not to write about the institution to which he devoted almost his entire working years. KBW stood in the center of the controversies about League affairs, yet much of it was not of his making. His reserved nature, his unswerving belief in his own ideas, may have emphasized some of these frictions. But it was his theme, as it must be the theme of all thinking amateurs, that we will achieve only what we, as a group, intend to do. Policy is not dictated by the Managing Secretary of ARRL. He is the instrument for executing the instructions of the Board of Directors, elected by League members. But it would be sheer naivéte to deny that this official exerts a powerful influence in the direction of League affairs. Now, as in the past, this official can do more to establish and guide ARRL policy than any other individual. In his passing KBW closes a chapter in amateur radio which can trace its growth from a few thousand enthusiasts to tens of thousands.

What lies ahead for amateur radio? In a hobby as vital as amateur radio the future is limitless. But our concept of the hobby must keep apace of the changing times. When KBW came to ARRL at the close of World War I, the future of amateur radio was at stake. By the intense devotion of hams, and in no small part by KBW's hard work, ham radio emerged as one of the tremendous influences in the electronic field. As a hobby, it more than justified its existence in terms of technical contributions to the art, as a reservoir of trained men for the military services, a purchasing power that provided sustenance for manufacturers who would otherwise not have been ready to make their tremendous war contributions. At Madrid, at Cairo, at Atlantic City, KBW was the spokesman and the instrument by which amateurs rose toward spectacular heights. Created against tremendous pressure from commercial and government services here and abroad, the heritage of KBW's work has been handed down, so neatly packaged, so pre-digested that perhaps too many amateurs are content to sit back and let Headquarters handle their affairs. And HQ was KBW—at least to the average amateur.

But that was yesterday. What lies ahead is tomorrow. KBW, while he lived, always tried to emphasize the point that it was the Board of Directors who ran the League. If his influence was too great, it was because the amateurs were content to sit back and let it become so. But, in his life, Kenneth Warner was never able to instill within average League members a genuine understanding of their part in the machinery of its organization. In his passing he may have done it. Amateurs can no longer afford the luxury of feeling secure in the shadow of Warner's experience.

Today, as never before, there is a new type of director on the League board—men who have been chosen more than ever by their merit. By the calibre of these men the League must be measured. As representatives in a democratic organization they are seeking the advice of their constituents. But

(*Continued on page 72*)

How it feels to own a 32V-1

We have had spontaneous letters from many owners of Collins 32V-1 ham transmitters. Here are extracts from a few of them:

W5SH—"About the transmitter, I have nothing but praise for it. It is constructed with the usual Collins excellence, and performs in a superior manner. It has lots of sock and the quality is perfect. The ease of changing frequency and the accuracy of calibration is a dream."

W1AHX—"I have been building transmitters since 1920 and I have never seen the equal of the 32V-1. The antenna loading circuit is one of the most astonishing features I have ever operated on amateur frequencies. The receiver silencing and audio tone circuits are a delight. Shifting frequencies is like tuning a broadcast receiver. Your engineers have my profound respect."

W5AUB—"Just a line to notify you that the 32V-1 is really a nice job and I am more than pleased with it. Having been a 'ham' for 24 years, it's the finest piece of gear for the money I have ever seen or owned! DX is a pleasure, and to work WAC in less than 6 hours is just a matter of form."

W3EYX—"I've repeatedly been told that the crispness of the voice qualities plus the stability of the signal permit copying me through QRM that is actually stronger than I in signal strength."

W9EMT—"I am enclosing the registration card for my 32V-1 transmitter. This is really a sweet little rig. In three weeks I have contacted 34 states, 3 ZL and several South and Central American contacts."

W2SLU—"It has been about six months since I first put my 32V-1 into operation, so will pass along in writing my appreciation to your organization for a completely satisfactory amateur type transmitter. During this six months a great deal of DX has been worked on 20 CW, as well as 40 and 10 meters. The reports received from all stations worked have consistently been T9. I have also found the VFO to be extremely stable during operation and that seldom has it been necessary to reset the dial when zero beat with WWV."

The price of the VFO controlled, band-switching, gang-tuned Collins 32V-1 amateur transmitter, conservatively rated at 150 watts input on CW and 120 watts input on phone, is $475.00. See or write your Collins dealer about it. If you don't know him, write us for his name and address.

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

COLLINS RADIO COMPANY, Cedar Rapids, Iowa

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

General view of the single-sideband exciter. The wide-band audio phase shifter coils are in the three round cans at the left end of the chassis. The two tubes between the modulator input transformers are the crystal oscillator and the buffer amplifier. At the corners of the Bud shield can housing the buffer tank coil are the two modulator input controls. The output balancing controls for the modulators are directly in front of the two outer cans housing the respective modulator output tank coils. The center shield can houses the single sideband amplifier grid tank coil, and the output gain control is located at the upper corner of the chassis. The toggle switch at the lower left enables the upper or the lower sideband to be selected instantly.

Single Sideband for Everyone

ROBERT C. CHEEK, W3LOE*

One of the most potent arguments against the use of single sideband has been the relative complexity of the equipment. In CQ two months ago Leigh Norton, W6CEM, described some truly simplified gear. Now W3LOE comes up with an uncomplicated SSSC exciter that makes use of a static wide-band audio phase shifter developed by Westinghouse for single-sideband carrier-current equipment. The simplicity of the unit, encouraging duplication, should be proof enough that everyone who wants to, can get a single-sideband transmitter operating.

THE ADVANTAGES of single-sideband suppressed-carrier transmission for 'phone work have been discussed widely in amateur circles during the past several months. The theoretical 9-db gain that single sideband offers over AM with the same peak power is just a starting point when we begin to compare the relative virtues of SSSC and AM. The reduced bandwidth that SSSC requires, the elimination of high-power modulation equipment, and the reduction in power consumption are advantages that are not to be taken lightly.

However, single sideband has suffered so far from one serious drawback which, no doubt, has been largely responsible for the fact that stations using SSSC are still relatively rare on the ham bands. This is the apparent complexity, in terms of circuit complication and adjustment procedure, of the SSSC transmitters that have been described in amateur literature to date. SSSC will never achieve widespread use in amateur work until an SSSC transmitter can be built, adjusted, and put into operation by the average amateur, who has limited access to laboratory instruments and measuring equipment.

Although the SSSC exciter described in this article is not presented with the claim that it represents the ultimate in simplicity that can be attained, and although a simple audio signal generator and an oscilloscope are practically indispensable in achieving correct adjustment, the writer believes that the unit represents a considerable simplification in circuit details and adjustment procedure over any that have been previously described.

*R.F.D. #4, Irwin, Pa.

Methods of Obtaining SSSC Signals

There are two distinct methods of obtaining a single-sideband suppressed-carrier signal. The obvious method, of course, is to generate a double-sideband signal in a balanced modulator, which provides carrier suppression, and to pass the resulting two sidebands through a sharp cut-off filter which eliminates one or the other of them. With this method, however, the double-sideband signals cannot be generated directly at any amateur frequency, because no practical filter can be made with sufficiently sharp cut-off at such frequencies to

separate the two sidebands directly. Instead, the two sidebands must be generated at a very low carrier frequency, where a practical filter can separate them, and the resulting low-frequency single-sideband signal must then be heterodyned upward in frequency to an amateur band. This process is in effect the reverse of that used in obtaining i-f frequency signals in a superhet receiver—in this case the original signal is translated upward in frequency instead of downward. Considerations such as practical sideband-filter design and the selectivity obtainable with practical circuits at the output frequency employed dictate that at least two steps of heterodyning be used to avoid the radiation of image signals. As a result, this method leads to considerable expense and complication in any single-sideband generator intended for amateur work, with resultant difficulty in setting up and adjusting such a system.

The other method is one which, in the language of the mathematicians, is much more "elegant" than the brute-force method just described. It involves the use of two balanced modulators, one of which is fed with audio and carrier signals differing 90 degrees in phase from the same signals fed to the other balanced modulator. As a result of these phase shifts, one of the sidebands from one balanced modulator will be 180 degrees out of phase with the corresponding sideband from the other, whereas the opposite sideband will be exactly in phase. The sum of the resulting outputs will therefore consist of only the one sideband; the other will be neutralized. The upper or the lower sideband can be selected at will by reversing connections to the output terminals, the audio input terminals, or the carrier input terminals of either modulator. In the unit to be described, a reversing switch is used in the audio input circuit to one balanced modulator to provide instant sideband selection.

This method of generating single-sideband signals was patented by Hartley in 1925, but for a long time it was not used commercially for voice transmission because no practical audio phase shifter was available which had the required characteristics; i.e., 90-degree phase shift of all the essential speech frequencies with the 90-degree output practically equal in amplitude to the unshifted output. A relatively simple static phase shifter having the required characteristics was developed about four years ago by the Westinghouse Company, however, and the phase-shifting technique has been used by them in commercial single-sideband equipment since that time. The single-sideband generator described here uses this phase-shifting circuit, and differs radically in this respect from the other single-sideband generators based on phase shifting that have been described for amateur work, all of which have required tubes in the audio phase-shifting circuits.

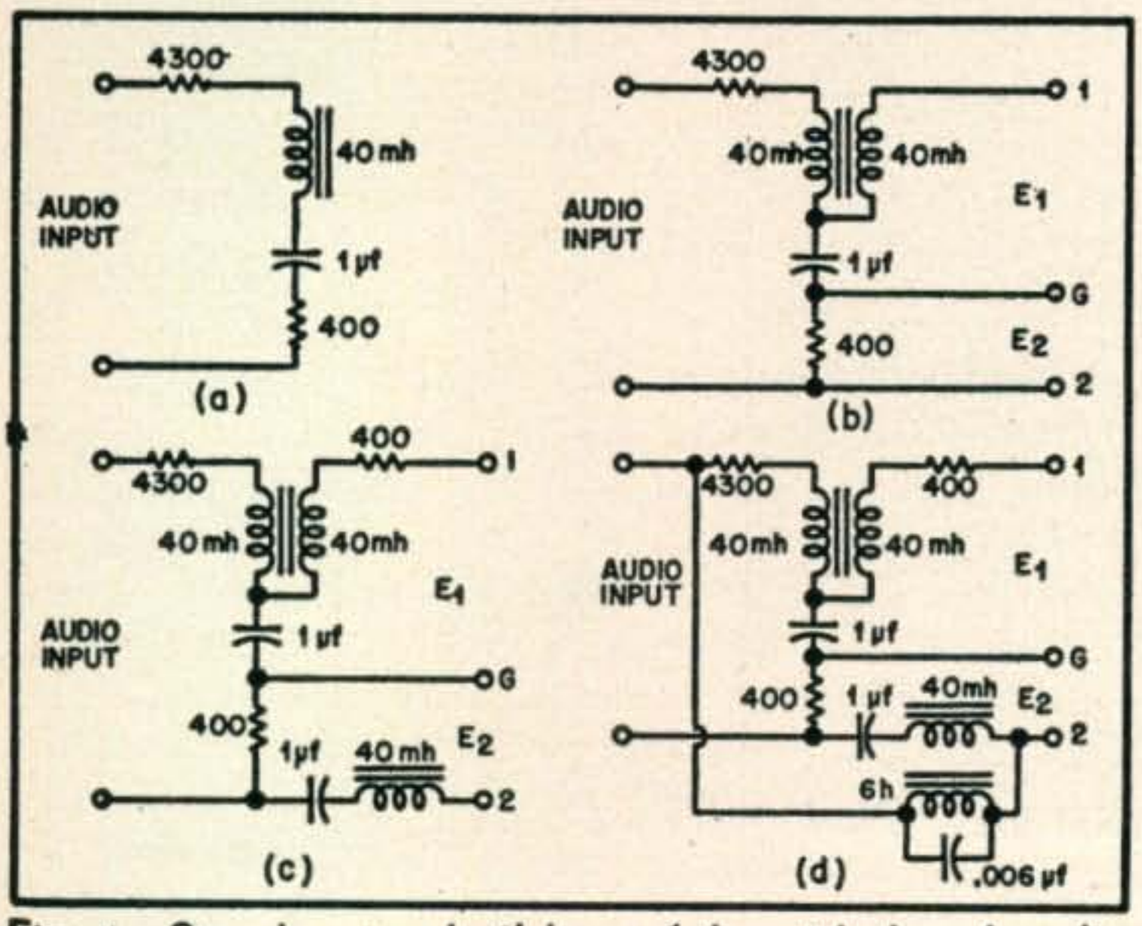


Fig. 1. Step-by-step build-up of the wide-band audio phase shifter.

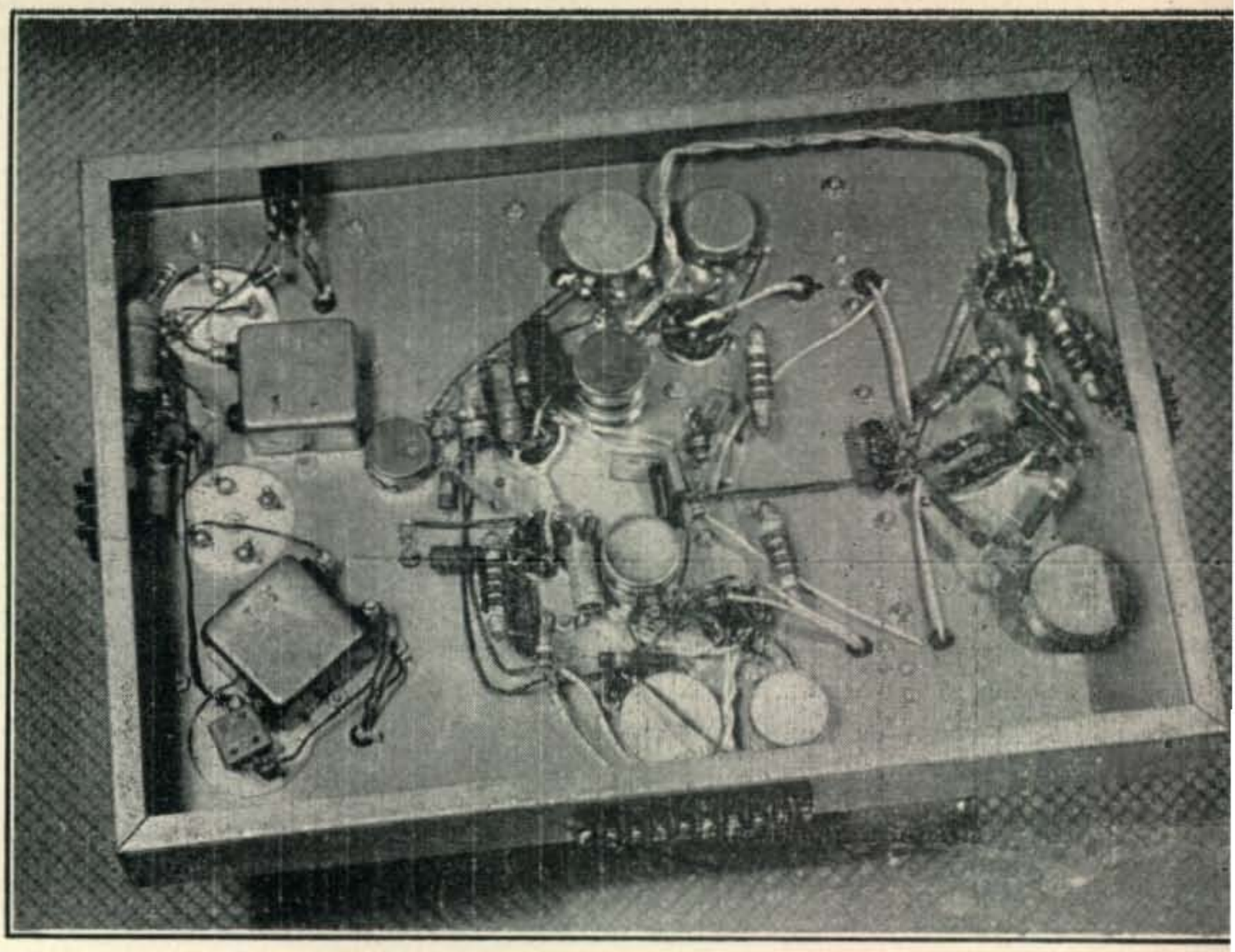
The Wide-Band Audio Phase Shifter

The basic elements of the wide-band audio phase shifter are a 400-ohm resistor, a 1-μf capacitor, and a 40-millihenry inductor, all connected in series as shown in *Fig. 1a*. The capacitor and the inductor are series resonant at 800 cycles, the geometric center of the audio band to be covered (160 to 4000 cycles) and the reactance of each at 800 cycles is half the resistance of the resistor. A relatively high resistance (4300 ohms) is placed in series with these elements so that the current through the entire circuit will be essentially in phase with the applied voltage and practically independent of changes in the reactance of the inductor and the capacitor over the audio band to be covered.

Consider first the voltage drop across each element at the mid-band frequency of 800 cycles. At this frequency, the voltage drop across the inductance is half the voltage drop across the 400-ohm resistor, and leads it by 90 degrees. The voltage across the capacitor is also half the drop across the resistor, but lags it by 90 degrees. Now if the inductance is wound on an iron core, and if an additional winding, identical to the original winding and tightly coupled to it, is placed on the same core and connected as shown in *Fig. 1b* with the proper polarity, the voltage across this added winding will equal that across the original winding but will be 180 degrees out of phase with it. In other words, the voltage across the secondary winding will be in phase with the capacitor voltage, and their sum will be equal to the resistor voltage and 90 degrees behind it. At 800 cycles, therefore, the voltage measured from the point "G" in *Fig. 1b* to the point "1" will equal in magnitude but will differ in phase by 90 degrees from the voltage from point "G" to point "2."

Consider now what happens at frequencies above 800 cycles. The drop across the 400-ohm resistor remains unchanged (assuming the same magnitude of applied voltage) but the drop across the capacitor is less, due to its lower reactance, although it still lags the resistor drop by exactly 90 degrees. On the other hand, the reactance of the inductance goes up as the frequency is increased, and its drop is greater. The increased inductor drop, appearing across the secondary winding in phase with the capacitor drop, gives a total voltage across these two elements still nearly equal to the resistor drop.

The opposite effects occur at frequencies below 800 cycles—the inductor drop decreases, due to the reduced inductive reactance, but the capacitive reactance increases to offset the reduction in inductor drop.



Bottom view of the SSSC exciter. Audio input terminals are at the left, SSSC output terminals at the right, and the power supply terminals trip is along the lower edge of the chassis. All leads carrying r.f. are made as short and direct as possible.

The simple phase shifter circuit shown in *Fig. 1b* will provide the required 90-degree phase shift with nearly equal output amplitudes over about a 3-to-1 frequency range, provided it works into a very high impedance. However, it still does not satisfy our requirements because, first of all, if we try to use it over a frequency range much greater than 3 to 1, we find that at the frequencies below this range the reactance of the capacitor increases more rapidly than the reactance of the inductor decreases. At the high frequencies, the reactance of the inductor goes up faster than that of the capacitor comes down. The result is that the output voltage from the reactive branch will exceed by a considerable amount the output voltage from the resistive branch at the extreme ends of the frequency band. Furthermore, if the phase shifter works into a finite load impedance, current drawn from the two branches will cause unequal voltage drops and unequal phase shifts in each, because of their unequal internal impedances.

The latter difficulty can be remedied quite easily, however, by adding in series with each output terminal an impedance which will make the total internal impedance of each output circuit the same. Thus, we add in series with the output from the reactive branch a 400-ohm resistor, to duplicate the effect of the 400-ohm resistor in the resistive branch. Likewise, we add in series with the output of the resistive branch a 1-μf capacitor and a 40-millihenry inductor to duplicate the effect of these elements in the reactive branch. Our phase shifter now looks like *Fig. 1c.* Any load impedance may now be added to the output terminals (provided it is the same across both output branches) and the voltage drops within the phase shifter resulting from load currents will be equal in both phase and amplitude in both branches, because their internal impedance is now the same.

To take care of the unequal output amplitudes that we obtain at the ends of the frequency band to be covered, we can make use of the inductance and capacitor we added to equalize the internal impedances. Let us connect a high-Q parallel resonant circuit, again resonant at 800 cycles, from the opposite input terminal to the output terminal in series with the inductor and capacitor, as shown in *Fig. 1d.* The impedance of this parallel combination will be very high by comparison with the remainder of the circuit at the resonant frequency, and it will have no noticeable effect at that frequency. At frequencies below 800 cycles, its impedance will be progressively less, although it will still be high by comparison with the other elements, and the magnitude and phase of the current flowing in the parallel resonant circuit will be determined practically entirely by that circuit itself. Now, the important point is that at frequencies below 800 cycles, the impedance of the parallel branch is inductive. This means that the current that flows through it, and consequently through the series L and C portion of the circuit back to the source, lags the source voltage by 90 degrees. In the series L and C (which were added to equalize the internal impedances) the capacitive reactance predominates, so that the net voltage across this portion of the circuit, due to the current flowing in the parallel branch, lags the current by 90 degrees and increases with decreasing frequency. This additional voltage in the series L and C branch is therefore 180 degrees out of phase with the drop across the 400-ohm resistor which supplies the major portion of the output voltage E_2. However, viewing the total voltage from output terminal "2" to ground, we see the *difference* between this voltage and the voltage across the 400-ohm resistor, so that the added voltage drop actually *increases* the output voltage E_2 at the lower edge of the band, as required to compensate for the increased voltage in the other output branch at these frequencies.

The parallel L and C branch will produce similarly desirable effects at the upper end of the phase shifter range. Here its net reactance is capacitive, and the predominating reactance of the series L and C in the output circuit is inductive. Again the resulting voltage drop across the series L and C branch is such as to increase the output voltage E_2 as required to make this voltage equal in magnitude to E_1.

All that is required now is that we choose the

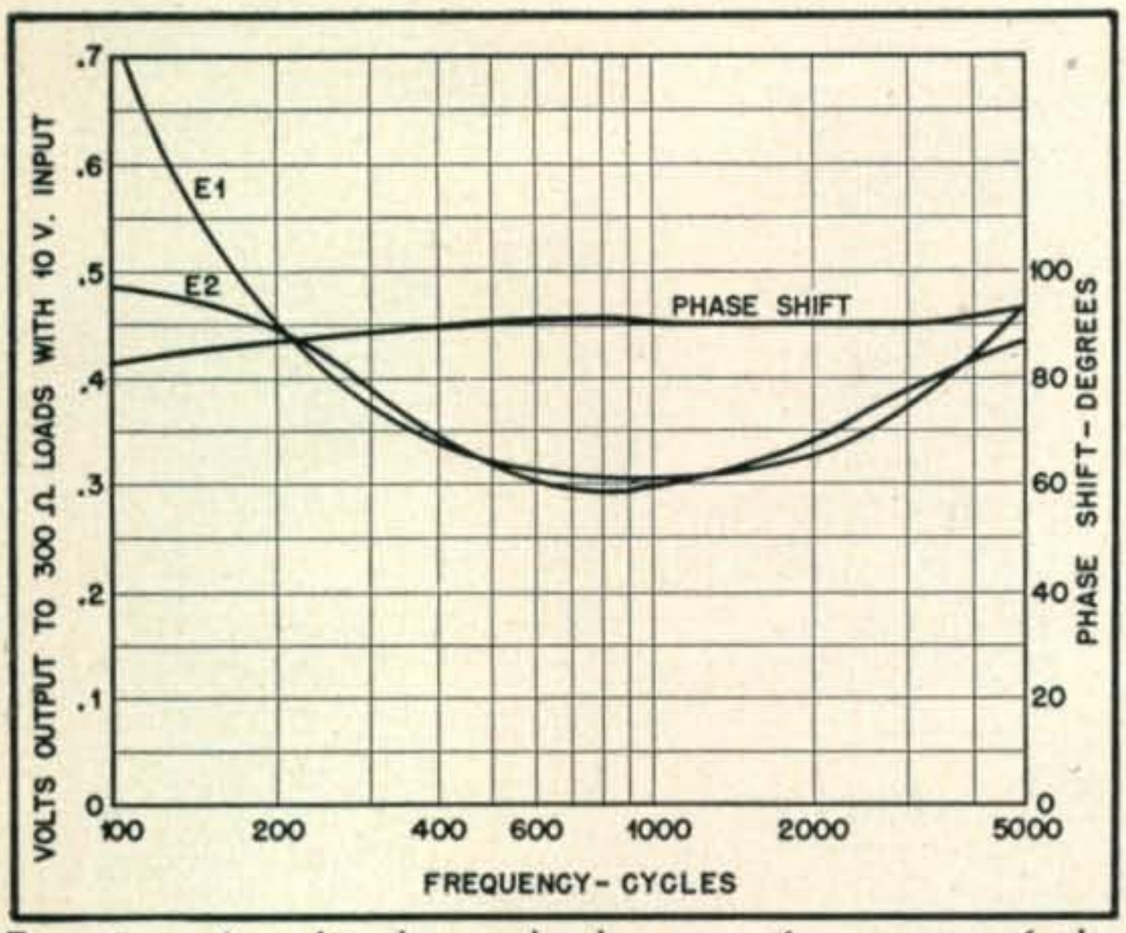


Fig. 2. Amplitude and phase performance of the wide-band audio phase shifter from 100 to 5000 cycles.

values of L and C in the parallel resonant branch to give us the proper impedance at the band edges to increase E_2 by the proper amount. It works out that an inductance of about 6 henries in parallel with a capacitance of .006 μf will do the job very nicely, bringing the output voltage E_2 up to exact equality with E_1 at several points in the band and maintaining the two voltages very nearly equal in magnitude over the remainder of the range. The curves of *Fig. 2* show the performance of the phase shifter (or phase splitter, as it should more properly be called) over the range from 100 to 5000 cycles.

The SSSC exciter shown in the photographs uses specially manufactured coils for the audio phase shifter. These specific components are not available on the general market, but satisfactory substitutes can be made from components which can easily be obtained.

For example, a suitable phase-shifting transformer has been made by modifying a Stancor type A-3877 midget output transformer. The transformer was disassembled and new primary and secondary windings, each consisting of 165 turns of No. 30 enameled wire, were wound on the original form. The proper number of turns was determined by using 200 turns on the first winding and then, with the core replaced, removing turns a few at a time until the coil was resonant at 800 cycles with a 1-μf capacitor. The second winding, having the same number of turns as the first, was then wound over it. With this procedure, it should be possible to use almost any small audio transformer assembly as a basis for a suitable phase-shifting transformer.

If the Stancor type A-3877 transformer is used, the core should be reassembled with the punchings interleaved. It is originally assembled with a butt joint between the "E" punchings and the "I" punchings, to improve its performance with d.c. in the primary.

The 40-millihenry inductor can be constructed in exactly the same manner, except that only one winding is necessary. This rewinding job will be considerably clearer with the disassembled choke as a guide to work from.

The 6-henry choke must be one which has approximately this inductance at zero d.c. In the homemade phase shifter which was constructed, two 3-henry chokes were used in series. These chokes, which are rated at 3 henries at 5 ma d.c., are available on the surplus market.

Obtaining 90-Degree Carrier Phase Shift

By comparison with the problem of obtaining the required 90 degree audio phase shift over a 20-to-1 range in frequency, it is quite simple to get a 90-degree carrier-frequency phase shifter which will work over an amateur phone band, where the frequency range is only slightly greater than 1 to 1. Consider the series resistor and capacitor, shown in *Fig. 3a*, connected to a source of carrier frequency voltage. The voltage across the resistor will be 90 degrees out of phase with that across the capacitor, and if we choose a capacitor whose reactance near

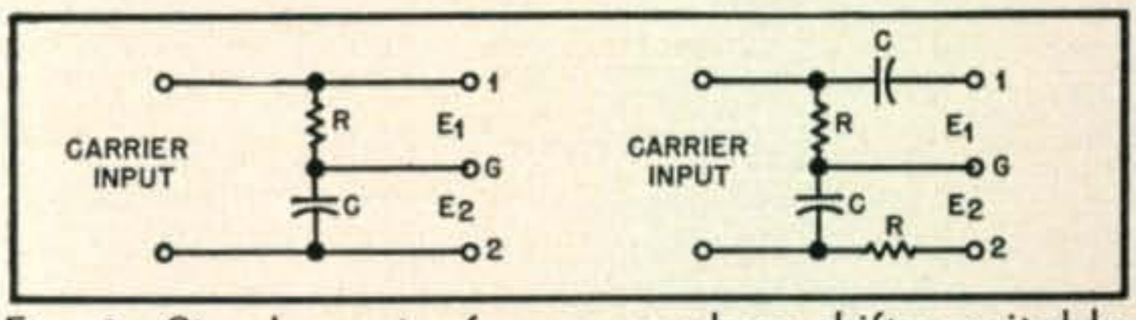


Fig. 3. Simple carrier-frequency phase shifter, suitable for use over a single amateur phone band.

the center of the phone band to be covered is equal to the resistance of the resistor, the magnitudes of the two output voltages will be equal at that frequency and will differ by a negligible amount at other frequencies in the same band. Furthermore, if we add in series with the output terminal of the capacitive branch a resistor equal in value to that in the resistive branch, and add in series with the resistive output a capacitor identical with that in the capacitive branch as in *Fig. 3b*, then the internal impedance of the two output branches will be equal and we can work into finite load impedances, provided that the loads on the two branches are equal.

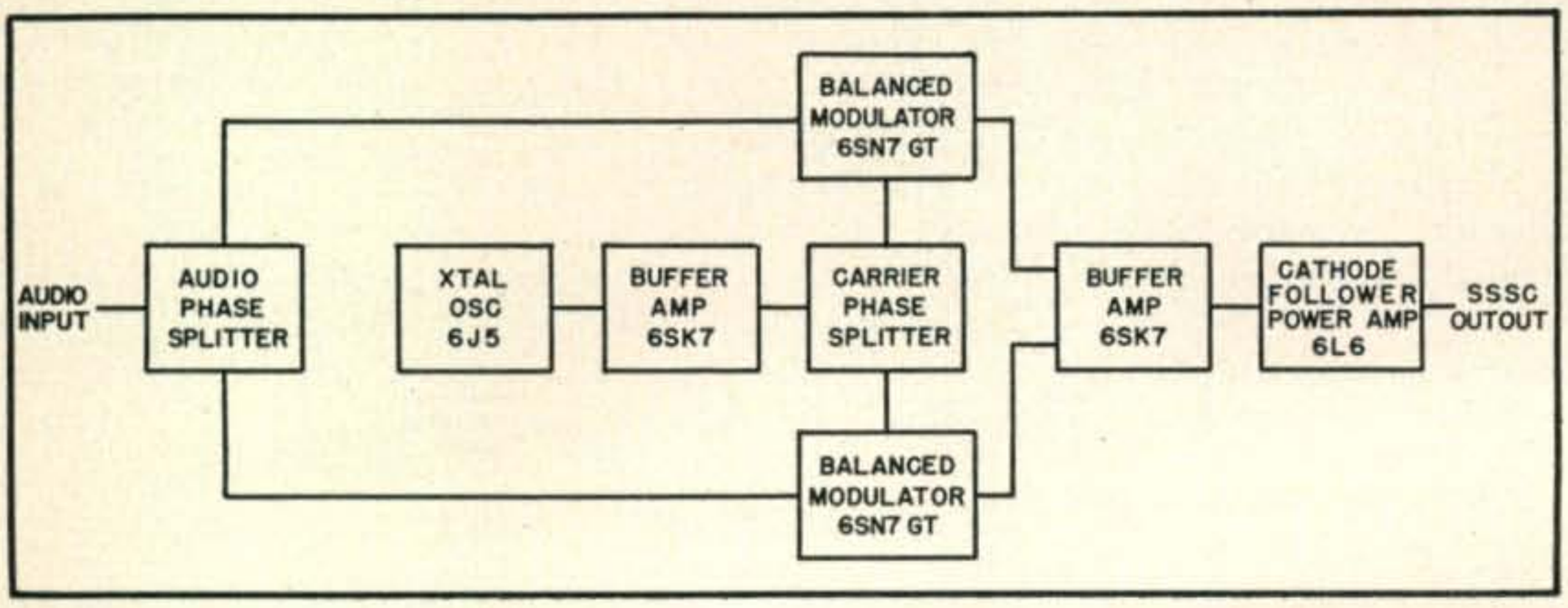


Fig. 4. Block diagram of the single-sideband exciter unit.

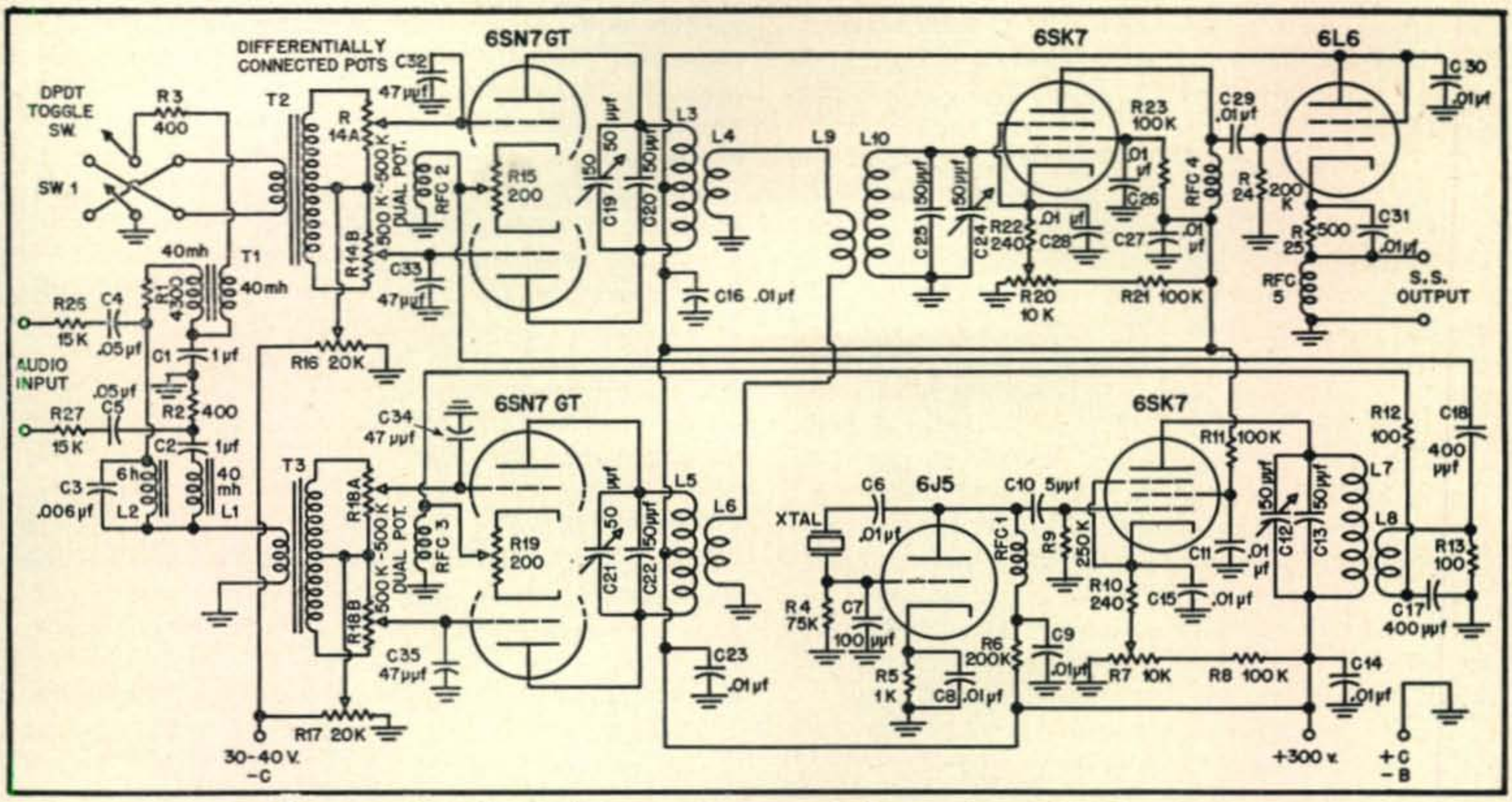


Fig. 5. Complete schematic diagram of the single-sideband exciter.

C_1, C_2—1 µf, 400 v., paper.
C_3—.006 µf, mica.
C_4, C_5—.05 µf, 400 v., tubular paper.
C_6, C_8, C_9, C_{11}, C_{14}, C_{15}, C_{16}, C_{23}, C_{26}, C_{27}, C_{28}, C_{29}, C_{30}, C_{31}—.01 µf, tubular paper.
C_7—100 µµf, mica.
C_{10}—5 µµf, mica or ceramic.
C_{12}, C_{19}, C_{21}, C_{24}—50 µµf, air trimmer.
C_{13}, C_{20}, C_{22}, C_{25}—50 µµf, silver mica.
C_{17}, C_8—400 µµf, mica.
C_{32}, C_{33}, C_{34}, C_{35}—47 µµf, mica.
R_1—4300 ohms, 1 w.
R_2, R_3—400 ohms, 1 w., 5% tolerance.
R_4—75,000 ohms, 1 w.
R_5—1000 ohms, 1 w.
R_6—200,000 ohms, 1 w.
R_7, R_{20}—10,000-ohm w. w. pot.
R_8, R_{21}—100,000 ohms, 2 w.
R_9—250,000 ohms, 1 w.
R_{10}, R_{22}—240 ohms, 1 w.
R_{11}, R_{23}—100,000 ohms, 1 w.
R_{12}, R_{13}—100 ohms, 1 w.
R_{14}, R_{18}—500,000-ohm dual pot.
R_{15}, R_{19}—200-ohm pot.
R_{16}, R_{17}—20,000-ohm pot.
R_{24}—200,000 ohms, 1 w.
R_{25}—500 ohms, 2 w.
R_{26}, R_{27}—15,000 ohms, 1 w.
T_1—Special phase shifting transformer, 40-mh primary and secondary inductance, 1:1 ratio (see text).
T_2, T_3—500 ohms to push-pull grids input transformer.
RFC_1, RFC_2, RFC_3, RFC_4, RFC_5—2.5-mh r-f choke.
L_1—40-mh high-Q choke (see text).
L_2—6 h. at 0 d. c. (see text).
L_3, L_5—40 turns No. 22 enameled, close wound, on 7/8" polystyrene rod, wound in two parts, each 20 turns, separated by 3/8".
L_4, L_6—6 turns No. 28 enameled, close-wound between two halves of L_3 and L_5.
L_7, L_{10}—38 turns No. 22 enameled, close wound on 7/8" dia. polystyrene rod.
L_8—6 turns No. 22 enameled, close wound, spaced 1/8" from ground end of L_7.
L_9—8 turns No. 22 enameled, close wound, spaced 1/8" from ground end of L_{10}.
SW_1—DPDT toggle switch.
XTAL—75 - meter phone - band crystal.

A Practical SSSC Exciter

Figure 4 is a block diagram of a practical SSSC exciter for the 75-meter phone band, based on the principles just outlined, and *Fig. 5* is the complete schematic. A 6J5 is used in a Pierce crystal oscillator, lightly coupled to a 6SK7 Class A buffer whose gain is controllable by means of potentiometer R_7. The output tank of the buffer is link-coupled to the carrier phase shifter, consisting of a 100-ohm resistor, R_{13}, and a 400-µµf capacitor, C_{17}, in series. The respective phase shifter outputs are connected through their proper compensating impedances, C_{18} and R_{12}, to the cathodes of the balanced modulators, each consisting of a single 6SN7GT tube. Potentiometers R_{15} and R_{19} constitute the output balancing controls for the modulators. It will be found that the two halves of nearly any 6SN7GT tube will differ considerably in characteristics, so that these potentiometers are necessary to compensate for this difference and any other dissymmetries that may exist in the modulator output circuit.

The modulator input potentiometers, R_{14} and R_{18}, permit additional compensation for differences in the characteristics of the two halves of the 6SN7GTs and also for any dissymmetry in the push-pull audio input voltages. It is important to note that these potentiometers are connected differentially, so that as the input voltage to one grid is increased, that to the other grid is decreased.

Potentiometers R_{16} and R_{17} are used to set the operating bias on the modulators. Their optimum setting would normally be that which gives maximum undistorted double sideband output from each modulator, but the setting of one or the other may have to be changed slightly from the optimum so that the double sideband outputs from the two modulators are equal in magnitude, a condition required for cancellation of the unwanted sideband.

The 6SK7 single-sideband amplifier operates in

Class A, its gain being controlled by potentiometer R_{20}. The output of this stage feeds a 6L6 cathode follower, which provides a good match for a 300-ohm output line to the grid tank of a linear amplifier.

The photographs show the general nature of the layout employed. More than ample space for all the components is available on the 12" x 17" x 2" chassis used. No attempt at neatness in the wiring was made, since the use of the shortest possible lead lengths was considered more important. The balanced modulators were made as symmetrical with respect to each other as possible, and corresponding leads from the carrier phase shifter to the modulator cathodes, from the modulators to their output tank circuits, and from the output links to the 6SK7 amplifier input circuit, were made the same length.

The coils are wound on 7/8-inch diameter polystyrene rods, 3 inches long. Homemade brackets for the 50-$\mu\mu$f trimmer condensers are attached to the top ends of the coil forms, which are drilled and tapped for 6-32 screws. The coils forms are similarly fastened directly to the chassis by 6-32 screws, and the shield cans may be removed without disturbing the coils or associated wiring.

Speech Amplfier Requirements

The audio input circuit contains a low-frequency de-emphasizing network, consisting of R_{26}, R_{27}, C_4, and C_5. This network de-emphasizes the audio frequencies below 800 cycles in opposition to the emphasizing effect that occurs in the phase splitter at the lower end of the audio range. The emphasizing effect of the phase splitter on frequencies above 800 cycles is desirable in speech work and so has not been compensated for. The speech amplifier used should cut off sharply at a frequency around 3000 cycles. Since the useful range of the phase splitter ends at about 4000 cycles, adequate suppression of the unwanted sideband cannot be obtained with audio frequencies much above this value, and the use of a low-pass filter in the speech system is mandatory.

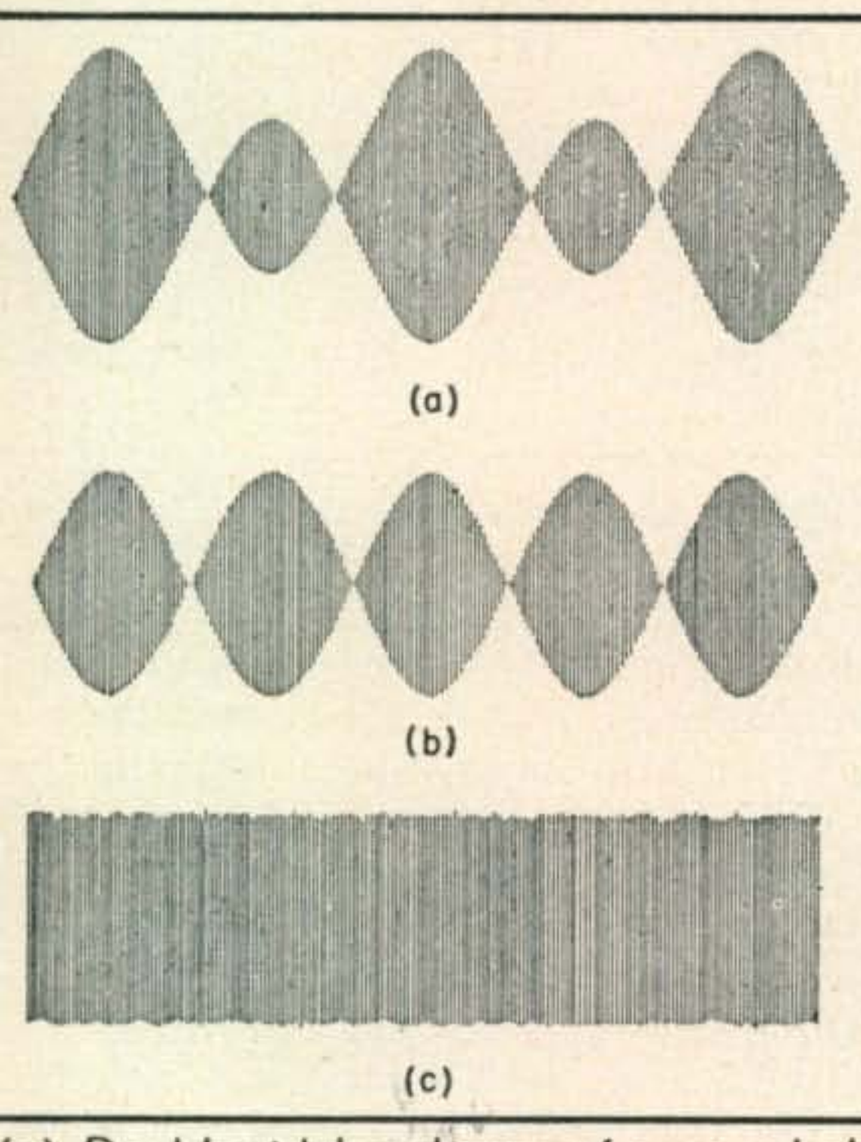


Fig. 6 (a) Double sideband output from one balanced modulator with sinusoidal input signal but with incorrect settings of balancing controls. (b) Double sideband output from one modulator with sinusoidal audio input and correct settings of balancing controls. (c) Single sideband output obtained with sinusoidal audio input and correct adjustments of all balancing controls.

The speech amplifier should be capable of supplying 40 volts to the 35,000 ohms or so load impedance which the audio input circuit of the single sideband generator presents. The output of the speech amplifier must be free of grounds, which means that an isolating audio transformer must be used between it and the single-sideband generator if the speech amplifier does not already have transformer-coupled output.

Adjusting the Unit

Three test instruments are desirable for adjusting the unit for proper operation; namely, a v.t. voltmeter, an oscilloscope, and an audio signal generator. It may be possible to dispense with the v.t. voltmeter, but it will be very useful in the initial tune-up.

The first step is to set the bias on the modulator grids by means of R_{16} and R_{17} to -12 volts with respect to ground. Next tune the carrier buffer amplifier to resonance. The slider of potentiometer R_7 should be at the maximum output (grounded) position during this process. Resonance will be indicated by maximum r-f voltage at the cathodes of either modulator tube, as measured by the v.t. voltmeter. Alternatively, a neon bulb held near the plate terminal of the 6SK7 buffer can be used as a resonance indicator. The bulb should be held no closer than necessary to obtain an indication, so as to avoid detuning because of hand capacity. The setting of potentiometer R_7 should be reduced until the r-f voltage at the cathodes of the balanced modulators is about 2.0 volts If the v.t. voltmeter is not available the optimum setting of R_7 will have to be found later by observing the signal on the oscilloscope.

Now, with no audio input to the unit and with balancing potentiometers R_{15} and R_{19} at either extreme of their ranges, tune the two modulator output tanks to resonance, as indicated by maximum r-f voltage on their respective output links. With R_{20} set for maximum output, tune the single sideband amplifier input tank to resonance. The r-f voltage at the 6L6 cathode follower output terminals may now be used as an indication of resonance in all the tuned circuits, and each should be retuned slightly if necessary for maximum r-f output at that point.

The oscilloscope should now be coupled to the output terminals of the unit. A resonant tank circuit between the vertical plates of the scope, link coupled to the exciter output terminals, should give adequate indication on the scope. If the scope is of the wideband variety, capable of handling input frequencies up to 4 mc, the output of the single sideband unit may of course be connected directly to the scope input terminals.

Vary the setting of one of the modulator output balancing controls, R_{15} or R_{19}, until a definite minimum value of carrier signal occurs. Then vary the other balancing control until this minimum is still further reduced. It will be found that by alternately varying first one control and then the other,

(*Continued on page 93*)

An Instantaneous Break-in Monitor

ROBERT C. MERRYMAN, W3FBB*

The c-w monitor has rightfully taken its place as an indispensible station accessory. The variations are many, but there is little doubt that the trend was definitely set by the monitor-gating amplifier first described by W2ESO in his T9'er. W3FBB presents a variation which make a compact portable unit that may be placed anywhere convenient to the operator.

THE PRIMARY function of a c-w monitor is to keep track of one's "fist," so that mistakes not recognizable otherwise will be brought to light. However, most monitors fall in a category of "mechanical" monitors, such as audio oscillators or buzzers, and only the keying itself is monitored. This of course is far better than no check at all, but it frequently requires a separate keying relay, split earphones, and the like. Such a monitor lacks flexibility, doing just one job—monitoring the key or "fist," with no indication as to how the carrier sounds.

The writer, giving c.w. a whirl for the first time, realized the urgent need for a monitor, but after going through numerous handbooks, could find nothing that would answer his needs. What was actually desired was a self-contained monitor that would not only constantly check the keying, but also give some indication as to how the transmitted signal sounded to the other fellow, i.e., if it was chirpy, had tails, clicks, etc. With these thoughts in mind, the subject monitor was designed.

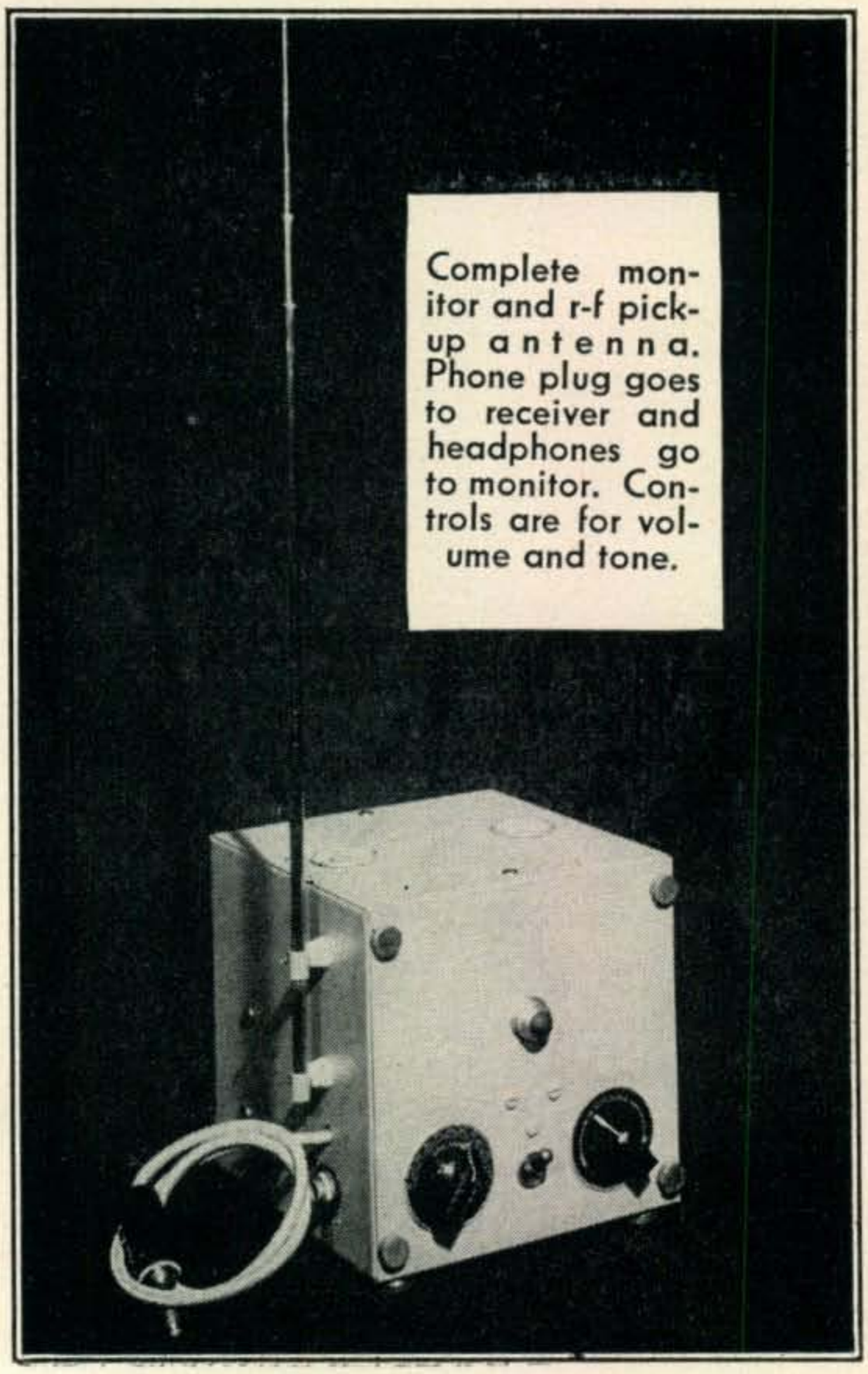
The first objective was a self-contained job, complete in a small box that could be placed in an out of the way space, and would not have to be coupled physically, such as with cables or pick-up coils, to the transmitter, or any portion thereof. Another object was a device that would not require separate, or split earphones. A further object was to include a gating amplifier to mute the receiver output under key-down conditions, and in the key-up periods allow the receiver to operate. This feature, of course, would appeal to traffic men, and other break-in operators.

The first thing decided on was the use of miniature tubes, in order to conserve space. Equivalent standard size tubes can be used, provided a larger housing is available. I had on hand a 6 x 6 x 6 inch steel utility box, which worked out very nicely as a housing—with practically no room to spare!!

The Basic Lineup

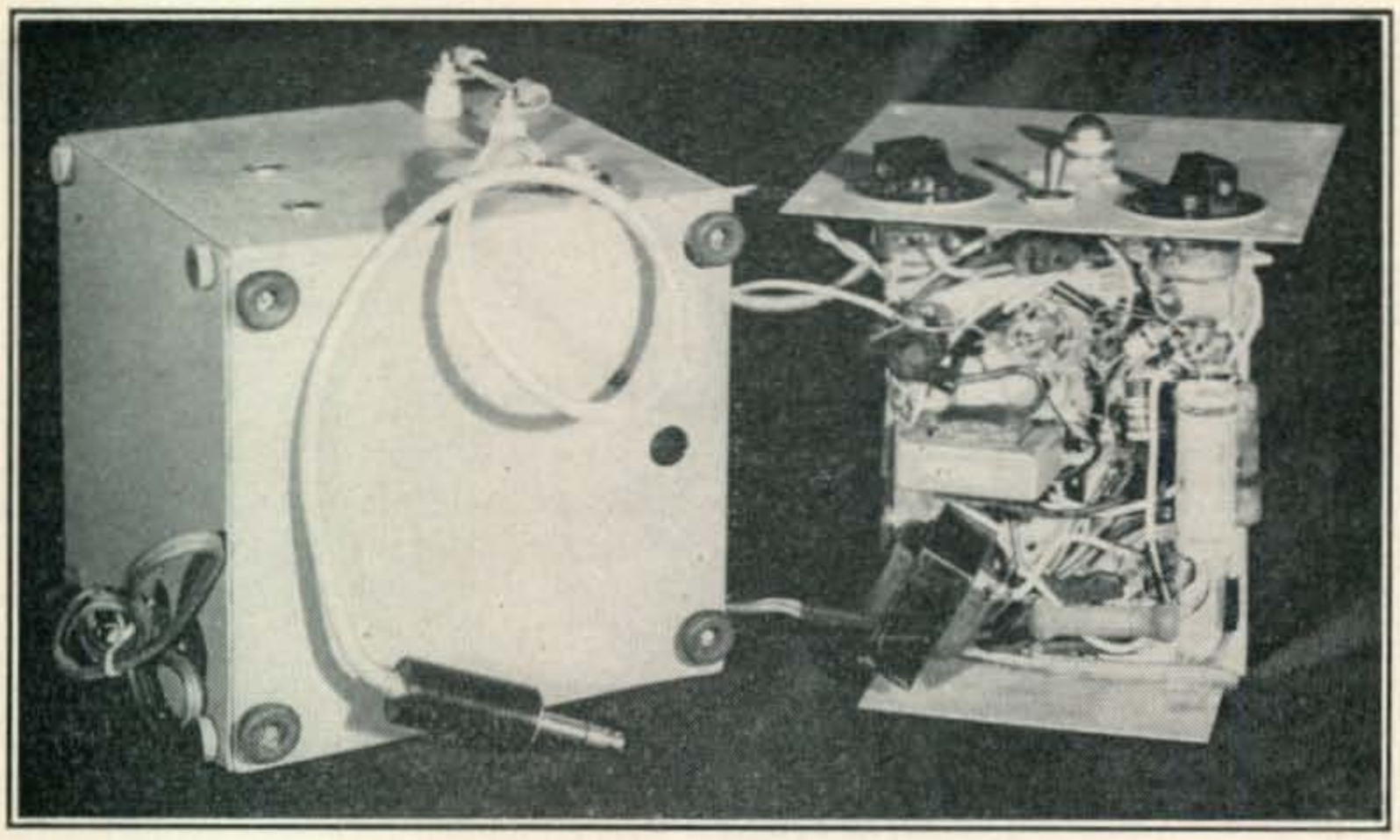
There are four tubes used, a 6AL5, 6C4, 6J6, and a 5Y3. Each tube has a separate function. The 6AL5 rectifies a small portion of the r.f., which is picked up from the transmitted signal by means of the pick-up antenna and the coil condenser combination *L1-C1*, and supplies the power to operate the 6C4 audio oscillator. This oscillator circuit is quite standard, using a small interstage audio transformer for coupling purposes. The output of the 6C4 oscillator is fed to one grid of a twin triode 6J6, through a volume control *R3*. This 6J6 stage serves as an audio amplifier as well as an audio mixer stage. The plates of this tube are connected in parallel and feed the earphones by means of the output jack, *J1*, through the blocking condenser *C5*. The receiver output is fed to the other grid of the 6J6 by means of a cord and plug, *P1*, through volume control *R6*.

When the key is down, some r.f. goes through the 6AL5 and comes out rectified to supply power to the 6C4, causing it to oscillate. This audio tone is then applied to one grid of the 6J6 where it is amplified and then passed on from the plate to the output



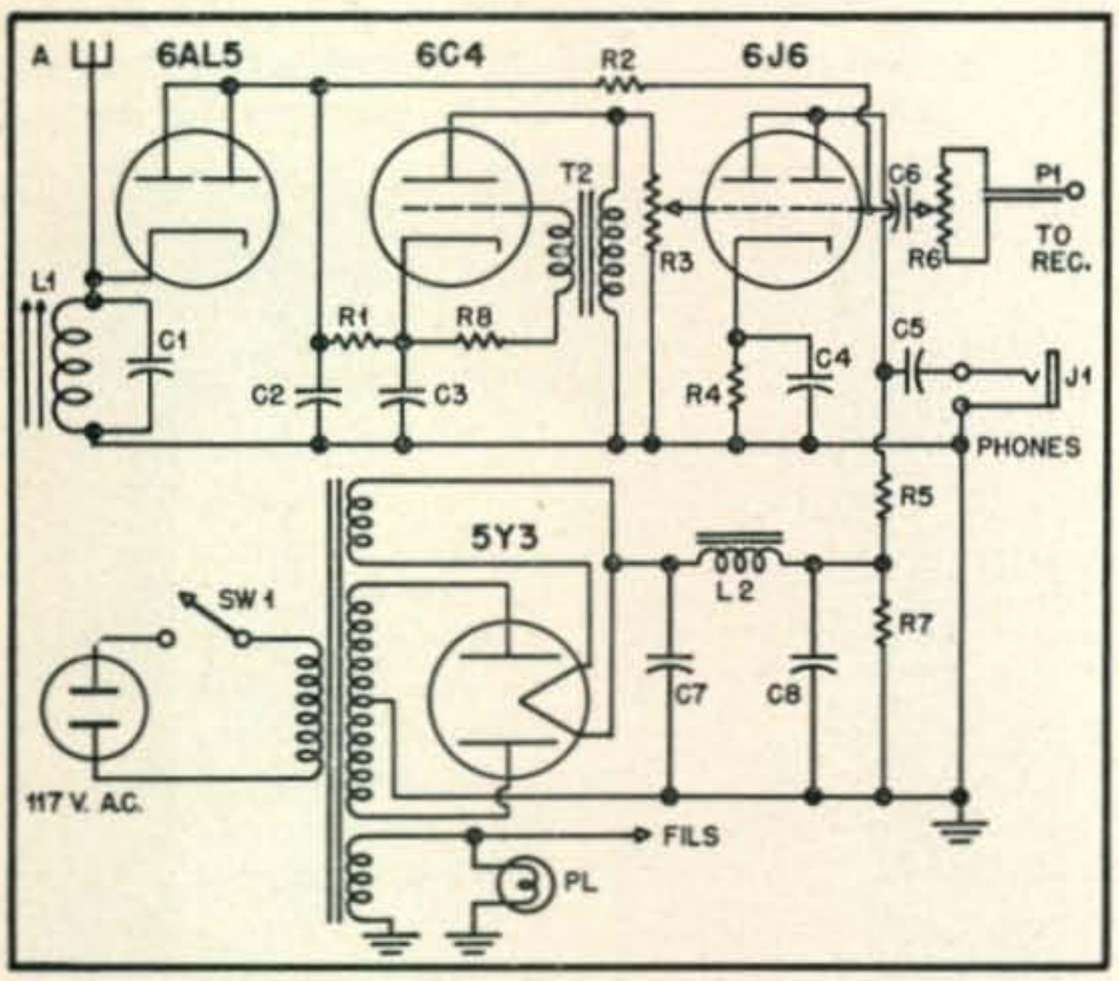
Complete monitor and r-f pick-up antenna. Phone plug goes to receiver and headphones go to monitor. Controls are for volume and tone.

* *6504 Brook Ave., Baltimore 6, Md.*



Simplicity of the monitor is illustrated by the underchassis view showing almost all the components and wiring.

jack, where it is heard in the phones. At the same time, signals from the receiver are entering the grid in the second half of the 6J6, and are also fed from the plate to the phones. This condition was undesirable, as a certain amount of thumping from our transmitter was coming through with the received signals and the audio tone. This was corrected by taking a portion of the 6C4 supply voltage and applying it to the receiver input grid of the 6J6, through resistor *R2*. This completely blocks the receiver output while the key is down, but unblocks it instantaneously when the key is up, allowing received signals to be heard.



C1, C2—.001 μf.
C3, C5—.1 μf, 400 volts.
C4—25 μf, 50 volts.
C6—.02 μf, 400 volts.
C7, C8—40 μf, 450 volts.
R1—47K, 1 watt.
R2—100K, 1 watt.
R3—500K, potentiometer.
R4—100K, 1 watt.
R5—25K, 10 watts, wirewound.
R6—500K, potentiometer.
R7—50K, 25 watts, wirewound.
R8—47K, 1 watt.
L1—22 turns 26 enamel wire close-wound on 5/8" diameter slug-tuned form.
L2—Miniature filter choke, receiver type.
T1—Power transformer, receiver type: 500 v., center tapped; 6.3 v. and 5 v. filament windings.
T2—Small interstage audio transformer.
J1—Open circuit jack.
P1—Phone plug.
PL—6-8 volt pilot light and socket.
SW1—SPST switch.
A—Pick-up antenna rod such as telescoping walkie-talkie type.

The 5Y3 rectifier, in conjunction with its associated power transformer, filter choke, filter condensers, and bleeder, supply the one hundred volt potential necessary for the plates of the 6J6 mixer stage. By using a selenium rectifier in place of the transformer and rectifier tube, space could be conserved.

Enough r.f. from the transmitter to operate the 6C4 audio oscillator is collected by a small pick-up antenna of the telescoping walkie-talkie type, and induced into a tuned input circuit, comprising coil *L1*, and condenser *C1*. When this input circuit is resonated around the middle of the band, in our case 7150 kc, it tunes broad enough to pickup enough r.f. from the transmitter, throughout its tuning range in the 40-meter band without the necessity of retuning every time the transmitter frequency is changed.

As soon as we had the rough model working, in haywire fashion, and found it would answer our purposes, it was re-assembled on a small chassis measuring 4½ x 6 inches, and bolted to the cover of the utility box which serves as a panel. The only controls necessary on this panel are volume controls *R3* and *R6*, 117-volt ON-OFF switch, *SW1*, and the pilot light. The output jack is mounted on the left-hand side of the box, together with the cord and plug, *P1*, which connects to the phone jack on the receiver. The pick-up antenna is conveniently mounted on small feed-through insulators which are mounted in a vertical plane above jack *J1*.

The top of the box is drilled to receive two 1-inch ventilating screen-type plugs, while a hole is drilled in back to allow the a-c line cord to pass through.

A Simple Beauty Treatment

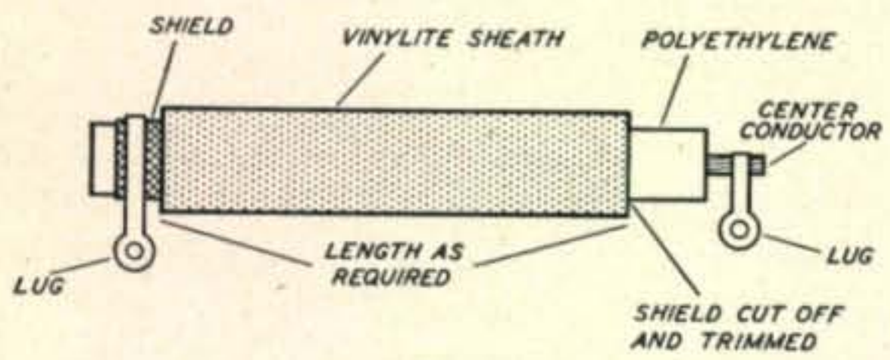
In order to dress up the monitor a little and give it that commercial "look," brass knurled thumb screws are used to hold the panel in place, instead of the round head screws supplied with the box. To match the color of our receiver, which is grey, a

(*Continued on page 100*)

Inside the SHACK AND WORKSHOP

Coax Cable Fixed Condenser

In looking for a simple way to pad my final tank for lower frequency operation I hit upon the idea of using RG-8/U. This cable has a capacitance of 30 $\mu\mu$f/foot and will withstand voltages of 4000 volts. The cable may be cut to length for the required capacity and the ends trimmed neatly leaving a short section of polyethylene insulation projecting from the shield to provide a long leakage path. Sharp



ends of the shield should be avoided to prevent corona. Short lengths of the cable could be mounted on the final tank plug-in coils.

At 40 meters there was no heating of the cable either with the 813 final loaded or unloaded. It is also possible to use this cable for fixed neutralizing condensers. Split-stator operation may be accomplished by using two pieces and tieing the shields to the center tap of the final tank.

R. G. Talpey, W2PUD

E.C.O. Stability Adjustment

The usual manner of adjusting an e.c.o. for maximum stability with variations in plate voltage or loading is to increase and decrease the plate voltage by about 10% and then measure or observe the frequency shift brought about by this voltage change. This is a rather tedious process which can be eliminated by introducing an a-c voltage into the

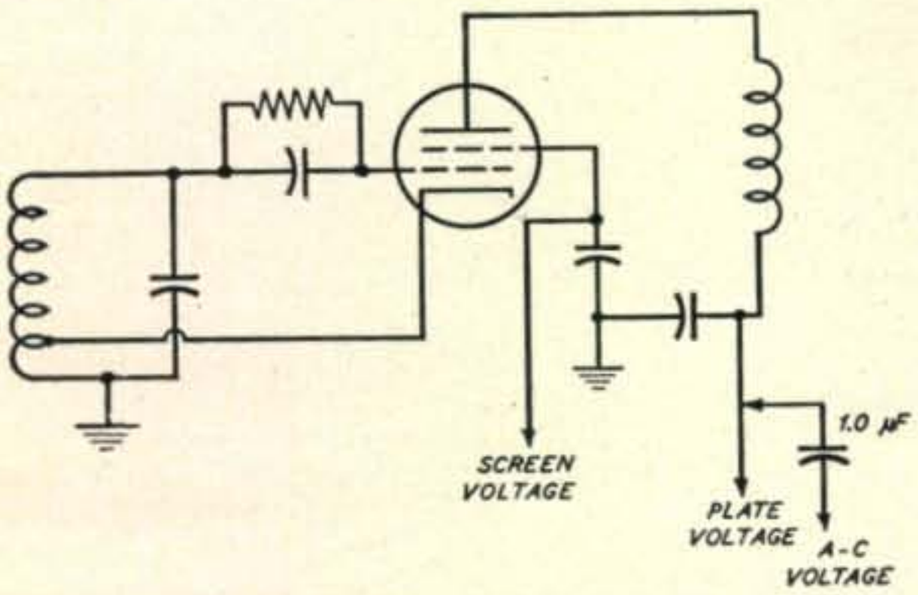


plate supply voltage to the oscillator until a ripple is heard on the note. Then adjust circuit components in the usual manner until minimum ripple is observed on the note—or in other words, until a point is reached where the output frequency is as immune as possible to variations in plate voltage.

Jack Najork, W2HNH

Milk Cartons for Tube Storage Cases

Some of us have transmitting tubes lying around for which the original cardboard boxes have long since been lost or damaged.

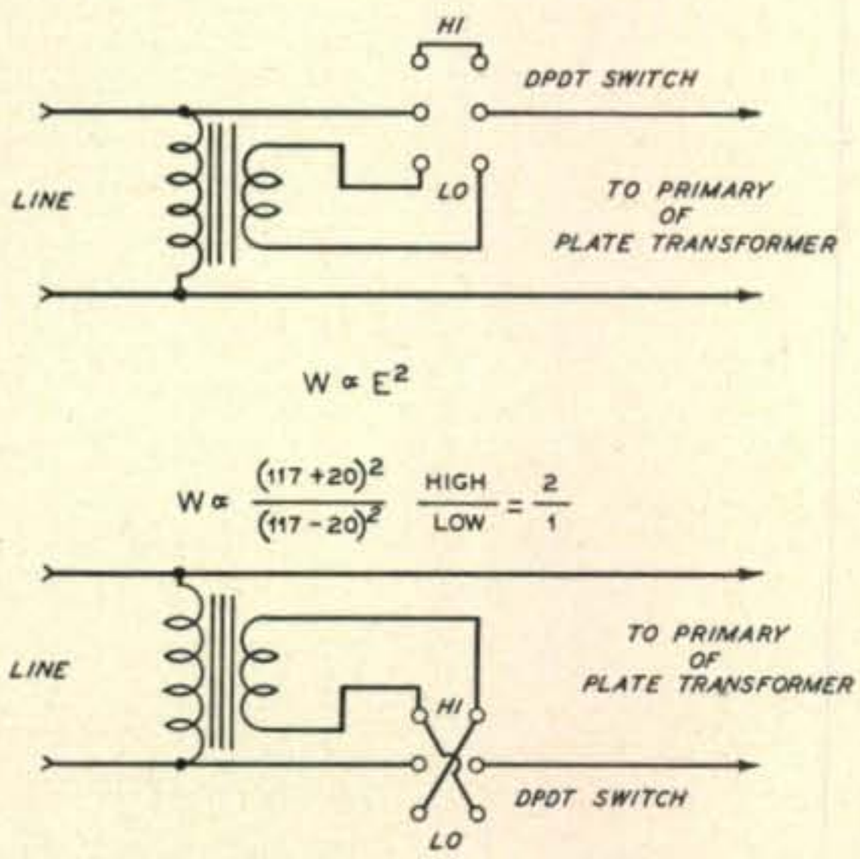
Recently our dairy started delivering milk in cardboard cartons, and these boxes appeared unusually suitable for tube storage and were so placed in use.

Our cartons are about 2¾" square and about 7½" long. The flap can be left open and the case is then 9½" in length which will accommodate the larger tubes. I store spare T-40s, 866s, 828s, etc., in a rack of these cartons, thus making a neat and safe way to care for my tubes.

Harry T. Hubbart, W9ABF

Simple HI-LO Change of Transmitter Input Power

This is a method of controlling the input power of a transmitter in two steps. The circuit uses a filament transformer having a high-current 20 to 28-volt secondary winding. These transformers are available and the one we are using supplies 20 volts at 9 amps. It cost us less than $2.00, yet it enables us to drop our power from 800 to 400 watts. The change in the power fed to the plate primary varies as the square of the input voltage. Thus a change



of ± 20 volts at the plate primary input causes a change of 50% in the input power. An alternative wiring arrangement is also shown which will reduce the primary voltage by the amount of the bucking voltage from filament secondary winding. Either of these methods are much more satisfactory than inserting a high-wattage lamp in series with the primary, since when a lamp is used the voltage drop will vary with the transmitter load and primary current drain.

Ray Rosenberg, W3NCJ

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.

A New Method of
Predicting Band Conditions

OLIVER P. FERRELL*

Greatly increased accuracy and simplified interpretation are the advantages of this new system of forecasting operating performance of communications frequencies.

NUMEROUS AMATEURS have acquired the knowledge of how to predict the MUF (maximum usable frequency) and the OWF (optimum working frequency) from the *Monthly CRPL-D Series Basic Radio Predictions*. While knowing the MUF is a valuable tool for working 10 meters, it is, when considered alone, rather ambiguous for predicting DX openings on either 40 or 20 meters. On these bands a most essential factor is a knowledge of how much a radio signal will be attenuated in transmission along the DX path. The CRPL-D series does not show how this may be computed.

To further explain and illustrate the operation of the basic radio predictions, the CRPL has prepared the book "Ionospheric Radio Propagation." In this book will also be found the necessary formulae, charts, maps and nomograms to enable an accurate prediction of possible 40 or 20-meter DX to be made. At first glance the method of making these low frequency predictions may appear exceedingly complicated. Many operators would hesitate before attempting to decipher how the methods are employed. This article is designed to provide a sufficiently painless and orderly arrangement where these predictions can be made in the minimum of time.

The individual steps (after the MUF has been determined) are recapitulated. A new set of graphs designed especially for use on the amateur DX bands are shown on page 27. To make full use of the more accurate predictions a new system of graphic presentation has been developed and is shown on pages 30 and 31. This system will also be employed hereafter in the *Monthly DX Predictions*.

In addition to the loss of signal energy resulting from the spreading of the radio wave with distance there are several other attenuating factors which must be considered. The most important is normal (i.e., day-to-day) absorption related to the elevation of the sun. This type of absorption is non-deviative [1] and takes place principally in the D-region of the ionosphere. The D-region is at a sufficiently low altitude that the only known ionizing agent is the ultra-violet light from the sun. The comparatively high recombination rate from this ionized condition causes an appreciable loss of signal energy. The measure of the loss is determined by the amount of sunlight falling on the ionosphere—hence the elevation of the sun above the horizon.

An empirical expression has been worked out to fit together the factors of distance, frequency, time of day and month of the year for computing absorption. Instead of lengthy calculations the amount of D-region absorption may be rapidly and fairly accurately estimated from the series of monthly absorption maps (I.R.P., Figures 7.34 to 7.45, inclusive).

To use the absorption maps a separate overlay (including local time meridian and the equator) must be made from the world map (I.R.P. Fig. 6.29) and the great circle chart (I.R.P., Fig. 6.30).[2] After the path has been plotted, it should be marked at 500-km intervals, throughout its entire length. The overlay is then shifted to the absorption maps. Readings are made at the *terminals* of the path. Not at the *control points*, as when predicting the MUF. Read and record *K* values at both ends of

*Assistant Editor, CQ.

1 Non-deviative absorption occurs when there is little retardation of the wave front, or bending of the wave through the ionosphere. This contrasts with deviative absorption that occurs near the MUF and is characterized by violent fading.

2 Although it would be desirable to use the same overlay as used with the CRPL-D series it can not be done since the base maps in the D-series and in the book are not to the same scale.

This article is an exception!

It is not our general rule to publish something which will only be slightly intelligible to the average reader, nor articles which require collaborating material. However, we are breaking this rule because of the importance of clearly and concisely presenting the necessary data on the prediction of the incident radio field intensities and the lowest required field intensity over long distances.

The business of making a DX prediction is now practically in long pants. Every DX man should appreciate that these systems exist, and should be able to make predictions using the CRPL-D series and the new book "Ionospheric Radio Propagation." The cost of one year's subscription to the D-series and a copy of the book only totals two dollars.

In view of the above factors, a large portion of this article by Assistant Editor Ferrell assumes that the reader is a DX man and has copies of both of these items. Thus, detailed and involved explanations have been cut short. In editorial parlance, this article is *instructional*, designed especially for operation.

W2IOP

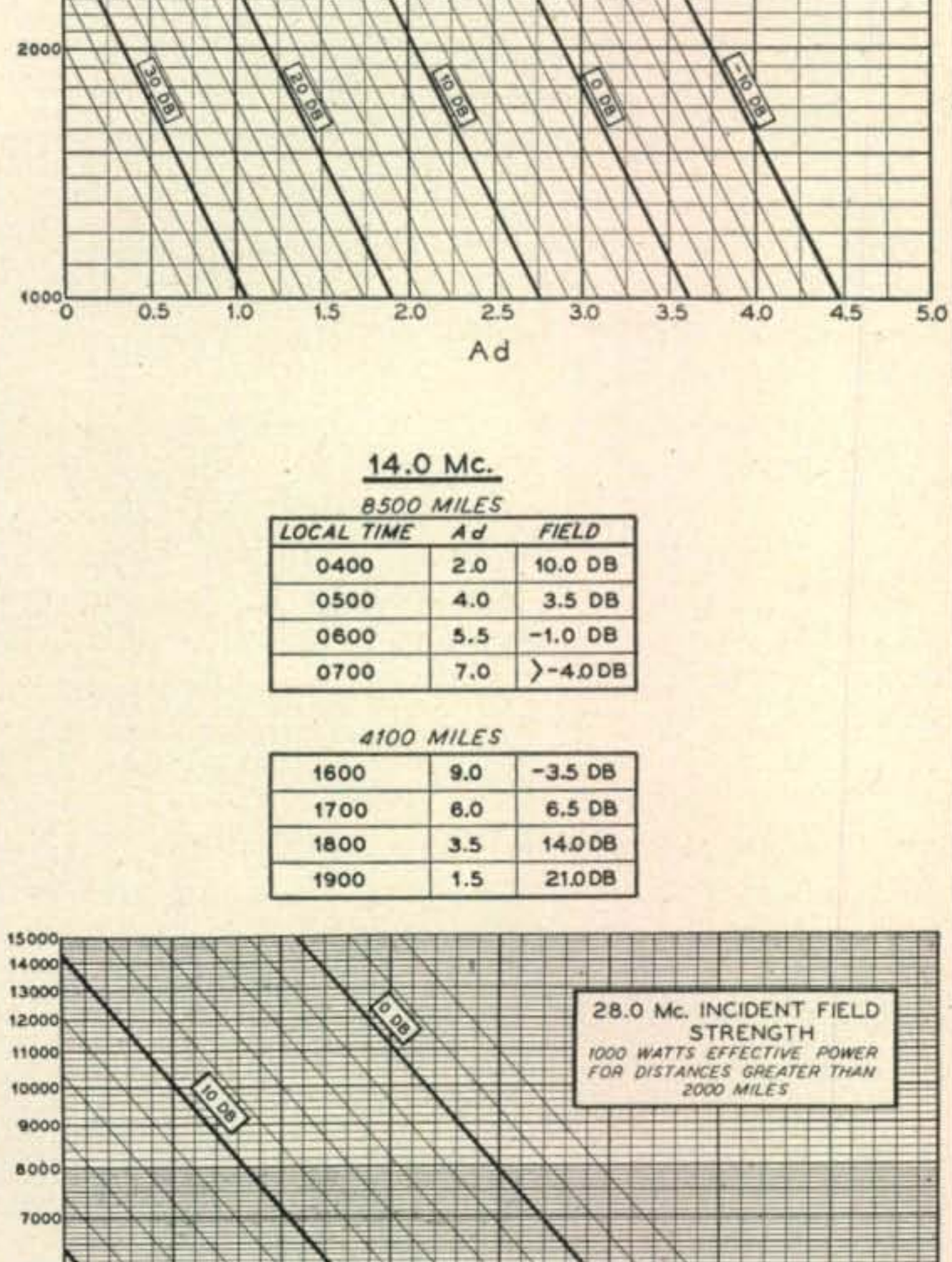
7.0 Mc

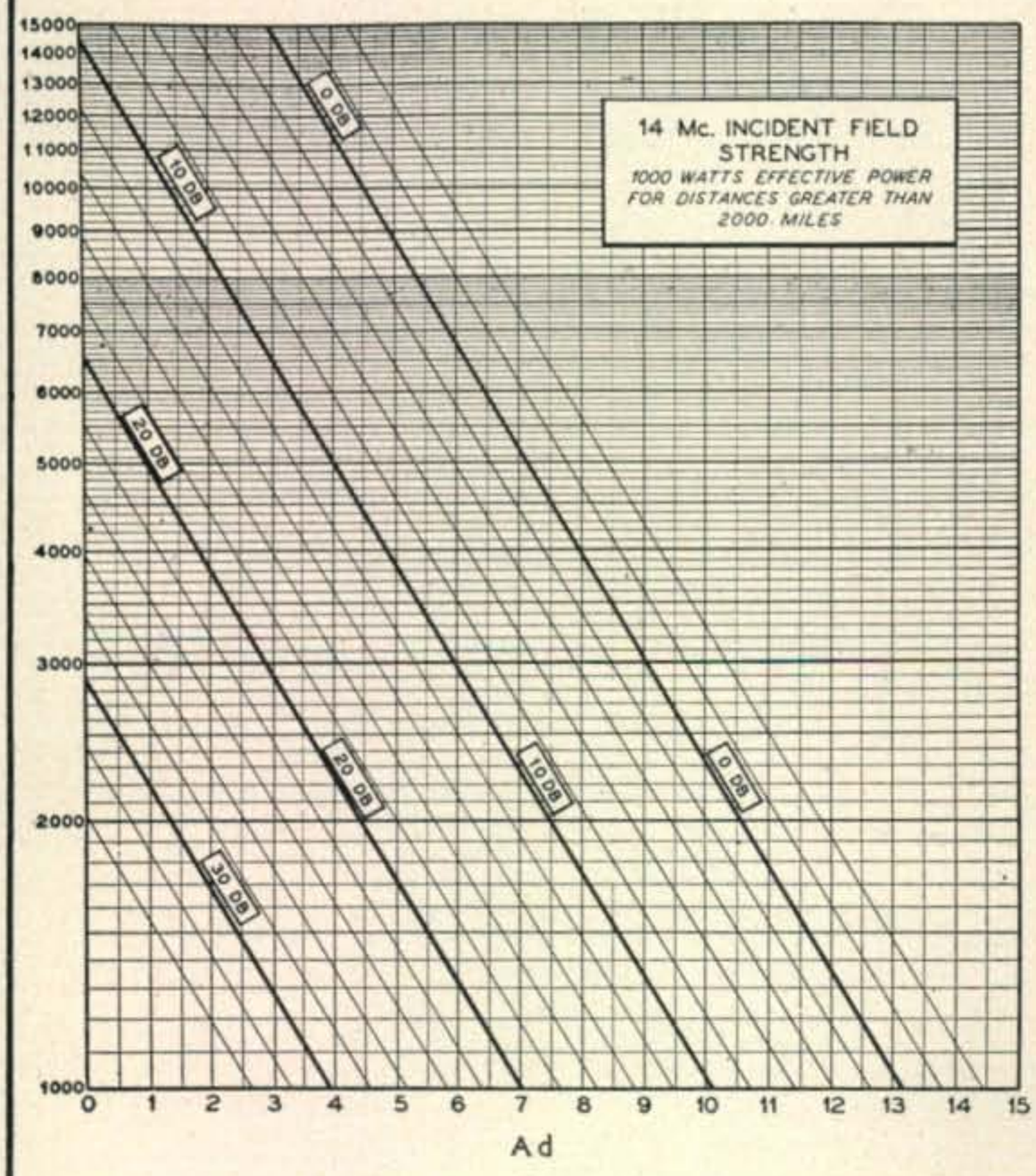
8500 MILES

LOCAL TIME	Ad	FIELD
0200	0.5	10.5 DB
0300	1.0	4.5 DB
0400	2.0	-7.0 DB
0500	4.0	>-10.0DB

4100 MILES

1900	1.5	7.5 DB
2000	1.0	13.5 DB
2100	0.75	16.5 DB
2200	0.5	19.5 DB





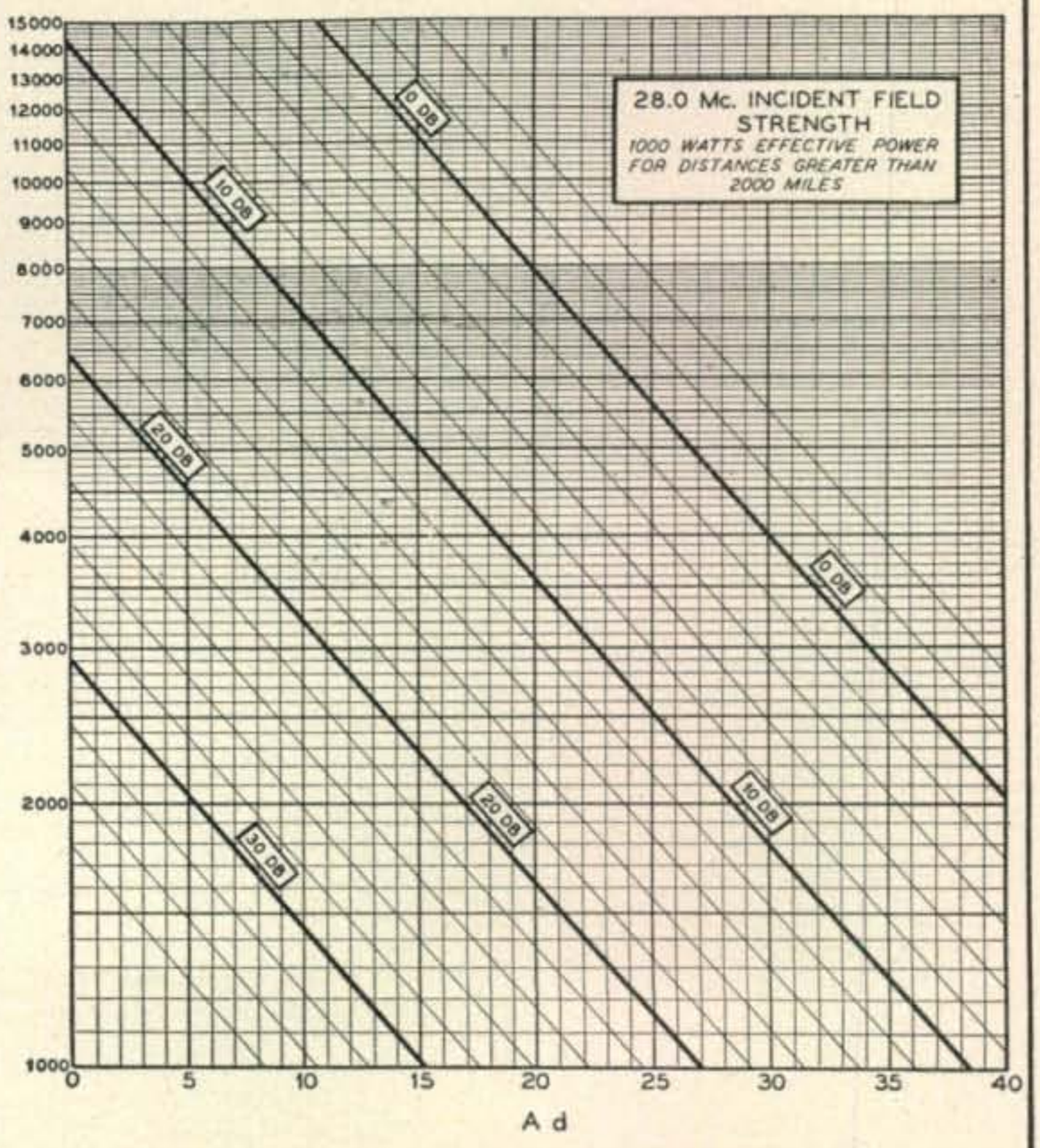
14.0 Mc.

8500 MILES

LOCAL TIME	Ad	FIELD
0400	2.0	10.0 DB
0500	4.0	3.5 DB
0600	5.5	-1.0 DB
0700	7.0	>-4.0 DB

4100 MILES

1600	9.0	-3.5 DB
1700	6.0	6.5 DB
1800	3.5	14.0 DB
1900	1.5	21.0 DB



28.0 Mc.

8500 MILES

LOCAL TIME	Ad	FIELD
0600	5.5	11.5 DB
0700	7.0	10.5 DB
0800	9.5	8.5 DB
0900	12.0	6.5 DB

4100 MILES

1300	20.5	8.0 DB
1400	18.0	10.0 DB
1500	14.0	13.0DB
1600	9.0	17.5 DB

Amateur band absorption/field strength graphs. The ordinate scale on each graph is in miles.

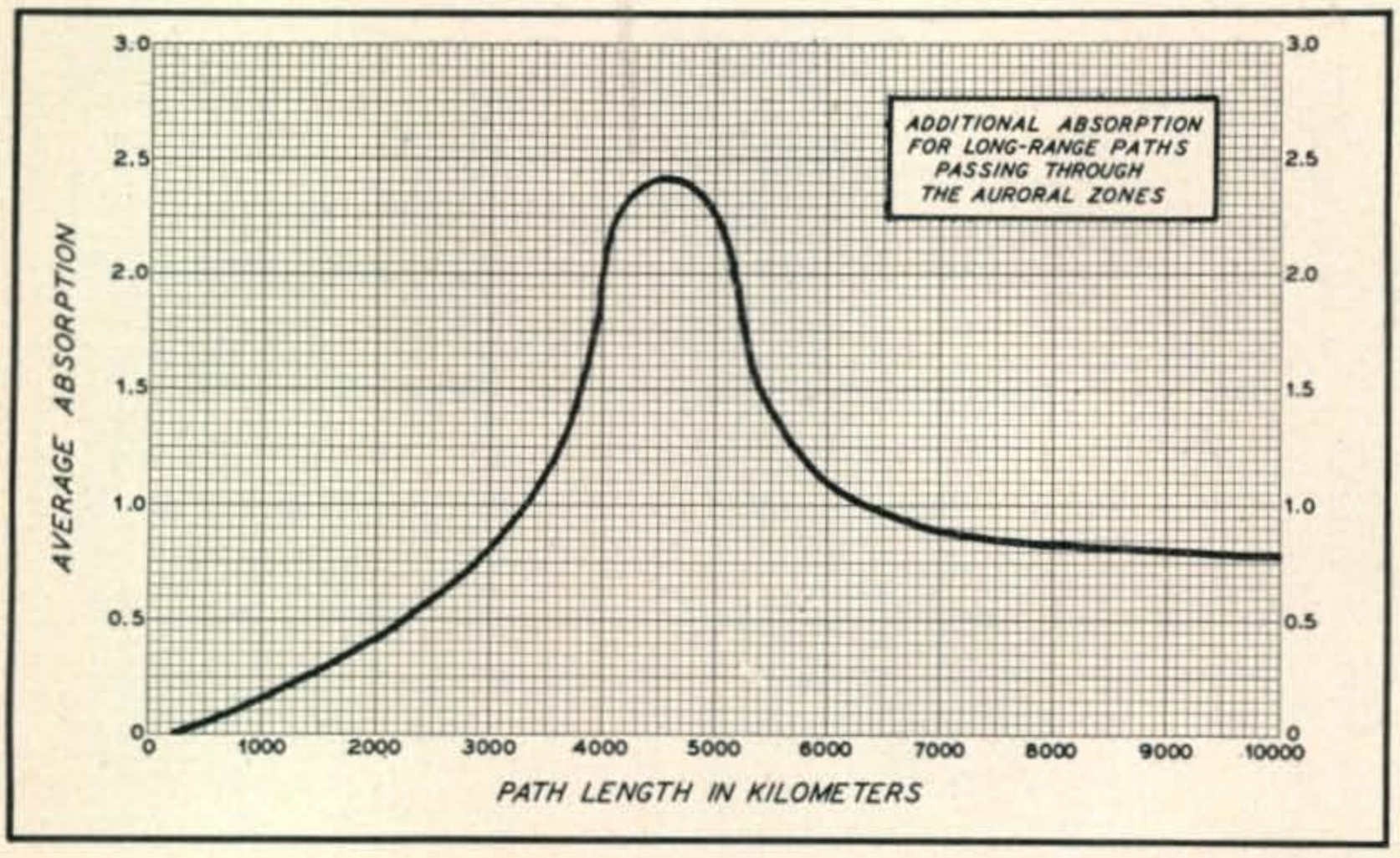


Fig. 1. Additional absorption encountered in the auroral belts. This graph is applicable only to long paths passing entirely through the high latitudes. Auroral absorption is approximate and should be added to Kd before it is corrected for season and solar cycle

the path and the total length of the path (to the nearest 100-km estimate) in the daylight regions where K is greater than 0 value. $\overline{K}d$ (absorption/distance) is then obtained through the use of nomograms (I.R.P., Figures 7.46 or 7.47).

The two K readings are added together and then by holding a straightedge from this sum on the right-hand scale of these nomograms and passing through the appropriate distance reading (length of path in daylight), a $\overline{K}d$ reading is obtained.[3] This is then recorded for the hour or period of time in question. The accuracy of the above steps is very important and should always be completed to the best of the operator's ability.

Auroral Zone Absorption

The great circle route of a signal which must enter into, or pass entirely through either auroral belt[4] suffers considerable additional absorption. It is necessary to stress that the calculation of auroral zone absorption is based upon very scanty data. Practically no long-term observations have been made of K values at the high latitudes and the CRPL is fully cognizant of the accuracy limitations in predicting this absorption. The CRPL would like it known that the present method is temporary and vigorous efforts are being made to improve our knowledge in these matters. The present method described on pages 119 and 120 (I.R.P.) although representing the extent of our knowledge at the present time only provides an estimate of the absorption to be expected.

The distribution of auroral absorption is not symmetrical about the geographic poles and as far as it is known, there is little diurnal change related to the position of the sun. The extra absorption encountered over these paths is therefore added to the normal $\overline{K}d$ values regardless of the hour of the day. A seasonal and a solar cycle variation of auroral absorption is presupposed and is taken into account by operating the correction factors (seasonal and sunspot) after the auroral corrected $\overline{K}d$ has been determined.

The method shown in "Ionospheric Radio Propagation" is tedious for computing the average auroral absorption over long paths. In view of the fact that we are only interested in DX path absorption a graph has been prepared showing additional auroral absorption vs. distance.[5] The auroral absorption graph *Fig. 1* is operated by noting the length of the path between the entry and exit points ($K' = 0$) along the great circle path computed with the aid of Fig. 7.48 (I.R.P.). To obtain normal $\overline{K}d$ the path has already been divided by 500-km markers. The same overlay is then moved to Fig. 7.48 (I.R.P.) and the total distance from the intersections of the contours where $K' = 0$ nearest the equator is recorded.[6] This distance is then noted on the graph *Fig. 1* and the additional absorption to be added to $\overline{K}d$ is given on the ordinate scale.

Calculating Ad

Absorption maps are unable to show several other variables in the attenuation of signal strength which might be classed as long-term functions. A long series of field strength intensity measurements made from the last sunspot cycle minimum through the maximum of 1947 showed that not only is there a variation in the MUF, but D-region absorption varied by a factor of approximately 1.50. The CRPL has assumed that this was a linear relationship equivalent to

$$Q = 1 + 0.005R$$

where

Q = absorption ratio multiplier
R = Zurich sunspot number (smoothed).

---

3 This method is not as "refined" as that shown in the Signal Corps publication RPU-144. The Army method employs tables givind Kd for paths reduced to 100 kilometers of length in the daylight region and for values of K to the 0.01. The tables, however, are based upon absorption at path midpoint, contrasting with the terminal method used by the CRPL. While this permits the calculation of Kd to a closer approximation, it is doubtful that it results in a very realistic increase in over-all computed accuracy. Especially for short period DX openings.

4 Auroral belts are the two regions where visible aurora is most prevalent. In these zones there are almost continuous minor ionosphere storms which are not observed at latitudes below 50°. Such paths are characterized by lower signal intensities and more violent fading and fluttering than over other paths. The disturbances are maximumized in a belt several degrees wide and about 26° from the magnetic poles.

5 This graph is only useful for regular F2-layer propagation and for paths whose total length exceeds 3200 km.

6 Disregard $K' = 0$ contours near the magnetic poles. Compute total length of path completely across the polar regions.

In calculating the field intensity or the LUHF this factor Q must be taken into account. The factor R is the smoothed 12-month running average Zurich number which is predicted by the CRPL methods and is given in each issue of the D-series.[7] *Figure 2* shows this relationship plotted on graph paper. The predicted November sunspot number is 115 corresponding to a Q multiplier of 1.58. The December number is 114, or a Q or 1.57. Similar Q factors may be obtained for any predicted sunspot number.

Another correction multiplier is the seasonal factor J. This is an arbitrary function also based on a long series of pulse and field strength measurements. The unity value is chosen for the summer months. *Table 1* shows the value of the correction factor J for each month of the year and for the three possible path terminal conditions.

The incident absorption of a radio wave may now be calculated from the formula

$$Ad = JQ\overline{K}d_{\text{(normal plus auroral)}}$$

This places the D-region effects into a form where they may be easily and fully considered.[8] The best method of making use of Ad is to ascertain its effect upon a "standardized" radio signal, or a signal of known intensity. Knowing both the MUF and Ad we may now predict DX openings at any frequency. A usable method is predicting the incident field intensity in microvolts or in db above one microvolt per meter. This may be done using nomogram Fig. 7.33 (I.R.P.) and the Ad values computed above.

Although the incident field nomogram is useful for making predictions it does have several disadvantages. One, it is not particularly suitable for continuous use; two, it includes non-amateur frequencies; and three, it is not readily adjustable for differences in effective radiated power.[9] The wide variance in amateur transmitters and antennas is the order of a possible change of 20 to 25 db in radiated power. Thus, except in instances where the actual antenna gain and radiated power are known it would be better to assign an arbitrary median value. For radio amateur work the 1000-watt value is an excellent choice.

MONTH	BOTH TERMINALS		ONE TERMINAL NORTH OF EQUATOR AND ONE SOUTH OF EQUATOR
	NORTH OF EQUATOR	SOUTH OF EQUATOR	
JAN.	1.3	1.0	1.15
FEB.	1.3	1.0	1.15
MAR.	1.15	1.15	1.15
APRIL	1.15	1.15	1.15
MAY	1.0	1.3	1.15
JUNE	1.0	1.3	1.15
JULY	1.0	1.3	1.15
AUG.	1.0	1.3	1.15
SEPT.	1.15	1.15	1.15
OCT.	1.15	1.15	1.15
NOV.	1.3	1.0	1.15
DEC.	1.3	1.0	1.15

Table I. Seasonal correction multiplier J.

The efficiency in operating the field strength nomogram may be increased by selecting a separate frequency and replotting distance vs. Ad on a semi-logarithmatic basis. This is what has been done in the graphs shown on page 27. The selected frequencies are the lower edges of the amateur bands. In this manner, the graphs are then showing the minimum incident field to be expected. Operating at higher frequencies within the indicated band should result in slightly (from less then 0.1 db at 7.0 mc to a maximum of 2.0 db at 28.0 mc) greater fields than shown. Accompanying the three incident field strength graphs are examples of the way the field is read for various values of Ad at different frequencies and for several hours of the day. The values of the field strength at the left-hand edge of the graph corresponding to $Ad = 0$ are "average" unabsorbed fields for normal F2-layer propagation. Transmission is assumed to be taking place via the lower angles of radiation, i.e., from 3° to 25°.

Required Field Intensities

A much discussed, but little understood or appreciated factor in amateur communication, is the lowest required field intensity. Point-to-point work over long distances may be based upon the lowest useful high frequency (LUHF), or the lowest required radiated power (LRRP). The former designation exhibits a number of disadvantages in practice. It may, in fact, appear ambiguous and thus

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7 The predicted sunspot number is also the basis for the MUF predictions.

8 Note that it is possible for absorption to nearly become twice as great as described in the original IRPL Radio Propagation Handbook, or in another book on propagation recently published. Both of these methods are now out-dated and should be discarded.

9 This momogram may be adjusted for other effective radiated powers by displacing the left-hand distance scale up or down. From the present setting raising the scale would be equivalent to an increase in power.

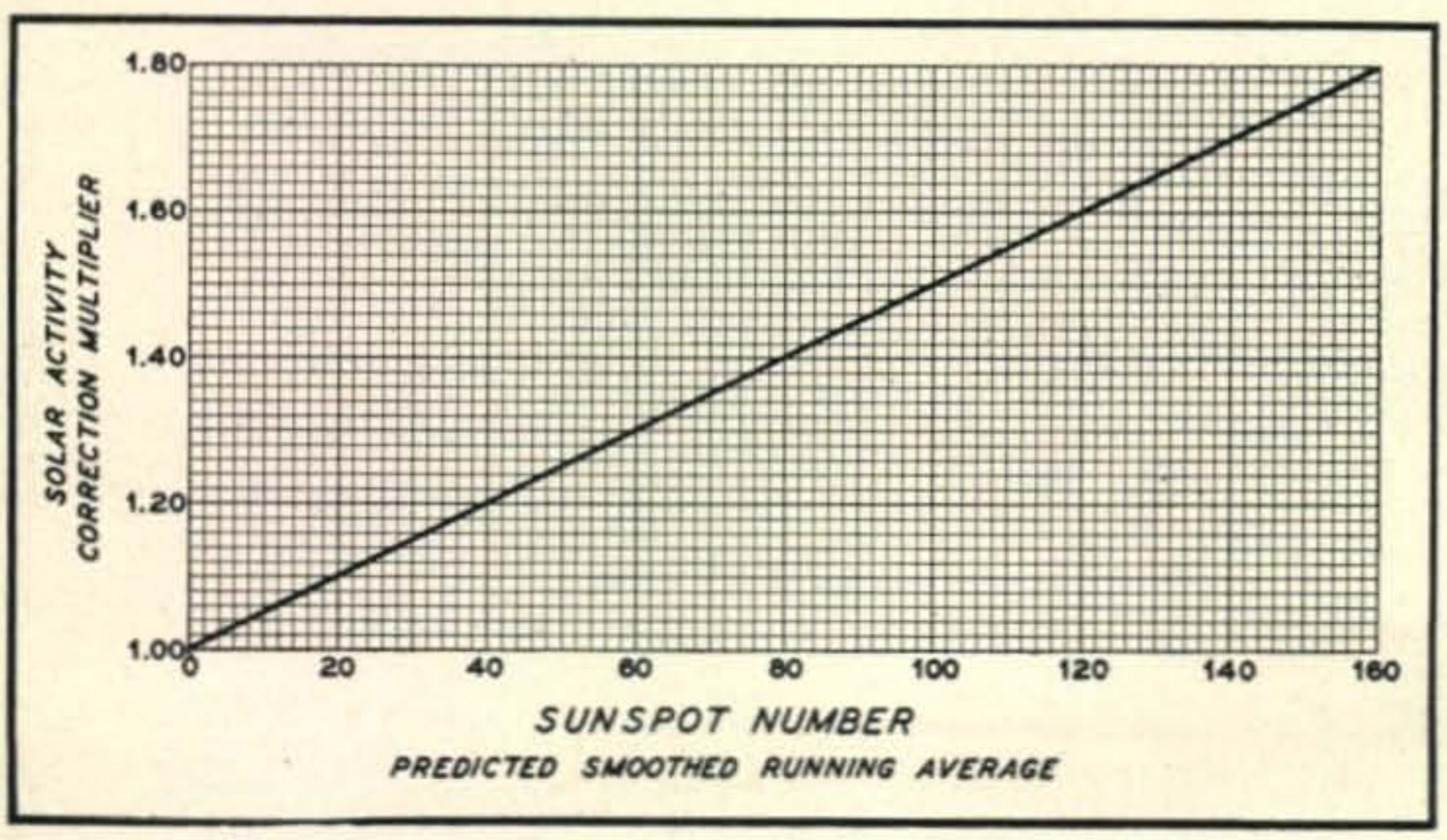


Fig. 2. The effect of the 11-year sunspot cycle must be included when computing the total signal absorption. Present theory indicates that the effect is a linear variation. This graph shows the correction factor Q for smoothed sunspot running averages.

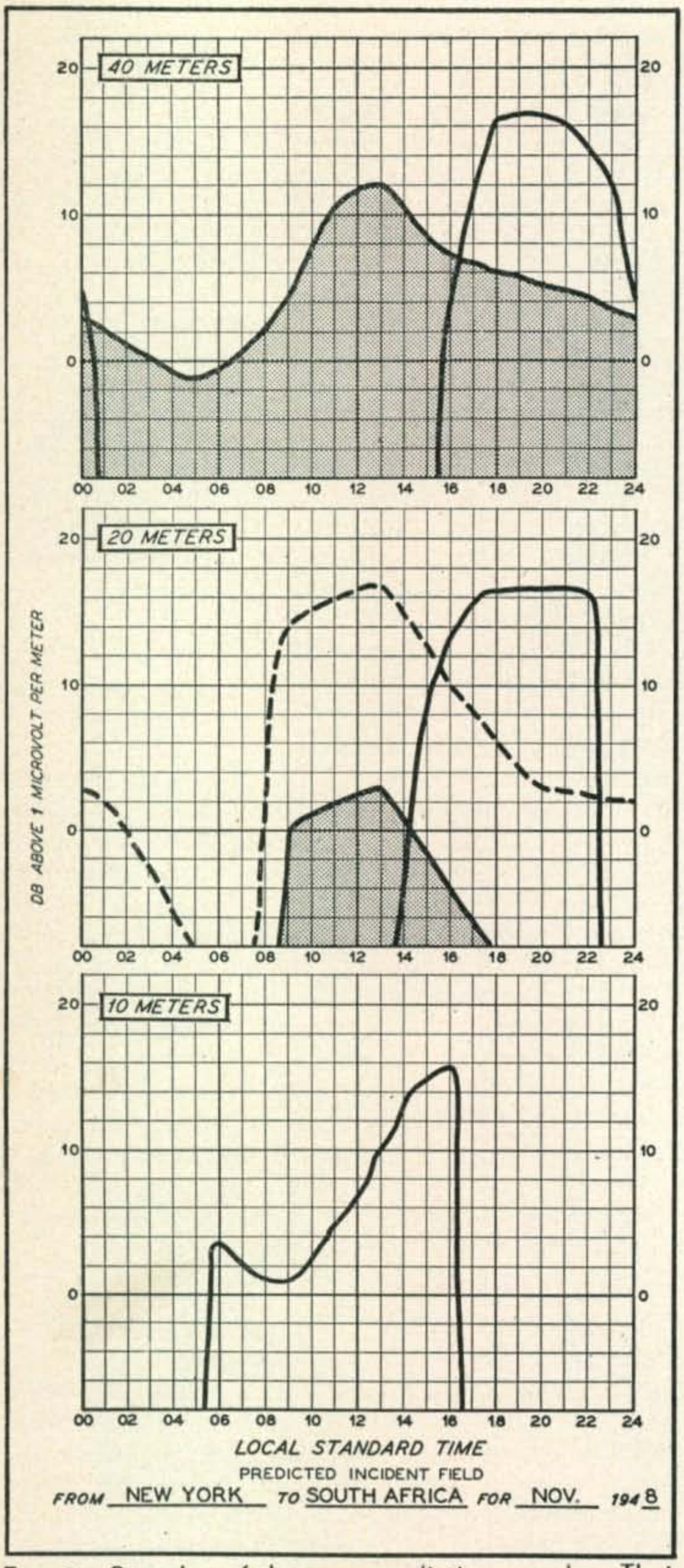


Fig. 3. Samples of the new prediction graphs. Their interpretation is fully explained in the text and opposite drawing.

should be discarded entirely for amateur communication. The LRRP although useful is based upon a prior knowledge of the transmitter and transmitting antenna at the distant point. This is one of the least known factors in amateur DX work.

A far better substitute is the lowest required field intensity (LRFI) which is computed on the basis of local (i.e., receiving) conditions. The quantities involved in estimating the LRFI are as follows:

1. Noise Grade: An estimate of the amount of atmospheric or precipitation static. (Figures 8.1 to 8.4, inclusive, I.R.P.)
2. Absorption: An estimate of the portion of the signal that will be absorbed over the path. (*Ad*)
3. Service Factor: Whether communication will be via c.w., SSSC, or radiotelephone.
4. Noise Discrimination Factor and Antenna Gain Factor: The audibility of the received signal will vary with the amount of antenna gain *G* and particularly on 7.0 and 14.0 mc the discrimination factor *Z* of horizontal lobe pattern with respect to the static or atmospheric noise sources.[10]

In making a prediction of the incident field intensity the factor of the noise grade was not included. For the purpose of these basic predictions we shall consider $Z = 1$ and that the receiving antenna is non-directional. The next step is to determine from the appropriate maps (Figures 8.1 to 8.4, inclusive, I.R.P.) the noise grade at both terminals of the path. These are then correlated with the required-field-intensity curves (Figures 8.5 to 8.10, inclusive, I.R.P.). At this point a most useful item will be a time scale device capable of showing the local time (at your end of the path) corresponding to the four hour intervals at the DX end. In this way, the local grade and required field is not only estimated, but also the same factors at the DX end of path.[11]

The resulting list should then appear for New York City to Capetown (14.0 mc, November, 1948) E.S.T.

2400	...	–2 db (New York City)
0100	...	5 db (1800 Capetown summer)
0200	...	
0300	...	
0400	...	–9 db (New York City)
0500	...	–5 db (1200 Capetown summer)
0600	...	
0700	...	
0800	...	7 db (New York City)
0900	...	17 db (1600 Capetown summer)

The minimum required incident field intensities shown in these six graphs (Figures 8.5 to 8.10, inclusive) are applicable to radio telephone communication at 90% readability.[12] An examination of RPU-140[13] upon which these figures are based shows that the minimum is probably 2 to 4 db higher than necessary for amateur DX phone communica-

10 Although factors *Z* and *G* are of tremendous importance they are too involved to be fully considered here. A later article will consider their function in amateur communication. It is interesting to note that it is possible for the discrimination gain .. to greatly exceed the gain of the antenna. This depends largely upon the orientation of the antenna lobes with respect to the noise sources (generally areas with noise grades greater than 3½) and the angles of signal/noise arrival.

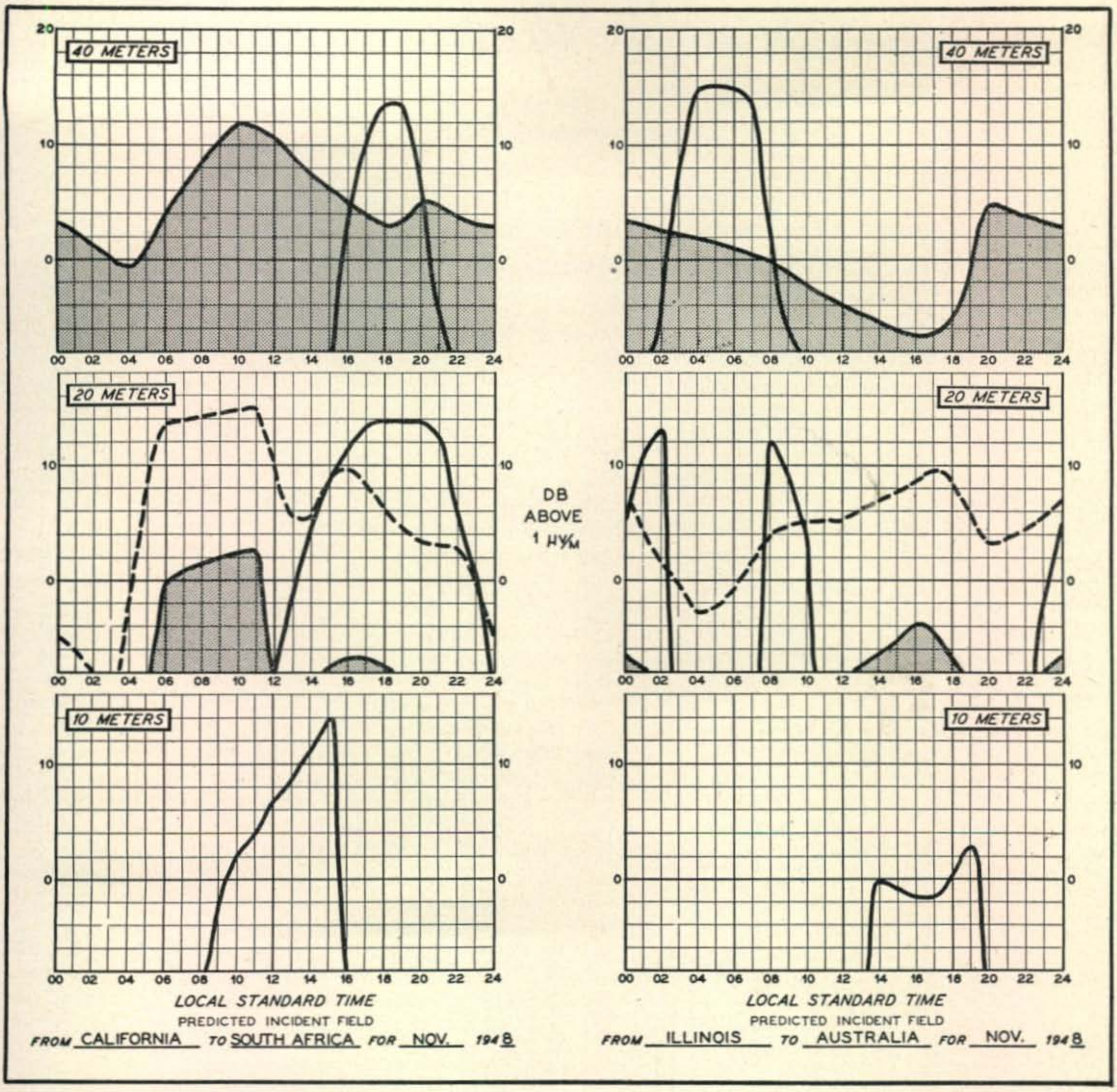
11 You can't work them if they can't hear you!

12 Approximately with a signal-to-noise ratio of 15 db using double sideband 3000 cycles each side of the carrier.

13 "Minimum required field intensities for intelligible reception of radiotelephony in presence of atmospherics or receiving set noise," Radio Propagation Unit, Technical Report Number 5.

TYPE OF SERVICE	RECEIVING CONDITIONS	RATIO DB	FACTOR T
DOUBLE SIDEBAND RADIOTELEPHONY	RECEIVER BANDWIDTH 6 KC TOTAL 100% MODULATION INTELLIGIBILITY 90%	0	1
SINGLE SIDEBAND	CARRIER SUPPRESSED 25 DB	-6	4
MANUAL C-W TELEGRAPHY	RECEIVER BANDWIDTH 6 KC TOTAL 10 WORDS PER MINUTE INTELLIGIBILITY 90%	-17	50
MODULATED C-W MANUAL TELEGRAPHY	RECEIVER BANDWIDTH 6 KC TOTAL 100% MODULATION	-15	32

Table II. Service correction factors.



How to read the DX predictions.

Three separate graphs are shown for each DX path, one for each of the principal bands. The solid line parameter is the predicted incident field intensity referred to the time scale at the bottom of the graph. The dashed line is the minimum required field intensity for intelligible radiotelephone transmission based upon the atmospheric noise level at both ends of the path. The solid line bounding the shaded area shows the minimum required field intensity for c-w operation. DX openings for either phone or c.w. are indicated when the incident field parameter equals or exceeds the minimum field parameter for the type of communication employed.

•ion. Therefore, in making arbitrary allowances for about 80% readability plus the ability of the amateur operator it appears likely that the values shown are 3 db greater than necessary.

Service Factors

Because radiotelephony is a common means of transmission it has been established as an arbitrary standard. For types of communication (essentially c.w. or SSSC) other than double-sideband radiotelephony the service factor T expressed in db is added to the required field intensity figures. These service gains are independent of frequency between 3.0 and 20.0 mc. Service factors are shown in *Table II*.

The basic formula for incorporating the antenna gain G, discrimination Z as well as service factor T is

$$P' = P_0 T Z G$$

where

P_0 = total radiated power (watts).

P' = equivalent radiated power (watts).

The operation of this formula to include Z and G will be discussed in a later article. For prediction purposes the 17-db gain of manual c.w. over radio telephony (RPU-140) appears reasonable and will be shown (revised for amateur communication) in

(Continued on page 93)

Insurance for Radio Amateurs

HERBERT S. BRIER, W9EGQ*

Any injury that hits the pocketbook can be doubly painful. By inexpensive precautions the financial danger can be eliminated. Here's how.

WHAT WOULD YOU do if your antenna fell and injured someone, and he sued you for $50,000? Such a risk is very real. Operating an amateur radio station can make you liable for losses and law suits totalling thousands of dollars. Fortunately you may protect yourself from most of the hazards through insurance, and this article will tell you how. If, at times, the discussion appears to wander from the point, be assured that it is deliberate. The presence of an amateur station in your home affects your overall insurance coverage, so it must all be considered. Too, where it is possible to insure merely your radio equipment, it is often more trouble and just as expensive as including it in existing policy.

Every statement in the article is based on information obtained from two or more insurance authorities, and the completed manuscript has been checked for accuracy by experts. The rates quoted are average rates in effect in Chicago, Illinois, at present. In many parts of the country the rates on most of the forms will be somewhat less; although in New York City they may be higher.

The points covered are only fully applicable to an amateur station located in a private residence, and

where none of the equipment is used in commercial pursuits. For stations in other locations it will be necessary to discuss the matter thoroughly with a competent insurance broker.

For insurance purposes amateur radio equipment is considered personal property. This includes the antenna system, if, when you move, you would normally take it with you. This covers about 99% of all installations; although there are a few where permanent towers would be classed as real property.

With these preliminaries out of the way, we can take up the problems in detail.

**385 Johnson St., Gary, Ind.*

Comprehensive Personal Liability Insurance: Insurance authorities are almost unanimous in agreeing that by far the most important coverage you, as an amateur, can carry is Comprehensive Personal Liability Insurance. Consider the following possibilities:

A child, playing around your antenna mast, falls and hurts himself. Your next door neighbor, who has the habit of taking a short cut through your yard, trips over a guy wire and breaks a leg. (You may be sorry it wasn't his neck.) Your tower or part of your antenna falls and damages your neighbor's house, or injures him, or does both. One of the local gang, who is helping you tune your beam, is injured or killed. Your antenna is mounted on the roof of a rented building, and to obtain permission to put it there you signed an agreement to be responsible for any damage it might do, and it punches a hole in the roof. Your young son shows his best friend how daddy draws an arc from the transmitter, and the friend is badly burned. A visitor to your home receives an electrical shock from your equipment and requires hospital treatment.

Under any of these circumstances, and dozens of others, you could be sued and, if the suit were decided against you, everything you own or ever expect to own could be seized to satisfy the judgment. Furthermore, even if you won the suit, you would have to pay the costs of defending yourself. Even if there was no legal responsibility involved, many amateurs would feel morally obligated to pay at least part of the medical expenses under some of the circumstances outlined. All in all such financial liabilities present a picture to make one cringe. But see how Comprehensive Personal Liability Insurance affects the picture.

It will cover you in all the conditions outlined above, plus hundreds of others. It will pay necessary hospital, surgical and medical expenses (up to $250.00 in the basic policy) of those injured. In addition it will protect you, your spouse, family, relatives, and others under 21 years of age, who live in your home or are under your charge, against liability arising from almost any act or condition either at home or away from home, plus any personal liability you may assume in writing (but be sure to consult your insurance broker before signing it).

Furthermore, the insurance company will defend any suit brought against the insured in connection with any personal liability claims. The company will pay all court costs, bond fees, etc.

Of course there are a few restrictions in the coverage afforded by Comprehensive Personal Liability Insurance. In brief it is purely personal insurance, and does not cover business pursuits. It does not cover the rendering of any professional service. Nor does it cover claims to which you are liable under Workman's Compensation Laws. Nor does it cover claims arising from the operation of boats, with the exception of canoes, that are over 21 feet long. And lastly the company reserves the right to cancel the insurance on five days notice should they decide you are a poor risk.

As said before, informed insurance men consider Comprehensive Personal Liability Insurance as the most valuable single type of insurance an amateur can carry. And the almost invariable reaction of hams on hearing about it for the first time is, "That's exactly what I've been looking for."

Cost: Comprehensive Personal Liability Insurance with a $10,000 liability limit and a $250.00 "medical" limit is $10.00 for one year, and $25.00 for three years. With a $50,000 liability limit the cost is $13.50 for one year, or $33.75 for three.

Personal Liability Insurance: Within its limits Personal Liability Insurance gives the basic protection of the comprehensive form. For example: it protects against injury and death claims, but not against property damage claims, unless an added premium is paid. Medical and surgical payments are also greatly reduced, unless another additional premium is paid. However these are not its major disadvantages. As we saw, Comprehensive Personal Liability Insurance covers every personal liability not specifically excluded in the policy. On the other hand, Personal Liability Insurance covers only those liabilities specifically mentioned in the policy. And there is always a question as to whether you will be actually protected when you need it.

Cost: Naturally the premiums on this less broad coverage are lower, being as follows: $6.00 for one year, and $15.00 for three years for a policy with "5/10" limits. With "10/20" limits they run 10% higher. Still higher limits are available. To refresh your memory, "5/10 limits" mean that the protection offered is limited to $5,000 per person and $10,000 per accident. With "10/20 limits" the figures are $10,000 and $20,000, and so on for other limits. Although Personal Liability Insurance must be considered inferior to Comprehensive Personal Liability Insurance, it is far better than no liability insurance at all.

Fire Insurance: Anyone owning or buying a home has, or should have, fire insurance. An amateur station on the premises makes adequate coverage even more desirable, especially "Extended Coverage" Fire Insurance. Before discussing the advantages of Extended Coverage insurance, we will examine a few fundamentals of fire insurance.

Most Fire Insurance on dwellings extend 10% of the insurance to private garages and outbuildings on the premises. However a few policies do not. If your station is housed in a separate "shack," you had better check this point in your policy. Under a 10% clause you would be reimbursed for a fire that damaged or destroyed your shack. But if the same fire also damaged your house equal to or exceeding the face value of the insurance, your protection would be used up, and there would be nothing left to pay for the loss of your shack. After a large loss is paid, your insurance is reduced by a corresponding amount; so after repairs are made, you must again increase your coverage to the correct amount.

Coinsurance: In locations where fire protection is excellent, you may feel that a small amount of insurance will cover any possible loss. This may be a dangerous assumption. In some localities fire insurance policies may specify that you must carry a certain percentage (usually 80%) of the value of the property at the time of the loss. This does not mean that you will be refused a smaller amount. It means

that if you carry less than the specified amount, you will only have partial protection on *any* loss. Any insurance broker can advise you if coinsurance contracts are written on private dwellings in your locality.

Personal Property Fire Insurance covers your transmitters, receivers, and (usually) antennas, as well as your family's personal property. When the antenna system is valuable it is essential to have it specifically mentioned in the policy, with its value rather closely estimated, to insure adequate protection, not only on it, but on the other property as well.

Standard Fire Insurance costs about $4.00 per $1,000. It protects against lightning and fire, and losses from water, etc., incurred in fighting the fire. An Extended Coverage endorsement adds protection against smoke from faulty cooking and heating devices with chimneys, windstorm, tornado, cyclone, explosion, hail, vehicles (except those of the insured or his tenant), aircraft, riot, and riot attending strike.

To an amateur the main restrictions in Extended Coverage Insurance are those concerning snow, cold, and water. One effect of them is evident when an antenna is damaged in a sleet storm, accompanied by wind. If you could prove that the wind was strong enough to cause the damage without the sleet, you would be entitled to compensation. But if the sleet played even a small contributory part in the damage, you would be out of luck. From the

practical standpoint you would be lucky to get even a small settlement under the circumstances.

Extended Coverage can be added either to Real or Personal Property Fire Insurance for $1.00 per $1,000. To be of maximum benefit it must be added to all your fire insurance. If you added the endorsement to only half of it, any losses covered under the Extended Coverage provisions would only be 50% covered.

The requirement of full Extended Coverage does not mean that if you add the protection to your Personal Property Fire Insurance, you must also add it to your Real Property Fire Insurance, but it is very wise to do so. Why? Suppose a windstorm topples your antenna against your house, doing considerable damage. The Extended Coverage on your personal property would reimburse you for the loss of the antenna, but unless you also have Extended Coverage on the house, you would have to pay for the damages on it yourself.

We have already discussed how Comprehensive Personal Liability Insurance will protect you if the antenna falls on your neighbor's property.

Vandalism and Malicious Mischief: Protection against these hazards can be added to Extended Coverage Fire Insurance for $0.70 per $1,000. Like Extended Coverage, it must be written in the same amounts as the basic policy. The protection afforded requires no explanation. However a Personal Property Floater, or Theft Insurance also provides protection against such losses.

A few precautions should be observed in conjunction with fire insurance policies, with or without Extended Coverage. It is advised that your coverage be in as few policies as practical. And while insurance on real property and household goods are considered separately, they can both be written in a single policy. If the property is covered in more than one policy, its description should be exactly the same in each.

Certain questions about insurance puzzle many amateurs. I paraphrased some of them, and put them to various insurance authorities. The questions and their answers follow:

Question: If I forget or neglect to ground my antenna system, and lightning strikes, does my insurance protection remain valid?

Answer Yes. Situations like these are among the more important reasons for carrying insurance, to protect against loss though accident, negligence, or oversight. Should your action cause damage to your neighbor's property, you might conceivably be held liable, but your Comprehensive Personal Liability Insurance would protect you.

Question: Would I be protected if damage, injury or death resulted from a piece of equipment later found not to be built according to recognized safety standards?

Answer: Yes, to the limit of the insurance carried. If anyone were was injured or killed, his Life, or Health and Accident Insurance applies. Here again Comprehensive Personal Liability Insurance would protect you against suits.

Question: My transmitter cost me $250.00 to build, if I place no value on my time. An equivalent commercial transmitter would cost $500.00. From which figure would a loss be computed?

Answer: Because it covers the matter so thoroughly, I quote the reply of Mr. John B. Walker, Assistant Manager, Survey Department, The Fidelity and Casualty Company of New York, verbatim: "Fire insurance policies agree to pay the actual cash value of the destroyed or damaged property at the time of the loss, subject of course to policy limits and any coinsurance limits which might be in the policy form. The fact that a home built transmitter cost the owner $250.00 to build would not necessarily limit its value to that figure since the policy reads to the effect that the loss shall not exceed what it would cost to repair or replace the property with material of like kind and quality within a reasonable time. It would appear to the writer that the value of the time spent would necessarily have to be included in a loss settlement since presumably the radio amateur would be entitled to go elsewhere to buy a duplicate of the destroyed apparatus. Proper allowance will, of course, be made for depreciation or obsolescence, or for appreciation if the property has increased in value over its original cost."

Mr. Ira J. Hemingway, Jr., who is better known to hams as W1HUM, ex-W3HUM, W8DHT, Assistant Secretary, The Travelers Indemnity Company calls attention to the "Electrical Apparatus Clause" in the standard fire insurance policy. In effect this clause provides that electrical injury or disturbance to electrical appliances caused by electrical currents artificially generated are not covered *unless fire ensues*. (Italics are his.) This means that a tube or other part fails in the absence of fire you are not protected. But if the failure is caused by lightning you are.

We have now covered the most important forms of insurance of special interest to the amateur, but they do not exhaust the available protection. Other forms are:

Personal Property Floaters: These floaters are, under certain limits, all protection policies against the hazards of fire, burglary, theft, etc. Costing about $18.00 per $1,000, they are usually considered "luxury" insurance, because many of their coverages are available on a more limited scale in Extended Coverage Fire Insurance. One of the most valuable features of the floater is that its protection is available anywhere in the Western Hemisphere by paying an extra premium.

A floater does offer about the only possible insurance for amateurs and other transients without a permanent address. The premiums then average about $25.00 per $1,000. It also affords some protection to portable and mobile equipment. But the

(*Continued on page 99*)

144-Mc Field Strength Meter

LLOYD V. BRODERSON, W6CLV*

On the band of high-gain beams, this is an essential tool.

PRIOR TO AND during the early part of the war, the basic components of most field strength meters consisted of a 1-ma meter and a diode or triode rectifying tube powered by portable batteries. Its sensitivity was good at the low frequencies, but when checking low-power emissions at the very-high frequencies it left much to be desired.

With the trend toward the use of more efficient antenna systems at 144 mc, a field strength meter is often required, especially since it affords the user a visual indication of beam patterns. The unit described was constructed for that purpose. It employs a diode crystal rectifier as the detector element and a two hundred microammeter indicating unit.

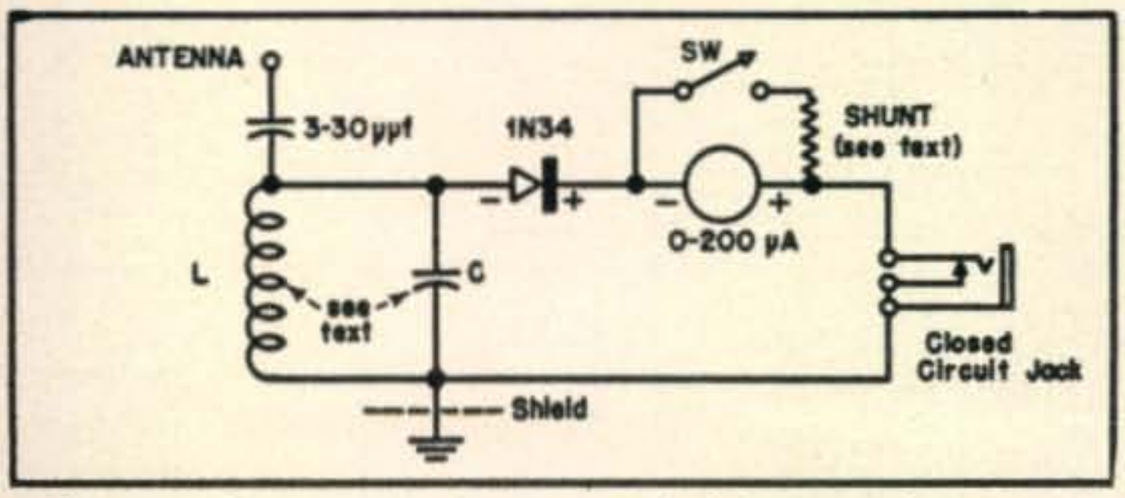


Fig. 1. Diagram of 144-mc field strength meter.

The circuit of the field strength meter is shown in *Fig. 1.* A standard tuned circuit covers the 2-meter band. The detector is the 1N34 Germanium crystal diode in series with the meter and phone jack. A shunt across the meter precludes any possibility of meter burnout when used in a strong r-f field. The headphone jack is normally closed, but may be used to monitor i-c-w and voice transmissions. A short metal rod coupled to the tuned circuit through a padder condenser completes the circuit.

**State Dept. of Agriculture, State Office Building No. 1, Sacramento, Calif.*

Construction

The unit is housed in a black crackle finish metal utility cabinet measuring 4" x 5" x 3". Both front and rear panels are removable. A 2-1/8" meter cut-out is made in one of the removable panels 1¾" from the upper edge. Directly below the cut-out and 1-3/16" from the side edges two holes are drilled, one for the tuning condenser and the other for the phone jack. Both holes are 1" from the bottom edge of the panel. On the right side of the cabinet 1½" from the top and 1½" from the back a hole is drilled for the SPST switch. On the top there is another hole 1½" from the back and 2" from the sides. This is used to mount the lucite feed-through insulator for the antenna.

The antenna coupling condenser is held in place and insulated from the metal cabinet top by a one-inch long steatite bushing. After this condenser has been located a hole is drilled in the back panel and made sufficiently large to allow the clear passage of a screw driver to adjust this condenser. It might be advisable to mount a small piece of lucite behind the back panel to insulate this condenser. The strip need only be about ¾" wide and 1" long.

The tuning condenser was originally a five-plate midget, but three plates were removed to spread the 2-meter band out over the dial. The coil consists of three turns of No. 14 enameled wire ½" I.D., spaced to cover a winding length of ¾". The coil is soldered directly across the condenser frame. No pruning should be necessary—contracting (to decrease frequency) or expanding (to increase frequency) the coil turns will shift the desired frequency range about on the dial.

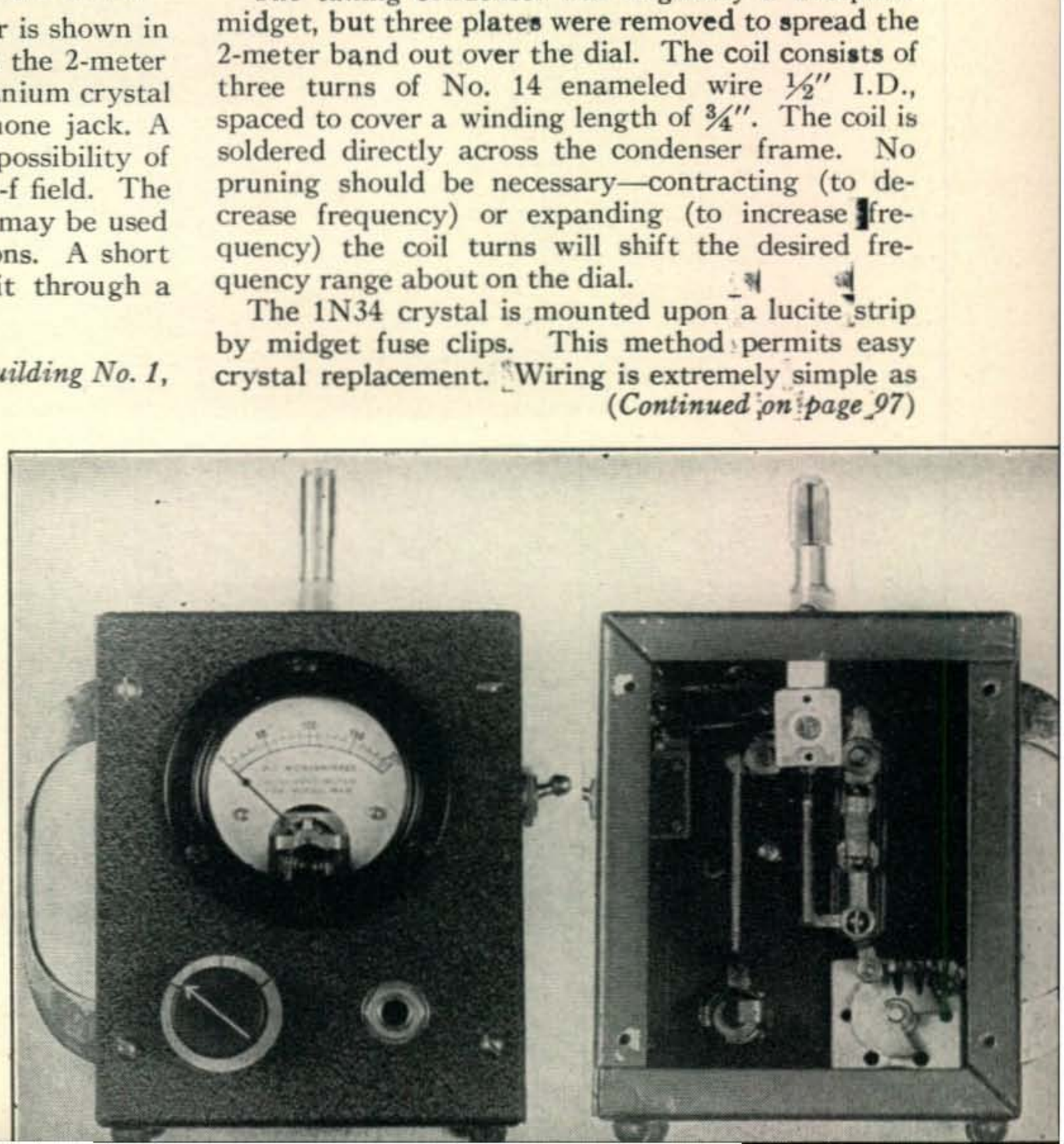
The 1N34 crystal is mounted upon a lucite strip by midget fuse clips. This method permits easy crystal replacement. Wiring is extremely simple as

(*Continued on page 97*)

◆ ◆

Front and back views show the extreme simplicity of the unit. For maximum flexibility a carring handle is provided. The toggle switch is used to safeguard the meter against excessive r.f. in a strong field.

◆ ◆



The Amateur Newcomer

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

Complete c-w transmitter

IN PREVIOUS ARTICLES the reader has become familiar with the principles of, and the equipment necessary for, amateur radio communication. By this time, he is probably ready to think seriously about getting on the air. It is expected, of course, that he has obtained, or is in the process of obtaining his licenses, since that is the purpose of the effort he has devoted to the study of these articles.

The transmitter to be described is sufficiently flexible to satisfy most operating needs, except those of the ultra-high frequencies, where different equipment must be used because of the special requirements of this portion of the spectrum. The complete transmitter, including the r-f section and power supply, is shown in *Fig. 1.*

The R-F Section

The r-f section may be seen in *Figs. 2* and *4*; the wiring diagram is shown in *Fig. 3.* The chassis measures 8″ x 17″ x 2″, and it is advisable that the general layout of the parts be followed. It will be necessary to fabricate some metal pieces that are used for shielding and for mounting the tuning capacitors for the first two stages. The shields for the 807 tube can be seen in the photographs. The main shield, upon which the tube socket is mounted, is L-shaped and is 3¾″ high; one side of the shield is 4½″ long and the other side is 2¾″. The second shield is mounted on the 807 plate coil socket and extends to a height of 3¾″ above the chassis, level with the first shield. The 807 itself is mounted so that the center of the socket is 1¾″ from the chassis; the round shield can for this tube is one purchased for this specific purpose. In *Fig. 4* it will be seen that the two midget tuning capacitors for the first two stages are mounted on a small bracket, fastened to the chassis by means of two machine screws; this bracket measures 2″ x 4″. Both shields are made of 0.051″ SO aluminum, although slightly thinner sheet steel may be used.

The coil sockets for L_1, L_2, and L_3 are five-prong ceramic tube sockets and all are mounted on bushings so that they clear the chassis by one-half inch; this permits connections to be made either above or below the chassis without the use of feed-through insulators. The swinging link assembly and coil socket for the final amplifier tank are mounted on1″ bushings to the left of the final tank capacitor.

All of the tuning capacitors are insulated from the chassis, since they are all "hot," or above ground by the amount of the plate voltage supply. The capacitors for the first two tuned stages are of the air-padder type and their mounting studs are insulated from the rotor by their ceramic frames, therefore requiring no special mounting procedure. The tuning capacitors for the 807 tank circuit and for the final are mounted on ceramic insulators, those for the 807 tuning capacitor being small ⅝″ cones, while those on the final tank capacitor are flat ceramic bottons such as the Johnson No. 55 or National XS-6. The neutralizing capacitor for the 809 is mounted on a ⅝″ feed-through insulator,

TABLE I
COIL COMPLEMENT

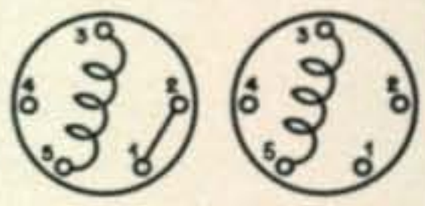
OUTPUT BAND (MC)	CRYSTAL	L1 1ST SECTION 6A6	L2 2ND SECTION 6A6	L3 807 PLATE COIL	L4 809 PLATE COIL
3.5–4.0	80 M	X	A	A	B&W 80 BVL
7.0–7.3	80 M	A	B	B	B & W 40 BVL
	40 M	X	B	B	
14.0–14.4	80 M	A	B	C	B & W 20 BVL
	40 M	B	C	C	
28.0–29.7	40 M	B	C	D	B & W 10 BVL

"X" = CRYSTAL PLUGGED IN SOCKET IN PLACE OF L1.

TABLE II
L1, L2, L3
WOUND ON 1.5" DIA. 5-PRONG FORMS

COIL	BAND (MC)	COIL DESCRIPTION
A	3.5-4.0	34 TURNS-NO.18EN.-1.5" LONG
B	7.0-7.3	18 TURNS-NO.18 EN.-" "
C	14.0-14.4	9 TURNS-NO.16 EN.-" "
D	28-29.7	3 TURNS-NO.16 EN.-" "

COIL CONNECTIONS
(TOP VIEW)



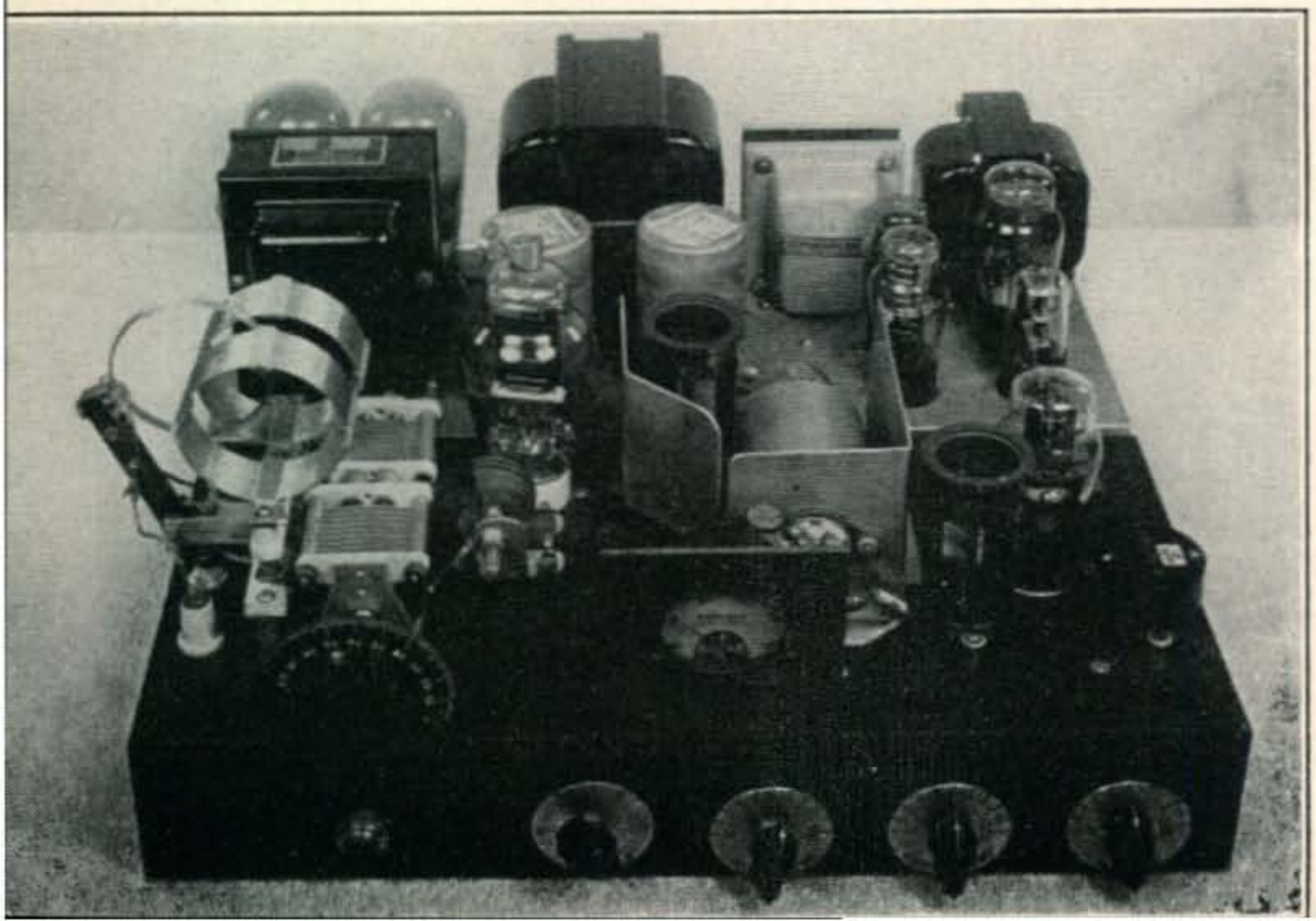


Fig. 1. The c-w transmitter. Mechanical operations have been limited to those which can be done with simple tools.

enabling the connection to the rotor to be made through the chassis directly to the grid of the tube.

As may be seen in *Fig. 4*, the metering resistors, $R_{A\text{-}F}$, are soldered directly to the contacts of the metering switch, and the circuits to be measured are wired to the switch. A word concerning the selection of a switch is in order here. The switch shown here is one which normally has eleven positions for two poles; five positions have been removed (every other one), so that six remain with larger separation. If available, a ceramic switch should be used.

The actual wiring of the unit is straightforward and should offer no particular obstacle. It is advisable that good quality hook-up wire be used, especially in the high-voltage circuits, since, under modulation, peak potential differences as high as 1500 volts may be present. The filament circuits should be connected with at least No. 18 wire to reduce the voltage drop at the tubes. All small parts, such as r-f chokes, small fixed capacitors and resistors, should be soldered rigidly in place, preferably between tube-socket clips, tie points, etc.

Table I gives the coil complement for each of the bands for which the transmitter was designed. *Table II* gives the actual coil dimensions and the coil connections. The coils for the first three stages are all wound on 1½" diameter 5-prong forms. Although enameled wire is specified, cotton-covered wire may be used. When the coils have been wound and have been found to tune the desired range, they may be given a coat of polystyrene "dope" which will prevent the turns from changing position on the form. The dope should not be applied without first determining whether or not the coil will tune the band; some adjustment in the number of turns may be necessary. If the coil shows indication of resonance with the tuning capacitor at maximum capacity, then more turns will have to be added to increase the inductance of the coil, thereby bringing the circuit into resonance with the capacitor near mid-capacitance. If the coil shows indication of resonance with the capacitor set at minimum capacity, then turns will have to be removed, reducing the inductance of the coil. A fuller explanation is given in the section on tuning up the transmitter.

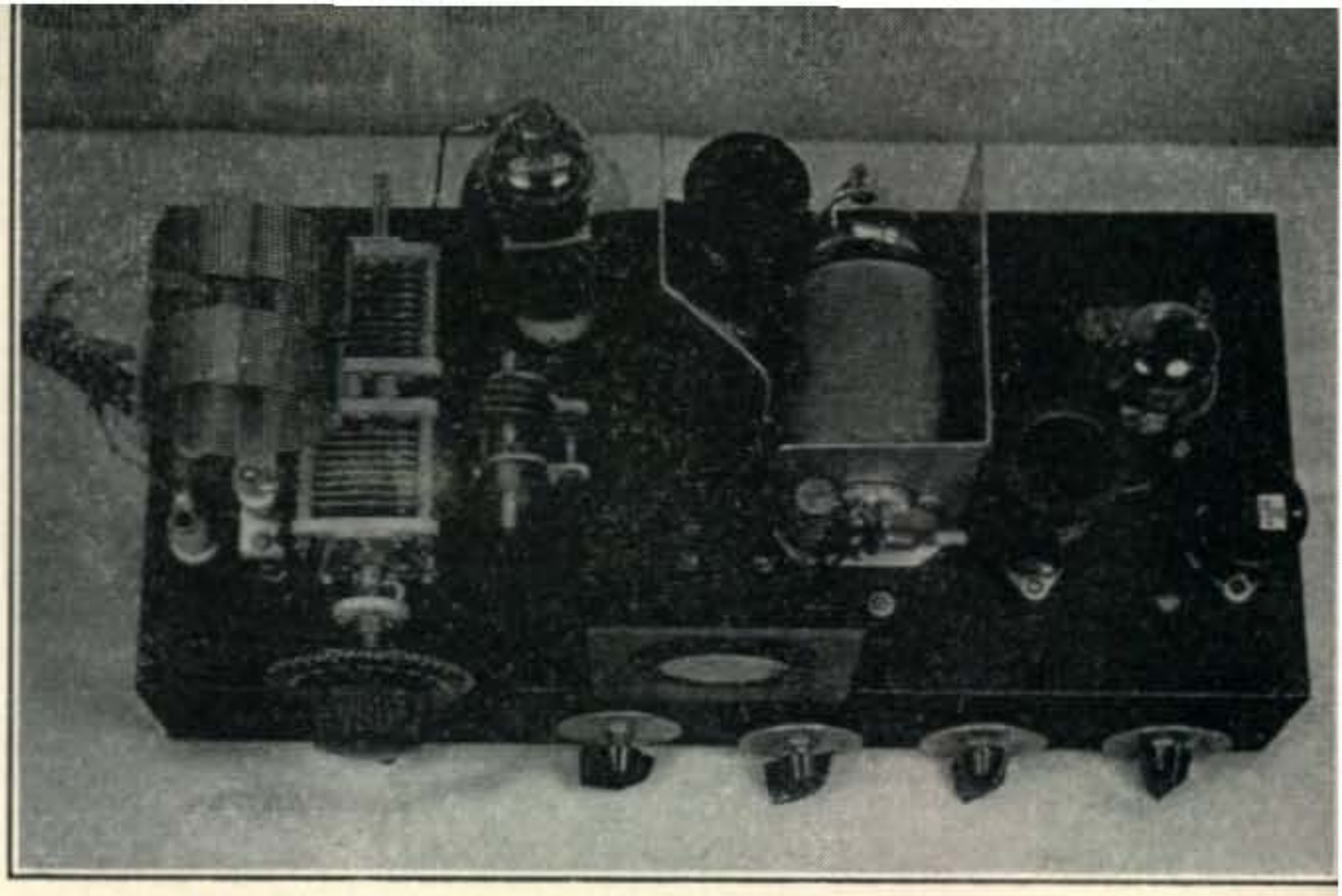


Fig. 2. The radio-frequency chassis.

The Power Supply

The wiring diagram of the power supply is shown in *Fig. 5*. It is built on a chassis measuring 7" x 17" x 3". The selection of parts other than specified may dictate the use of a slightly larger chassis than this. A feature of the power supply arrangement is that the connections to the r-f section are made through 7-prong tube sockets which are placed so that they will just take the 7-prong male plugs from the r-f section. Some care will have to be exercised in the alignment of the sockets to prevent

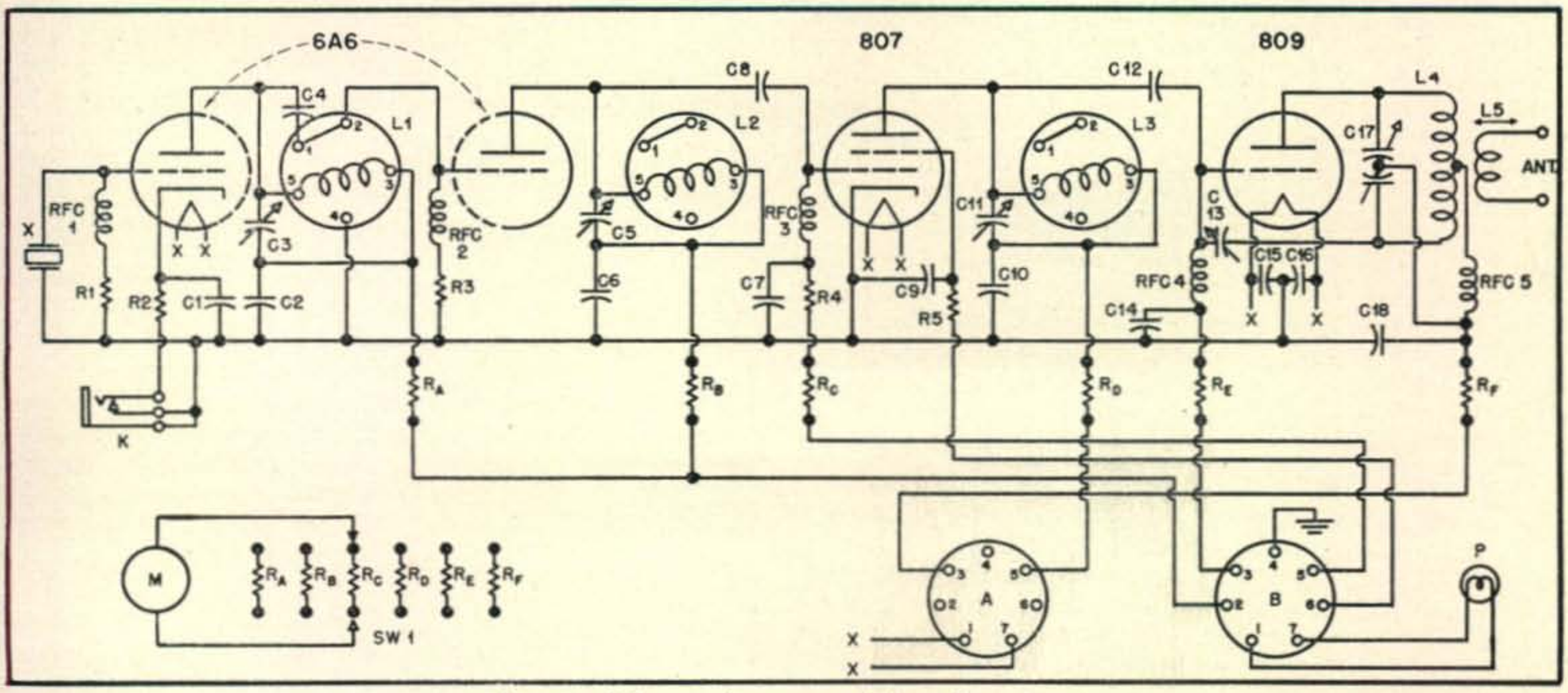


Fig. 3. Wiring diagram of the r-f section.

C_1, C_2, C_6—0.02 μf, 400 volts, tubular.
C_3, C_5—100 μμf, midget variable.
C_4, C_8—50 μμf, ceramic or mica fixed.
C_7, C_{14}—0.01 μf, 400 volts, tubular.
C_9—0.05 μf, 600 volts, tubular.
C_{10}, C_{18}—0.001 μf, 1200 volts, mica.
C_{11}—75 μμf, double-spaced variable (Bud MC1864).
C_{12}—50 μμf, 1000 volts, ceramic or mica fixed.
C_{13}—15 μμf, neutralizing capacitor (Bud 565).
C_{15}, C_{16}—0.001 μf, 600 volts, mica.
C_{17}—100 μμf per section, 2000 volts (Johnson 100FD20).
R_1, R_3—10,000 ohms, ½ w.
R_2—400 ohms, 10 w.
R_4—30,000 ohms, 1 w.
R_5—470 ohms, ½ w.
$R_{A\text{-}F}$—25 ohms, 1 w.
X—Crystal (See Table I and text).
M—0/200 or 0/300 d-c milliammeter.
SW_1—Meter switch, 2-pole 6-position.
P—6-volt pilot lamp.
K—Jack for key, closed circuit.
RFC_1, RFC_2, RFC_3, RFC_4—2½-mh. r-f chokes (National R100).
RFC_5—1 mh. r-f chokes (National R300).

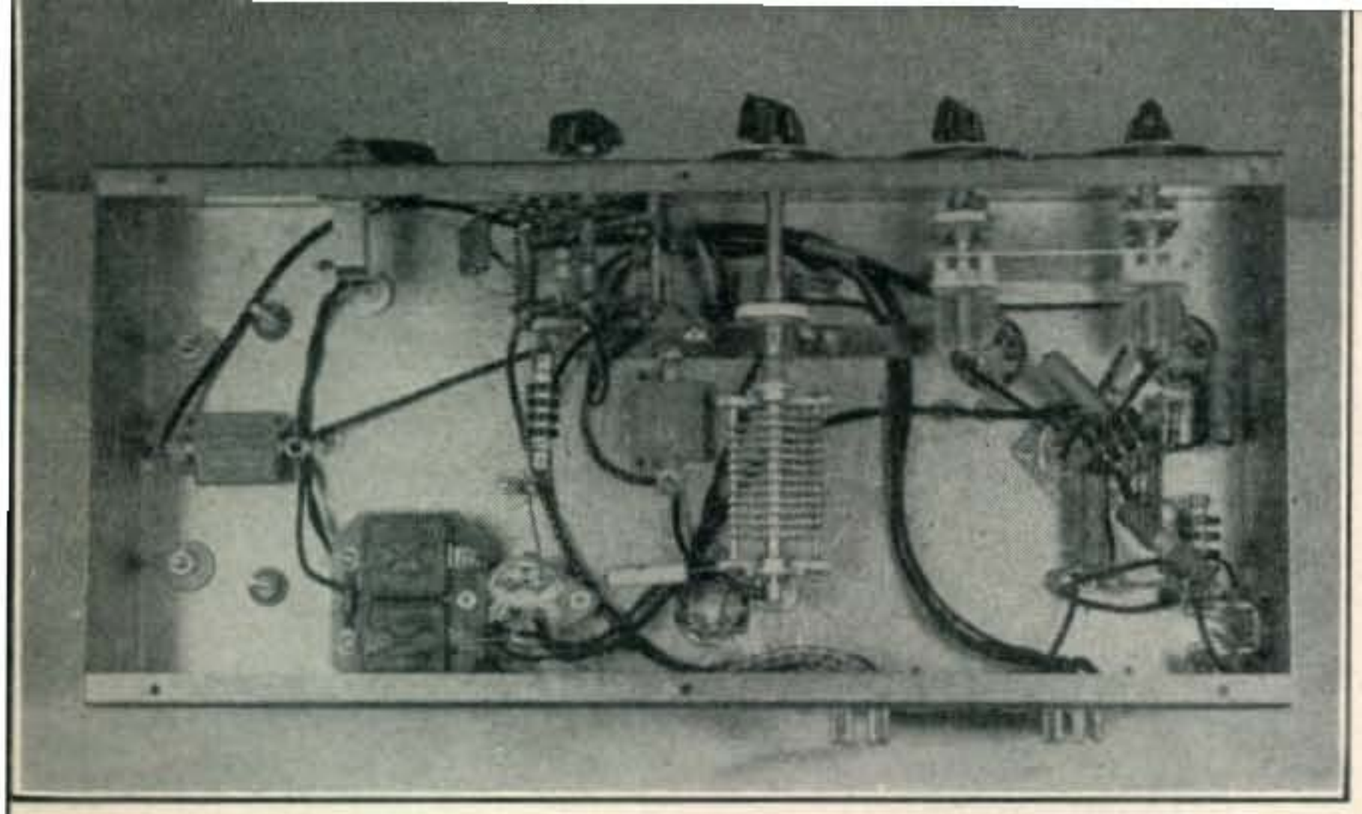


Fig. 4. Bottom view of the r-f section.

binding of the connecting prongs. The connections for the 117-volt line are brought into the chassis through a 5-prong male plug, and it will be noted that the connections for the plate and filament transformer primaries are separate. The reason for this is that the SEND-RECEIVE switch, closing the primaries of the plate transformers, will probably be located at the operating position, and the arrangement shown easily permits this. If it is desired, the fifth prong on the input socket may be used for grounding the chassis of the power supply.

The power-supply contains three separate units: the high-voltage supply for the 807 and 809, the low-voltage supply for the 6A6, and one providing negative grid bias for the 807 and 809. The first two supplies are quite conventional. The high-voltage supply employs a transformer which should have ratings approximately as shown on the list of parts; it is desirable that the transformer have at least two ranges of voltages so that adjustments may be made at a lower voltage than that used for operation. *Fig. 6* shows the underside of the chassis, and it will be seen that there are fuses in the primary circuits of the two supplies mounted in a two-way holder; F_1 and F_2 in the wiring diagram. The other fuse, F_3, is included in the circuit to offer additional protection for the 809. F_3 is removed during the neutralizing process to break the plate supply to the 809. R_1 and R_2 are adjustable voltage dividers which also act as a bleeder for the power supply. It will be noted that two separate resistors are used in series; one tap, for the 807 plate, must be capable of passing up to 100 ma or so, while the other tap, for the 807 screen, need only pass about 10 ma. If a single heavier duty bleeder were used one of much higher wattage would be required than is shown here.

Capacitor C_1 as built into the power supply actually is two 2-μf capacitors; of course, one 4-μf capacitor of the same voltage rating may be used. The filter choke, L_1, was found to be entirely adequate for this application, although most designs for power supplies recommend that two chokes be used. If the builder wishes, another choke can be included, resulting in a filter of the choke-input type, described in a previous article on power supplies.

The low-voltage supply for the 6A6 makes use of an ordinary receiver-type power transformer having 5-volt and 6.3-volt windings in addition to the high-voltage windings. The 5-volt winding is not used, but the 6.3-volt winding operates the pilot lamp on the front of the r-f section; this signals the fact that the high-voltage supplies are on. The rest of this supply is conventional and consists of the type 80 tube for the rectifier and a single-section pi filter.

The supply for the bias of the buffer and amplifier will bear a little explanation. Since the voltage above ground from this source is negative, the supply is said to be "inverted." Inspection of the wiring diagram will disclose that the rectifier, a 6X5 tube, obtains its voltage from one side of the low-voltage transformer, T_4, and that this voltage is applied to the cathode. In this way the tube operates as a half-wave rectifier of the voltage between one side and the center-tap. The filter for the bias supply consists of R_5 and C_4; this arranegment is quite adequate, for there will be very little current drain from this source. Unless some method of regulation were provided, the bias voltage would be subject to variation when grid current flows. To maintain constant bias voltage, the two voltage-regulator tubes are included. As shown, the VR75/30 regulates the bias on the 807 grid and the VR150/30 regulates the bias on the 809 grid. These regulator tubes have the property of maintaining constant voltage between cathode and anode regardless of the current passing through the tube, provided that it is within certain limits—5 to 40 ma in the case of the tubes used. It is not expected that the grid current on the 809 will exceed 40 ma on c.w., and the grid current on the 807 will be about 2 ma. Sufficient latitude in the values of the dropping resistors to the VR tubes has been allowed to cover the possibility in some cases of using either a VR105 or a VR75 in place of the VR150.

A word of caution about the use of the high-voltage supply: It is impossible to show *too* much respect for high voltage, and it is strongly recommended that the supply be *turned off* when making any adjustments not provided for by insulated knobs on top of the chassis. Under no-load conditions, the output voltage from the supply will be as high as 1000 volts.

Single-Switch Control

When operating on the air it is desirable to have a single switch which simultaneously controls the plate supply to the transmitter, changes the antenna from the receiver to the transmitter, and breaks the plate supply to the receiver. An arrangement for doing this is shown in *Fig. 7*. Connection to the 117-volt line is made through the 5-prong plug on the power-supply chassis. Two switches will be needed at the operating position; one, SW_2, closes the circuit to the primaries of the filament transformers, and the other, SW_1, is the send-receiver switch. Operation of SW_1 closes the circuit to the primaries of the plate transformers, breaks the plate supply in the receiver, and closes the antenna relay which changes the antenna from the receiver to the transmitter. The cable to the power supply consists of four wires and may be made up from lamp cord or some similarly suitable wire.

Tuning Up

The process for tuning up the rig for the 3.5 to 4.0-mc band will now be described. The procedure for the other bands is quite similar in most essentials. Reference to *Table I* gives the necessary information as to the coils required for operation in the desired band. The table shows that two type "A" coils are required and that, in place of L_1, a crystal is plugged in the socket. The absence of L_1 breaks the coupling to the plate of the first section of the 6A6 and at the same time breaks the plate supply to that section. The second section of the tube then acts as the crystal oscillator. In the initial tuning-up process the two fuses, F_2 and F_3, should be removed.

After the above has been accomplished, close the filament switch. It will take about a minute for the

filaments to warm up. In the meantime, turn the metering switch to the second position; no reading should be obtained in the first position, since only the second section of the 6A6 is being used at this time. After filaments are warmed up, close the SEND-RECEIVE switch and note the recording of the milliammeter. The chances are pretty good that very little current will be indicated. Adjustment of the tuning capacitor, C_5, will cause the current to increase when the crystal starts to oscillate. This is because the 6A6 is a "high-mu" tube and even with zero bias the plate current is low; as soon as the crystal begins to oscillate the operation is analogous to that of a Class C amplifier. Increased current is an indication of resonance in the plate circuit of this tube when it is used as a crystal oscillator, though it should be pointed out that this condition is quite generally the opposite with most other (low-mu) tubes, the plate current ordinarily being very high when the crystal is not oscillating or when the plate tank is detuned.

Before proceeding to tune the next stage, the 807, it will be necessary to set the voltage dividers in the power supply. As a starter, set the tap on R_1 about one-third the way down from the positive end and the tap on R_2 about in the center. Replace the fuse, F_2. Because the 866 Jr. rectifier tubes are of the mercury-vapor type and these tubes get mercury deposited on their filaments in handling and in transit; if they are subjected to plate voltage with the mercury still on their filaments, they will be permanently damaged. To prevent this, the first time the filaments are turned on they should be permitted to heat at least one half hour before applying high voltage.

After the rectifier tubes have been "seasoned," the send-receive switch may be closed, applying

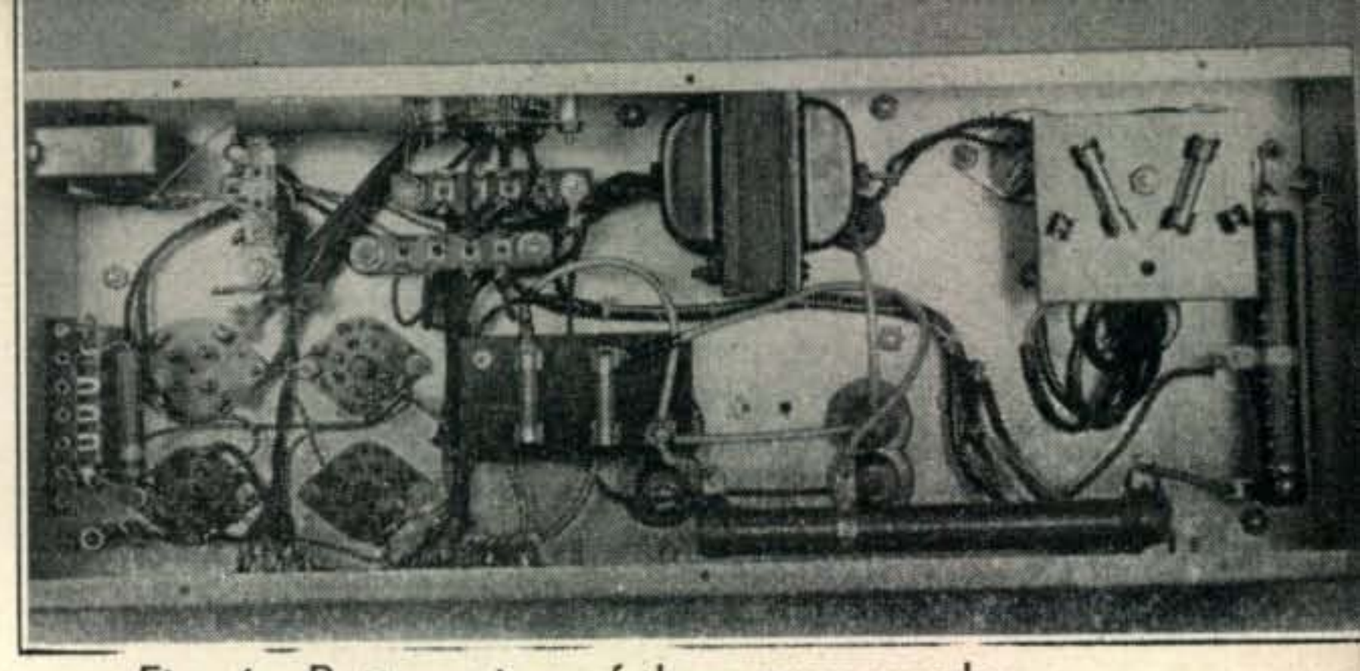


Fig. 6. Bottom view of the power supply.

plate and screen voltage to the 807. Move the metering switch to the fourth position so that it will permit the plate current in the 807 to be read. Adjust the tuning capacitor for that stage until the plate current is minimum; this should not be greater than 75 ma. It is possible that some further adjustment in the crystal stage will be required, though this is not expected. Move the metering switch to the fifth position so that the meter reads the grid current on the 809. This current should be about 20 to 40 ma, and it probaby can be increased by further adjustment of the tuning on the 807. The last step in the adjustment of the 807 should be to check the settings of the taps on the voltage dividers to see that the proper voltages are being applied to the tube. The plate voltage should be between 550 and 600 and the screen between 200 and 250 volts. Measure these voltages *at the voltage divider* and not at the tube socket itself; to measure the plate voltage at the tube would subject the measuring instrument to the application of r. f. which could damage the meter.

Neutralization

The next step is to neutralize the 809. This is done with no plate voltage on the 809, but with the

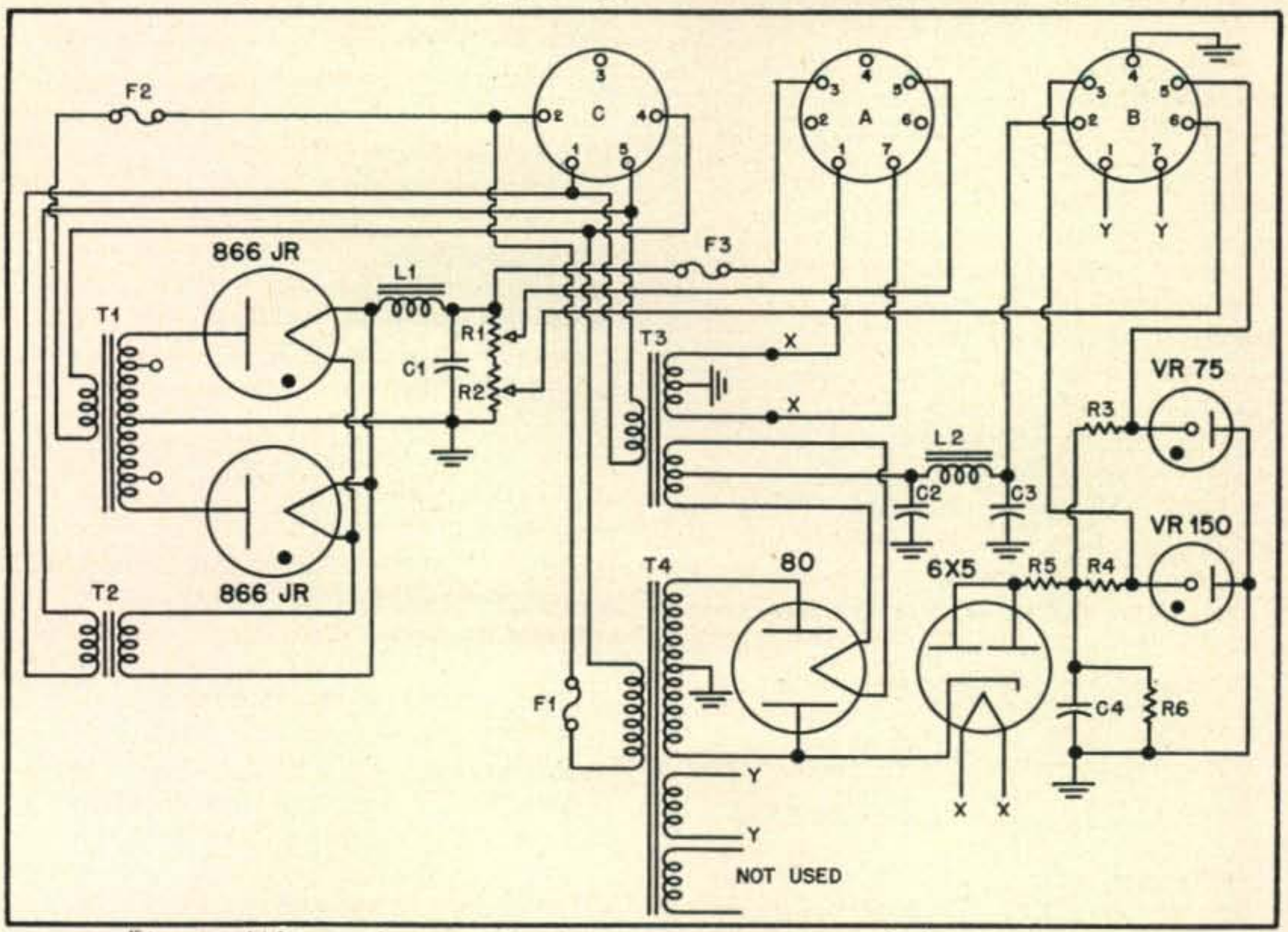


Fig. 5. Wiring diagram of the power supply for the c-w transmitter.

C_1—Two 2 μf 1500-volt oil-filled capacitors (1000-volt oil-filled may be used).
C_2, C_3, C_4—8 μf, 450 volts, electrolytic.
R_1—4000 ohms, 75 watts, adjustable wire wound.
R_2—25,000 ohms, 75 watts adjustable wire wound.
R_3, R_4—15,000 ohms, 1 watt.
R_5—10,000 ohms, 10 watts.
R_6—20,000 ohms, 10 watts.
T_1—900/800 volts each side of center @ 225 ma. (Thordarson 19P56).
T_2—2.5 volts @ 5 amp.
T_3—5.0 volts @ 3 amp., 6.3 volts @ 5 amp.
T_4—700 volts c.t. @ 50 ma.
L_1—15-henry, 250-ma choke.
L_2—20-henry, 50-ma choke.
F_1—3 amp. fuse.
F_2—5 amp. fuse.
F_3—¼ amp. fuse.
A, B—Large 7-prong sockets.
C—5-prong male plug.

807 operating normally, supplying grid current to the 809. With the meter indicating final grid current (position 5), tune the final tank capacitor from maximum to minimum capacity. In doing this there will be found a point at which the grid current suddenly changes value (unless by a great stroke of luck the amplifier happens to be neutralized by the random setting of the neutralizing capacitor). The dip in grid current when tuning the plate tank is indication that the amplifier stage is not neutralized. If operated in this condition, it would have a tendency to oscillate and generate spurious frequencies.

To neutralize the stage, set the neutralizing capacitor, C_{13}, at its minimum capacity; then gradually increase its capacity until a setting is found which results in no change of the grid current reading as the plate tank is tuned from maximum to minimum capacity. In making the neutralizing adjustment, it is absolutely necessary that C_{13} be adjusted with an insulated screwdriver. The best tool is a length of ¼"-diameter polystyrene rod filed down on one end to make a screwdriver tip. If the hand is brought too close to the circuit during the process, an accurate adjustment cannot be made.

After the neutralization has been completed, tune the final plate tank from maximum to minimum capacity, carefully noting the grid current. The grid current may still gradually change in one direction as the tank is tuned, but there should be no sudden change. The gradual change which will be seen is normal for amplifiers of this type employing high-mu tubes such as the 809, and is accounted for by the increased grid-to-ground capacity presented by the split-stator tuning capacitor.

For the initial adjustment of the final, a dummy load should be used such as an electric light bulb Since the output from the amplifier is expected to be something like 70% of the 75 watts input, a 60-watt lamp may be used. The dummy load should be connected across the output link with the link, L_5, about half meshed with the tank coil, L_4. Replace the fuse, F_3, in the power supply so that plate voltage may now be applied to the 809. Close the SEND-RECEIVE switch with the metering switch in the last position, giving plate-current indication on the final amplifier. The meter will probably read a very high value, but immediate tuning of the final amplifier will bring this reading down to a reasonable value. At resonance the plate current will dip to its minimum value; the minimum value will be governed by the amount of coupling between the final tank and the dummy load. With no coupling at all, the minimum value of the plate current will be around 15 ma. By increasing the coupling the load on the final amplifier may be increased to its operating value of 100 ma.

When the adjustments described have been satisfactorily completed, the transmitter is ready for use. The antenna may be coupled to the link through the change-over relay, mounted as close to the link as possible. The key may be plugged into the jack provided for the purpose in the end of the chassis. The tuning of the antenna to the transmitter merely consists of varying the amount of coupling between L_4 and L_5 to give the desired loading on the final amplifier.

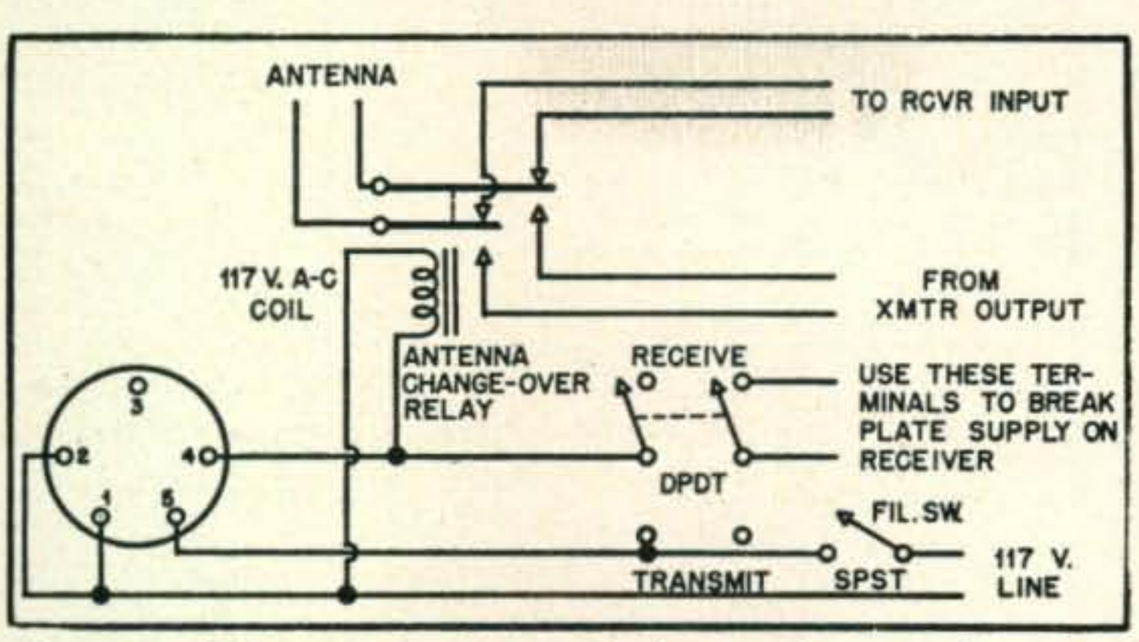


Fig. 7. Wiring diagram of the single-switch control for the c-w transmitter.

Other Bands

To tune the transmitter up for operation on one of the other bands, the procedure is much the same as that just outlined for the 3.5-mc band. The method of tuning up for 10-meter operation will be given briefly.

Table I shows that coils B, C, and D are used for L_1, L_2, and L_3, and that the tank coil for the final is a B & W 10BVL. It is also shown that the crystal used to give output in the 10-meter band has a fundamental frequency in the 7.0-mc region and that the crystal is placed in its own socket. The output frequency will therefore be four times the crystal frequency. After deciding upon the output frequency (in the c-w portion of the 10-meter band, between 28.0 and 28.5 mc) a crystal may be selected to give as nearly as possible the desired frequency.

When the first three stages are used in 10-meter operation, each one acts as a doubling stage; that is to say, the frequency of the output from each of these stages is twice that of the input, or of the previous stage. Under these conditions, each of the stages will operate less efficiently than it does as a straight amplifier, and this fact will have to be taken into consideration when making adjustments. The final amplifier is operated "straight-through."

With the crystal in its socket, the first section of the 6A6 is used as the crystal oscillator. The metering switch should be in the first position, to measure the current to the oscillator plate. As before, remove the plate voltage from the 807 and the 809 when making the initial adjustments on the first two stages by taking the fuses, F_2 and F_3, out of their holders.

In tuning up the crystal oscillator it will be found that its behavior is like that described above, in that the current will rise as the crystals begin to oscillate. This will be true also of the current to the second stage; as the crystal begins to oscillate, the current to the second section of the tube will rise. With the crystal oscillating, switch the meter to the second section and note the plate current; as just stated, this value will be greater than it would be without the excitation from the oscillator. Tune the plate coil for the second section until a dip is noted in the plate current, and then retune for minimum current. At this point resonance has been established for the first doubler.

It is wise at this point to find out definitely whether the frequency is actually being doubled in the second stage. Checking the frequency on a receiver will not help because it is not possible to distinguish between the fundamental and its harmonics. Since the output should be at twice the crystal frequency, it should be checked with an absorption type wavemeter such as was described in the article on frequency measurement.

This may be done by placing the coil of the wavemeter near the coil of the stage being tuned, in this case, L_2. With the stage in operation there should be an indication near the point on the wavemeter calibrated for 14 mc. If this is not the case, it will be necessary to retune the coil, for it is possible

(*Continued on page 96*)

A Visit to Zanzibar

JOHN POWELL, VQ3HJF VQ4*

DURING THE TWO years preceding the war, and for the last eighteen months, I have given much thought to the question of getting over to Zanzibar, as a portable, but owing to accommodation difficulties (there is no hotel and one has to rely on the hospitality of friends), and the question of the mains supply, which is 220 v.d.c., it amounted to little more than wishful thinking.

However, when plans for a radio telephone link between Zanzibar and Dar es Salaam started to become more concrete, and equipment became available for tests, it does not take a lot of hard thinking to guess who was the first volunteer for the Zanzibar portable end! The worst shock and disappointment of my life was when I found that I was earmarked for the Dar es Salaam terminal, and my most vehement protests went unheeded. But, by one of those queer twists of fate, completely unexpected, I was asked at 2000 hrs. if I could pack and be ready of leave by boat at 1000 hrs. on the following day. Would I be ready! Where was the rig? Where is any rig when you want it in a hurry? In pieces! However, my slaves (one XYL) and I worked into the small hours of the morning and the bits and pieces were put together, and the receiver and transmitter, with two a-c power packs, were packed in boxes with towels, socks, shirts and anything that could be found to stop them bouncing. It was intended to operate the receiver and transmitter from 6 v. batteries for the heaters and use d-c mains as h.v., but the power packs were taken on the off chance that I could borrow a converter. How glad I was that I did, as things turned out.

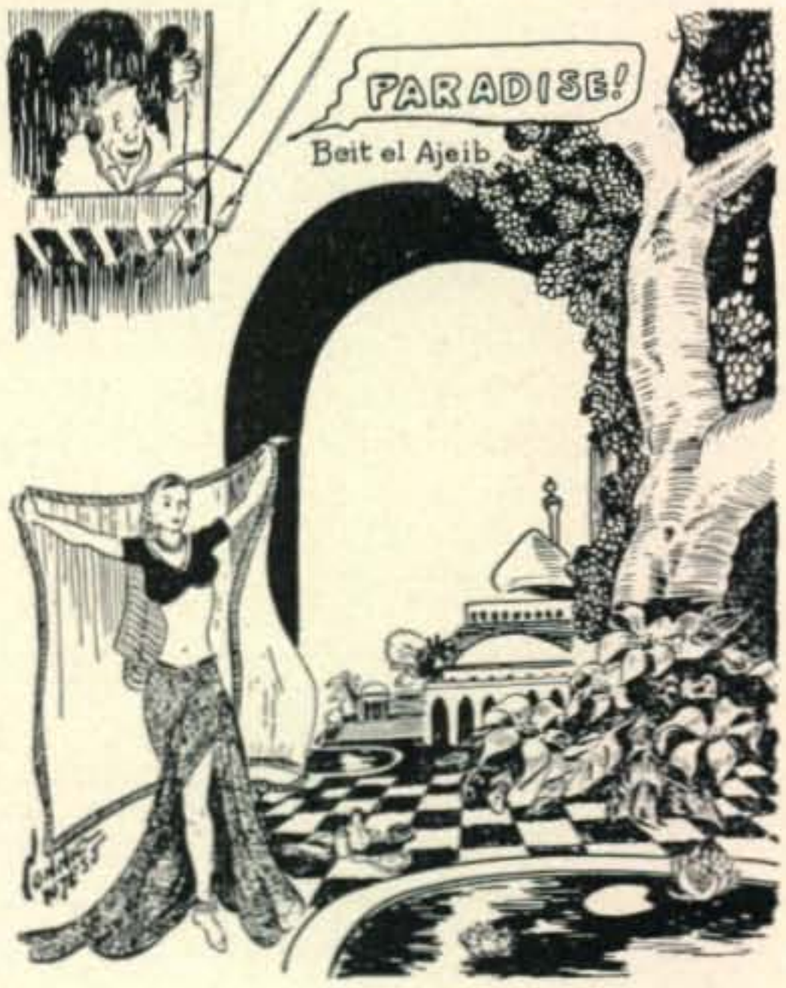
The trip over in a 300-ton coaster was very interesting, as the radio telephone test equipment was temporarily installed and communication maintained with Dar es Salaam for a distance of 25 miles, on 81 mc using 10 watts to a simple dipole slung at the masthead. At this distance signals faded out, owing to the limited height of the portable station's antenna. Five hours after leaving Dar es Salaam I was in Zanzibar—an ancient and mysterious-sounding name for a piece of the world on its own. Surely no other place exists, of its type, more out of the modern world with its narrow paved streets, its tall Arab buildings, Sultan's palaces, and ever present smell of cloves and spices, leaving an old traveller like myself wondering if I was just another Alice in Wonderland.

Thanks to the extreme kindness of Mr. Coutinho, the Officer in charge of the Government Radio Coast Station, a room for the ham rig *and* a d.c./a.c. converter was found. Unfortunately, work coming first (!!!), the rig was just dumped, and the radio telephone equipment installed with a 3-element beam at the top of the Beit-el-Ajeib (the old Palace). The top of the building is 145 ft. above ground level, and commands a completely clear view on all sides—even hills on the mainland, some 45 miles away, could be plainly seen. No better site for radio could be found anywhere, but the incongruity of 81-mc FM equipment—3-element beams and co-axial cable—in such a magnificent old building, with its antique Arab carved and brass studded doors, its courtyard, lofty halls, and its history, left one with a still greater feeling of "Wonderland" than ever.

Tests with Dar es Salaam (45 miles away) established contact on 81 mc, and was big thrill number one of the trip. Much interesting data was collected during the tests, particularly as the height each end (approximately 120 and 160 ft.) did not give a visual path, and the amount of "bending" was found to be particularly erratic during the ten minutes of dusk. However, *retournons a nos moutons* (sorry, hams!)

Time did not permit of any ham work until 16 hrs. on 1st December, when the installation was commenced. Thanks to the loan of the converter, installation was comparatively simple, and VQ1HJP was on the air.

The RX was the normal VQ3 one—a converted Bendix RA1B, and the transmitter (my usual v-f-o exciter) a converted Bendix TA12B with approximately 35 watts input. (As some wise guy said: "You only need a prop and you can take off"). The antennas were hook-up straight wires. (What does any station need but a piece of wet string and a



VQ1 call?). A listen across the old hunting ground of 14000/14200 kc. at 1730 hrs. (Zanzibar time) or 1445 (G.M.T.), and there were the familiar W6s pounding away. A hurried CQ—no soap! A longer CQ—still N.D. A re-check of the TX—all O.K. Another CQ and still N.D. Hear a W6 (he shall be nameless), give him a call—still N.D. Another and still another CQ; nearly an hour and still no VQ1 anywhere QSO. Nearly 1830 hrs. (Zanzibar time) and the W6s getting stronger. Another CQ and at last a reply. Who is it who sounds a little breathless, and a little uncertain of the "1" in my call? Nobody less than my old friend W6VFR. A 579 report—what has been the matter with the other guys?

(*Continued on page 101*)

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Looking Over V-H-F Antennas

C. B. LESTER*

As the frequency of operation gets higher so does the number of different types of antenna. Here is a general discussion of the many types of v-h-f antennas being employed in and out of amateur circles. The first part of this article covers vertical non-directional antennas.

THE COMING OF AGE of the v-h-f spectrum has made it economically possible for the average ham to seriously consider experimenting with antennas, a luxury previously denied all but the commercial point-to-point operators with heavy financial backing.

Of course, hams have been experimenting with antennas since the days of the flat-top and fan counterpoise, but the cost of such an antenna, or even more complex antennas such as the popular rotary beams, is insignificant compared with the complex multi-element arrays used by the long haul commercial stations.

At v.h.f., where antenna elements are so small that they can be constructed quite inexpensively from self-supporting tubing, arrays to accomplish almost any purpose can be erected for a very reasonable cost. This is especially true in the range near the microwave spectrum.

Design of v-h-f arrays on paper is usually quite simple; physical realization of the design is sometimes quite difficult. For instance, theoretically, parasitic elements can be added to a driven element indefinitely with an increase in gain accruing to each additional element. Actually, when dealing with elements of finite conductivity, a condition is rapidly reached where the ohmic resistances combine with a reduction in driving point impedance in such a manner that increasing the number of elements actually decreases the gain.

The purpose of this article, which will be presented in two parts, is to review data on proven v-h-f antennas, giving the advantages and disadvantages of each where these factors are not self-evident. Because of the necessity of drawing from commercial experience and designs, most of the data given here of necessity relates to the commercial 30-44 mc, 72-76 mc, and 152-162 mc bands; all data can be readily converted to ham band design figures, however, by formulas given.

The first part of this article will be concerned with vertical non-directional antennas, and the second with simple horizontal antennas and both vertical and horizontal arrays.

At v.h.f., polarization of the transmitted signal is of primary importance. A station transmitting vertically polarized waves cannot normally satisfactorily work into a station using a horizontally polarized receiving antenna, and vice versa. A signal transmitted with one particular polarization will retain that polarization unless badly refracted, or reflected.

Happily, at v.h.f., an antenna with main radiating elements *vertical* produces *vertically* polarized waves, and similarly *horizontally* oriented antennas produce *horizontally* polarized waves.

Use of either polarization is dependent upon the whim of the operator more than anything, though, of course, if it is desired to work into other nearby stations, their receiving polarity must be determined. While there is some evidence that horizontally polarized waves suffer less attenuation while traveling over average earth than vertically polarized waves, this evidence is far from being conclusive. There is no evidence whatsoever that either

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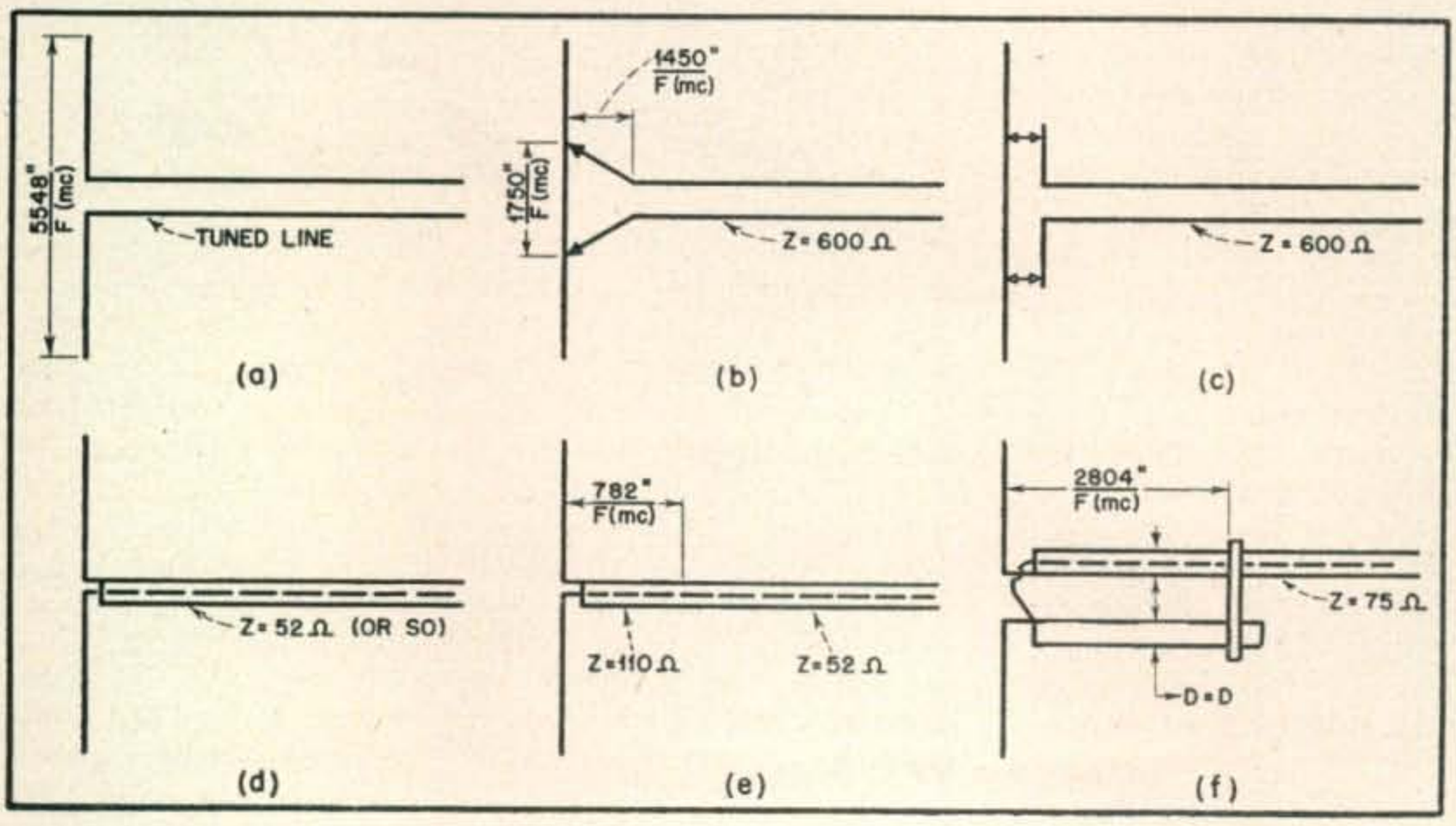

Fig. 1. Six center-fed vertical half-wave dipoles.

polarization is superior to the other on long distance communications dependent upon superrefraction or tropospheric reflections. Actually v-h-f transmissions may be reflected in such a manner that a portion of the energy of an originally horizontally polarized wave may arrive vertically polarized, so that polarization is not too important for extremely long range communications.

Commercial operations involving transmitting into or out of mobile units use vertically polarized antennas of necessity since the "whips" used as antennas on mobile units are vertically polarized. Some commercial point-to-point systems use vertical polarization simply because such equipment is easily available commercially; most lower frequency (6-25 mc) point-to-point systems use horizontal polarization if mobile unit communications are not required because of the ease with which directional arrays can be set up for horizontally polarized systems.[1]

Most vertically polarized systems use non-directional antennas at the fixed stations because of the desire to talk-out to mobile units equally well in all directions. All gain in the antenna must, therefore, be produced by lowering the angle of radiation, and many designs have been worked out to accomplish this. Most designs are based on elimination of undesired radiation from antenna mounting masts and feeders and vertical stacking of radiators. If present, radiation from masts and feeders usually combines with the main signal in such a manner as to effectively increase the angle of radiation, which, of course, is tantamount to a loss in antenna gain.

The Simplest V-H-F Antenna

The simplest antenna at v.h.f. is, as at the lower frequencies, the center-fed shortened half-wave dipole. Theoretically, it has a free space driving point impedance of about 73 ohms, but this may be considerably lower at v.h.f. where the element L/D ratio, resistance, proximity to earth, and many other factors, effectively alter the theoretical value. Though center-fed half-waves are generally fed with 73-ohm coaxial or twisted-pair cable at low frequencies, at v.h.f. a better match is generally obtained with 52-ohm cable. Though this is theoretically only a fair impedance match, reasonable SWRs are obtainable and the system yields excellent results.

Six examples of center-fed (current-fed) half-wave vertical dipoles are illustrated in *Fig. 1.* Alternate *a* is tuned two-wire open line fed, and is impractical above 30 mc or so; radiation from the tuned line may be considerable, and greatly lower the efficiency of the antenna system. Alternate *b* is a delta-section matched two-wire open line feeder arrangement with the feeders untuned (non-resonant). The alternate shown in *c* approximates *b* except that a T-section matching unit is used. In general, the delta-section is the preferable design to use, but the T-section can be more easily constructed at the low frequency end of the v-h-f region.

Alternates *d*, *e*, and *f* illustrate three variations of the coaxial line fed antenna. Alternate *d* is simplest,

[1]Ed. Note: Generally speaking, high directivitity can be obtained most economically by horizontal arrays at the lower frequencies, chiefly because of decreased array height requirement.

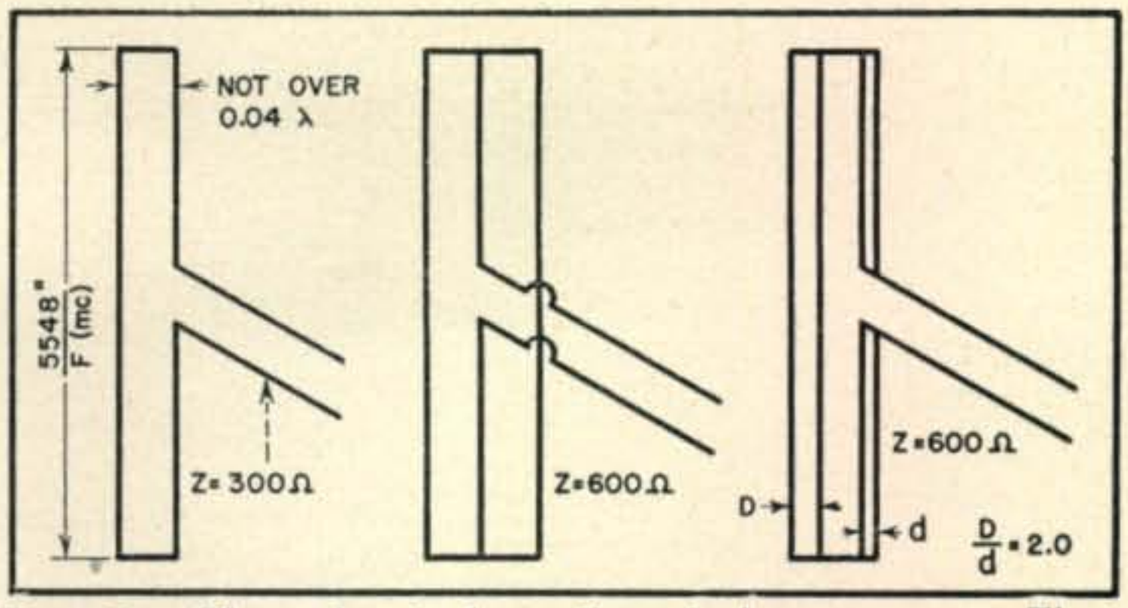

Fig. 2. Three basic broadbanded antennas. Their application is not limited to v.h.f.

of course, but will have a high SWR when required to operate over a wide frequency range. This antenna can be coupled to a receiver or transmitter by a loop (or hairpin at the top end of the v-h-f region) and a suitable condenser in series with the loop to tune out the reactance, reflected into the tank circuit.

The four alternates discussed thus far have been high-*Q* antennas, not adaptable to working over a wide range of frequencies. A fair impedance match can be obtained with an arrangement such as shown in alternate *e* which uses a modified *Q*-section to provide a fair impedance match over a frequency range as high as 1.3-1.5/1. The series *Q*-section should be about 0.1 wavelengths long at the lowest frequency desired, and will substantially compensate for variations in antenna reactance as the frequency increases.

For operations at the extreme high end of the v-h-f region, unbalanced coaxial line feeders unbalance the radiator substantially and antenna current induced on the outside conductor of the feeder is re-radiated, thus distorting both vertical and horizontal patterns. This can be almost eliminated by using a Bazooka-section to balance the line into the antenna as shown in *Fig. 1f.* Other balancing sections have been developed for this work, but the Bazooka-section is as simple as any, and as effective.

The *Q* of the average v-h-f radiator made of relatively small tubular elements is quite high, though, of course, not nearly so high as antennas for, say, 40 meters. This means that unless some sort of "broadening" arrangement is used, the tuning will be very sharp and the frequency band over which the antenna will operate satisfactorily will be quite narrow.

The half-wave center-fed dipole can be broadbanded quite simply by methods illustrated in *Fig. 2;* these methods have the added advantage of raising the driving impedance of the antenna to a point where 300-ohm Twin-Lead or 600-ohm open wire line can be used to advantage.

In *Fig. 2a* two vertical half-wave dipoles have been electrically paralleled by tieing them together at both ends. Feeding one of the elements results in a splitting of the antenna element currents in such a manner that the impedance seen looking into the terminals of the driven element is about four times that of a single vertical half-wave dipole, or approximately 300 ohms, effectively matching 300-ohm Twin-Lead. If it is desired to match a 600-ohm line, three elements can be used which re-

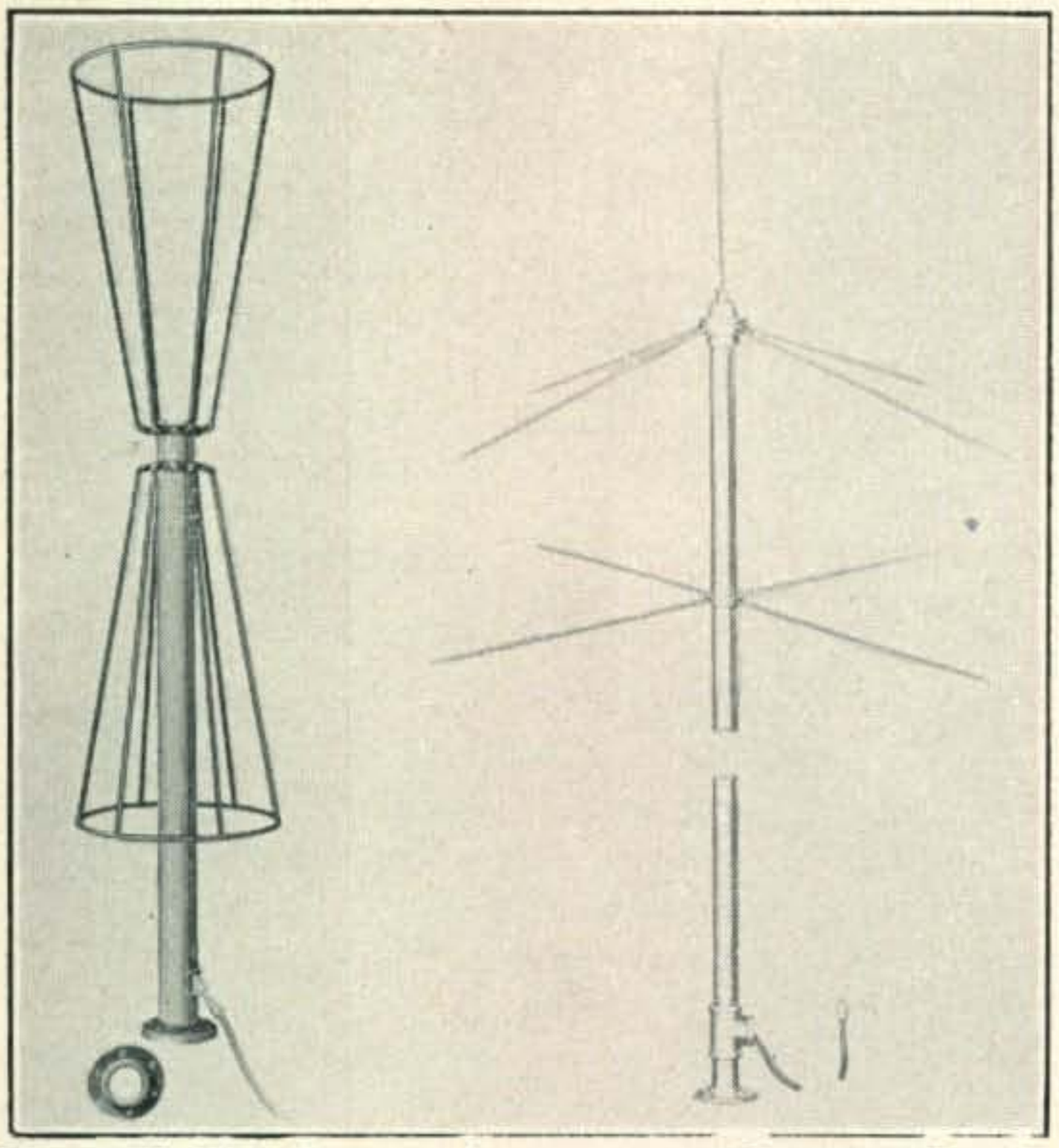

Fig. 3 (left). Biconical antenna. (Courtesy Bendix Company). Fig. 6 (right). Isoplane antenna. (Courtesy Motorola, Inc.)

sult in an increase in impedance of nine times, or slightly more than 600 ohms. In both of these antennas, the elements should not be separated by more than 4% of a wavelength, and preferably should be spaced even closer.

A broad-band antenna matching a 600-ohm line can also be produced as shown in *Fig. 2c* wherein one element is made twice the diameter of the other, resulting in an unequal split in element current.†

Due to the use of conductors having appreciable cross section thickness with respect to length, these "broad banded" dipoles have a very broad tuning characteristic and can be used over an entire amateur band without retuning.

One point should be noted concerning center-fed dipoles. A moderate amount of horizontal pattern distortion can usually be tolerated, and distortion due to bringing in the feeders will not be appreciable if the horizontal section of line between the antenna and the beginning of the down-run is kept at least a half-wave long or greater; if less than a half-wave length is used, severe pattern distortion will usually result.

One other point should be considered—lightning protection. Since it does not affect the antenna's transmitting or receiving characteristics, the element tied to the coaxial line shield should be uppermost, thus providing a direct path to ground for the highest point in the antenna system.

†Ed. Note: The impedance at the feed point is a function of the spacing between and diameter of the conductors. Roberts, *RCA Review*, 1947.

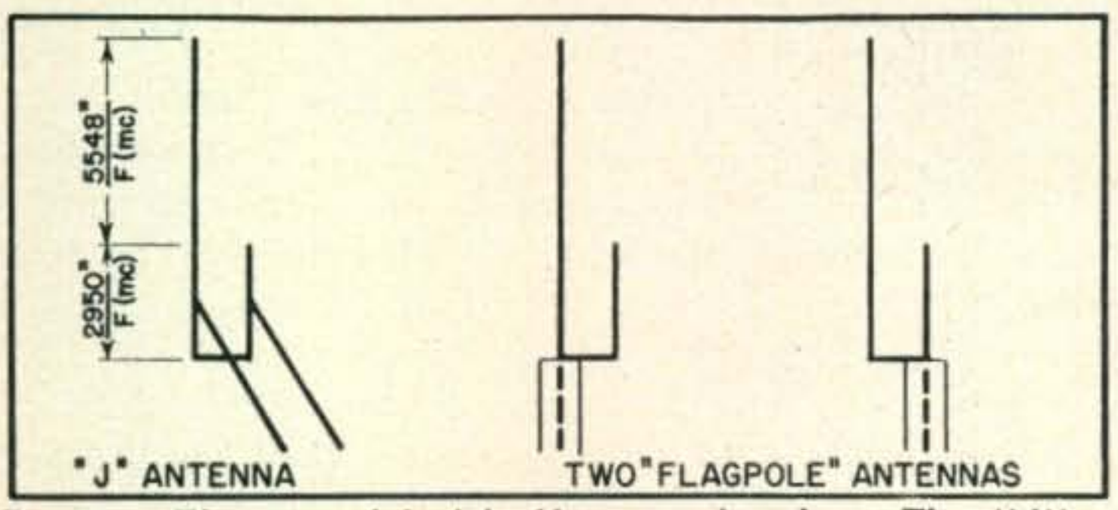

Fig. 4. Three end-fed half-wave dipoles. The "J" is one of the most popular in use.

Conical Antennas

There is one group of center-fed broad-band antennas which eliminated feeder pattern distortion by bringing the feeder to the antenna inside the antenna itself, thus keeping it out of the radiation field. These antennas, known generally as conical antennas, are used commercially in some fixed station-to-mobile unit systems with excellent results.

A commercial model of an antenna of this type known as the biconical antenna is illustrated in *Fig. 3*. This particular antenna, designed to be fed by a 52-ohm cable, will operate over the entire 152-162 mc band with a SWR of less than 1.5/1, and over the range 135-180 mc with a SWR less than 2.0/1. A good power gain is claimed over a half-wave vertical dipole because of lowered angle of radiation.

A good design figure for ham biconicals would be about 0.70-0.75 wavelengths over-all, with an angle of revolution of 20°-30°. Actually, the dimensions

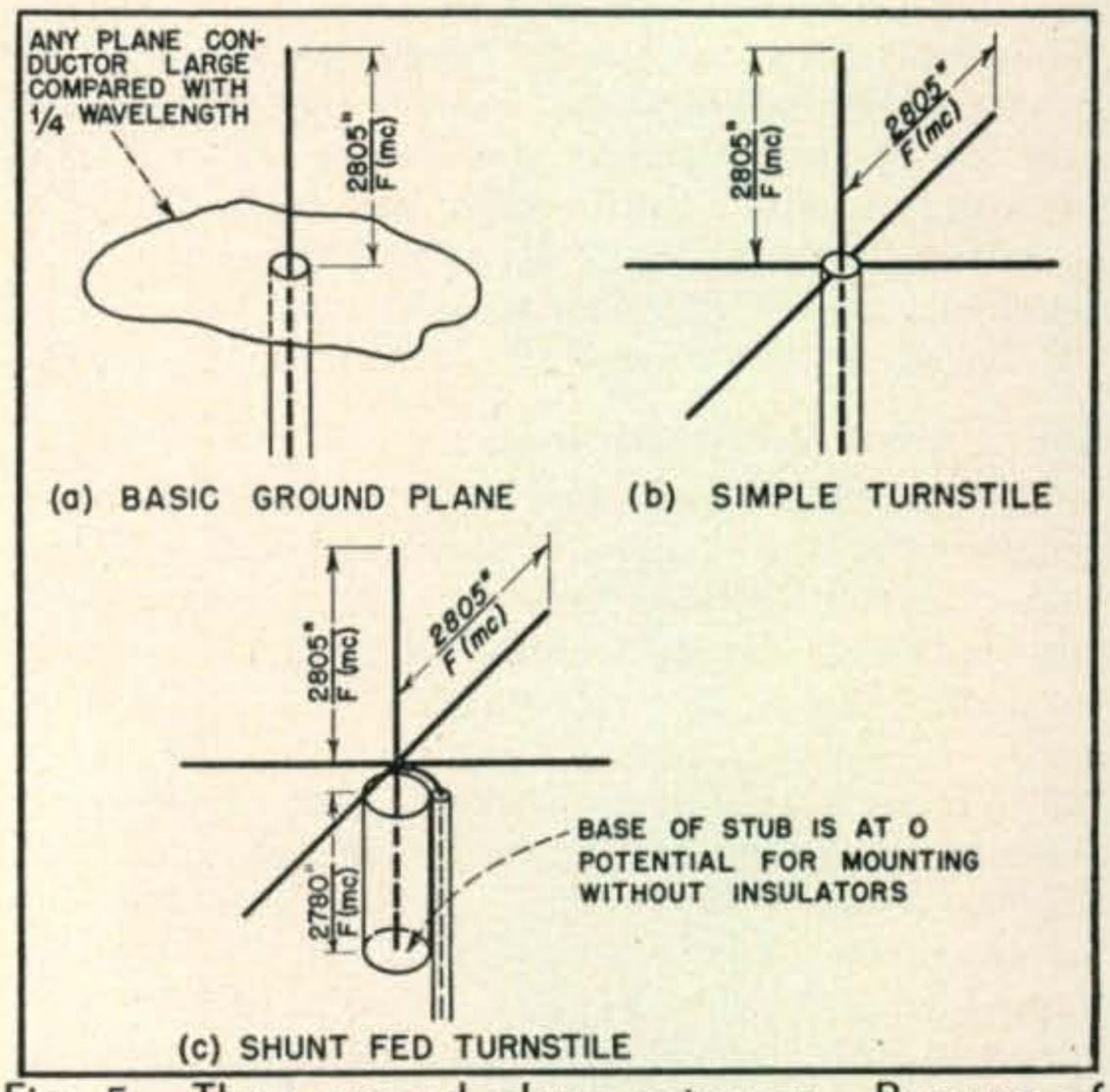

Fig. 5. Three ground plane antennas. Because of their dimensions application is largely confined to the v.h.f.

are not too critical because of the broad-band characteristics of the antenna itself.

If the lower element is removed and replaced with a ground plane in the form of a metal sheet, or several radial rods slightly over a quarter wave long, the driving impedance will be approximately 37 ohms, and can be fed with two 75-ohm cables in parallel. Such an arrangement will operate with fair characteristics over a frequency range of 3/1. At least 10 splines should be used for the cone, or it can be made of sheet metal if desired.

Hams have favored the two-wire open line because it is considerably less expensive than most coaxial cables. One of the most popular v-h-f antennas ever designed is shown in *Fig. 4a*. This antenna is known as the "J" because of its con-

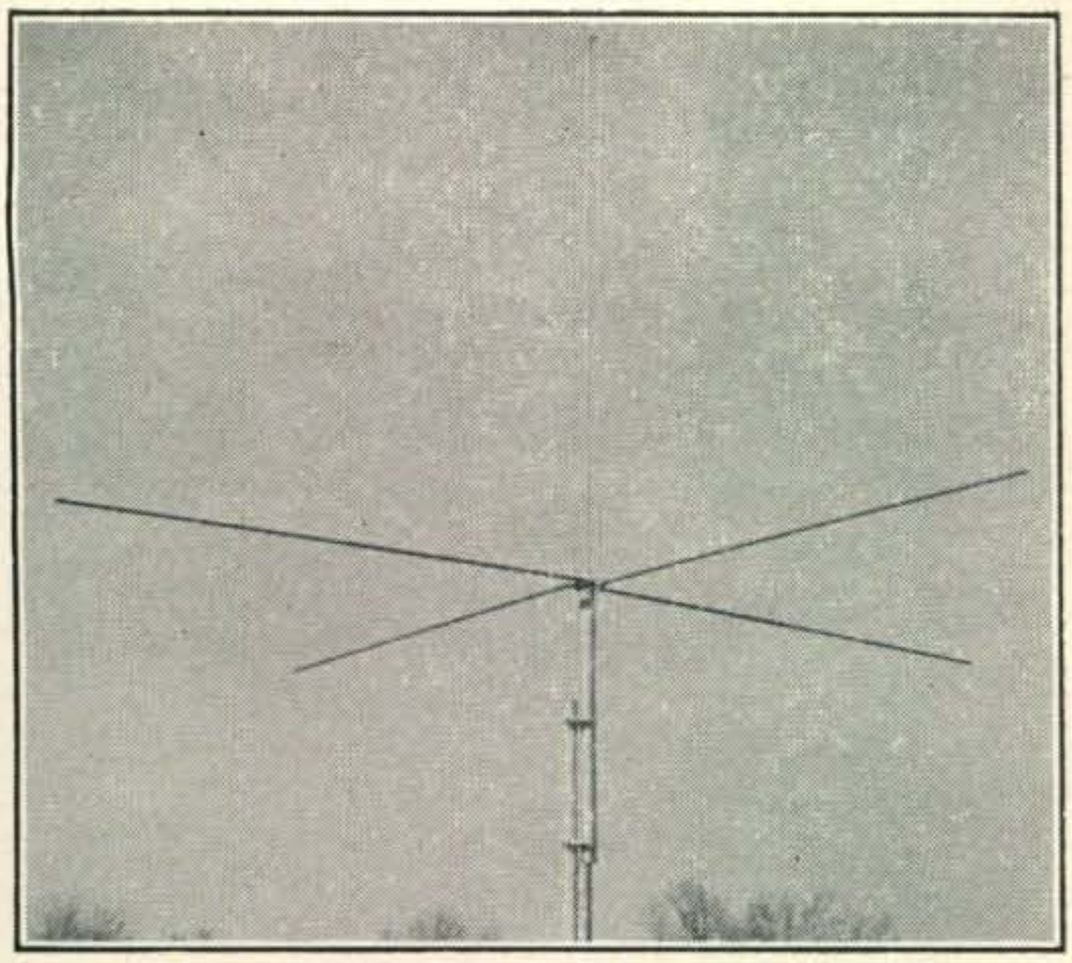

Fig. 7. Folded unipole for 30-44 mc. (Courtesy Andrew Corporation).

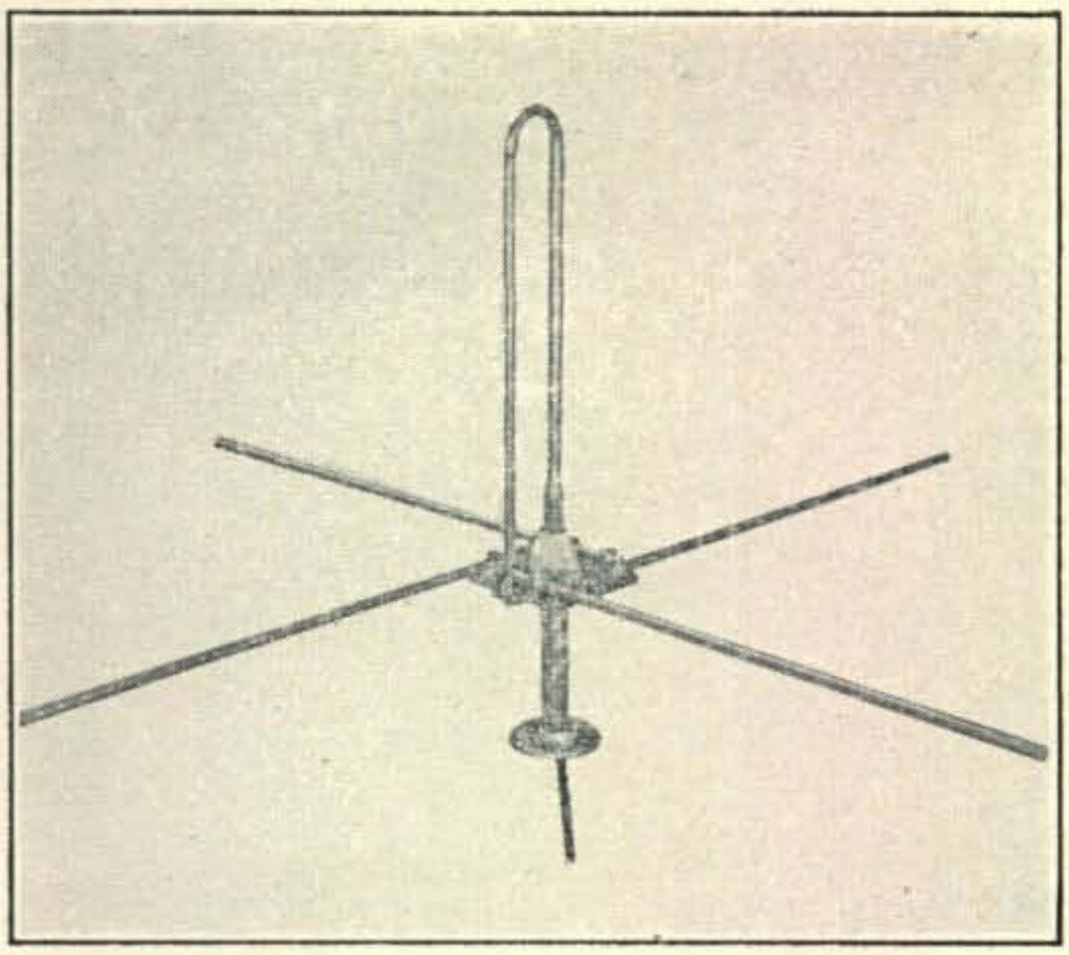

Fig. 8. Folded unipole for 152-162 mc. (Courtesy Andrew Corporation).

figuration. The bottom end of the J-section is at ground potential and can be mounted directly to the support without insulators.

This same antenna can be coaxial fed as shown in *Fig. 4b* and *c* which are identical except *c*, with the highest point grounded for lightning, is slightly unbalanced near the microwave region.

This class of antenna has been largely replaced commercially by the ground plane and coaxial antennas to be discussed.

The Ground Plane Antenna

The ground plane group of antennas is one of the most popular now in use in non-directional vertically polarized systems. It has many variations, all of which claim some improvement over the simple ground plane design. The basic ground plane in *Fig. 5a* has a driving impedance half that of its equivalent dipole, or about 37 ohms. When four quarter-wave long radials are used for the "plane," the impedance drops to about 20-25 ohms, and the coaxial line feed should be matched with a "*Q*-section" a quarter-wave long with a characteristic impedance equal to the geometrical mean of the antenna and line impedance.

It can also be shunt fed as in *Fig. 5c*, the length of the stub and the radiator being varied to produce a match.

For low power installations, it is sometimes possible to allow rather high SWRs on the feed line if the transmitter can be loaded properly. It is common practice in mobile installations to ignore the line match to the antenna proper and produce the power transfer match at the transmitter by tuning the loop.

An exact match to any standard transmission line can be accomplished in two ways, however. In one method, the ground plane radials are pointed downward so that the entire assembly begins to approach a semi-conical antenna, with a consequent rise in driving impedance. One particular example of this antenna is the "isoplane," illustrated in *Fig. 6*. Here the radials are bent downward to match the transmission line, and another set of ground plane elements is mounted one quarter wave below the base of the first set to eliminate vertical pattern distortion due to mounting staff radiation. This antenna, shown for the 152-162 mc band, may be obtained for other frequency ranges also. It is usually shipped pre-cut for the desired frequency. All elements are one-quarter wavelength long electrically, or 2805 inches/F(mc).

Another method to increase the driving impedance of the ground plane antenna is to fold or "trombone" the vertical element. A commercial design for the 30-44 mc band known as the "folded unipole" is shown in *Fig. 7;* another antenna for the 152-162 mc band made by the same company, is shown in *Fig. 8*.

With the vertical element cut to an electrical quarter wave, variation in ground plane radial length from 0.25 to 0.31 wavelengths has little or no effect on the driving impedance. Also, increasing the number of ground plane radials beyond four has practically no effect on performance.

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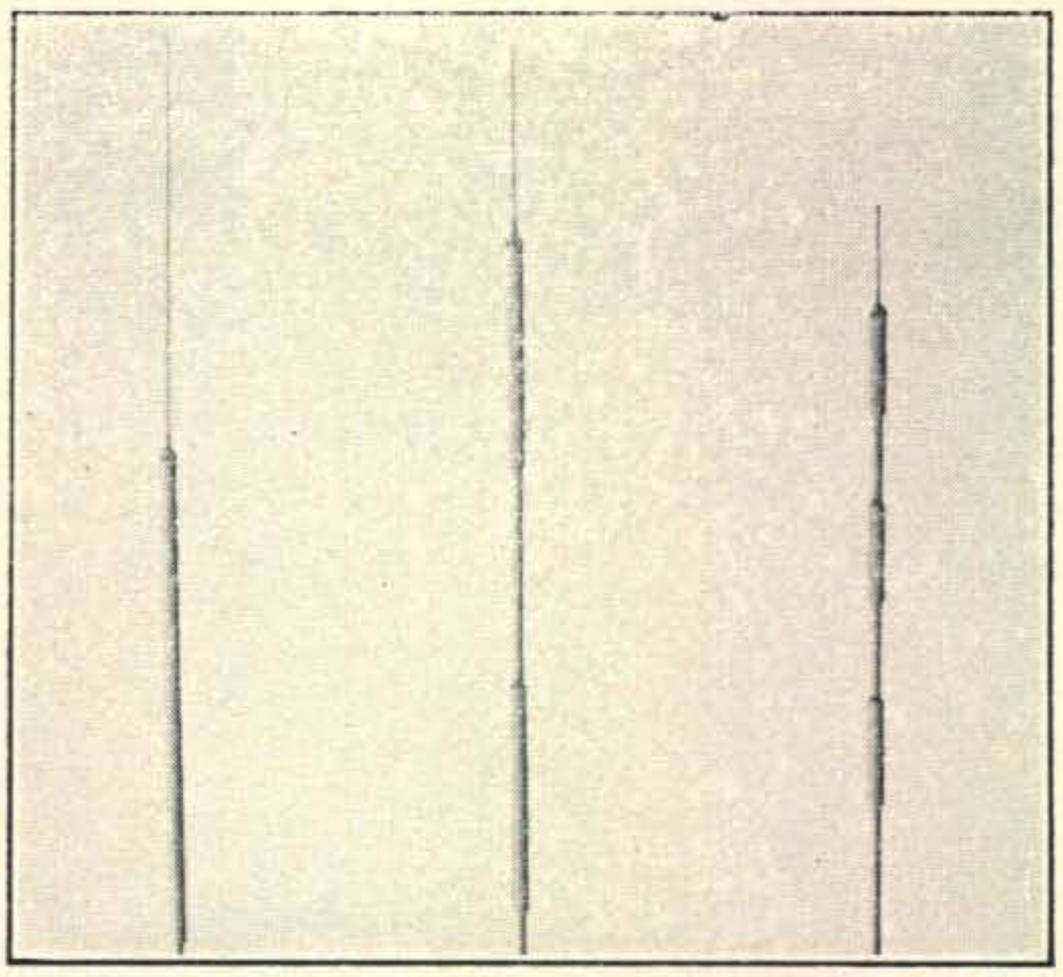

Fig. 9 (left). 30-40 mc coaxial antenna. Fig. 10 (center). Twin-skirted colinear coaxial antenna for 72-76 mc. Fig. 11 (right). Triple-skirted colinear coaxial antenna for 152-162 mc. (All courtesy Motorola, Inc.)

A Miniature 2-Meter Transmitter

ROBERT B. TOMER, W1PIM*

Compactness need not be achieved at the sacrifice of efficiency. For fixed or mobile operation big rig performance can be expected from this transmitter.

THE MINIATURE mobile superhet described in the August [1] issue of *CQ* obviously needed an equally compact companion transmitter to complete the installation. The space available for such a transmitter in the author's car was not very great—the remainder of the glove compartment, to be exact, after first installing the receiver! So the transmitter had to be very small. Because previous experience with midget transmitters of the flea power variety had been rather disappointing, 10 watts minimum antenna power was set as the goal. In addition, the present state of the art on 2 meters definitely dictated a stable transmitter—either crystal or v.f.o. All this was accomplished with a battery drain that is reasonable and permits operation from fixed locations without worrying about how to get the car started when it is time to head for home.

Looking over the field, the prospects were not too encouraging. A transmitter such as the 522 would meet the power output requirements very nicely, but where would a fellow put it in a small car? And how long can you operate with a rig drawing almost 50 amperes from the battery? A new design was indicated and the project was undertaken with some misgivings about the outcome, although they proved baseless.

The resulting transmitter is very compact, measuring only 2" x 8" x 5" over-all. It uses three tubes and develops 10.6 watts output at a primary drain of less than the headlights, or about 16 amperes. It is "push-to-talk" by means of a foot-operated switch. Instant heating tubes eliminate heater current during standby periods and add immensely to the over-all operating efficiency. Although it is v-f-o controlled and uses only three tubes, the stability is good and remains readable with fine quality on any type of receiver, even highly selective double-conversion communication receiver setups.

The original receiver was modified slightly in order to include the modulator in the space previously occupied by the a-c power supply. The transmitter was then designed to mount across the rear of the receiver, thus increasing its over-all length some 2½" but remaining within the same width and height dimensions.

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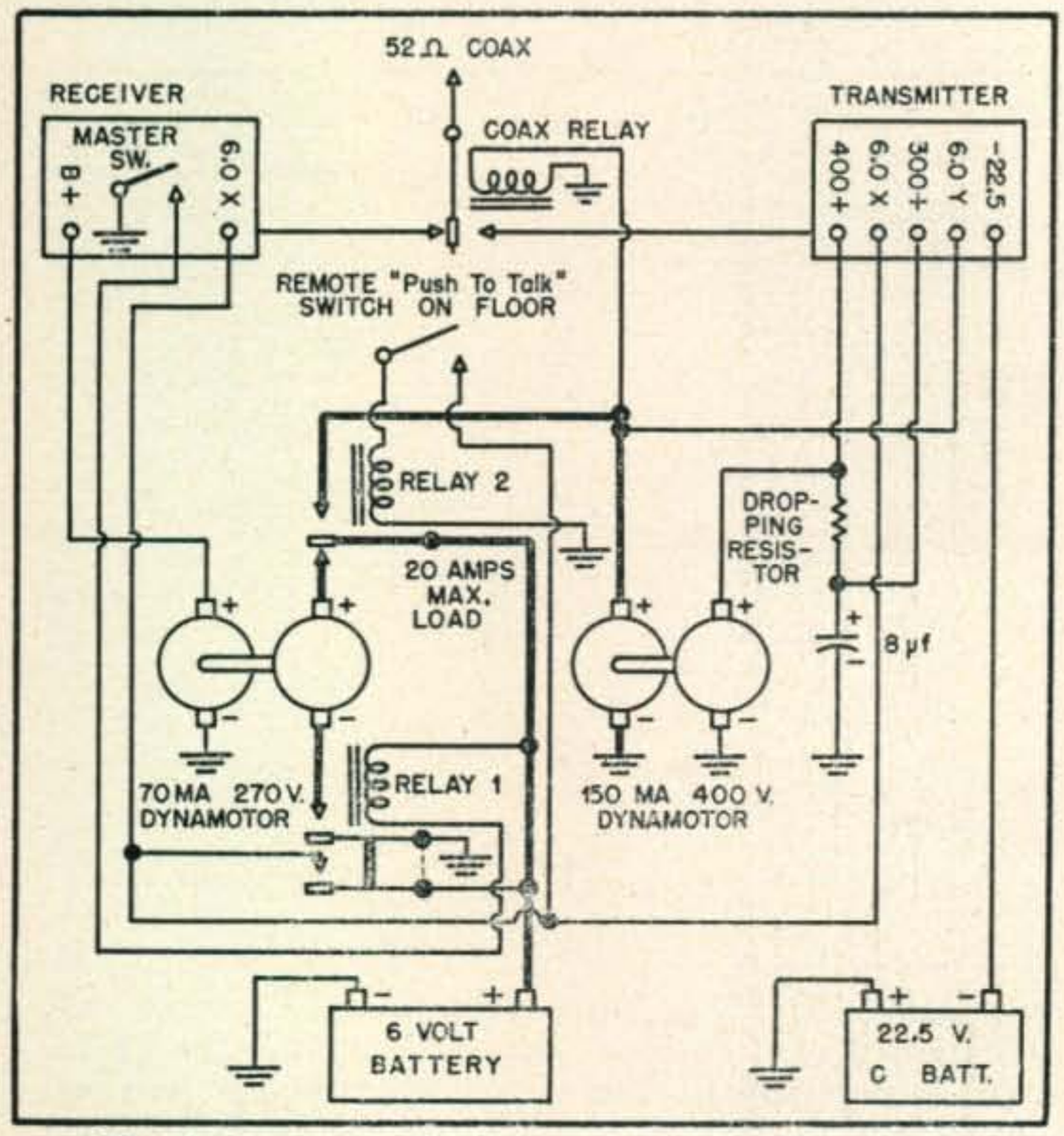
1 Robert B. Tomer, "A Miniature 2-Meter Superhet," *CQ*, August 1948, p. 15.



Block diagram of power and control systems.

Tube Selection

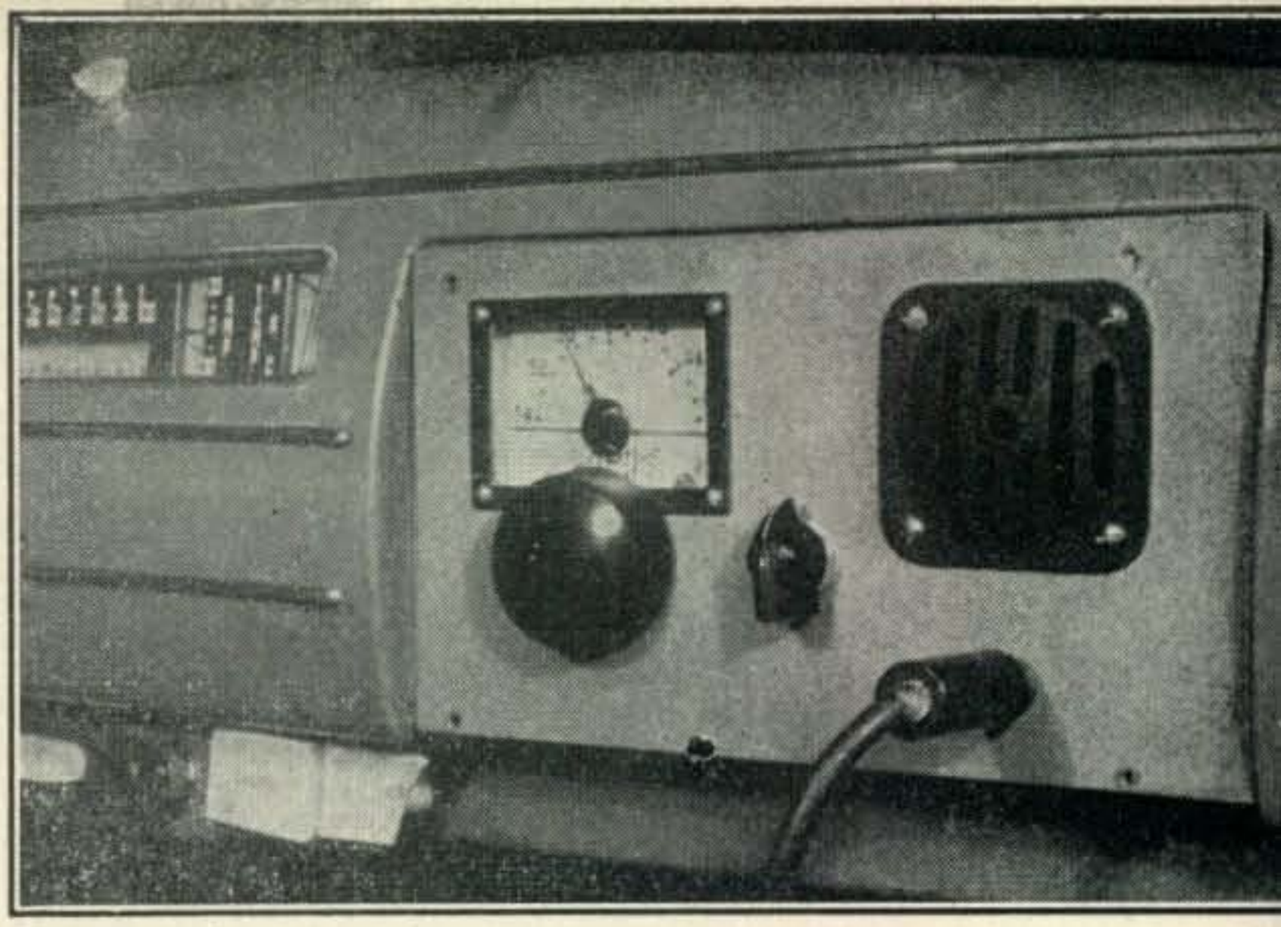
The v.f.o. operates between 36 and 37 mc in a high-*C* temperature-compensated e-c-o circuit. Adjusting the series limiting capacitor *C3* determines the amount of temperature compensation (*C2*) in the tank circuit and thus the degree of correction of frequency drift. The completed unit showed a drift at 146 mc of about 5 kc and complete stability after 5 or 10 seconds operation. The oscillator tube is the miniature pentode 6AR5 which has characteristics similar to that of the 6K6. The plate of the e.c.o. is tuned to twice the grid frequency and provides adequate power to drive the HY 2E30 buffer-doubler.

The 2E30 is one of the newer miniature pentodes of the instant heating type used in commercial mobile transmitters. It is an excellent frequency multiplier and requires very little drive to develop as much as 10 watts output. It is run very conservatively in this transmitter and even though doubling, the output is more than adequate to drive the final. The screen is therefore operated at the very lowest voltage that provides saturation drive to the final. This method of operation insures the highest possible efficiency of the multiplier stage.

The final amplifier uses an HY 5516, another in the new series of instant heating pentodes suitable for v.h.f. This tube can be operated in such a manner as to develop 15 to 18 watts output, but in this rig voltage and current limitations of the power supply determine the ultimate power output. The

tube is only slightly larger than the prewar series of GT types and makes a fitting companion to the other miniature tubes. Normally, the 5516 does not require neutralizing, and this rig is no exception. Care was taken, however, to properly shield the tube and its tuned plate circuit and, in addition, the tube is mounted in such a manner as to bring the internal shield flush with the chassis deck. This is done by lowering the mounting socket below the chassis on a small sub-deck. This, plus the good by-passing, are the only precautions in the construction of the transmitter.

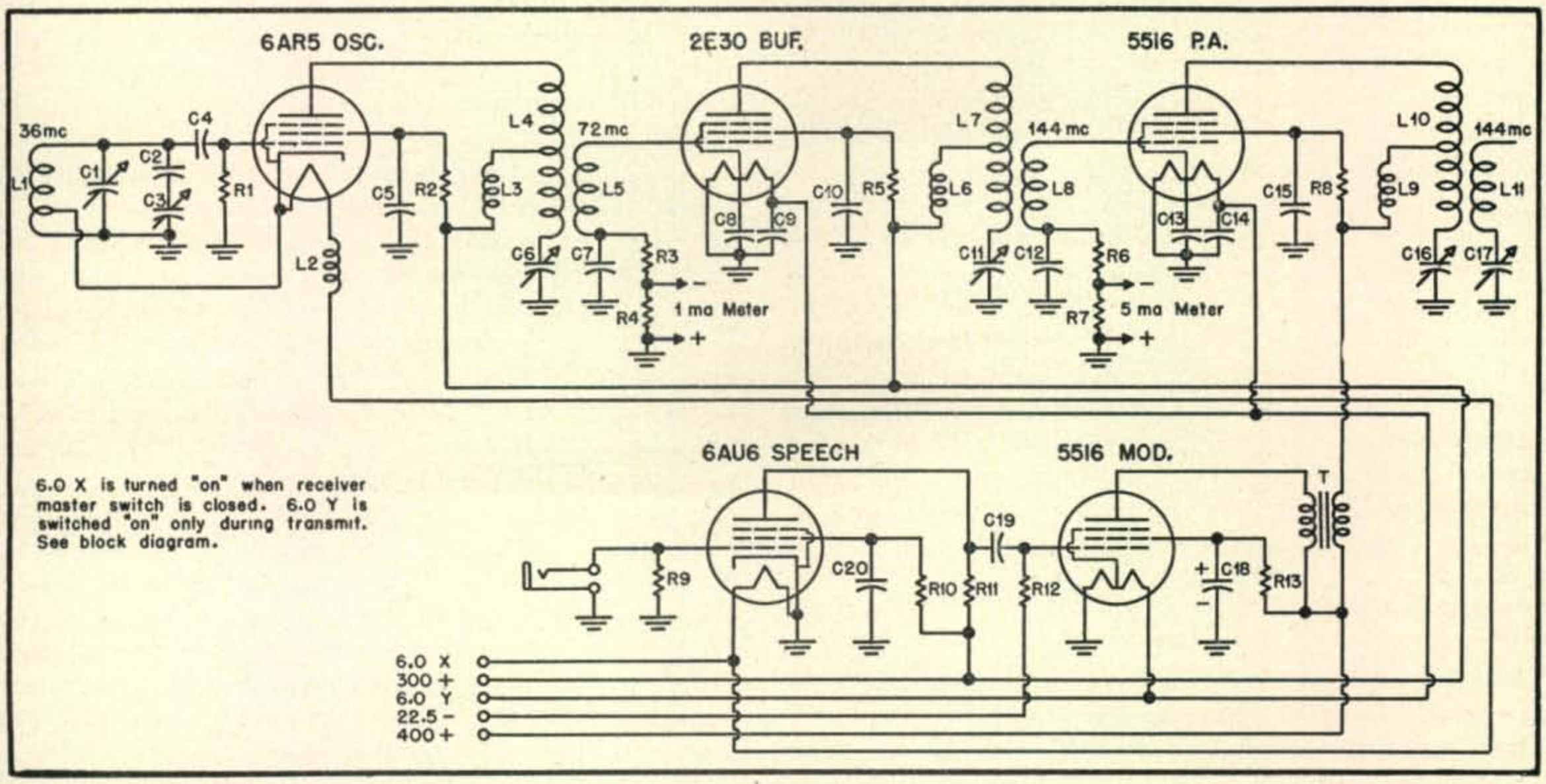
The modulator employed in this rig is a simple Class A transformer-coupled unit with one stage of resistance-coupled speech to permit a crystal mike to be used. Had a carbon mike been decided upon, the speech stage could have been eliminated and the mike transformer connected directly into the grid of the 5516 modulator. The 5516 is somewhat overbiased, using a battery for a voltage source, in order to keep its plate and screen currents at a minimum and provide slightly higher over-all voltage. Power output from an overbiased Class A stage



The complete mobile station in the glove compartment of the author's 41 Willeys.

is raised slightly and, although there is some distortion, it is of a much less noticeable type than that caused by driving the grid positive when less bias is used.

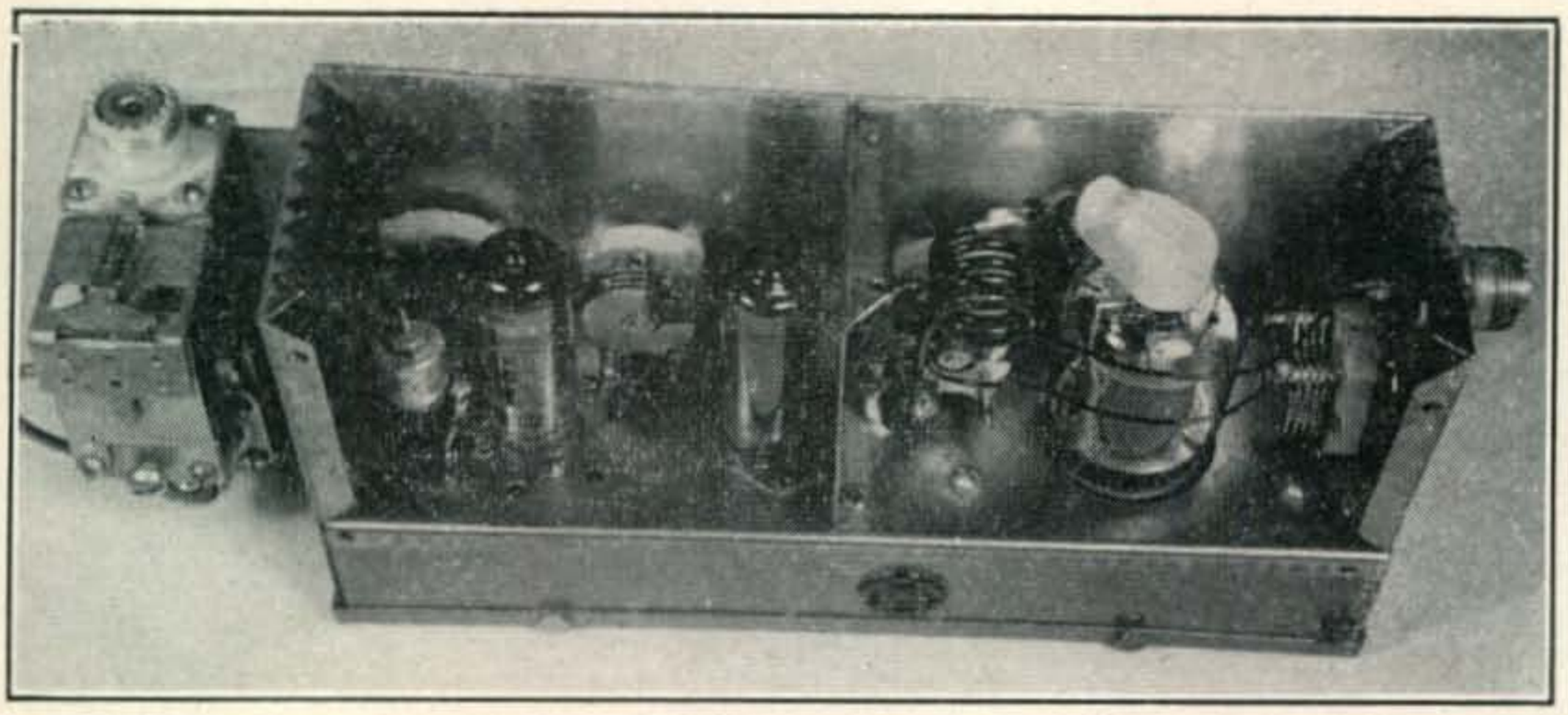
The circuit used in the transmitter is quite conventional except for the method of tuning the plate



Circuit diagram of transmitter and modulator.

C1—50 μμf, APC.
C2—50 μμf, negative temp. ceramic.
C3—35 μμf (McMurdo Silver).
C4—100 μμf, mica.
C5, C7, C8, C9, C10, C12, C13, C14, C15—500 μμf, stud.
C6—25 μμf, APC.
C11—15 μμf, APC.
C16—15 μμf, APC, double spaced.
C17—35 μμf, APC.
C18—8 μf, electrolytic.
C19—.01 μf, 400 v.
C20—.05 μf, 400 v.
R1—25K, ½ w.
R2—50K, ½ w.
R3—100K, ½ w.
R4—100 ohms, ½ w.
R5—50K, ½ w.
R6—30K, ½ w.
R7—100 ohms, ½ w.
R8—25K, 1 w.
R9—10 meg, ½ w.
R10—2 meg, ½ w.
R11—500K, ½ w.
R12—250K, ½ w.
R13—75K, 1 w.

L1—6 turns No. 16 e., ½" dia., spaced, ⅝" long, tap 3rd turn.
L2—45 turns No. 28 e., ¼" dia., close wound, ⅝" long (Ohmite Z-28).
L3—65 turns No. 36, 3/16" dia., close wound, 9/16" long (Ohmite Z-50).
L4—8 turns No. 16 e., ½" dia., spaced, ⅝" long, tap center.
L5—10 turns No. 18 e., ⅜" dia., close wound, 7/16" long.
L6—45 turns No. 28 e., 3/16" dia., close wound, ⅝" long (Ohmite Z-144).
L7—6 turns No. 18 e., ⅜" dia., spaced, ½" long, tap center.
L8—4 turns No. 18 e., ⅜" dia., spaced, ¼" long plus 1" leads.
L9—Same as L6.
L10—4½ turns No. 12 e., ⅝" dia., spaced, ¾" plus 1" leads.
L11—1 turn No. 16 e., ⅝" dia., pick-up loop.
T—10-w. modulation transformer (Stancor A-3891, UTC S-18).



View of transmitter and externally mounted antenna relay. Tubes are 6AR5 osc. doubler, 2E30 buffer-doubler, 5516 final.

circuits. The arrangement is advantageous at v.h.f. wherein it is desirable to have the highest possible L/C ratio in the tank circuit. The resonant circuit is comprised fo the output capacity of the tube and the tuning condenser in series, and the inductance. Looking at the circuit from a different angle (but equivalent) the tank capacity is the output capacity of the tube, and the series combination of the tank condenser and the tank coil (an adjustable positive reactance whose magnitude may be varied by varying the tank condenser) which has a net inductive reactance. By the use of this arrangement the amount of L which can be placed in the plate circuit is increased, with the result that the tube operates more efficiently at high frequencies.

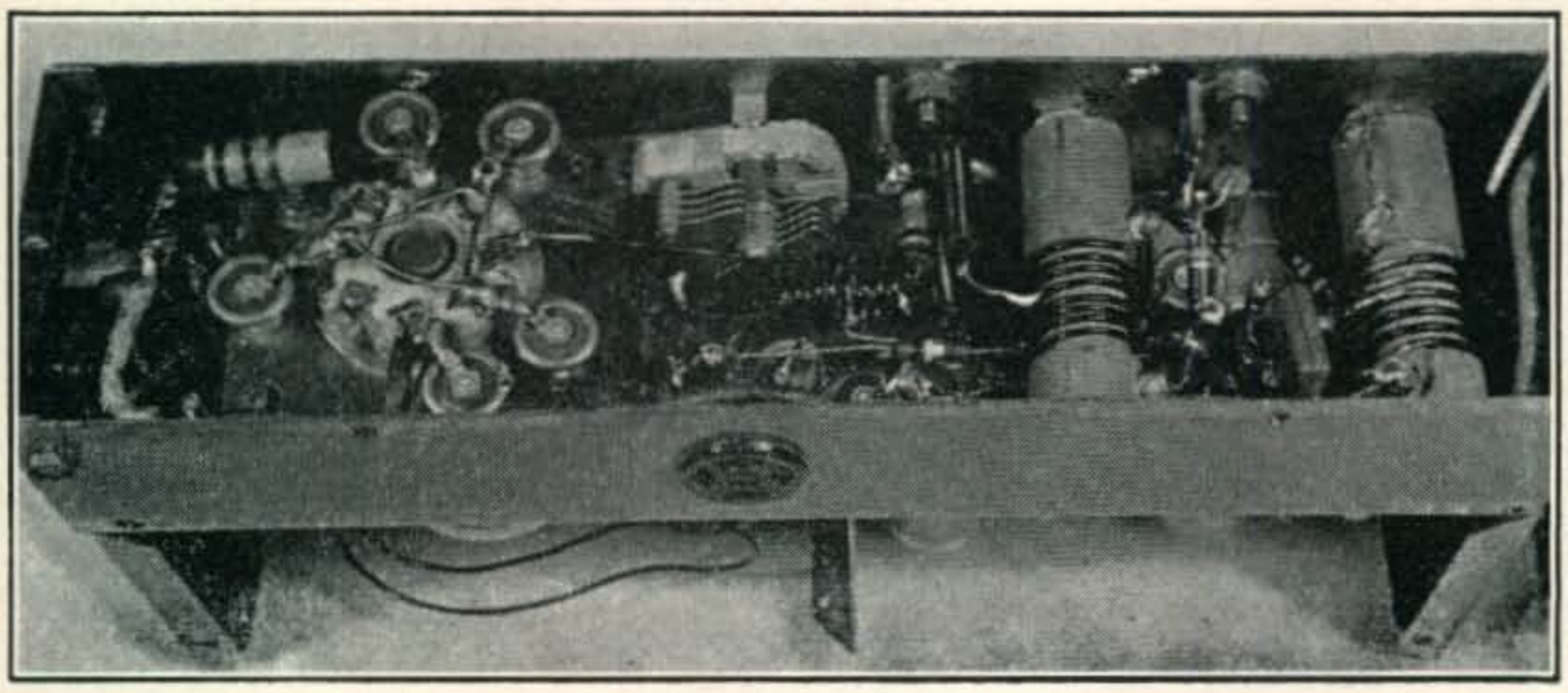
The grid circuits are all coupled inductively to the preceding plate circuits and are self-resonant. These are parallel resonant circuits which make use of the input capacity of the tube, the distributed capacity of the coil, and the strays to tune them to resonance. They are adjusted by spreading or crowding the turns slightly until resonance is indicated by maximum grid current. The "tuning wand" described in the previous article,[1] is also very useful here in determining the proper adjustment.

Tuning the Transmitter

Tuning up this rig is very simple. For reasons of simplicity, only the buffer and final grids are metered; however, during the initial tune up you may want to add meters in any or all of the plate and screen circuits. Complete operating current data is given in *Table I.*

The oscillator grid is set to the desired frequency by any one of several methods. One way is to tune in the fundamental on a receiver that covers that region and then check the harmonic on the 2-meter receiver. After setting the grid so that its fourth harmonic falls inside the 2-meter band, insert a 1-ma meter in the grid of the buffer stage and, with the plate and screen voltage removed from all but the oscillator, tune the plate of the oscillator for maximum current in the buffer grid. Vary the coupling between the plate and grid coils and adjust the grid inductance as mentioned above, all for maximum grid current. After properly adjusting the drive to the buffer, the plate and screen voltages are applied to this stage and the meter is moved to the grid of the final.

A shunt is added to limit the meter sensitivity to 5 ma. The plate of the buffer is tuned to twice its grid frequency and the adjustments are repeated as before. When maximum current has been obtained in the grid circuit of the final, the plate of the final should be tuned through resonance without application of plate or screen voltage. If no change in the grid current is seen, the final does not need neutralizing. If even a slight dip or "flick" of the grid current is noted, neutralizing is indicated. It can be easily accomplished. Drill a hole through the chassis near the plate tuning condenser, *C16*. Bring a small stiff wire from the ungrounded side of *C16* through the chassis to a point near the grid of the 5516. Adjust the position of this wire until no change in the grid current is noted when the plate is tuned through resonance. If adding the wire increases the dip (and it is quite apt to do so) then the tube is over-neutralized and some grid-to-plate capacity is required to allow neutralizing. Drill a hole through the chassis and sub-deck near the grid pin of the 5516. Attach a stiff wire to the grid terminal on the socket and bring this wire up through the chassis



View of under side of transmitter showing method of mounting 5516 and proper by-passing. Pins 1, 4 and 6 are all connected together and individually by-passed. In addition, one filament and the screen must be by-passed. Either the stud type shown or good ceramics should be used.

a short distance near the side of the tube. Adjust this wire for zero grid current change as the plate is tuned through resonance. These steps may not be required if the layout is followed carefully and the by-passing is carried out as shown.

The last step in tuning up the rig is to apply power to the final and check the power output. For this purpose a small 7-watt candle arbor base lamp is used. Solder very short leads to the base and connect these to the output terminals. The coupling loop should be adjusted while the series coupling capacitor *C17* is tuned for maximum brilliance of the lamp. Some retuning of the plate tank by means of *C16* may be necessary. When the transmitter is coupled to an antenna these adjustments may have to be altered slightly and a field strength meter should be used for best possible results. Plate current resonance can be used in the traditional manner, although it is not as accurate an indication of radiated power as some sort of field strength meter, since power may be absorbed in the line without reaching the antenna if the series coupling capacitor is not set to tune out the line reactance and this will not be as easily observed when reading plate current alone.

TABLE I—OPERATING CONDITIONS

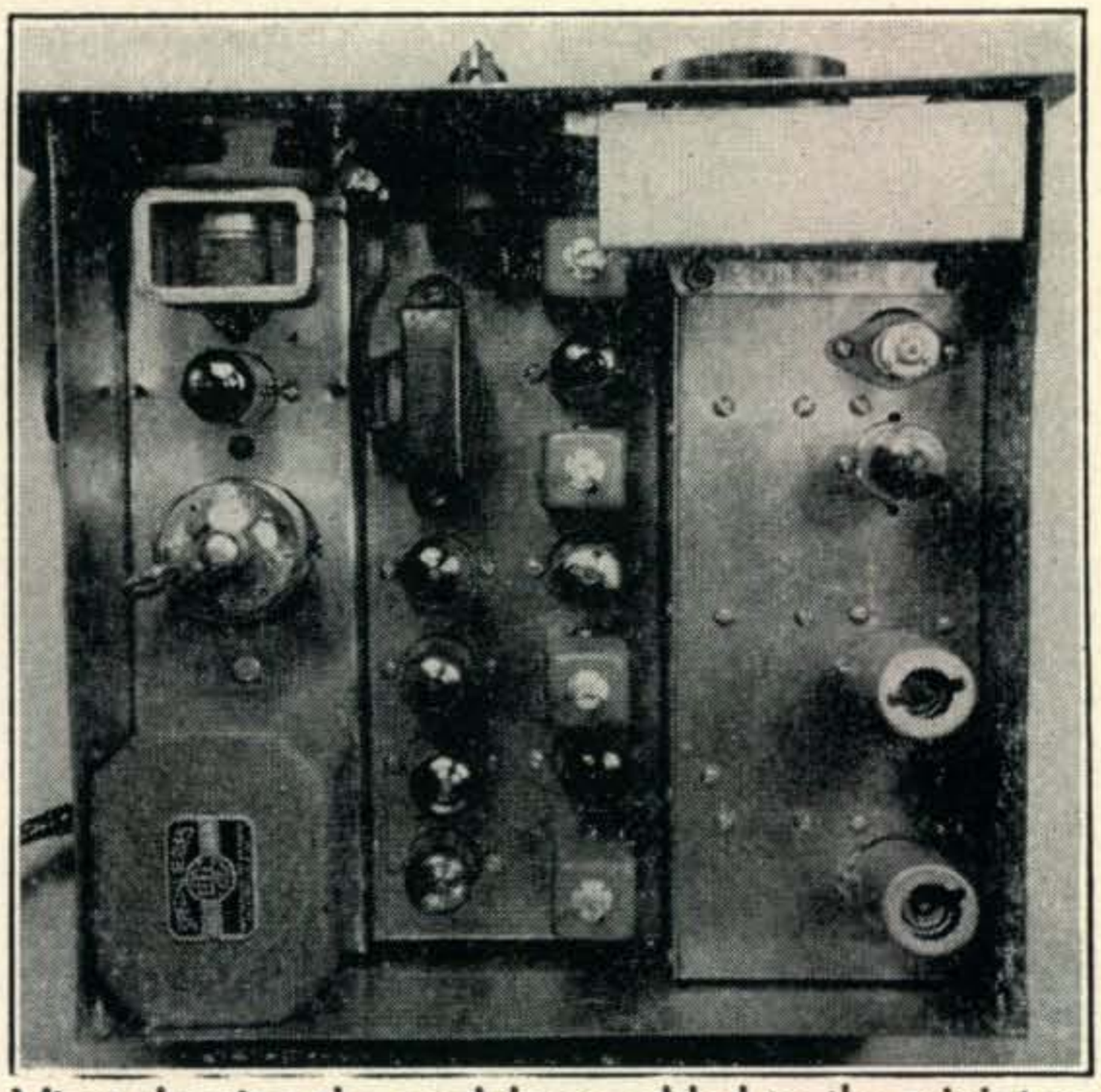
	6AR5 Osc.	HY 2E30 Buf.	HY 5516 Amp.	HY 5516 Mod.
Plate volts	375	375	400	400
Screen "	220	250	300	320
Plate current	23	24	54	29
Screen "	3.1	2.5	4.0	2.4
Grid "	1.2	0.5	2.0	0
Grid volts	−36	−50	−60	−22.5
Htr. volts	6.0	6.0	6.0	6.0

Note: The manufacturer does not rate the HY 2E30 for more than 300 volts, however, no trouble has been experienced after a good many hours of operation at the values shown.

Performance

The table of operating conditions shows what to expect in the way of power supply requirements. The supply used furnished 400 volts at 150 ma. This is adequate to develop the full 10 watts into a dummy load. Lower voltages can be used with a subsequent reduction in output. If a lower supply voltage is used, it is suggested that the screen dropping resistors be lowered somewhat, but not below the value that will give the same screen voltages as shown in the table when measured at the tube sockets. As seen in the block diagram, one master switch turns on the receiver and the two cathode type tubes in the transmitter. The push-to-talk switch throws out the receiver dynamotor and turns on the transmitter dynamotor as well as the transmitter filaments which come up to operating temperature while the dynamotor is gaining momentum.

Some notes about the performance of such a rig may be of interest to those considering 2-meter mobile equipment. Many are surprised to discover how solid 2 can be over considerable distances even



View showing the modulator added to the miniature 2-meter superhet described in August CQ.

while the car is in motion. The reliable radius of the receiver and transmitter combination, over average level terrain, is about 25 to 30 miles. You may work further, much further, during an "opening" but the above distances refer to day or night, all-year operation. From elevated points, in the absence of skip, 50 to 100 miles seems to be about the best to expect, depending entirely upon what is meant by "an elevated location." A few hundred feet will give results in the former class while a couple of thousand feet may produce the latter. Of course, success during an opening is somewhat dependent upon luck and persistance, but nevertheless, from the Boston area this spring, several stations in the New York area have been worked and one in Portland, Maine. While on vacation in Maine at Kennebunk, a sea level QTH, Cape Cod, 175 miles across open water, was worked on a night that was quite dead. This midget will out-perform many of the "big rigs" and is guaranteed to turn the mobile fraternity green with envy.

Dollars for Watts

Bandspreading the BC-455

GEORGE E. BIDWELL, W9FIS*

Overcoming the greatest deficiency of this popular surplus receiver.

THE 6-9 mc receiver of the SCR-274N radio set is an inexpensive but efficient receiver for the 40-meter band. This article shows through a step-by-step process how the utility may be further enhanced by bandspreading the tuning range across the whole 7-mc band. This is done by removing portions of the main tuning condenser and substituting an adjustable padder and two negative coefficient condensers.

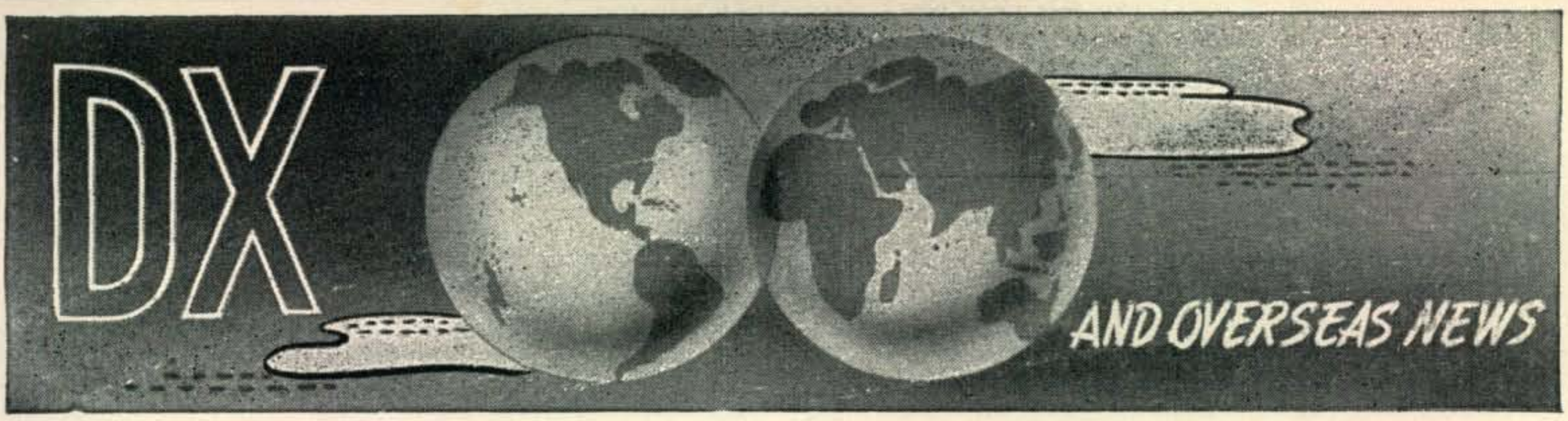
Step-by-Step Procedure

1. Remove the cabinet shield and all the tubes. It may also make it easier to work with the receiver if the i-f transformers are also removed. They should be clearly marked beforehand, as they cannot be interchanged. Remove the small shield from the front of the top chassis which houses the condenser gang assembly.
2. Turn the receiver right side up with the rear chassis wall facing you. Take a pair of diagonals and cut in two all the mica rotor stops on the ends of the three rotor sections. However, be sure to leave as much as possible of the stop on the last rotor plate on the right-hand side of each rotor.
3. Remove all rotor plates in each section starting from the left side with the exception of the last main rotor plate on the opposite end. Twist the rotor plates free, do not pull out. The shaft is floating on ball bearing which may be set free if caution is not exercised.
4. Remove the rotor phasing plates on each end of the rotor. These are the small plates with slots that are used to gang up or phase the main tuning condenser.
5. Mechanically line up the three remaining rotor plates, one in each section, if they have been bent while the other rotor plates were being removed.
6. Bend the right hand end stator plate about half way over towards the right side of the frame. This is done to further decrease the tuning capacity. Do not remove this plate, as it will be used to adjust the bandspread tuning range.
7. Solder a 50-$\mu\mu$f ceramic adjustable padder across the r-f tuning condenser section. This is done by mounting the padder as low as possible onto the top of the gang frame. Solder the adjusting screw lug to the frame. Then take a piece of #12 wire and run it directly between the top of the stator section and the other side of the padder. This wire should be heavy as it will also serve as the mechanical support for the padder. Drill a hole in the top of the gang shield can so that this padder may be adjusted with the shield in place.
8. Solder a 20-$\mu\mu$f CRL negative coefficient capacitor across the detector gang and another 20-$\mu\mu$f CRL negative coefficient capacitor across the oscillator gang. Both connections are made at the bottom of the gang on the top of the coil sockets. Do not attempt to use ceramic or bakelite adjustable padders across the oscillator or detector gangs as these will upset the stability of the receiver.
9. If the i-f transformers have been removed they should be carefully replaced and the receiver made ready to be brought back into the 40-meter band. With a known signal at either end of the band adjust the two midget air padders on the gang as well as the additional padder soldered across the r-f gang. Tune all three in the normal alignment procedure; no trouble should be experienced in tuning in the 40-meter band. By slightly bending each of the three stator plates, more or less bandspread may be obtained. Of course, after bending these plates the padders must be readjusted.

The entire band should extend from nearly one end of the dial to the other. As a matter of fact, it will probably be found necessary to use a spinner type knob, as the vernier and bandspread action are both so great as to make tuning a little slow.

* *605 W. Martin St., Abingdon, Ill.*

Dollars for Watts



Conducted by HERB BECKER, W6QD*

How is the contest coming along? Most of you fellows in the States and Canada will just about be getting this issue during the first weekend of *CQ*'s World Wide DX Contest. The first weekend is for phone and starts at 0200 GMT October 30, to 0200 GMT November 1. The second weekend for c.w. starts at 0200 GMT November 6, and ends at 0200 GMT November 8. We would like to get as many scores from you fellows as possible by November 15, which is my deadline. Remember this! . . . All logs must be postmarked before midnight, November 30, 1948. Logs postmarked later than this date will not be considered. Send them directly to CQ Magazine, 342 Madison Avenue, New York 17, New York.

At the time of writing this column, I am trying to arrange with our DX prediction expert, Perry Ferrell, to guarantee good conditions for these two weekends. Perry says, for a certain consideration, he will be glad to arrange this. In the meantime, you had better keep your fingers crossed and gather up a flock of horse shoes.

W.A.Z.

It looks like the boys hit the jackpot this month. We want to congratulate the following for having achieved W.A.Z.

61	W7GBW	George A. Wise	40	129
62	KH6IJ	K. Nose	40	147
63	VE7HC	Gord Wightman	40	156
64	W2CZO	H. L. Sepessy	40	185
65	W6QD	Herb Becker	40	141
66	W5AFX	Arthur La March, Jr.	40	158
67	G3AZ	John Hunter	40	134
68	W6EGB	Gene Royer	40	196
69	W6RM	Carroll B. Smith	40	159
70	W6KRI	Dale W. Schuyler	40	178
71	W1AB	Horace Goss	40	145

There are a number of "firsts" in the above; for example, KH6IJ, who to many old timers will always be remembered as K6CGK, is the first to W.A.Z. in his country. W5AFX is the first W5, while W1AB takes honors for his district. W6KRI and W6EBG waited a long time for their Zone 19 cards. W6RM thought he had 40 a short time ago, but lacked one from Zone 29. G3AZ is very proud to have made W.A.Z., and you will note that he bears the same name as the late G2ZQ, who was the second station in the world to W.A.Z. before the war. W7GBW, VE7HC, W2CZO, all worked hard to get that last card. . . . The rest of the characters shouldn't even be mentioned. (Old DX man 6QD doesn't say much about his own W.A.Z., but it represents a very solid achievement under some very substantial handicaps. Being a manufacturer's rep keeps Herb on the road a fair amount. Trying to meet our deadline, answer a tremendous pile of correspondence, spend some time with his swell family, and still work DX, is an achievement in any man's language. Perhaps what we need is a handicap of a zone or two for the overworked DXer. Congratulations Herb on W.A.Z. 65!—*W2IOP*)

WØNUC tells one on himself. . . . It seems he had passed up *VP8AM*, as he had already worked the Falklands. The next night he gave him a blast just to see how he was getting through, and VP8AM gave him a report and his QTH as "Margurite Bay, Antarctica." NUC thought nothing of it until the next day when he mentioned it to WØNTA, whom he calls "Lord Plushbottom." When he wised up, he took his blushing face home and added a new one to his list. Leo has been messing around with NFM phone lately, and has been doing a pretty good piece of work with it, too. W3DRD wants the west coast gang to give the east coast boys a break, once in a while, on stuff like PK5, VS4, FK8, FI8, etc. The west coast gang would be glad to make it a reciprocal deal.

KB6AD in his control tower operating position.

If the guy who sent in five new countries, CP1AP, F8NE, I1PL/M1, IS1AHK, and ZC1CL, had put his call on the sheet of paper bearing the above, he would have received credit in the Honor Roll. Sorry . . . our crystal ball wasn't working.

W9LM is still dreaming of getting a good beam, but as yet, nothing has been accomplished. He says he got his card from *ZA2AA*, as have others, so that's a piece of good news.

A bunch of you fellows have asked me how to get cards out of the Russians. We received a letter a couple of weeks ago from the American QSL Bureau, stating they had received 9,000 cards from Russia. W2YWR, who is director of the American QSL Bureau, tells me that these 9,000 cards have been received since May of this year, and from the looks of the list, they came from about 150 different Russian stations. For your information, the address of this Bureau is: P. O. Box 7073, Roseville Station, Newark 7, New Jersey.

(*Continued on page 72*)

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

W. A. Z. HONOR ROLL

C. W.-PHONE		
W6VFR	**40**	**211**
W2BXA	**40**	**202**
W8HGW	**40**	**202**
W6PFD	**40**	**201**
W6ENV	**40**	**200**
G2PL	**40**	**199**
W6ITA	**40**	**198**
W6EBG	**40**	**196**
W6SAI	**40**	**195**
W4BPD	**40**	**193**
W6ADP	**40**	**191**
W6SA	**40**	**186**
W6MJB	**40**	**186**
W2CZO	**40**	**185**
W4CYU	**40**	**184**
W6DI	**40**	**180**
W7AMX	**40**	**179**
W6KRI	**40**	**178**
W6MEK	**40**	**177**
WØYXO	**40**	**176**
W6PCS	**40**	**175**
ZS2X	**40**	**175**
W6NNV	**40**	**174**
W6TT	**40**	**174**
W2IOP	**40**	**173**
VE7ZM	**40**	**173**
W6FSJ	**40**	**172**
W6WKU	**40**	**170**
W6AM	**40**	**168**
VK2DI	**40**	**168**
W7FZA	**40**	**166**
W6DUC	**40**	**166**
W6AMA	**40**	**165**
W9KOK	**40**	**165**
W7DL	**40**	**162**
WØNTA	**40**	**161**
W7BD	**40**	**160**
W6RM	**40**	**159**
W5AFX	**40**	**158**
W6OMC	**40**	**157**
VE7HC	**40**	**156**
W7GUI	**40**	**154**
W6BPD	**40**	**154**
W6PKO	**40**	**153**
W7BE	**40**	**152**
W6FHE	**40**	**152**
W6KUT	**40**	**151**
G3DO	**40**	**151**
W6SC	**40**	**150**
W6LEE	**40**	**150**
W6PB	**40**	**149**
ON4TA	**40**	**148**
W6ANN	**40**	**148**
W6BAM	**40**	**147**
KH6IJ	**40**	**147**
W7DXZ	**40**	**146**
W9NRB	**40**	**146**
W6LER	**40**	**145**
W1AB	**40**	**145**
W6QD	**40**	**141**
W6TI	**40**	**139**
W6AOA	**40**	**139**
ON4JW	**40**	**136**
W6RDR	**40**	**134**
G3AZ	**40**	**134**
W6PZ	**40**	**132**
W7GBW	**40**	**129**
W6YZU	**40**	**129**
W6MLY	**40**	**129**
G5BJ	**40**	**126**
W6NRQ	**40**	**123**
W3BES	39	201
W2GWE	39	198
W6EBG	39	192
W2PEO	39	190
W8BKP	39	190
W3JNN	39	189
W8RDZ	39	188
W6SN	39	188
W3KT	39	186
W3DPA	39	185
W2HHF	39	184
W3GHD	39	183
W5ASG	39	180
G6ZO	39	180
W2HZY	39	180
W3JTC	39	180
W9IU	39	180
F8BS	39	179
W9ANT	39	179
WØNUC	39	178
W3EVW	39	177
W8NBK	39	174

C. W.-PHONE		
W6KRI	39	173
W6ZCY	39	173
W2CYS	39	170
W3DRD	39	167
W9RBI	39	165
W1ENE	39	164
W1NMP	39	164
W6MVQ	39	164
W1BIH	39	163
W4BRB	39	162
W6MX	39	162
PY1DH	39	162
G5DQ	39	160
W6GDJ	39	160
WØGKS	39	159
W6RM	39	159
W4DKA	39	159
CE3AG	39	158
W4INL	39	157
G8KP	39	156
VE7HC	39	156
VK2ACX	39	156
W2RDK	39	154
W9VW	39	153
W6SRU	39	153
G6QB	39	152
G5YV	39	151
G2AJ	39	151
W2COK	39	150
G2WW	39	147
D2KW	39	147
W8LEC	39	146
W2MEL	39	145
W1AB	39	145
W6RW	39	145
W4GG	39	145
W8SDR	39	144
W6OEG	39	143
W6JZP	39	142
W6PQT	39	141
W9DUY	39	141
G6BQ	39	140
W6QD	39	140
G3FJ	39	139
W6EPZ	39	138
W9VND	39	136
W9LNM	39	136
G5RV	39	132
G2VD	39	132
G2FSR	39	130
W6LRU	39	130
W6UZX	39	130
G3AAM	39	126
W6UCX	39	125
VR5PL	39	124
G5VU	39	124
W6EAK	39	123
G3AAK	39	122
OK1AW	39	122
W2GUR	39	120
G5WM	39	120
G8RL	39	120
WØOUH	39	119
G6BS	39	117
W6NRZ	39	117
W7ETK	39	116
G3QD	39	116
G3TK	39	114
W6RLQ	39	110
W6LN	39	107
W7GXA	39	106
KG6AL	39	104
W6LEV	39	103
W6MI	39	102
W7ENW	39	101
W6WJX	39	101
W6AX	39	93
W6BIL	39	81
G6PJ	39	76
W3JNN	38	191
W1JYH	38	170
VE3QD	38	170
W2CWE	38	164
W3EPV	38	161
W3IYE	38	161
W9LM	38	154
KP4KD	38	151
W3DKT	38	151
W1ZL	38	150
W4OM	38	149
W8FJN	38	147
W1ENE	38	147
W9LNM	38	144

C. W.-PHONE		
W8CVU	38	142
W2PUD	38	141
W3KDP	38	137
W1KFV	38	134
W4FPK	38	132
G8IL	38	131
W4VE	38	131
W3ZN	38	130
G5CI	38	130
W2PQJ	38	130
G6LX	38	126
W9MZP	38	126
TF3EA	38	125
W9TB	38	124
GW3AX	38	123
WØSQO	38	123
W9FKH	38	120
GW4CX	38	120
W8WWU	38	119
W8KPL	38	117
W9YNB	38	117
W8VLK	38	117
W5CPI	38	113
OK1CX	38	110
G3ZI	38	107
G8IP	38	105
W6DLY	38	102
W6ID	38	96
W6MUF	38	96
G3BI	38	75
W2TJF	37	144
W3JKO	37	143
W4ML	37	128
W1KFV	37	121
G4CP	37	117
W2EMW	37	117
VE1EA	37	116
WØAZT	37	112
W2GUR	37	109
G4AR	37	108
W8HSW	37	104
G5MR	37	100
W2BLS	37	100
G3AAE	37	99
W2SGK	37	95
W7BTH	37	95
W6MUF	37	94
W6WJX	37	92
W2RGV	36	137
W3OCU	36	134
W3LVJ	36	131
WØDU	36	125
OA4AK	36	124
SV1RX	36	119
MD5AK	36	118
WØEYR	36	117
W2CNT	36	115
G2CNN	36	114
G2AKQ	36	112
W2BF	36	108
W4D1A	36	107
W6CTL	36	104
W4BK	36	101
G2AO	36	100
W3AYS	36	97
G6WX	36	95
W7EYS	36	90
WØRBA	36	82
W9FKC	36	81
GM2AAT	36	75
CM2SW	35	143
VE3AAZ	35	118
W8AVB	35	113
W3WU	35	113
W9WCE	35	112
W9CKP	35	109
W6ZZ	35	104
VE3ACS	35	103
G8VR	35	100
W2WC	35	99
G2AVP	35	89
W8JM	35	86
W2HAZ	35	86
D4ANM	35	80
G8RC	35	78
G3BDQ	35	74
W7FNK	35	72
W4HA	34	118
W4DHZ	34	116
W2GVZ	34	112
W8ZMC	34	107
W9FNR	34	103

C. W.-PHONE		
G8QX	34	99
G8KU	34	96
VK4RC	34	91
W8JM	34	89
G6XX	34	89
WØFWW	34	86
W2JA	34	84
W9LI	34	81
KH6PY	34	78
W5CD	34	74
J4AAK	34	66
W4LVV	33	111
W4QN	33	104
WØGBJ	33	79
G2LC	33	85
GM2UU	33	79
W8PCS	33	78
G8VG	33	78
G3BFC	33	77
W6WUD	33	61
W2NXZ	33	61
W1BFB	32	94
W2OEC	32	88
W7PK	32	83
HA1KK	32	78
W8QUS	32	75
WØFET	32	71
W2AYJ	31	103

PHONE ONLY

W6VFR	39	143
W6DI	38	162
W8BKP	38	145
W7HTB	38	132
W4CYU	37	153
W2BXA	37	141
W1HKK	37	136
G3DO	37	125
G6LX	37	124
G2AJ	37	121
W1JCX	36	146
W2DYR	36	135
W8REU	36	135
W1FJN	36	128
G2PL	36	128
W6PXH	36	128
G6BW	36	127
W3JNN	36	126
F8VC	36	111
W6WNH	36	110
G5YV	36	106
G6WX	36	105
W3DHM	36	96
W6SA	36	92
F8DC	36	87
W1NWO	35	132
W1MCW	35	127
W9RBI	35	126
W8BF	35	120
G3FU	35	115
GM2UU	35	107
W6CHV	35	107
W4OM	35	106
W6PCK	35	103
G8QX	35	100
W9CKP	35	100
W9HB	35	89
XE1AC	34	135
W2RGV	34	111
W8BIQ	34	103
W5ASG	33	118
W2ZW	33	115
W4HA	33	108
W5LWV	33	100
W2PQJ	33	100
WØHX	33	89
W8QBF	33	87
VE3ZM	33	81
W2DRH	33	60
W4INL	32	101
W9RNX	32	100
W4ESP	32	99
W9BZB	32	96
W8ZMC	32	90
W2HY	32	85
W9GZK	32	72
W9WCE	31	89
W6UZX	31	85
W6AM	31	80
W9MIR	30	82
OA4AK	30	81
W2SVK	30	74
W8SXU	28	59
W2BF	27	52

Conducted by VINCE DAWSON, JR., WØZJB*

Where are we heading?

It is seldom we attempt to editorialize in this column simply because it has always seemed somehow a little out of place. Recently, however, in our assorted junkets around the country we have had an excellent opportunity to personally glimpse the v-h-f situation at first hand. The most important things we found were; (a) that plenty of fellows were talking 6-meters with probably good intentions, but the band is deserted days on end; (b) the fruits of the antenna polarization controversy are bitter indeed and are now just being realized and; (c) that there is a definite move afoot to the higher frequencies.

The 6-meter band which naturally consumes a good portion of our interest should be, by the rules in the book, the "new" 160-meter band. This feeling is held by quite a few of the 50-mc partisans who are out drumming up interest. So far we have found that TVI has taken a heavy toll especially in the New England and Middle Atlantic areas where channels 2 and 3 are assigned. Some fellows are still getting on after the TV hours, but these are exceptions. Most of the active stations are 40 to 60 miles from the nearest TV transmitter or receiving area. All-in-all the feeling is that something will be done to clear up TVI (our new *TVI Elimination Handbook* is a big step forward) and the prospects of more activity is good, although a lot of it is still in the so-called paper stage.

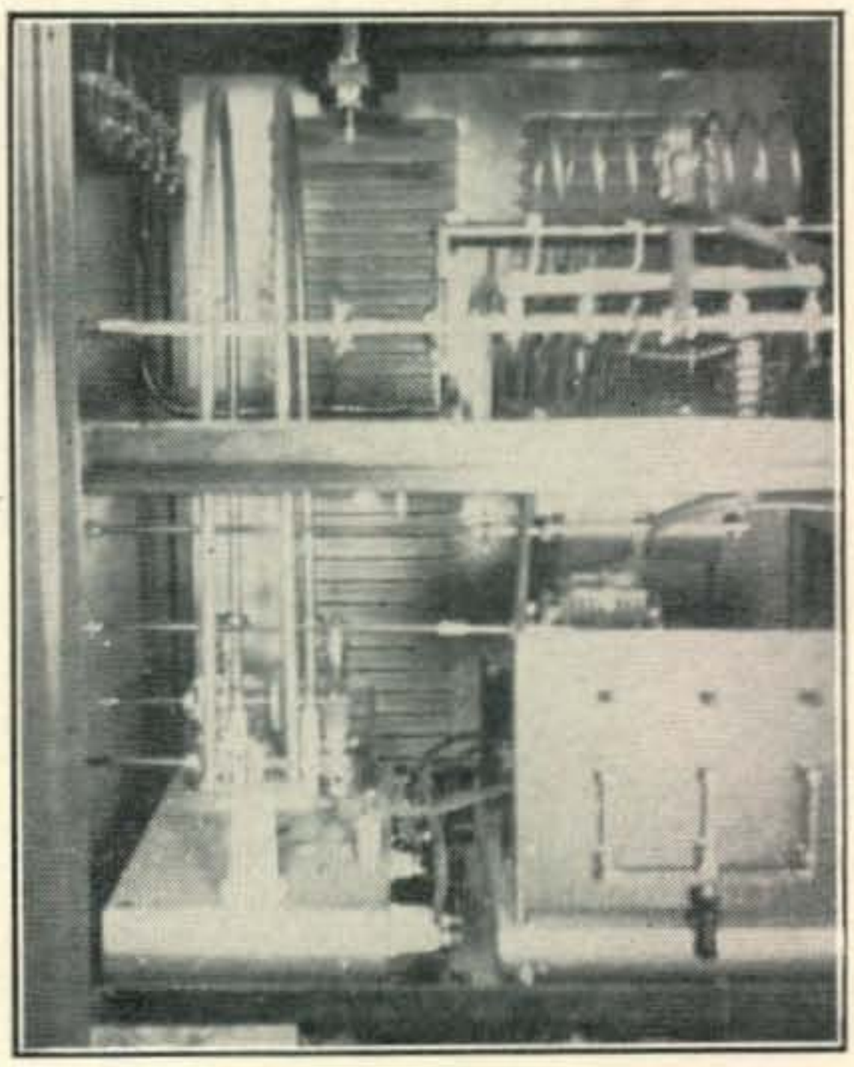
On 2 meters, activity is faced with the question of who do you want to work and how often? The strictly vertically polarized territory of New York and Philadelphia is gradually expanding much to the alarm of the horizontal proponents. On examination it appears that the use of the vertical in urban areas is more than justified. The small-time operator with his 522 can put up a co-linear and completely do away with antenna rotation problems. When the band is open he still stands a better than average chance of working DX. The big-time operator with 8 to 16 elements vertically polarized probably hears DX earlier and later, and quite likely just as often as if the antenna was horizontal. Fellows on the fringe of the vertical territory (Washington, Richmond, Norfolk, Harrisburg, etc.) are pondering whether it is worth having a horizontal area to work into the mid-west on one big slam-bang opening, or a vertical beam to work consistently north of the Delaware River. More than a few are deciding in favor of the latter alternative. Openings of the type of August 26 are when the middle man (western New York, western Pennsylvania and Ohio) really suffers, for he needs a horizontal to work to the west and a vertical to work to the east. Only a few fellows can afford that elaborate an installation.

It was surprising to find that the one band where new activity was really going to town was on 420 mc. Most work is still regarded as experimental while attempting to get out from under the influence of an ill-conceived super-regen receiver. Strangely enough, almost everyone is skipping right over 220-225 mc which all think is too much like 144 mc. We will have to admit that equipment can be made really simple and the results with very low power sounds impressive.

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

Those South Americans!

While we here in North America must be satisfied with one DX season on 6 meters the Central and South Americans are apparently going to have two per year. Running well over a month ahead of predictions the XE-LU path opened on the first day of September. And as usual the northern end was held down by B. J. at XE1KE and the southern end by Ramon at LU6DO.



The high-frequency and low-frequency finals of W7HEA. Parallel lines are used on 50 mc.

What causes these openings still remains a mystery. The signals generally have a terrific flutter sometimes as rapid as two to three times a second. Signal strengths are often quite strong building up to better than equivalent signals on either 10 or 20 meters. On occasions the flutter is only evident in one direction while the character of the flutter appears different for each path. The path from Mexico City to Mendoza sounds lower in tone and often creates the impression that the power supply has no filter condensers.

This season OA4BG is holding down the Lima end of the DX and has finally converted HC1JW to some 6-meter operation. This also gave John 11

(*Continued on page 88*)

Conducted by LOUISA E. DRESSER, W2OOH*

WITH CONVENTIONS still the highlight of amateur activities, we hear from Dot, W1FTJ, that there was the usual high YL turnout at the New Hampshire State Convention on September 11th. Among the YLs attending were Lou, W1MCW; Norma, W1MUW; Alice, W1MJE; Eleanor, W1MWI; Eleanor, W1QON; Charlotte, W1QJX; Olga, W1QJY; Ruth, W1MVX; Beatrice, W1KTG; Veronica, W1HIH, and, of course, W1FTJ. Dot took several pix of the gals; maybe we'll have some in time for the next issue. A nice time was had by all, with an excellent family-style roast beef feed—"all they could eat." Dot adds: "Martha now weighs 15 pounds at four months, and is *never* filled up—goodness but *she's* going to eat roast beef later!"

YL Broadcast Engineer

We were pleased to meet Esther, W2QFM, recently. Although she is a native New Yorker, it was our first meeting for Esther's job as studio engineer at WOV (1280 kc) with hours anywhere from 1 to 3 in the afternoon until 11 or 1 at night, have prevented her from attending any of the N. Y. YL club meetings. Esther took us on a tour of the WOV studios at Fifth Ave. and 57th St., and introduced us to a number of other hams on the staff (among them W2OHH—hi!). Then, over lunch, we started with the inevitable questions of how and when did she get into ham radio.

It seems Esther's first brush with this hobby came when she was attending Hunter College, and while looking up some books in the library for her course in constitutional law, she came across a copy of W2IU's "Two Hundred Meters and Down," which so fascinated her she proceeded to read it through then and there. At this time her ambition had been to get into social work, and it was not until 1941 that a ham friend interested her in taking up the hobby. She was studying for her license at the time of Pearl Harbor, and got her ticket some weeks later.

By this time Esther decided to take up radio in earnest, and attended RCA Institute where she got her commercial tickets. She put her name on file with a number of broadcast studios, but they were reluctant to employ women to replace the men going into service. Shortly, however, NAB started an experimental 10-week course to train women in studio control room operation. Esther took the course, but still no job; then several weeks later she was called to WOV and has been there ever since. During the war several other girls were doing similar work at WOV, but Esther is the only YL there at present.

Shortly after joining the staff at WOV, Esther, developing enthusiasm for her new work, went to visit another studio—WQXR. One of the announcers showed her around the station. His name: Duncan Pirnie. Just a year later Esther became Mrs. Duncan Pirnie, and they combined her hobby of ham radio with his of experimenting with audio equipment. He likes to build her gear and she likes to operate it—when there is time available after a 9-hour shift at the studio and keeping house besides. But right now Esther's "work" is meeting DX in person, for she and her OM are off for a vacation trip to England and France.

Personal Mention

Speaking of broadcast studio engineers, we hear from Ellen, KH6QI, that she and her OM have moved again. The new QTH: 4014-A Koko Drive, Honolulu, T.H. Ellen says the new location is better in every respect—it's on top of a hill, not only giving a nice view overlooking most of the island, but a good ham location, too. Ellen's OM, Bob, is now working at KPOA, too, and Ellen adds that she has been transferred into doing a 20-minute disc-jockey show daily, which she finds really fun.

Did you see the interesting article written by W7PEY, entitled "Third Sight by Short Wave," which was published in the *Marianist* and the *Catholic Digest* for September? About ham radio generally, the article more especially is a tribute to Rosemarie Canak, W9AWI, blind YL operator of Milwaukee, whom we wrote about in this column last June.

Is it purely chance that some hams get the calls they have, or does the amateur licensing section of FCC harbor some sly kilocycle elf that gets considerable amusement out of arranging calls? For instance, look what the OM of Jerry, W2PBI, active DXer on 10, just received for his call—W2YYL! And for Max of all people! Jerry, incidentally, is now up to 88 countries, with Pakistan the latest.

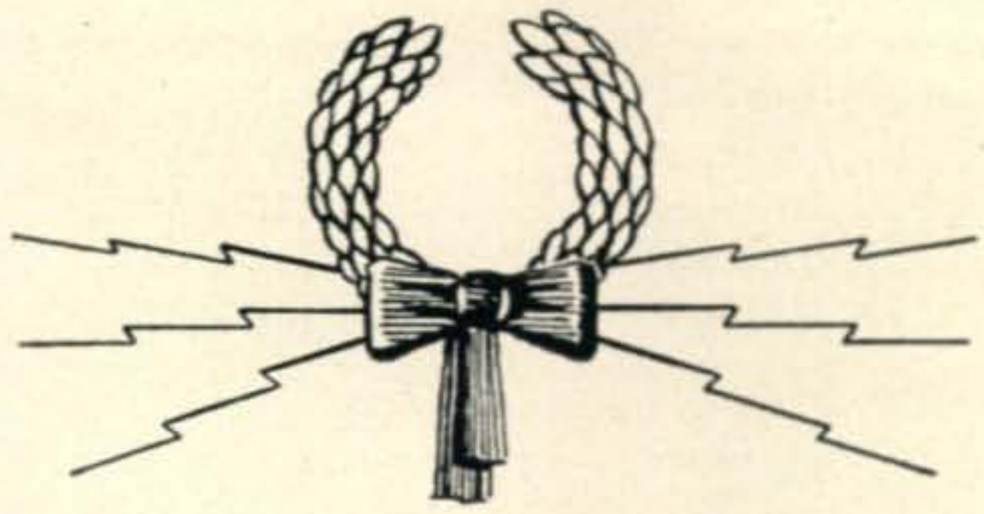
Mentioning DX, Lou, W1MCW, is up to 130 countries, 36 zones on 10 phone. Latest new ones are Mauritius, VQ8AE; Italian Somaliland, MD4JG, and Panama, HP1LA.

From Emily Schuette, W9EXM, new editor of

(*Continued on page 66*)

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

YL of the Month, Alicia G. Rodriguez, KP4CL, is the only active YL in Puerto Rico. The pet parrot, 2-year old "Linda," joins in when KP4CL operates phone for Alicia has taught her to say "CQ."



KENNETH BRYANT WARNER, W1EH

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in the advancement of

amateur radio.

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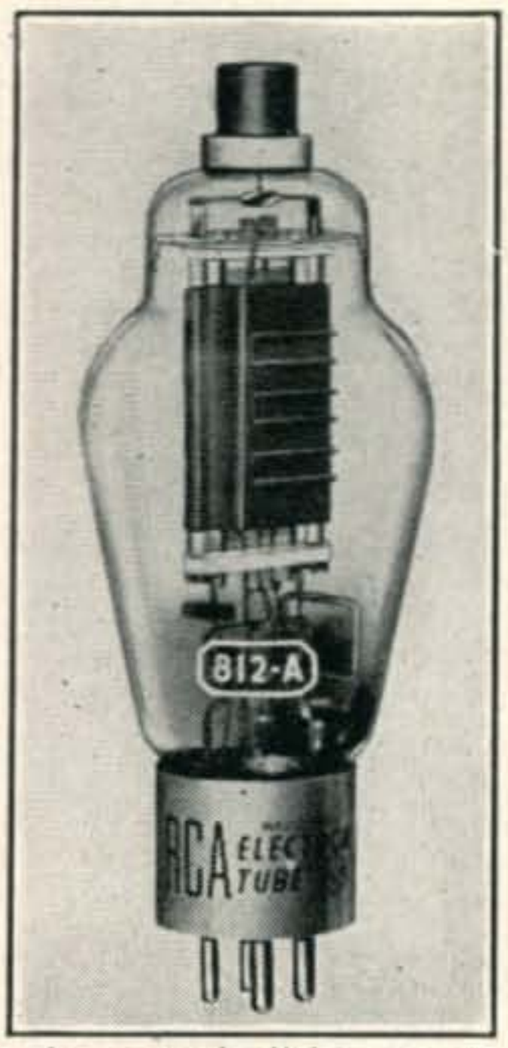
PARTS AND PRODUCTS REVIEW

Improved 812 Power Triode

The new 812-A power triode, an improved and superseding version of the popular 812, utilizes a modified construction featuring a zirconium-coated plate having radiating fins to give greater dissipation capability, grid and plate leads designed to have low r-f loss, and a greatly strengthened top-cap assembly with ceramic collar. The greater dissipation capability permits increased ratings for plate current and plate input.

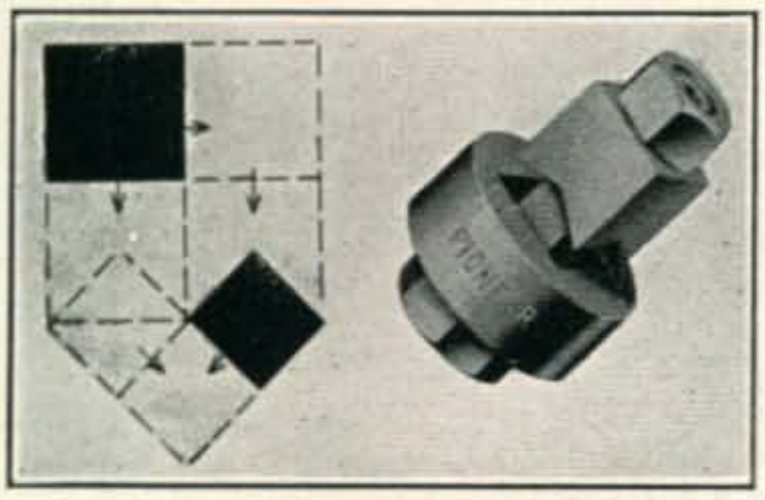


Because of its high perveance, the 812-A can be operated at high efficiency and low driving power. For example, a pair of 812-As under ICAS conditions in unmodulated Class C service can be operated with a plate input of 520 watts and the exceptionally low driving power at the tubes of only 13 watts. Operation with maximum ratings is permissible up to 30 mc, and with reduced ratings to 100 mc.

In Class B audio service, two 812-As as modulators under ICAS conditions can modulate 100 per cent an r-f amplifier with an input of 680 watts.

Square Hole Chassis Punch

The Pioneer Broach Co., Los Angeles, Calif., is manfacturing a punch that cuts square holes in sheet metal. By making combination cuts if necessary,



angular, rectangular, L-shaped, or any square corner pattern type hole can be cut with precision and ease. To obtain the desired square hole, or other combination of straight-edge cut-outs, all that is necessary is to first drill, punch or pierce the sheet metal with a round hole to permit the guiding screw bolt to pass through. This screw bolt is first inserted through the die and then through the hole from the underside of the sheet metal. The square Pioneer chassis punch is then slipped over the threaded portion and on to the square body of the bolt. The nut is then screwed on the threads and turned with a hex head wrench, forcing the punch through the metal, and the square hole is cut. At the present time the Pioneer chassis punch is made in two square sizes, 5/8" and 3/4". In addition, the Pioneer Broach Company has been supplying manufactures with thirteen sizes of round hole chassis punches which range in size from 1/2" to 1 3/8".

Pioneer chassis punches are made of high grade tool steels. They are precision machined, carefully heat treated and finish ground to close tolerances. They are fully guaranteed and supplied individually wrapped and packaged in oil-proof metal containers. Completely illustrated descriptive literature is available by writing to the Pioneer Broach Company, 1424 South Main Street, Los Angeles 15, Calif.

Magazine Library

Walter Ashe, radio and electronics distributor, St. Louis, has introduced a custom-built storage file which holds 12 issues of CQ or similar size magazines. Measuring 6 3/4" wide by 3 3/8" thick by 10" high the Library is made of high quality Kraft fibre board, printed and constructed to look like a Buckram bound book. Copies of favorite radio publications can be preserved in orderly, chronological sequence, indexed and ready for instant reference. Free date label stickers, enough to index a 20 year supply of magazines are furnished with every Library. The stickers are supplied in strips for convenience in typing. The Library may be ordered in any combination desired.

Wave Trap

To eliminate interference caused by amateur radio transmission received through the a-c line, Bud Radio, Inc., has perfected a new and very efficient wave-trap. It can be used in connection with any television, AM or FM receiver. Its three point installation method is quick and easy.

1) Plug the cord from the receiver into the receptacle in the wave-trap.

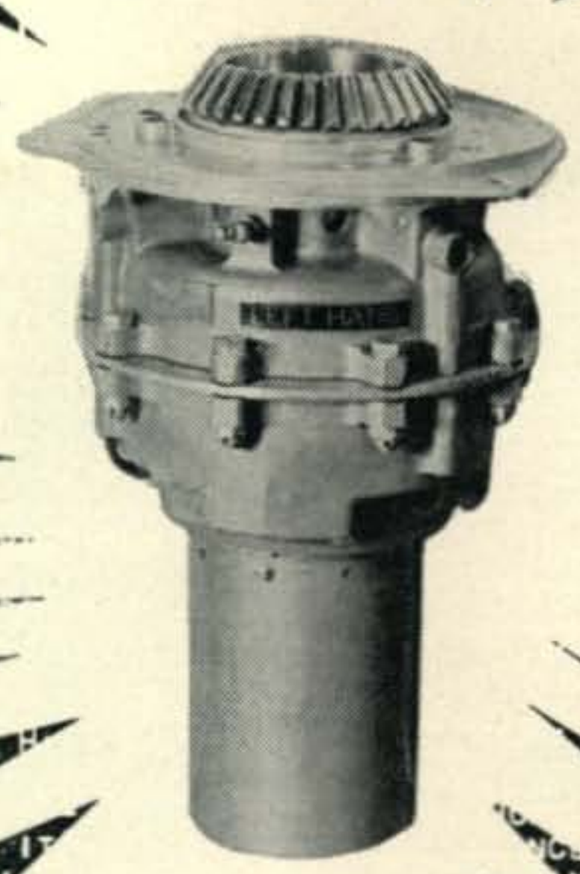
2) Plug the cord from the wave-trap into the a-c receptacle.

3) Adjust the condensors by means of hand tuning extensions, until the interference has disappeared. It is not necessary to tamper with the receiver in any way to install the wave-trap. The entire unit is small, compact and completely encased. The

(*Continued on page 68*)

LOOK WHAT BIL HARRISON HAS NOW!

PROP PITCH ROTATOR FOR BEAMS



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BRAND NEW "SPARES"—never installed nor used in any way—clean, perfect. (Worth many times the battered ones removed from worn out planes)

These are the highly desirable SMALL TYPE—POWERFUL enough to easily turn the largest dual beam!

RUGGED enough to support even the heaviest array!

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(Do not confuse with the ordinary ones you see around that weigh over 80 lbs)

- COMPACT! — Illustration is 1/7 actual size. (only 15½" high)
- Operates on 24 to 30 V, DC or AC. (3 Amp transformer will do)
- Continuous rotation in either direction, reversible with single pole switch.
- Approximately 1 RPM (With 30 volts)
- 9000 to 1 gear reduction. No free swing, even in high winds.

These sturdy, dependable units, manufactured at a cost of several hundred dollars each, to control the pitch of propeller blades, make an excellent beam rotator!
(See pages 22, 23, 29, Nov. '47 QST; page 38, April CQ; Handbooks, etc.)

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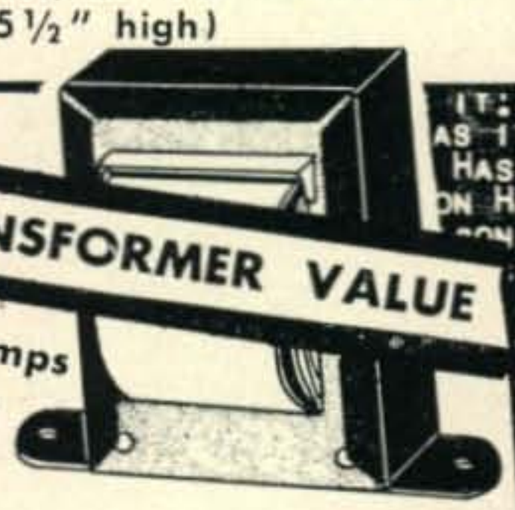

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10 VCT, 5A – For 805, 810, 813, etc.	T21F18	$3.56
10 VCT, 12A	T21F19	$5.09

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600 Watts Audio – 1200 Watts Class C.	T442	$39.69

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550 MA – 60 Ohms		$13.72

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2100-1800-1500-0-1500-1800-2100	300 MA	S-49	$25.97
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Postscripts

The National Amateur Radio Council

The National Amateur Radio Council, a group of interested amateurs who have banded together to permit increased emphasis of their views within the A.R.R.L. and before the F.C.C., have recently made public, results of the poll taken among their 800 members. Noteworthy is the fact that the tabulation is the result of replies by over 65% of their members.

The proposals placed before the N.A.R.C. membership resulted in a request by this group for a 100 kc allocation for A3 operation on 7200-7300 kc; a 100 kc extension of the 75-meter phone band making the limits 3750-4000 kc; opposition to the 16 w.p.m. requirement for Class A licenses; and opposition to the Class B requirements which would limit a new amateur to c-w operation on frequencies below 30 mc for the first year of operation. In addition, the group favors active campaigning for the return of the 160-meter band, either in full or under a shared operating plan so as to avoid conflict with navigation aids now in that band.

At the present time N.A.R.C. members are selecting officers from a list of nominees chosen by them in a meeting held during the National A.R.R.L. Convention in Milwaukee. Nominees are WØCVU, W9WT, W9CCB, W3BWH, W4TFK, W4NGZ, W9GWL, W8DVS, W6RWT. Five members will serve as the board and this group will elect their regular officers. Acting secretary is S. L. Bing, W9IJM, 23 Main Street, Champaign, Ill.

●

The Old Old Timers Club

In the Fall of 1947 a group of amateurs in frequent QSO on 75-meter phone decided they had in common, among other things, there long years of amateur activity. To cement this comradeship a club was formed, the first meeting of which took place in January of this year on 3990 kc. The purpose of the O.O.T.C. is to tie together all the real old timers from coast to coast who have had 40 years or more of amateur experience. No young squirts of a mere 25 years activity in the O.O.T.C.! Started with 13 members there are now 37 active in the group.

The only qualification for membership is that the old timer must have had some kind of an amateur transmitter on the air during 1908 or earlier. Actual contact must have been made with some other station whether amateur or commercial. When applying it is requested that the original call letters be given, location, and the call letters and location of the station with whom they worked. Applicants must also hold a valid license today, although it need not have been continuously in force.

O.O.T.C. charter member W1CPI threatens some QRM from his rock crusher!

Weekly meeting will be held on Thursday evening 8 p. m. EST on 3990 kc. When participation becomes more national in scope latter meetings will be scheduled. Certificates of membership are awarded to all O.O.T.C. members. All new applicants should address their correspondence to the club secretary, Bert Ingalls, W1NQ, R.F.D., Epping, N. H. Present membership includes: president, W1ZE; vice-president, W1ANA; secretary, W1NQ; treasury, W1TK; custodian of old gear, W1CPI. Members: W1SS, CQR, FZU, NF, ZS, VW, FUR, AI, ANC, TP, UE, BMK. W2ZI, FG, DH, OUS, ENX, RBH, EG, TF, MB, BO, EE. W3CC, KBB. W4ZB. W6IZ, RR. W8CBI. W9AO, RA. WØNH. W2GOX one of the first members passed away on July 17 this year.

●

Long Island Hamfest

The Federation of Long Island Radio Clubs will hold its 12th annual hamfest at the Lost Battalion Hall in Elmhurst, L. I., N. Y., on November 18th, 8 p.m. There will be technical talks, entertainment and prizes. Admission $1.50 at the door, or $1.25 in advance. Tickets available from any member club, or from Edgar E. Newman, W2RPZ, 214 Munro Blvd., Valley Stream, L. I.

N.A.R.C. members photographed at A.R.R.L. National Convention. Back row, left to right: W4KBY, W9FKE, W4TFK, W9WT, and WØCVU. Front row, left to right: W9CCB, W4NGZ, WØRMF, and W9IJM.

◆

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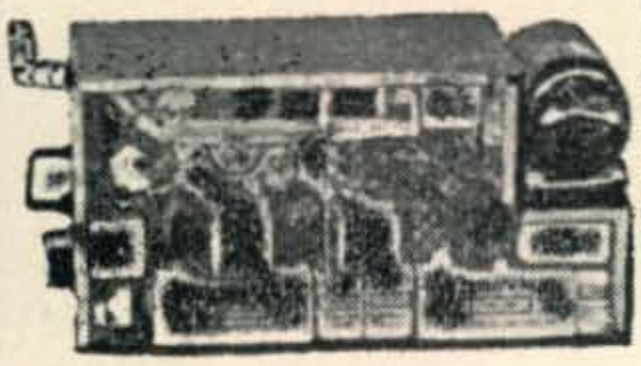

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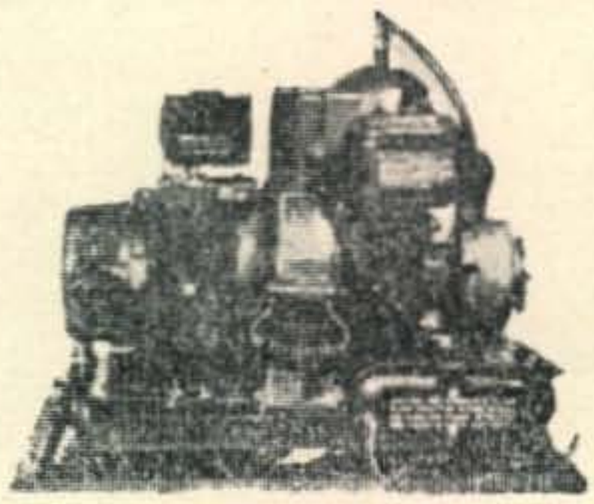

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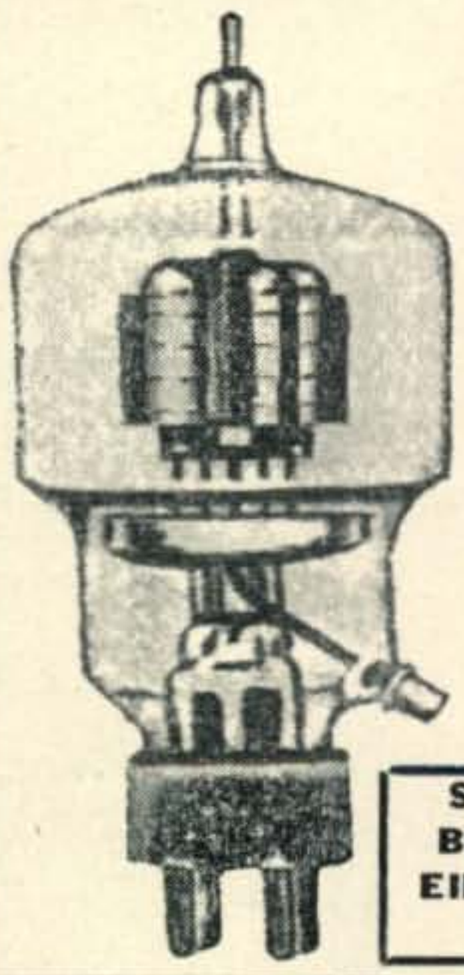

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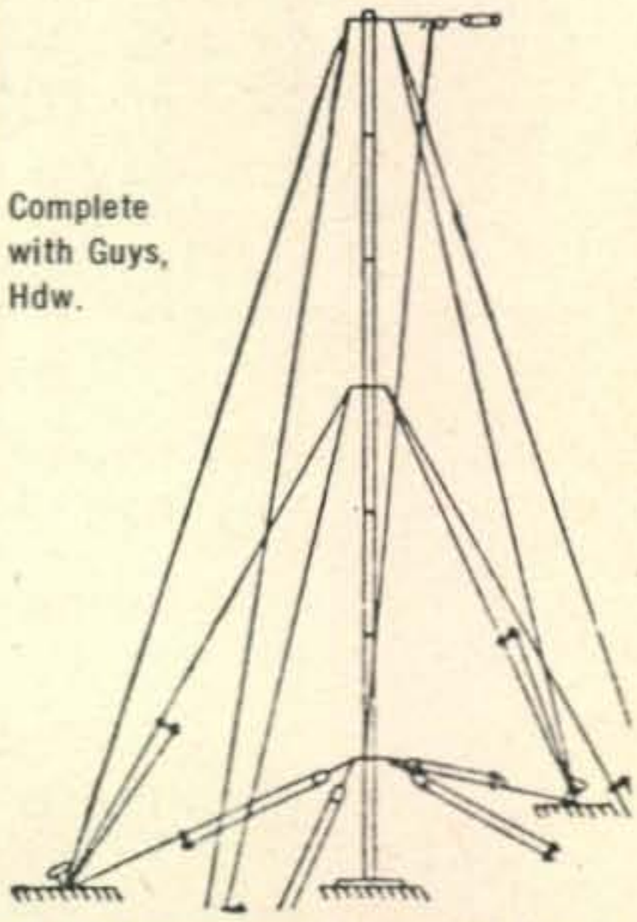
75 ohm Amphenol (heavy). Per C **7.20**
Kilowatt 75 ohm Amphenol. Twin lead, Per C. ft. **7.20**
3 Gang 410 mmfd. per Sect. Cond. Excellent Quality **2.95**
4 Gang 150 mmfd. Variable **.95**
Condensers—New: 2 mfd @ 2500 W.V. Each **2.95**
4 mfd. @ 600 V. Oil—round can. Each **1.18**
Relay. Cramer type TD-2-120S—Max. 1 min. delay. Cont. 10 amp. 115V **6.95**
Relay, Leach 115V-AC DPST. New **1.50**
Relay, Allen Bradley, heavy duty, 30 amp. 115V-AC. Perfect for 1 KW rig—Near new cond. **4.95**
Toggle Switch — SPST — plus spring return ..... **.19**
Toggle Switch — H.D.-DPST—12 amp. 125 V. ..... **.39**
Siren, Commercial type, hand operated, very loud noise. Gov't. cost **$21.00.** Special **4.95**
Phosphor Bronze dial cable 16 str.—250' spool ..... **.69**
Cable—6 wire #16, glass insul. shielded, plastic covered—perfect for beam cont. Per ft. **.12c**
100 ft. **$10.00**
Cable—6 wire #18, unshielded. Per ft. ..... **.08**
Cable—4 wire #18 Plastic—shielded. Per ft. **.06,** 100 ft. **5.50**
Cable—Single shielded grid wire #20-AN Specs. Special—Per hundred **1.50**
Steel tape—50' mfd. by Roe. NEW **4.95**
Phone Plugs. Each ..... **.25**
Jones Plugs 6 & 8 prong. Each ..... **.24**
2" PM speaker (Bakelite cased), used in Walkie-Talkie. Each **1.95**
SCR 522 Dynamotors PE94C—new. Each **3.95**
SCR 522 Receiver Conversion Kit with instr. (less dial) **3.50**
ACN dial for above. Each **3.30**

Doublet Antenna Kit

used with the famous Hallicrafters BC-610, consisting of 7 steel-alloy mast sections in a handy canvas bag. Each section is 5' 6" long, 1½" OD with the last 6" rolled to a smaller OD to telescope into the end of the preceding section. No taper. Assemble into mast up to 35 high or shorter by any multiple of 5'. Finished in weatherproof olive drab.

Complete with Guys, Hdw.



Ideal for erection of FM and Television Beams! Drop your coaxial cable right through the center! Brand new, export packed.

TERMS: F. O. B. Pasadena unless postpaid. 25% deposit on ALL Orders. All C.O.D.'s shipped by Rail Express. Save freight and C.O.D. fees by sending full price with order and we will ship by fast truck transportation collect. Minimum order $2.00. No C.O.D.'s under $2.00. Californians include 2½% sales tax.

Be Sure To Ask For Our Big Special Bulletin

DOW RADIO

1759 EAST COLORADO BLVD.
PASADENA 4, CALIFORNIA
Tel. Sycamore 3-1196
L. A. Ryan 16683

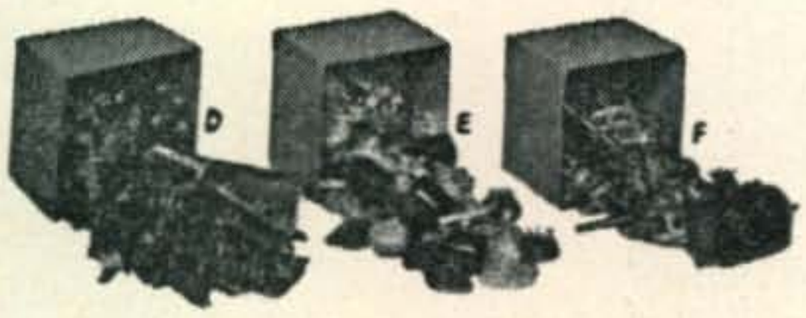
ESSE Specials!

Do not fail to closely examine this list of bargains. We believe that every item listed below is a sensational value that soon can never be repeated. All equipment advertised herein is unconditionally guaranteed to the customer's satisfaction to this extent: Return any item advertised within five days after delivery for full refund except transportation charges (both ways).

A—Insulated Resistors. Kits of assorted resistors of various wattages and values. Some gold band resistors. 100 for **$1.25.** 500 for **$5.49**

B—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. **2.65**

C—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**



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

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

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

FIELD TELEPHONE WIRE

3 conductor, stranded, insulated and weather-proofed. Ideal for intercommunication systems, telephones, selsyn indicators. Use it inside or out of doors. 525 Foot roll, brand new, ... **$4.25**

ARGON BULBS

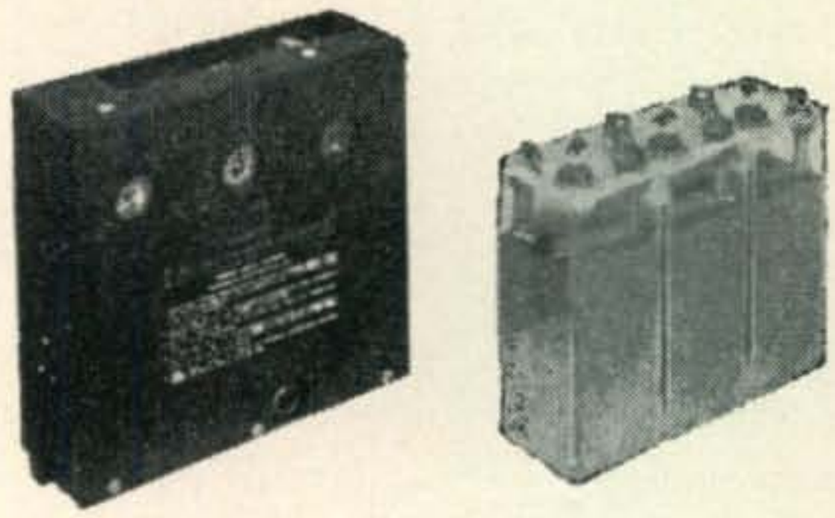
2 watt, 110 Volt, Edison base. Ideal for R.F. indication, night light.

Brand new, Box of ten **$1.75**

WESTINGHOUSE RECTIGON BATTERY CHARGER BULB

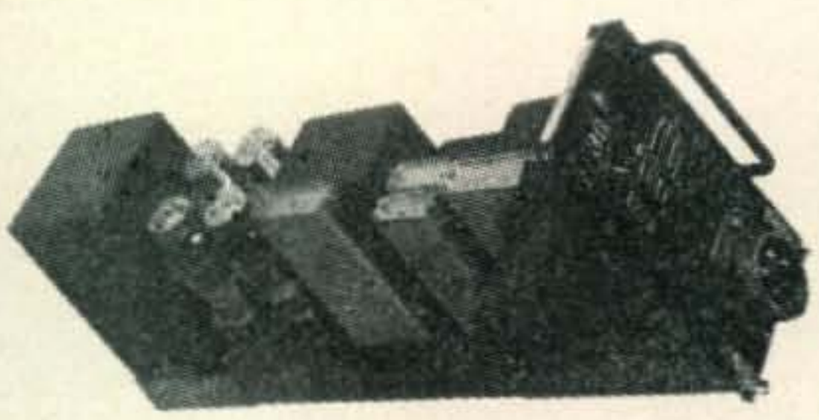
Style 289416, 6 ampere rating. For replacement in most chargers or for building power supply to use on D.C. operated equipment. Brand new ..... **$2.50 ea.**

WILLARD LEAD ACID CELLS



6 V. (New) (Dry-charged) **$3.00**

6 V. (In metal carrying case) (Add electrolyte specific gravity 1.265) (Drugstore) **$4.00**

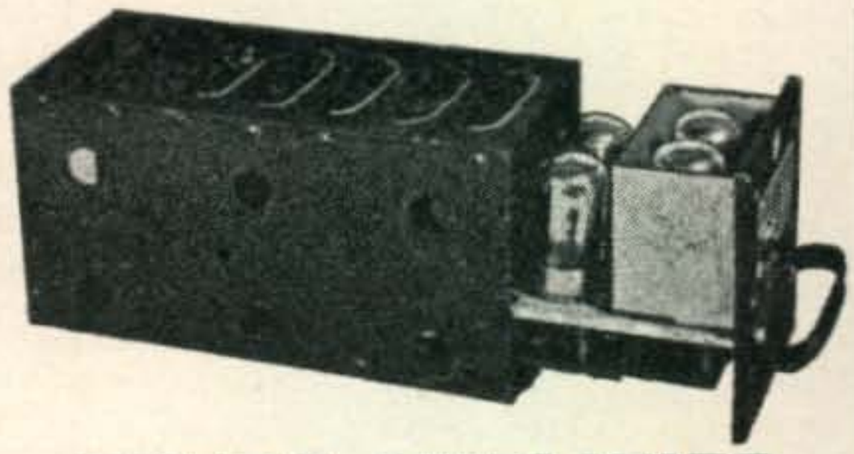


PP-51/APQ-9 RECTIFER POWER UNIT

400 cycle 115 V. Contains 4—5R4GY, 2—4Mfd. 1000 V. DC condensers, 2—1 Mfd. 1500 V. DC condensers, 400-2600 cycle power transformer resistors, etc. Weight 38 lbs. Size 21"L x 5⅝"W x 7¾"H. Price **$7.95**

BC-314 RECEIVER

Frequency coverage 150-1500 Kc. — 4 ranges, two RF stages, 1st detector, two IF stages, 2nd detector, RF oscillator, CW oscillator and audio. Total 9 tubes. 14 V. DC at 5.3 amps. input to dynamotor. Easily converted for 110 V. AC. Use headphones or speaker or both. New, with manual **$99.50**
Used **79.50**



TURBO AMPLIFIER

Used for parts—shipped complete with the following tubes:

2 ..... 7 C5's
1 ..... 7 Y4
1 ..... 7 F7

Price ..... $1.00 ea.

ESSE SPECIALS!

BRAND NEW SCR-625 MINE DETECTORS

ATTENTION, PROSPECTORS, PLUMBERS, ETC.

Used by the Army to detect buried metallic mines. Its private use suggests the location of underground or underwater pipes, cables and ore-bearing rock, the location of metallic fragments in scrap materials, logs, etc., and the screening of personnel in plants for carrying of metallic objects.

New complete in original overseas packing container. Originally sold by War Assets for **$166.00.** The U. S. Forestry Service has recommended procedure for using the SCR-625 Mine Detector to find concealed metal in tree logs and other timber products.

Brand new

59.50

SURPLUS RADIO CONVERSION MANUAL

Edited and printed by Techno-Graphic Publications. It contains 115 pages, size is 7" x 10½", printed on good paper stock, covers well bound. A partial list of contents includes complete information on the conversion of the following popular war surplus items: BC-221 Frequency meter, BC342, BC312, BC348, BC946B, SCR274N, SCR522, BC1068A receivers, BC412 cathode ray oscilloscope, BC645 transceiver for citizen's band, SCR274N transmitters, SCR522 transmitter, TBY transceiver, various dynamotors, and a cross-index on tube numbers. frequency allocation chart, electronic surplus index with listing of over 135 items and descriptions or functions or frequencies or tube line-ups etc. of same. Circuit diagrams of original items, and of converted jobs, together with values of various component parts abound in the manual. The text is clear, concise and easy to read and follow. The price per copy is.....

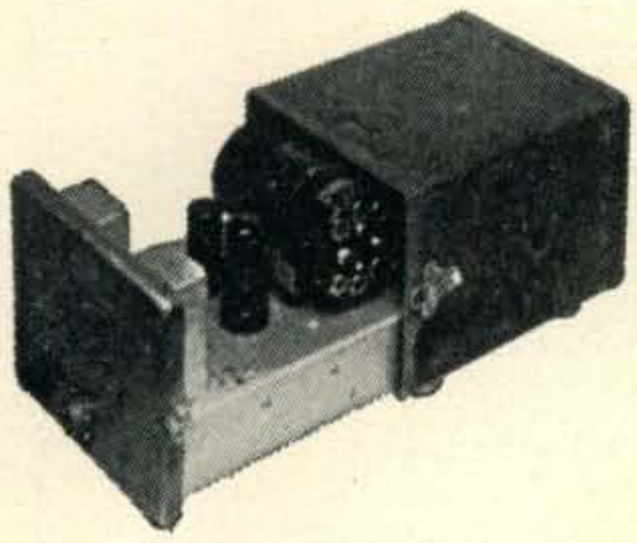
$1.75

ULTRA-VIOLET FLUORESCENT COCKPIT LIGHT ASSEMBLY

Air Corps type C-5, 28 V. DC operated. Black plastic case about 1½" dia. x 3" long. Has adjustable mounting flange, 3 foot two conductor shielded cord nd plug. Includes bulb. Brand new.....

$1.00 ea.

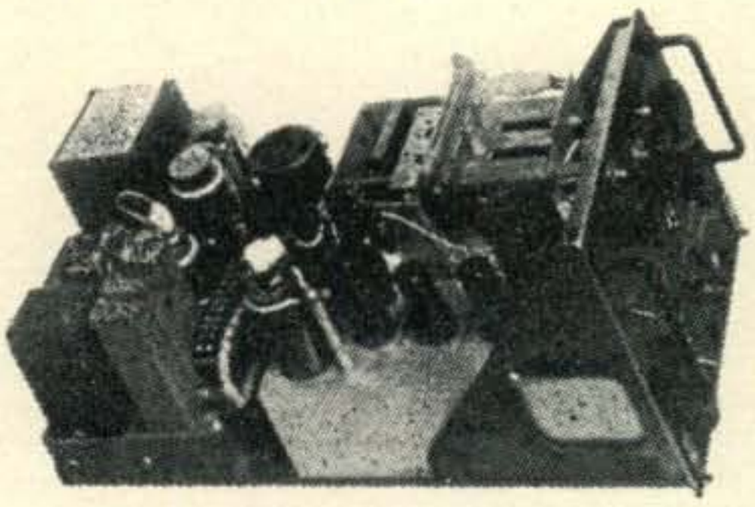
SCR-522 (100-156 Mc. receiver & transmitter,)comp.with tubes **$39.75**



INTERPHONE AMPLIFIER

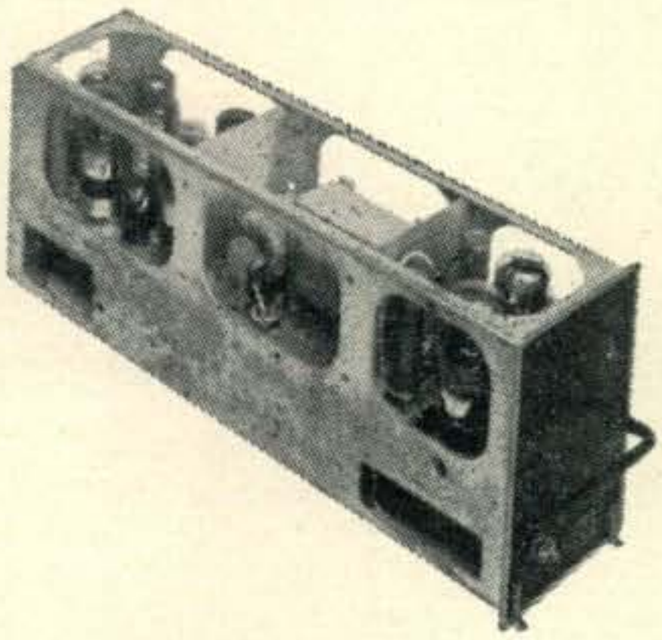
Beautifully constructed in gray, finish sturdy metal cabinet. Operates on 24 V. input. Complete with dynamotor. Has 1—6V6 and 1—6SJ7 tube, volume control, carbon or magnetic microphone input. Fastened to sturdy resilient mounting on rubber. Size 6" x 7" x 9". Shipping weight 14 lbs.....

$3.45



T-26/APT-2 RADAR TRANSMITTER

Contains tunable VHF circuit using 2—JAN CTL 703A's or 368AS tubes. Other tubes are: 2 — 5R4GY's, 1 — 2X2, 1 — 807, 1 — 6AG7, 2 — 6AC7's and 1 — 931A. Other parts such as 24 V. DC motor and blower, HV. condensers and transformers, terminal strips and Amphenol connectors, knobs, fuse holders, etc. make this unit invaluable for parts alone. Weight approx. 45 lbs. Size 21"L x 10½"W x 7¾" H, in metal case. **$9.75**



PP-2/APQ-5 POWER UNIT

400 cycle, 115 V. Contains 10 tubes as follows: 2 — 5U4G's, 1 — 6A5GT, 4 — 6Y6G's, 1 — 6SL7GT, 2 — VR150-30 and numerous condensers, transformers and resistors. Weight 17 lbs. Size 21"L x 5¼"W x 7¾"H. Price.....

$5.75

Television wire, 2-conductor—300 ohm. 250 ft. spool..... **$5.00**
4-Conductor wire. 16 gauge impregnated rubber coated sheathed stranded copper wire. 100 ft..... **$6.00**

Plastic coated Assault wire, twisted 2-conductor No. 20-7 strand tinned 100 ft. or more ..... **.01c** per ft.

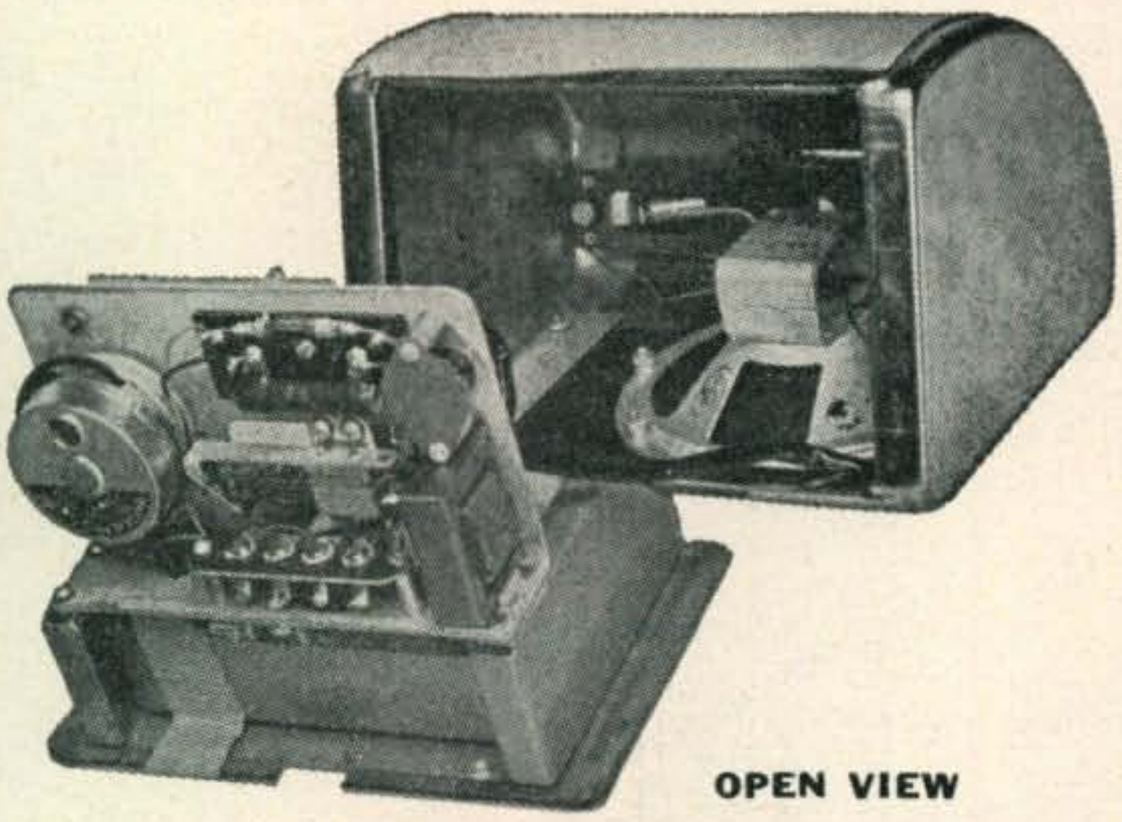
ESSE SPECIALS!

REMOTE CONTROLLED COIN INSERT & SPEAKER BOX

CLOSED VIEW

- Sloping front
- P M Speaker 5″ size
- Has 2 Pilot Lights for illumination
- Finished in chrome metal and grill with red plastic
- Accepts 1 to 6 nickels
- Each 5c coin gives about two phono records of music
- Should be mounted on a flat base
- Has Haydon Mfg. Co. timer
- Has provision for locks (not furnished)
- Easily removable coin box, size 6″ x 3½″ x 1½″
- Requires 4 wires from power unit
- A beautiful piece of equipment that could be built to house coin operated radio.
- Worth several times our asking price.
- Price brand new

$4.95



OPEN VIEW

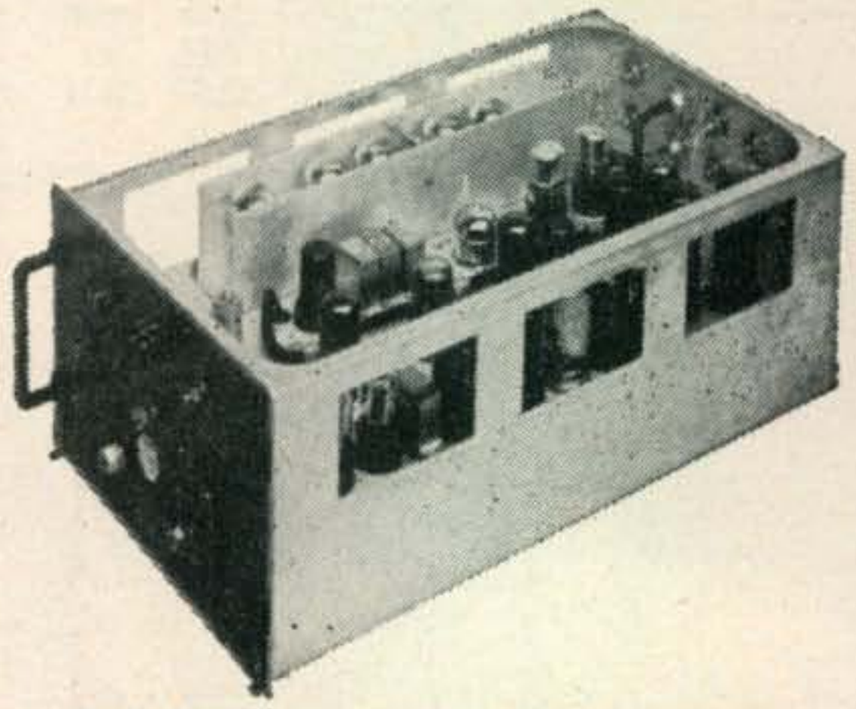
CO-AXIAL CABLE VALUES

Co-axial cable values that we can only offer to customers who buy minimum of 100 foot per type

RG-8/U cable 52 ohms impedance (unmarked) ..... **$2.95** per 100 foot

RG-8/U cable 52 ohms impedance (marked) ..... **$3.95** per 100 foot

RG-29/UCO-AXIAL 53.5 ohms impedance (marked) ..... **$3.95** per 100 foot

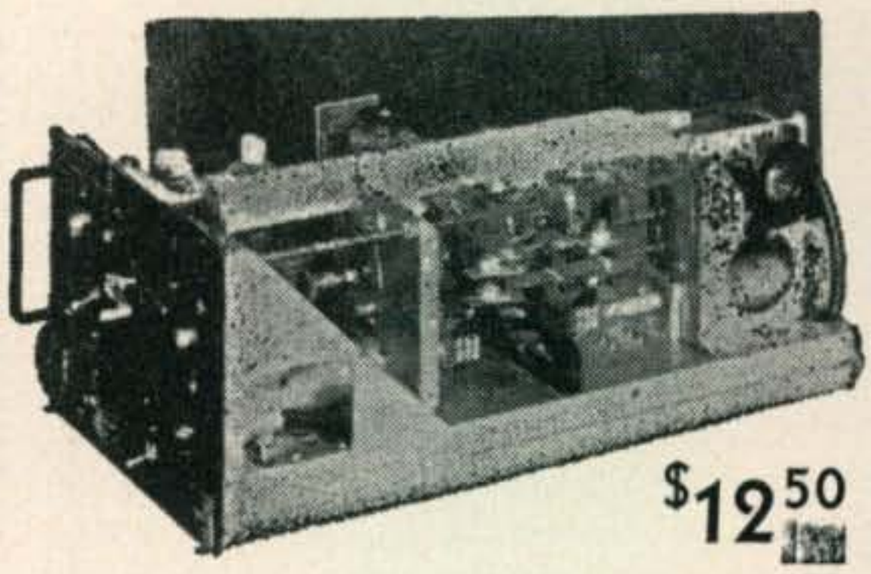


BC-1155-A SYNCHRONIZER

Another invaluable unit for the Television and VHF experimenter. Contains 19 Mc. IF strip using 5—WE717A tubes. A total of 24 tubes included, consisting of 6—WE717A's, 2—6SL7GT's, 2—6AC7's, 5—6SN7GT's, 2—6N7GT's, 2—6L6's, 1—6V6GT, 2—6AG7's, 1—6AC7, and 1—6H6GT. Other parts included are 6 pots, 10 Amphenol 831R chassis connectors and numerous condensers, resistors, and transformers. Weight 22 lbs. Size 21″L x 11½″W x 7¾″H. Price.....

$20.00

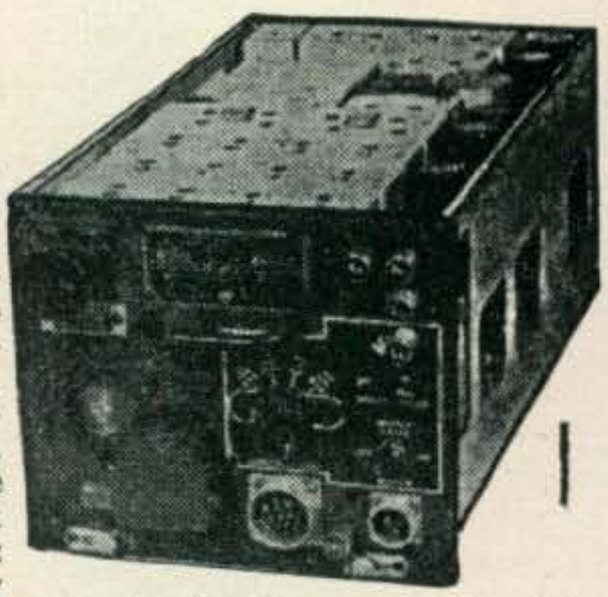
T-39/APQ-9 RADAR TRANSMITTER



$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, tc.

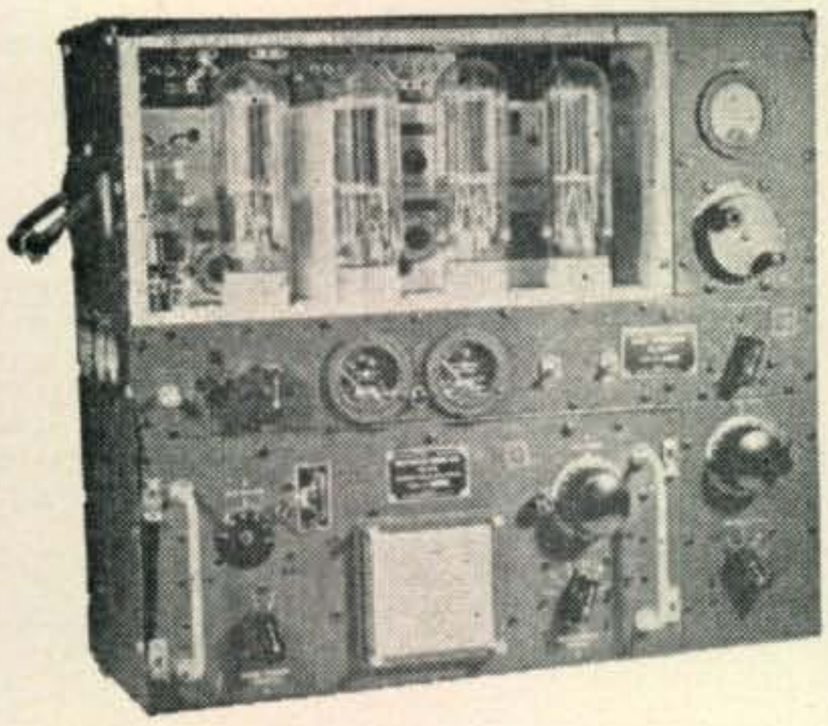
NAVY ARB RECEIVER

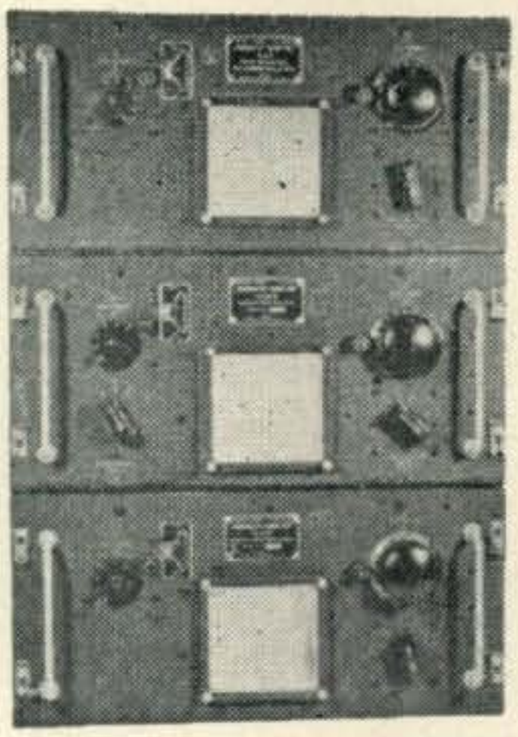


195 Kc. thru 9 Mc. Includes broadcast band. Can be converted easily to a good ham receiver. 28 V. DC input. Covers 4 bands. This is a deluxe type super-het receiver. Note: The frequency coverage includes the standard broadcast band. Has 4-gang tuning condenser; can be converted to 110 V. AC receiver. Complete with tubes: 12SF7, 12SA7, 3—12SF7 and 12A6. Dial is built on front of chassis. Electric driven or manual band change switch. Weight 28 lbs. Size 6″ x 7″ x 15″. Complete with tubes and dynamotor. .....

$27.50

ESSE SPECIALS!



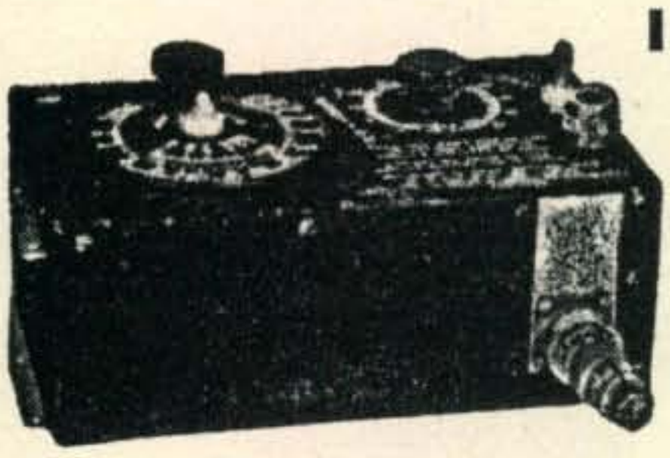


BC-375 GE MOPA TRANSMITTER

The most famous of all surplus transmitters. Was used by the Army bombers and ground stations during the War. Frequency range is covered by means of plug-in tuning units as shown below. Each tuning unit has its own oscillator and power amplifier coils and condensers, and antenna tuning circuits all designed to operate at top efficiency within its particular frequency range. Transmitter and accessories are finished in black crackle, and the milliammeter, voltmeter, and RF ammeter are mounted on the front panel. **Frequency Range:** 200-500 Kc. and 1500-12,500 Kc. (Will operate on 10 and 20 meter band with slight modification). **Oscillator:** self-excited, thermo-compensated, and hand calibrated. **Power Amplifier:** neutralized class "C" stage, using 211 tube, and equipped with antenna coupling circuit which matches practically any length antenna. **Modulator:** Class "B"—uses two 211 tubes. **Power Supply:** Dynamotor which furnishes 1000 V. at 350 Ma. **Conversion** instructions and diagram for 110 V. AC furnished upon request for **$1.00.**

PRICES: As follows—

Transmitter only **$19.50**
Tuning units TU-5B, TU-6B, TU-7B, TU-8B, TU-9B, TU-10B, TU-26B, choice **$2.50**
Dynamotor PE-73C **$4.95**
Antenna tuning unit (BC-306A) **$4.95**



INTERVALOMETER

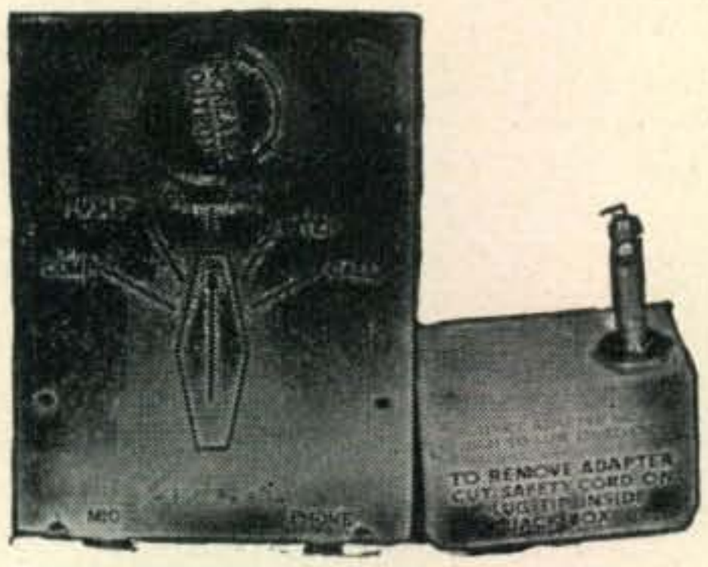
Electronic timing device. Was used for releasing bombs at intervals. Ideal for darkroom timer, model train controller. (Contains relays, switches pilot lights resistors knobs, etc.)
Price **$2.25**

MARKER-BEACON RECEIVER

Can be adapted to radio controlled devices. Was used by pilots to flash a signal lamp on aircraft instrument panel when in range of a beacon transmitter. Responds to modulated signals over a variable range of 62 to 80 Mc. Tube plates and filaments operate directly from 24 V. DC. Can be adapted for radio control of experimental apparatus opening garage doors, etc. Circuit diagram and parts list included on either model shown below:

BC-357 — contains 12C8 and 12SQ7 tubes and sensitive relay (size 5⅜" x 5¼" x 3¼").
Price **$2.95**

BC-1033 — contains 6SH7, 6SL7 and 12SN7 tubes, sensitive relay (size 5⅜" x 5¼" x 3¼")
Price **$3.50**



JACK BOX BC-1366

Contains 2-pole 5-position switch, rheostat, two phone jacks, etc. In aluminum case 3½" x 4⅜" x 2¼". Complete with headphone set adapter to match high to low impedance.
Price **$1.25**

R-89/ARN-5A GLIDE PATH RECEIVER

Formerly used for blind landing but adaptable to many other uses such as receiver for new police or citizens band. Band of operation 326-335 Mc. on any of its 3 pre-determined crystal controlled frequencies. Contains 11 tubes, 6 relays and other valuable parts. For 24 V. DC operation. Size 13¾ x 5¼ x 6⅜". Price complete **$12.45**

MN-26 RADIO COMPASS

Brand new in original cartons. Should sell for several times the amount that we are asking. Complete with type MN-20 rotable loop and azimuth indicator, left and right indicator, remote control, except for part of the connecting cable which can be purchased elsewhere or for which you could substitute other cable **$69.50**

RECEIVER TUNING HEAD CRV-23253

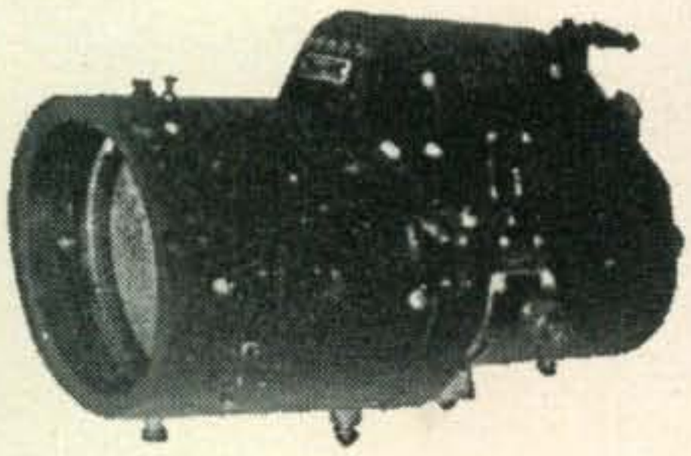
Used with CRV-46151 Receiver for vernier tuning. Has beveled dial with hairline cursor. Bands are 200-560, 560-1600, 1600-4450, 4450-9050 Kcs. Each band spread over about 280 degrees of dial edge. Has provision for flexible tuning shaft or can be adapted for direct drive on any tuning shaft. Black crackle finish. Size 5″ x 3″ x 2″ overall. Brand new.....

$1.50

PILOTS CONTROL BOX TYPE CRV-23254

Used with CRV-46151 Receiver for remote control of volume, selection of any one of six frequency bands, as off/on switch or selection of C.W. and M.C.W. and M.V.C. or A.V.C. Black crackle finish. Size 2″ x 2½″ x 5″ high. Brand new.

$1.50



INDICATOR SCOPE ID-41/APQ-13

About 6″ diameter by 15″ deep. Contains 1—5FP7, 1—6AK5 tube, 5 Grain of Wheat 3 V. pilot lights, magnetic deflection yoke, condensers, resistors, potentiometers, sockets.....

$5.75

ESSE SPECIALS!

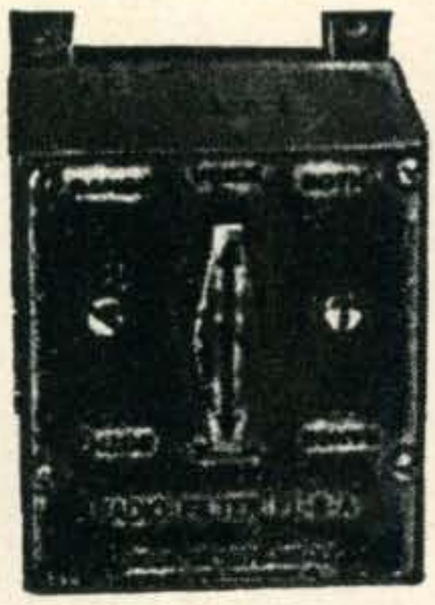
24V—L-3 50 AMP LEECE NEVILLE AIRCRAFT GENERATOR FOR HEAVY DUTY WORK

24 V L-3—50 Amp—Leece Neville aircraft generator for heavy duty work. Can be used on automobiles, etc. for that 24V rig. Weight 24 lbs—5″ diameter—11″ long—(¾″ diameter; 1″ length shaft) Brand new..... **$17.50**

Transformer, 110 volts 60 cycle input; output being two secondaries—each giving 14 volts @ 11 amperes, which can be used alone, in parallel, or in series for various voltage and current combinations. Size about 3½″ x 3½″ x 4″ high. Ideal for operation of propeller pitch motors used for beam antenna rotation. Shipping weight 7 lbs. Manufactured for our company. Brand new.... **$5.95**

CP-11/APS-15

Contains following tubes: 13 — 6SN7GT's, 3 — 6SA7GT's, 1 — 5Y3GT. Has 24 V. motor and blower. Blower will operate on 110 V. 60 cycle, 4 one megohm precision wire wound resistors, 80-86 Kc. crystal, numerous other transformers, condensers, etc. Wgt. 25 lbs..... **$12.95**



AIRCRAFT RADIO RANGE FILTER

For helpful reduction of QRM on crowded CW bands. When attached to output of any communications receiver:

1—Will pass signal of 1020 CPS, eliminating others.
2—Will pass voice frequencies and eliminate 1020 CPS code signal.

Compact, light weight, with switch. Size 2¾″ x 2⅝″ x 3¾″. Price..... **$2.25**

BC-348 Communications Receiver 149.50

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

BC-645 ULTRA HI-FREQUENCY TRANSMITTER-RECEIVER

You read about it recently in QST! Originally operated in the frequency band from 450 to 500 Mc. Can be converted to 420 Mc. amateur band. Consists of complete transmitter and modulator system, and receiver. Complete, Brand New with 15 tubes.

$11.95

(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..... **89.50**

ESSE SPECIALS!

NEW VOLUME CONTROLS

1 megohm, carbon, 1″ shaft	$.35
1000 ohms, carbon, screw-driver shaft	.35
20 ohms, wire-wound, 1″ shaft	.35
500,000 ohms, carbon, 2″ shaft	.35
1000 ohms, wire-wound, 2″ shaft	.35
6000 ohms, with switch, carbon, 1″ shaft	.40
Dual 25000 ea., wire-wound, 1″ shaft	.35
Triple 25,000-50,000-20,000, carbon, 1″ shaft	.70

NEW RESISTORS — WIREWOUND

3 ohms, 20 watt	$.10
2500 ohms, 20 watt	.10
½ ohm, 20 watt	.10
11269 ohms, 100 watt (has 5 taps)	.35

NEW RESISTORS — CARBON

	per hundred
100 ohms, ½ watt	$3.00
120 ohms, ½ watt	3.00
220 ohms, ¼ watt	3.00
270 ohms, 1 watt	3.00
470 ohms, ¼ watt	3.00
480 ohms, ½ watt	3.00
1200 ohms, ½ watt	3.00
6800 ohms, 2 watt	3.00
12,000 ohms, 2 watt	3.00
21,000 ohms, ¼ watt	3.00
56,000 ohms, ¼ watt	3.00
85,000 ohms, ¼ watt	3.00
150,000 ohms, 1 watt	3.00
270,000 ohms, ½ watt	3.00
830,000 ohms, ¼ watt	3.00
1,200,000 ohms, ½ watt	3.00
5,600,000 ohms, ¼ watt	3.00

NEW CONDENSERS

.5 mfd. 600 V., Oil, ¾″ x 1¼″ x 2″	$ .20
.5 mfd. 400 V., paper, 1″ dia. x 2¼″	.25
5.2 mfd. 50 V., Chicago Ind. Cond. Corp., Oil, 1 x 2½ x 3″	.25
4 mfd. 600 V. GE Pyranol, 1″ x 2½″ x 3″	.50
2 mfd. 600 V., Aerovox Oil, 1″ x 1″ x 3½″	1.25
8 mfd. 600 V., Chgo. Ind. Cond. Corp., Oil, 1″ x 4″ x 5″	1.50
1 mfd. 4000 V., C-D, Oil, 2″ x 4″ x 7″	4.00
.02 mfd. 600 V., mica	.05
4 mfd. 1000 V., Oil, C-D or Aerovox, 1″ x 2″ x 7″	2.50
30 mfd. 330 V. AC, GE pyranol	3.00
2 mfd. 1000 V., C-D, Oil, Single hole mounting, 1½″ dia. x 4½″	1.75
4 mfd. 600 V., C-D, 1½″ x 4½″, single hole mounting	1.25
140 mmfd., variable, padder screwdriver adjustable	.25
7-17 mmfd., variable tuning, 5 plate, 2″ shaft, ¼″ dia.	.25
.1 mfd. 400 V., paper, Aerovox	.15
.14 mfd. 50 V., paper	.15
.1 mfd. 1500 V. paper	.20
.05 mfd. 400 V. paper	.15

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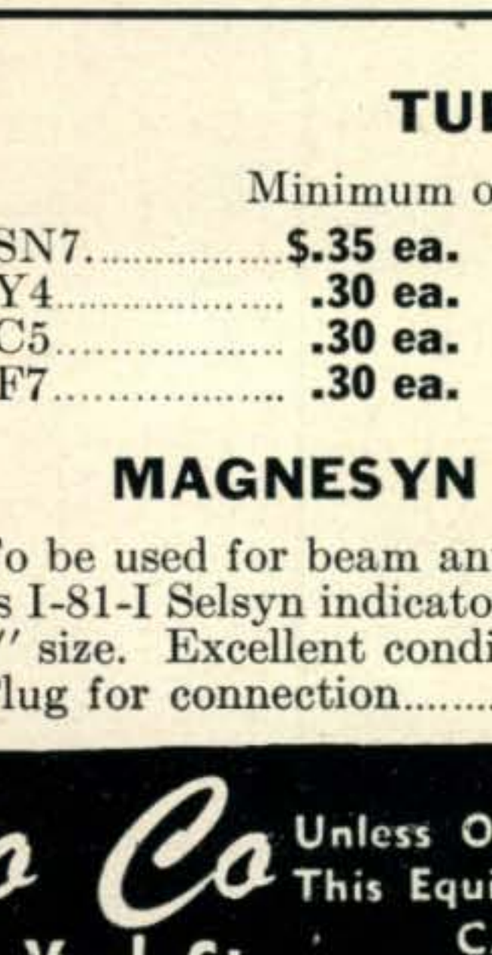
Lip microphone, made by Western Electric, Navy type CW-51071, with instruction sheet, brand new $1.50

TYPE 813 TUBES

Type 813 tubes (New)	$5.95 ea.
Type 813 tube sockets (New)	.50 ea.

TELRAD 18-A FREQUENCY STANDARD



Checks signals in the range of 100 Kc. to 45 Mc. with a high degree of accuracy. Self-contained power supply is 110, 130, 150, 220, and 250 V. 25-60 cycle AC. Complete with tubes, dual crystal, and instruction book. Brand new. Price.....

$39.50

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7F7	.30 ea.		

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THE YL's FREQUENCY

(*from page 54*)

YLRL *Harmonics*, we hear there is a wounded veteran, W1AN, who is hospitalized and who would very much like to hear from hams. He has a receiver but cannot have a transmitter in the hospital. A card or note will reach him: Harold P. Hatch, W1AN, c/o Veterans Hospital, Rutland Heights, Mass.

We learn that Mildred, W5NMD, and other Tulsa amateurs are wondering why *CQ* and *QST* aren't printed in Braille for our blind amateurs. The answer is simply that the cost would be prohibitive, and the demand would not be great enough to justify the labor involved. Better that amateurs display a little friendly ham spirit and read articles to their blind ham friends.

YLs on the broadcast bands again! Maxine, W6UHA, was recently interviewed by Jeanne Gray on KMPC on "The Woman's Voice."

Frances, W3AKB, attended a hamfest of the Baltimore Radio Club and won an NC-57 on ticket number "33."

Amelia, W2OLB, is back in New York and, lucky gal, has found an apartment in Greenwich Village.

Jean, W5HYF, is busy managing a hotel and coffee shop in Paducah, Texas. Another Texan, Dorothy, W5NNN, has been busy all summer studying drama at the University of Denver. She appeared in the play "On Borrowed Time" presented by the Miami Little Theatre.

This summer Esther, W8ATB, had visitors from all over the country, also HK5EM and his XYL. We hear that Theresa, W8VYU, was married in September. She still takes up flying and is going to Ohio State for her masters degree in electrical engineering.

First meeting of the fall season was held by the New York City YL Club in mid-September, with much swapping of news as to summer activities. The N.Y.C. club, by the way, was just exactly six years old at the time of this meeting! Willy, W2MEG, has come up with her Class A ticket. She has a new Collins 32V1 and will soon be on 20. Sophie, W2QGK, has been on 10 or 2 most every evening, while Selma, W2PUY, is in the process of changing her rig over to 20. Ruth, W2OWL, handled traffic from Helen, W6QOG, concerning the purchase of a Koala bear from the Bronx Zoo, to be used as a mascot for UCLA. Hope, W2RTZ, recently visited A.R.R.L. and operated W1AW transmitter.

Our congratulations to the San Diego YL Club for starting a radio class for YLs and XYLs. It's part of their membership drive and there are five enrolled to date. And lots of success to Marie, WØPFO, member of the St. Louis Area YL Club, and her OM, who are planning to give code and theory lessons to girls in St. Louis this Fall who are interested.

YL of the Month

We salute this month the first, and at present the only active, YL in Puerto Rico—Alicia G. Rodriguez, KP4CL.

Alicia's interest in ham radio originated in much the same manner as so many other YL's, for she says: "As you probably know, in order to live a happily married life one has to follow one's husband's hobbies. When we were first married fifteen years ago, his hobby was speed-boating. Although I

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6F6GT	6SQ7GT	12SK7GT	50Y6
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6J7G	12A8GT	14X7	
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1P5GT	6C6	12F5GT	43
1V	6C8G	12J7GT	45
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3Q4	6F5GT	12K8GT	51
3Q5GT	6H6GT	12Q7GT	57
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6AC5	6P5GT	12SG7	75
6AC5GT	6SC7GT	12SJ7GT	76
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6A8G	6SJ7	25L6GT	78
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6B8	1LA4	70L7GT	7K7
6F8	1LA6	117L7GT	2050
6T7G	1LC6	117P7GT	
6Q6G	1LD5	XXFM	
6S7G	1LE3	6L6G	

89c Each

1Q3	6D8G	7C7	25A7GT
1T5	6S8GT	7H7	35L7GT
2A3	7A4/XXL	7Q7	117Z3
2A7	7A7	7Y4	35Y4
5Z4	7B6	14A7	117Z6
6AC7	7B7	14B6	XXL
6B4G	7C5	14Q7	
6C8G	7C6	25AC5GT	

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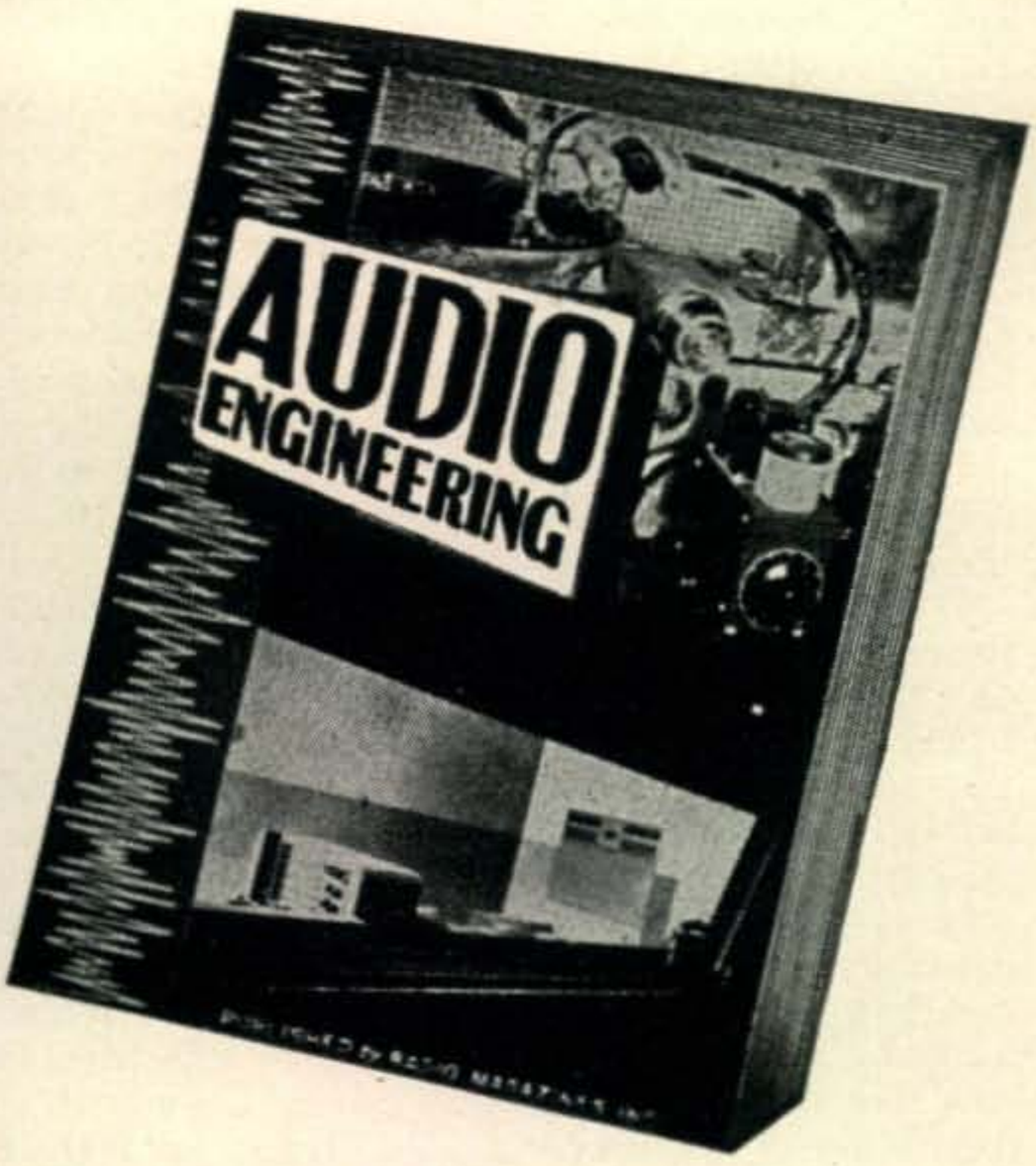

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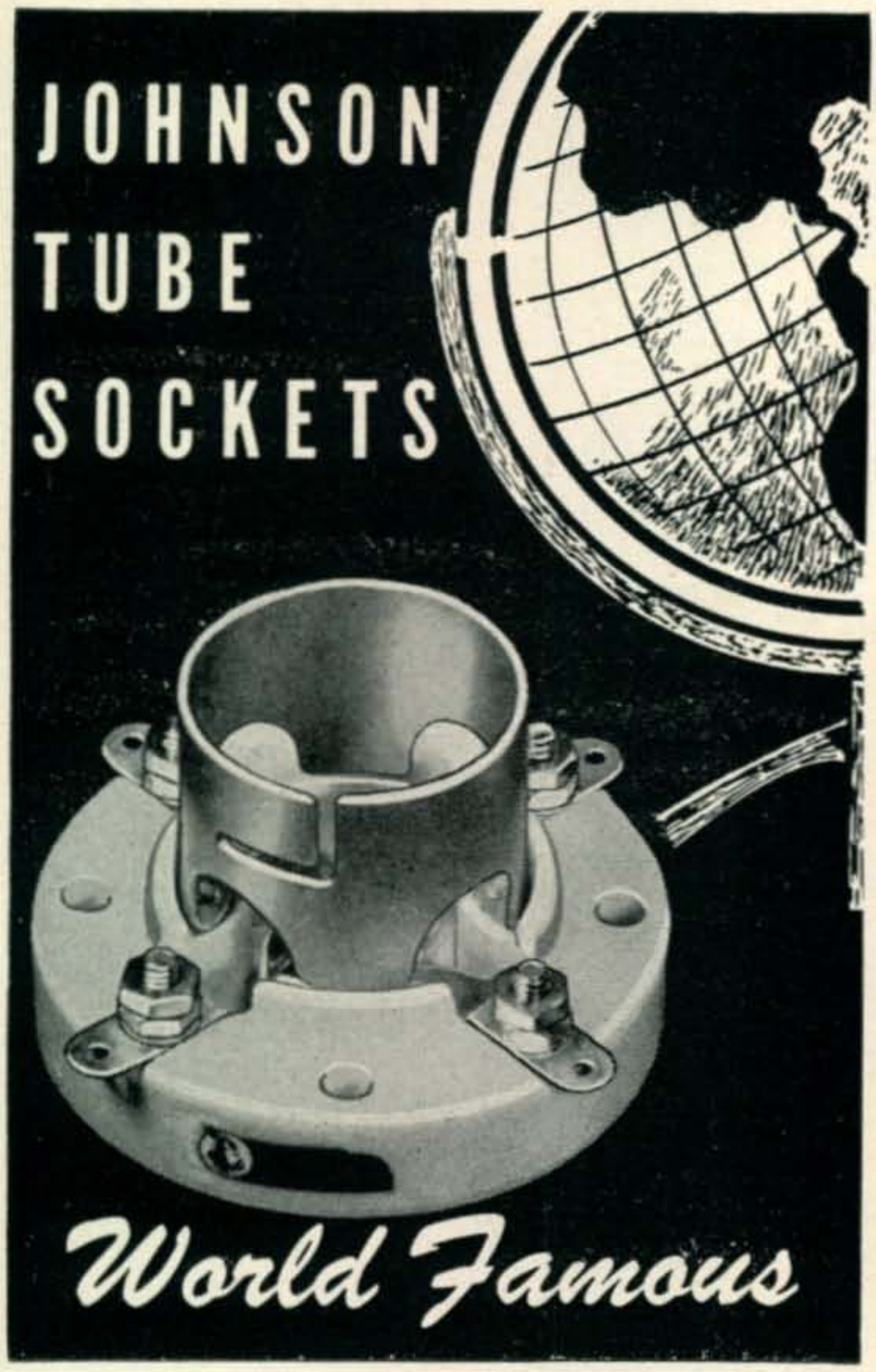

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am very much afraid of the ocean, I just had to learn to manipulate the boat, and after a while I grew to like it very much. In time my husband, tired of the boat and its continual care, became interested in amateur radio. He obtained his license and the call K4EPO, later changed to K4FKC.

"During a long period when he would spend all his time on the air or rebuilding his equipment I would stay at home alone, but for me that was too monotonous. One evening we planned to go to the movies, but Felix had a schedule with a ham in Ciudad Trujillo. He asked me to say a few words to his friend, and the conversation became so interesting that we missed the show. From that day on I talked over his rig frequently and started to study radio, coming up with my own license in 1937 and the call K4EZR."

In the prewar YL fraternity no one was more active than Alicia, who operated both c.w. and phone on 20 and 10 until the war closed all operations. After the war, when the F.C.C. reclassified calls for the Island, Alicia received her present call of KP4CL, and since then she has been active on 20, operating at about 14,290 kc most of the time. Besides a Class A ticket, she holds a second-class commercial radiotelephone license.

Alicia has her own transmitter apart from her husband's (KP4CK), operating with 400 watts input to a pair of T-125s push-pull final. They both share in the use of the receivers, an HRO and HQ-129X. Antennas include a 14-mc 4-element rotary beam and a 28-mc extended double Zepp.

During the war period Alicia served as secretary to the supervisor, Radio Intelligence Division of the F.C.C. in Puerto Rico.

Elected secretary of the Puerto Rico Amateur Radio Club when it was formed in 1939, Alicia is now serving her second term as president. She is active in most of the contests and participates in emergency work, having received a Certificate of Merit from A.R.R.L. and being awarded the Emergency Work Trophy for 1947 by the Southern Puerto Rico Radio Amateur Club for her activity during the Texas City disaster. During that tragedy the combination of skip and the telephone strike necessitated many circuitous relays to deliver messages. Traffic which originated in Texas City was given to KP4CL on 10 phone, who in turn relayed it to other sections of the U.S. and Puerto Rico, and to Canada, Germany, etc.

Of the Texas disaster Alicia writes: "From April 16th through the 21st, besides my regular eight hours working for the F.C.C., I spent most of the time on the air handling traffic from KP4CL, with just a few hours rest. I handled about 177 messages (received and sent) concerning the safety of people, Red Cross aid, doctors offering their services, messages for F.C.C. personnel, etc.

As to Alicia's other hobbies, they include motorcycling (during the war when they were "out of hobbies"), dancing, caring for her 9-year old toy fox terrier, "Baby," and her parrot, "Linda," and driving her convertible coupe with the license plates 7388!

PARTS AND PRODUCTS

(*from page 56*)

Wave Trap comes in two models, WT500 for 10, 15 or 20-meter bands, and WT501 for operation on 40 or 80-meter bands. For complete information write Bud Radio, Inc., 2118 East 55th Street, Cleveland, Ohio.

HARVEY *Has Them ALL*

Gon-Set Converter—6-10-11-15 or 2-6-10-11 meter bands in one converter without changing coils! 8 tubes, actually 3 separate converters in one with selector switch, large band-spread dial, output frequency 7 mc. Built-in power supply. Specify bands when ordering.
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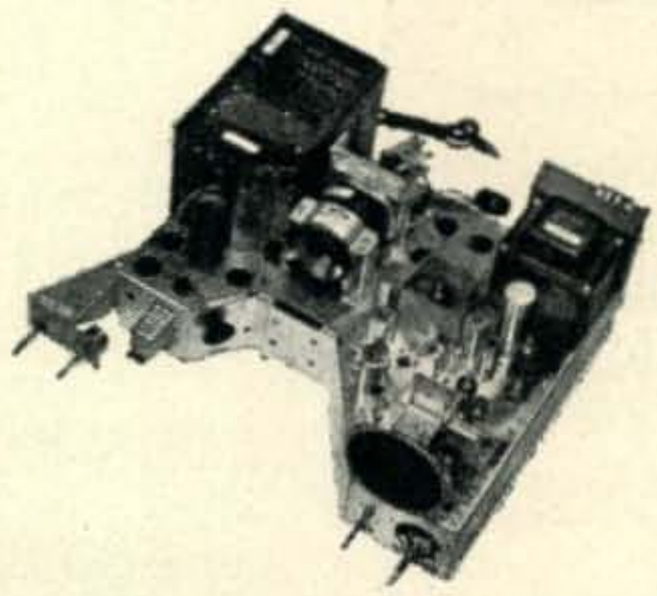

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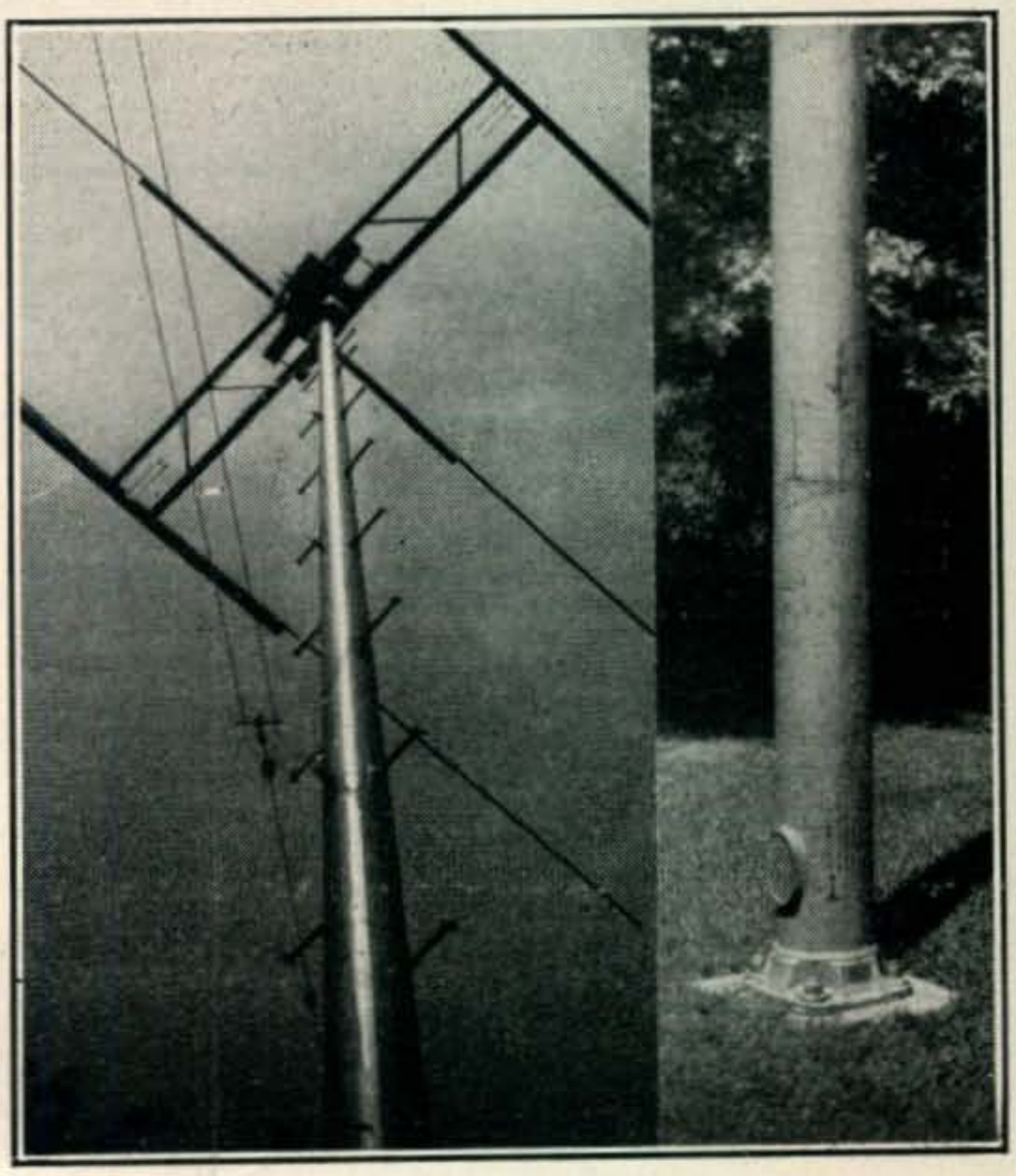
Postscripts

A Permanent Antenna Pole

So much interest has been displayed by readers when we even talk about antennas and there supports that we thought they would like to see the support used by W8NFD. The beam itself is a conventional close spaced array feed with a 2" open line inductively coupled to the antenna. The boom and element supports is made of 2¾" x 2½" x 3/16" aluminum angle and is home made, as is the rotating mechanism. In tne rotating mechanism housing there is a 150-watt "stip" heater thermostatically controlled so that the mechanism will not get colder than 38° F.

The pole was commercially made by the Union Metal Manufacturing Company of Canton, Ohio who make steel poles for street lighting and for flood lighting use. They make poles up to 100, which may be the practical limit for an unguyed steel tower of this type. Almost any fair sized city will have someone in the business of supplying steel poles. The modifications made to this pole included steel cross arms for mounting the rotating mechanism and steel poles steps which are removable by unscrewing.

The pole is 38' to the cross arms. It is 9" in diameter at the base and tapers to 4½" at the top. The base of the pole bolts to four 1" anchor bolts set in the concrete foundation which is 20" square. A 12 conductor control cable runs down the inside of the pole and underground in 1¼" conduit into the basement shack. The pole and cross arms without rotating mechanism weighs 450 pounds and was installed by four men with the aid of a winch truck. With the mechanism and beam on top the pole is calculated to have a safety factor of 5 in winds of 100 m.p.h. While the initial cost of such a pole would seem expensive, if an amateur is planning a commercial installation of a beam tower the possibility of using a hollow steel pole of this type is well worth considering. At W8NFD the modest dimensions of the beam support have eliminated a lot of criticism that might have become annoying in a residential area.



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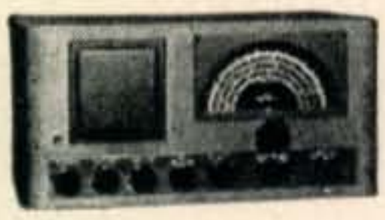

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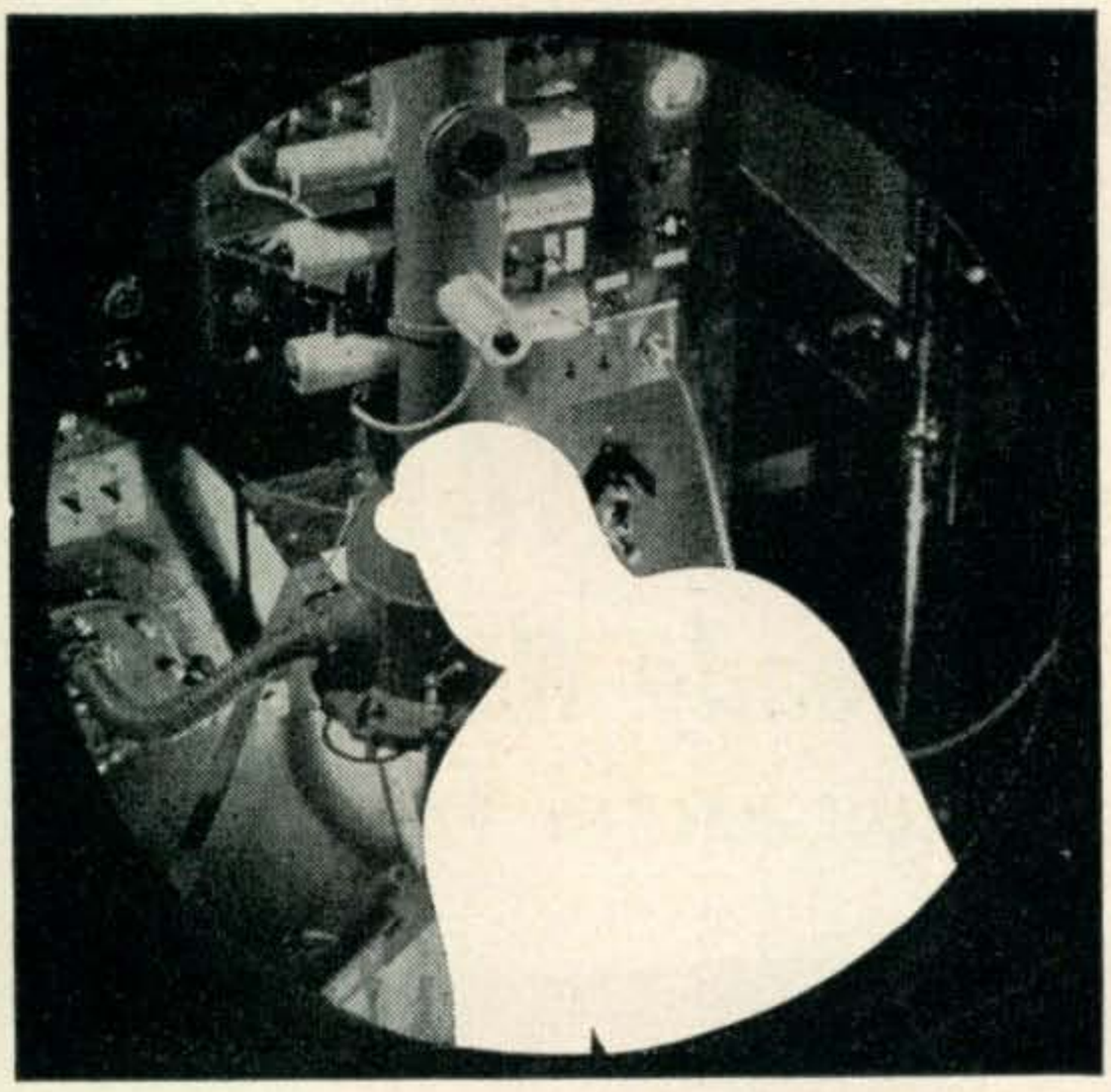

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ZERO BIAS

(*from page 15*)

the best of them will fail in his job unless each member does his share in the management of ARRL affairs. There are hard days ahead for the ham. His frequencies are coveted as they never have been before. His transmissions are the source of annoyance, much of it beyond his control. There are other wonderful hobbies competing for amateur radio's new blood. The fight will be even more difficult without KBW.

The 30 years in which Kenneth B. Warner served as Managing Secretary of the American Radio Relay League are a brilliant three decades of radio achievement. It has been a long and glorious history. But if amateur radio is to have the opportunity to write another decade of progress, then by its leadership it must show the same farsightedness, aggressiveness, and ambition that was shown by the founders of ARRL. KBW would have wanted it that way. His critics would have, and also his friends. For amateur radio to progress, so must the ARRL. To this unswerving ideal KBW devoted his life. Amateurs everywhere should pause a moment and give thanks that he did.—*W2IOP*

DX

(*from page 51*)

VE7HC says he expects to have time to overhaul his rig and antennas at home before the big event on November 6. . . . W3JTC, another one to nab VP8AM, says he will QSL everyone he has worked when the first ship arrives there in February 1949. W9RBI had a swell time at the Milwaukee Convention meeting a lot of the DX boys, including the guy who wields the blue pencil, W2IOP. I guess you might call him a DX boy. . . .

I guess this is just about as good a place as any to tell you once again that *C6YZ* is not in Zone 23. He is in Zone 24. Sorry, but I really can't help it.

Some of the boys have been wondering about *MP4BAB*. That's the new official call of old VS9GT. . . . Yep, I know this won't be news by the time you read it.

EA5BE has been quite active lately, and it might interest you to know he uses an 829B in the final, controlled by a v.f.o. The receiver, at present, is an HQ129X. EA5BE has been on the air since last May, and he has worked about 500 Ws. He says he has to lay off some nights, because of his aching arm. His XYL acts as his secretary, helping him fill out the QSL cards, as well as writing letters. Santos says that she is an ardent movie fan, and is crazy about American movie magazines. She certainly would appreciate getting some from the YL ops in this country. As a matter of fact, he, his XYL, and jr. op visited Florida and New York last year, and while he bought a lot of radio material, his wife bought a trunk full of movie magazines!!! You'll find his QTH on the regular section.

VK9NR . . . last month we told you about him. He is VK5NR operating on Norfolk Island. As yet, not a new country but you never can tell . . . could be sometime. Anyway, ZL1HY says VK9NR at this time is operating on the low end of the 40-meter band. I presume he will be active on other bands before long.

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Hallicrafters S51	149.50
Hallicrafters S58	59.50
Hallicrafters S55	129.50
Hallicrafters S56	110.00
Hallicrafters T54	189.50
Hallicrafters HT18	110.00
Hallicrafters HT19	350.00
RME HF-10-20	77.00
RME VHF-152A	86.60
RME DB22A	71.00
Hammarlund HQ129X	177.30
Gon-Set 10-11 converter	39.95
Stancor ST-203-A	44.70
Hunter Cyclemaster	169.50

Millen, Sonar, Bud, Gonset, Silver, Premax, WorkShop, Amphenol-Mims; Jensen, Meissner, Browning; I have everything.

Some prices slightly higher on the west coast.

LOW PRICES

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

COMPLETE STOCKS

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

QUICK DELIVERY

Mail, phone, or wire your order. *Shipment at once.*

EASY TERMS

I have the world's best time sale plan because I finance the terms myself. I save you time and money. I cooperate with you. Write for details.

LIBERAL TRADE-IN ALLOWANCE

Other jobbers say I allow too much. Tell me what you have to trade and what you want.

TEN DAY FREE TRIAL

Try any receiver ten days, return it for full refund if not satisfied.

FREE NINETY-DAY SERVICE

I service everything I sell free for 90 days. At a reasonable price after 90 days.

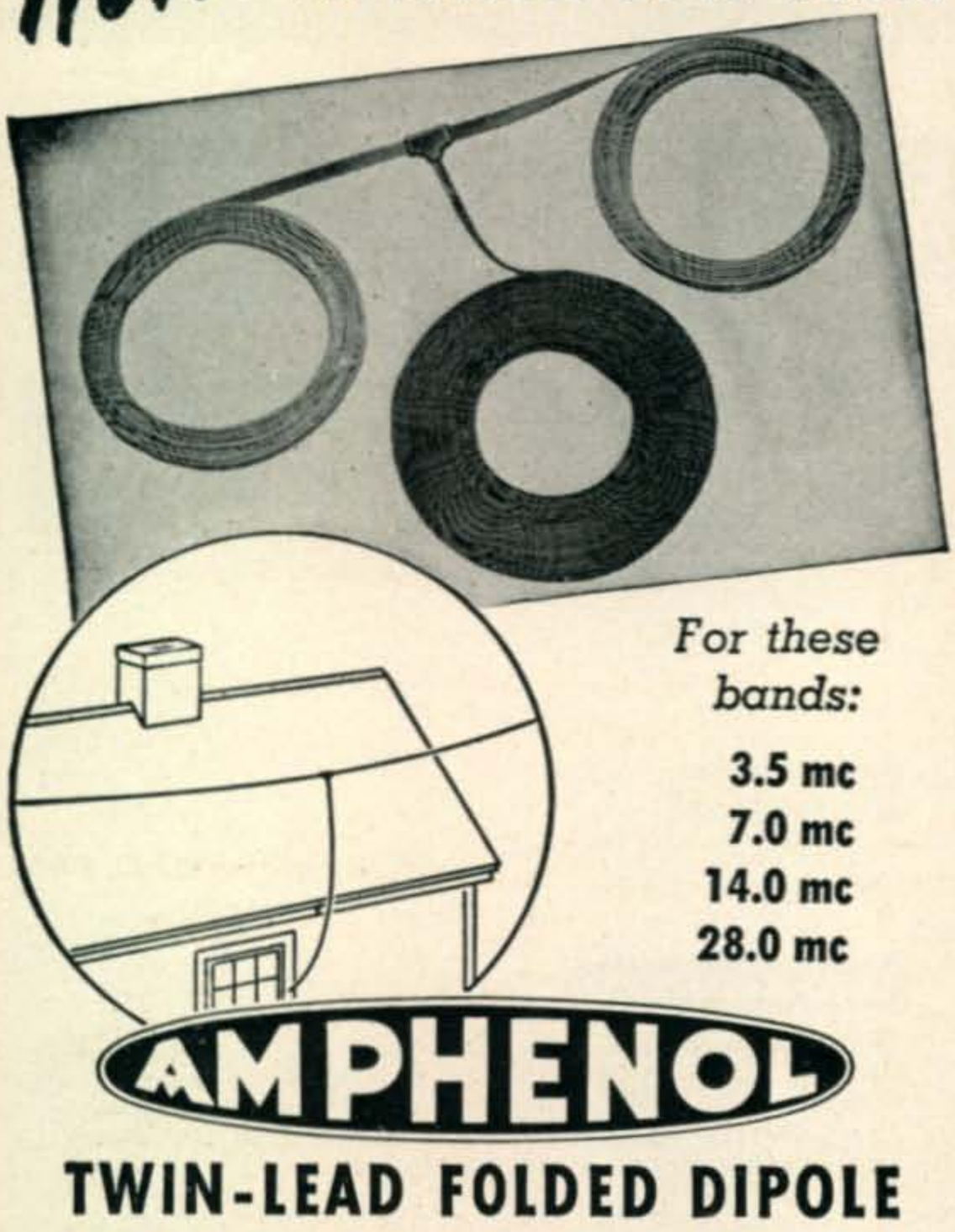
FREE TECHNICAL ADVICE

and personal attention and help on your inquiries and problems.

Butler, Missouri **HENRY RADIO STORES** Los Angeles 25, Calif.

"WORLD'S LARGEST DISTRIBUTORS OF SHORT WAVE RECEIVERS"

NOW! A REAL DX ANTENNA AT A NEW LOW COST!



For these bands:

3.5 mc
7.0 mc
14.0 mc
28.0 mc

AMPHENOL

TWIN-LEAD FOLDED DIPOLE
AMATEUR ANTENNAS

Complete, for 28 mc Band Only $4.63 Amateur Net
(OTHERS IN PROPORTION)

Look to Amphenol for the new ideas in amateur radio. Now, Amphenol offers you complete packaged Twin-Lead folded dipole antennas ready-cut to your choice of four bands. Inexpensive and rugged, they offer you unusual DX, are easy to install. Simply trim to your operating frequency in accordance with instructions furnished, add end insulators and go on the air with one of the best broadband antennas ever developed.

The folded dipole antenna section is Amphenol Twin-Lead No. 14-022. Conductors are "copper-clad" steel for strength to withstand wind, ice-loading, etc. The 75-foot lead-in is Amphenol 300 ohm Twin-Lead No. 14-056. It affords a perfect match, and is joined to the antenna with a weather-proof molded polyethylene jacket.

Radio Servicemen Note!

The 7 mc antenna may be trimmed to provide top reception on the shortwave BCL 9 or 12 mc bands. See your jobber today for complete information and prices.

Amphenol Accessories Simplify Installation:

For highest efficiency, and maximum convenience, ask your jobber also for Amphenol Polyethylene Stand-off Insulators, Clear Plastic Window Pane and Silicone Compound.

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1830 South 54th Avenue, Chicago 50, Illinois
COAXIAL CABLES AND CONNECTORS • INDUSTRIAL CONNECTORS, FITTINGS AND CONDUIT • ANTENNAS • RADIO COMPONENTS • PLASTICS FOR ELECTRONICS

The snicker of the month was had by all, a couple of weeks ago, when the guy who had been signing *ZD7AA* made a mistake when he signed off to one of the boys thus, "de W—." His carrier stayed on a few seconds and then disappeared. ZD7AA hasn't been heard since. . . . Scratch one.

W6KUT received a letter from *ZS6NU* who was formerly located in Bechuanaland. ZS6NU had just ordered some QSL cards to be printed when he heard that his call sign was to be changed. Just after he got the new call sign of ZS9B, he moved his QTH to Salisbury, Southern Rhodesia. Now, of course, he is waiting for still other QSL cards. He says, however, if anyone wants his QSL card in a hurry, if they will drop him a line, he will send them a makeshift card in return. QTH is in the usual spot.

A new one in the Marathon is *TG9AD* who had his first QSO on January 2, 1948. Although he will be in California going to school, he says all QSL cards will be answered by sending them to the old QTH. G6LX has worked his 40th zone in hooking *C8KY*, however, he still lacks one card which he expects any day. He has worked 38 zones on phone, but claims that the situation in Zones 23 and 18 is very sticky, as they don't seem to be very well represented by phone stations.

PY1JY works mostly 10-meter phone and runs about 300-watts input. The antenna is a 3-element rotary.

WØRBA tells me that a friend of his, WØPNQ worked a station signing *CP1AQ* and sent him a card airmail. A week later, he received a message via ham radio from CP1AQ stating that he had not been on at that time, and, apparently, PNQ had worked a pirate. However, he gave PNQ date and time for a sked, and they connected okay WØRBA says he wishes all phoney QSOs would have such a happy ending.

Our good friend, W6TI, QSL manager for this district, is now up to 139C. Horace had a nice write-up and picture in last month's *QST*, and among other things, stated that he had made W.A.S., W.A.C. and DXCC. I guess it's alright if we say that he is also W.A.Z., having made it some months ago. . . .

W3BES is still snagging them, the last three being *EA8AO*, *CZ2AC*, and *I1HR/M1*. W8HGW adds six, and just take a look at where this puts Les.

Some of you have been asking about *LU1ZA*. There never has been any question on this one, and we show it along with VP8 on our Country List. We haven't found any reason why it shouldn't be counted, along with VP8, as South Orkney Islands.

This little paragraph will serve a dual purpose. First, it will tell you that W5LDH was operating *TI6MB* from June 10 to August 8. Phil worked as an accountant for the United Fruit Company at Port Limon, Costa Rica. He says he worked over 2000 stations on 10 meters exclusively, and used one frequency, 28,360. Power never exceeded 40 watts into an 807, and the antenna was a folded dipole 15 feet off the ground. If you want a card from him, send yours to his home QTH, that is, of W5LDH.

The second purpose is as follows. W5LDH is back at Tulane University, and the University, along with the Tulane University Club, is jointly sponsoring an "International Federation of University Radio Clubs." He says they would like to form an organization that will bring together 50 to 75 University Radio Clubs which are now operating in the United States and all over the world. If any of you fellows are connected with a University Radio Club anywhere, and are interested in receiving further information, you can write either to Philip Slipakoff, W5LDH, or to the Director of Student

NOW READY!

SEND FOR YOUR FREE COPY TODAY!

ANNOUNCING

Bigger-Than-Ever "SURPRISE" Trade-In Allowances on your Used Communication Equipment

No reason to put off buying that new Communication Equipment you want and need. Never before in Walter Ashe history have allowances on used, factory-built receivers and transmitters been so generous. Yes, NOW is the time to trade and save real money. Simply tell us on the coupon what you have to trade in. List your preference in new equipment. Back will come our big, new Surprise offer. Don't put it off. Mail the coupon today!

All the big name brands of New Communication Equipment in Stock . . . ready for immediate delivery.

All prices F.O.B. St. Louis Phone CHestnut 1125

Are they STACKED all over the shack?

If you're caught in a "Magazine Mess" . . . stymied by untidy stacks of your favorite radio publications . . . frustrated by failure to locate just the issue you want . . .

Then, Brother, you need the neat, orderly, flick-of-the-finger convenience provided by the

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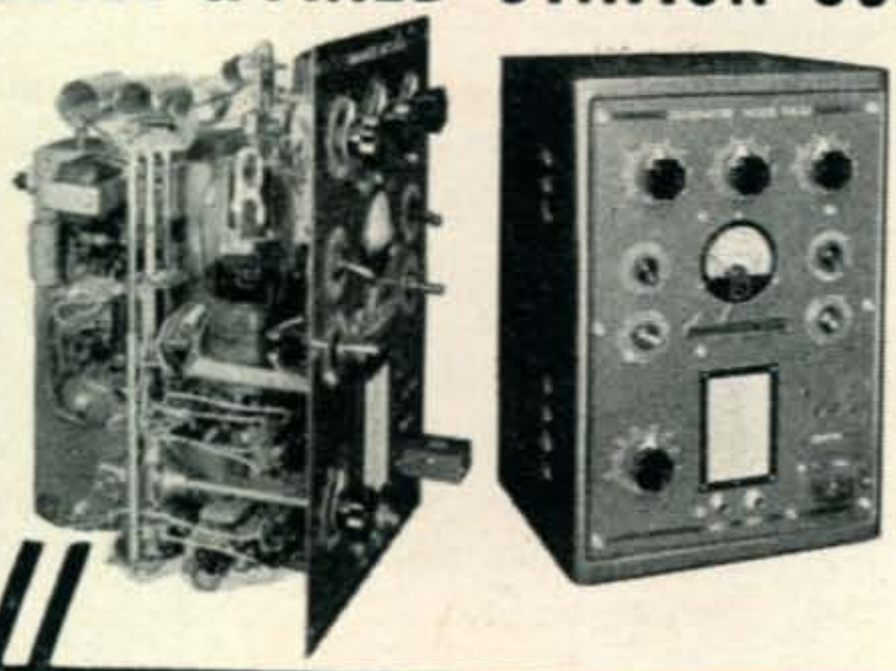
SPECIAL! Save as much as 50% on some of our many smash values in used, Reconditioned, "Good-As-New" Amateur Short Wave Receivers and Transmitters. Write for complete list of these amazing bargains.

CONVENIENT TIME PAYMENT PLAN

For BOTH

MOBILE & FIXED STATION USE



Harvey - WELLS

TBS - 50

TBS - 50A

Now that mobile phone can be used on all amateur bands (except 40 meters) the TBS-50 & TBS-50A become more adaptable than ever before because it is ideal for use in automobiles, trucks, boats, camps, etc.

50 WATTS **8 BANDS**

PHONE OR CW

(Class B. Modulation)

NO PLUG-IN COILS

80, 40, 20, 15, 11, 10, 6 and 2 METERS

(*Completely wired and tested — not a kit*)

Crystal controlled on all bands, yet requires no oscillator or multiplier tuning. Operates from AC pack or Dynamotor Supply for mobile work. New, beautiful black crackle finish.

TBS-50..Complete with tubes, only **$99.50**

THE NEW TBS-50A

Incorporates a small three tube preampli-

Activity, Tulane University, New Orleans.

FB8AB

FB8AB may be getting back on the air soon. Several of the gang have sent him some new gear. W2VHS contributed an ARC5 so he should have a respectable signal. Later Paul intends to go to some of the rare Indian Ocean islands. Line forms to the right men!

W. A. Z. Honor Roll

To enter the Honor Roll, fill out one of the Zone and Country List forms which we will supply on request. Please send a stamped, self-addressed envelope.

The Honor Roll contains totals of postwar contacts only, that is, contacts made since November 15, 1945.

It is not necessary to submit confirmations until you are eligible for a W.A.Z. certificate. To be awarded a W.A.Z. certificate, send confirmations for the 40 zones direct to the DX Editor, as well as a list of these 40 confirmations giving the call letters of the station, date and time of the QSO. You can again use one of our standard Zone forms for this. It will become our permanent record of your W.A.Z.

Those applying for W.A.Z. awards and not having been previously listed in the Honor Roll, submit your list of zones, as well as the 40 confirmations, and a Country List.

The Honor Roll is in two divisions; the c.w.-phone section, which gives the current total of zones and countries any station has work while using c.w. or phone, or both; the other section contains a list of "phone only" stations. All contacts claimed in this section must be on a "phone-to-phone" basis.

All-time W.A.Z. certificates will be issued upon presentation of proper confirmations. The certificate will be similar to the postwar certificate, although no listings of all-time W.A.Z. certificate holders is anticipated at this time.

We see in VE3QD's DX column in *Xtal* that VE4RO is head man in VE with 40Z and 161C. (Hey, let's see those 40 cards!) He is followed by VE3QD with 38Z and 164C.

Through the grapevine, we hear that G6ZO is taking unto himself a wife this coming October

Build YOUR OWN TEST EQUIPMENT

Heathkit ELECTRONIC SWITCH KIT
DOUBLES THE UTILITY OF ANY SCOPE

$34.50

Two separately controllable traces with individual inputs on any scope.

See both the input and output traces, locate distortion, phase shift, etc., immediately.

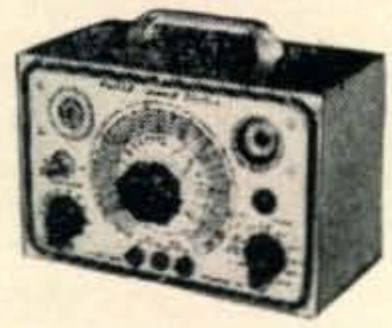
Individual gain controls and positioning control. Coarse and fine sweeping rate controls. Complete Heathkit matches others, with 5 tubes, All metal parts are punched, formed and cadmium plated. Complete with tubes, all parts, detailed blueprints and instructions. Shipping Wt. 13 lbs.

Nothing ELSE TO BUY

HEATHKIT
CONDENSER CHECKER KIT

$19.50

Nothing ELSE TO BUY



A condenser checker anyone can afford to own. Measures capacity and leakage from .00001 to 1000 MFD on calibrated scales with test voltage up to 500 volts. No need for tables or multipliers. Reads resistance 500 ohms to 2 megohms. 110V 60 cycle transformer operated complete with rectifier and magic eye indicator tubes.

Easy quick assembly with clear detailed blueprints and instructions. Small convenient size 9" x 6" x 4¾". Wt. 4 lbs.

HEATHKIT
SIGNAL GENERATOR KIT

$19.50

NOTHING ELSE TO BUY

Every shop needs a good signal generator. The Heathkit fulfills every servicing need, fundamentals from 150 Kc. to 30 megacycles with strong harmonics over 100 megacycles covering the new television ond FM bands. 110V 60 cycle transformer operated power supply.

400 cycle audio available for 30% modulation or audio testing. Uses 6SN7 as RF oscillator and audio amplifier. Complete kit has every part necessary and detailed blueprints and instructions enable the builder to assemble it in a few hours. Large easy to read calibration. Convenient size 9" x 6" x 4¾". W.t. 4½ lbs.

HEATHKIT
SIGNAL TRACER KIT

$19.50

Nothing ELSE TO BUY

Reduces service time and greatly increases profits of any service shop. Uses crystal diode to follow signal from antenna to speaker. Locates faults immediately. Internal amplifier available for speaker testing and internal speaker available for amplifier testing. Connection for VTVM on panel allows visual tracing and gain measurements. Also tests phonograph pickups, microphones, PA systems, etc. Frequency range to 200 Mc. Complete ready to assemble. 110V 60 cycle transformer operated. Supplied with 3 tubes, diode probe, 2 color panel, all other parts. Easy to assemble, detailed blueprints and instructions.

Small portable 9" x 6" x 4¾". Wt. 6 pounds. Ideal for taking on service calls. Complete your service shop with this instrument.

HEATHKIT SINE AND SQUARE WAVE
AUDIO GENERATOR KIT

$34.50

Nothing ELSE TO BUY

The ideal instrument for checking audio amplifiers, television response, distortion, etc. Supplies excellent sine wave 20 cycles to 20,000 cycles and in addition supplies square wave over same range. Extremely low distortion, less than 1%, large calibrated dial, beautiful 2 color panel, 1% precision calibrating resistors, 110 V 60 cycle power transformer, 5 tubes, detailed blueprints and instructions. R.C. type circuit with excellent stability. Shipping weight 15 pounds.

THE NEW HEATHKIT VACUUM TUBE
VOLTMETER KIT

$24.50

Nothing ELSE TO BUY

The most essential tool a radio man can have, now within the reach of his pocketbook. The Heathkit VTVM is equal in quality to instruments selling for $75.00 or more. Features 500 microamp meter, transformer power supply, 1% glass enclosed divider resistors, ceramic selector switches, 11 megohms input resistance, linear AC and DC scale, electronic AC reading RMS. Circuit uses 6SN7 in balanced bridge circuit, a 6H6 as AC rectifier and 6 x 5 as transformer power supply rectifier. Included is means of calibrating without standards. Average assembly time less than four pleasant hours and you have the most useful test instrument you will ever own. Ranges 0-3, 30, 100, 300, 1000 volts AC and DC. Ohmmeter has ranges of scale times 1, 100, 1000, 10M and 1 megohm, giving range .1 ohm to 1000 megohms. Complete with detailed instructions. Add postage for 8 lbs.

HEATHKIT FM AND TELEVISION
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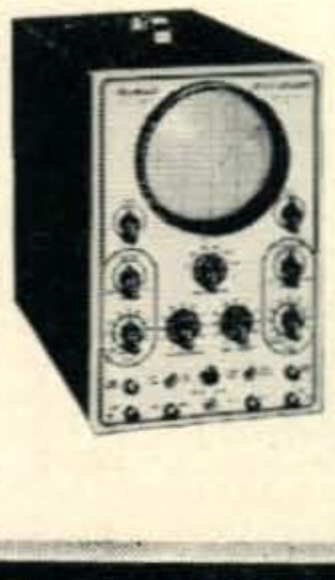
THE BASIC FM AND TELEVISION SERVICE INSTRUMENT

At the lowest cost possible, anyone can now service FM and television receivers. The Heathkit sweep generator kit operates with oscilloscope and covers all necessary frequencies. A few pleasant hours assembling this kit puts any organization in position to share the profits of the FM and TV boom.

Every part supplied — grey crackle cabinet, two color calibrated panel, all metal parts punched, formed and plated. 5 tubes, complete detailed instructions for assembly and use. Shipping weight 6 lbs.

The NEW 1948 HEATHKIT 5 INCH
OSCILLOSCOPE KIT



$39.50

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New improved model of the famous Heathkit Oscilloscope. Building an oscilloscope is the finest training for television and newer servicing technique and you save two-thirds the cost. All the features and quality of instruments selling for $100.00 or more. Supplied complete with cabinet, two color panel, 5BP1 tube, 2 5Y3 tubes, 2 6SJ7 tubes and 884 sweep generator tube. Power transformer supplies 1000V negative and 350 volt positive. Sweep generator 15 cycles to 30 M. cycles. Has vertical and horizontal amplifiers. Oil filled filter condensers for long life. Complete blueprints and instructions included.

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DEPT. Q . . . BENTON HARBOR, MICHIGAN

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T20/ARC-5 4 to 5.3 mc..... **$5.95**
T22/ARC-5 7 to 9.1 mc..... **$7.95**
Special—both for..... **$11.95**
BC 375..... **$12.95**
BC 447E 500 watt CW..... **$139.50**
BC 457 4 to 5.3 mc..... **$5.95**
BC 458 5.3 to 7 mc..... **$5.95**
BC 459 7 to 9.1 mc (new)..... **$12.95**

RECEIVERS

MN-26C Radio Compass..... **$19.95**
BC 454 3 to 6 mc (new)..... **$6.95**
BC 683 27 to 39 mc FM..... **$18.95**

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MC-7/ARC-5 push-pull 1625's..... **$7.95**
BC 456..... **$3.95**

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2 Mfd 600 volt..... **$ .59**
4 Mfd 600 volt..... **$ .89**
10 Mfd 600 volt..... **$1.19**
2 Mfd 750 volt..... **$ .89**
1 Mfd 1500 volt..... **$1.47**
8 Mfd 2000 volt..... **$3.95**
2 Mfd 2500 volt..... **$2.39**
1 Mfd 4000 volt..... **$2.95**
2 Mfd 4000 volt..... **$3.95**
3 Mfd 4000 volt..... **$5.95**
2 Mfd 5000 volt..... **$6.95**
2X .15 Mfd 8000 volt..... **$3.25**
.045 Mfd 16000 volt..... **$2.95**
.02 Mfd 20000 volt..... **$3.95**

TRANSFORMERS 115 v. 60 cy. pri.

250 vdc 150 ma, 6.3 v @ 5 a, 5 v @ 3 a..... **$3.95**
6.3 vct @ 15 a..... **$3.95**
250 vdc @ 70 ma, 6.3v @ 3 a, 6.3v @ 3 a..... **$2.95**
33 v @ 150 ma, 6.3 v @ 6 a, 5 v @ 3 a..... **$1.95**
24 vct @ 2 a, filament..... **$2.95**
3200 v 300 ma, No C.T..... **$8.95**
Two for..... **$15.95**

DYNAMOTORS

PE-103 6/12 vdc to 500 v @ 160 ma without base..... **$7.95**
DM-34-D 12vdc to 220 v @..... **$4.95**
274-N Receiver dynamotor..... **$1.49**

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FL-8 Audio Filters (new), see June CQ..... **$1.39**
274-N receiver racks, Triple..... **$1.50**
274-N shock mount for triple rack..... **$ .50**
BC 348 Racks..... **$2.49**
BC 348 Plugs..... **$1.00**
BC 306 Ant Tuning Unit..... **$ .99**
BC 434 Compass RecControl Head..... **$2.39**
BC 442-A Ant Relay Unit..... **$2.45**
T-17 Microphone (new)..... **$1.49**
500 Kc crystals..... **$1.95**
EE-8 Field Telephone, Used, exel..... **$9.95**
EE-8 Field Telephone, New..... **$13.95**
12 v vibrapacks, 300 v @ 100 ma natl adv..... **$3.95**
ART-13 Remote Control Head..... **$ .97**
BC 375 Tuning Units..... **$2.49**
12 v vibrators, for above packs..... **$1.00**
Telegraph keys..... **$.49, $.79,** and **$.99**
Relay 6 vdc DPST..... **$ .89**
Relay 12 vdc 3PDT..... **$ .97**
Sound Powered Phones TS-10-G
New, Per pair..... **$27.95**
Used, Per pair..... **$24.95**
Headphone extension cords..... **$ .59**
Milliammeters 0-15 New..... **$3.19**
Milliammeters 0-300 New..... **$3.19**
Modulation Xformers 807PP..... **$4.49**
Headphones, Hi impedance, used..... **$1.19**

TUBES

2X2	$0.89	VT127A	2.95	861	12.95
3AP1	2.49	304TL	.97	866A	1.10
5Z3	.79	371B	.97	872	.97
6AJ5	.89	713A	1.59	954	.59
6AK5	.89	717A	.97	958	.59
6L6	1.25	801	.89	959	.59
6L6G	.89	809	1.75	1616	.89
6SC7	.89	810	4.95	1625....2 for	.49
2SH7	.79	826	2.95	7193	.49
6SN7	.89	829	2.95	9001	.89
6J7	.79	832	2.95	9002	.89
UH5O	4.95	843	.69	9003	.89
75TL	2.95	860	4.95	9004	.89

FILTER

Mobile Generator, cuts out gen. noise. Special **$1.00**

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1306 Bond St. **Los Angeles, Cal.**

26 . . . the grapevine in this case being G5LI. Well, I wonder what this means as far as G6ZO is concerned? Oh well, we may hear him again someday. . . . Seriously, congratulations Jim!

W4AIS says he is now running a South Carolina kilowatt in an effort to catch up with W4BPD. He says he thought he had all zones, but found he didn't have Zone 23. His station is located on top of a 2000 foot mountain in a BC-FM station, and George says it is really a good location.

LU8BF gives quite a running account of the stuff he has been hearing on 10 meters. I am listing some of the QTHs he shows, because I think they might come in handy.

All of the comforts of home at KG6CU, ex-W9TDT, W4JVH. Eric runs 700 watts on 10 and 20 phone.

Rules for Obtaining W P R Certificates

1) To obtain a WPR Certificate of the 25 or 50 type, it is necessary to have confirmation cards from either 25 or 50 bona fide KP4 stations. Cards must be mailed to: Puerto Rico Amateur Radio Club, P. O. Box 73, Hato Rey, Puerto Rico.

All cards must be accompanied by a self-addressed and stamped envelope for their return. The Club assumes no responsibility for loss in the mails.

(*QSY to page 82*)

QTHs

AP5B, Office of the U.K. High Commissioner, 4 Racecourse Road, Lahore
C7ENX, Box 692, Nanking, China
CP5FB, Bill Beasley, Consulado Norteamericano, Cochabamba, Bolivia
CP5FA, Bill Poole, Consulado Norteamericano, Cochabamba, Bolivia
CP6FB, Adan Gutierrez, Santa Cruz de la Sierra, Bolivia
CP5EZ, A. Quiroga de Ugarte, Casilla Correo 329, Cochabamba, Bolivia
D4AZQ, RD 1, Box 115, South Fork, Pa.
EP1J, Via ARRL
EA5BE, Santos Yebenes, Box 12354, Madrid, Spain
HP1LA, Arturo Castillo, Apartado postal 1633, Panama
I8PAP, Via ARRL
KP4GK, A. Carmona, 6 R. Lopez st., Catano, Puerto Rico
MP4BAB, Signal Section, RAF Station, Shejah, Arabia
PK3IXN, Box 400, Veron, Shoerahaja Java
PK6OB, Box 222, Soerahaja Java
TR1P, 175 AACS Sqdn, APO 231, c/o P.M. New York City
VR2BD, Lofty Bloomfield, Royal New Zealand Air Force, Laucala Bay, Suva Fiji Islands
VP3AS, 184 AACS Sqdn, APO 857, c/o P. M. Miami, Florida
VR1B, c/o R. Brownlie, 79 Palace St., Ashfield, Sydney, N.S.W.
ZA2AA, Box 28627, Basle, Switzerland
ZS6NU, c/o Operations Central African Airways, Box 1319, Salisbury, Southern Rhodesia
ZB1AS, Via RSGB
ZK2AA, Niue Island, Via Zealand
W7KMV/Iwo, APO 86, c/o P. M. San Francisco, California
XZ2EM, 17 Link Road, Rangoon

LEO I. MEYERSON
WØGFQ

fellows-here's the

NEW 275 WATT "GLOBE KING"

"More Watts per Dollar"

275 WATTS PHONE OR CW

KIT FORM	WIRED-TESTED
$379.45	$399.45

Above is complete "Globe King" Transmitter with all tubes, meters and one set of coils in cabinet—packed in special wooden shipping crate.

The "Globe King" is a versatile advanced design XMTR Kit giving efficient performance on 10-11-15-20-40 and 80 meter bands on phone & CW. Also available in individual sections.

CHECK THESE FEATURES...

- Provisions for Eco.
- Automatic Protective Bias on final and buffer.
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- Voltage controlled osc and Buffer stages.
- New Speech Modulator circuit—modulates up to 300 watts.
- Dual power supply for OSC—buff and R. F. Stage.
- Most compact Xmtr on the market—stands 28¼ inches high.
- XMTR available complete or in *individual* sections. *Write for prices.*

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It is easy to buy from WRL. In most cases your present rig will serve as sufficient down payment. Tell me what you have to trade-in—the kind of payments you would like to make and I will quote prices and terms by return mail. Let me equip your Ham Shack—you'll get on the air faster and for less money. Leo I. Meyerson, WØGFQ.

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Just right for your control room wall. Approximately 28"x42". Contains time zones, amateur zones, leading shortwave stations, monitoring stations. Mail coupon today & **25c**

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Deal with the "World's Most Personalized Radio Supply House". Send for your new complete WRL Catalog containing everything new in radio.

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Name .....

Address .....

City..... State.....

DX MARATHON

C.W.-PHONE

Zone 1

KL7KV	29– 50
KL7KI	15– 23
VE8AS	14– 18
KL7CZ	12– 12

Zone 2

VO6EP	35–100
VO6J	15– 38

Zone 3

W6PFD	40–184
W6ITA	40–176
W6ENV	40–174
W6SN	40–173
W6NNV	40–153
W6KRI	40–142
W6AM	40–142
W6RM	40–131
W6OMC	40–123
W6WKU	40–121
W6SRU	40–117
W6HZT	40–115
W6UCX	40–114
W6LRU	40–113
W6UZX	40–105
W6FSJ	40– 92
W6PQT	39–126
VE7ZM	39–119
W6ANN	39–109
W6GAL	38–140
W6QD	38– 87
W6LN	38– 72
W6MI	36– 78
W6MUF	36– 66
W6OEG	35– 80
W6WWQ	35– 76
W6CTL	34– 88
W6ZZ	33– 79
W6KYV	33– 69
W6QWL	32– 83
W6LER	32– 53
W6BIL	31– 55
W6MXN	30– 72
W6CID	26– 37
W6AGT	24– 44
W6EYC	23– 42
W6MGZ	23– 29
W6OKL	22– 53
W7PK	21– 49
W6MIO	19– 22
W6UXF	17– 18
W6VAT	15– 15

Zone 4

WØYXO	40–146
W9VW	40–135
W8EWS	40–133
W9IU	39–162
W9NDA	39–159
W9LM	39–153
W5ASG	39–152
WØGKS	39–122
W8SDR	39–120
W9GA	39–106
W9LNM	38–123
WØEYR	36–117
W9CIA	36–111
W9TB	36– 89
WØDU	35–106
W8GLK	34– 97
W4HA	33–107
WØSBE	33– 95
VE3QD	31– 99
W9WCE	31– 88
WØCFB	31– 81
W8KPL	30– 77
WØCMH	30– 48
W5CPI	29– 75
WØAZT	29– 60
W5EWZ	29– 51
W8MQR	28– 57
W9MZP	28– 49
WØUOX	27– 57
W5ZD	26– 68
W8BF	25– 68
W9EHS	23– 52
W9EHS	23– 52
W8LFE	23– 38
W8NKU	21– 46
W5JPC	19– 37
W9KMN	15– 13

Zone 5

W1ENE	39–149
W1AB	39–115
W1NMP	38–148
W3DPA	38–133
W1JYH	38–132
W1BIH	38–125
W3DRD	38–125
W3IYE	37–120
W3EPV	37– 94
W3OCU	36–134
W1AWX	36–104
W2TJF	35–125
W4JFE	35–120
W2EMW	35– 96
W2RGV	34–101
W1BFT	34– 98
VE2WW	33– 87
W2MEL	33– 87
W3WU	33– 87
W2PQJ	32– 91
W2AW	32– 80
W4LVV	31– 88
W3NOH	30– 88
W8JM	29– 68
W2OM	29– 65
W3AQT	28– 59
W4TO	27– 95
W1MRP	27– 74
W2BF	27– 72
W4JUJ	27– 59
W1CJH	26– 66
W4ALJ	26– 52
W3RJS	25– 52
W2PUD	23– 40
W4LK	21– 46
W1HJ	21– 44
W1QCJ	21– 38
W4CY	19– 37
W3NPZ	18– 41
W4BRB	16– 36
W4HKJ	13– 20

Zone 7

TG9JK	31– 62

Zone 8

KP4HU	38–136
KV4AD	28– 65
KP4KD	21– 48

Zone 10

OA4AK	36–111

Zone 11

PY1DH	39–134

Zone 12

CE3AG	39–121
CE7AA	35– 33

Zone 14

F8BS	39–142
G3DO	38–113
ON4MS	35– 76
EA5BE	29– 73

Zone 20

SV1RX	31– 93

Zone 25

J2AHI	18– 35

Zone 27

KG6AI	28– 51

Zone 30

VK2DI	40–131

Zone 31

KH6IJ	37– 57
KH6LF	36– 75
KH6PY	34– 78
KH6NB	34– 70

Zone 32

ZL1HY	33– 82
ZL1QW	17– 21

Zone 36

FE8AB	31– 72

Zone 37

VQ3HGE	39–122

Zone 38

ZS2X	39–126

PHONE

Zone 3

W7HTB	38–117
W6DI	37–140
W6CHV	32– 92
W6ITA	31– 89
W6PXH	30– 95
W6PCK	29– 84
W6WUI	28– 54
W6AM	26– 48

Zone 4

W9NDA	36–104
W9RBI	34–105
W5ASG	32– 99
W8HUD	32– 96
W4HA	31– 96
W8NK	31– 70
W5LWV	29– 71
WØSBE	26– 61
W9WCE	24– 60
VE3BBZ	24– 52
W5ERY	24– 51
W8LFE	16– 23

Zone 5

W1JCX	34–117
W1ATE	34– 87
W1NWO	33–114
W1FJN	33– 97
W4ESP	32– 98
W2RGV	31– 76
W2IUV	30– 68
W2DYR	29– 78
W2PQJ	25– 54
W1CJH	23– 52
W1EQ	22– 57
W2BF	20– 44

Zone 6

XE1AC	33–126

Zone 7

TG9AD	22– 35

Zone 8

KV4AD	27– 55

Zone 10

OA4AK	30– 63

Zone 12

CE3AB	30– 87

Zone 14

G3DO	34– 96
F8DC	28– 47

Zone 25

J2AHI	19– 31

Zone 31

KH6NB	25– 48

SURPLUS SPECIALS

XMITTERS

BC-459 used w/tubes 7-9.1 Mc. **$7.95**
ATA/ARA 3-4 MEG Used **12.50**
BC-924 Less dyn used 29-38 Mc. **9.95**
TA-12B New **39.50**
ARC-5/T22 Used 7-9.1 Mc. **7.95**
BC-223 w/3 tuning units New **29.50**
T-26/APT-2 very clean **13.50**
TBW-3, like GO-9, used **49.50**

RECEIVERS

274N SET 6-9.1 Mc Rcvr. Used **4.95**
APR-1 w/2 tuning units 30-300 meg New w/cables **265.00**
APR-5A Used 1000-6000 Mc. **95.00**
BC-683 Used complete 27-39 Mc. **18.95**
RBZ Used 2.0-6.0 Mc. Btry op. **9.95**

XMITTER-RCVR UNITS

SCR-522 Used **24.95**
BC-966 Used IFF unit **4.95**
BC-441 chkd operating. Boat un.t **129.50**
APS-13 Used **6.95**
TBY Used 28-80 Mc. **13.95**
SCR-596 Jammer **59.50**

SPECIAL VALUES!

LN Freq. Meter Plugs. **1.00**
RELAY 110 vac 60 cyc New DPST ..... **.99**
COND 8-8-8-8 @ 600 v. New **1.95**
SENS. RELAY 10,000 ohms New SPDT ..... **.79**
2 VOLT STORAGE BATT New **1.95**
SURPLUS CONVERSION MANUAL **2.50**
RL-42B ant reel New **3.95**
ARC-5/MD-7 mod Used w/dyn Class "B" 1625 ..... **6.95**
COND 1 mfd @ 25 kilovolt New **17.95**
MIN TUBE PIN ALIGNER ..... **.49**
K-7 Gun mount Beam Rotator, Used **4.95**
AUTO-XFORMER 1 KVA 110-220 60 cyc **8.95**

V & H RADIO SUPPLY

2033 W. VENICE, LOS ANGELES 6, CALIF.

Terms: Cash w/order Prices subject to change

BAND PASS FILTER

#70473. Sharp band pass peaked at 700 cps. High-to-high impedance. Band-with: 650 cycles at 20 db Down From Peak. Can be plugged into 'phone output of receiver for good results. Cuts out QRM. New, with circuit diagram..... **$2.25**

POWER EQUIPMENT

Plate Xfmr: Pri: 115 v., 60 cy. Tapped to give 2750, 2470, or 2240 v. on Sec., 750 ma. No C.T. 7 KV INS..... **$34.50**

Step down transformer: Pri: 440/220/110 volts a.c. 60 cycles, 3 KVA. Sec. 115 v. 2500 volt insulation. Size 12" x 12" x 7"..... **$40.00**

PLATE TRANSFORMER. Pri: 117 v. 60 cy. Sec. 17,000 v @ 144 ma. with choke. Oil immersed. Size: 26" x 29" x 13" Amertran..... **$65.00**

Fil. Transformer: Pri: 220 v.a.c., 60 cy; .05KVA, sec.; 5 v.c.t., 34,000 v. test..... **$24.50**

Fil. Trans. UX6899 Pri: 115v. 60 cy. Sec: Two 5V 5.5A windings 29 KV Test..... **$24.50**

Voltage Reg. Transtat "Amertram" type PH 2KVA load. Input 90/130 v. 50/60 cycle output 115 v..... **$40.00**

OIL CONDENSER STANDARD BRANDS

15 mfd. 1000 vdc	$ 2.25
.06 mfd. 15 KVDC, 25F585-G2	$ 8.70
1.5 mfd. 6000 vdc	$12.50
.25 mfd. 20,000 vdc	$17.50
10 mfd. 1000 VDC	$ 1.79
3x10 mfd. delta connected synchro-capacitor, 90 v 60 cycles	$ 4.95
1 mfd. 6000 vdc, 25F509G2	$ 3.85

POWER CHOKES

SWING CHOKE: 4.5 to .8 hy; .2 to 1 amp 12 OHMS **$10.95**

.03 hy, 2 A..... **1.45**

8.5 hy, 125 ma **1.50**

25 hy, 65 ma.. **1.10**

Dual 7 hy, 75 ma, 11 hy, 65 ma..... **1.65**

Dual 2 hy, 100 ma ..... **.75**

.116 hy, 150 ma **4.50**

6 hy, 150 ma. **1.50**

Dual, 120 hy, 17 ma **2.45**

.01 hy, 2.5 A.. **1.50**

.35 hy, .35 A.. **7.50**

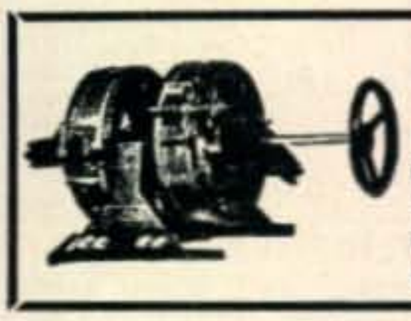
Dual 2.5 hy, 130 ma **1.25**

.1 hy, 12 A, 46 ohms **16.00**

Dual .5 hy, 380 ma ..... **.95**

5 hy. 40 ma, 312 ohms ..... **.65**

2 hy, 200 ma.. **.75**



TRANSTATS (AMERTRAN)

Input: 0.115 v, 50-60 cycle. Max. **output:** 115 v. 100 amp. All units are new, guaranteed **$75**

SCR 610 11-10 METER PORTABLE/MOBILE RIG

SCR 610 portable transmitter-receiver, 27 to 38.9 mc, crystal controlled, using FM for efficient operation. Unit consists of Xmtr-rcvr BC 659 and power supply PE 97 . . . operating from 6 or 12 vdc. Slightly used, excellent condition. Less Xtals, Antenna..... **$25.00**

COAX CONNECTORS

831R	$.35	UG 21/U	$.85
831SP	$.35	UG 86/U	$.95
831AP	$.35	UG 254/U	$.75
831HP	$.15	UG 255/U	$.85

Homedell male to type "N" male adapter..... **$1.25**

RT ANGLE Sperry fittings..... **$1.00**

MAGNETRONS

TUBE	FREQ. RANGE	PK PWR OUT	PRICE
2J31	2820-2860 mc.	265 KW.	$15.00
2J21-A	9345-9405 mc.	50 KW.	$25.00
2J22	3267-3333 mc.	265 KW.	$15.00
2J26	2992-3019 mc.	275 KW.	$15.00
2J27	2965-2992 mc.	275 KW.	$15.00
2J32	2780-2820 mc.	285 KW.	$15.00
2J38 Pkg.	3249-3263 mc.	5 KW.	$25.00
2J39 Pkg.	3267-3333 mc.	8.7 KW.	$25.00
2J55 Pkg.	9345-9405 mc.	50 KW.	$25.00
3J31	24,000 mc.	50 KW.	$55.00
714AY			$15.00
720BY	2800 mc.	1000 KW.	$50.00
725-A			$25.00
730-A			$25.00
KLYSTRONS: 723A/B			$12.50
707B W/CAVITY			$20.00

MAGNETS

For 2J21, 725-A, 2J22, 2J26, 2J27, 2J31, 2J32 and 3J31..... Each **$8.00**

4850 Gauss, 5/8" bet. pole faces, 3/4" pole diam..... **$8.00**

1500 Gauss, 1 1/2" bet. pole faces, 1 5/8" pole diam..... **$8.00**

TUNABLE PKG'D "CW" MAGNETRONS

QK61 2975-3200 Mc QK62 3150-3375 Mc

QK60 2800-3025 Mc QK59 2675-2900 Mc

New, guaranteed..... $55.00 each.

A COMPLETE LINE OF MICROWAVE EQUIPMENT IN STOCK: SEND FOR MICROWAVE FLYER

30' US ARMY SIGNAL CORPS RADIO MASTS

Complete set for the erection of a full flat top antenna. Of rugged plymold construction telescoping into 3 ten-foot sections for easy stowage and transportation. A perfect set-up for getting out. Supplied complete: 2 complete masts, hardware, shipping crate. Shipping wt. approx. 300 lbs. Sig Corps #2A289-223-A. New ..... **$39.50 per set**

HEADSETS

Dynamic mike and headset combination. A high quality, efficient unit, used in B-19 tank Xmtrs. Mike and phones complete, new **$2.75**

R-15 headsets: 8000 ohms impedance, rubber cushions. Comes with 8" cord and plug PL 55. New..... **$2.95**

Head and Chest Set. HS-19. New..... **$4.50**

WIRE WOUND POTENTIOMETERS

20,000 ohms, 10%, 8 watt	$.95
5,000 ohms, 10%, 8 watt	$.95
15,000 ohms, 10%, 4 watt	$.69
Dual 250 ohms, 25 watt	$.98
50 ohms, 25 watt	$.69
1000 ohms, 50 watt, mod J	$.98
800 ohms, 50 watt, mod J	$.98
5 ohms, 250 watt, mod L	$3.25

SPECIALS

SELENIUM RECTIFIERS. Input: 115 vac. 60 cy. Out: 120 vdc. 1.66 amps. Full Wave. F. T. & R. #DE11..... **$9.95**

POWER SWITCH. 4 pos. 60 amps, 600 vac. Arrow H&H..... **$4.25**

ROTARY SPARK GAP. 24 vdc motor, 4 spark gap electrodes, p/o Xmtr BC 1081-TG **$5.50**

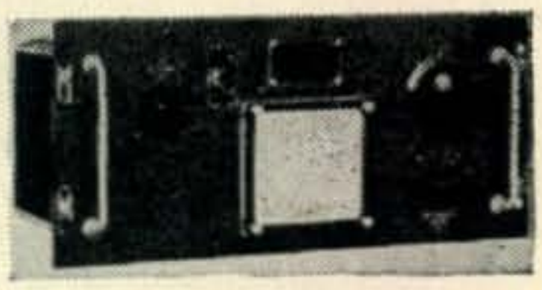
SONAR SOUND DETECTOR: Underwater detector with 7 microphone units encased in rubber sheath. Model JR..... **$12.50**

VIBRATORS

TR 1210, 12 vdc, 5 pin	$1.20
OAK V-6675, 24-32 vdc, 7 pin	1.10
Mal. Type G534C, 12 vdc, 5 pin	1.25
Mal. Type G629-C, 12 vdc, 4 pin	1.15
Radiaart VRS, 6 v. DC. 6-pin special	1.40

Mfrs. quantities in all types available.

XMTR TUNING UNITS



XMTR TUNING UNITS

From BC 375: TU-9 (7.7-10 mc); TU-10 (10-12.5 mc); TU-22 (250-650 kc); TU 26 (200-500 kc). Each..... **$2.25**

For BC 610: TU 47 (2-2.5 mc); TU 48 (2.5-3 mc); TU 53 (8-12 mc). Each..... **1.75**

For BC 223AX: TU 17 (2-3 mc); TU 18 (3-4.5 mc). Each..... **1.95**

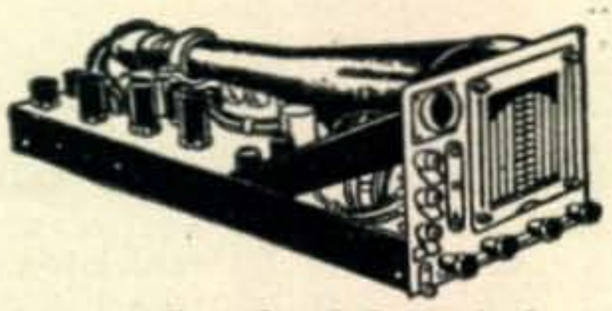
INSTRUCTION MANUALS

BC 312, BC 342	$1.25	SCR 281	$1.25
Mark II	1.00	ZA Eqpt.	1.00
SCR 508	1.00	SX-32	1.00

GREAT TUBE VALUES

01-A	$.45	7E5	1.00	836	1.15
1B24	4.85	7E6	.72	837	1.95
1H5	.55	10Y	.60	843	.59
1N5	.69	12A6	.35	860	15.00
1T4	.69	12GP7	14.95	861	40.00
2C21	.69	12K8Y	.65	874	1.95
2C22	.69	12SF7	.49	876	4.95
2J21-A	25.00	12SR7	.72	1005	.35
2J22	15.00	15R	1.40	1613	.95
2J26	15.00	28D7	.75	1619	.21
2J27	15.00	30 (Spec).	.70	1624	.85
2J31	15.00	35L6	.69	1629	.35
2J32	15.00	35Z5	.66	1961	5.00
2J38	25.00	45 (Spec.)	.59	8012	3.95
2J39	25.00	50L6	.79	9002	.65
2J55	25.00	39/44	.49	9004	.47
2X2/879	.69	35/51	.72	9006	.47
3A4	.65	211	.75	CEQ 72	1.95
3BP1	2.25	227A	3.85	EF 50	.79
3C24	.60	225	8.80	E-1148	.75
3C30	.70	268-A	20.00	F-127	20.00
3D6	.79	355-A	19.50	FC 258A	165.00
3CP1/S1	3.50	417A	22.50		
3D21-A	1.50	530	90.00	FC 271	40.00
3DP1	2.25	531	45.00	GL 562	75.00
3EP1	2.95	532	3.95	FC 271	40.00
3FP7	1.20	559	4.00	GL 562	75.00
3J31	55.00	562	90.00	GL 623	75.00
3Q5	.79	615	.89	GL 697	75.00
5BP1	1.20	703-A	7.00	ML 100	60.00
5BP4	4.95	704-A	.75	QK 59	55.00
5CP1	3.75	705-A	2.85	QK 60	55.00
5FP7	3.50	707-B	†20.00	QK 61	55.00
5JP2	8.00	714AY	15.00	QK 62	55.00
5J30	39.50	715-B	12.00	RCA 932*	.65
6AC7	1.00	720BY	50.00	VR 91	1.00
6AK5	.95	720CY	50.00	VR 130	1.25
6C4	.58	721-A	3.60	VR 135	1.25
6G	2.00	723-A/B	12.50	VR 137	1.25
6J6	1.00	724B	1.75	VR 150-30	.95
6K7	.55	724-D	2.50	VU 120	1.00
6L6GA	1.00	725-A	25.00	VU 134	1.00
6SC7	.70	726-A	15.00	WL532	4.75
6SL7	1.00	800	2.25	WN 150	3.00
6V6GT	.79	801-A	1.10	WT 260	5.00
7C4	1.00	804	9.95	† With Cavity.	
		815	2.50	* Photocell.	

SCOPE BC-704-A



Makes an excellent foundation unit for a high gain scope. Has following tubes: 4-6AC7, 3-6H6, and 1-5BP1 CR tube. Comes enclosed in metal shield. New, with all tubes less power supply. With wooden carrying case, schematic diagram **$17.50**

131-Q LIBERTY ST. NEW YORK 7, N. Y.

ALL MERCHANDISE GUARANTEED. Mail orders promptly filled. Rated Concerns Send P O

Manufacturers' Quantities In Stock

All prices F. O. B. New York City. Send Money Order or Check. Shipping charges sent C. O. D.

COMMUNICATIONS EQUIPMENT CO.

PHONE DI-9-4124 CABLE "COMSUPO"

2) Specifically, bona fide KP4 stations are defined as follows:

a) All land stations operated from a permanent and fixed QTH in Puerto Rico.
b) All portable or mobile stations operating at any location in Puerto Rico or on any highway within Puerto Rico.
c) Amateur stations of the U.S. and possessions which have been moved to Puerto Rico and have not yet received KP4 calls. Such stations will sign as "portable" after their "W" or other federally assigned call letters, in accordance with existing FCC rules and regulations.

3) Contacts with or by maritime/mobile or aeronautical/mobile stations are not entitled to count as contacts for WPR Certificates.

4) Contacts made with bona fide KP4 stations, as defined in paragraph (2) above, may be counted for WPR Certificate, regardless of whether made with fixed, portable, or mobile equipment. This gives a possibility of three (3) separate confirmations from the same KP4 station.

5) WPR Certificates issued by the Club will normally bear no endorsement for contacts made on any or all bands. However, if a station submits either 25 or 50 confirmations indicating his Puerto Rico contacts were all on any one band, a special endorsement to that effect will be entered on the certificate, if requested.

VE7HC hasn't done a bit of DX since last May, as he has been busy since then digging for gold. It seems that he was near a place called Slate Creek in the northern part of British Columbia, and they are trying to do as much exploration as possible before the snow comes. He expects to head back home the first week in October, and then get ready for the Contest.

F8PQ holder of an all-time W.A.Z. certificate.

W4LZM says he might have to take me up on that "Carpet Baggers" W.A.Z., as it looks like he may return to W5KZV. . . . *VQ3EDD* is now back in England and is signing his old call, G5YM.

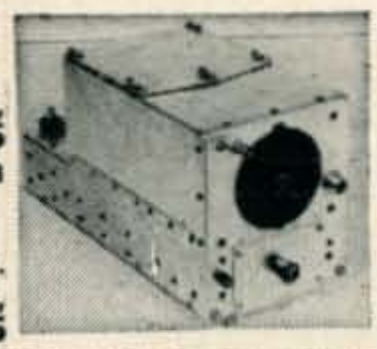
I would like to give credit and compliment the *F.E.A.R.L. NEWS* for publishing a set of operating rules to be used by foreign amateurs. We have been advocating essentially the same operating code, stating consistently that if they were published in enough radio magazines, and particularly overseas, it would have more to do with eliminating confusion and QRM than any other medium. J2AHI has printed this in his DX club news.

1. Do not answer calls on your own frequency or anywhere within a few kilocycles thereof.

AC POWER SUPPLY AND SPEAKER

Completely wired power supply and speaker, with volume control C.W. and on & off switch, housed in metal cabinet. For Command Receivers, with connections to plug into receiver or rack, and 110 Volt 60 Cycle line.
Price—Completely Wired **$14.95**
Price: Kit of Parts only **$9.95**

BC-454 COMMAND RECEIVER



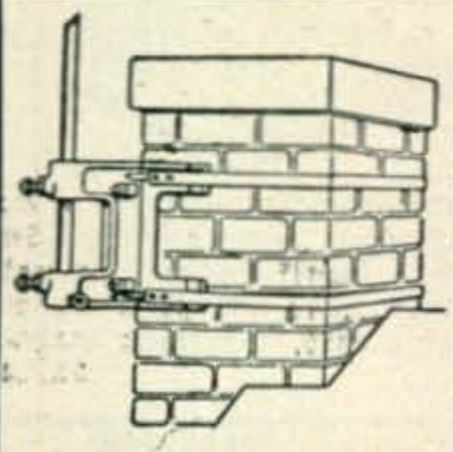
3 to 6 Megacycles. Price—with Schematics, NEW: **$6.95**
TUNING CRANK for Command Receivers **.65c** ea

TRANSFORMER FOR COMM. RECEIVERS—115 Volt, 60 cycle Primary; Sec. 250-0-250 Volt, 50 MA; 6.3 Volt and 24 Volt, with AC Schematic. NEW: **$2.95**

DUAL RECEIVER RACK: **$1.25** TRIPLE RECEIVER RACK: **$1.50**

MOBILE DYNAMOTORS For COMM. RECEIVER

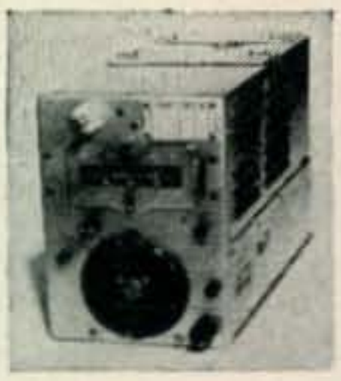
P.M. Field Dynamotors, operate 6 Volt DC Input; Output 240 Volt 50 MA. Normally 12-24 Volt Input; Output 500 Volt 50 MA. Size: 4"W. x 3"D. x 7½"L. Price—NEW: **$1.95**



ANTENNA MAST MOUNT

MULTIPLE MAST MOUNT—Can be mounted on chimneys, on gable or flat roofs, or on sides or corners of brick or frame walls. Ideal for holding all popular types of Television and FM antenna in sizes up to 1¼" diameter. Made of aluminum, with plated steel hardware. Complete with banding for chimney mounting—Price: **$4.50**
Price—Less chimney banding: **$3.00**

COMMAND TRANSMITTERS With SCHEMATICS



BC-696 3—4 Mc.
NEW: **$18.95** USED: **$14.95**
BC-457 4—5.3 Mc. USED: **$5.95**
BC-458 5.3—7 Mc. NEW: **$7.95** USED: **$5.95**
BC-456 **MODULATOR** for Comm. Receivers, Price—NEW: **$2.50**

TRANSFORMERS

24 V. 1 amp. Sec.; 110 V. 60 cycle Pri.— **$1.95**
24 V. .5 amp Sec.; 110 V. 60 cycle Pri. **$1.50**
12 V. 1 amp. Sec.; 110 V. 60 cycle Pri. **$1.50**

TRANSFORMER FOR COMM.

TRANSMITTER—Primary 110 Volts, 60 cycle. Sec. 525-0-525 Volt, 50 MA; 12-12 or 24 Volt, 3 amp., 5 Volt, 3 amp. NEW: **$9.95**
DUAL TRANSMITTER RACK—NEW: **$1.50**

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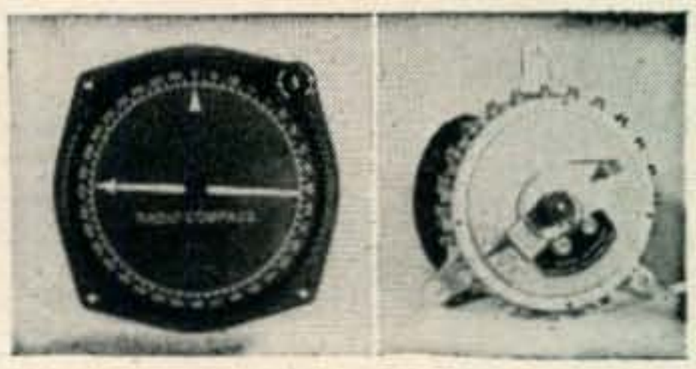

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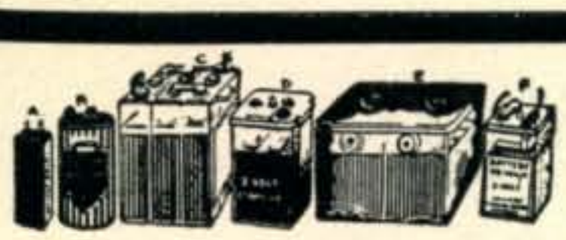

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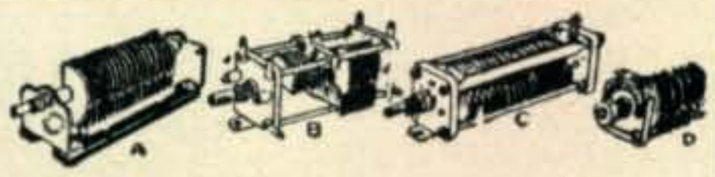

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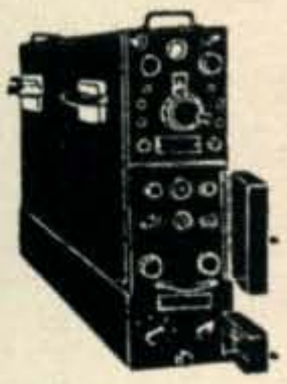

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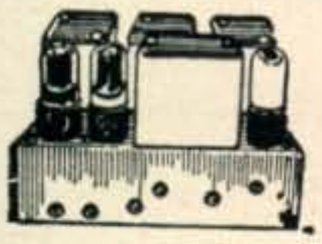

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36	28	5	**7.50**
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210	190	.04	**.79**

Sel Rect FEDERAL 100 ma..... **81c**
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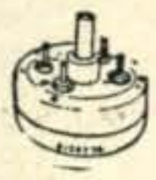

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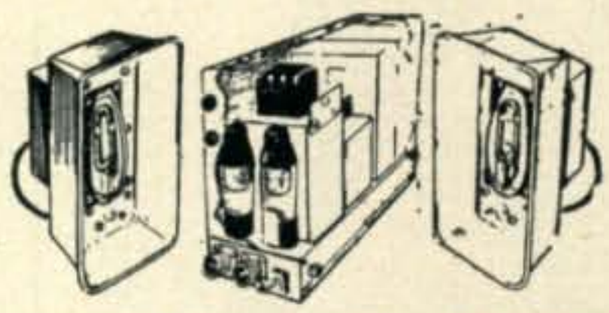

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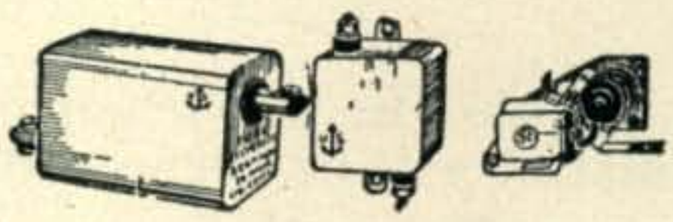

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3. Refuse to answer calls from other stations when you are already in contact with someone, and do not acknowledge or act upon calls from amateurs who indicate they wish to be next.

4. Give everybody an even break. When there are many W/VE amateurs patiently and quietly waiting for a chance to work you, avoid complying with requests to "listen for a friend."

5. Use ML, MH, LM and HM to indicate whether you are tuning from the low end, high end, or middle of the band. Keep your tuning habits flexible so that you do not always listen for answers to CQs in the same place.

6. Use the A.R.R.L. recommended ending signals especially $\overline{KN}$ to indicate to impatient listeners the status of the QSO.

7. Let it be known that you avoid working amateurs who are constant violators of the above principles.

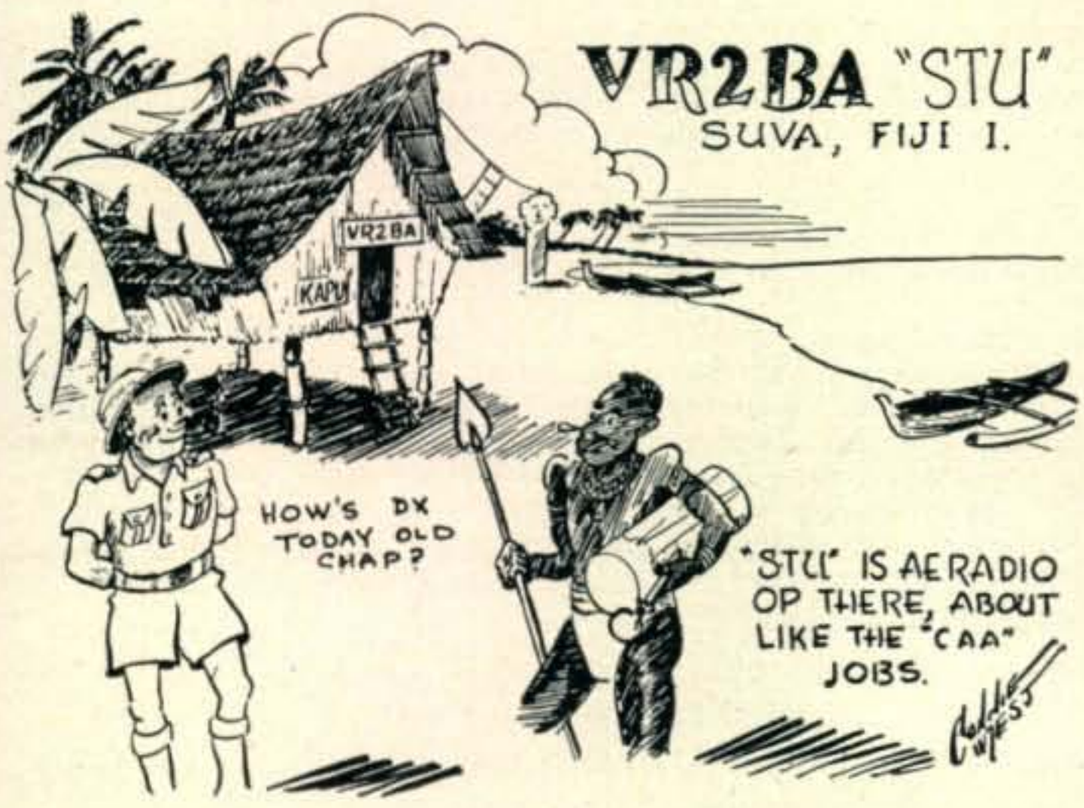
G3AZ, another W.A.Z.er this month has a final for each band, either a pair of 807s or an 813 running 130-watts input. His antenna gets me. It is a 14-mc full-wave 30′ high, end-fed and runs through the roof tiles into his shack. All of his DX has been done on this hunk of wire. John says this wire seems to work very well in all directions but goes on with "though you can't appreciate how all those photos of 2, 3 and 4-element beams on 80 foot towers make our mouths water."

KH6QH, ex-W6ORT, is using a folded dipole under the eaves of the apartment. Thinks the metal roof makes a good reflector . . . down, that is!! Jim wants me to tell the boys in Zones 20 and 34 to listen for KH6s. Okay . . . 'tis done.

W1ENE finds that by putting up a new antenna his Marathon score goes up. Seems to make sense to me, too. W4GG is worrying about getting in another crack for Zone 23 since C6YZ isn't there. Last, and only time I saw 4GG was during the war in Toledo . . . and even then a bit of ham radio was covered. Good ol' Toledo.

Marathon in 1949?

From the reaction thus far it looks like you guys want the Marathon again in 1949. Of course there will be some that have really been putting on the steam during 1948 to keep their Marathon totals up to the top. They can't be expected to exert this much energy year in and year out. But, it is a good contest for those starting out, or maybe for some



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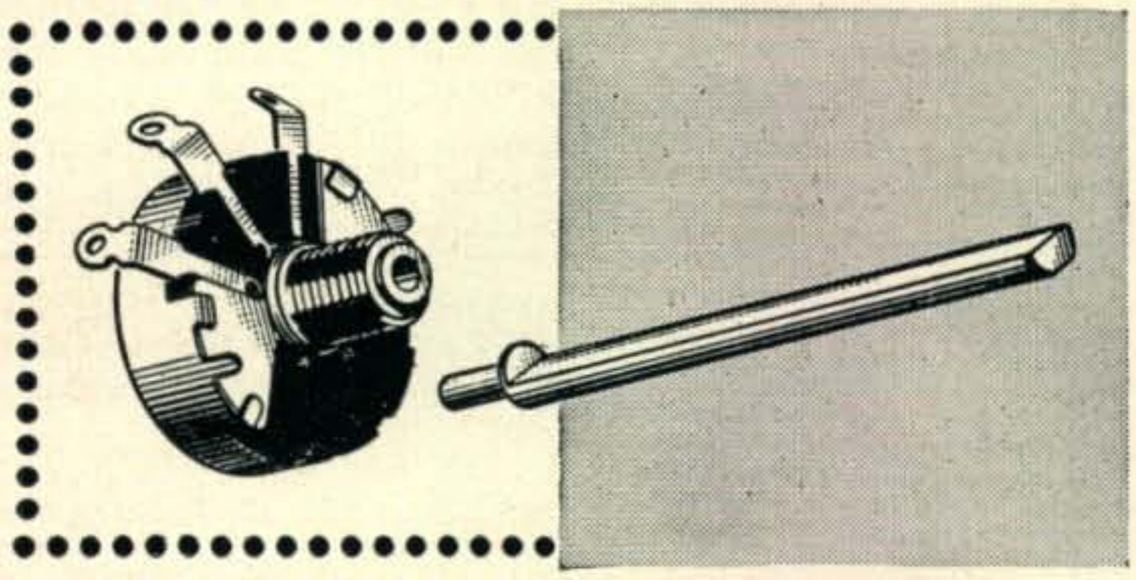

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Did you get this one . . . San Marino Republic? I1PL/M1 at key and I1HR/M1 keeping the log. The rig ran 100 watts into a long wire. Receiver was a 10 tube super.

DX man who got in too late to get near the top in '48 but knows he can do better in '49. Unless the next mail brings forth a deluge of votes against the 1949 Marathon . . . we'll have it. So far the mail bag has only produced one against it.

From *SVØAG* . . . says he "Anyone working SVØAG on phone and not getting a QSL card as expected please drop us a card to our bureau giving the information of the QSO and we will gladly send those stations another card." This was signed SVØAG, S/Sgt M. H. Burnell, Athens, Greece.

OK1AW says, "My XYL will learn Morse, hi! So it is not bad, my marriage, for s.w. radio. . . ." Guess not, since he seems to have worked some new stuff, including *C8LY*.

It's good to hear from G2PL . . . but he says he is practically retired and proceeds to list a few new countries. Peter is longing for the old days when he used to be able to rag chew by the hour with the boys. Now they are all antsy and want to QRT just after they hook up. Says he is getting too old (32!) to hit high code speed any more and he's thinking about teaching his 8 year old Robin the dot and dash business. Well, he might be too old but in closing his letter he asked for a pix of Jane Russell. Peter received a letter from Lawrence Kelsey who you may remember as being W3LYK in Antarctica a while back. Well, Kelsey is now in Afghanistan in charge of communication equipment for a large construction outfit. He has signed up for a two year stretch. Kelsey says that YA stations are definitely not allowed and if there are any on the air it would put him in a bad spot. He hasn't been on, and won't get on, any ham bands himself.

W7GBW one of those to W.A.Z. this month, was one of the less fortunate living in Vanport, the town that was nearly wiped out with a flood a short time ago. George did manage to salvage his NC-101X but must build a new rig. His XYL says . . . no breadboard this time. But he was lucky to complete his W.A.Z. before the flood.

Hadn't any sooner written it down for last month's column that W2TJF would soon be a W6 in San Diego than I bumped right smack into the guy. Guess where! In a S. D. ham store buying some gear.

I can't figure out what Al Kahn, W9KYM would be doing with a License Manual. Seems like he should know the code . . . goes to show you . . . even your best friends cross you up.

Guess *VP8AM* expects to stick around the frigid part of the world until about February 1949 if what he told W9IU holds up. Previously he told *PY1DH* he was signing off practically immediately.

ON4JW tells me that their GPO has just licensed 50 new ON stations making a total of about 210 in Belgium. Jules also says that any 3-letter ON4 stations are definitely pirates.

W6AY is handling the QSLs for *YR5T* if any of you guys need that one. W2IOP gives with some dope . . . that *W2WMV/C9* has left Mukden and

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

of CQ, The Radio Amateurs' Journal, published monthly at New York, N. Y., for October 1, 1948.

State of New York } ss.:
County of New York }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared John H. Potts, who, having been duly sworn according to law, deposes and says that he is the Editor of CQ. The Radio Amateurs' Journal, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editor, managing editor and business manager are: Publisher, Sanford R. Cowan, 1620 Ocean Ave., Brooklyn 30, N. Y.; Editor: John H. Potts, 1737 York Avenue, New York, N. Y.; Managing Editor, Lawrence LeKashman, 1 Ike Place, Woodmere, N. Y.; Business Manager, S. R. Cowan, 1620 Ocean Ave., Brooklyn 30, N. Y.

2. That the owners are: Radio Magazines, Inc., 342 Madison Ave., New York 17, N. Y.; John H. Potts, 1737 York Avenue, New York, N. Y.; and Sanford R. Cowan, 1620 Ocean Ave., Brooklyn 30, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities, are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders or security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock, and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

(Signed) JOHN H. POTTS, Editor.

Sworn to and subscribed before me, this 8th day of September, 1948.

(Seal). HARRY N. REIZES, Notary Public.

In the State of New York, Residing in Kings County Kings Co. Clk's No. 634, Reg. No. 612-R-9; N. Y. Co. Clk's No. 779, Reg. No..... Term Expires March 30, 1949.

anyone who has not received his QSL can write to his home QTH. Where is that? Look in Charlie Simpsons call book . . . it's filled with QTHs. (W2WMV just sent a QSP that he is staying on until after the *CQ* DX contest!)

The Canal Zone Amateur Radio Assn. announces that it is discontinuing their certificate for working ten KZ5 stations. This is effective January 1, 1949. In its place will be a new and much better certificate. This will be awarded to all who have worked 25 or more KZ5 stations. It is not necessary to submit cards. Simply submit a list showing the calls of the stations worked along with dates and times. *KZ5AW* gives with the above.

Major S. G. Blencoe writes to say that there are now over 20 licensed hams in Korea. They have an organization, American Amateur Radio League of Korea. The HL1s put out a little paper giving all the latest activities of the gang in what they call "The Hermit Kingdom."

Before winding up this little clambake let me remaind you to read carefully the rules of the World Wide DX Contest. Remember this . . . there is no limit to the number of contacts but QSOs made within your own continental boundaries count ONE point; QSOs outside of your continent, THREE points. This is all in Rule 6.

I would like to remind you to be sure to enter the correct Section. Rule 2 covers this phase of the contest. We will award Certificates to *all* winning operators in both the "One-Operator" and the "More-than-One Operator" sections. In this way all operators involved will be recognized and we are counting on you adhering to this rule.

Send in your scores by November 15 and this will be in time to make the January issue. This will give you all a quick look at what some of the boys have done. Then, send in your logs direct to CQ in New York City. All logs must bear a postmark no later than midnight November 30, 1948. (Except

SURPLUS MATERIALS

While A Few Items Listed Are War Surplus, Most Items are Standard Materials Which Are Merely Surplus With Us.

#1 —TRANSFORMER: 2-Winding (insluated) 115 Volt, 60 Cy. Primary. #1 secondary is wound for 2.2 volts, 18 amperes, continuous. #2 secondary is wound for 7 amperes, continuous (up to 12 amperes intermittent), with 11 taps of approximately 4 volts each from 18 to 60, or other end of winding may be used in approximately 4 volt steps from 4 to 40. Ideal for operating certain AC war surplus items or for use with copper oxide, copper sulphide, selenium or Tungar bulb type rectifiers for operating 12 and 24 volt DC equipment. May be used for half-wave, full wave or center-tapped applications. Net wt 22 lbs. Packed 2 in wooden box for overseas shipment. This is your opportunity to secure a high quality general purpose transformer at a fraction of the usual cost. **$7: 2 for $12.** Supplied with all leads tagged at $1 extra.

#2 —PIPE TYPE BLOWER: 1/6th HP, 115 V. AC-DC. Made by GE. A powerful blower. Price as shown **$12.** With extra intake funnel, mounting bracket, 4 speed (transformer) control, 5′ rubber hose, cord and wiring, **$27.50.** Ideal for kitchen ventilating.

#3 —ELECTRIC MOTOR: 1/3 HP, 115 V. 60 Cy. Split (single) Phase, 1725 RPM, reversible rubber mounted, drip-proof, 5/8″ x 2″ shaft, extremely quiet, Type FH Westinghouse motor. Regular price **$32.26.** Our price while stock lasts, **$27.50: 2 for $50.**

#4 —ELECTRIC MOTOR: 1/80th HP, 115 V. 60 Cy. 2900 RPM open type suitable for fans, etc. Single speed **$2.50**; Two-Speed **$3.50.**

#5 —TRANSFORMER: 115 volt primary: 4½, 10 and 20 volt insulated output with 3 primary adjustment taps. Shielded. Windings may be tied in series F for voltages up to 24½. Or insulated windings may be tied in series with primary taps to be used as auto-transformer up to 33½ volts. Rating should be 1 to 6 amperes, depending upon voltage hook-up and duty cycle. **$3.50: 2 for $6.** Leads tagged for .50 extra.

#6 —SELENIUM RECTIFIER: 50-80 ampere fan cooled G-E unit for 6 volt output. May be used at less current without fan cooling and up to 12 volts. **$25:2 for $45.**

#7 —TRANSFORMER: 115 Volt, 60 Cy. input: 8-9 volt output at 2 to 6 amperes depending upon duty cycle. **$2:2 for $3.50.**

#8 —MAGNET WIRE: We have surplus magnet wire in sizes 44 HE, 31 SCE, 31 DC, 30 SCE, 29 SCE, and larger sizes, at greatly reduced prices especially for quantity shipments. Write for prices on sizes and quantities desired.

#9 —MOGUL BASE BULB SOCKET: Cleat Type. **.60: 2 for $1.**

#10 —TRANSFORMER COILS: Approximately 525 turns #25 Formex wound on 1½ x 1¼ x 1½″ opening. **.50.**

#11 —5 HOUR-TIMERS: M. H. RHODES 10 ampere, 115 Volt, 60 Cy. May be set for operating electrical items up to 5 hours. **$4:3 for $10.**

#12 —THERMAL CUTOUTS: Klixon Radium-Bearing Luminous Tips. Type PM 25 and PM 60 **$1,** Type PLMS-80 **$2,** PLA-70 **$1.50.**

#13 —SELENIUM RECTIFIER: 150 Mils, 36 volt DC output. **$2:2 for $3.50.** Similar but HW made by W-E, 200 mils, 80 to 90 volts when 2 used together connected directly to 115 volt line for full wave. **$2:$3.50 for necessary set of 2.**

#14 —AMMETER: 0-15 No. 321 Triplett DC. **$4:3 for $10.**

#15 —SPAGHETTI TUBING: Plastic clear #10, in 250′ hanks. **$1.75. 4 hanks for $6.**

#16 —SOLDERING LUGS: 25 ampere, **$1** per hundred: **$6 per thousand.** 90 ampere, **$3.50** per hundred: **$30** per thousand. 125 ampere, **$4** per hundred: **$35** per thousand.

#17 —5-POINT DIAL SWITCHES: Good for 10 to 20 amperes. On transformer applications should be used as 3-point. **$1:5 for $4.**

#18 —BELLS: Monitor type Edwards for 24 volts DC but operates equally as well on AC. Can be used directly on 115 volts. Plated, **$2:2 for $3.50.**

#19 —CONTACTORS: 24 volt DC, 50 to 200 ampere Cutler Hammer and other standard makes. **$3.**

All items are new and guaranteed in perfect condition when shipped. Quantity prices will be quoted on any of the above items. All prices are FOB Columbus. All items are subject to prior sale. Terms (to accounts not on our books), 25 % with order, balance COD, or if remittance in full is sent with order, deduct 2 %. If items are desired by Parcel Post, be sure to include enough for postage. Any overage will be returned.

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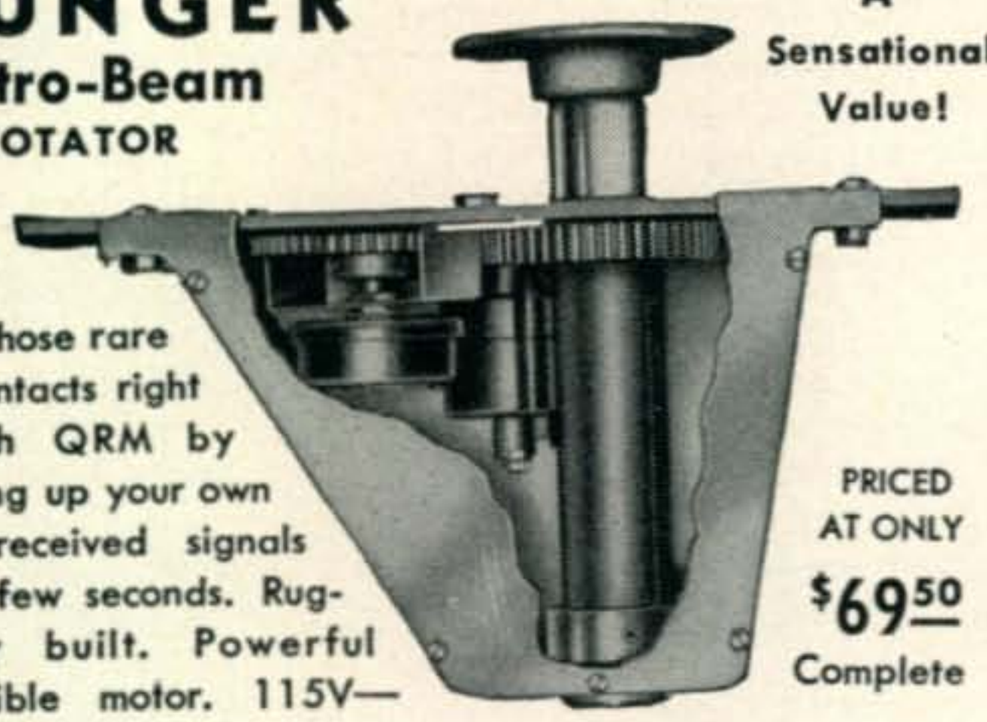

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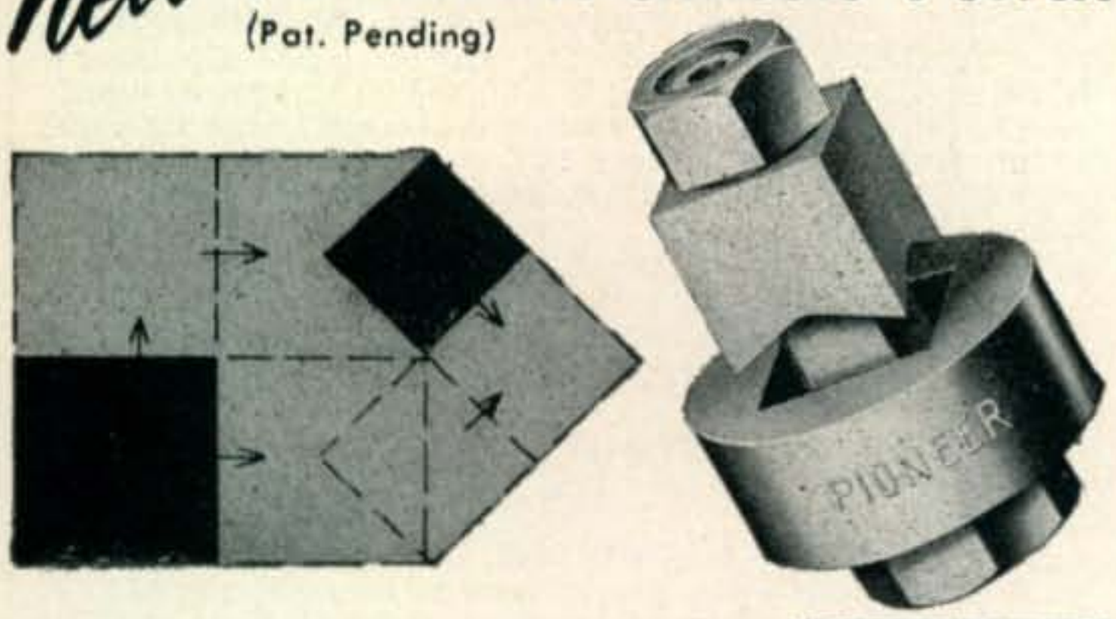

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NET	$2.95	$3.50		$1.95			$2.15			$2.30					$2.65

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where no mailing facilities are available until after that date, i.e. VP8AM, etc.) I hope you phone men find the first weekend with plenty of stuff to work . . . and naturally the brasspounders are entitled to the same hope. Happy days!

Now, ol' QD is looking for something new to dream about since no longer is it necessary to dream about cards from Zones 2, 19 and 39. I'm not sure that Larry (W.A.Z.) LeKashman is going to approve of this . . . in fact, I'm worrying about the guy signing my certificate. After all, it is a little silly for *me* to award myself a W.A.Z. certificate. For too long W2IOP has been giving me a bad time . . . by rubbing this in . . . "you're a fine DX Editor, about the only guy on the Committee who isn't W.A.Z." I wonder if it would be okay, now, if I go back to working nines? 73.

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

(*from page 53*)

countries on 6 meters. OA4AN may soon be on with a Millen exciter and possibly CP1AX who has an SCR-522. XE1GE has not been on as much as he would like, but did manage to sneak in a few contacts on September 13. New this season is an extension of the path into Texas giving W5VY 11 countries on 6 meters as well. A summary of the openings appears in the *50-mc Propagation Log*.

The 50-mc Scene

A new Project member is Vic, VE7CN of Prince George, B. C. Vic has an S-36A and a VHF-152 SX28A combination for receiving. The transmitter is an 829B final with 85 watts input while the antenna is a 5-element some forty-five feet in the air. First DX station contacted was W7ACD on June 4th. W7BQX was worked on aurora using c.w. on both August 7 and 19th.

Oscar, VE1QZ did not get on too often this year because he was out on the "high seas." He did raise his 6-meter beam up to forty-two feet which made about a 24 db improvement of the signal from VE1TR in Chester, some 40 miles distant.

W7QLZ passes along the information that he has recently made up a transmitter with plug-in coils covering 2 to 80 meters. A 6AG7 oscillator is capacity coupled to a 6AQ5 driving an 832. The 6AQ5 plate coil socket is wired so that it is series tuned on 144 mc and parallel tuned on the other bands. Four grid mills were obtained from the 6AQ5 as a tripler to 2 meters and from seven to to twelve mills on the other bands. However, on 2-meters 1-to-1 modulation ratio was used with 6V6s in Class AB2.

VE7NM says that local activity in Vancouver, B. C. has dropped off considerably with VE7AEZ, VE7OE and VE7NM the only ones fairly regular. Jack mentions that they often miss the DX on sporadic-E either because the boys aren't listening close enough to believe the VE7 call, or the limit of the skip is 60 to 100 miles south. The band may sound dead in Vancouver while W7DYD, W7DF, W7LYA and W7BQX are working the DX.

Aurora Openings

The distorted reflection of 6-meter signals from the vicinity of auroral curtains has been known for a number of years, although a very large percentage of the observations have been made in the eastern and central sections of the United States. The gigantic display on August 8th which occurred partially in the late afternoon and was not visible to the naked eye, resulted in considerable intermediate DX both here and in Europe. The Septem-

50 MC HONOR ROLL

CALL	S.	C.	CALL	S.	C.	CALL	S.	C.	CALL	S.	C.	CALL	S.	C.
W9ZHB	**48**	**6**	W8QYD	41	4	W2RLV	37	6	W1HDQ	33	6	W5LBG	26	3
WØZJB	**48**	**4**	W3CIR/1	41	3	W5FSC	37	6	W6PUZ	33	4	WØDNW	26	2
			W5ML	41	3	W5JTI	37	5	W4WMI/4	33	3	WØYKX	26	2
WØNFM	47	5				W4EQR	37	4	W4DRZ	33	3	W7BOC	26	2
W9QUV	47	4	W5VY	40	11	W5VV	37	4	W7KAD	33	3	WØUEL	26	2
W6UXN	47	3	W8ZVY	40	7	W6IWS	37	3	W3MKL	33	2	W6NAW	26	2
WØUSI	47	3	W5AJG	40	7	W6OVK	37	3						
W6WNN	47	3	W9ALU	40	5	W9NJT	37	3	W1CLH	32	3	W7QLZ	25	3
			W4QN	40	4	W7DYD	37	2	W5WX	32	3			
			W1LLL	40	4	W9UNS	37	2				VE1QZ	24	6
W9PK	46	4	W8NSS	40	3				W6FPV	31	3	W5LIU	24	3
W4GJO	46	4	W4FBH	40	3	W7FDJ	36	3						
W9DWU	46	3	WØSV	40	2				W4HVV	30	2	G5BY	23	14
WØDZM	46	3	W4GIY	40	2	W3OR	35	6	WØDER	30	2	XE1KE	23	6
						W1GJZ	35	5				W9AB	23	4
W9ZHL	45	6	W5JLY	39	10	W6BPT	35	4	W4FNR	29	3			
W1CLS	45	5	W1CGY	39	6	W1JLK	35	4	W8MVG	29	3	W8YLS	22	3
W7BQX	45	4	W4EQN	39	4	W9VZP	35	4	W5ELL	29	2	W7CTY	22	2
			W6ANN	39	3	W9UIA	35	3						
			WØDKS	39	3	W5HF	35	3	VE1QY	28	4	W8LBH	21	1
W7ERA	44	4	WØYSJ	39	2	W5HTZ	35	3	W9FKI	28	4	W5HVP	20	3
W7FFE	44	4	W4GMP	39	2	W5HLD	35	3	W4FQL	28	3			
WØQIN	44	4							W1ATP	28	3	VE7NM	17	2
			W2AMJ	38	6	W2BYM	34	4	W5ESZ	28	2			
WØBJV	42	3	W5FRD	38	6	W3RUE	34	3	W9MBL	28	2	VE7CN	15	2
WØINI	42	3	W2IDZ	38	5	WØJHS	34	3						
W7HEA	42	3	W3OJU	38	5	W6AMD	34	3	W1AF	27	5	W8EP	14	2
WØKPQ	42	2	W4EID	38	4	W7JPA	34	2	W7ACD	27	2	KH6PP	5	7

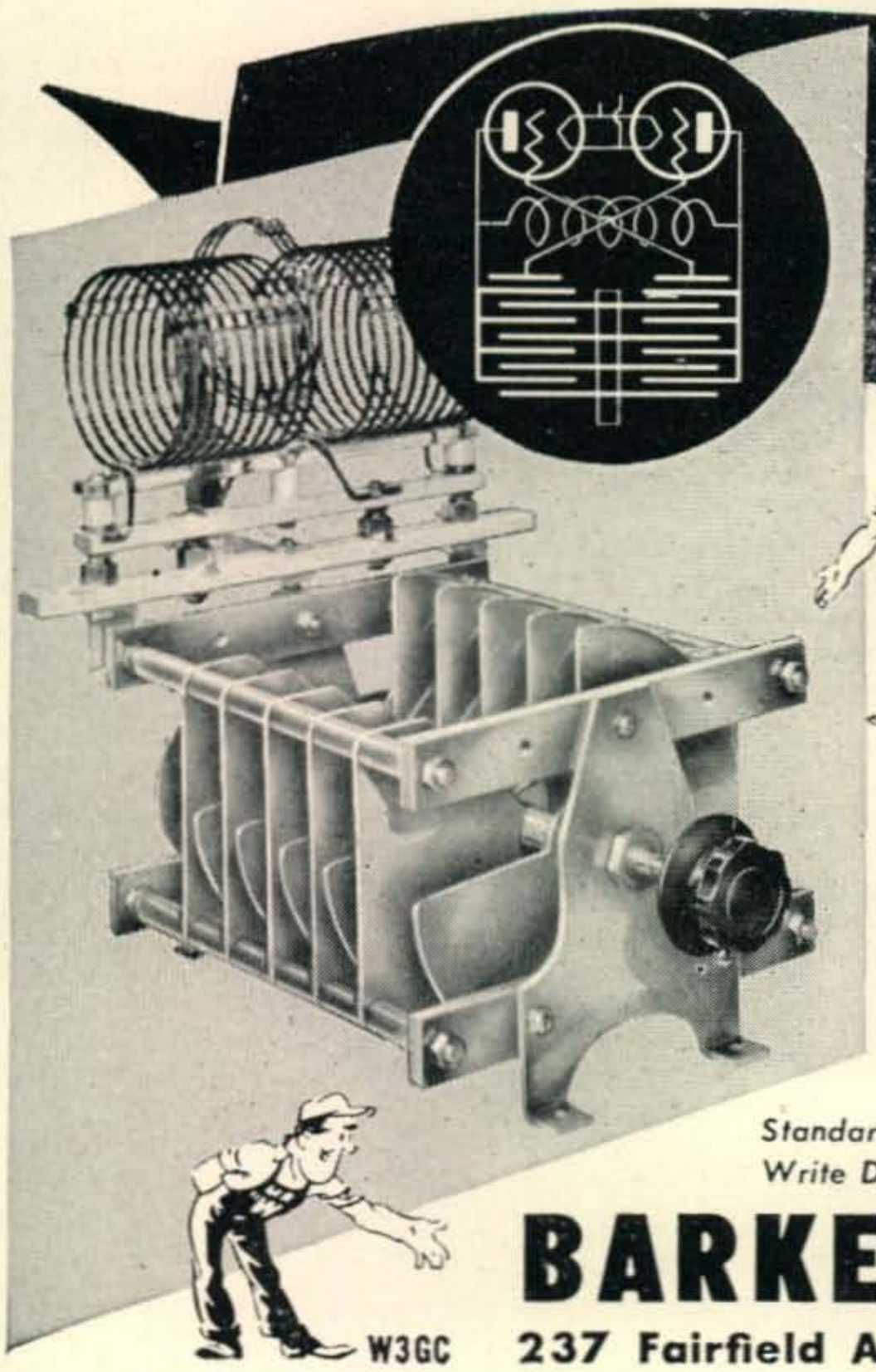
ber "VHF Bands" column by G2XC in *Short Wave Magazine* devotes quite a bit of space to this effect and offers some interesting comments on the type of signals heard and worked from which we quote.

"All reflected signals were very distorted. By careful listening it was possible to determine that the signals did have a slight d-c characteristic, but gave impressions of 25-75 cycle notes. Local signals [about 10 miles distant] were heard T9 on the direct path with interfering T2-T7 signals . . . indicating a very effective reflection.

"The reflecting medium was found to lie at bearing 355 to 360 [from G5WP observations]. Bearing was quite critical, pointing to a small reflector or remoteness of reflector."

50-mc Propagation Log

This part of our column originated a number of



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16 hy @ 450 ma, compact oil filled, 6000v, **7.50;** 6 hy @ 350 ma **2.95;** dual 3-3 hy @ 200 ma **2.15;** 2 chokes, 8 hy @ 130 ma and 4-15 hy 130 ma swg. both for **2.90;** high current 4 amp choke only..... **89c**

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months ago purely on the basis of necessity, but has proven to be so successful that we are continuing it indefinitely. The Watson Lab reporting project enables a month-to-month summary to be prepared which many operators find useful for comparison purposes or for checking back through their own logs (ostensibly to see what they missed!)

August 25—W5WX reports working W6OB and W6ABN during a short opening from 2000 to 2100 EST. Only report received.

August 26—Isolated opening with fairly strong signals between Nova Scotia and the middle Atlantic seaboard from 1800 to 1900 EST. VE1QZ worked W20RA and W30JU. W30JU worked VE1VL, VE1QY and heard VE1JS. At 2000 EST W30JU heard and worked W5HLD. Another isolated opening around 2130 to 2230 EST with W7QLZ hearing and working W5AJG and W0KVE. W7QAP also heard W5KVE, plus W5UB.

August 27—Unusually strong morning opening from W1, W2 and W3 to the W9 area. Ferrell in Philadelphia hears W9ALU call CQ over a dozen times from 1000 until 1219 EST. W9ALU works W1DJ/1 on Cape Cod and later W2BYM with the strongest signal of the season.

August 28 and 29—Nothing reported.

Louie B. Cox, W7ACD, Shelly, Idaho.

August 30—W7QLZ hears W5JLY(?) at 1840 EST.

August 31—W9PK reports working across state into W9QUV with aurora signals at 2030. XE1KE hears weak fluttering LU signals from 1655 EST. OA4BG reports first season opening working LU6DO and LU4DI from 2039 until after 2130 when QRT with band still open.

September 1—XE1KE works six LU stations from 1650 to 1935 EST. Hears LU9EV on c.w. at 2005 EST. Strengths good, though signals fluttering.

September 2—XE1KE works LU stations from 1635 to 1830, particularly LU6DO. OA4BG works five LU stations from 1956 until 2045 EST. Severe ionosphere storm in progress.

September 3—XE1KE works LU6DO and LU8BQ from 1720 until 1742 EST.

September 4 and 5—Nothing reported.

September 6—OA4BG hears LU4DI at 2020 EST.

September 7—Isolated opening with quick bursting signals; example, W7JRG hears W9ZHL at 2223 EST.

September 8—Nothing reported.

September 9—LU6DO works W5VY at 211 EST. XE1KE works LU6DO from 2052 until 2115 with XE1KE unable to hear W5VY. OA4BG also in on this contact. Band open until about 2155 EST.

September 10, 11 and 12—Nothing reported.

September 13—XE1KE works LU6DO from 1655 to 1720 EST. OA4BG hears LU6DO with resounding echo at 1910 EST. XE1KE works W5VY at 2000 EST. LU6DO works new station HC1JW at 1956. XE1KE and XE1GE work or hear LU stations until 2130 when QRT. OA4BG works XE1KE at 2100 EST on c.w. W5JLY works LU6DO and is heard by OA4BG at 2055 EST. W5VY and W5JLY worked by OA4BG after 2115, although W5JLY QRM'd by LU9MA. CX3AA, LU9MA, HC1JW and LU6AO also worked by John at Lima.

September 14—XE1KE works HC1JW and LU6DO, hearing LU5CK between 2025 and 2100 EST.

September 15—Auroral opening after 2030 EST. W2AMJ works two VE3, two W8 and hears WØNFM calling CQ West Virginia. Band also reported open a little after 1600 EST.

The 144-mc Scene

During September, Miles at W4EID kept schedules from Jacksonville to the boys in Tampa, Orlando and Lake Placid. These are ranges of 171, 124 and 194 miles, respectively. Results were only moderately successful apparently because of the rather unsettled weather conditions. A vertical rotary was used, although Miles has an 8-element horizontal in a fixed position directed north. Local activity in Jacksonville is pretty low, consisting of only W4RU and W4EID. W4GYO at Gainesville is soon to be on. Miles bought a Pilot FM tuner to check ground wave conditions and finds it to be very useful with stations from Miami to Charleston having been heard. This shows what possibilities 144 mc holds in that area.

WØNFM, Solon, Iowa worked WØJHS on September 17th for what appears to be the first Iowa-Minnesota 144-mc contact. This gives Clair 6 districts and 10 states. WØNFM is on 144.090 mc. WØWGZ, Grinnell, Iowa generally uses 144.140 mc.

New stations on 2 meters include W7JRG, Sheridan, Wyoming who has a 24-element vertically polarized beam and is putting the finishing touches on an 80 watt transmitter. VE7CN, Prince George, B. C., says that if the boys in Vancouver show sufficient interest he will put a 32-element beam up to try and work them. This is a good jump of some 325 miles across fairly rough territory.

During the excellent Lake Erie opening of September 4th W9AB worked or heard W8YGM, W8RDZ, W8ML, W8WSE and W8WXV in and about Cleveland, and W8ARF, W8TWD and W8VOZ in the Toledo area. During this opening W8YGM was forced to use i.c.w. because he had loaned out his mike. However, this DX was too much and while in contact with Harry he requested QRX and in a couple minutes was back again, but on phone, explaining that borrower still didn't know why Jake had snatched the mike out of his hand and ran back to the transmitter!

W3KUX, Washington, D. C., now lists 12 states

144-Mc Honor Roll

	States	Dist		States	Dist
W8UKS	15	6	W9IPO	8	5
W8WJC	14	6	W3GV	8	5
W8WXV	13	5	W4FBJ	7	5
W1JFF	12	4	W8PYY	7	4
W1IZY	12	4	W9PK	6	4
W1PIV	12	4	W8DRZ	5	4
W3KUX	12	5	WØWGZ	5	4
W3RUE	11	5	WØRNC	4	2
W9BBU	11	5	WØKPQ	3	2
W3GKP	10	5	WØDDX	3	2
W9AB	9	5	WØMZH	3	2
W9ZHB	9	4	WØZJB	1	2
W9LWE	8	5			

THE F.C.C. SAYS - - -

§ 12.133. *Purity and stability of emissions.* In the case of A-3 emission, the amateur transmitter shall not be modulated to the extent that interfering spurious radiation occurs, and in no case shall the emitted carrier wave be amplitude-modulated in excess of 100 per cent. Means shall be employed to insure that the transmitter is not modulated in excess of its modulation capability for proper technical operation.

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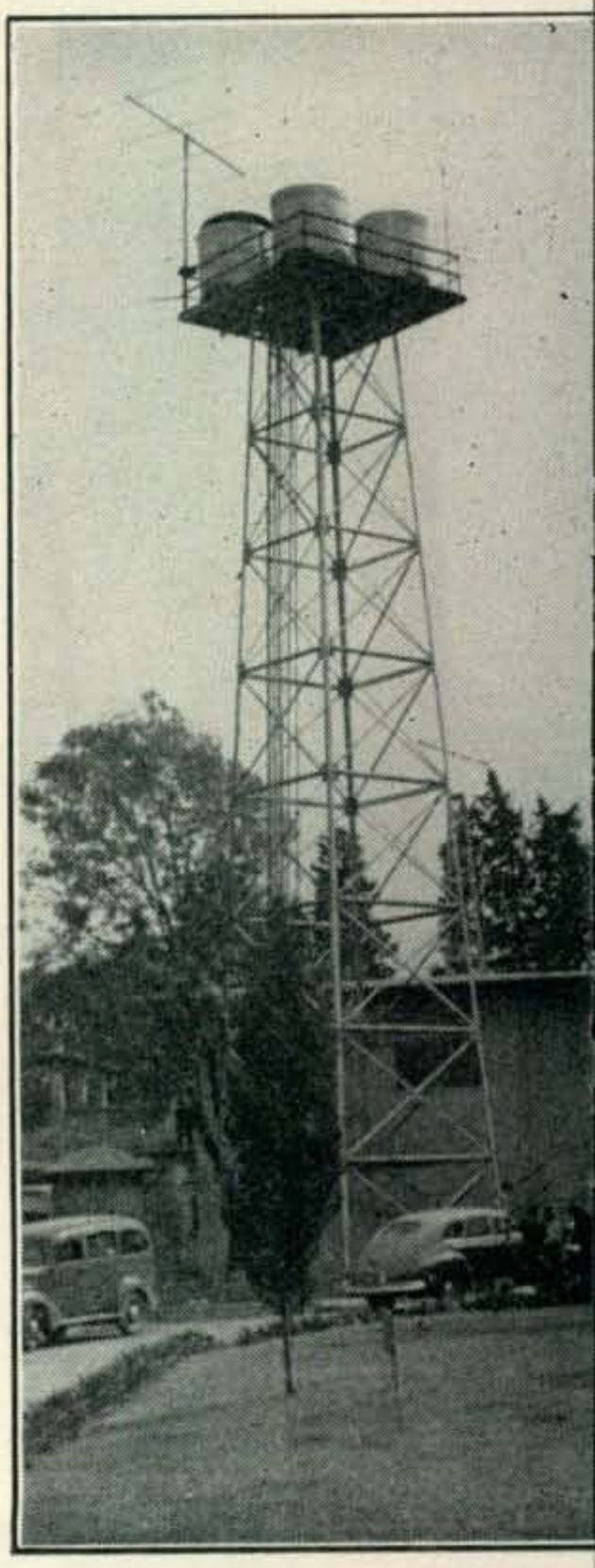
and 5 districts. Of these four we're using horizontal polarization and eight were on vertical. I expect this shows that the two over two Yagi used by W3KUX and which can be rotated in polarization has an advantage. P.S. The longest path was worked on vertical.

W8WRN reports that the severe aurora and ionosphere storm on August 8th also affected the 144-mc signals. Since everyone was using phone, only a fragment of a word could be read now and then. Most the signals seemed to come from north of his location. Ken also mentions that W8CYE, Miamisburg, Ohio, has had a morning sked with W9EHX in Illinois which worked out to an average of 5 times per week.

During the August 26th opening Sam Harris, W8UKS, reversed the field and went over to vertical (16-elements, 60 feet high) working 32 New Jersey and Long Island stations, plus two in Connecticut and possibly W1BCN in Massachusetts. Sam wants to publicly thank W2QNZ and W2RH for working on the W1IYO contact for him until they got together. Although the band appeared open to the east for various horizontal signals on August 25, 27, 28 and 29 as well as the 26th, the latter was the only time vertical signals were heard. However, rumor has it, that verticals are being seriously considered on the Lake Erie shore.

A fugitive from the daily 20-meter rat race is W8RDZ, Cleveland Heights, Ohio. Jerry has popped up on both 6 and 2-meters. Managed to get in on some of the good DX working as far west as W9TKL, Waukegan, Ill., on an indoor antenna.

VE1QZ has unfortunately just about exhausted his interest in 144 mc. Oscar has monitored the band for at least 23 nights when the local Naval weather people said inversions were present. The results have been nil. Present plans, in case nothing turns



This is where the stuff takes off from XE1KE.

up on 2-meters before November is a shift to 235 and 420 mc with square corner or 48-element beams.

W4FBJ went portable during September to a QTH near Haysville, Tennessee. No mountain top location, but DX was reached at the 250 mile mark. W8CYE, W9JMS, W8ZUR/4, W4MKJ, W4KKG, W9FVJ, W8AKW, W9ZHL, W9LLA and W9ASM worked. Floyd says that plenty of stations were getting through, but apparently they were not listening carefully enough to hear him. And a new state, too!

W8EP, Terra Alta, West Virginia is on every evening with a frequency of 144.510 mc. The station altitude is 2800 feet above sea level and the transmitter runs 100 watts with a 4-element horizontal beam.

The 2-meter band which is now open in England has provided some good ground wave DX. G5BY reports working out to 287 miles between September 9th and 17th. Horizontal polarization was used.

PREDICTING BAND CONDITIONS

(*from page 31*)

the prediction graphs for each month. Samples of the new prediction graphs are shown in *Fig. 3*. The contour of the heavy line and the shaded area gives some indication of the required field intensity over this path for c-w operation. The contour of the dashed line shows the minimum required field intensity for 80% readability in radiotelephony communication.

In the equivalent power formula P_0 may be based upon the maximum input power permitted by the DX country. At 40 meters $Z = 1$ and $G = 1$ are good basic assumptions. At 20 meters the use of directive antennas should easily permit the use of $G = 2$ to 4. These methods also permit the DX operator to estimate how strong his own signal must be in a foreign country where the noise grade is high. Disregarding absorption for example, it is evident that while a Capetown phone station might be heard in New York City at about 0830 EST (required 4 db above 1 μv/m), the ZS stations would need signals at least 10 db stronger to be heard through their high local noise level. 1000 watts radiated in South Africa would reach New York, but only 10,000 watts could reach the other way around.

SINGLE SIDEBAND

(*from page 22*)

the carrier-frequency output can be reduced to zero, indicating proper output balance in the two modulators.

Now temporarily short-circuit the grids of one of the modulator tubes to their input-transformer center tap and apply a sine wave audio signal of about 400 cycles (or any convenient frequency in the voice range) to the audio input terminals of the unit. Increase the output of the audio signal generator until a signal like *Fig. 6a* appears on the oscilloscope. This signal is the sort of double-sideband output that will be obtained from the unshorted stage with the incorrect setting of the input balancing control associated with that stage. Adjust the input balancing control until adjacent half cycles of the output

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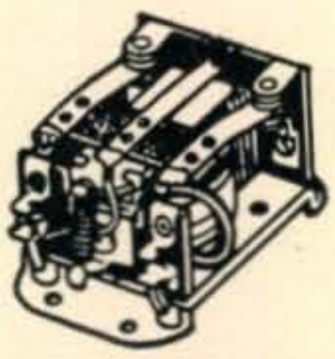

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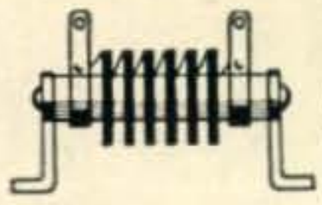

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signal have the same peak value, as in *Fig. 6b*. These half cycles should be identical with each other, provided the audio input signal is truly sinusoidal and no distortion is occuring in the modulator. Readjust the modulator bias control, R_{16} or R_{17}, for maximum undistorted signal output. This will probably require retouching of the output balancing control for maximum carrier suppression and a symmetrical output signal like *Fig. 6b*. Always reduce the audio input to zero before attempting to adjust the output balancing control for carrier suppression.

It may be worth while now to experiment with slightly different settings of the carrier buffer gain control, R_7, and with greater or less audio input to determine the optimum amount of carrier to inject into the modulator cathode circuit. In general it will be found that the greater the injected carrier amplitude, the smaller the permissible audio amplitude will be for undistorted output, and vice versa.

Now short-circuit the grids of the other modulator tube, remove the short-circuits from the first, and repeat all the adjustments that were described for the first modulator. The final output signal should again be like *Fig. 6b*, and should have about the same amplitude as was obtained from the first modulator.

With both modulator tubes in operation, observe the output on the oscilloscope. With sine wave audio input, it should look like a pure unmodulated carrier wave, with very little variation in amplitude, as in *Fig. 6c*. If it does not, the trouble is probably due to inequality between the outputs of the balanced modulators; this can be remedied by readjusting slightly the settings of one or both of the bias potentiometers, R_{16} and R_{17}. Each time their setting is changed, remove the audio signal and recheck for carrier suppression, adjusting the output balancing controls, R_{15} and R_{19}, if necessary. Now bring up the audio input to the maximum value for which the pure single sideband output can be obtained, and note the amplitude of the signal on the scope.

The final step is to determine what audio input is permissible on speech without overloading the modulator. Apply the output of the speech amplifier to the unit, and speak with your usual "on the air" voice level as you bring up the gain of the speech amplifier. Locate the setting which gives output on speech peaks equal to the peak value of the output wave that was obtained with maximum permissible sinusoidal input to the unit. Be careful not to exceed this setting in operating the equipment, because normal monitoring with an oscilloscope will not show up overloading of the modulator in as definite a manner as it will show overmodulation of an AM carrier.

Adapting the SSSC Unit to 14 and 30 Mc

The only components of the basic circuit that need to be changed for operation on 14 or 30 mc, other than the coils, of course, are the capacitors in the r-f phase shifter. For 14-mc operation, capacitance values of 110 $\mu\mu$f are required at C_{17} and C_{18}, in place of the 400-$\mu\mu$f units used in the unit described. Of course, frequency doubling stages as required will have to be used between the

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oscillator and the Class A carrier buffer stage. For 28.5-mc operation, 55-$\mu\mu$f capacitances will be necessary in the r-f phase shifter. These capacitance values will probably have to be obtained by paralleling standard capacitor sizes to make up the required value, or by paralleling fixed capacitors with trimmers.

At 14 and 28.5 mc, the cathode follower stage may have to be replaced by a conventional tuned Class A amplifier with an output link, because circuit capacitances may not permit adequate output to be obtained from the cathode follower.

Amplifiers for Single-Sideband Signals

Although it is not the purpose of this article to discuss power amplifiers for single-sideband signals, a few general comments will not be out of order.

First of all, any power amplifier used in a single-sideband transmitter must be linear. This means that in dealing with SSSC transmitters we must drop the usual concepts associated with Class C r-f amplifier operation and view our r-f amplifiers more in the light of audio amplifier practice.

For the same reasons that we usually use Class A amplifiers in the low-powered stages of our audio systems and operate our high-powered modulators Class B, it is wise to consider the use of Class A r-f amplifiers in the intermediate stages of a single-sideband transmitter. Their efficiency will be low, but the driving power required will be only that required to supply external grid-circuit losses, and the distortion will be the least that can be obtained. The Class A audio amplifier ratings and typical operating conditions given in the tube manuals can generally be applied for Class A r-f amplifier operation, provided, of course, that the tube is one which is suitable for r-f service in the contemplated frequency band.

High-powered final r-f amplifiers for single-sideband work should be operated Class B for good efficiency and highest output. It must be noted that the typical operating conditions usually specified in tube manuals for Class B linear r-f amplifier operation apply for amplification of ordinary amplitude modulated signals, and do not give the conditions that are obtained with SSSC excitation, where there is no constant carrier signal. The typical operating conditions given for Class B audio amplifier and modulator service give a much better picture of the capabilities of a tube as a single sideband amplifier. These operating conditions are always based on the use of two tubes in push-pull, whereas in Class B r-f amplifier service either a push-pull or a single-ended amplifier can be used. In the latter case, the typical current and power values given for Class B audio operation can be divided by two to get the minimum and maximum plate current, grid excitation, power output, etc. The same requirements with respect to plate and grid bias supply regulation that apply in Class B audio service also apply to Class B r-f amplifiers.

The efficiency of a Class B amplifier operating as a linear amplifier of sideband-plus-carrier AM signals is quite low, on the order of 30 to 35 per cent, when the unmodulated carrier is being transmitted. The permissible input and hence the peak output are generally determined by the amount of plate

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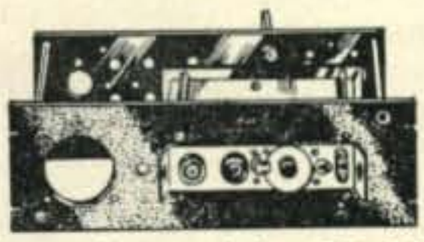

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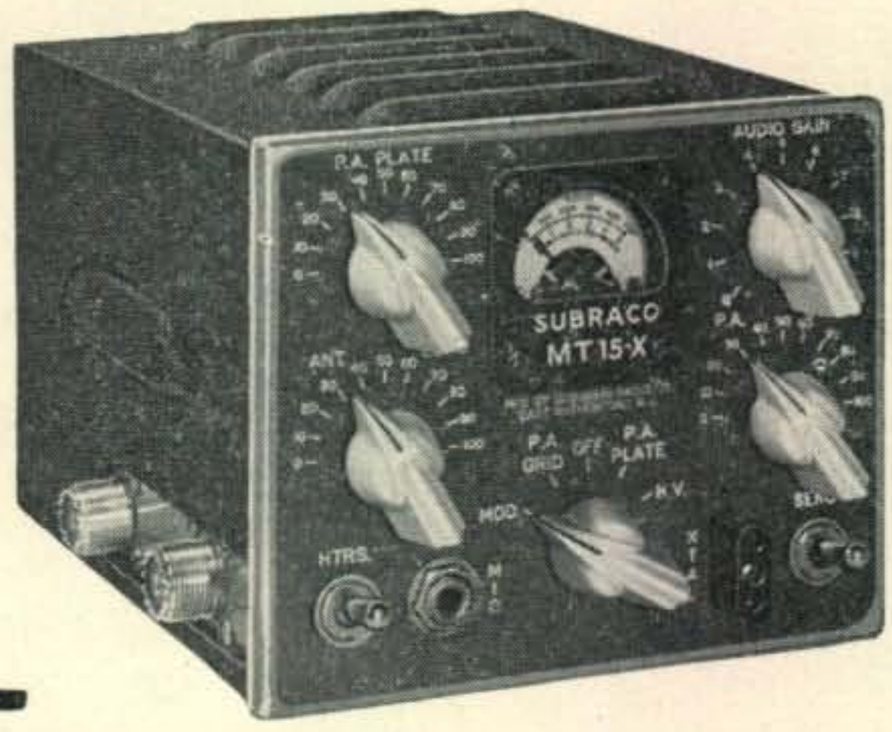

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dissipation the tube can stand under unmodulated carrier conditions. However, the same amplifier amplifying an SSSC signal is not subject to this limitation, because there is no carrier present to cause such dissipation during no-signal periods, and the plate current returns to the static value determined by the grid bias, as in Class B audio amplifier service. Because of the intermittent nature of speech, it should be possible in speech work to drive a Class B amplifier to somewhat beyond the inputs and outputs specified for sinusoidal excitation in Class B audio data sheets and to obtain an efficiency on peaks close to the theoretical 78.5 per cent maximum for Class B amplifiers. Thus we would sacrifice little, if any, of the 75 to 80 per cent efficiency which we might be able to obtain from the same amplifier operated Class C. When we consider the fact that our peaks produce a signal at the receiving point 9 db more effective than the same peaks in an AM signal, and do it in half the AM bandwidth, the practical possibilities of SSSC become extremely attractive.

THE AMATEUR NEWCOMER

(*from page 40*)

that the second section of the 6A6 is either operating straight-through on 7 mc and not doubling, or that it is tripling to 21 mc. As mentioned before, some change in the number of turns on individual coils may be necessary. If the output is on fundamental frequency, with the tuning capacitor near minimum setting, some turns will have to be removed. If the output is on the third harmonic, with the tuning capacitor near maximum setting, some turns will have to be added to the coil. Neither of these conditions is to be expected, however, if the dimensions given are followed.

After the crystal oscillator and the first doubler are operating, the 807 stage should be adjusted. Replace the fuse, F_2, to restore plate and screen voltage to this stage. Move the metering switch to the fourth position and close the send-receive switch. Tune the tank of the 807. A minimum value of plate current will be observed, but it will not be quite as pronounced a dip as that for the preceding tube. When the minimum has been established, check the output with the wavemeter to determine if the output is actually on 28 mc. It is extremely unlikely that any change will be necessary in L_3 for 28 mc. The grid current to the 807 may be checked by moving the metering switch to the third position, but unless a meter more sensitive than the recommended 0-200-ma instrument is used the reading would be so slight as just to cause movement of the pointer.

The next step is to adjust the final. Move the metering switch to the fifth position and read the grid current to the 809; it may be that some further tuning of the 807 will be required. With the plate and screen voltages used with the 807 on 3.5 mc it is possible that insufficient drive for the 809 will be obtained. The grid current to the 809 should not be less than 30 ma, and if it is below this value the drive will have to be increased. This may be done by moving the tap on the voltage divider, R_1, toward the positive end. When the plate voltage is increased it would be wise to check the screen voltage to see if it has dropped below 200 volts; the screen should be operated at 200 to 250 volts. Sufficient drive will be obtained from the 807 with about 600 volts on the plate and with about 75 ma plate current.

If the neutralizing process has been carefully car-

ried out on 3.5 mc, no change will be required for operation on 28 mc. It would be a good idea, however, to check to see that no dip in the grid current reading on the 809 is found when its tank capacitor is tuned from maximum to minimum. If any dip is noted, the neutralizing procedure should be carefully repeated.

Insert the fuse, F_3, and attach the dummy load. Put the transmitter on low power by using the lower voltage from the power transformer. Move the metering switch to the last position to measure the plate current of the final amplifier. At first, when the plate voltage is applied to the 809, the plate current will assume a very high value, just as it did on 3.5 mc. The plate tank should be immediately tuned to dip at resonance. Again the amount of dip depends upon the coupling between the final tank coil and the dummy lead. If very little dip is noted, the coupling should be reduced by moving the link away from the tank coil. With no coupling (the dummy load disconnected entirely) the plate current should dip to about 20 ma. With the link fully meshed the dummy load will be capable of causing the 809 to draw much more current than is desired. In between these two limits there will be found a point at which the desired loading may be accomplished.

After the final seems to be operating satisfactorily, the full voltage from the power supply may be applied and the transmitter coupled to the antenna, and you are ready to go on 10-meter c.w. for a little DX.

A word might be given here about the operation of the transmitter on c.w. and the method of keying the first two stages. It will be seen in the wiring diagram that the transmitter is keyed in the cathode of the 6A6, leaving plate voltages on the 807 and the 809 all the time. It will be found in the operation of this transmitter that these two stages do not draw any current when the excitation is removed; this is accounted for by the fact that each of these is biased beyond its cut-off point and, of course, there is no output from the transmitter.

FIELD STRENGTH METER

(*from page 35*)

one side of the tuning condenser and one side of the phone jack may be grounded to the front panel. No. 10 bare copper wire is used for leads running from the microammeter to the jack and to the crystal. The antenna is a 13″ length of ¼″ diameter tubing. For longer pickup rods the capacity of the antenna coupling condenser will need to be reduced.

Either the shunt or the SPST switch may be used to protect the meter. The shunt will naturally reduce the sensitivity of the meter and it may be used or left out of the circuit entirely as desired. In our case a shunt with a winding of 25 turns of No. 28 enameled wire on 3/8″ fibre tubing was employed.

The unit is very sensitive and power inputs of two to three watts are fully capable of registering a full scale deflection at distances of fifteen to twenty feet from the antenna. For measurements at a greater distance from the antenna a half-wave pickup rod may be substituted. At any time the initial reading is more than full scale the SPST switch should be thrown to protect the meter. Normally open, the only function of this switch is to prevent meter burnout.

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V-H-F ANTENNAS

(from page 45)

The antenna shown in *Fig. 7* has vertical members made of 61ST seamless aluminum tubes and horizontal members made of tapered steel tubes ¾″ diameter at the large end tapering to ⅜″ at the small end. The support tube is 2½″ aluminum.

This antenna can operate over a 1.1-1.2 frequency range with a SWR of less than 2.0.

The Coaxial "Sleeve"

One of the most popular types of vertically polarized antennas in use is the coaxial or "sleeve" antenna, and its colinear coaxial modifications. A simple coaxial antenna for the commercial 30-44 mc band is shown in *Fig. 9*.

This class of antennas is very sensitive to frequency and requires very careful construction. The whip should be a quarter-wave long, or 2805 inches /F(mc). If fed with a 52-ohm cable, the skirt should be 2775/F(mc) inches long, or 2920/F(mc) inches long if fed with 72-ohm cable.

The dimensions of the whip are not too critical, plus or minus 1% being sufficiently accurate; the dimensions of the skirt are extremely critical, and should be set using a slotted line in the feeder between the antenna and the transmitter so that the skirt length can be cut for a minimum standing wave ratio.

This type of antenna is entirely symmetrical, and there are essentially no support mast radiation effects to raise the naturally low angle of radiation. However, in an effort to further lower the angle of radiation, the antennas illustrated in *Fig. 10* and *11* have been developed. *Figure 10* shows a twin-skirted colinear coaxial antenna for the 72-76 mc band and *Fig. 11* a triple-skirted colinear coaxial antenna for the 152-162 mc band. The additional skirts are parasitically driven, and it is claimed that a lower angle of radiation is obtained; surely better isolation from the mast is obtained.

Both the twin-skirted and triple-skirted colinear coaxial designs are extremely difficult to adjust, and their construction should not be undertaken unless good instruments are available. A slotted line is almost a necessity.

These antennas should also be adjusted in conjunction with a field strength meter some distance away because the minimum SWR does not always coincide with the lowest angle of radiation.

A controversy has been going on for some time as to the merits of a properly constructed coaxial (or colinear coaxial) antenna as compared to a properly adjusted ground plane type, such as the isoplane of folded unipole. In all probability, these antennas are approximately equal when properly adjusted. Theoretically, the multi-skirted coaxial antenna should have a lower angle of radiation, but, since the parasitic elements are out of the main radiation field of the driven element, it is doubtful that full use is made of the additional elements. All in all, either type will be entirely satisfactory for general purpose omni-directional coverage.

A word is in order as to the merits of the other types of antennas discussed. Purposely, this article has presented antennas in order of their physical complexity. The half-wave dipoles, whether center-fed, end-fed, folded or coned, are all capable of good results. The center-fed folded and coned antennas will be less expensive generally than any of the ground plane or coaxial antennas, but are more difficult to mount and usually have a higher angle of radiation than the more complicated antennas.

If the maximum non-directional coverage is required, one of the coaxial or ground plane antennas should be used. These antennas have the economic disadvantage that they must be fed with coaxial cable which is relatively expensive in long runs. Further, in long runs the power losses in coaxial cable on the v.h.f.s becomes considerable.

The second part of this article will cover simple horizontally polarized antennas, and both vertically and horizontally polarized arrays.

INSURANCE FOR AMATEURS

(*from page 34*)

protection offered to equipment in an automobile may be more limited than in other policies with "away from home" coverage.

Theft Insurance: Theft Insurance protects against Theft, Larceny, Burglary, "Mysterious Disappearance," Vandalism, Malicious Mischief, Robbery, and Damage incurred during attempted robbery. As with all "residence" policies, it covers the property of all members of the household up to the policy limit. For an additional premium the coverage can be extended to anywhere in the Western Hemisphere. A typical "All Protection" Theft policy costs about $18.00 per $1,000.

The easiest way to buy Theft Insurance is in an All Protection policy. However the premium can be reduced by itemizing the property to be insured. A typical list would include your most valuable jewelry, watches and rings, with a value assigned to each piece. Next a lump sum value would be assigned to the less valuable jewelry and table silver, etc., and another lump sum value would be placed on your furniture and radio equipment. These amounts would then be totalled, and 20% or so added to cover damages suffered in an attempted robbery, plus $100.00 for cash on hand, and $500.00 for securities, plus the desired amount of away-from-home protection.

Theft Insurance can be written to cover only your radio equipment. However the premium on an itemized policy covering most of your valuables may cost little more than an all protection policy on only your radio equipment.

Being an amateur does not affect the advisability of carrying Health and Accident, or Life Insurance. The same is true of most automobile insurance; although mobile equipment mounted permanently in an automobile would be considered part of it. And the value of such equipment should be computed in buying applicable insurance.

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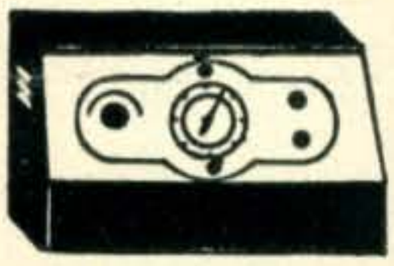

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not discussed here, because it is doubtful if it would be sold to an amateur. Nevertheless if your antenna system is extensive, it is worth investigating.

Quoting Mr. William B. Braman, Supervisor of Educational Extension, The Aetna Casualty and Surety Company, "Tailoring an insurance program to an individual's needs is very much like tailoring a suit of clothes. The best job can only be done on an individual basis, and the need for accurate tailoring is much more important in insurance than in the making of a suit of clothes." No article can pretend to answer all possible questions that may arise. If yours is not covered, consult your insurance broker. If he does not know the answer, he can get it from his home office.

This is especially important in antenna installations, because even the various insurance companies themselves do not agree on the exact protection available here. In any case you can ordinarily anticipate no difficulty on minor antenna values, say less than $100.00, but on more elaborate installations, or on anything doubtful, *get it in the policy in writing.*

Be fair with the company and you may be sure that any reputable one will reciprocate and will tend to give you the benefit of the doubt. If they get the idea you are trying to cheat them, the resources of the entire industry may be mobilized against you.

Besides those already mentioned, the following contributed time and information in answering questions on insurance, many of which probably seemed silly to them, to make this article possible:

Mr. L. R. Nelson, Insurance Broker, 536 Carolina St., Gary, Indiana.

Mr. Charles L. Smith, Electrical Field Engineer, National Fire Insurance Protective Association.

Mr. W. H. Birkemeier, Assistant Manager, Western Department, Hartford Fire Insurance Company.

Mr. E. H. Luecke, Agency Department, The Fidelity and Casualty Company of New York.

Mr. Jarl T. Sorensen, Assistant Underwriter, North America Companies.

Mr. John W. Tierney, Publicity Department, The Travelers Insurance Company, and

Mr. F. Paul Bland, Assistant Agency Director, United States Fidelity and Guaranty Company.

As a final thought even the most complete insurance coverage can only supplement Care, Courtesy, and Common Sense. What good is even a $1,000,000 of it to a dead man?

BREAK-IN MONITOR

(*from page 24*)

coat of grey enamel was put over the original black crackle, giving it a very pleasing appearance.

The monitor works perfectly, even when the transmitter input is reduced to as low as five watts. It was found that the best way to operate this equipment, is to set the oscillator volume control to a point where the audio level of the tone is slightly higher, or louder, than the level of the signals from the receiver. The receiver gain control can be opened "wide" and the volume then controlled by means of the volume control on the monitor.

Undoubtedly changes in the mechanical structure and layout will be necessary to some builders in

ord er to use available parts, and for that reason, the mechanical details were glossed over.

Although the tone heard under key-down conditions is purely from an audio oscillator, it nevertheless depends on transmitted its source of power and reproduces a very good facsimile of the way the signal sounds to the other fellow, instantly showing any signs of chirps, tails, etc.

A VISIT TO ZANZIBAR

(*from page 41*)

Have they forgotten how to dig, now that nearly all the DX stations are running BC610s, etc.?

W6SZY lines up on Marv and the fun starts. No time for chatting, even with old friends. The W6s fade out. A ZS6 says: "I don't think I have worked a VQ1—not postwar. By the way, where is VQ1?" (hi!) . . . and so on, with W2s, W1s, VKs, KG6, KH6, NY4 and G, until the band and I go flat at 0100 hrs. (Zanzibar time), and so to bed.

The next night I can't get on until 2000 G.M.T. A few more QSOs—conditions bad and bed at 0100 (Zanzibar time). Up at 0600 for more. One CQ and up comes W8BTI. Sez: "Won't keep you as all stations will be after you, hi!" Lots of silence. Another CQ—no soap. W8BTI calls CQW: "Anybody want a VQ1?". Lots and lots of silence. W8BTI: "Where are those DX hogs?". Another chat with W8BTI until a W9 and a VE3 come to life. Only two more nights left, and time is short. Only two things to do—work all day and ham all night.

So on the night of 3rd December I do a nine hour stretch, kept awake by mosquitoes, of which there are billions, and the Ws, who are not digging for my peanut whistle too well. W2PEO gets QRM from the XYL's egg-beater (any better excuse for becoming a wife-beater?). I tell him she will be reported and put in a harem or sumpin. She says she might as well be, as married to a guy who is radio nuts.

LU8EN gives me WAC. One W wants me to go on phone. W1DX comes up a few cycles off the frequency I am on and calls CQ. Has a rag-chew with a W4 and then goes QRT—I call him but no soap. Hi, By! . . . and so on through two long nights and two days without sleep. I hear: "He's just about here." Am I? I am beginning to wonder where I am. W6GRL just makes it (maybe he has heard that remark from 6SZY), and I have to close at 0530 Zanzibar time on 5/12/47 after working W3DPA, making 120 QSOs and WAC for VQ1HJP.

I packed feverishly, dashed for breakfast and caught the boat at 0800 hrs. Tired? Yes, but there's lots of time for sleep and little time to be a VQ1, and I hope all the boys enjoyed it as much as I did.

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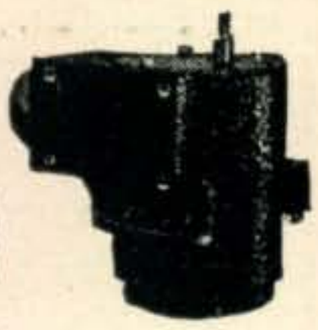

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FOR SALE: 304TH 20 meter kw final—813 doubler driver, also 60 watt multiband exciter each on standard rack size chassis with panels, also kw power supply full wave 872As on heavy duty chassis, also PP2A3 speech amplifier and LM freq meter. Sell units separately. Best offer. Apt. H54, 5424 Arlington Avenue, New York 63, N. Y., KI 9-8725.

TWIN CITY RADIO HAMS: I offer the three big cw transmitters at WØCO, in place at my station, and in "as is" operating condition, for cash, as follows: 40 meter 1,000 watts input $350.00; 80 meter 800 watts input $200.00; 20 meter 750 watts input $200.00; all three together $650.00. These rigs all crystal and temperature controlled. Make appointment to operate transmitters if interested. Sumner B. Young, Maplewoods, Wayzata, Minn.

COMPLETE 100 WATT 40 meter station for sale or swap, BC-459, BC-455. Also paid new 803 tubes. Herman Hoechstetter, W6UVM, 2161 Fremont Street, Monterey, California.

WANTED: Used receiver S38 and 53 etc. to get started as an amateur. State conditions, price, etc. Kermit Derstine, Box 15, Fountainville, Penna.

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500 WATT POWER SUPPLY and parts, also final parts and 807 driver parts, milliammeters, two UTC filter chokes, condensers, new Kenyon 2300 v at 300 ma. power transformer, four 813 tubes, two HK54 tubes, six foot relay racks, hinged rear door on rollers, final condenser 50-50 mfd, 1 kw. Write your needs. Sell at best offer, reduced prices. Everything practically all brand new, not surplus. W8KJ, Irving Davis, 505 Grayton, Detroit, Michigan.

ARR-5 like S-36 like new. Converted to tune 149 mc narrow and broad FM and AM rom 27.5 mc to 149 mc. Bass boost and phono input added, less speaker and power supply. Best offer over $75. W9BYG, 1635 Farwell, Chicago, Ill.

FOR SALE: ART/13 complete. Started to convert but never finished. Need a little work. $30.00. Also HRU dc power supply, 28 volts at 70 amp in good condition, $35.00. Both f.o.b. W. Handler, W8ZRO, Blanchester, Ohio.

FOR SALE: A complete 2 meter station 35 watt xtal control transmitter (not 522) work shop. 6 element beam, antenna and B supply relay, converted 522 receiver, power supplies for both units included for $125.00. F.O.B. W1JFF, 74 Bedlow Avenue, Newport, R. I.

QSL CARDS: New, original, exciting. New modern designs exclusive with us from one to multiple color cards. Your own design reproduced at small additional charge. Our prices are the most reasonable, consistent with quality work. Fast service. Send for free samples of price list. The W2PEO Press, 24 Villa Road, Larchmont, N. Y.

FOR SALE: Meissner signal shifter, Jefferson-Travis Xmttr-Rcr (50 watt). 701 Silver transmitter with coils, BC645 HF unit (new), RCA 10 meter mobile transmitter, BC654s, PE103A dynamotor, vibrapacks, cables, 920 Precision tester, 188X signal generator, RCA 3″ oscilloscope, CTC & Kenyon chokes & transformers, tubes & misc. parts. Send for complete list of bargains. Want a good all wave receiver for 6 volt operation ham bands or converter to put in car. W3BBV, P. O. Box 722, York, Penna.

FOR SALE: 15″ diameter TELECHRON 24 hour electric clock, 115 vac, 60 cycle, sweep second hand, red hand for GCT, $30.00 f. o. b. Valley Stream, New York, W2RPZ, 214 Munro Blvd, Valley Stream, L. I., New York.

WHY WAIT? Join N.A.R.C. today. The best $2.00 investment ever made for the good of the amateur. Send your application with handle, QTH and class of license to: National Amateur Radio Council, Inc., 23 Main Street, Champaign, Illinois.

WANTED—Issues of QST as follows: all issues before December 1924; 1925-Jan, Mar, May, July, Oct; 1927-Jan, Mar, Apr, May, June, Sept, Oct, Nov, Dec; 1928-Apr, May, June, Sept, Nov, Dec; 1929-Apr; 1932-Jan. All issues must be in excellent condition with both covers and no pages missing. Will swap CQ, Radio or QST for the above. Write Ed. Newman, 214 Munro Blvd. Valley Stream, L. I., New York.

USED HEARING AIDS: good working condition. May be converted to miniature receivers, transmitters or transceivers. These aids are used, but are in good working condition. $20 each or 2 for $35 postpaid. Byron Eriksen, 4437 Grand Avenue South, Minneapolis 9, Minnesota.

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New Ham Ratings

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Tube Type	Max. Plate volts	Max. Screen volts	Max. Grid volts	Max. Plate Ma.	Max. Screen Ma.	Max. Grid Ma. (Note 1)	Max. Plate Dissipation (watts)	Max. Screen Dissipation (watts)	Power Output (watts) (Note 2)	Max. Freq. in Mc. (Note 3)	Grid Bias Calculator Factor (approx.) (Note 4)
RCA-6AG7	375	250	—75	30	9	5	9	1.5	7.5	30	22
RCA-6AK6	375	250	—100	15	4	3	3.5	1	4	60	9.5
RCA-6C4	300	—	—100	25	—	8	5	—	5.5	60	18
RCA-6F6	400	275	—100	50	11	5	12.5	3	14	30	7
RCA-6L6	400	300	—125	100	12	5	21	3.5	28	30	8
RCA-6N7	350	—	—100	30 (per plate)	—	5 (per grid)	5.5 (per plate)	—	14.5 (total)	30	35
RCA-6V6GT	350	250	—100	47	7	5	8	2	11	30	9

Note 1: 100,000 ohms maximum grid resistor
Note 2: Based on 70% plate efficiency
Note 3: Maximum frequency for full power output and input
Note 4: For pentodes, this is the grid-screen amplification factor

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