CQ
RADIO AMATEURS' JOURNAL

OCTOBER 1953

10 METER CURTAINS ... at W6RV

35c

CQ RADIO AMATEURS' JOURNAL

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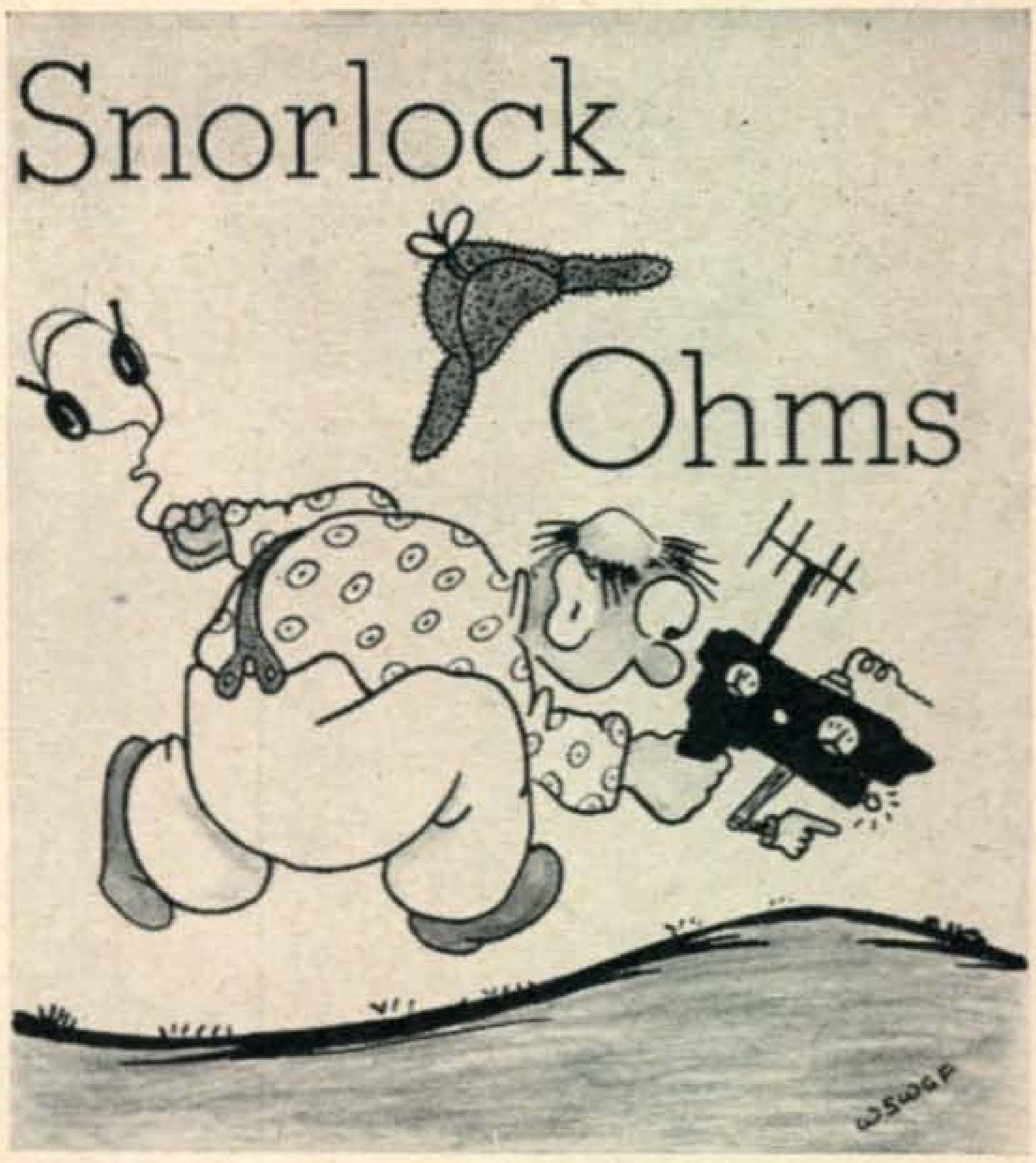
FEATURE ARTICLES

Departments

Miscellaneous



One of the most intriguing problems that has faced the CQ Editor within the past year was the extent and type of reader reaction to the inimitable Scratchi. While in some circles considered a long standing institution, other readers would have preferred their monthly copies of CQ with pages 6 and 8 deleted. Since most of the constructive criticism singled out the use of dialect humor, we have decided to alternate Scratchi with a different brand of humorous adventure—the detective story.

Appearing this month, and then every other month thereafter, will be the famous radio amateur and detective Snorlock Ohms. As might be expected, he is accompanied throughout these adventures by his faithful companion, Dr. Watts Gnu.

Like Scratchi (a series of over 50 stories), the Snorlock Ohms series is being written by a very well-known amateur. Both of them will continue to remain unidentified. *Editor.*

The Strange Suit of Mr. Sol N. Oid

Inspector Louis Coupler's voice was heavy with sarcasm.

"Now, mind you," he was 2-way radioing to the great detective Snorlock Ohms, "I could solve this murder myself, but I'm — —"

"Too dumb," offered Snorlock.

"Yes — — No! Look here, I'll bet you my favorite ping-pong ball that you won't know who murdered Sol N. Oid, senior business partner of Electronic Playthings Inc."

Snorlock yawned, played tick-tack-toe with his physician-friend, Watts Gnu. "If the case interests me — —"

"There's a beautiful blonde doll — —"

"It interests me!" broke in Snorlock, simultaneously pressing a key on a small oscillator. From the bowls of the house came the whir of

(Continued on page 6)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(from page 4)

machinery and soon appeared Algernon, the detective's devoted robot valet. Another button was pressed and the robot held out a greatcoat. At the press of a third button, the iron monster picked up Watts by the scruff and deposited him outdoors. "Oops!" apologized Snorlock, "I pressed the *Cat Out* button by mistake."

With the aid of a king-size shoehorn the two men managed to get into Snorlock's sports car which was supercharged by about 150 dollars. The roar of 300 horsepower rent the air as pedestrians, cats, dogs, and birds sought cover. Five minutes later the car screeched to a stop in front of the murder address. Watts' head bounced on the windshield in demonstration of Newton's law of inertia and the Inspector, who was leaning out the window of the prowl car, had a 5-cent cigar *boi-innged* in two by Snorlock's 75-meter whip.

The Inspector, who fancied himself a bit of an athlete, leaped out the car and landed flat on his face. "Follow me," he said through a mouthful of gravel.

The door of the toy plant opened electronically and they were met by the remaining business partner, Maximilian Dollars, who ushered the trio down the aisle lined with the latest in scientific playthings. There were junior atom bomb kits, Frankenstein monsters, baby cyclotrons, robot dolls, and midget electric chairs with which a child could electrocute a doll that had been naughty. A big beautiful blonde doll equipped with salt shaker for real tears, brought a horse laugh from the Inspector, who taunted: "What'd you expect? Marilyn Monroe?"

Snorlock viciously kicked the Inspector in the shins, then asked the owner: "What is that transmitter-like machine?"

The proprietor's face turned as red as an overloaded plate. "That? Oh, that's just an induction heating machine we use for silver brazing."

"Huh!" sneered the Inspector. "I suppose you see some clue that we dumb police can't find! Maybe," he guffawed, "I'm even stepping on one!"

Snorlock turned on his speech clipper and spoke in clipped British accent: "Several clues, Inspector. And, if you will remove your fat foot, I'll pick one up."

The Inspector stood aside while Snorlock picked up a card which read: "Boy, are you getting hot!"

In what was obviously the laboratory, lay the ill-fated partner, Sol N. Oid, wrapped in his latest creation, a space playsuit designed for short jaunts into the F-layer of the ionosphere. The cocoon-like suit was topped by a goldfish bowl from which jutted a folded dipole. Snorlock noted that the antenna's terminals were connected to two parallel aluminum discs inside

(Continued on page 8)

Heathkit AMATEUR TRANSMITTER KIT

MODEL AT-1

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Range	80-40-20-15-11-10 meters
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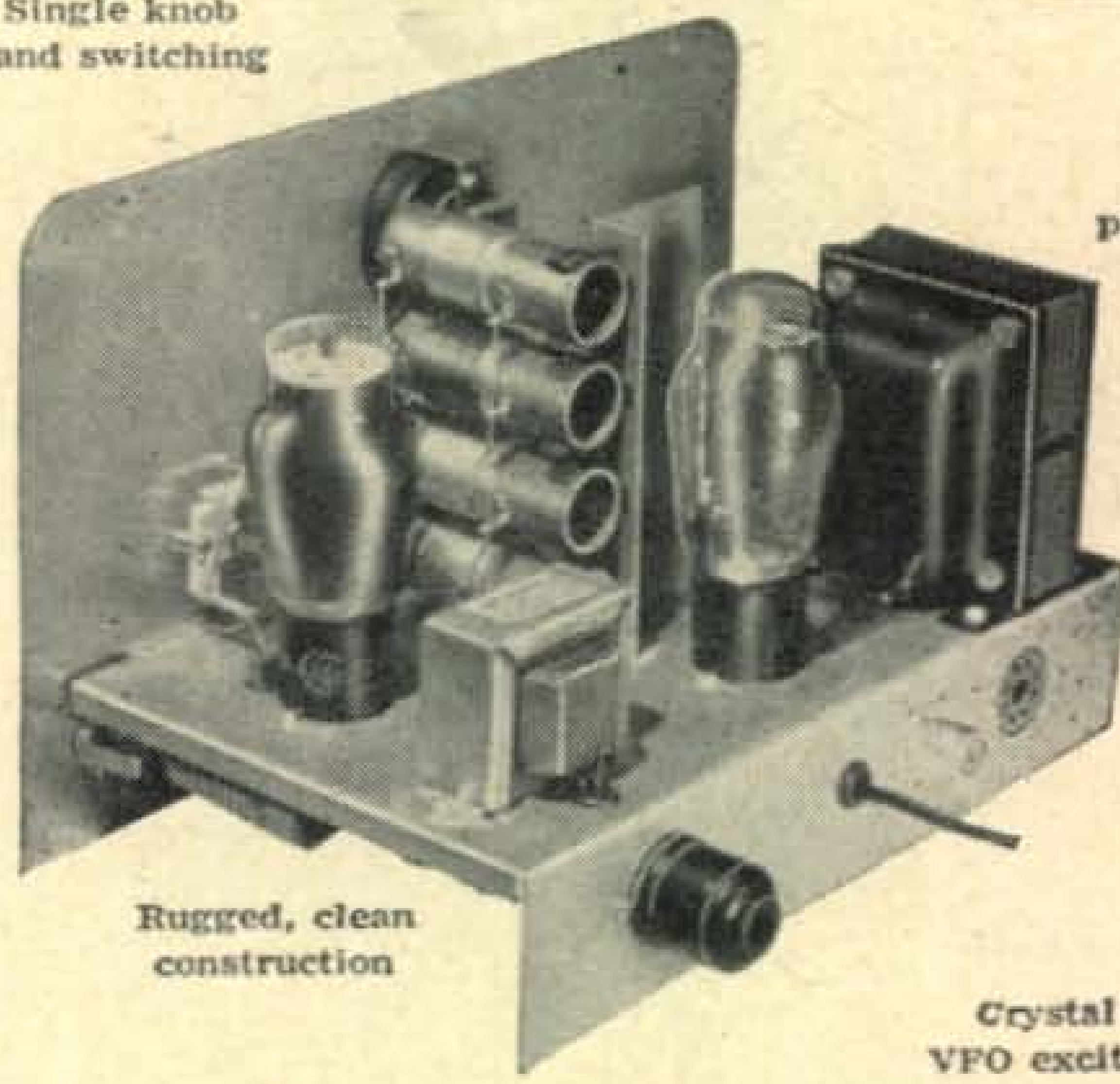
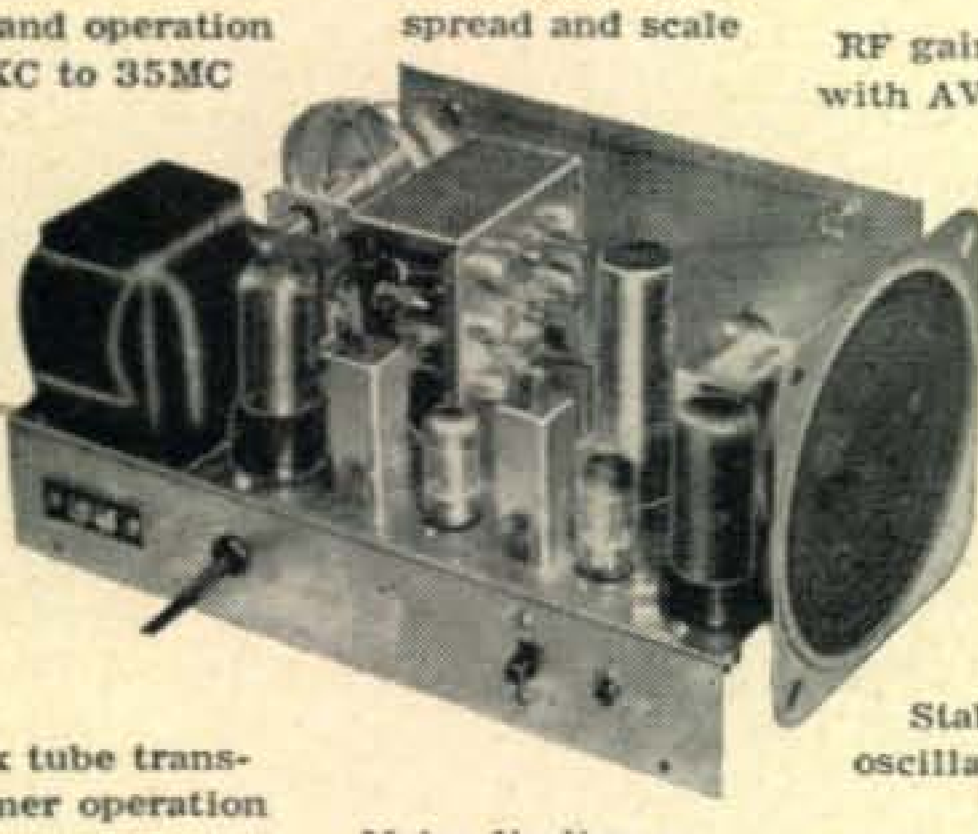


New HEATHKIT COMMUNICATIONS RECEIVER KIT



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HEATH COMPANY
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(from page 6)

the helmet. Between the discs was Mr. Oid's head, his face the color of the setting sun.

Watts bent over the corpse, uttered various physician sounds for which he charged clients one dollar per grunt. "Third degree erythema," he announced. "This man has been burned to death!"

The business official growled. "Impossible! Sol hated old Sol, avoided the sun like the plague. And how else could he get burned? We have no stoves, no inflammatory solutions. This is not murder, gentlemen. My dear partner died of heart failure or some rare disease."

Snorlock pulled out his personal chemistry set and soon the place stank of the rotten egg odor of hydrogen sulphide. But he made no tests. "The laboratory odor helps him think," Watts explained, his voice muffled by a gas mask.

Now the great sleuth rose to his full four feet two inches, and pointing to the company official, said: "I charge this man with murder!"

"But why?" demanded the business man.

"I don't know. I just like that line of dialog."

The Inspector snorted. "Got you stumped, eh, Snorry? Or have you found another clue which my poor dumb eyes can't see?"

"I have," said Snorlock. "If you will be so kind as to remove your hat — —"

The police official took off his hat and yelled "Ouch!" as Snorlock removed a burning card with an asbestos glove. Still visible in ancient Sanskirt were the glowing words: "Give him the needle, Snorlock!"

"The means by which our departed friend met his demise were diabolical and ingenious," began Snorlock, making himself comfortable on Dr. Watts' bent thigh. "You will observe that the dipole antenna on the goldfish bowl is the same length as the one you did not notice, Inspector, on the electronic heating equipment."

"Just a moment!" interjected Maximilian. "That's not a real antenna—just a toy!"

Snorlock stifled a yawn. "A toy antenna does not connect *electrically* to two plates which may well serve as the fixture for an induction heating machine."

Watts spluttered. "DO you mean to imply, old man, that that electronic welding device burned the victim to death?"

"Yes," said Snorlock, stifling another yawn. "You see, an induction heating machine is a powerful radio oscillator capable of generating tremendous R.F. If hooked to an antenna, as it was, and beamed to the laboratory, the result was, well — —"

"Tuned to murder, he was, the poor devil," broke in the Inspector. "Roasted like a radio-heated wienie!"

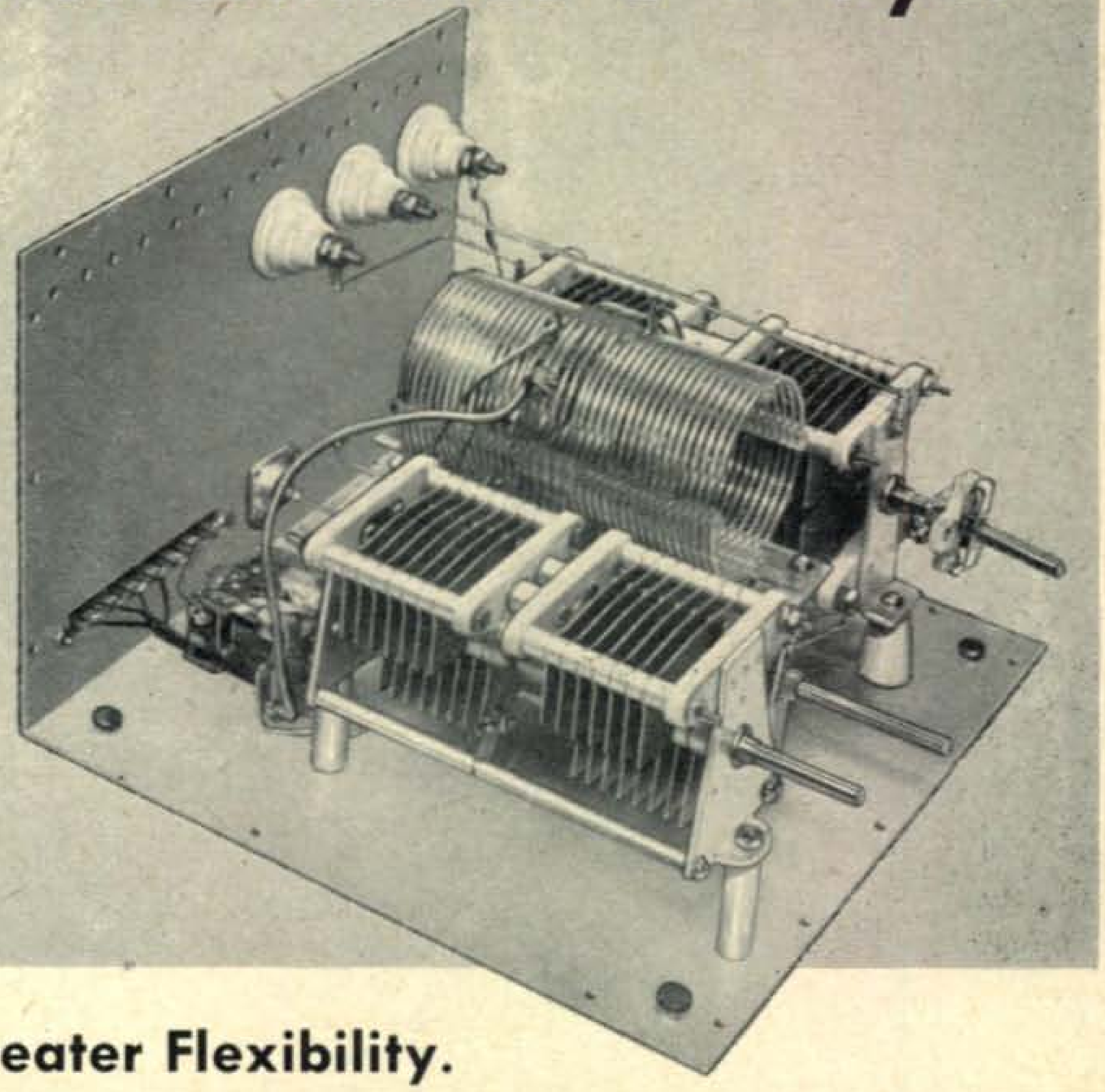
"The motive," continued Snorlock, "was greed. This individual"— he pointed to the cringing Maximilian— "saw a tremendous market of

(Continued on page 10)

Boost Station Performance 3 Ways!

Johnson

MATCH BOX



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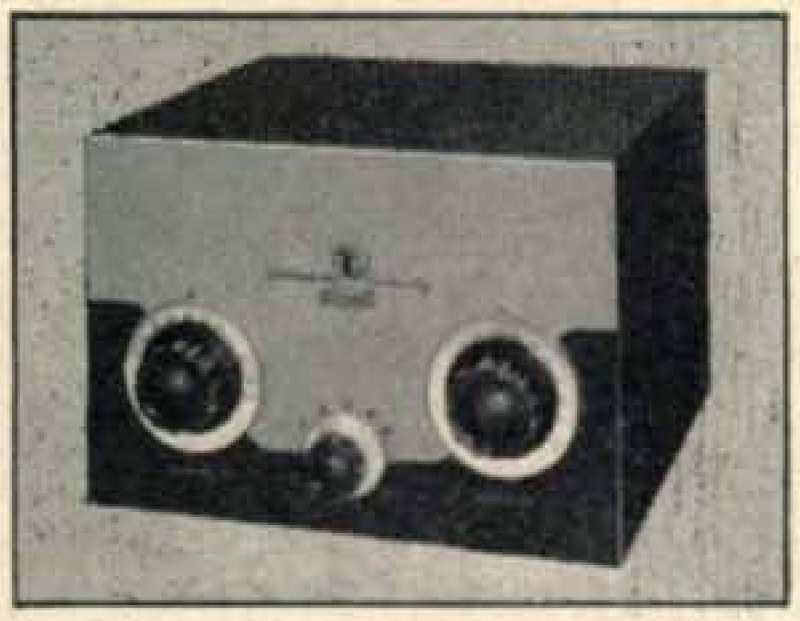

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Rear view showing coaxial RF input connector, antenna connectors for RF transmission lines, and terminal strip.

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The "Matchbox" is designed for use with any transmitter having up to 250 watts maximum power input, and a PA plate voltage not exceeding 1000 volts. Matches a 52 ohm coaxial link line to reactive and non-reactive loads ranging from 25 to 1250 ohms for balanced lines, and 25 to 3000 ohms for unbalanced lines.

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(from page 8)

Mr. Oid's space suit to radio amateurs. With it they could explore the F-layer and spray it with ions if skip was poor.

"This case is closed," Snorlock concluded, digging out what he whimsically called his hydrous magnesium silicate pipe (he could never remember the word meerschaum). Into the bowl he tamped his latest formula, a mixture of 3 parts ground-up skunk cabbage, 2 parts potassium nitrate, and a jigger of TNT. He lit the charge and air raid wardens one thousand miles away rushed to their posts.

"Trouble with this mixture," mused Snorlock, looking into a mirror, "one loses face!"

Broad Band . . .

QSL Percentages?

EDITOR, CQ:

I Thought that a few observations that I have made on the QSL-ing habits of U.S.A. might be of interest to your readers. I feel that sending a QSL in return for a QSO is a courtesy that far too many Hams do not care to be bothered with.

I am especially referring to cases such as my own, where I QSL 100% on all first contacts. There are exceptions, such as when no QTH is in the Call Book, etc., but every effort is made to send one. Out of 580 QSO's for the first time and for which QSL's were sent, I find that I got a 70% return. This average has held fairly close from year to year. It might be considered by some to be a good average, but a very few of my very much wanted cards have not been received. Quite a few of the fellows who say, and claim, that they QSL 100% on all cards received, certainly do not live up to their promise.

Here is a breakdown on how each call area has responded to QSL's sent by me:

83%	return on	QSL's to the	W1	Dist.
77%	"	"	W2	"
66%	"	"	W3	"
76%	"	"	W4	"
85%	"	"	W5	"
75%	"	"	W6	"
94%	"	"	W7	"
56%	"	"	W8	"
63%	"	"	W9	"
91%	"	"	WØ	"

It would be very interesting to know how other Hams average up their QSL returns.

Al Wessel, W9HEX
Indianapolis, Indiana

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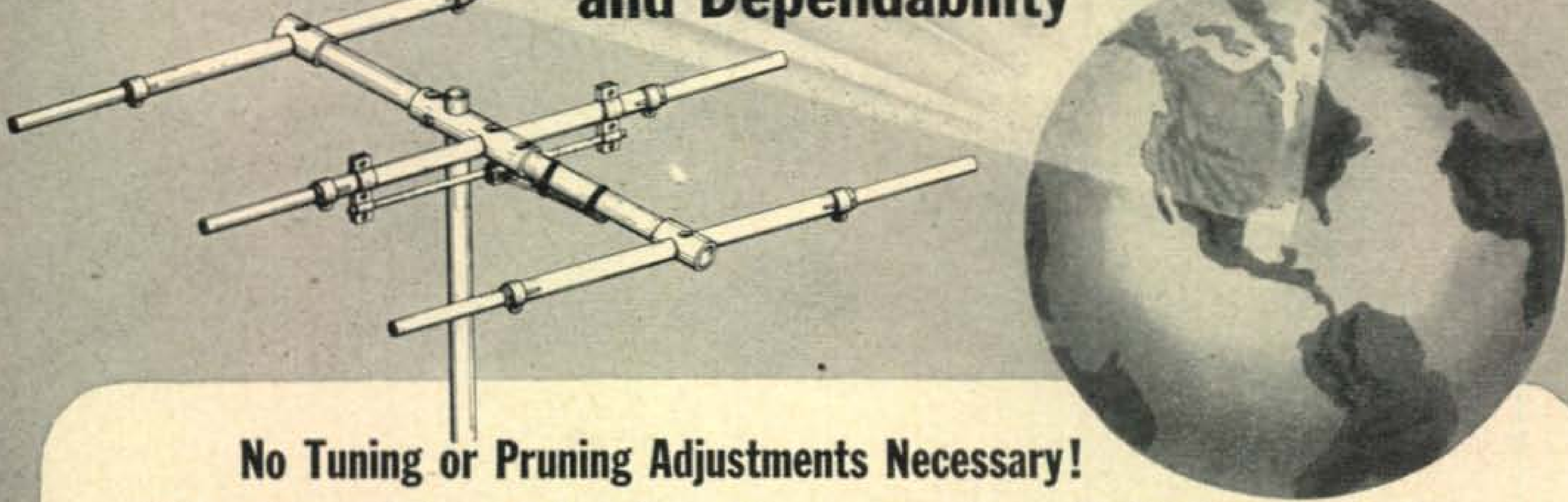

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3 element 20 meter array, wt. 47 lbs., 8.9 db gain, 30° beam-width, 26 db F/B, 16'3" x 3" boom. **MODEL 503 — AMATEUR NET $120.00**

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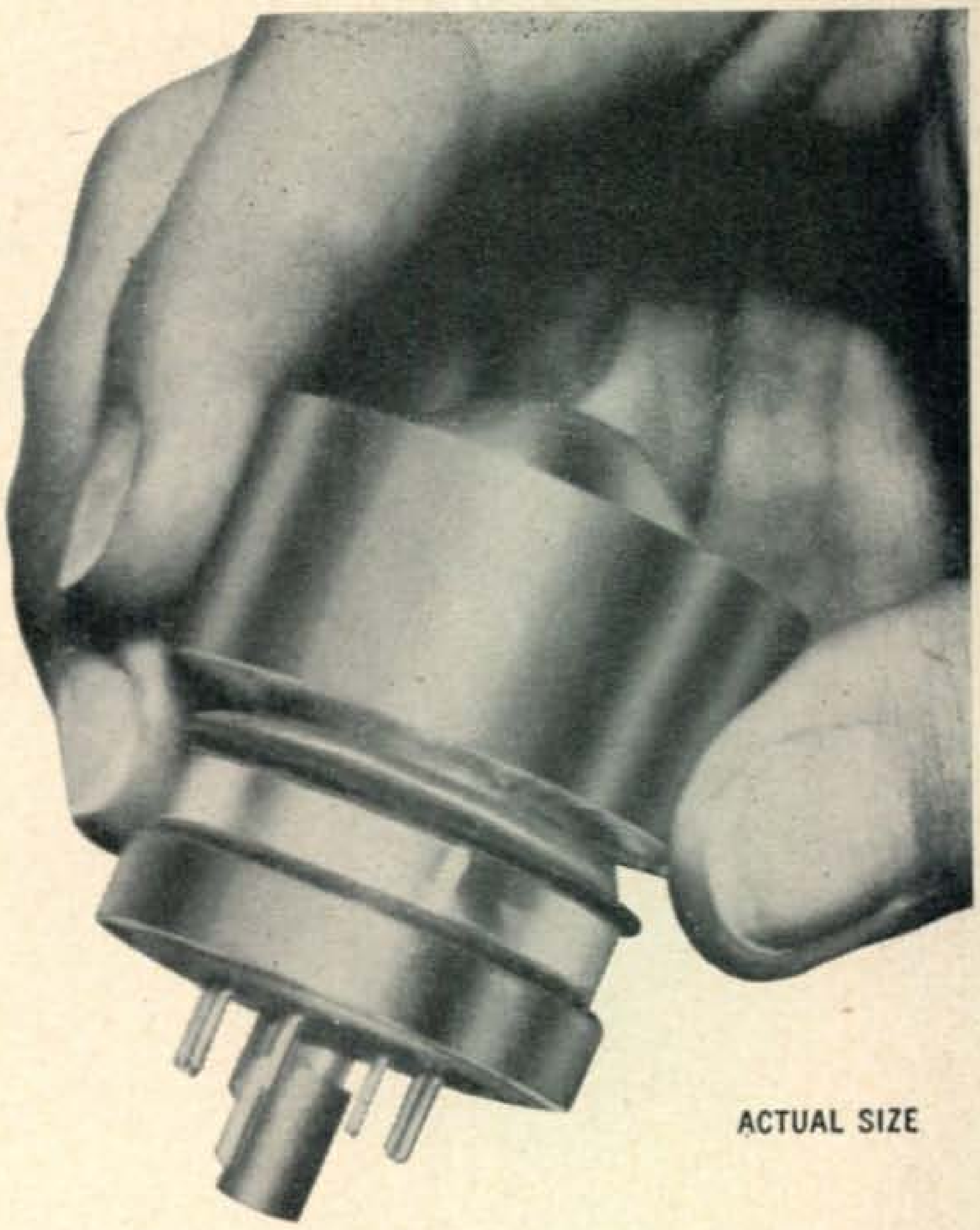


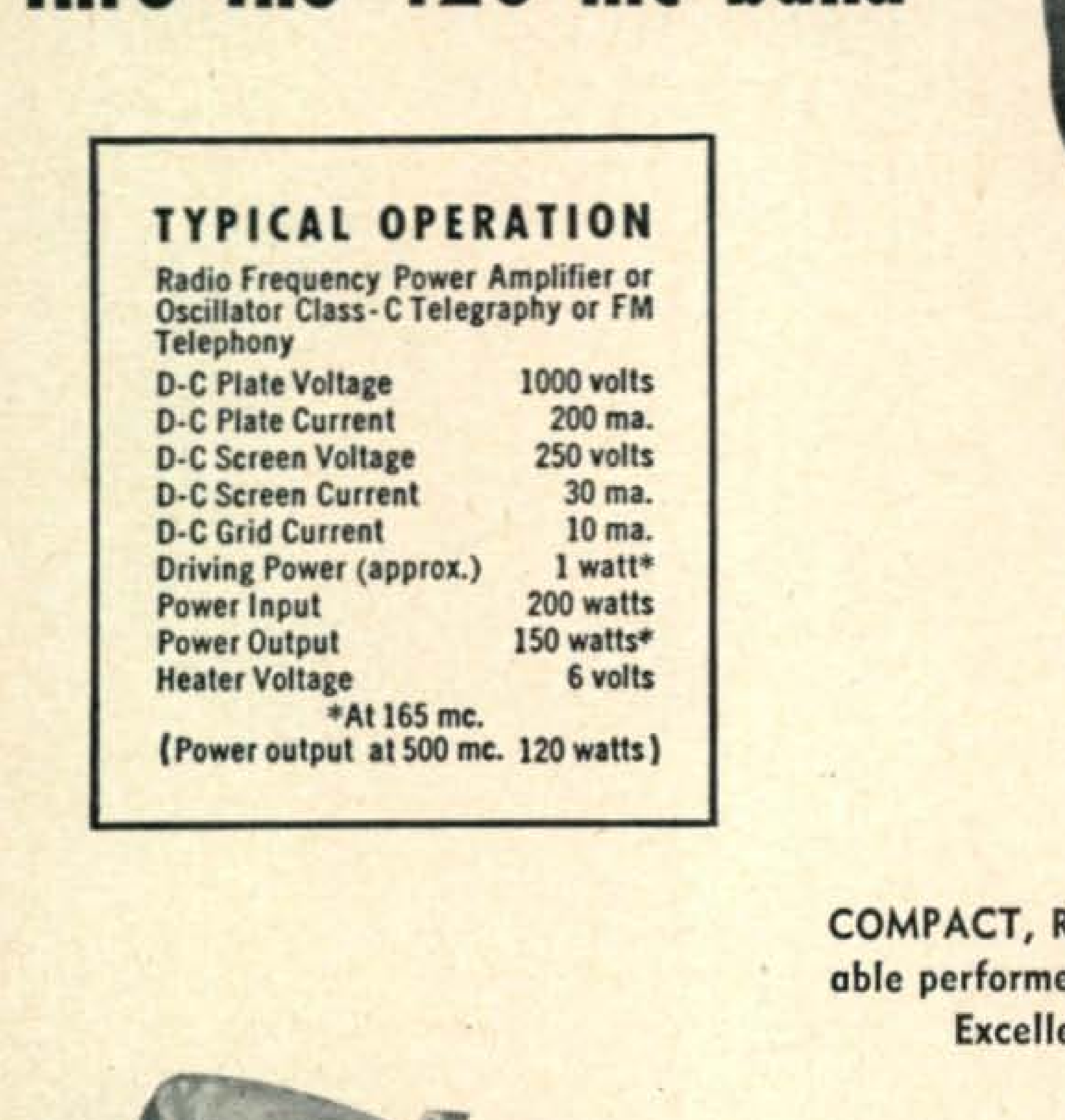
ACTUAL SIZE

TYPICAL OPERATION

Radio Frequency Power Amplifier or Oscillator Class-C Telegraphy or FM Telephony

D-C Plate Voltage	1000 volts
D-C Plate Current	200 ma.
D-C Screen Voltage	250 volts
D-C Screen Current	30 ma.
D-C Grid Current	10 ma.
Driving Power (approx.)	1 watt*
Power Input	200 watts
Power Output	150 watts*
Heater Voltage	6 volts

*At 165 mc.
(Power output at 500 mc. 120 watts)



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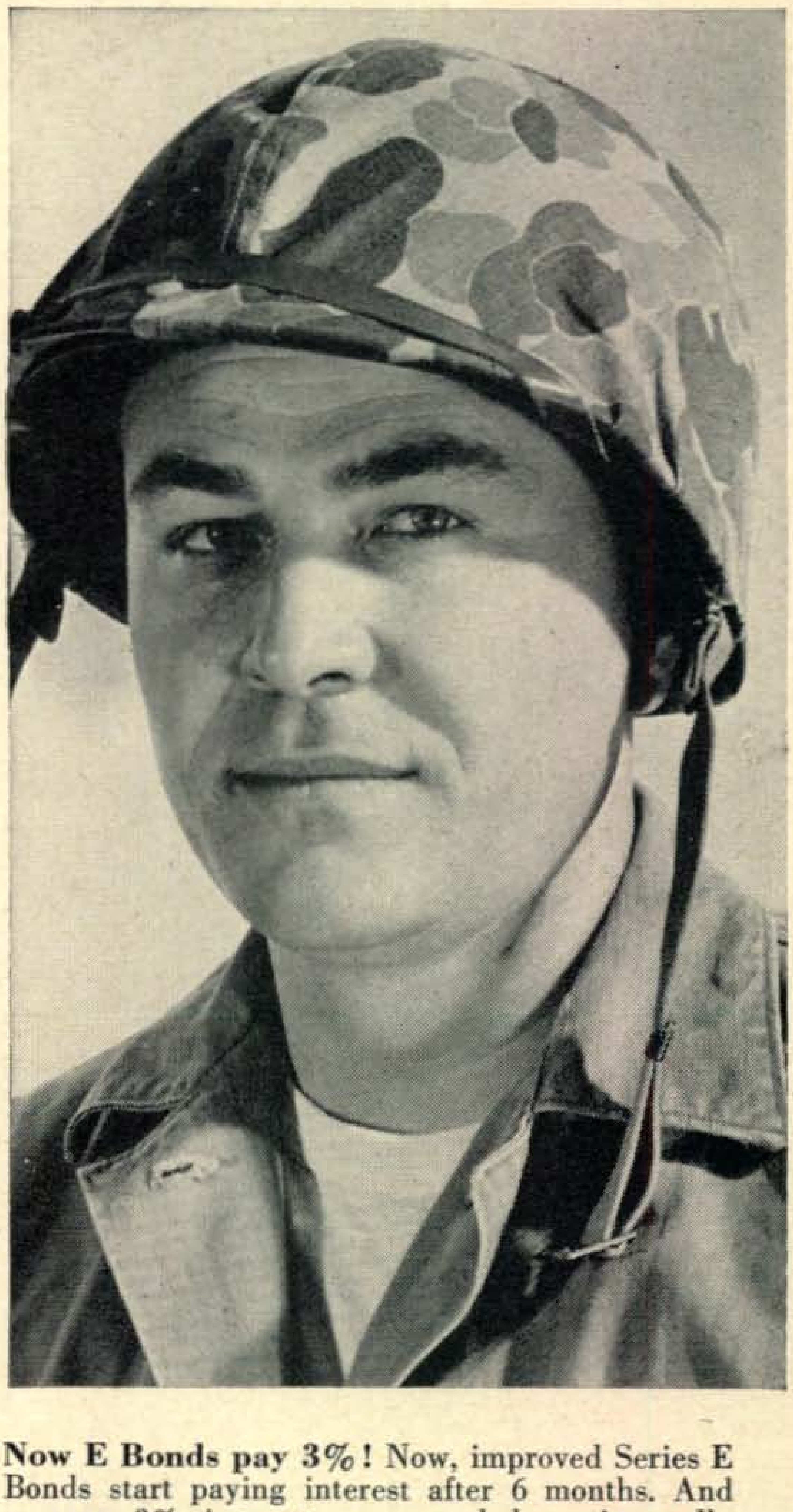

THE MACHINE GUN belonged to E Company, Second Battalion, Seventh Marines. It was under the command of Technical Sergeant Robert Sidney Kennemore.

It was busy. For on this November night fanatical Red masses were swamping Marine defense positions north of Yudam-ni.

Fifteen yards in front of the gun, a Red soldier raised his body briefly and sent a grenade into the air. It landed squarely among the crew. In a split second, Sergeant Kennemore had covered it with his foot.

There was a violent, muffled explosion, but not a man was hurt. Not a man except Sergeant Kennemore. He had given both his legs to save his comrades' lives.

"When I was on active duty," says Sergeant Kennemore, "I sometimes wondered if people back home cared as much about stopping Reds as we did. Now that I'm a civilian, I know they do. And one proof is that so many of my neighbors are investing in E Bonds for our country's defense. Believe me, I know how important that defense is. So I'm investing, too, just as I hope that you are!"

Now E Bonds pay 3%! Now, improved Series E Bonds start paying interest after 6 months. And average 3% interest, compounded semiannually when held to maturity. Also, all *maturing* E Bonds automatically *go on* earning—at the new rate—for 10 *more* years. Today, start investing in U. S. Series E Defense Bonds through the Payroll Savings Plan; you can sign up to save as little as $2.00 a payday if you wish.

Peace is for the strong!
For peace and prosperity save with
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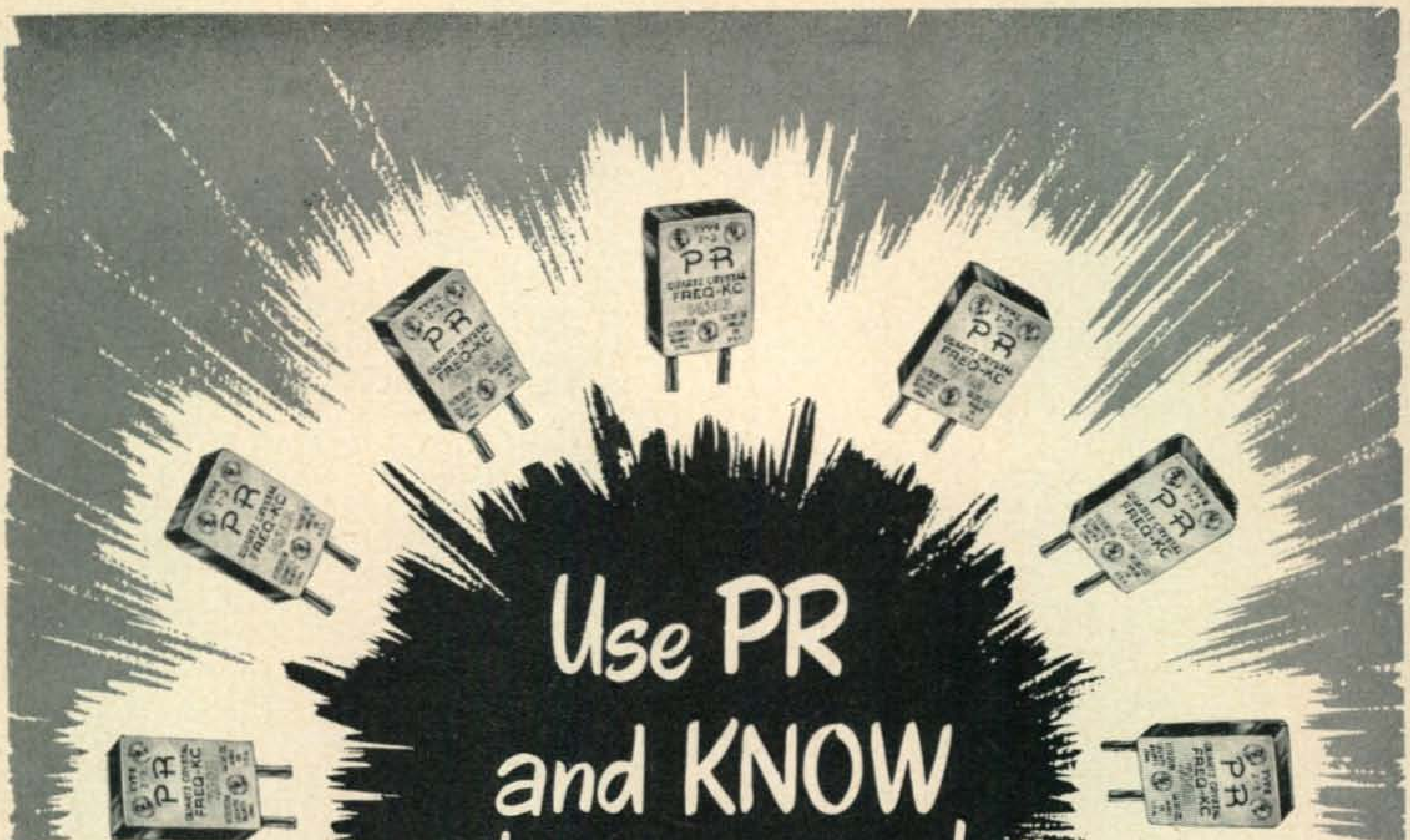

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The Terrible T and Gamma, too!

WILLIAM I. ORR, W6SAI

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From Start to Finish—The Complete Story on How the T and Gamma Matching Networks were Developed and How They May be Used by Every Reader to Greatest Advantage

The various Handbooks and Manuals that deal with the subject of antennas and antenna matching systems invariably mention certain coupling devices called *T matches* or *Gamma matches*. After the Handbook gives a glowing description of how these wonderful coupling devices are supposed to work, the subject is summed up to the effect that, "the *T match* and the *Gamma match* are best adjusted by the cut-and-try method."

This article is respectfully dedicated to anyone who has spent hours or days juggling a *T match* at the top of a tower. It took me two years of spare time "cut-and-try" to conquer the *T match* to the point where I was the boss, rather than the *T match!* The discussion below is a summary of the results of the most successful "cut-and-try" method of adjusting these perplexing affairs.

Development of the T Match

The *T match* and the *Gamma match* are closely related to each other and to the single-wire fed antenna. Refer to *Fig. 1* for a moment. A simple dipole antenna is shown, with the voltage and current curves superimposed upon it. At the center of the antenna is a point of maximum current and minimum voltage. In practical cases, the center of the dipole may be connected to ground, or attached directly to the supporting structure that holds the dipole in the air. The structure may or may not be grounded.

As one moves toward the ends of the antenna, the current in the antenna gradually decreases in value, and the voltage slowly increases. At the ends of the dipole the current is practically non-existent, but the voltage is extremely high. The high ratio of *e* to *i* at the tips of the dipole indicates that the impedance of the dipole to ground (z) is very high at these points. The impedance to ground gradually decreases as one moves back along the antenna towards the center, and when the center point is reached the impedance to ground is zero. As mentioned above, the dipole may be grounded at this point with no effect upon its performance.

Note that we are not talking about the *radiation resistance* of the dipole. If the dipole is split in the center *(Fig. 2)* and the impedance measured between the two halves, it would be found to be in the vicinity of 72 ohms. We can, in fact, break the antenna at the center and feed energy to it with a balanced 72-ohm line. If we do this, two rather unpleasant things happen:

1. Since the antenna is fed with a balanced line, both halves of the dipole are "hot" at the feed point, and the dipole cannot be grounded to the supporting structure. Insulated mountings must be used to clamp the dipole to the supporting framework.

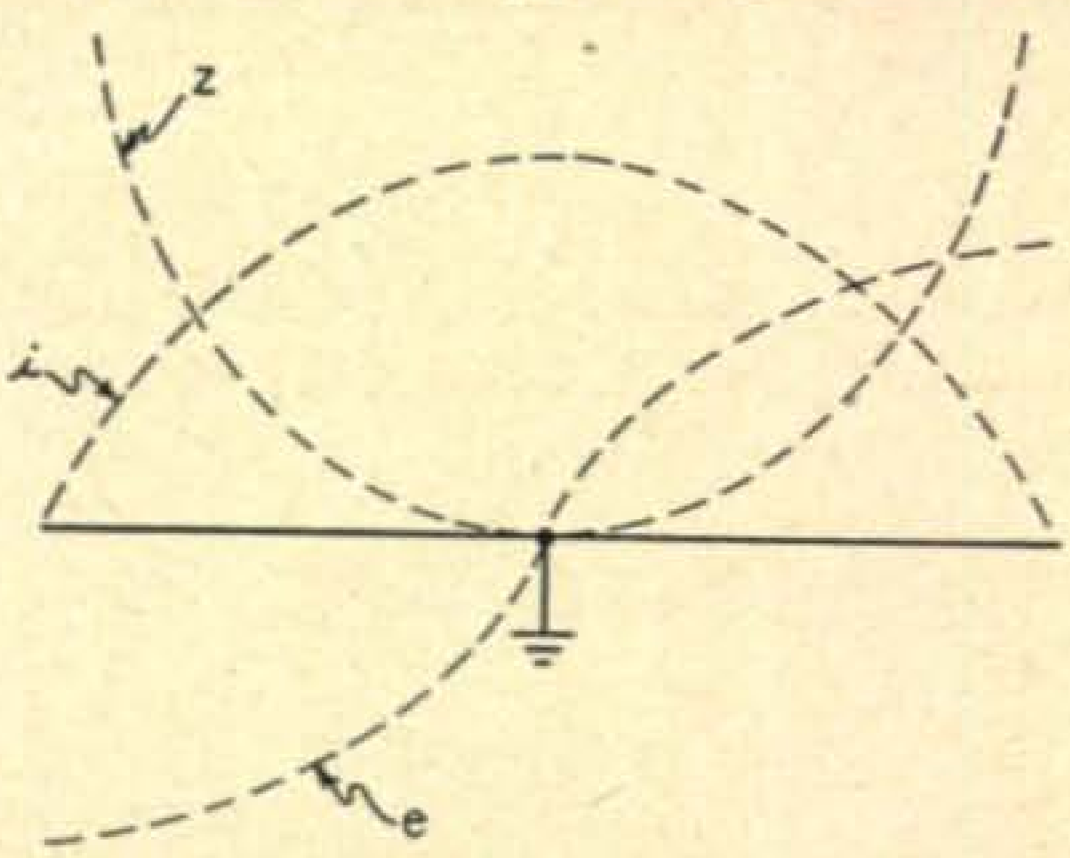


Fig. 1. This illustration shows the classic half-wave dipole with current (i), voltage (e) and impedance to ground (z) superimposed upon it. The center of the dipole may be assumed to be grounded.

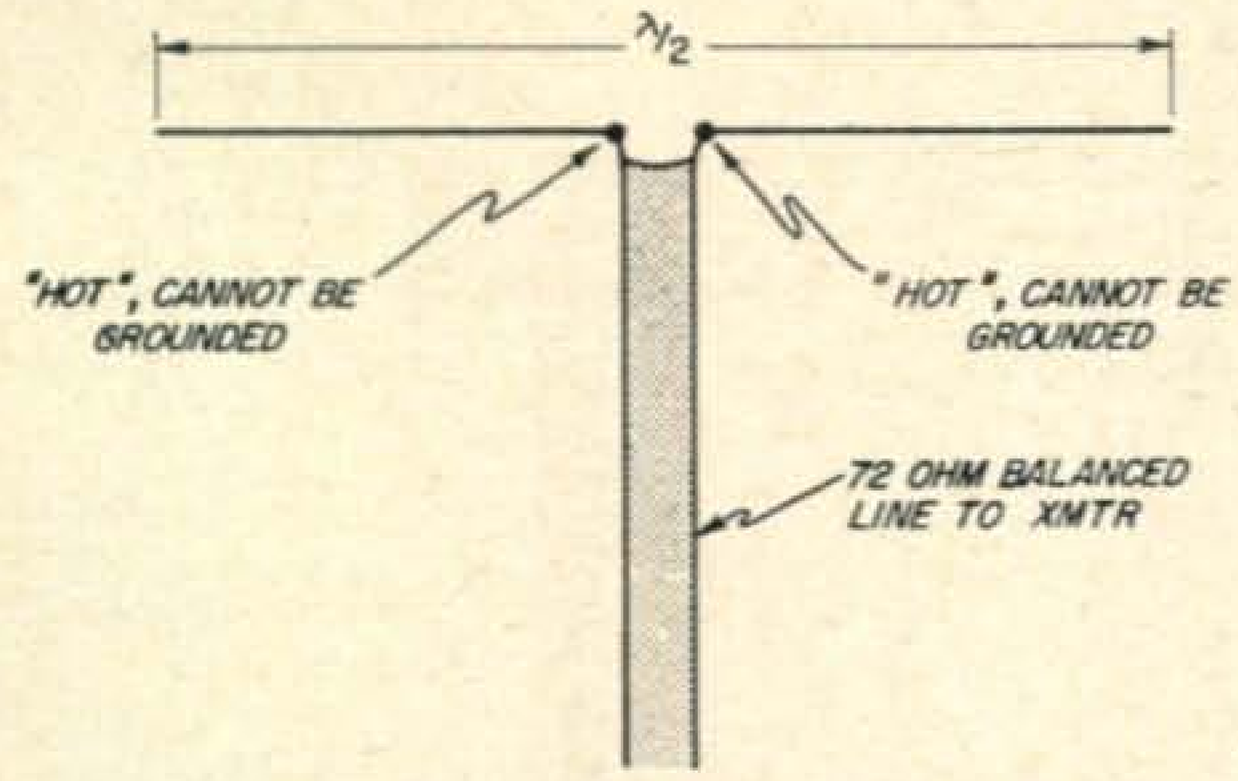


Fig. 2. Splitting a dipole into two quarter-wave sections will permit it to be fed from 72-ohm balanced feedlines.

The splitting of the dipole also introduces mechanical problems of mounting and preserving the rigidity and strength of the dipole.

2. The impedance of the dipole is a function of the antenna array in which it is used. The center feed point may drop to a value around 10 to 20 ohms. A matching network of some kind is needed to match this low impedance feedpoint to a 50 or 300-ohm feed system. If a *Q section* of quarter-wave transformer is used, only certain transformation ratios can be obtained, but there is no assurance that the center impedance of the beam will be kind enough to match the transformation ratio that is readily available.

It would seem, therefore, from both a mechanical and an electrical point of view that it would be best to leave the driven element in one whole piece. If the driven element is not split, but considered as a dipole, it may be fed in a number of ways that take advantage of the varying impedance to ground (or to the center of the dipole) that exists along the length of the dipole.

Early Relations of the T Match

The first antenna to utilize this method of feed was the single-wire fed antenna. *(Fig. 3)* A single-wire feeder was tapped on the dipole at a specific point representing about 500 ohms impedance to ground. A single wire has a surge

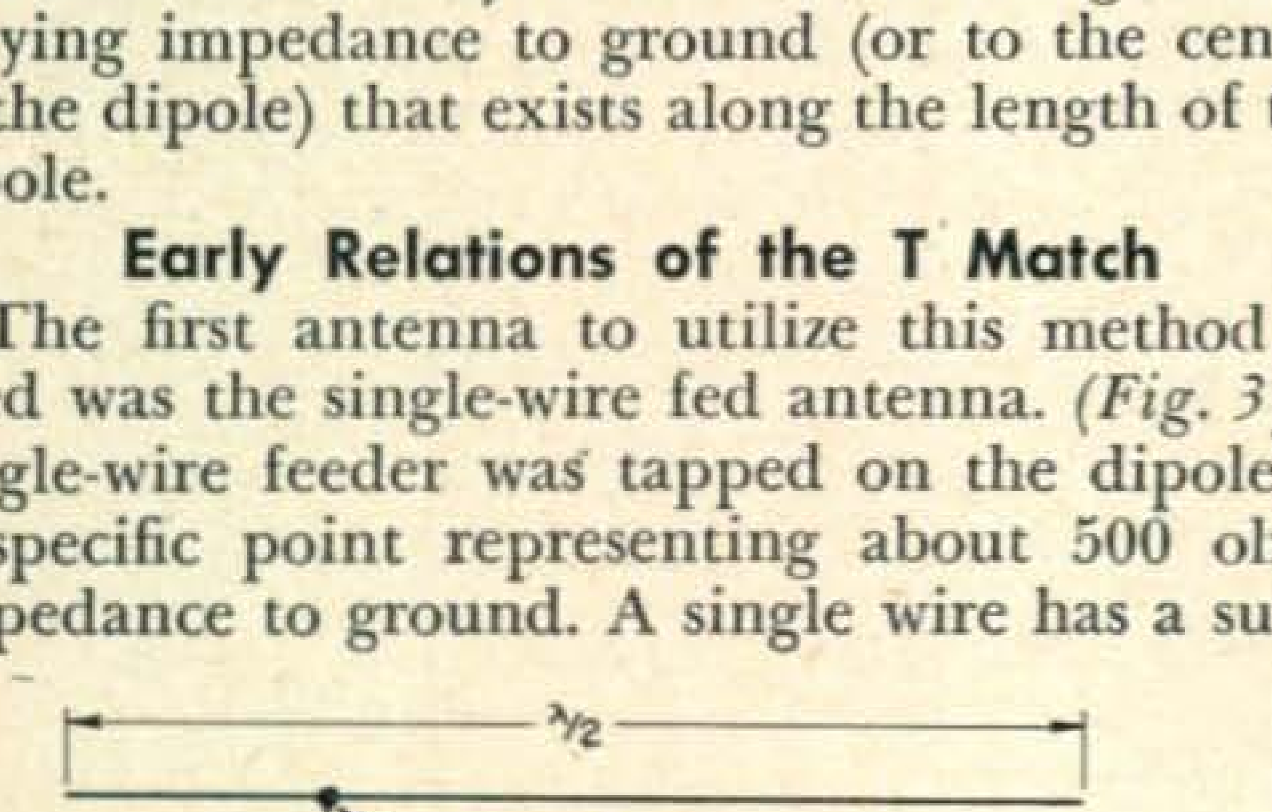


Fig. 3. The single-wire fed antenna is a distant relative of the gamma and T-match type of antenna feeding.

impedance of about 500 ohms, depending upon the diameter of the wire and the proximity to nearby objects. If the placement of the tap was correct, the current in the feeder was uniform along its length, and the radiation from the feeder was at a minimum. This feed system utilized the mirror image of the antenna for a ground return, and was therefore subject to considerable ground losses which were dependent upon the conductivity of the soil above which the antenna was located.

The single-wire fed antenna worked well in most cases, but the feeder did radiate, and distorted the pattern of the antenna.

To overcome the problem of feeder radiation, the grandfather of the *T match* was devised—the *Delta match*. The *Delta match* employed a balanced feedline, which was tapped out equidistant on each side of the dipole. *(Fig. 4)* It may be considered as two single wire feeders "back-

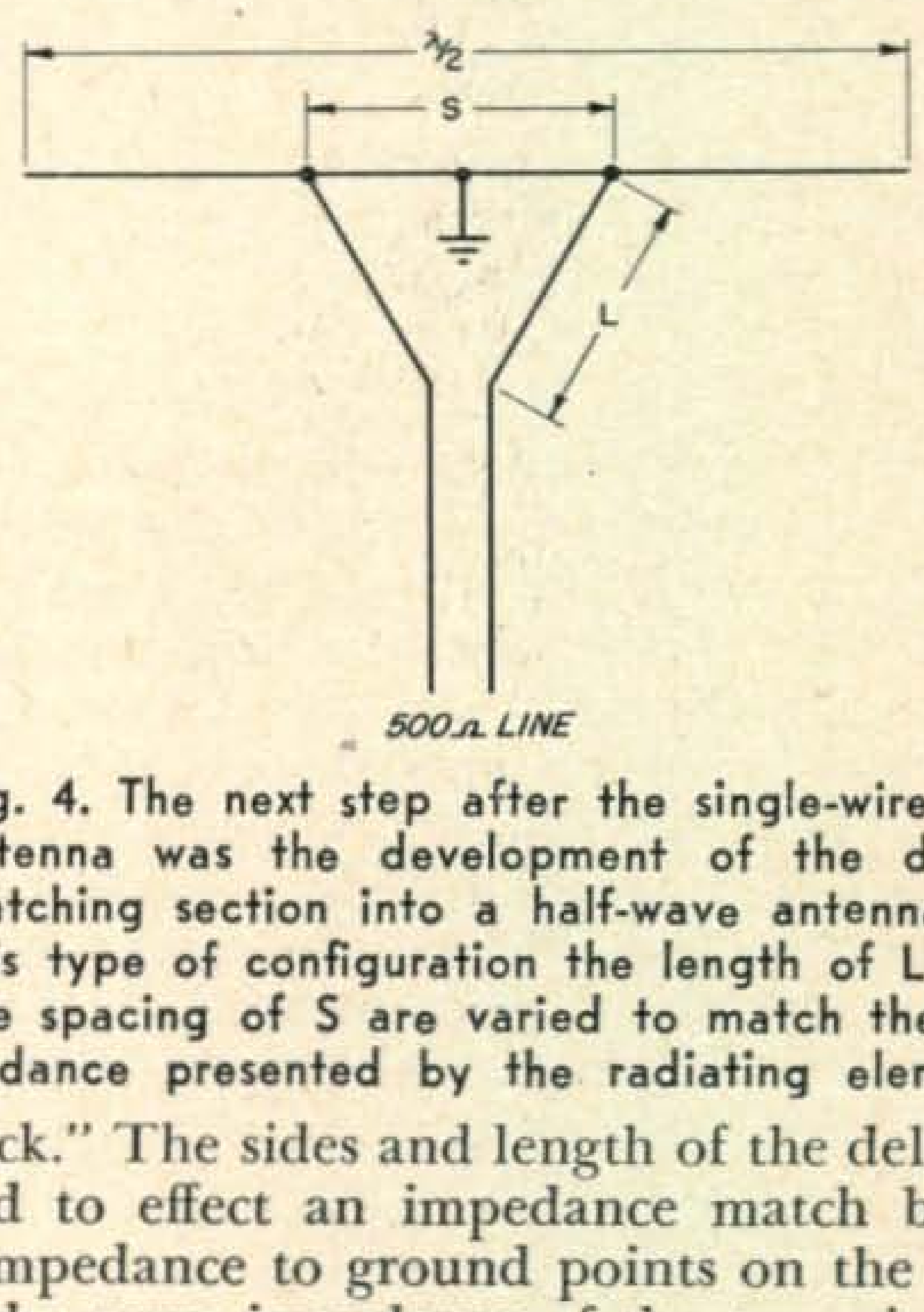


Fig. 4. The next step after the single-wire fed antenna was the development of the delta-matching section into a half-wave antenna. In this type of configuration the length of L and the spacing of S are varied to match the impedance presented by the radiating element.

to-back." The sides and length of the delta were varied to effect an impedance match between the impedance to ground points on the dipole, and the surge impedance of the two wire transmission line. The *Delta match* never became really popular because of the mechanical difficulties of varying the delta dimensions to obtain the proper match.

The *T match* is the first cousin to the *Delta match*. It makes use of the varying impedance to ground characteristics of the dipole. The balanced feed line is used, and is fanned out to run parallel to the antenna, a short distance away from it. At the correct impedance point, the feeders are tapped on the dipole. The impedance between these two points (or between each point and the center of the antenna) is chosen to match the particular impedance of the transmission line. The transformation is accomplished by changing the length or spacing of the *T*-section with respect to the antenna. *(Fig. 5)*

Since a dipole antenna is a balanced device, it may be fed by an unbalanced feed system by merely applying the feed to one-half the dipole. This is done with the *Gamma match*. *(Fig. 6)*

The *Gamma match* is merely half of a *T match,* and is intended to be used with an unbalanced coaxial line. The shield of the coaxial line is grounded to the mid-point of the dipole, and the inner conductor is attached to the dipole at the correct impedance to ground point. One half the dipole is excited, and it is very difficult for the other half of the dipole not to follow suit!

The matching systems of *Fig. 5* and *Fig. 6* have been in general use since 1946 by many amateurs with good to indifferent results. In many cases the use of these matching systems resulted in a high SWR on the transmission line, and severe detuning of the dipole, regardless of the setting of the matching rod. With the advent of instruments such as the *Antennascope*[1] and the *Micro-match,*[2] many such installations that did perform in a satisfactory manner were nevertheless found to have an unsatisfactory SWR, and were reflecting considerable reactance back into the transmitter output circuit. Even though coaxial feed systems were known to be superior to others from a TVI standpoint, many amateurs shied away from the use of coaxial line because of the difficulty of arriving at a low enough SWR to permit the line to function properly. A truly sad state of affairs!

Preliminary Tests with the Gamma Match

When the 14-Mc. beam at W6SAI was overhauled, it was decided to change over from an open wire feedline to RG-8/U coaxial line as an anti-TVI measure. A series of tests were run to determine just what the correct adjustments for a *Gamma match* would be. The following results apply equally well to a balanced *T match,* since both are operating on the same principle.

The 2-element 14 Mc. beam was mounted on a short tower atop the garage roof in such a position that all elements could be easily reached from the roof of the garage. Before the tests were started, the driven element of the beam was grid-dipped to 14,150 kc., and the director was cut 5% shorter in length than the driven element. A short distance away, a 21-Mc. 3-element beam was set up, to serve as a cross check on the measurements made on the 14 Mc. array. The three test instruments used were a grid-dip oscillator,[3] an *Antennascope* and a coaxial standing wave indicator.[4]

Results of the Tests

Antenna Resonance. As soon as either the *Gamma match* or the *T match* was attached to the driven element, the resonant frequency of the driven element changed several hundred kilocycles. No adjustment of the matching system could be made that would provide a resistive 52-ohm load at the terminating end of

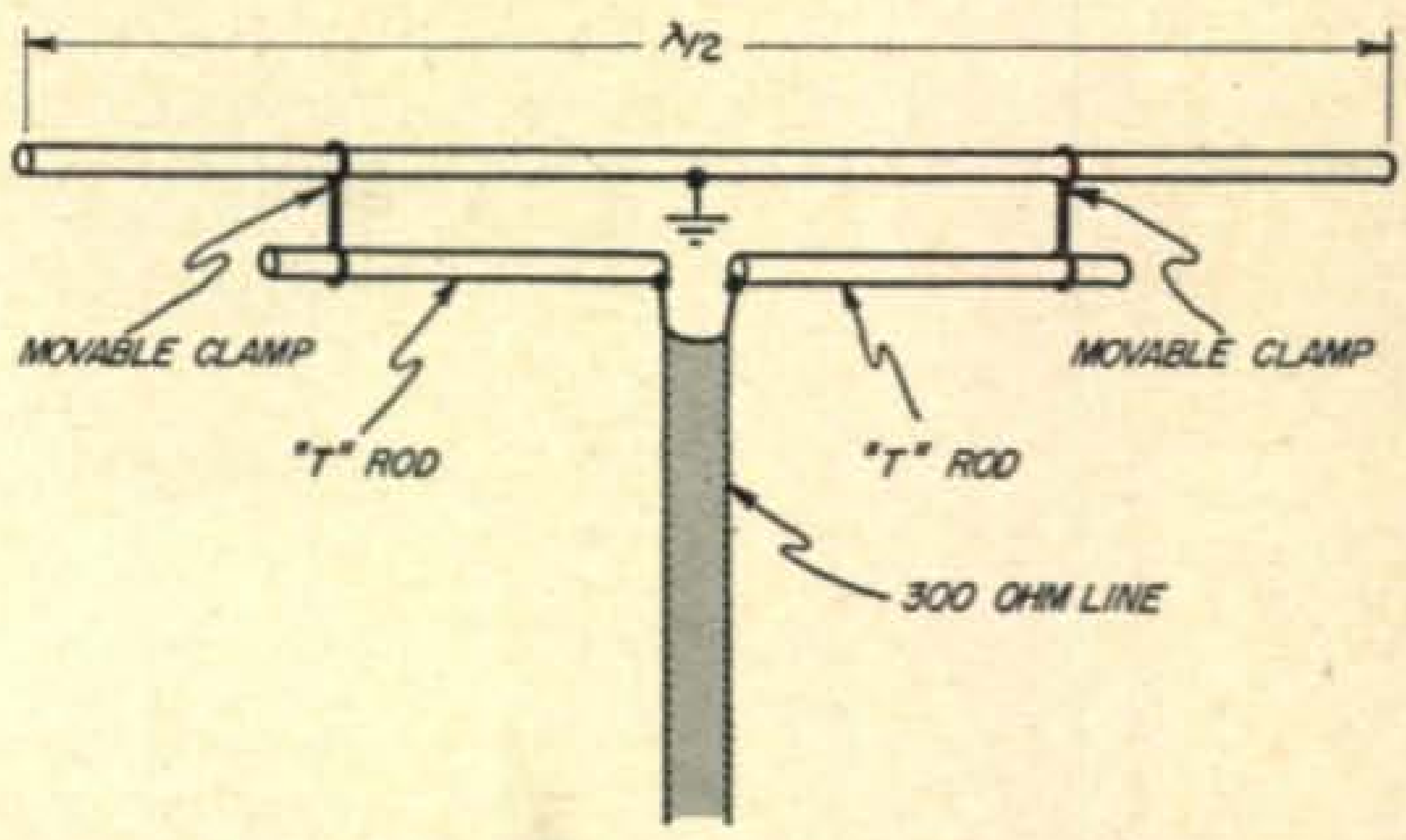


Fig. 5. In the T-match device the movable clamps are adjusted to provide a match between the dipole radiating element and the feed line.

the matching device. A SWR of about 2:1 could be reached by adjusting the matching rod length, but the terminating impedance always exhibited a large amount of reactance. This reactance could only be eliminated by retuning the driven element of the array. Different settings of the *Gamma match* necessitated changing the driven element length by as much as one foot. Since the *Gamma match* unbalances only one side of the driven element, the length correction was only applied to that side of the dipole. This produced a lop-sided looking beam, and resulted in a definite mental hazard, to say the least. Of course, the corrections would apply to both sides of the driven element if a *T match* had been used.

This system is effective, but poor to use in actual practice, since the reference point for all adjustments is the initial resonant length of the driven element. If we continually "readjust our zero setting," the resonant frequency of the antenna is liable to wind up on top of WWV!

A much better method of eliminating the reactance of the *Gamma match* is to include a compensating condenser in series with the gamma rod. By properly adjusting the capacity of this condenser, the reactance of the *Gamma match* may be eliminated. A resistive load will be presented to the coaxial feedline, and the beam will not be detuned by the presence of the matching device.

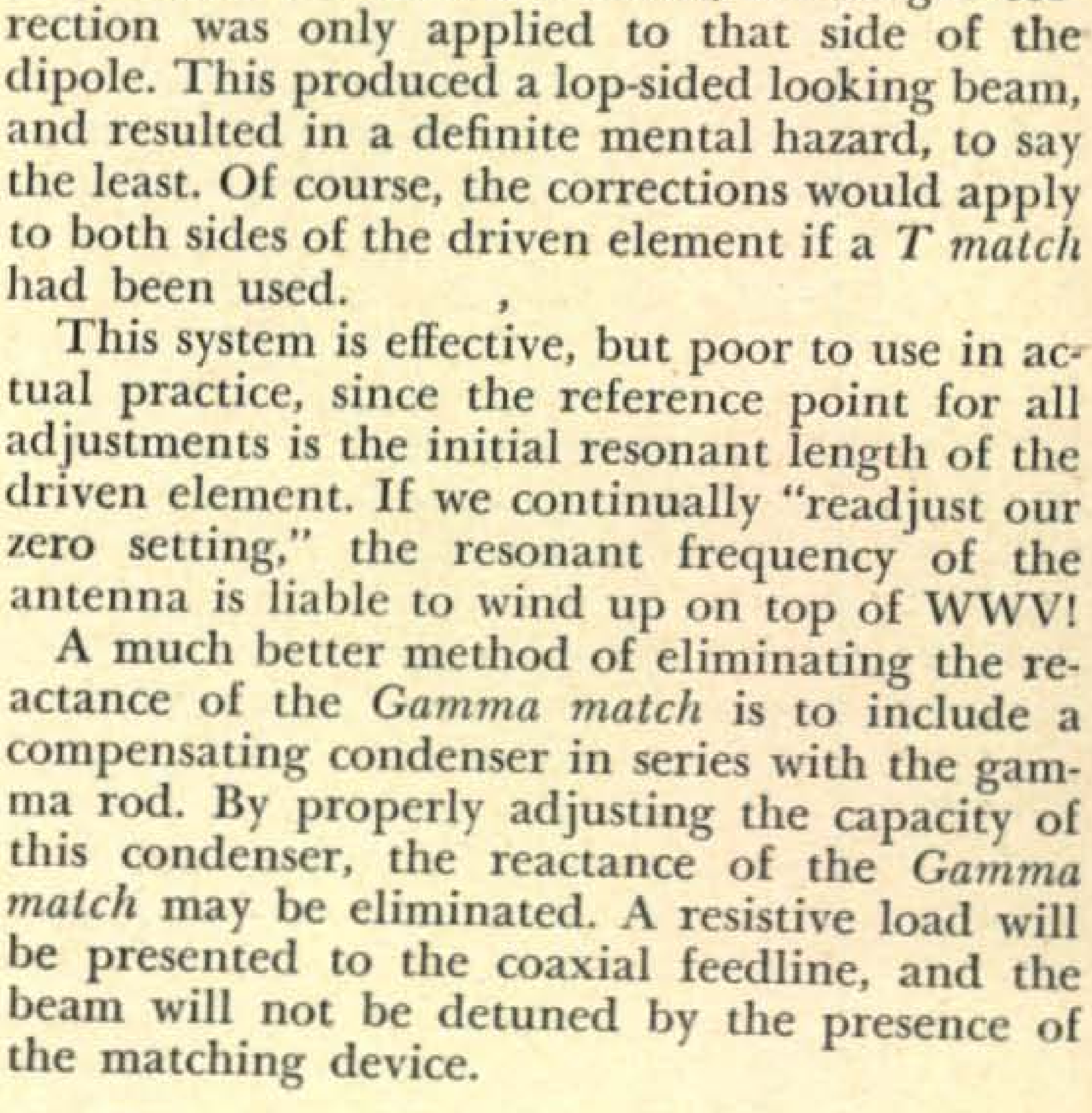


Fig. 6. The gamma match was developed to provide an easy method of feeding the radiating element with coaxial line. It is effectively one-half the T-match shown above.

1. Scherer, "Building and Using the Antennascope," CQ, Sept., 1950.
2. Jones and Sontheimer, "The Micro-Match," QST, April, 1947.
3. Brown and Scherer, "Subject: Grid Dippers," CQ, January, 1953.
4. Scherer, "Balanced Feed Systems with Coax," CQ July, 1949.

Gamma Dimensions. The dimensions of the *Gamma match* determine the transformation ratio that is being performed.

1. The *longer* the gamma rod, the *higher* the impedance presented at the base of the rod.
2. The *longer* the gamma rod, the *smaller* the value of the resonating series capacity.
3. The *greater the spacing* between the gamma rod and the driven element, the *higher* the impedance presented at the base of the gamma rod.
4. The converse of these statements is also true.

A *Gamma match* or a *T match* may be made to perfectly match line impedances of 10 to 500 ohms. In general, a rod-to-driven-element spacing (measured center-to-center) of 5″ should be used for 28 Mc., 6″ for 21 Mc., and 7″ for 14 Mc. If spacings much less than this are used, the length of the gamma rod will be excessive. Gamma lengths of about 2 feet at 28 Mc., 3 feet at 21 Mc., and 4 feet at 14 Mc. may be expected when the above spacings are used. These lengths apply for 52-ohm feedlines. For 300-ohm lines, the *T match* rod will be about 50% longer on each side than the above figures.

The diameter of the gamma rod is of relatively little importance. It may be a piece of one-inch tubing for maximum rigidity, or it may be as small as No. 12 enamelled wire. The length of the gamma, and the setting of the compensating condenser will take care of these variations in the gamma diameter with ease. If a piece of wire is used, it need not run parallel to the driven element as the tubing would do, but may approach the driven element by the shortest direct path. A hose clamp or tubing clamp may be used to attach the wire to the element. *(Fig. 7)*

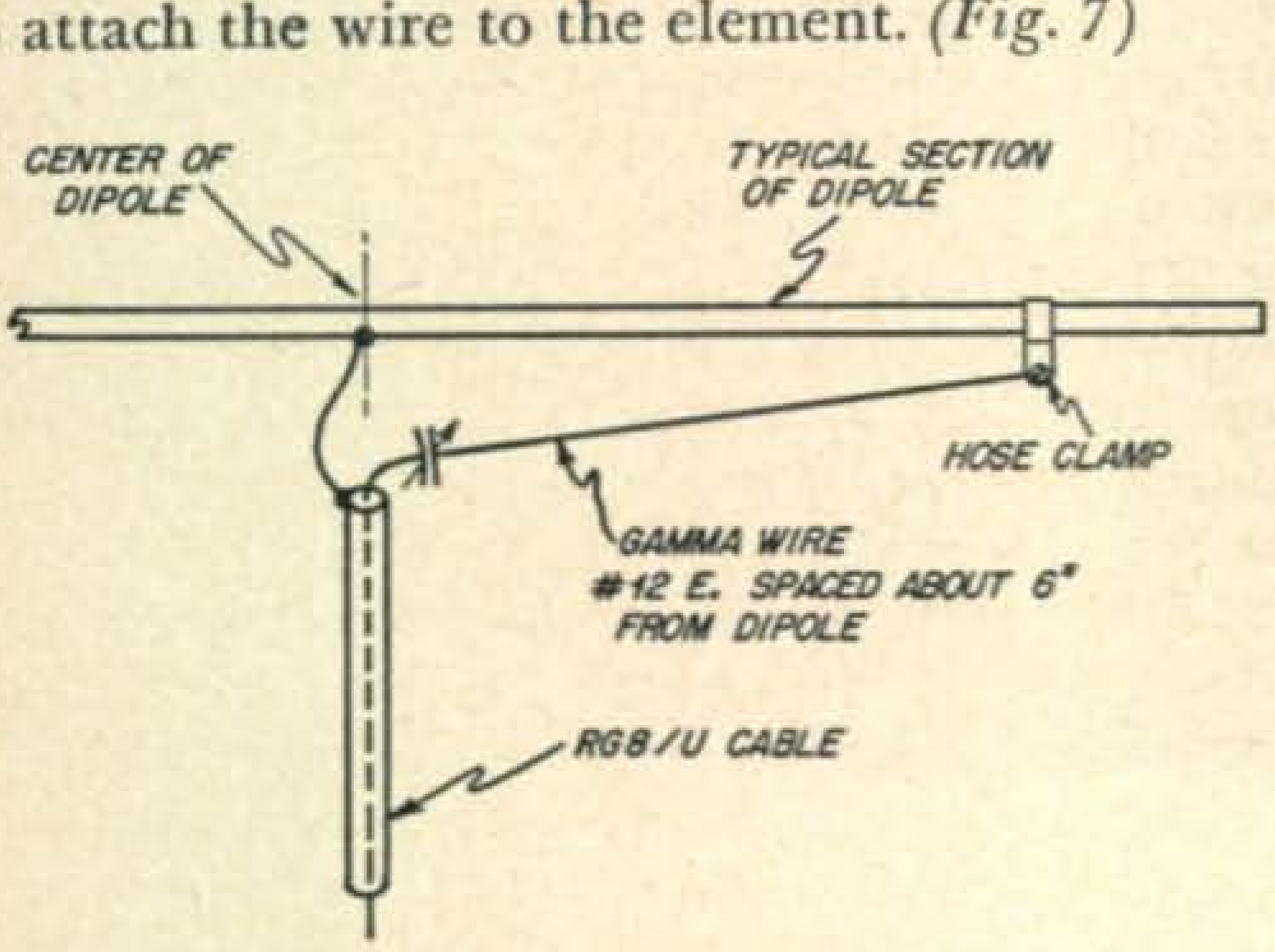


Fig. 7. Illustrating the use of a wire in place of the rod or tubing in the gamma match.

If tubing is used for the gamma rod, a suitable clamp should be bent out of soft dural or brass that can be easily slid along the driven element and the rod, to facilitate changes in the length of the match. Once the gamma is positioned the extra length of rod that is free of the clamp may be cut off, if desired. There will be no noticeable difference in the action of the match if this is done. Be sure that all bolts, nuts and parts of the *Gamma match* are made of plated or non-corrosive material! If you forget this important step, you may need an acetylene torch the next time you want to make changes in the feed system!

The resonating condenser for the gamma rod may be a small receiving type 200 uufd. condenser for the tests. The coaxial line should attach to the beam framework (if metal) by a *SO-239* coaxial receptacle, bolted to the boom directly next to the center of the driven element.

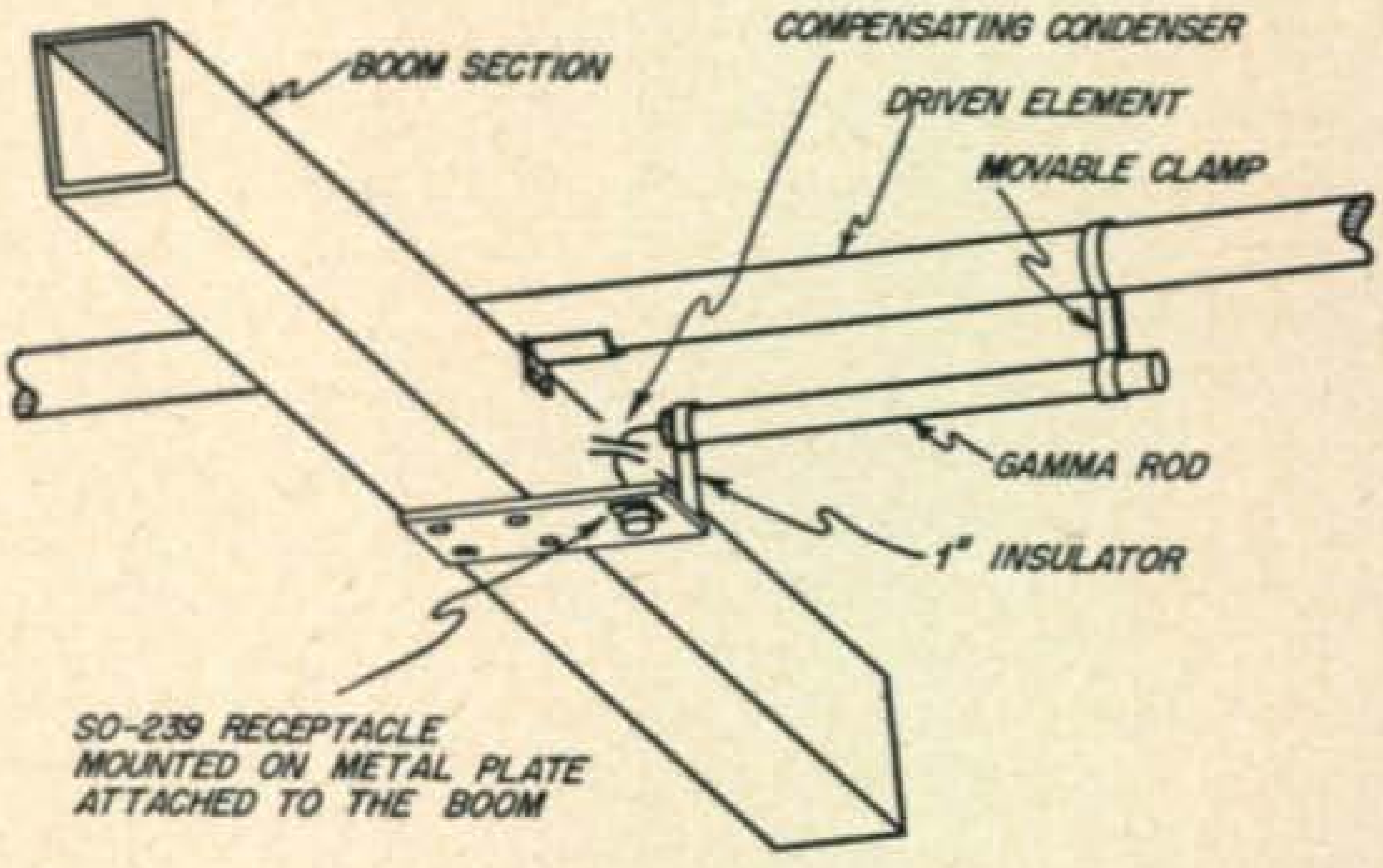


Fig. 8. Suggested method of mounting the compensating condenser and gamma rod.

It should be bonded firmly to the center of the element. The center pin of the receptacle connects to one side of the variable compensating condenser. The opposite side of the condenser connects to the gamma rod. *(Fig. 8)*

Metal vs. Wood for the Structure. Either metal or wood will work well for the beam framework and tower. If a wood boom is used, the elements of the beam should be left "floating." If a metal boom is used, best results will be obtained if the elements are grounded at their centers to the metal boom. This point was brought to my attention during the tests on the beam when it was found that the SWR would fluctuate violently when the extremities of the boom were touched, indicating that the boom was not at ground potential. All the elements were attached to the boom by short insulators, and when the centers of the elements were grounded to the boom this hand capacity effect disappeared. The SWR measurements were now independent of the positioning of the boom, or the placing of hands thereon.

If the width of the boom is small, the elements may be clamped directly to it by means of metal straps. If the boom is a lattice structure of a foot or so in width, it is better to insulate the elements from the boom by means of thin strips of micarta or other flexible insulating material, and then ground the elements to the boom by means of a short, flexible strap. This will tend to keep circulating currents at a minimum.

If both a metal tower and a metal boom are used for the array, the entire assembly should be bonded together, so that the center of the elements, the boom, and the tower are all at the same potential.

The Choice of Feedline. The easiest and most practical feedline for a *Gamma match* is coaxial cable, such as RG-8/U. If a metal tower is used, the outer conductor of the coaxial line should be bonded to the tower at the base. The coaxial line may be run underground to the transmitter, is desired.

When a *T match* is used, either open line of the 75-ohm or 300-ohm variety, or balanced diaxial line (RG-57/U or RG-22/U) may be used. The latter type of line is best, since the shield may be grounded and the line will remain balanced to ground regardless of how it is conducted about the yard, or the proximity of the line to other objects. The open wire TV-type lines, on the other hand, may become easily unbalanced to ground during the run from antenna to transmitter. Also, the open line is exposed to the field of the antenna and may distort the beam pattern, or may pick up undesirable fields from the antenna that will tend to cause a greater unbalance in the system. Since the *Gamma match* and coaxial line performs as well as the *T match* and the diaxial line, it would seem to be the proper answer to the feed problem for any parasitic array. Then, too, modern transmitters, such as the *Viking*, the *Collins 32V* and the *KW-1* all have unbalanced coaxial feed systems and are designed for 50 or 70-ohm output lines.

Preliminary Beam Adjustments. To properly adjust the *Gamma match*, three pieces of equipment are needed: A grid-dip oscillator, an *Antennascope* and a midget 200 μμfd. variable condenser. A small dial and marker plate should be attached to the condenser, and the condenser should be calibrated on a capacity bridge. If a semi-circular plate condenser such as a *BUD MC-1858* is used, the capacity settings between minimum 9 μμfd.) and maximum (190 μμfd.) may be easily estimated.

The beam should be placed atop a tall step ladder, or on the roof of a wooden structure, such as a garage. It should clear the ground by about ten feet, and be in a reasonably clear area. If the beam must be near some objects, such as telephone wires, it is best that the reflector be nearer the object, as it is much less susceptible to outside influences than the director. The following steps are now taken:

1. The driven element should be set to frequency. A very close approximation is: Length in feet of the element equal to
$$\frac{470}{f_{(Mc)}}$$
2. The director should be set 5% shorter than the driven element for director driven-element spacings of 0.15 to 0.20 wavelengths. For spacings less than 0.15 wavelength, the director should be set 4% shorter than the driven element.
3. The reflector should be set 6% longer than the driven element if the reflector to driven element spacing is 0.16 wavelength or less. For spacings between 0.16 wavelength and 0.2 wavelength, the reflector should be set 5% longer than the driven element.

When the elements have been set to the above lengths, the next thing to do is to adjust the driven element length, adjust the gamma rod length, and resonate the gamma condenser. All the above can be done in one step.

Adjusting the Gamma Match. With the beam in the elevated position, the *Gamma match* is attached to the resonating condenser, and the g.d.o. is coupled to the *Antennascope*, as shown in *Fig. 9.* If RG-8/U line is to be used, the *Antennascope* is set for 52 ohms.

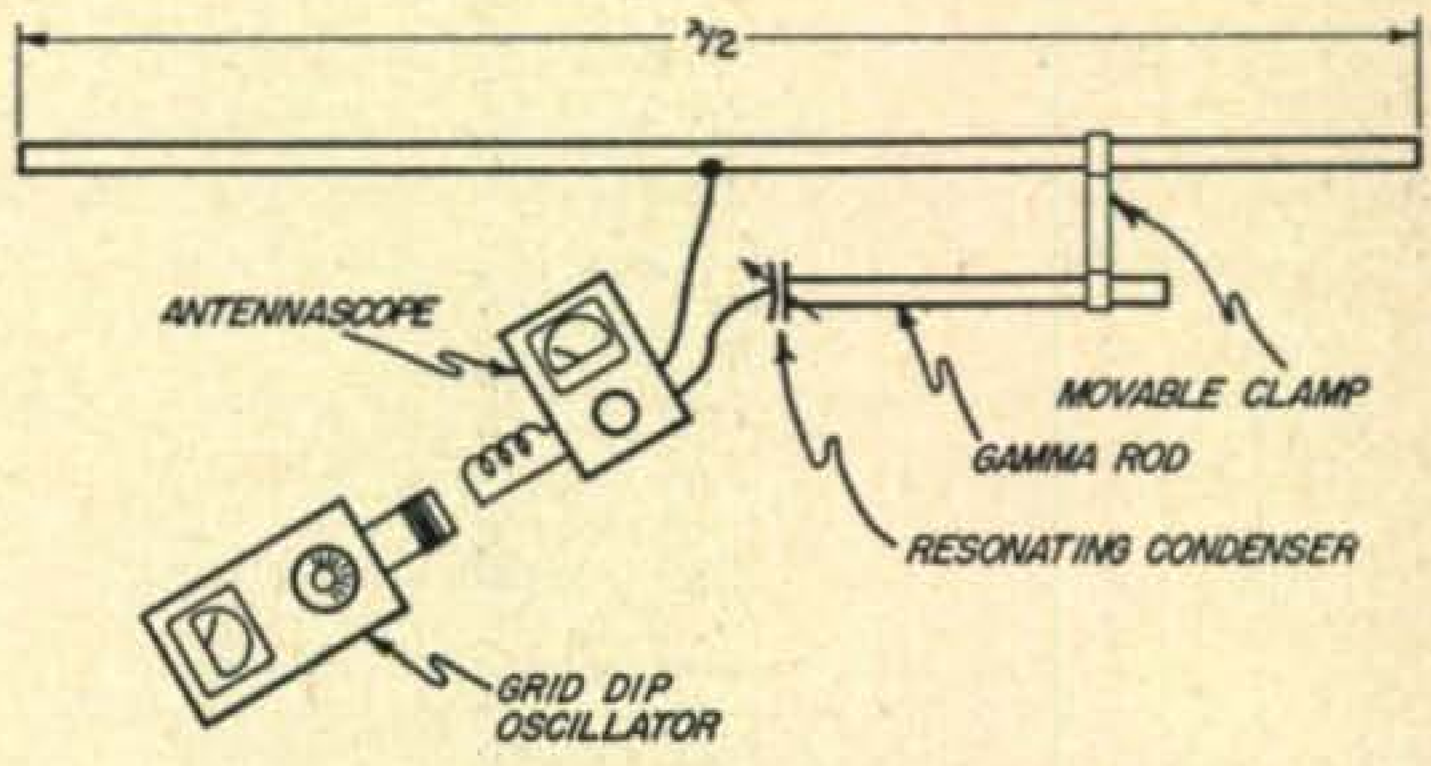


Fig. 9. Test setup for adjusting the gamma match.

The g.d.o. is tuned back and forth across the band, and the meter of the *Antennascope* is watched for a null, indicating the resonant frequency of the driven element. When the null is found, the resonating condenser of the gamma is tuned to enhance the null. The frequency of the g.d.o., the resonating condenser and the impedance dial of the *Antennascope* are all adjusted to complete the null, and bring the meter of the *Antennascope* to a zero reading. If a zero null cannot be obtained inside the band limits, the length of the driven element (both sides) must be altered slightly to bring the null to the correct point in the band. If the null occurs at some other impedance setting than 52 ohms, the length of the gamma rod must be changed, according to the rules set forth above. The frequency of the null should be checked with a calibrated receiver, as the calibration of the usual g.d.o. is none too good at high frequencies. Also, the calibration of the g.d.o. may shift slightly when it is coupled to the driven element of the beam.

During the course of these measurements it will be noted that there are two spurious nulls of weaker intensity, one on each side of the larger, center null. These represent the resonant frequencies of the reflector and director. As a cross-check on the tuning of an array, it should be noted that both these spurious nulls must fall outside the limits of the amateur band. If they do not, the lengths of the parasitic elements should be adjusted slightly until the nulls move out of the band. The low frequency null is caused by the reflector, and the high frequency null by the director.

When these adjustments have been completed, the capacity setting of the gamma resonating condenser should be measured. It is well to replace the variable condenser with a fixed condenser of the correct capacity, since the usual variable condenser will corrode badly, even when protected by a waterproof box. *Erie 850S and 853 series* Ceramic capacators may be paralleled to provide the correct value. Parallel connected 3000-volt transmitting mica condensers may also be used. Some surplus mica condensers have the exact capacity value stamped on the side of the case, and it might be possible to find a single unit in the junk box that is of the correct capacity. A slight deviation from the correct value will not be harmful. It will merely raise the minimum SWR from 1:1 at the resonant frequency of the array. As long as the overall SWR across the band is below 1.5:1, the beam is probably "on the nose."

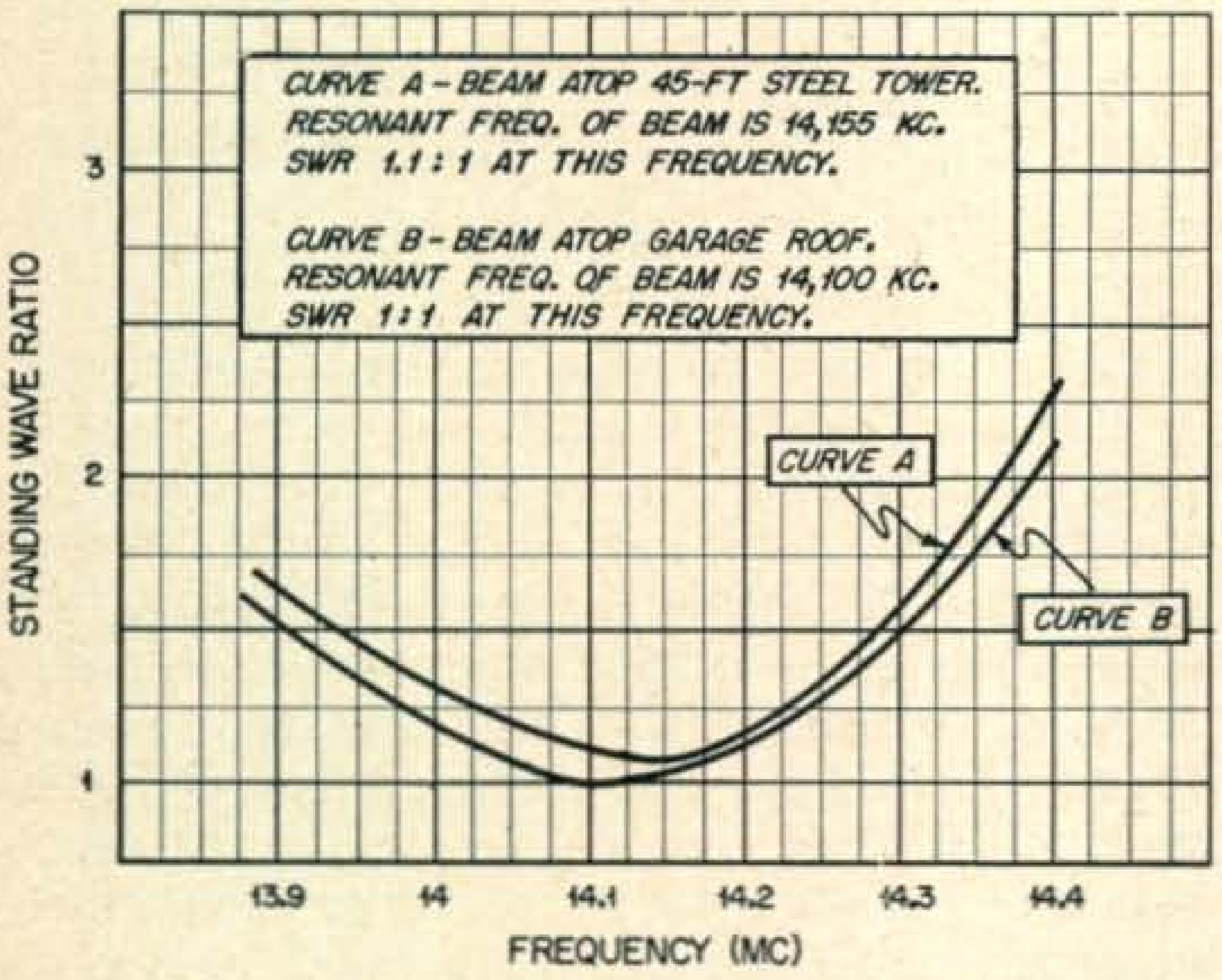


Fig. 10. Final results!

The gamma resonating capacitor should be mounted inside a plastic drinking cup, or a plastic refrigerator box, and the box or cup sealed with a lid coated with plastic cement. This will keep the condenser both dry and clean.

Checking the Beam Atop the Tower. When the beam has been placed atop the tower, a length of coaxial line should be attached to the beam, and the free end dropped to the ground. The SWR meter and the g.d.o. may be attached to the line and a final SWR curve should be run. If the beam was tuned up in a fairly clear spot, the resonant frequency of the beam should not have changed over 50 kilocycles, and the SWR at the resonant frequency should have not increased appreciably.

Curves A and *B* of *Fig. 10* illustrate the change in SWR and the frequency shift of a beam tuned up 12 feet above the ground, and then mounted atop a 45-foot tower. Close inspection of these curves will show that the SWR is not symmetrical about the resonant frequency, the slope of the curve being greatest on the high frequency side of resonance. This interesting deviation has been noticed on every beam antenna that has been checked, and is caused by the action of the director. The director is in the field of highest intensity, and exerts more influence on the driven element than does the reflector. In fact, changing the length of the director one inch changes the resonant frequency of the array a greater amount than does a one-inch change in the radiator length itself!

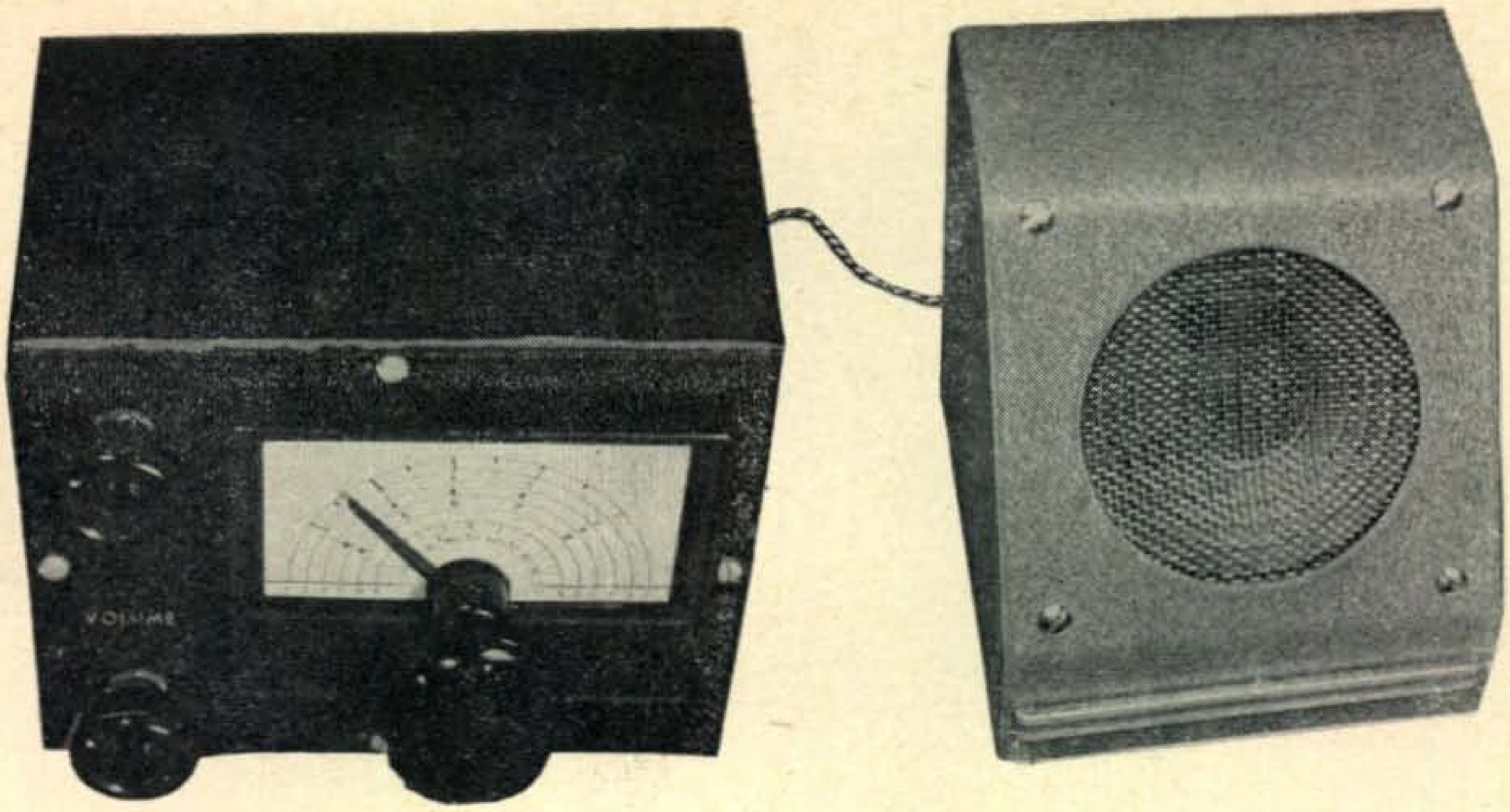
Loading the Beam Antenna

A frequent complaint of users of coaxial feed lines is that the array refuses to take a load from the transmitter. This is the result of a high SWR on the coaxial line reflecting an undesired reactance at the transmitting end of the line that the transmitter is unable to handle. This effect is caused by improper tuning of the beam, or reactance in the matching device, or both. Sometimes, however, even with a SWR as low as 1.2:1 a coaxial feed system will refuse to take a load from a transmitter. It is only necessary to add a few extra feet of line to the coaxial system to reflect a slightly different load to the transmitter and this trouble will clear up. The writer has four special pieces of RG-8/U cable, fitted with *PL-259* plugs at each end, and a *PL-258* splice at one end. The pieces are two feet, four feet, six feet and eight feet long. Through the use of these short pieces of line, the length of the main feed line can be changed by two-foot increments from two feet to twenty feet. This little stunt is not intended as a cure-all for cases of loading trouble where there is a high value of SWR on the coaxial feedline. There is no better way to blow up a coaxial fitting or to heat up a coaxial line than to have a high SWR on the feed system. In the cases where the SWR is reasonably low, the short splicing sections will save a lot of headaches.

Present and Prophetic

As soon as the September issue was on the presses we suddenly realized that the crossword puzzle on page 40 had not been properly credited. Our very sincere apologies to Mr. William E. Snow, W6UUC who submitted this very well received puzzle.

Have you found it difficult to decide between plate and screen modulation on the basis of which is the most efficient? Next month Contributing Editor, W3FQB reviews straight plate modulation, controlled-carrier and constant carrier screen grid methods analyzing the advantages and disadvantages of each.



A Super/Super for 144 Mc.

E. MILES BROWN, W2PAU and EDWIN T. KEPHART, W2SPV

c/o CQ Magazine, 67 West 44th Street, New York 36, N.Y.

This is a super-regenerative superhet mobile receiver capable of efficient performance with a minimum of components. Novice phone operators may also find it an easy way to fire up on two meters.

The "mobileer" who looks to v-h-f operation is confronted with a definite receiving problem. He requires a receiver with the best possible sensitivity. An effective ignition noise limiter is essential. Extreme selectivity is not required—in fact, it is not desirable, especially for net operation. Good stability under conditions of changing battery voltage and mechanical shock is important.

The commercial converters on the market meet the requirements for sensitivity, but too often the selectivity is greater than necessary for comfortable mobile operation. The selectivity offered by the narrow band-pass of an automobile broadcast receiver (used as an i-f system) is fine for 75 meters, where QRM is a big problem. However, it usually requires constant re-tuning during a mobile net operation on two meters, due to transmitter crystal tolerances and drift. Extremely rigid requirements are set for converter oscillator stability. Too, the superheterodyne is susceptible to noise—ignition and otherwise, requiring a good noise limiter in the car receiver. Then too, a converter by itself cannot be used as a stand-by receiver in the shack or in a fixed-portable station set-up.

The simple superregenerative receiver offers a possible solution, and has been widely adopted for v-h-f mobile work. But unless the entire receiver is well shielded and equipped with an r-f stage to isolate the regenerative detector from the antenna, it may radiate and QRM other receivers in the near vicinity. The usual v-h-f superregen does offer broad selectivity—often much *too* broad! It is difficult to obtain smooth superregeneration over a wide tuning range such as the four megacycles of the two-meter band. On the credit side, a properly designed superregenerative detector discriminates against ignition and similar pulse-type noises.

Many of the disadvantages of the simple superregenerative receiver may be overcome by combining it with the superheterodyne converter. This is not a new idea, but the receiver to be described here has a few novel features which may be of interest. Experience has shown that this unit is easy to adjust for optimum performance, and no un-standard parts or tricky multi-purpose circuits are used. The end result is a receiver offering the full potential sensitivity of a low-noise triode r-f stage, a compromise bandwidth of about 250 kc., the good inherent noise discrimination of a superregen, and plenty of audio power output. It is a self-contained, complete receiver (no larger than a box camera), that may be used in the car, or used as an emergency receiver at home. The

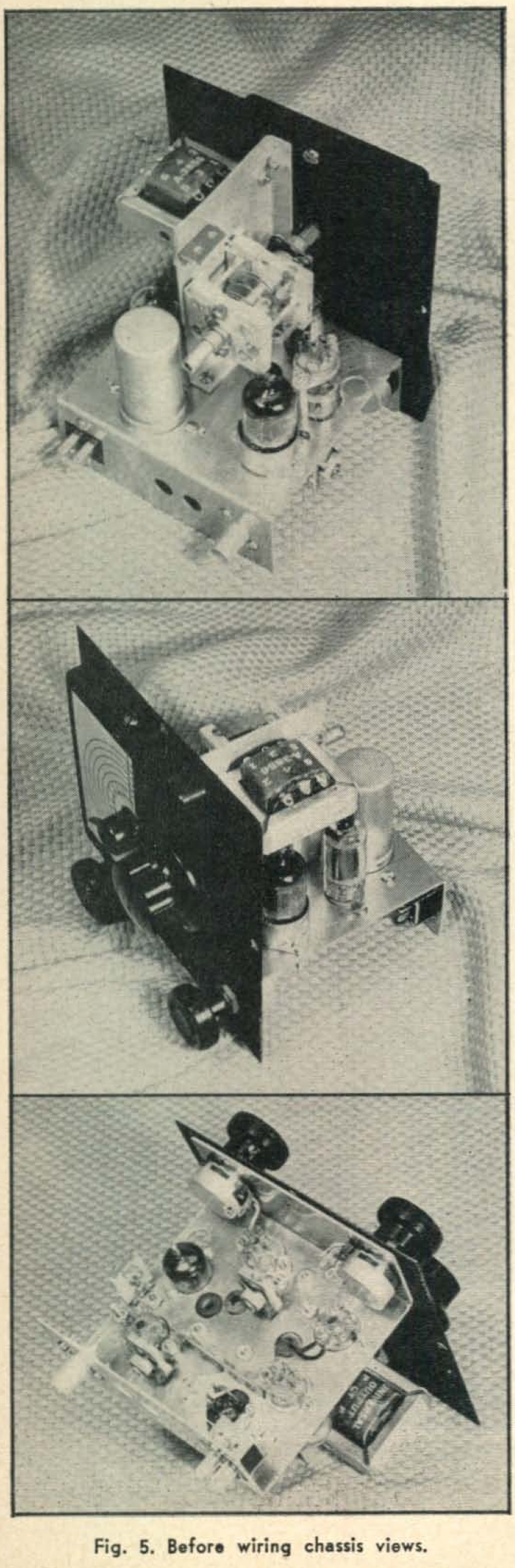


Fig. 5. Before wiring chassis views.

power requirements are low, and plate current may be obtained from a small vibrator supply, a dynamotor or from an automobile radio power system.

Circuit Description

One section of a 6BQ7 *(V1)* is used as a grounded grid r-f stage, the other section as a triode mixer. The antenna is directly coupled to the r-f stage cathode coil *L3*. This is an inherently broad-band tank circuit and does not require tuning. The r-f stage coil, *L4*, is tuned by a mica sandwich capacitor, *C3*. In the remaining half of the 6BQ7, the triode mixer, the grid leak resistor (*R5* and *R6*) is tapped to provide a convenient point for attaching a test meter during tune-up. (More on this later.) The output coil of the mixer, *L5*, is also tuned by a mica sandwich condenser, *C4*.

A 6J6 *(V2)* is used in the familiar T.N.T. oscillator circuit. Varying the amount of self-excitation by spreading the turns of the grid coil, *L2*, has a negligible effect on the frequency. The tuning capacitor is of the split-stator type and the rotor need not be insulated from ground. The mixer injection signal is taken directly from the grid circuit of the oscillator, as changes in the loading on the grid tank have less effect on the frequency of the oscillator than changes on the plate tank. A "gimmick" coupling capacitor made from a short length of insulated wire hooked over the mixer grid lead provides sufficient coupling and ease of adjustment of injection voltage. This front-end circuit is quite similar to that used in the beginners two-meter converter described in *CQ* for Nov., 1952.[1]

A 6AK5 *(V3)* is used as a superregenerative second detector, operating on an intermediate frequency of approximately 31 Mc. Basically, the circuit is the well-known tapped-coil Hartley, in which self-controlled quench action is obtained through the use of a large grid leak-grid capacitor time constant. Experiments have shown that in this circuit the quenching frequency should be quite low—just above the range of audibility—for best results. For this reason it is necessary to provide a quench-frequency filter to prevent overload of the a-f amplifier by the super-sonic output signal of the superregen detector. Resistance/capacitance type filters are used, including *C12, R9, R12*, and *C15*. The filtering also helps to eliminate much of the harshness of the usual superregenerative hiss. Regeneration in the detector is controlled by varying the screen-grid voltage with potentiometer *R19*. This control also tends to change the quenching frequency, which is lowered by raising the screen-grid voltage. This detector operates at very low voltages and displays unusually high sensitivity and reasonable selectivity. An i-f signal of about one microvolt

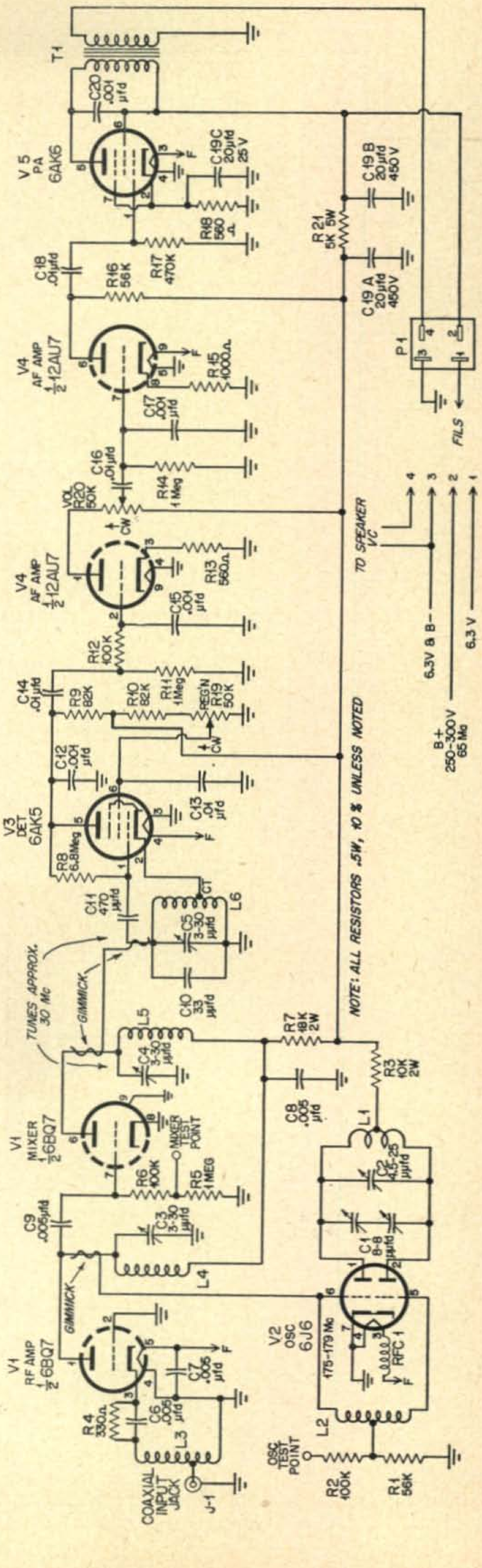
1. "A Two-Meter Converter—The Easy Way," E. M. Brown, "CQ", Nov., 1952, Page 20.

can be copied easily—thus there is no need for additional i-f amplification. Signals are coupled between the mixer plate and the detector grid by means of a very small coupling capacitor. This is formed by hooking a short length of insulated hookup wire loosely around the plate and grid leads.

The audio output of this superregen detector* is quite low, requiring considerable audio-frequency amplification. This is provided by *V4*, a 12AU7 connected as a conventional 2-stage resistance-coupled amplifier. This stage is coupled to the power output stage, *V5*, a 6AK6, which provides sufficient audio power to override the noise usually encountered in mobile work. A low-impedance loudspeaker capable of handling at least one watt of audio power may be used.

Construction

The receiver is constructed on a 4⅛ x 3¾ x 1½-inch aluminum chassis *(Bud # CB-1627)* and housed in a black crackle finish 4 x 5 x 6-inch utility box *Bud # CU-729)*. The chassis is laid out and drilled in accordance with *Fig. 1*. If one has the facilities available to form his own chassis it should be cut and drilled



Parts list and wiring schematic.

C1—dual variable, 8 μμfd. per section (Bud LC-1659)
C2—4.5-25 μμfd. zero temp. ceramic trimmer (Centralab 822AZ)
C3, C4, C5—Mica compression trimmer (Bud MT833, Millen 27030, National M30)
C6, C7, C8, C9—5000 μμfd. disc ceramic (Erie 811, Centralab Disc Hi-kaps)
C10—33 μμfd. tubular ceramic (Centralab BC Hi-kap tubular)
C11—470 μμfd. tubular ceramic (Centralab BC Hi-kap tubular)
C12, C15, C17, C20—1000 μμfd. disc ceramic (Erie 811, Centralab Disc Hi-kaps)
C13, C14, C16, C18—10,000 μμfd. disc ceramic (Erie 811, Centralab Disc Hi-kaps)
C19—triple section electrolytic, 20-20/450v-20/25v. (Mallory FP345.8)
R1, R16—56,000 ohm, ½w.
R2, R6, R12—100,000 ohm, ½w.
R3—10,000 ohm, 2w.
R4—330 ohm, ½w.
R5, R11, R14—1 megohm, ½w.
R7—18,000 ohm, 2w.
R8—6.8 megohms, ½w.
R9, R10—82,000 ohm, ½w.
R13, R18—560 ohm, ½w.
R15—1000 ohm, ½w.
R17—470,000 ohm, ½w.
R19, R20—50,000 ohm potentiometer (IRC type Q)
R21—5000 ohm, 5w. wire wound
RFC1—r-f choke (Ohmite Z-50)
T1—single 6AK6 to voice coil. Pri-10,000 ohms, Sec-4 ohms (Stancor A3879, A3856 or equal)
J1—antenna jack UG-290/U (Amphenol 31-003)
P1—4-pin power plug, male, with angle brackets (Cinch-Jones P-304-AB)
V1—6BQ7 or 6BQ7A (RCA)
V2—6J6 (RCA)
V3—6AK5 (RCA)
V4—12AU7 (RCA)
V5—6AK6 (RCA)

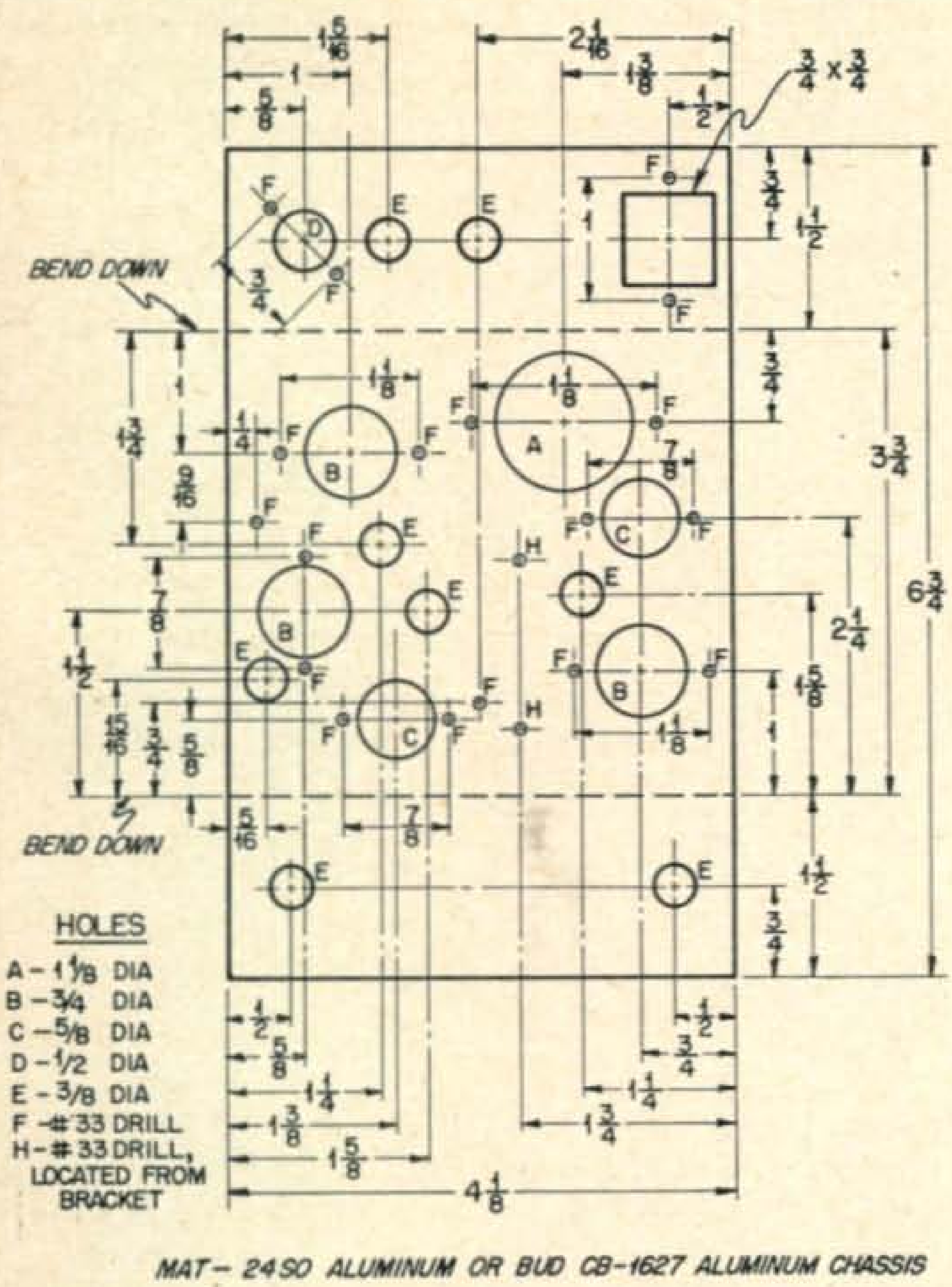


Fig. 1. Suggested chassis lay out and drilling plan. The chassis is a BUD #CB-1627 and the cabinet is a BUD #CU-729. The method of mounting is discussed on this page.

for mounting the oscillator tuning condenser and audio output transformer. This is drilled and bent in accordance with *Fig. 4*. It should be fabricated from a rather sturdy piece of aluminum in order to insure a rigid mounting for the tuning condenser. The front panel is mounted to the chassis by means of the regeneration and volume control mounting nuts. A 1/32″ washer should be slid on the threaded shafts between the chassis and panel to provide a fitting space for the lip of the cabinet. These washers may be made from the punchings of the socket holes. The condenser bracket is next mounted as shown in *Fig. 5*. It is mounted to both the chassis and front panel with *4-40* machine screws, making the chassis, bracket and front panel one rigid unit. Tube sockets are mounted with *pin 1* toward center of chassis on all tubes except *V2* and *V5*. *V5* mounts with *pin 1* toward the outside of the chassis.

The oscillator tube socket is mounted on 1″ metal standoff pillars using *4-40* screws; with *pins 2* and *3* toward the tuning condenser. The standoffs and screws were salvaged from a discarded rotary tap switch. The tuning condenser mounts with its short shaft toward the front panel. A length of fiber shaft is coupled to this short stub with a small flexible coupling *(Johnson # 104-154)*. If too large a flexible coupling is used it will not clear the top of *V3*. A clearance hole must be drilled in the front panel to pass the tuning shaft. It is recommended that this hole be made large enough to clear any eccentricity of the tuning shaft. It one does not care to go to the expense of a vernier dial, a direct drive dial may be used, however, a friction drag should be provided to prevent turning of the condenser by vibration. Trimmer *C3* is secured to the chassis by the same bolt used to mount tube socket *V1*. *C4* is bolted to the chassis between *V1* and *V2*. Similarly *C5* is bolted to a hole located on the center line of the chassis near *V4*. The exact location and position of the remaining parts may be ascertained by referring to the photograph of the under chassis *Fig. 6*. A strip 1½″ wide should be trimmed from the back panel

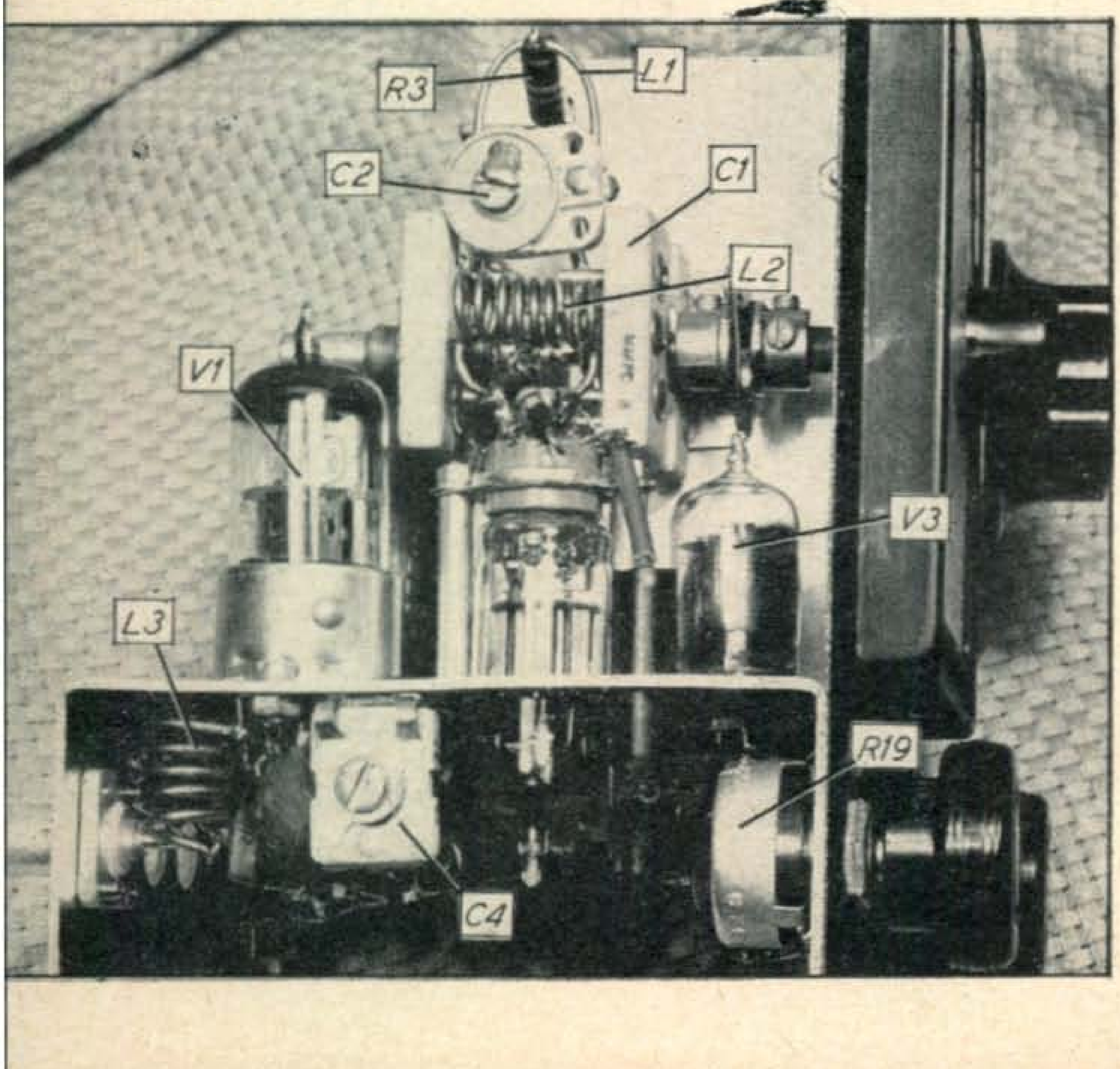


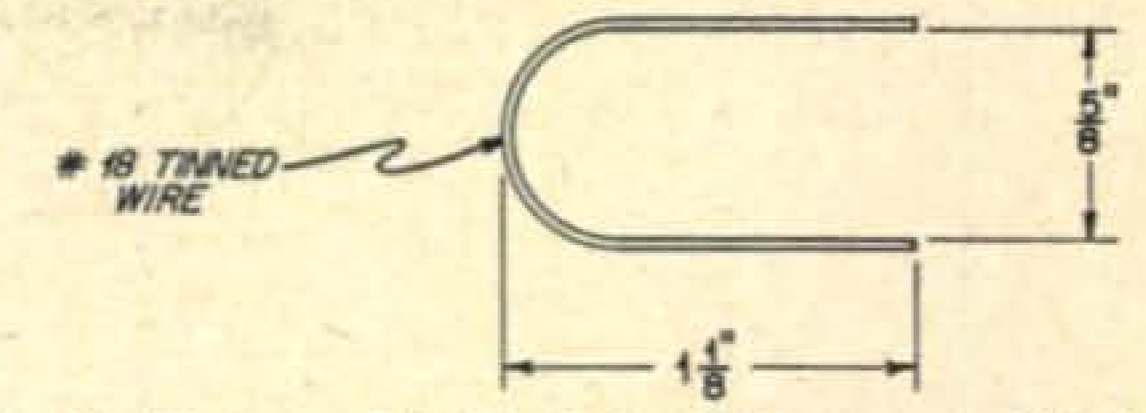
Fig. 2. This photograph shows the location of the self-supporting coil L2 and the associated oscillator components. Note that the 6J6 oscillator is inverted with the socket mounted near the tuning condenser C1.

to provide clearance for the antenna and power receptacles.

Wiring is simple and straightforward. All tube socket grounds should be made to lugs mounted under the tube socket bolts. Bend these lugs to provide as short a path to ground as possible. The filament wiring should be dressed close to the chassis. Keep all wiring as short as possible especially in the r-f and mixer sections. No r-f circuit lead should be longer than ½" if the suggested layout is carefully followed, and all condenser leads are less than ¼" long! The coils are self-supporting and may be located by referring to the photographs. Wiring details of the oscillator may be noted by referring to photograph *Fig. 2*. The grid coil is self-supported, between *pins 5* and *6* of socket *V2*. Oscillator test point resistor *R2* is tied to the coil center tap at the junction of *R1*. Its end is left hanging in space after being trimmed. Short leads tie the plate *pins 2* and *3* to the bottom lugs of the tuning condenser. The oscillator plate hair-pin inductor, *L1*, is mounted on the two top lugs of the tuning condenser; and oscillator padder condenser *C2 is* soldered across the hairpin close to the aforementioned lugs. *R3* is soldered between the center tap of *L1* and an insulated tie point on the vertical bracket. The plate voltage lead connects to the tie point and drops down in back of *C1* through a grommeted hole to junction of *R21* and *C19A*. The oscillator injection lead is dropped through the remaining grommeted hole—dressed clear of the chassis and wrapped one turn around the plate lead of *V1 (pin 1)* at the hot end of *L4* and *C3*. Take particular care that the "gimmick" lead does not make electrical connection with the plate lead of *V1*.

Coil Winding Data

L1—Oscillator plate hair pin, #18 AWG tinned. Bend as per sketch.



L2—Oscillator grid. 8t. #18 AWG tinned, ¼" I.D., center tapped and spaced to ¾" length.

L3—R-f cathode. 4½t. #18 AWG tinned ⅜" I.D., tapped 1½t. from ground end and spaced to ¾" length.

L4—R-f plate. 3t. #18 AWG tinned, ¼" I.D., spaced to ½" length.

L5—Mixer plate. 20t. #20 AWG Formex or Formvar, closewound ¼" I.D. Coil should be "doped" with plastic spray or coil dope for support.

L6—Detector grid. 11t. #20 AWG Formex or Formvar closewound, center-tapped, ¼" I.D. Coil should be "doped."

Note: All coils are self-supported. Leads should be trimmed as short as possible when being fitted in circuit.

Pin 3 of the oscillator tube socket is grounded to a lug under the socket mounting bolt. *RFC1 (Ohmite Z-50)* is tied to *pin 4* and run through a ⅜" clearance hole in chassis to *pin 3* of *V4*. It is desirable to wrap *RFC1* with a layer of "Scotch" electrical tape or to slide it in a length of large-diameter spaghetti to prevent its accidentally becoming grounded to chassis.

A shield is required between the input and output coils of the rf amplifier. It is made from a piece of flashing copper or metal from a "beer can." It is fitted in as shown in *Fig. 3* after all wiring is completed. One edge is soldered to the center post of socket *V1* and *pin 2;* the other edge is soldered to a lug under the antenna receptacle mounting bolts.

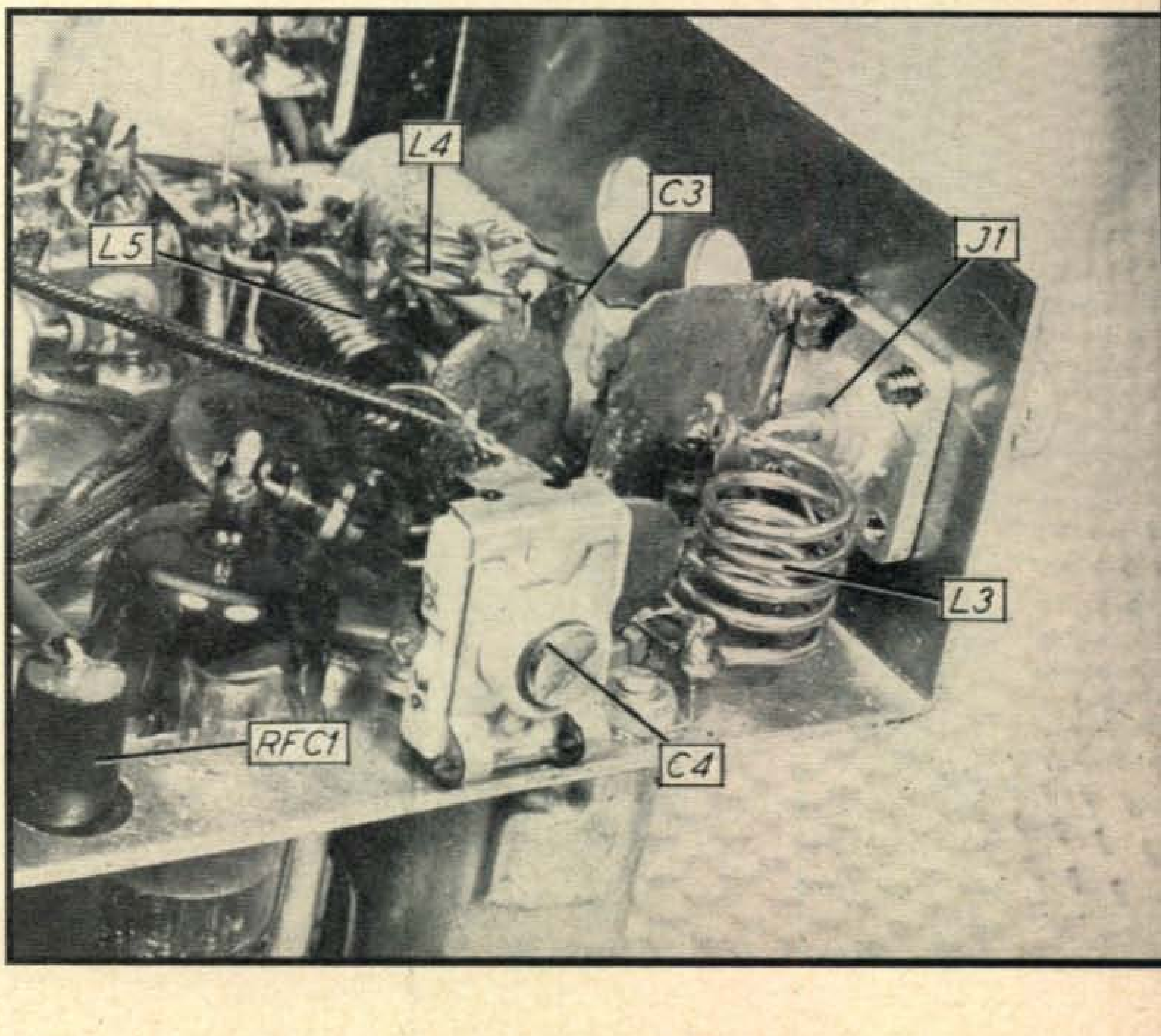


Fig. 3. The small shield used to prevent coupling between the input and output circuits of V1 is shown in this photograph. It is mounted as described in the last paragraph on this page. One edge is soldered to the top left corner of J1 and the bottom is soldered to the center post and pin 2 of the V1 socket.

Test and Operation

Apply 6.3 volts to the filaments and 250-300 volts to the B plus circuit. Connect a suitable speaker to the output circuit. Turn the volume control *R20* fully clockwise and rotate regeneration control *R19* clockwise. This should produce a typical loud superregenerative hiss which should change gradually to a squeal as the control is rotated. This phenomenon indicates proper operation of the detector and audio stages. It might be well, at this time, to check the various voltages at the tube socket terminals. The voltages should approximate those listed in *Table I*. The regenerative detector stage should be tuned to the vicinity of 30 Mc.

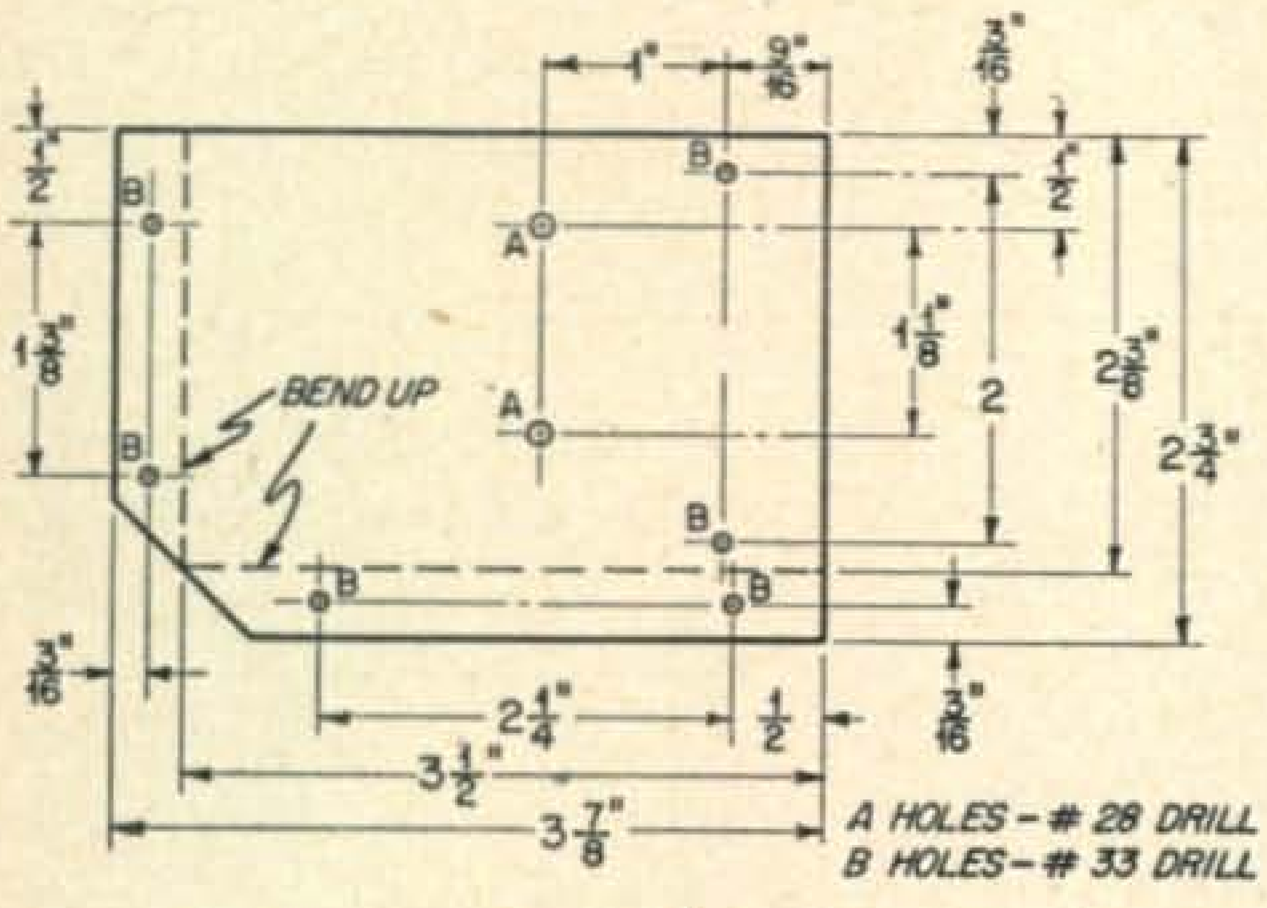


Fig. 4. Cutting, drilling and bending layout plan for the small bracket required to mount the oscillator tuning condenser, C1, and the audio output transformer T1.

The exact i.f. should be selected in an effort to locate the image of your local TV channels out of the two-meter band. The local oscillator, operating on the high side of the two-meter band, will also receive signals on a frequency equal to the *sum* of the oscillator frequency and the i.f. If an i.f. of 31 Mc. is chosen, for example, the oscillator frequency range would be 175 to 179 Mc. and the image range would be 206 to 210 Mc. This range would include the sound channel of TV channel 12 (209.75 Mc.). By shifting the i.f. slightly lower (perhaps to a frequency of 30 Mc.) we can move this interfering signal out of the band—where it could be used as a marker!

The i.f. may be set either by listening to the oscillating detector on a communications receiver, covering the frequency range (it sounds like a broadly-peaked hiss), or by tuning in the output signal generator or grid dipper. (Don't be fooled by tuning to a harmonic or an r-f circuit response.) The intermediate frequency is set by padder *C5*.

The "gimmick" between *L5* and *L6* consists of a length of insulated hookup wire wound one turn around the detector grid coil lead and the mixer plate coil lead. It is a form of capacity coupling—capacity being varied by wrapping more or less turns around grid or plate lead as needed. When the capacity of the "gimmick" is correctly adjusted, tuning the mixer plate padder, *C4*, through resonance will cause the oscillating detector to "suck out" of oscillation. Coupling should be adjusted so that this effect is barely noticeable—as *C4* is tuned through resonance it should sound as though a weak signal were being tuned in on the detector. The detector should be just on the threshold of superregeneration for this test. After proper coupling is achieved, re-check the detector frequency and readjust as required.

TUBE VOLTAGES											
			PIN NUMBERS								
TUBE	TYPE	USE	1	2	3	4	5	6	7	8	9
V1	6BQ7	R.F.MIX.	84	0	1.6	0	6.3	84	-1.5*	0	0
V2	6J6	OSC.	150	150	0	6.3	-9**	-9**			
V3	6AK5	DET.	-1***	0	6.3	0	120	15***	0		
V4	12AU7	AUDIO	75	---	.6	0	0	100	---	3.5	6.3
V5	6AK6	P.A.	---	14	0	6.3	280	280	14		

B + VOLTAGE MEASURED BETWEEN PIN 2, POWER PLUG P1 AND GROUND = 280 VOLTS D.C.
NOTE: ALL MEASUREMENTS TAKEN WITH VTVM (VOLTOHMYST JR.)
* MEASUREMENT AT MIXER TEST POINT.
** MEASUREMENT AT OSCILLATOR TEST POINT.
*** MEASUREMENT AT POINT OF REGENERATION.

Table I

The r.f. and mixer may be best aligned with a grid-dipper or a transmitter operating in the two-meter band. Remove the oscillator tube, *V2*. Insert a ¼ wavelength wire (approx. 19") in the antenna terminal. Connect a v.t.v.m. (set to the 5-volt d-c range) or a 200 microamp meter between the mixer test point and ground. Ground is positive. Couple the 19" antenna closely to the output circuit of the transmitter or grid dipper which should be tuned to 146 Mc. *C3* should be tuned to provide the greatest deflection of the meter, corresponding to the best gain in the r-f amplifier. *L3* is inherently broad-banded, no adjustments are required. Return the oscillator tube to its socket. Watch the mixer grid meter as oscillator padder *C2* is rotated. If the oscillator is putting out a signal, there should be a sharp increase in grid current as it passes through 146 Mc. Set the padder to *slightly less* capacity. Turn on a 146 Mc. signal source, which may be the grid-dip oscillator or a low-powered transmitter. Use *loose* coupling to receiver, or remove the antenna. Set *C1* at mid-scale and tune in the 146-Mc. signal by adjusting oscillator padder *C2*. Not much re-tuning should be required.

Next connect the test meter to the oscillator test point at the end of *R2*. Squeeze or spread the turns of the oscillator grid coil, *L2*, to pro-

Mounting Components

Sockets, V1 & V4—9 pin miniature (Cinch-Jones 9XM or 9XC).
Sockets, V2, V3, V5—7 pin miniature (Cinch-Jones 7EM).
Dial—Millen 10039.
Shaft Coupling—Johnson 105-154.
Grommets, ⅜"—Walsco 3343.
Cabinet—Bud CU-729.
Chassis—Bud CB-1627.
Insulated tie points—Cinch-Jones 51, 51B; 2 each required.

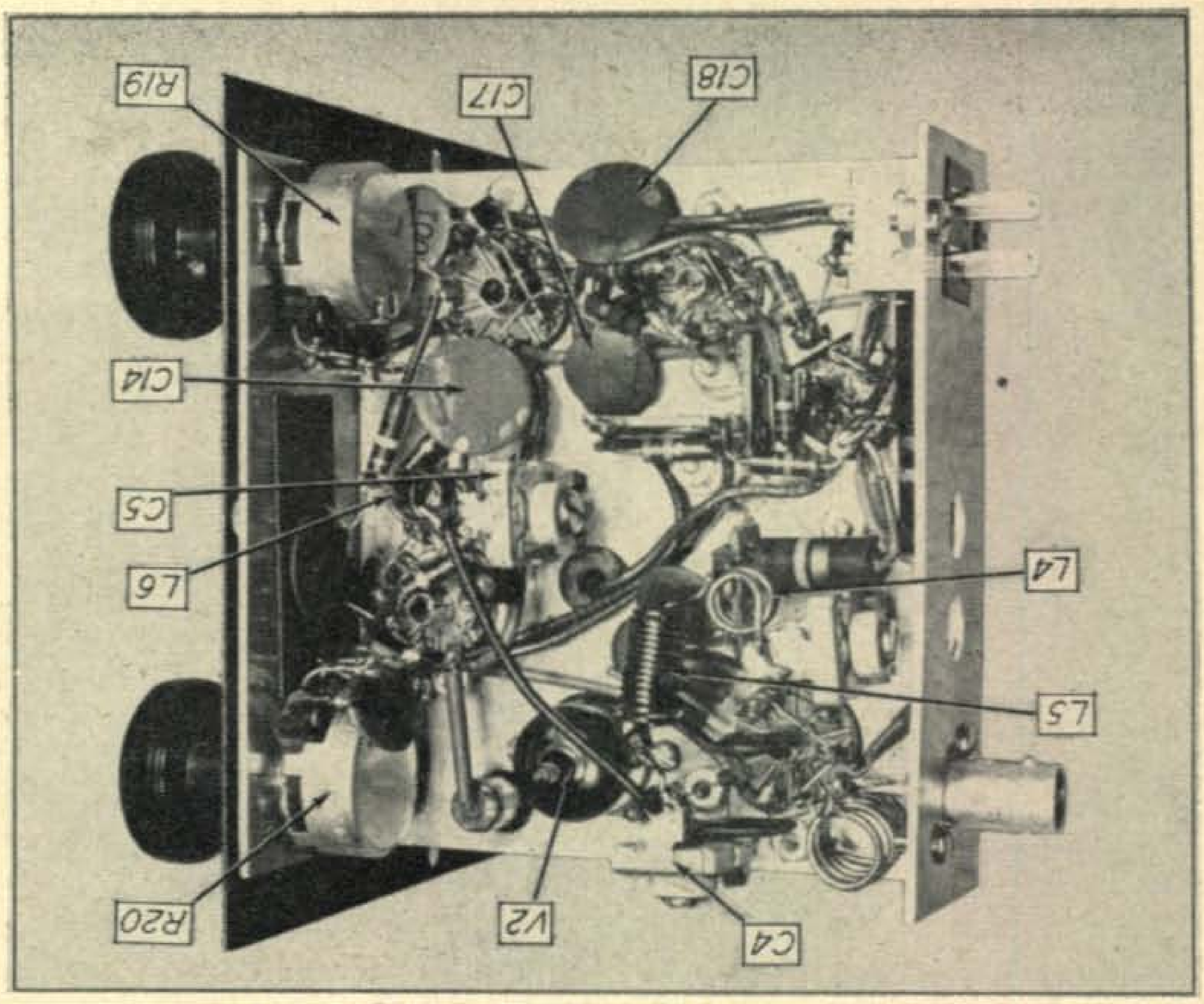


Fig. 6. Under chassis view after wiring has been completed. The two holes drilled in the rear skirt of the chassis are for re-setting C3 and C5 after the unit has been permanently mounted.

duce a reading of 70 microamperes or (7 volts). Move the meter back to the mixer grid test point and adjust the coupling "gimmick" to the r-f stage plate lead to produce a reading of about 20 microamperes or 2.0 volts. (Injection voltage should not be less than 1.5 or greater than 5 volts.)

Connect an antenna and tune across the band. Tune in a signal as near to the center of the band as possible. Re-peak the r-f trimmer *C3* for maximum volume. Be careful not to tune the trimmer to a signal coming in via the image response! If in doubt that you are on the proper peak go back to the original test set-up and check the mixer grid current due your own transmitter or grid dip oscillator.

The receiver as designed provides approximately 120 degrees of band-spread. More band-spread may be obtained by bending the rotor plates of *C1* slightly outward. Decreasing the size of L1 and increasing the capacity of *C2* will also accomplish the same results. Band-spread may be decreased by increasing the size of *L1* while at the same time decreasing the capacity of *C2*.

An access hole must be drilled in the case to permit adjustment of *C2* after final assembly. Installing the unit in the case might shift the oscillator frequency slightly. If so, locate a signal of known frequency and retune the oscillator padder, *C2*.

Power Supply

The unit may be operated from a separate vibrapack or a small receiving type of dynamotor supplying approximately 300 volts at 65 ma. If one cares to do a minor operation on the automobile broadcast receiver, power may be taken from this source. It will be necessary to install a switch to disconnect the filaments of the auto receiver to reduce the drain on the plate supply. Very few car receivers can stand the load required by this receiver—in addition to the normal load.

Antenna

The input impedance of the receiver, with the antenna coil tap as called for in the *Coil Table,* is approximately 50 to 75 ohms. This input impedance was chosen to match the conventional roof top ¼-wave antenna or coaxial mobile antenna.

"But all I did was turn those knobs a little to dust them off!"

A TVI-Free Transmitter for 40

Nothing Startling New in this Article—Just a Straight Forward Circuit with Optimum TVI Precautions

EDWARD MARRINER, W6BLZ

528 Colima St., La Jolla, Calif.

Probably the best way to build a really TVI-proof transmitter is to enclose it in a metal box and filter all conductors connected to it; so that only at the output connector is there any r-f output, which should be fundamental-frequency energy, free of spurious frequencies.

Building a box that will not leak r.f. is sometimes difficult, without specialized tools. This is especially true, if it must be easily opened to permit changing coils and make other adjustments. A band-switching transmitter eliminates having to open the box, but in this case constructional difficulties are acute.

The fifty-watt, 7-Mc. transmitter shown in the accompanying pictures and diagrammed in *Fig. 1* is one way to solve (or evade) the difficulty. It is built *in* a standard aluminum chassis, complete with bottom plate. The important thing about it is that it is designed to cover only the 7-Mc. band. Similar units cover the other bands by switching power-supply leads.

This arrangement does away with compromises in design frequently required in a transmitter that works several bands. For example, the output TVI filter is designed specifically for the 7-Mc. band, sharply attenuating all frequencies above 10 Mc. Units for the other bands may be added at will, resulting eventually in pre-tuned units for all desired bands.

The Circuit

The circuit *(Fig. 1)* contains several points worthy of comment. Contrary to common practice, both the grid and plate circuits of the Clapp oscillator are tuned to 7 Mc. The excellent internal shielding of the 6AG7, plus the excellent isolation of the two circuits virtually eliminates reaction between them.

A noteworthy feature of the 807 stage is the use of voltage-regulator tubes to reduce the d-c plate voltage to the proper value for the screen. When the key is pressed, it takes a finite time for the v-r tubes to ionize and permit current to flow through them. This provides an automatic time delay in the buildup of r-f output, which is very effective in reducing keying transients. When the key is opened, the screen current drops to zero, and the v-r tubes de-ionize. Their resistance increases to infinity; therefore, the screen voltage drops to zero, in contrast to soaring to the full plate voltage, as occurs when a series dropping resistor is used. This, too, helps to eliminate clicks.

R6 prevents the screen from "floating" when the v-r tubes are not conducting. Its resistance

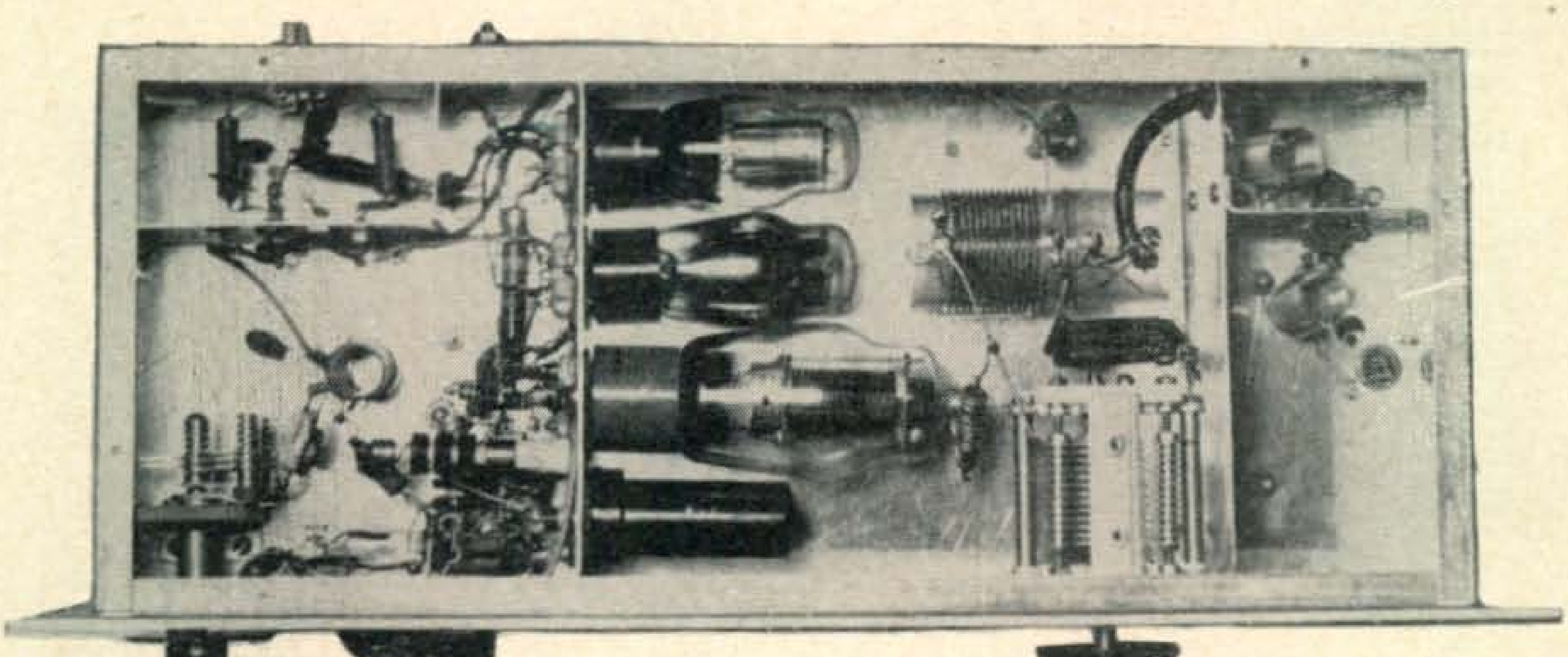
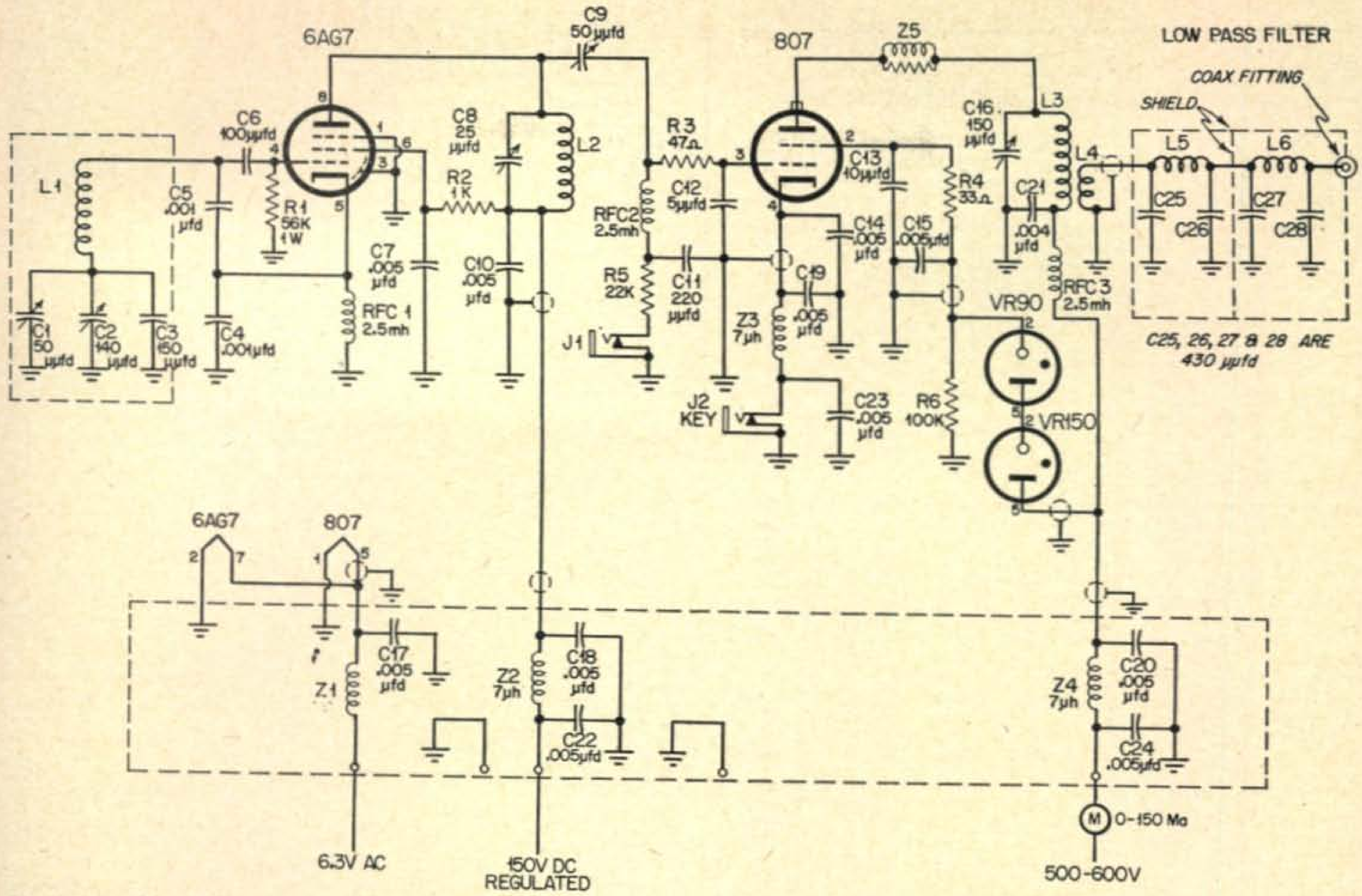


Fig. 2. Bottom view of the transmitter showing the 7x17x3-inch chassis sub-divided into small compartments to obtain the necessary shielding.



C1—50 µµfd. midget variable, APC type (see text)
C2—140 µµfd. midget variable, APC type
C3—150 µµfd. zero-temp. fixed ceramic
C4, C5—0.001 µfd. silver mica
C6—100 µµfd. mica
C7, C10, C14, C15, C17, C18, C19, C20, C22, C23, C24—0.005 µfd. 600v. disc ceramic
C8—25 µµfd., midget variable
C9—50 µµfd. variable ceramic
C11—220 µµfd. mica
C12—5 µµfd. silver mica
C13—10 µµfd. silver mica
C16—150 µµfd. variable
C21—0.004 µfd., 1000v. mica
C25, C26, C27, C28—430 µµfd. silver mica
R1—56,000 ohm, 1w.
R2—1000 ohm, 1w.
R3—47 ohm, 1w.
R4—33 ohm, 1w.
R5—22,000 ohm, 1w.
R6—100,000 ohm, ½w.
RFC1, RFC2, RFC3—2.5 mh. r-f chokes
Z1—40t. #20 enam., close wound, ¼" dia.
Z2, Z3, Z4—7 µh. r-f chokes (Ohmite Z-50)
J1, J2—closed circuit phone jacks

Fig. 1. Parts list and wiring schematic.

must be high enough; so that the current drawn by it does not keep them ionized. Otherwise, their click-suppressing qualities will be lost.

Making the low-pass filter an integral part of the transmitter eliminates possible radiations from a line between the output terminals of the transmitter and a separate filter. It has a nominal design impedance of fifty ohms. Being of the "½-wave" type, the filter reflects to its input terminals exactly the same impedance as connected to its output terminals; therefore the transmitter "loads" just as it would without the filter.

Construction

The transmitter is built in a standard 7x17x3-inch, aluminum chassis. *Figure 2* shows how it is divided into compartments with partitions of 1/16-inch aluminum. They are approximately five, ten, and two inches wide, respectively. In

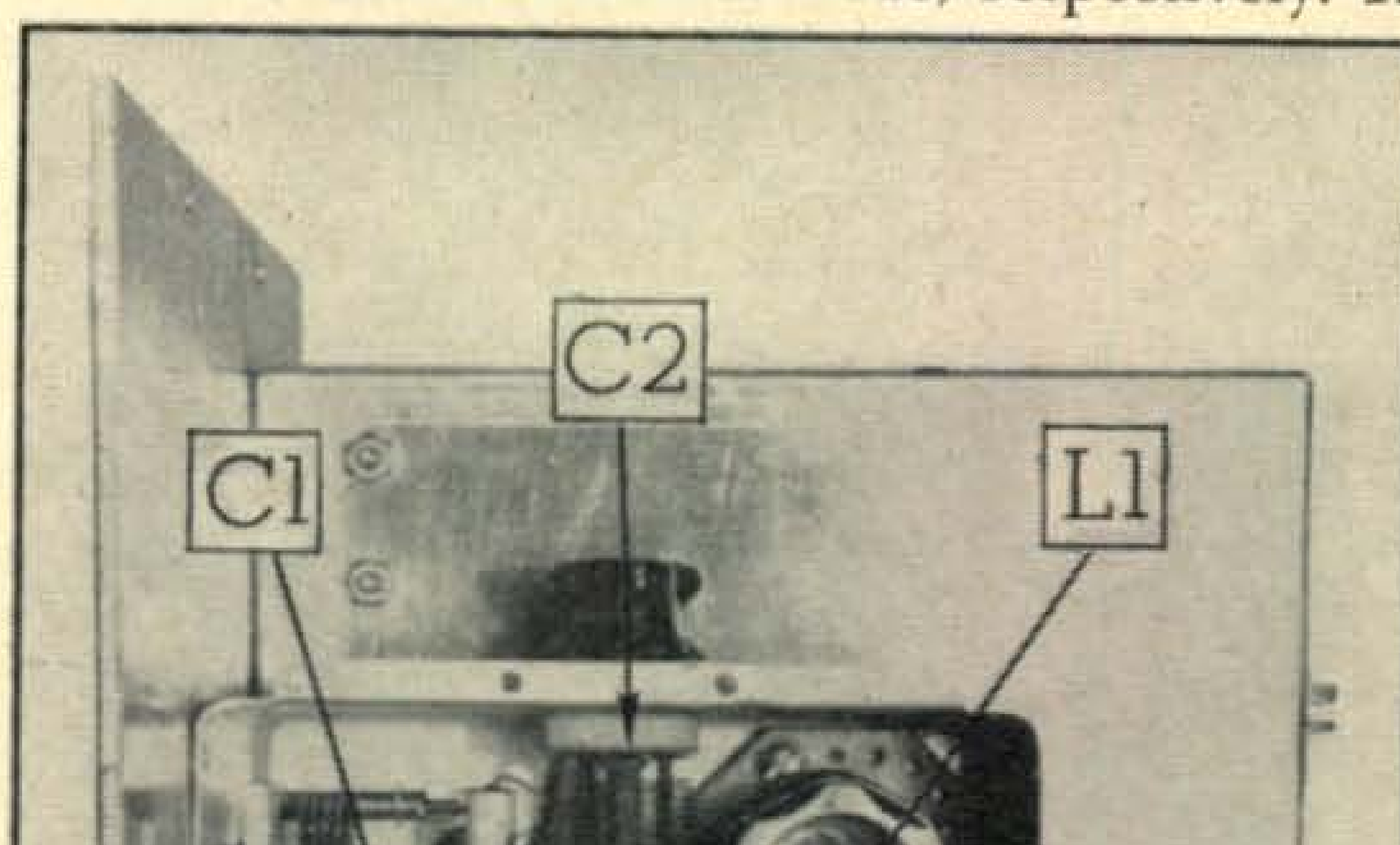


Fig. 3. Oscillator grid circuit with cover plate removed. The box and coil form were salvaged from a Command transmitter. After this picture was taken a number of very small holes were drilled in the top and rear of the chassis for air circulation.

Mounting Components

Chassis—10x17x3-inch, aluminum, bottom cover
Panel—8¾x19x¼-inch, aluminum
Tubes—6AG7, 807, and two VR tubes. (Choose VR tubes so that voltage drop across them subtracted from plate voltage equals 250 to 300 volts.)
Power requirements—6.3v/1.5 amp., 150v./15ma., approx. 500-600v./110ma.

Coil Winding Data

L1—12t. #16 enam., spaced wire dia. on 1¼" dia. ceramic form.
L2—20t. #30 DSC, closewound on ¾" form.
L3—12t. #18 enam., spaced wire dia., on 1½" dia. form.
L4—3t #18 enam., closewound, ¼" below L3.
L5, L6—13t. #20 enam., spaced to occupy 1.6" on ⅝" dia. form (Miniductor #3006).

addition, an L-shaped partition subdivides the rear corner of the five-inch compartment into one of about 3½x1½ inches, and the two-inch one is bisected with another partition.

The partitions are bolted into place with *6-32* screws through ½-inch lips bent along each end along their tops. Note that their height is the full depth of the chassis (approximately 2-⅞ inches); so that when the bottom plate is screwed into place, the edges of the partitions touch it to make each compartment individually r-f tight. The edge of each one must thus be filed down slightly at the ends to slip under the chassis lip.

As the picture shows, the tubes are mounted on the left-hand partition. There is not too much room, but they will fit.* *RFC1* is mounted on the partition by means of the small stand-off insulator supplied with it, but most of the remaining parts associated with the sockets are supported by their leads.

Most of the wiring to the sockets may be completed before remounting the partition. Solder *R3* and *R4* directly to the control-grid and screen-grid terminals of the 807 socket. Keep the leads to all by-pass condensers short.

The six-prong power plug goes on the rear flat of the chassis, centered in the area enclosed within the L-shaped partition, which houses the power-lead filters. Connections to the chokes, are brought through the partition by means of feed-through bushings (*National* TPB or equivalent). The r-f filter in the key lead is mounted right at the key jack. The leads to these chokes, and, in fact, all leads not designed to carry r-f currents, are shielded. Ground the shield braid at each end and wherever convenient throughout its length. The bypasses are disc ceramics.

In mounting the two variable condensers below the chassis, note that the oscillator plate condenser is insulated from the chassis, and its shaft is fastened to the dial through an insulated coupling, but the 807 plate condenser is fastened directly to the chassis.

In assembling the output filter, center the coils in the shield boxes and keep the condenser leads short. A short length of coaxial cable brings the r.f. from *L4* to the filter.

Oscillator Grid Circuit

Frequency stability of the transmitter depends largely upon the care with which the oscillator grid circuit is constructed. (*See Fig. 3*) I used the coil form and oscillator shield can from a dismantled *BC-459* in its construction, but any ceramic coil form, 1¼ inches in diameter *National XR-16*, etc.) and a metal box, about 2½ x 5 x 5 inches may be substituted for them.

C1, the main tuning condenser, is mounted on the front of the box, with its mounting bushing also serving to fasten the box firmly to the front panel. *C3*, the 150-μμfd., fixed ceramic padder, is soldered directly across it. C2, the variable padder, is mounted on the side of the box. The coil, which is firmly fastened to the chassis, completes the components inside the box.* A cover, cut from a piece of scrap aluminum, completes the shielding of the components.

C1 originally had a maximum capacity of fifty μμfd., but I removed plates from it after the oscillator was in operation until the 7-Mc. band was spread over most of the dial. The dial is home-made. It consists of a four-inch bar knob and a hand-calibrated paper scale, fastened to the panel with electrical Scotch tape.

Placing The Transmitter In Operation

Plug in the tubes and apply filament voltage and 150 volts, regulated d.c. to the oscillator B+ terminal. Set *C1* to half capacity and adjust *C2* until a signal is heard in the station receiver tuned to the middle of the 7-Mc. band. Plug a low-range milliammeter into the 807 grid-current jack and tune *C8* for maximum grid current. (In normal operation, *C8* can be adjusted at the middle of the band, and then left untouched.)

Plug in a key and apply plate voltage to the 807. Press the key and quickly resonate the 807 plate circuit, as indicated by a sharp dip in plate current. Connect a suitable load to the output connector and adjust coupling until the 807 plate current is approximately 100 milliamperes. Now adjust 807 grid drive with *C9* to the minimum value that does not cause the output to decrease.

Screw the bottom plate on the chassis and make final adjustments to *C1* and *C2* to center the band on the oscillator dial, removing plates from *C1* for the desired amount of band spread. Prepare the dial calibration.

* A possible modification would be to mount the v-r tubes in the power supply. This would give more room, decrease the heat dissipated in the compartment, and permit the same v-r tubes to be used in the screen circuit of several transmitters. It would necessitate TVI filtering one additional power lead—Editor.

* Although W6BLZ mounted C4 and C5 near the 6AG7 socket, there might be some advantage in placing them inside the grid-circuit shield. Also, omitting C6 may improve oscillator stability—Editor.

Flexible I-F Channel Selectivity

Obtaining Selectivity an Easy Way with a Simple All-Electronic Filter

KEITH S. CHAMPLIN, WØMCY

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Have you ever been sitting back, relaxed, and enjoying a nice QSO, when someone else decided to try your channel? Its happened to me, and its happened to you. You probably muttered a few choice words, flipped on the crystal filter, and tried to tune your boy into the clear. Ten minutes later you were still tuning—about 30 kilocycles from your friend. You heard a lot of interesting conversations, but what happened to your QSO?

Let's face it. Crystal filters are hard to tune. The phasing control effects the shape of the whole pass-band. Consequently, you must turn two controls to get the desired station into the peak and the offender into the null. A precarious process to say the least.

Electronically, we can separate stations easier and faster. The "electronic crystal filter" is as sharp as a good crystal and twice as simple to operate. One control selects the desired function—"off," "peak," or "null." The only other control tunes the null or peak across the i-f pass-band. It tunes as easily as your b.f.o. With only one connection to the i-f strip, it is simple to install in your present receiver or a "natural" for that new job you're building.

The Peaking Circuit

This circuit (see *Fig. 5)* gets its high selectivity from *Q* multiplication caused by positive feedback. A multiplication factor of 20 to 40 applied to an ordinary tuned circuit results in a *Q* as high as that of a good crystal filter.[1] This is accomplished by neutralizing the loss resistance of an *LC* circuit with the negative resistance of a positive feedback amplifier. The idea isn't new. The same principle has been used for years in regenerative i-f and r-f amplifiers.

The novel twist in the present arrangement is the provision of a separate selective circuit which can be added to existing i-f amplifiers without change. The circuit may be built right into an existing set, or, if desired, may be entirely external to it. Furthermore, the electronic null selectivity provided will be found to be much more flexible than that obtainable with a crystal filter.

Figure 1 shows the basic diagram of the *Q* multiplier connected to the i-f strip. Off resonance, the impedance of the tuned circuit LC_aC_b is low, resulting in the attenuation of i-f signals. At resonance, the parallel resonant impedance of LC_aC_b becomes very high. Because the impedance of the circuit is raised, signals pass unhindered through the i-f strip. This produces a sharply peaked i-f pass-band similar to *Fig. 3.* The resonant frequency of the LC_aC_b combination determines the position of the peak. If C_a is the variable, the feedback will remain fairly constant over the tuning range when C_b equals approximately $2C_a$.

The through phase-shift from *A* to *B* at resonance is zero. We will see the significance of this fact when we investigate the null circuit.

The Null Circuit

We obtain the null circuit by using negative feedback to control the plate resistance of an amplifier. A tube such as a *12AX7* has a high

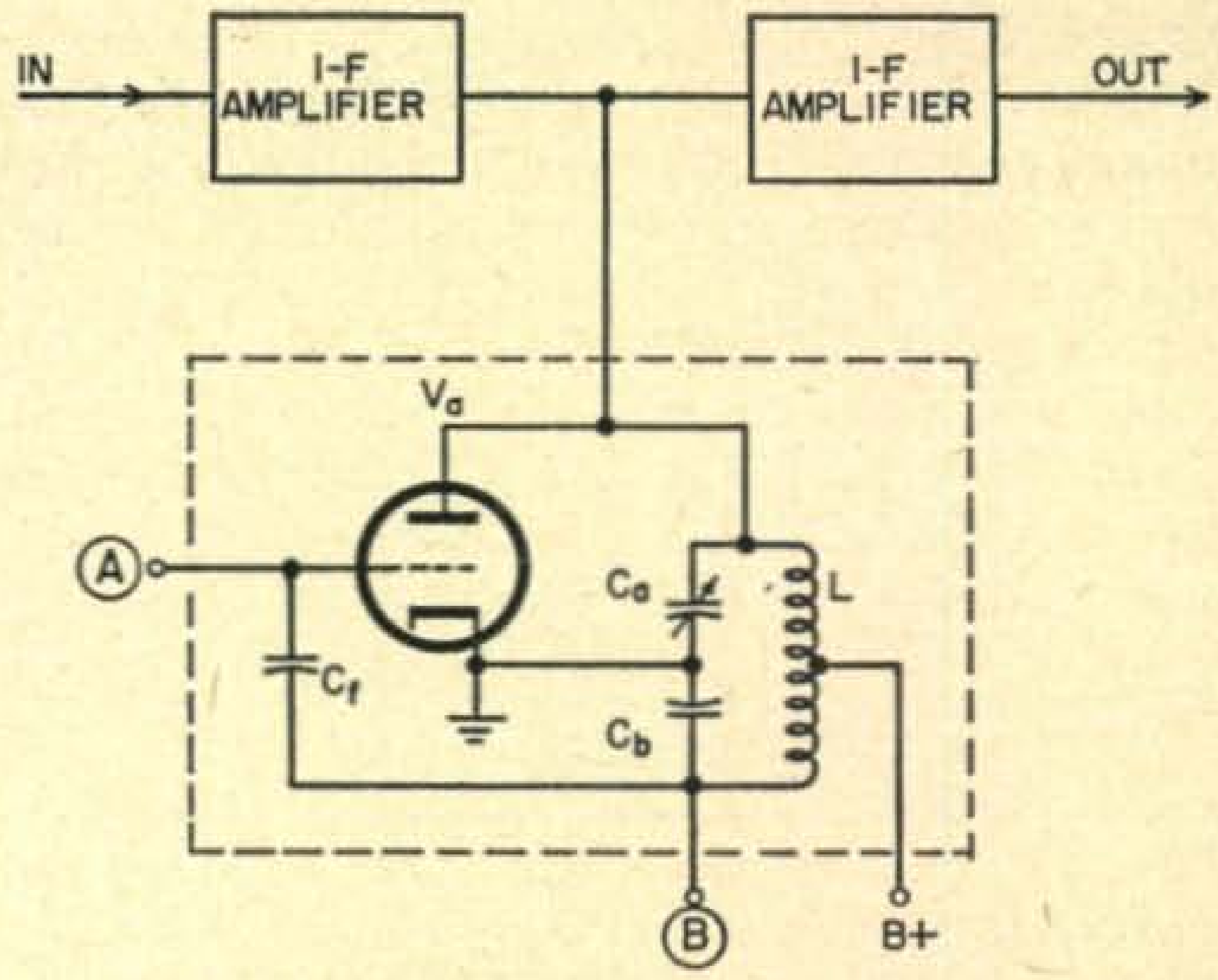


Fig. 1. Basic Q multiplier connected to the i-f strip.

1. O. G. Villard, Jr. and W. L. Rorden, "Flexible Selectivity for Communication Receivers" Electronics, April, 1952, p. 138.

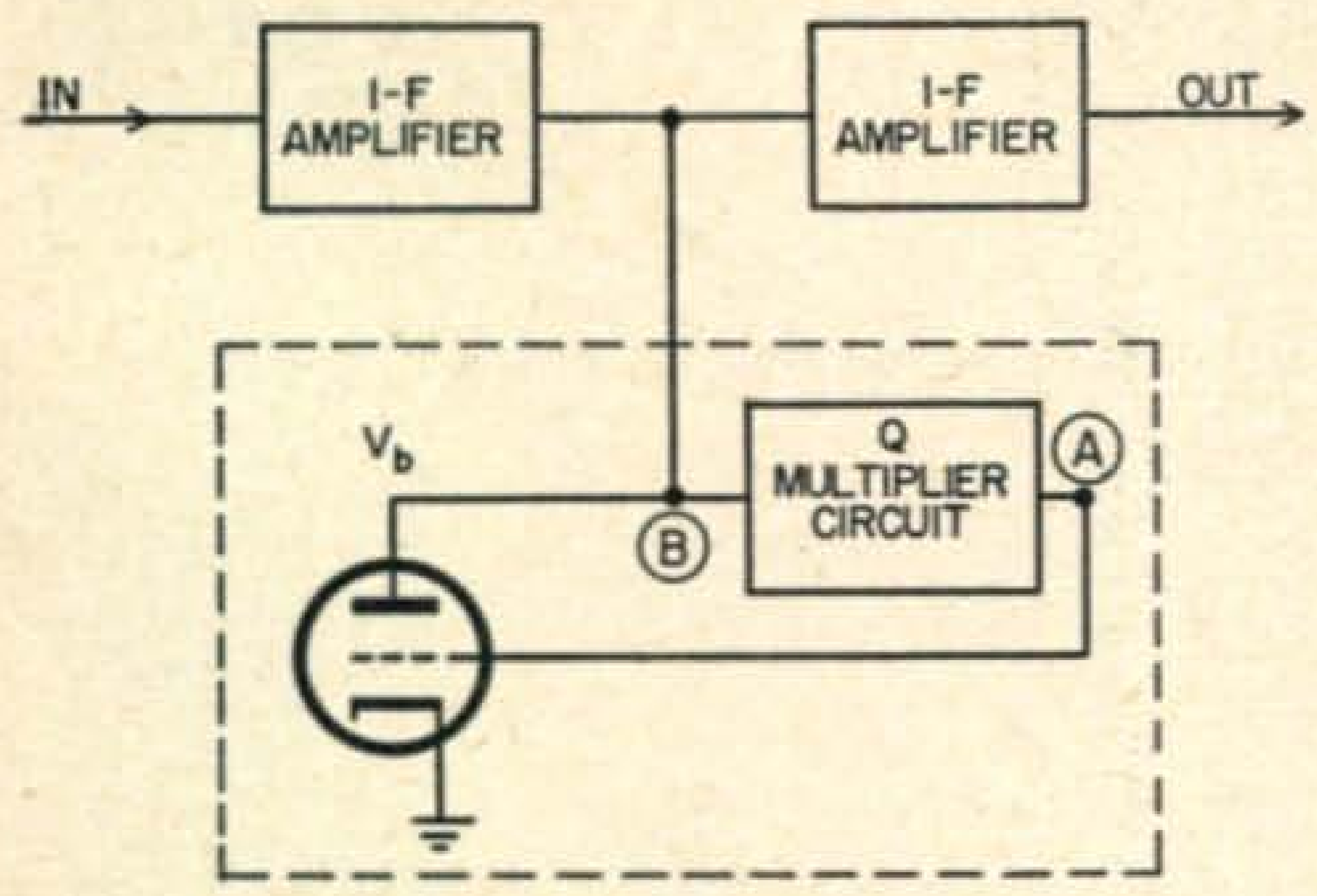


Fig. 2. Basic diagram of the null circuit.

plate resistance compared to the impedance of the i-f circuit. Connecting the tube from i-f plate (or grid) to ground inserts a variable impedance, thus controlling the i-f amplification.

The basic diagram of the null circuit is shown in *Fig. 2*. The *Q* multiplier, V_a, regulates the negative feedback of V_b. At resonance, since the phase-shift through the *Q* multiplier is zero, V_b receives high negative feed-back. The resulting low plate resistance of V_b attenuates the i-f signals. Away from resonance, the negative feedback drops, raising the plate resistance to its normal value so signals pass through the i-f strip with little attenuation. This circuit produces the sharp null shown in *Fig. 4*.

The Practical Circuit

The circuit of *Fig. 5* combines both operations in one unit. Switch *S1* selects *null, peak,* or *off* (i-f pass-band unchanged). Tube *V2* is the *Q* multiplier that produces the selective peak. The negative feedback amplifier *V1,* in conjunction with the *Q* multiplier, gives the i-f null. Wire-wound potentiometers *R5* and *R6* control the positive feedback of *V2*. Mica trimmers, *C7* and *C8,* are adjusted for constant feedback throughout the tuning range of the variable condenser, *C9*. Resistor *R2,* by-passed by *C2,* insures a normally high plate resistance of *V1*. The only connection to the i-f strip is through *C1*.

Voltage regulation, although not absolutely necessary, is desirable for circuit stability. Connecting the circuit to the low-level i-f stages prevents the possibility of overloading the filter on strong signals. Mount the components of the filter near the connection to the i-f stage so that stray coupling to other i-f amplifiers is minimized. If necessary, use extension shafts on *S1* and *C9*.

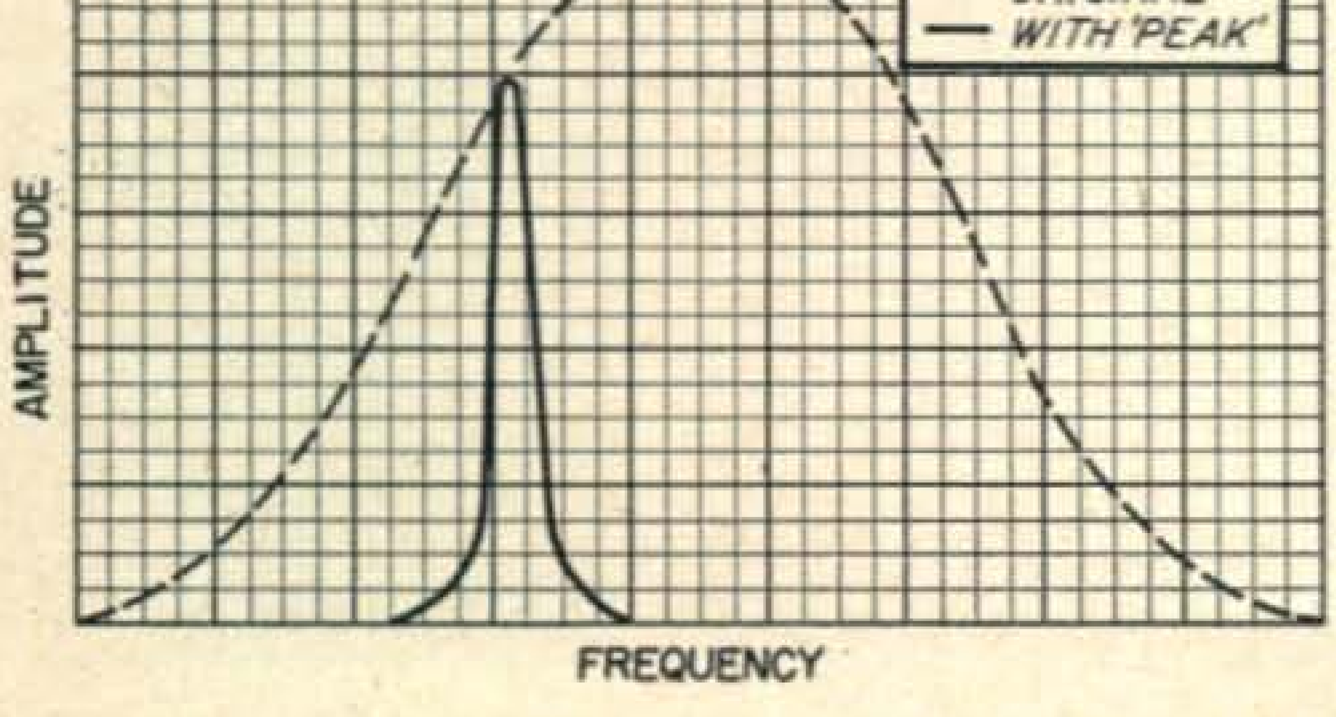
Coil *L1* is a cut-down i-f transformer with the condensers and one winding removed. If you have no means of measuring the inductance, use a slug-tuned transformer and take off about two-thirds of the windings. You can adjust the inductance to its correct value with the slug. Coil *L1* should have a reasonably good *Q* for a high-*Q* overall circuit.

Adjustment

Adjustment of the electronic filter is fairly easy without a signal generator or oscilloscope. If you have these items it is somewhat simplified, but the procedure is essentially the same. The adjustment consists of (1) resonating the tuned circuit in such a manner that C_b equals $2C_a$; (2) setting *R6* just below the point of feedback on *peak,* and (3) setting *R5* for minimum response in the *null* position.

Without test equipment, the adjustment is as follows:

1. With *S1* in the "off" position, tune a signal to the center of the i-f pass-band by rocking the bandspread dial back and forth, converging on the signal.
2. Set *C7, C8,* and *C9* to mid-capacity, and turn *S1* to *peak*. The signal will disappear.
3. With *R6* just below the point of oscillation, adjust *L1* until the signal reappears. If *L1* is already 200 microhenries, this step isn't necessary.
4. While rocking *C9* back and forth, adjust *C7* and *C8* so that the tendency toward oscillation is constant. Turning *C7* and *C8* in opposite directions keeps the signal peak in the center of *C9*.
5. The peak circuit is adjusted when the resistance of *R6* is just above the point of oscillation; varying *C9* does not affect the setting of *R6;* and the signal



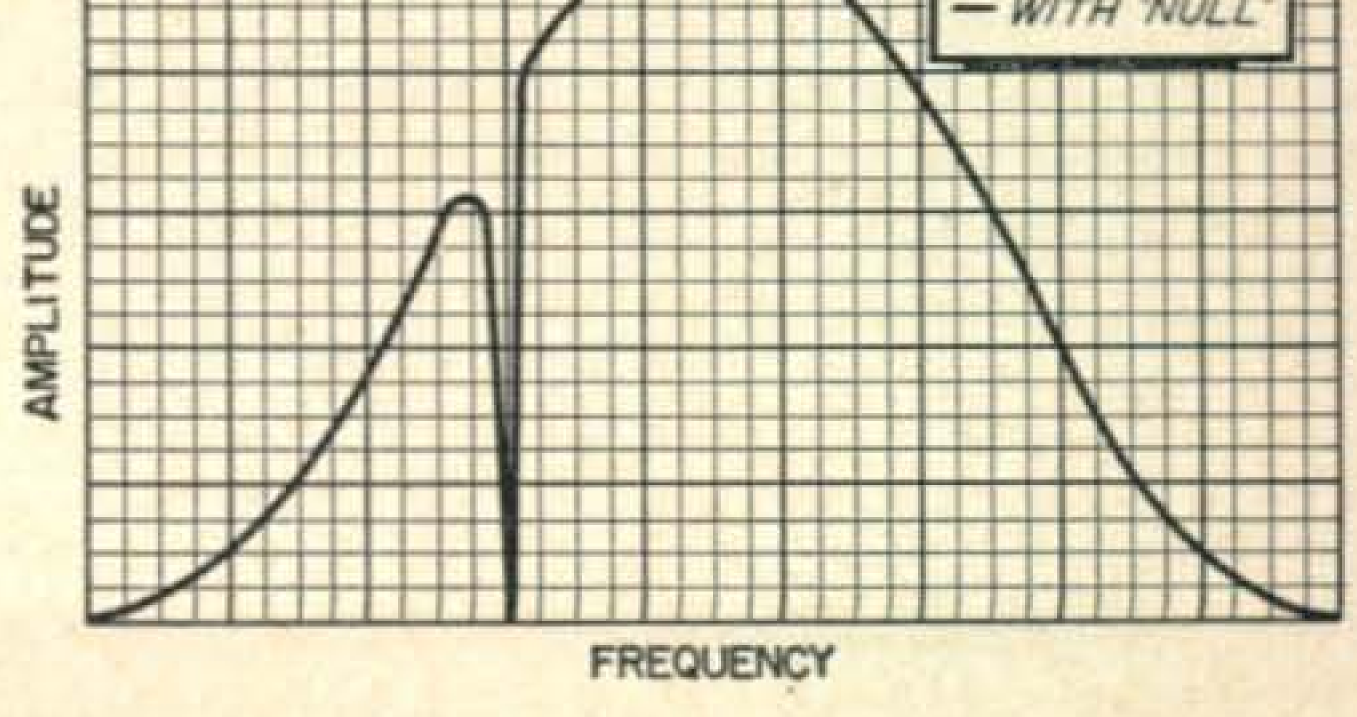
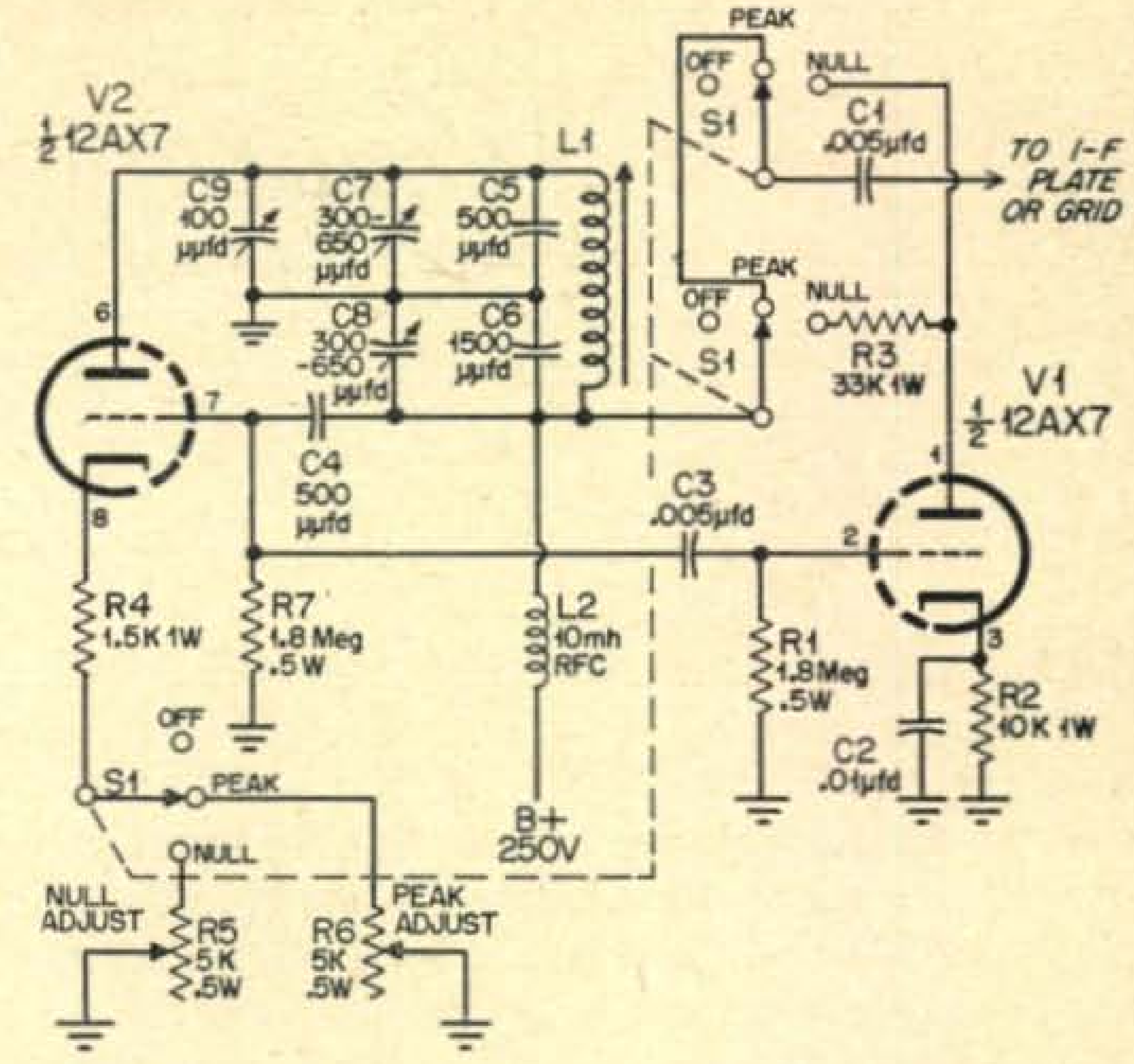


Fig. 3. (left) The i-f channel pass-band with the circuit set for "peak." Fig. 4. (right) Rejection in the i-f channel pass-band with the circuit set for "null."

C1, C3—0.005 μfd. mica
C2—0.01 μfd. mica
C4—500 μμfd. ceramic (Erie)
C5—500 μμfd. silvered mica
C6—1500 μμfd. silvered mica
C7, C8—300-650 μμfd. mica trimmer
C9—100 μμfd. variable (surplus)
R1, R7—1.8 megohms, ½w.
R2—10,000 ohms, 1w.
R3—33,000 ohms, 1w.
R4—1500 ohms, 1w.
R5, R6—5000 ohms, wire wound pot., ½w.
L1—250 uh. (modified Miller 12C1, see text)
L2—10 mh. r-f choke
S1—3-gang, 3-position ceramic wafer switch (Centralab)

→

Fig. 5. Parts list and wiring schematic.



in the center of the pass-band peaks at the mid-position of *C9*.

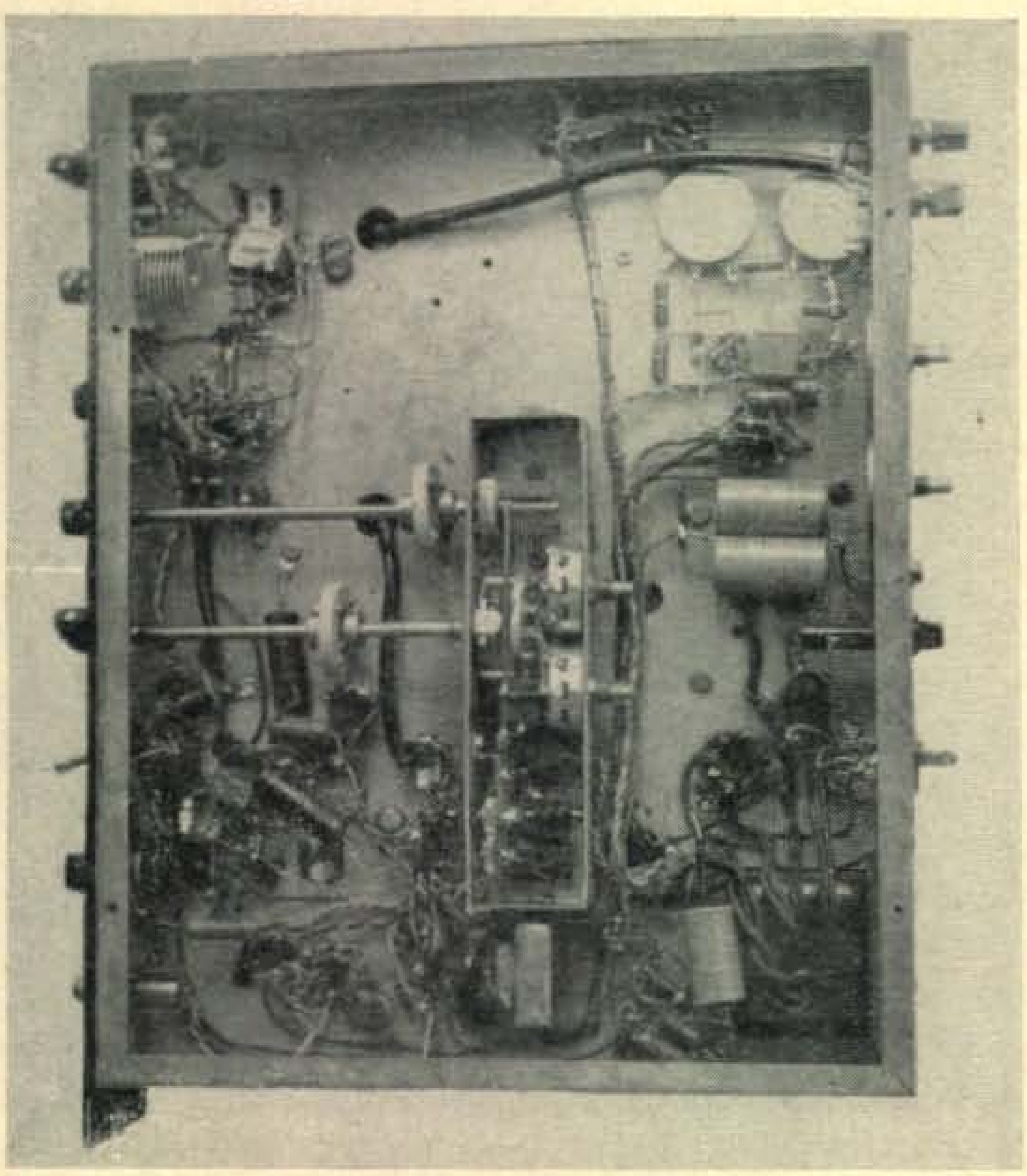
6. Now, turn *S1* to *null* and adjust *R5* until the signal disappears. This adjustment is very sharp.

With adjustment completed, you're ready to try it out.

Operation

CW reception is greatly simplified with the electronic filter. The desired station is peaked or the offender nulled without changing the desired signal's pitch by tuning *C9*.

On phone, a heterodyning station will disappear when placed in the null. For a graphic demonstration, select two interfering signals, and place the peak on one of them. By switching *S1* from *peak* to *null,* each station will alternately appear in the clear!



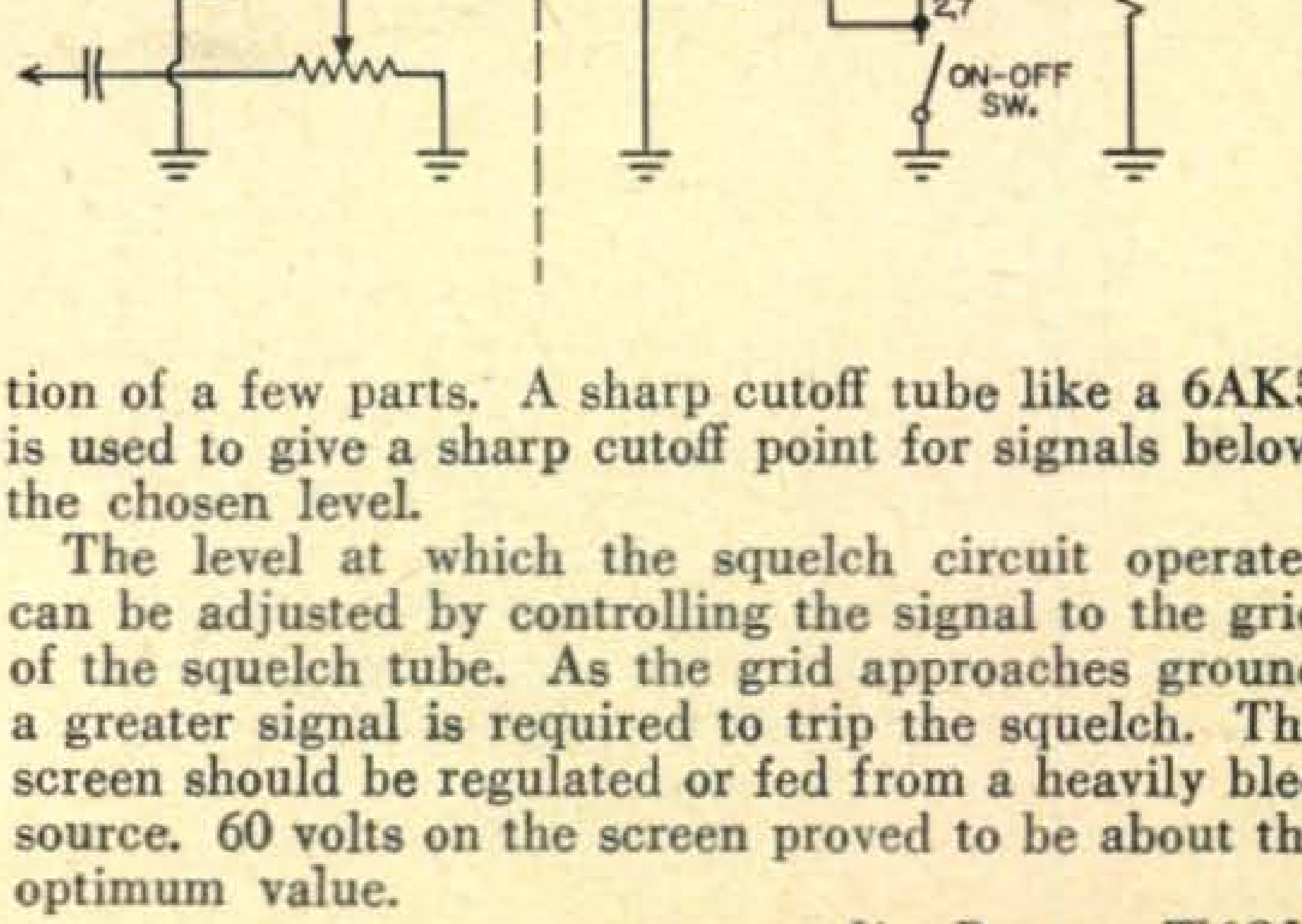
The above photograph shows the installation of a unit described in the text in the author's communication receiver. The filter is mounted in the shielded compartment. Condenser C9 and switch S1 are brought out to the front panel. Controls R5 and R6 are pre-set with the receiver out of the cabinet and do not require further adjustment.

Inside the Shack and Workshop

Simple Squelch Circuit

No doubt all mobile Hams have experienced the headaches that usually result from extended periods of patient listening to a band filled with signals too weak to work.

Here is an ideal place for a squelch circuit to be put to use which will only allow signals above a certain level to come through. The circuit shown requires no changes in your present receiver; only the addition of a few parts. A sharp cutoff tube like a 6AK5 is used to give a sharp cutoff point for signals below the chosen level.



The level at which the squelch circuit operates can be adjusted by controlling the signal to the grid of the squelch tube. As the grid approaches ground a greater signal is required to trip the squelch. The screen should be regulated or fed from a heavily bled source. 60 volts on the screen proved to be about the optimum value.

Jim Pepper, W6QIF

More on Mechanical Filters

The Follow-Up Story from our March 1953 Issue on Filters with Narrow Bandwidths and Special Adaptations

E. MILES BROWN, W2PAU

Technical Advisory Editor, CQ.

The recent announcement by the *Collins Radio Company,* of a line of packaged mechanical filters designed for use in the 455-kc. intermediate frequency amplifiers, should be of great interest to those desiring to improve receiver selectivity. The 3000-cycle bandwidth filter was designed to suit the needs of the radio telephone operator. It is equally well adapted for use with double or single sideband reception. For strictly CW reception, an 800-cycle bandwidth filter is now available. To meet the demands of other specialists, the *Collins Company* will also produce, on special order, certain bandwidths lying between 500 and approximately 6000 cycles.

Using Adapters in Present Equipment

These filters may be used in connection with any receiver which has an intermediate frequency of about 455 kc. In general, some circuit changes are required to adapt an existing i-f system for use with the mechanical filter. However, it is quite practical to arrange the filter and necessary circuit elements on a plug-in adapter unit designed to fit into the place of one of the normal i-f tubes in the receiver. Through the use of such an adapter the full potentialities of the mechanical filters may be realized without drastic receiver-circuit modifications.

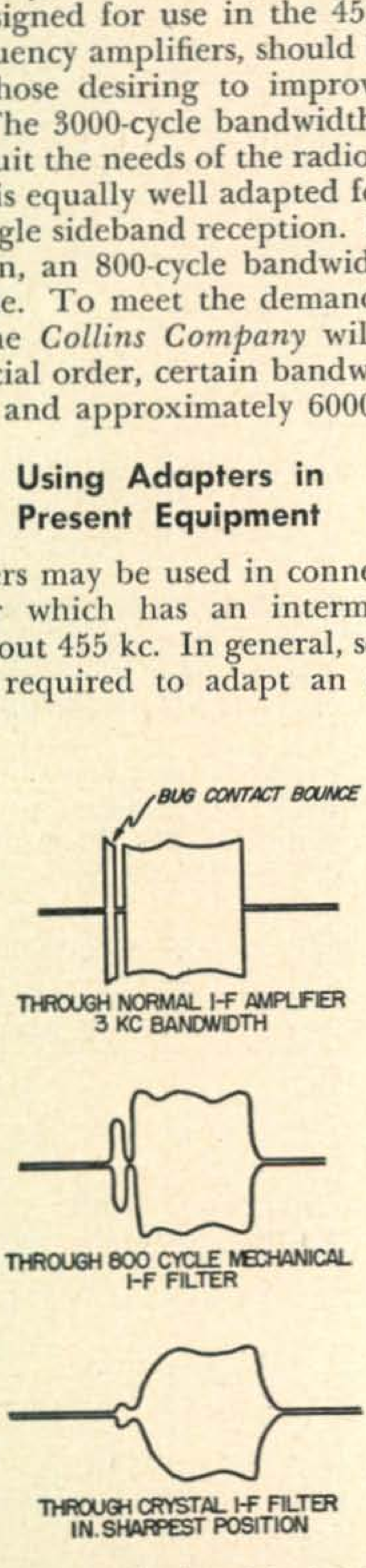


Fig. 1. Oscillograms (reduced to drawings) of a keyed "dot" at approximately 15 w.p.m. The waveform is the response obtained at output of the receiver i-f strip.

Two possible arrangements for a plug-in adapter were described in the March 1953, issue of *CQ*.[1] The "box-type" adapter consisted of a single unit assembly; the mechanical filter and two sub-miniature tubes with their associated circuit elements were housed in a small box fitted with a tube base-type plug. The entire unit was designed to be plugged into a receiver in place of the normal i-f tube. The second type of adapter was constructed in two sections. A plug-in "probe" assembly contained the two sub-miniature tubes and their circuit components, and the mechanical filter (or filters, if more than one were to be used) was mounted on a separate box connected by flexible cables to the probe unit. A switch was included in the box to permit selection of the desired filter unit, or a non-selective network which served to restore the receiver to its normal selectivity.

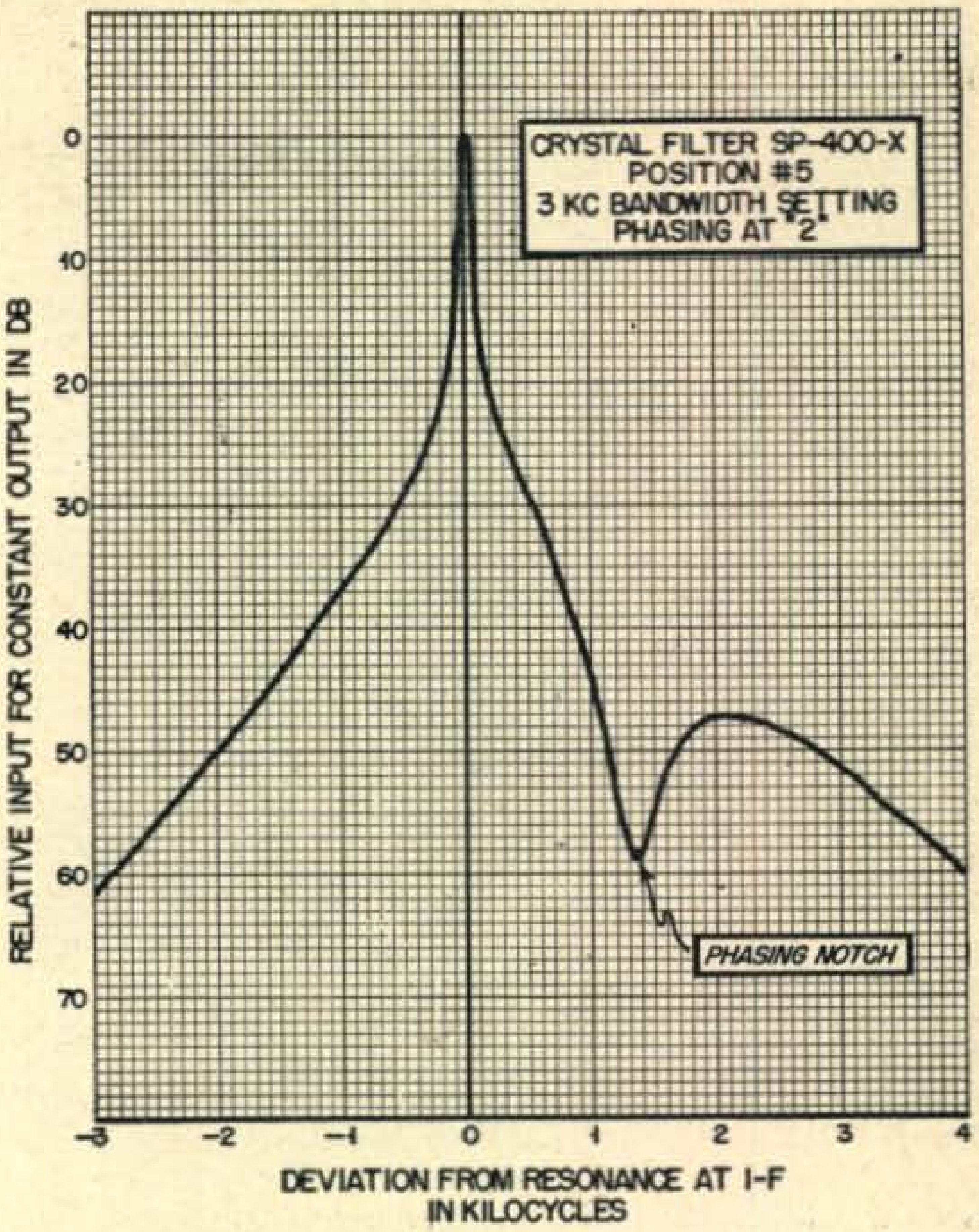
The performance of the 3000-cycle bandwidth filter as reported in the early *CQ* article has since demonstrated that our initial enthusiasm was not premature. The selector switch always seems to end up in the 3000-cycle position whenever the receiver is used for 'phone reception on the crowded low-frequency bands. It has been our observation that inexperienced operators quickly catch on to the trick of tuning the carrier near one edge of the filter's pass-band to obtain crisp audio quality. When a heavy heterodyne appears on the received signal, it becomes instinctive to touch up the tuning to listen on the other sideband, usually placing the heterodyning character far down on the filter's response curve. In short, the performance of the 3000-cycle filter and the probe-type adapter has been fully satisfactory during six months of continuous service (the receiver runs 24 hrs. per day). No maintenance has been required.

1. Brown, "Using the Collins F455A-31 Filter," CQ, March, 1953, p. 13.

As soon as the 800-cycle mechanical filters became available, one was installed in conjunction with our present receiving equipment. Selectivity curves shown in conjunction with this article tell the full story. Despite the extreme selectivity, it is very easy to handle. One can rock the tuning dial around a bit without the fear of losing the signal at the first touch. A slight amount of drift in the other fellow's signal is tolerable. To one who has developed a strong dislike to the ultra-sharp crystal filters, these features come as a distinct and welcome relief. Although there is a tendency for the filter to "ping" when sharp noise pulses are received, it is not as objectionable in this respect as most crystal filters.

Signals outside the immediate pass-band are attenuated more completely by the mechanical filter than by the best of the crystal-type filters. There are times, however, when the adjustable phasing notch of the crystal filter does come in handy. Using the mechanical filter adapter setup in a receiver in conjunction with a good crystal filter has one decided advantage—the performance of the crystal filter can be retained—provided the peak of the crystal filter response curve falls within the pass-band of the mechanical filter.

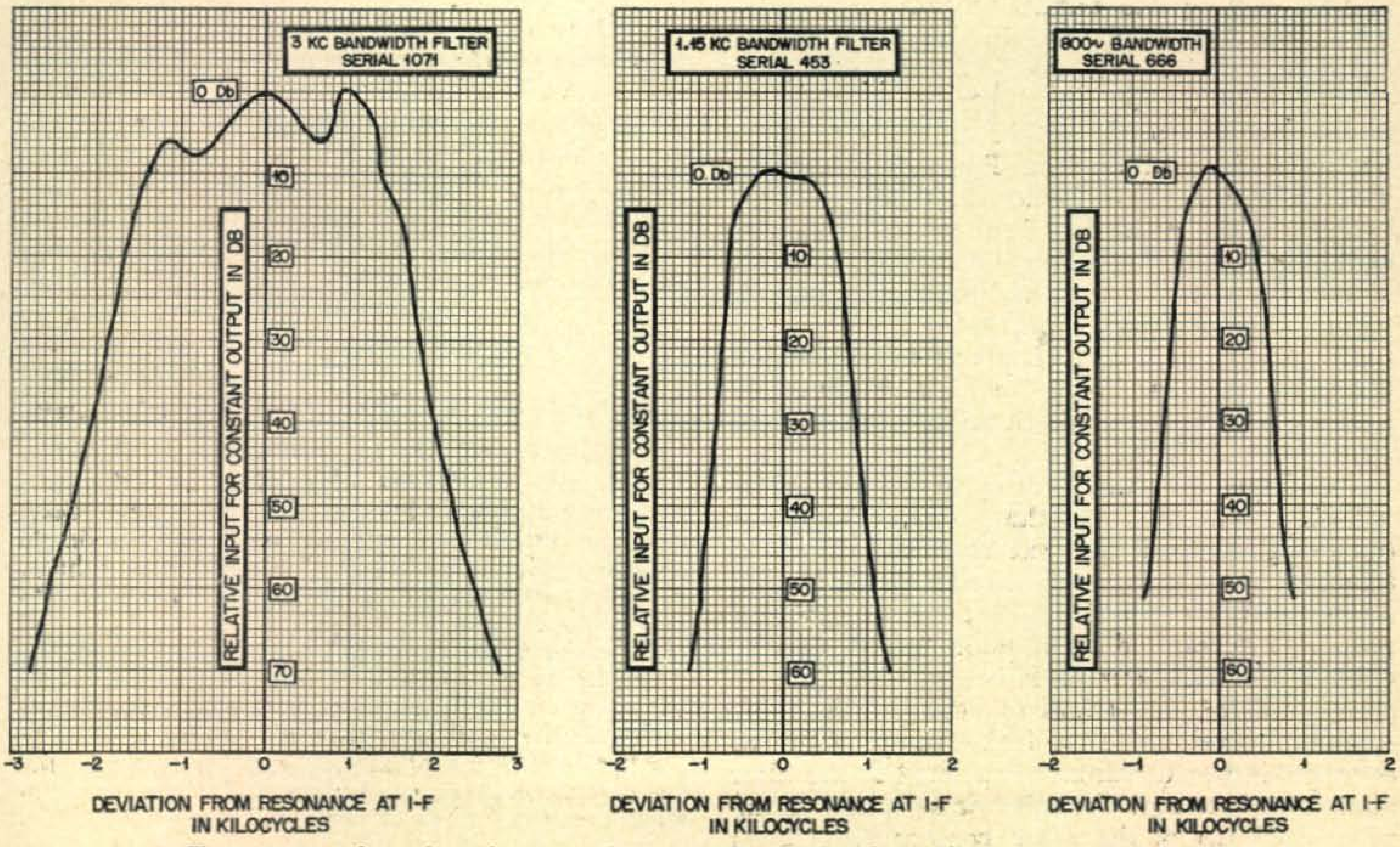
An interesting comparison of the behavior of the two types of filters on CW signals is afforded by a series of oscillograms showing the reproduction of a typical CW dot through the two filters (see *Fig. 1*). The top drawing shows the dot as reproduced through the normal i-f amplifier of a *Hammarlund Super-Pro* receiver (without fil-



Combination selectivity curve obtained through the use of a 3100-cycle mechanical filter and a crystal filter in the author's Super-Pro receiver.

ters). Note the effects of chattering contacts on the automatic key—the sharp transients and the steep rise and fall of the edges of the dot. Truly, a signal with "character!"

The 800-cycle mechanical filter (second drawing) preserves most of the characteristics—the



These curves show the selectivity characteristics of the three filters experimentally used at W2PAU.

In this latest model of the external adapter the author (with W2SPV doing the wiring and layout) has separated the input and output cables so that one does not run through the compartment of the other. The input cable is brought directly to its own compartment and is shown entering through the grommet to the left of the 3100-cycle filter. Only two filters are used with this adapter.

contact bounce is still obvious, but the edges of the dot are slightly more rounded. The third drawing shows the response of the crystal filter. This looks almost like the proverbial bell-like tone. Obviously, of the two filters, the 800-cycle unit preserves more of the original information hence it should be easier to copy in normal practice.

Using the Filter on RTTY

Recently, we have had the opportunity to use a filter having the bandwidth of 1150 cycles. This filter has been used in conjunction with our FSK receiving set-up. No problems were encountered in getting this filter to work and in operation, the special 1150-cycle filter provides beautiful copy of a clean FSK RTTY signal. Tuning the receiver is no problem—once the proper BFO setting has been established, one can simply tune by ear to the only dial setting where both tones are audible and bang—it prints! An oscilloscope on the i-f output shows that when the FSK signal is properly centered on the filter pass-band, the *mark* and *space* responses are equal and there are no serious switching transients.

When the 800- and 1150-cycle units were installed, it was observed that some leakage was occurring around the external switching assembly unit. Even though these responses might be as much as 80 db. below the normal input signal they resulted in a poor "skirt" on the overall selectivity curve. It became necessary to employ all of our tricks of shielding and decoupling to minimize the leak-through. Most of the trouble was fortunately confined to the filter mounting box and the selector switches. Complete shielding of the input compartment from the output compartment is most essential. The unused filters and the non-selective coupler should be short circuited by a switch section. The switch must be of split-section construction with an insulated shaft. Mounting screws for the front and back sections of the switch should be separate to avoid mutual paths through the switching hardware. The input signal cable must not run through the output compartment. Good electrical bonding of the box cover is essential.

In summary, it is apparent that the mechanical filters are capable of providing the desired selectivity characteristic of a wide range of bandwidths. It is practical to use these filters in a receiver without modification of the receiver circuitry through the use of a plug-in adapter. Based on the author's experience, use of a mechanical filter, designed to pass only the minimum required bandwidth for a particular mode of transmission, provides a significant improvement in readability of signals under typical conditions on the crowded amateur bands.

Inside the Shack and Workshop:

Eliminating Auto Generator Whir

After two experiences of eliminating bothersome auto generator whir by the trial and error method, complete satisfaction was obtained by the simple expedient of putting a .01 μfd. metal case tubular condenser from the hot brush inside the generator to the generator case, usually called "ground." Several other easier cures were tried, to that of removing the generator to get to the proper place (inside, under the strap covering the opening to the commutator) to install the condenser, with no success.

After installation of the .01 μfd. condenser in the generator, all other condensers and traps were removed, and no trace of whir can be heard on 10 meters.

Paul M. Cornell, W8EFW

Class 'K' Modulator

An Experimental Method of Plate Modulating 90 Watts Input to the Final with a Single 807

DALE HILEMAN, WØMCB

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One of the simplest (although least used) means for obtaining high-level plate modulation is the class A Heising, or choke-coupled modulator. The principal advantage of Heising modulation over the conventional class AB or B push-pull method is that the Heising system uses a garden-variety filter choke in place of a more expensive modulation transformer.

Heising modulation has little use in medium- and high-power rigs for several reasons. In the first place, since the plate efficiency of a class A amplifier seldom exceeds 30 per cent, the modulator tube must be disproportionally large to handle the extra plate dissipation. The power wasted in the modulator plate might just as well be put to use elsewhere in the transmitter. Another drawback to the use of Heising modulation is that the modulator draws full plate current continuously; whereas with class B modulation, plate current is a function of the applied audio voltage, and the associated power supply is allowed to rest between voice syllables and sentences.

The theoretical maximum efficiency of a class A amplifier is 50 per cent. However, this figure is seldom realized in practical class A amplifier

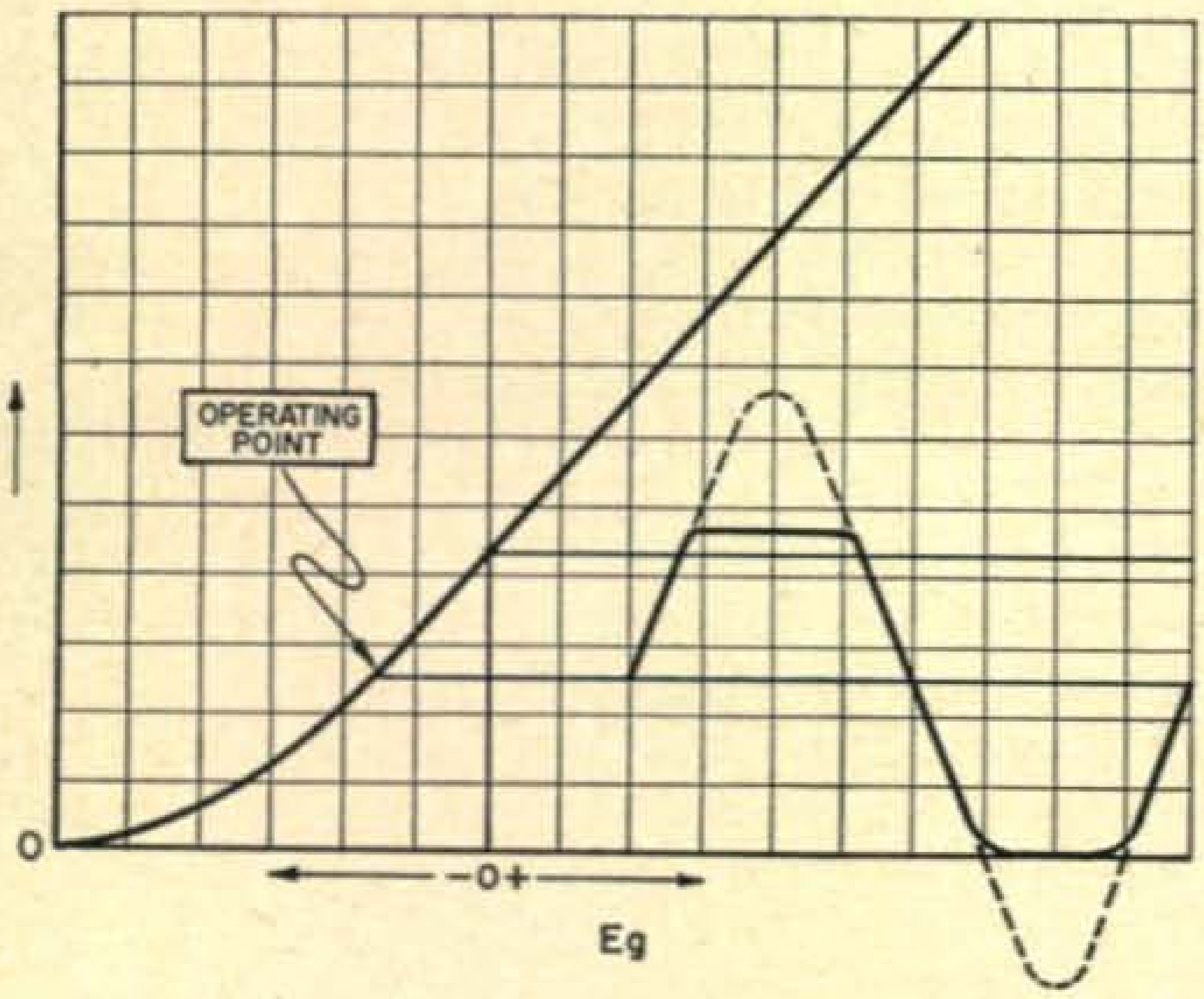


Fig. 1. The usual class A amplifier has an efficiency of less than 50% in order to keep distortion down to a reasonable level. Peak clipping results if the grid is swung into the grid current region on the positive half-cycle and distortion when it is swung into the plate current cutoff region.

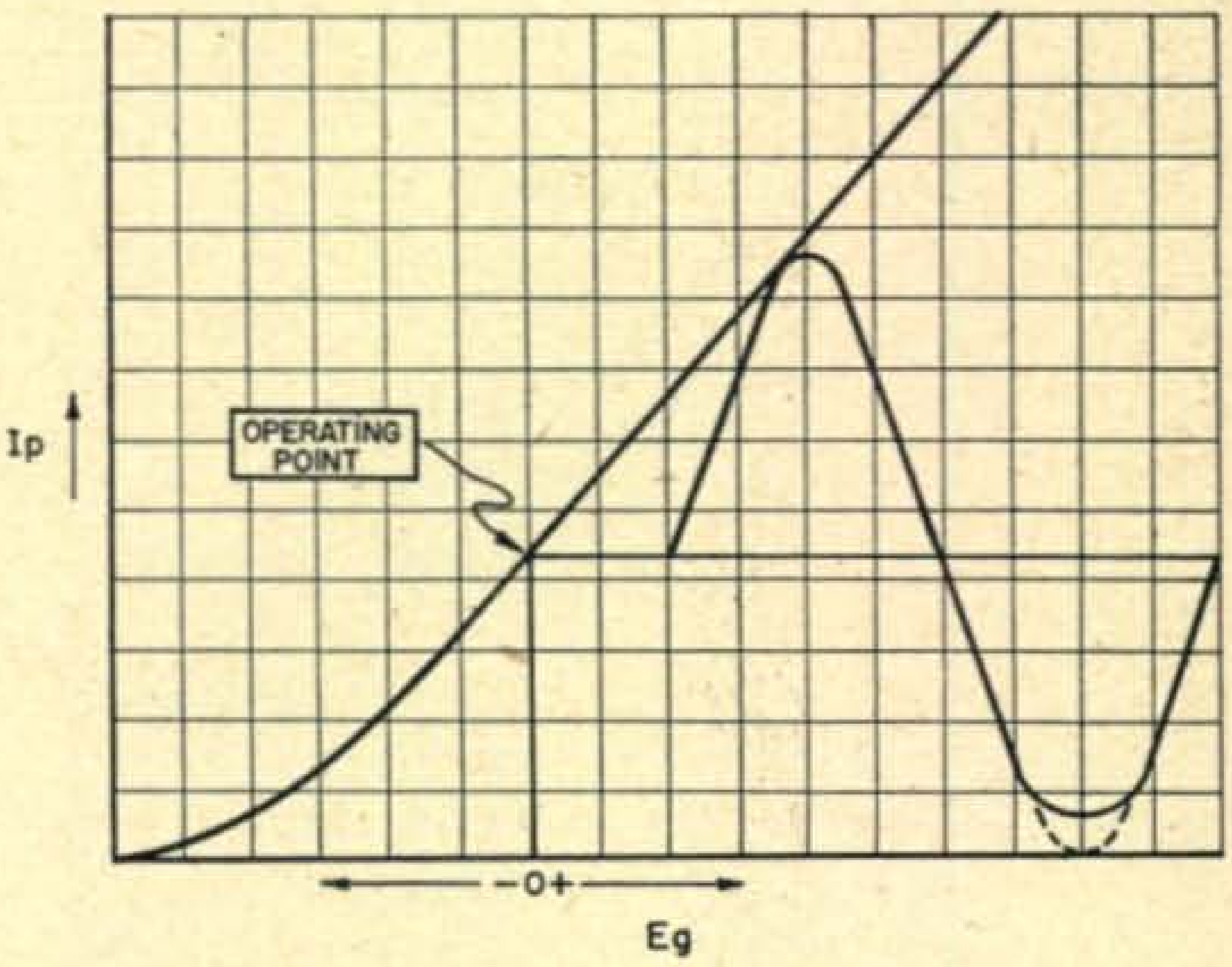
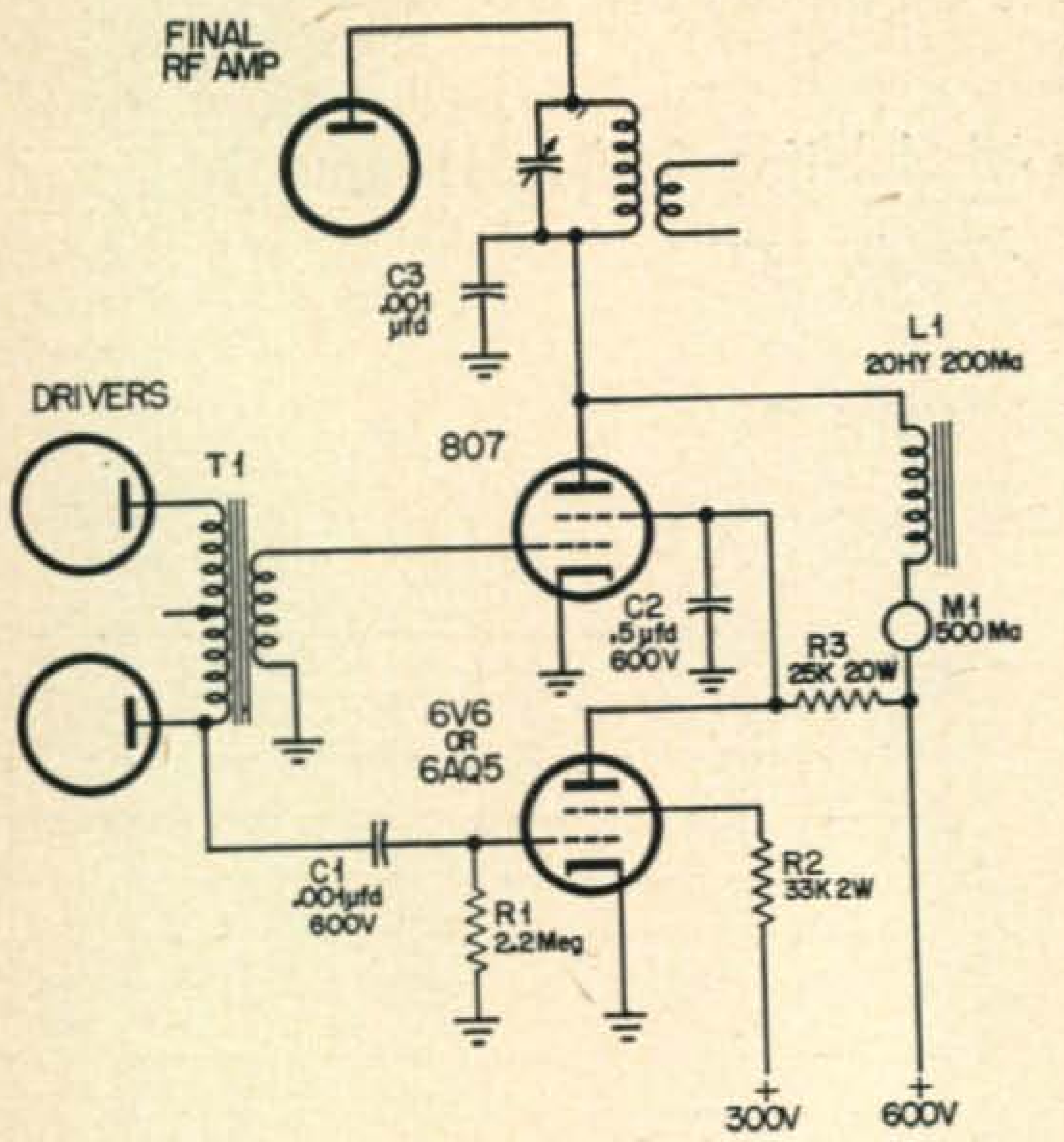


Fig. 2. The grid can be swung to nearly cutoff if we operate the tube at a very high plate current point. Distortion (see Fig. 1) is present only during a negligible fraction of the plate current cycle.

circuits; in order for the amplifier to deliver an output equal to half the input, the peak plate voltage swing would have to equal the d-c supply voltage. This condition can be approached if the amplifier is overdriven; but distortion is introduced when the grid is swung into the plate current cutoff region. And if the grid is swung into the grid-current region on the positive half-cycle, peak clipping is very likely to occur (see *Fig. 1*).

However, if the amplifier tube is operated at a high-plate-current point on its characteristic curve (either by reducing bias or by raising screen voltage), the grid voltage can be swung nearly to cutoff without too much distortion being introduced. This is because the flattened portion of the peak would occupy only a small fraction of the entire plate-current cycle. Then, if the driving source is capable of delivering the required grid losses with good regulation, the grid voltage can be swung far into the grid-current region without producing excessive distortion (see *Fig. 2*).

The obvious disadvantage to a circuit such as that described in the previous paragraph is that the static plate current is extremely high. Now if some system were devised to reduce the plate current of the amplifier during the intervals no



R2—33,000 ohms, 2w.
R3—25,000 ohms, 20w.
C1—0.001 µfd., 600v.
C2—0.5 µfd., 600v.
C3—0.001 µfd., 1200v.
L1—20h., 200 ma.
M1—0-500 ma. meter
T1—driver transformer, see text

Fig. 3. Parts list and wiring diagram of the class K modulator.

audio were being applied to the tube, such a system might be feasible.

The Class K Amplifier

The circuit shown in *Fig. 3* meets these requirements. This amplifier, developed by Richard Klensch (K2AZJ) and the author, is fundamentally a class A_2 zero-bias amplifier with audio-controlled modulator-screen clamp tube. For want of a shorter name, Klensch calls it the Klensch calls it the "class K" amplifier.*

The 807 is operated at zero bias so that the grid must be swung many volts negative before cutoff occurs. Transformer coupling and low-plate-impedance triode drivers are used so that positive peaks are not clipped appreciably when the 807 draws grid current.

Conceivably, the same results can be obtained if the 807 is operated class A_1 and the screen voltage increased to produce the high-plate-current operation. A cursory attempt was made to obtain this type of operation, but the experiment was abandoned because of the difficulty encountered in producing the required screen-voltage variation with audio input.

The clamp tube in the 807 screen circuit is used in much the same manner as with r-f power amplifiers, except that an audio voltage is used to develop the clamp-tube bias instead of an r-f voltage. Thus when no audio is applied to the amplifier, the 6V6 conducts to reduce the 807 plate current. When an audio signal is applied to the amplifier, the 6V6 average plate current is reduced in proportion to the amplitude of the audio. Thus the 807 plate current is proportional to the audio level.

The Class K Modulator

Class K modulation is not screen-grid modulation; it is not efficiency modulation; it is not a controlled-carrier system. It is high-level plate modulation. The clamp tube controls the average plate current of the modulator tube only; not of the r-f amplifier plate current.

The circuit shown in *Fig. 3* could just as easily use transformer coupling instead of choke coupling. But this would defeat the purpose of the class K modulator, as modulation transformers usually cost considerably more than chokes.

For the sake of convenience, the modulator was built in the same chassis with a commercially-made audio amplifier unit using push-pull 6V6's in the output stage. The 6V6's supplied far too much drive for the 807 grid; so the author triode-connected 6V6's to reduce the gain of the amplifier and at the same time improve the audio regulation.

T1 is the output transformer of the amplifier unit. Originally intended for push-pull 6V6's to a 500-ohm line, the transformer made a good driver for the 807.

The 807 grid must be swung about 20 volts on peaks; and the maximum average d-c grid current is about 4 ma. The 6V6 develops from zero to 30 volts grid-leak bias, depending on the amplitude of the audio, causing the 807 screen voltage to vary between ten and about 150 volts.

Since the plate current of the 6V6 contains audio, the 807 screen was bypassed by *C2*. This condenser bypasses most of the audio so that the 807 screen voltage is allowed to follow only the amplitude of voice syllables. If *C2* were made larger, less audio would be impressed on the 807 screen; but at the same time the screen voltage would be unable to follow voice syllables and would be maintained at a rather high average level. The values shown work satisfactorily.

The 807 plate current varies between a static value of about 10 ma. and a full-output value of about 100 ma. At full output the amplifier voice modulates 90 watts (600 v. at 150 ma.) about 85%. The efficiency of the amplifier is a function of the audio level, but is about 50% at maximum output.

Distortion

Since it is a rather involved procedure to measure distortion with the use of complex waves such as occur in voice, the author used a sine wave for this test. Because the clamp tube for some reason does not respond to sine waves so well as voice, the tube was unclamped by means of a 27,000-ohm resistor connected from the screen to ground. At 36 watts output the entire

* An idea similar to this was presented in the October, 1950 issue of CQ by W2IJU. An error exists in the wiring schematic in that the junction of R16 and C14 should be returned to the -150 volt bus rather than to ground. Also 304TL tubes will probably perform better than 304TH's. A follow-up story on these systems will be published in an early issue.—**Editor.**

amplifier, including speech amplifier, drivers, and 807, showed a total harmonic distortion of only 12%.

The class K modulator was used with a Command transmitter running between 90 and 100 watts input. Tests conducted on the air indicated the speech was of good quality, although the 'scope pattern did show some peak flattening on the r-f envelope.

Design Considerations

This article is not intended as a "how to build it" story. A hastily constructed class K amplifier of guesswork design is very likely not to operate the first time it is turned on. The circuit shown in *Fig. 3* is the result of many hours of experimentation and at least five debilitated 807's. The information presented here is intended only as a guide to anyone further interested in further developing the class K amplifier.

First, the driving source must be capable of delivering grid swing to the 807 without bogging down when the 807 draws grid current. The driver should be a triode or a pair of triodes to provide a low source impedance. The driver transformer must be able to supply grid current for the 807 and maintain good voltage regulation. A properly-matched triode-connected 6AQ5 will drive the class K 807.

Second, several very important measures must be taken to reduce the average plate dissipation of the 807. In the class K amplifier of *Fig. 3*, the rated plate dissipation of the 807 is exceeded —of this there can be little doubt. Since the plate current, and therefore the plate dissipation, of the class K 807 is a function of the applied audio level, the class K amplifier will not tolerate jazz music, Tarzan yells, or singing.

Also, in order to keep the 807 static plate current down, the time constant of *C1* and *R1* should be no higher than is necessary to allow the clamp-tube average grid voltage to follow the amplitude of voice syllables. The time constant of *C2* and *R3* should also be kept to a minimum, but not so low that the screen grid voltage is allowed to follow the audio cycle. The resistor and condenser values shown in *Fig. 3* work satisfactorily.

Another condition affecting the average plate dissipation of the 807 is the amount of hum present in the driver plate supply. Excessive hum will trigger the clamp tube and will allow the 807 to conduct unnecessarily.

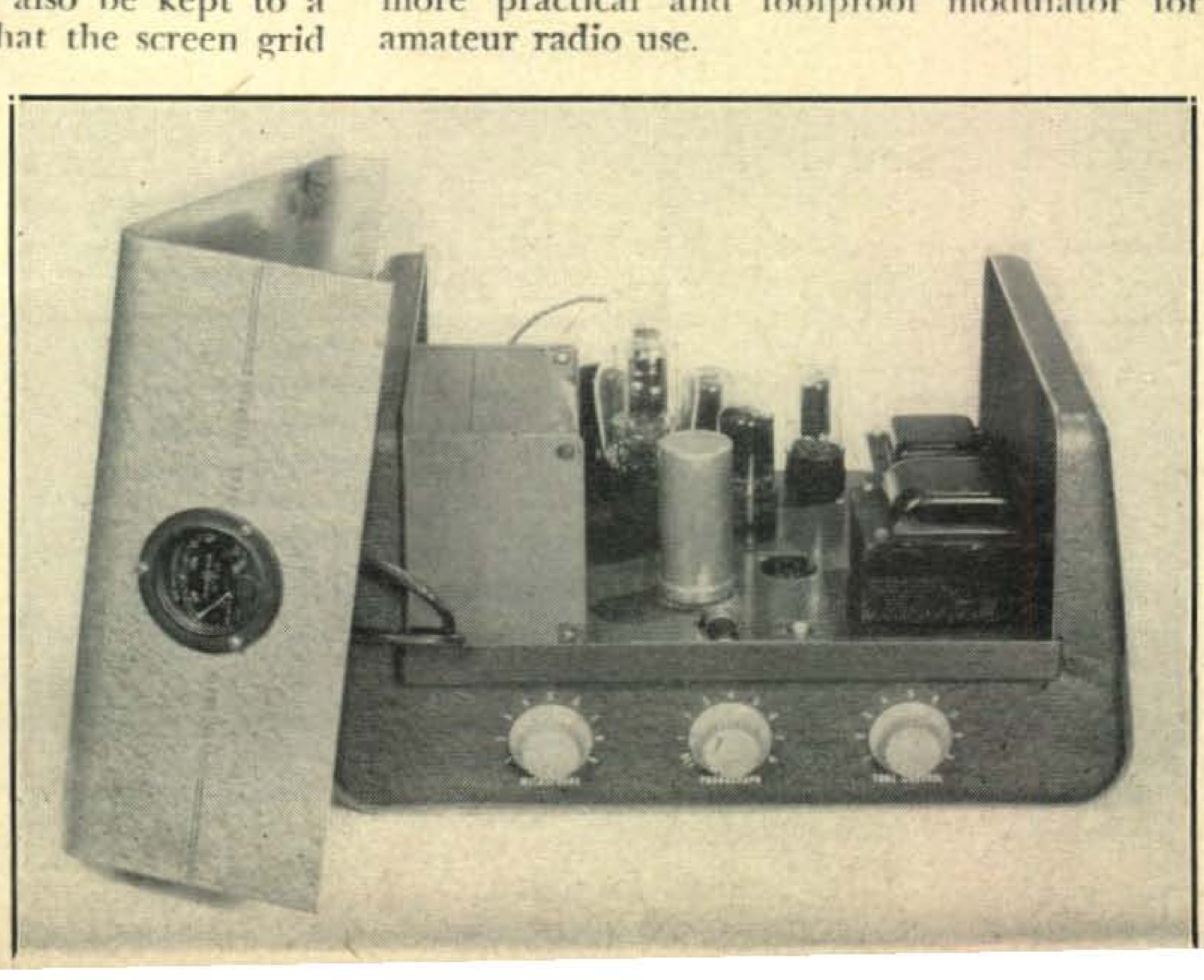
The value of *R2* must be determined by experiment. The function of this resistor is simply to drop the supply voltage for the 6V6 screen. A greater modulator screen voltage variation can be obtained by using a better-regulated clamp-tube screen supply. In fact, the modulator screen voltage variation can be controlled by controlling the clamp-tube screen-voltage regulation.

L1 should be at least five henries, and should be capable of carrying the r-f amplifier plate current plus the maximum d-c modulator plate current.

With Heising modulation it is usually necessary to insert a d-c dropping network between the modulator plate and the final r-f amplifier to produce 100% modulation. This network wastes power, however, and for that reason was not used. The modulation percentage was great enough—about 85%.

Power tetrodes are subject to parasites in the class K amplifier almost as certainly as they are in r-f amplifiers. Therefore, when constructing a class K amplifier, observe the standard precautions: Keep the grid, screen, and plate leads short, bypass screens and cathodes close to the tube sockets, etc. It may even be necessary in some cases to use parasitic suppressors in the grid, plate and screen circuits.

Although as it now stands, the class K amplifier/modulator is little more than a "trick" circuit, the author hopes that further development of the basic circuit will disclose methods by which the class K amplifier can be made a more practical and foolproof modulator for amateur radio use.



The author's experimental model of the class K modulator was built into a commercially-made audio amplifier. The 807 is in the left center with the 6V6 clamp tube mounted next to it.

	15 Meters	20 Meters	40 Meters	80 Meters
NEW YORK CITY TO:		ALL TIMES IN E S T		
Australasia	1600-1800 (1)	0700-1100 (2) 1400-1830 (0-1) 1830-2000 (2)	0100-0730 (2-3)	0200-0630 (1-2)
Central & South Africa	1200-1500 (0-1)* 0800-1400 (1-2) 1400-1600 (2-3)	0630-1400 (0-1) 1400-1600 (1-2) 1600-1800 (2-3)	1730-0100 (2-3)	1900-0000 (2)
Guam & Pacific	1400-1800 (1)	0900-1200 (0-1) 1500-1800 (1) 1800-2000 (1-2)	2300-0630 (2-3)	0000-0600 (1-2)
Japan & Far East	Nil	1600-1900 (1-2)	0100-0700 (1)	Nil
Near & Middle East	0930-1200 (1-2)	0600-1130 (1) 1130-1400 (2-3)	1800-2300 (2)	1900-2230 (1)
South America	1100-1630 (2)* 0700-1500 (2-3) 1500-1700 (3-4)	0700-1600 (2) 1600-1800 (3-4) 0000-0300 (1)	1830-0500 (3-4)	1930-0400 (2)
South East Asia	Nil	1600-1900 (0-1)	Nil	Nil
Southern Europe & North Africa	0800-1400 (3)	0600-1300 (3) 1300-1500 (3-4) 1500-1630 (1-2)	1630-2300 (3-4) 2300-0200 (2)	1830-0100 (2-3)
Western & Central Europe	1000-1300 (2)	0630-1300 (3) 1300-1530 (3-4)	1700-2300 (3-4) 2300-0400 (2-3)	1900-0200 (2-3)
TAMPA, FLORIDA TO:		ALL TIMES IN E S T		
Australasia	1800-1900 (0-1)* 1500-2000 (2)	1400-1700 (1) 1700-2100 (2) 0200-0400 (1)	0200-0730 (2-3)	0300-0700 (1-2)
Central & South Africa	1000-1400 (2)* 0800-1300 (1-2) 1300-1600 (3)	0700-1300 (0-1) 1300-1600 (1-2) 1600-1800 (3)	1700-0100 (3)	1830-0030 (2)
Europe & North Africa	0800-1300 (3)	0700-1200 (2) 1200-1530 (3-4)	1700-0200 (3-4)	1800-2300 (3)
Japan & Far East	1700-1800 (0-1)* 1630-1900 (1-2)	1600-2100 (2-3)	0100-0700 (1)	Nil
South America	0900-1300 (1-2)* 1300-1800 (3)* 0730-1500 (3) 1500-1900 (4-5)	0700-1500 (2-3) 1500-2000 (4) 2000-0200 (3)	1700-0500 (4)	1800-0400 (3-4)
South East Asia	1830-1930 (0-1)	0630-0900 (1) 1830-2000 (1)	Nil	Nil
CHICAGO, ILLINOIS TO:		ALL TIMES IN C S T		
Australasia	1600-1800 (1)* 1500-1900 (1-2) 1700-2100 (2)	0800-1100 (1-2) 1400-1700 (1)	0100-0730 (2-3)	0130-0630 (1-2)
Central & South Africa	1200-1500 (0-1)* 0700-1300 (1) 1300-1600 (2-3)	0600-1300 (0-1) 1300-1600 (1-2) 1600-1800 (2-3)	1800-0030 (2-3)	1930-2330 (1-2)

	15 Meters	20 Meters	40 Meters	80 Meters
SAN ANTONIO, TEXAS TO:		ALL TIMES IN C S T		
Japan & Far East	1500-1800 (3)	1400-1700 (2) 1700-2100 (3)	0100-0700 (2)	0200-0600 (1-2)
South America	1300-1700 (2-3)* 0700-1400 (2-3) 1400-1800 (4)	0600-1300 (1-2) 1300-1600 (2-3) 1600-1900 (3-4) 2300-0200 (1)	1900-0430 (4)	2000-0330 (3)
South East Asia	1730-1900 (0-1)	1700-2100 (1)	Nil	Nil
DENVER, COLORADO TO:		ALL TIMES IN M S T		
Australasia	1500-1800 (1-2)* 1300-1700 (2) 1700-1900 (3)	1300-1700 (1) 1700-2000 (2-3)	0100-0700 (2-3)	0200-0600 (1-2)
Central & South Africa	0900-1200 (1) 1200-1500 (2)	0600-1200 (0-1) 1200-1500 (1-2) 1500-1800 (2)	1830-0000 (2-3)	2000-2230 (1-2)
Europe & North Africa	0900-1100 (0-1)	0700-1100 (1) 1100-1230 (1-2)	1830-2300 (1)	1900-2300 (1)
Japan & Far East	1100-1800 (2-3)	1000-1500 (2) 1500-2200 (3)	0100-0700 (3)	0200-0630 (2)
South America	1200-1600 (2)* 0700-1200 (1-2) 1200-1700 (3-4)	0700-1100 (1) 1100-1500 (2) 1500-1800 (3-4)	1900-0300 (3-4)	2000-0130 (2-3)
South East Asia	1700-1800 (0-1)	1700-2100 (1-2)	Nil	Nil
PORTLAND, OREGON TO:		ALL TIMES IN P S T		
Australasia	1500-1800 (1)* 1200-1800 (2) 1800-2000 (3)	1200-1700 (1) 1700-2100 (2-3)	2300-0600 (3)	0030-0530 (1-2)
Central & South Africa	1200-1400 (1)	0800-1400 (0-1) 1400-1700 (1-2)	1600-2100 (1)	1730-2000 (0-1)
Europe & North Africa	0900-1100 (0-1)	0800-1200 (1-2)	1600-2100 (1)	1800-2100 (0-1)
Japan & Far East	1300-1800 (2-3)	1200-1800 (2-3) 1800-2100 (3-4)	2300-0630 (3-4)	0030-0600 (2-3)
South America	1300-1500 (1-2)* 0800-1200 (2-3) 1200-1600 (3-4)	0600-1100 (0-1) 1100-1400 (1-2) 1400-1800 (3-4)	1800-0200 (3)	1900-0100 (2)
South East Asia	1600-2200 (2)	1600-2300 (1) 2300-0200 (2)	0300-0630 (1-2)	0400-0600 (1)
LOS ANGELES, CALIF. TO:		ALL TIMES IN P S T		
Australasia	1500-1900 (1-2)* 1100-1730 (2) 1730-1930 (3)	1000-1800 (1) 1800-2030 (2-3)	2300-0600 (3)	0030-0600 (2)
Central & South Africa	0900-1200 (1) 1200-1500 (1-2)	0600-1400 (0-1) 1400-1700 (1-2)	1630-2200 (2-3)	1730-2100 (1-2)

Hawaii	1100-1900 (2-3)	0900-1030 (2-3) 1030-1700 (1-2) 1700-2030 (3-4)	2100-0400 (3-4) 0400-0700 (1-2)	2200-0600 (3)
Japan & Far East	1400-1700 (1-2)	1300-1700 (1) 1700-2100 (2)	0100-0700 (1-2)	0200-0600 (1)
South America	1200-1600 (2)* 0730-1400 (3) 1400-1700 (4)	0600-1500 (2) 1500-1800 (3-4) 0100-0300 (1)	1800-0500 (3-4)	1930-0400 (2-3)
South East Asia	1500-1830 (0-1)	1500-2000 (1)	Nil	Nil
Southern Europe & North Africa	0900-1300 (2)	0600-1200 (2-3) 1200-1430 (3-4) 1430-1600 (1-2)	1730-2200 (3-4) 2200-0100 (2)	1830-0000 (2-3)
Western & Central Europe	0900-1200 (1-2)	0700-1300 (2-3) 1300-1430 (3-4)	1800-2000 (2-3) 2000-0200 (1-2)	1900-0030 (2)
SAN ANTONIO, TEXAS TO.		ALL TIMES IN C S T		
Australasia	1700-1830 (1)* 1400-1900 (3)	1400-1700 (1) 1700-2100 (2) 0200-0400 (1)	0100-0700 (2-3)	0200-0600 (1-2)
Central & South Africa	1100-1500 (1-2)* 0800-1200 (1-2) 1200-1700 (3)	0600-1300 (0-1) 1300-1600 (1-2) 1600-1900 (2-3)	1830-0030 (2-3)	2000-2330 (1-2)
Europe & North Africa	0900-1200 (1-2)	0700-1200 (1) 1200-1400 (2-3)	1830-0030 (2-3)	2000-0000 (2)
Europe & North Africa	0900-1100 (0-1)	0700-1100 (1) 1100-1230 (1-2)	1600-2100 (1-2)	1900-2100 (0-1)
Japan & Far East	1300-1800 (0-1)* 1300-1700 (2) 1700-2000 (3)	1200-1800 (2-3) 1800-2200 (3-4)	2300-0700 (3-4)	0030-0600 (2-3)
South America	1000-1530 (2)* 0700-1200 (3) 1200-1600 (4)	0600-1500 (1-2) 1500-1700 (3-4) 1700-1830 (2-3)	1730-0300 (3-4)	1830-0200 (2-3)
South East Asia	1530-1800 (0-1)* 1400-1900 (1-2)	0800-1100 (1-2) 1400-1900 (0-1) 1900-2100 (1-2)	0200-0600 (1-2)	0300-0500 (1)
Guam & Marshall Islands	1300-1800 (1)* 1100-1700 (2) 1700-1900 (3)	1000-1800 (2) 1800-2100 (3-4)	2300-0630 (3-4)	0000-0600 (2-3)
Hong Kong, Formosa & Macao	1530-1730 (0-1)* 1400-1900 (2)	1330-1800 (1-2) 1800-2100 (2-3)	0100-0600 (2-3)	0200-0500 (1-2)

Symbols For Expected Percentage Of Days Of Month Path Open.

(0) None (1) 10% (2) 25% (3) 50% (4) 70% (5) 85% or more.

*Indicates time of possible ten-meter openings.

Ionospheric Propagation Conditions

Forecasts by

GEORGE JACOBS, W2PAJ

144-40 72nd Ave.,

Flushing, Long Island, N. Y.

DX Contest Analysis—Part II

Last month the DX Contest Analysis was devoted for the most part, to a propagation study of special interest to the *CQ* overseas reader. This study was included in the September issue of *CQ* so that the information would reach the overseas readers in time for them to make use of it during the World-Wide DX Contest. The Contest is scheduled for the week-ends of Oct. 24th-26th and Oct. 31st-November 2nd.

Part II of this special DX Contest Analysis will be devoted to an expanded study of propagation conditions affecting Amateur Circuits from the United States to all areas of the world during October and early Nov.; specifically during the Contest period.

This month's *Propagation Charts* have been calculated, centered on the following cities: New York City, Tampa, Chicago, San Antonio, Denver, Portland, and Los Angeles.

Since these *Charts* are generally good for at least a 250-mile radius around the City selected as the center, they do in fact, cover practically all of the United States. Calculations are made for the 10-meter (openings indicated by asterisk under 15-meter heading), 15, 20, 40 and 80-meter Amateur Bands.

A period of good short wave propagation conditions is expected during Oct. 4-8, 13-14, and 25. A severe ionospheric disturbance with the possibility of auroral display is expected Oct. 1-3. Other disturbed periods are predicted for Oct. 9-12, 16-23, 27-30.

All forecasts appearing in this month's *Propagation Charts* are based primarily upon basic propagation data appearing in the National Bureau of Standards D Series, and reception information supplied by many amateurs, with special thanks due W2ESO, W6ZAT, G3CEU, G4HQ and I1ER. The predictions are computed upon a predicted smooth sunspot number of 17. Forecasts are based upon an assumed effective radiated power of 100 watts CW or approximately 600 watts amateur double sideband phone. Effective radiated power is equal to the power fed into your antenna multiplied by the gain of your antenna over the gain of a horizontal half-wave dipole, a half wavelength above ground. Deviations in power up to 6 db. from these values will usually change the rating of the "percentage of days of month path open" by one number or grade. For example, if you are running 150 watts phone into a half-wave dipole, a half-wave above ground, you are approximately 6 db. below the effective radiated

(Continued on page 56)

The VHF-UHF News

FURMAN C. COBB

c/o CQ Magazine, 67 West 44th St., New York 36, N.Y.

Hi Gang!

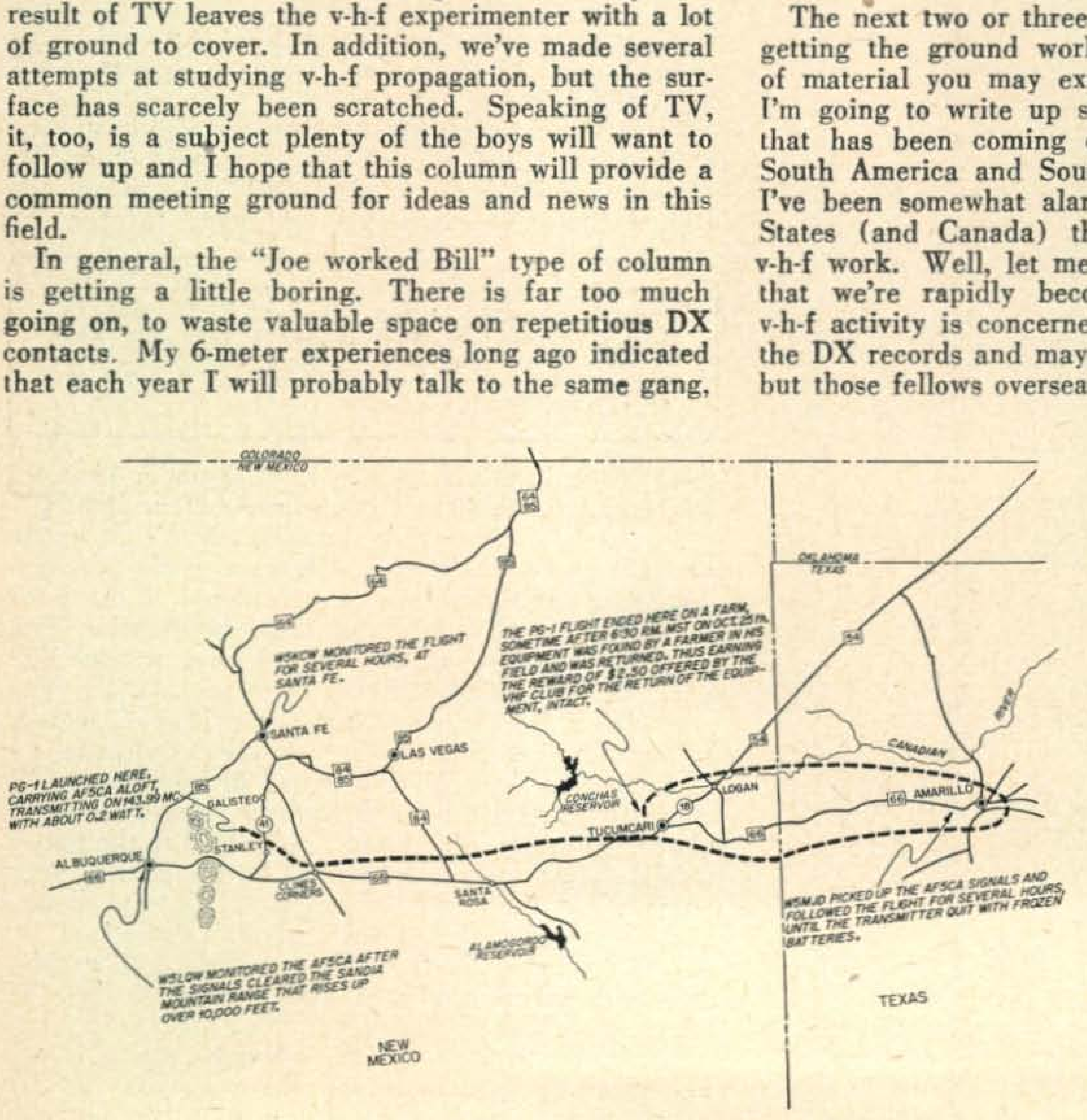
By way of introduction let me say that I have talked to many of you, and hope to be writing about many more of you in forthcoming columns. For the time being it is just as well that I remain in the background, and these initial columns be accepted for what they are worth to us—the v-h-f gang.

The fancy Dan days of getting people active in the v-h-f spectrum are over. The v-h-f world can stand on its own two feet and give and take interest and activity just as well as the low frequency bands. As far as new developments are concerned the v-h-f end of hobby wins hands down. Improved circuitry as a result of TV leaves the v-h-f experimenter with a lot of ground to cover. In addition, we've made several attempts at studying v-h-f propagation, but the surface has scarcely been scratched. Speaking of TV, it, too, is a subject plenty of the boys will want to follow up and I hope that this column will provide a common meeting ground for ideas and news in this field.

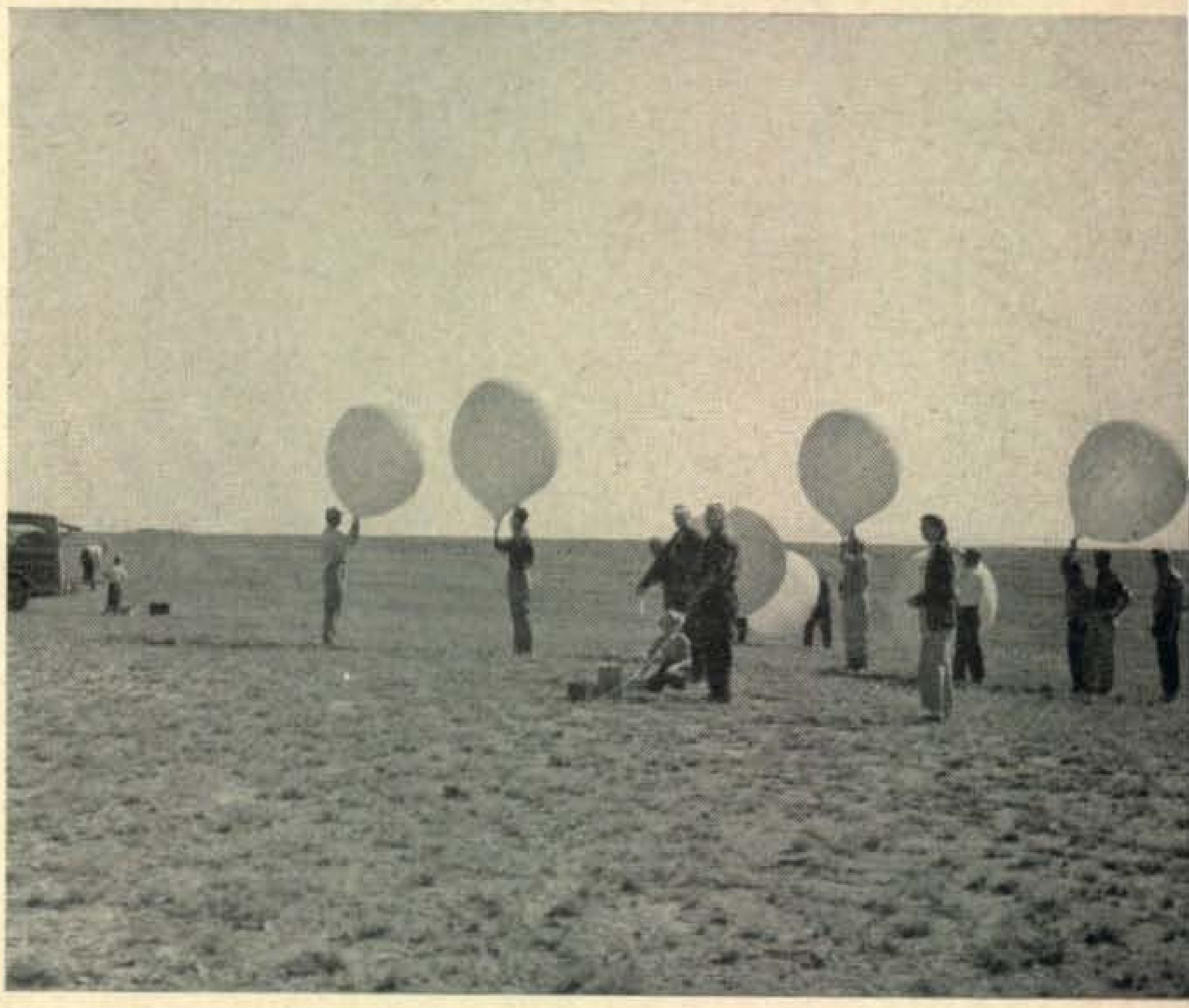
In general, the "Joe worked Bill" type of column is getting a little boring. There is far too much going on, to waste valuable space on repetitious DX contacts. My 6-meter experiences long ago indicated that each year I will probably talk to the same gang, plus some new ones, and that I can recognize most of the old-timers by their voices. This doesn't make startling news—but, if someone had up a three-tier stacked beam that was laying down a terrific signal —that would be news.

Not only would I list out what was worked, but I would try to get an idea of signal strengths and length of the opening vs. observations of signals coming from the same general area. If a three-tier stacked array is going to be the answer on 6-meters to working double-hop all the details are going to be reported right here. And the same goes for any of the v-h-f/u-h-f bands.

The next two or three columns will be devoted to getting the ground work established on what type of material you may expect to see in this column. I'm going to write up some of the ideas and news that has been coming out of Europe, Australasia, South America and South Africa. For a long time I've been somewhat alarmed by the attitude in the States (and Canada) that we're doing all of real v-h-f work. Well, let me be the first to inform you that we're rapidly becoming third-rate as far as v-h-f activity is concerned. Maybe we hold some of the DX records and maybe we get better equipment, but those fellows overseas are running circles around



This map shows the approximate flight path of the PG-1. During the first part of the flight it drifted eastward, apparently circled overhead Amarillo and landed near Tucumcari.



(Above) W5OLN connects the batteries up for a trial, as W5RFF, on the left, looks over the balloon situation. W5CA and W5WRS, on the extreme right, look eastward hoping that the v-h-f gang will be listening. (To the Right) The seven balloons are ready for launching as a strong wind brings up out of the west. (Below) The PG-1 is launched! The wind is still very strong but the six-foot balloons go right up with a combined lift of over 30 pounds. The parachute can be seen at the lower left corner.

us right at the moment. The spark has been lost on this side of the Atlantic—let's get it back.

To take a peek at what the competition looks like I will review some of the more imposing articles that have appeared recently in contemporary journals. I'm sure you will find them interesting and ofttimes a little surprising. To round it out I will dig up some unpublished dope from the *CQ* files and then will count on hearing from you and you *and you.*

The Albuquerque V.H.F. Club Balloon—PG-1

One of the first things I did in assuming the Editorship of the VHF NEWS was to read back in the various v-h-f/u-h-f departments for the past two years to refresh my memory on exactly what had taken place. One thing that did strike me was that there seemed to be no follow-up story on the October 25, 1952 flight (or launching, if you prefer) of the PG-1.

Quite a bit of material appeared in the magazines about the preparations the Albuquerque V.H.F. Club made for launching this balloon with a keyed c-w transmitter sending AF5CA (plus a 3-letter identification cypher). What happened to it was not thoroughly reported and sure attracted my curiosity. But then surprise of surprises, our M.E., Perry, came back from the Houston ARRL Convention with details and a photographic report.

As shown on the map, the balloon was launched from a point some 10 miles north of Stanley, New Mexico. The "lift" was provided by seven weather balloons filled with helium which was more than adequate to handle the 0.2 watt output transmitter weighing only 7 pounds. The frequency was 143.99 Mc.

Launching took place at 1245 M.S.T. with the rise of the balloon noted towards the east. The signal was monitored by W5CA at the site, W5VWU at Sandia Park and W5KCW at Santa Fe. W5LQW also monitored during part of the afternoon. In the latter part of the afternoon the signal was intercepted by W5MJD in Amarillo (about 240 miles from the launching site). Tracking it with his beam, W5MJD noted that he lost "sense of bearing" shortly afterwards indicating that the balloon was practically overhead and outside of the horizontal directivity pattern of his beam.

Recovering his "bearing" later, W5MJD was surprised to find the balloon had apparently turned and now heading westward. Then at 1830 M.S.T. the transmitter stuttered and stopped in a middle of a letter (it was also being monitored by W5VWU). Several days later the transmitter was recovered intact by a farmer outside of Tucumari, New Mexico. Upon examination and test it was determined that the batteries had frozen. This information plus a Weather Bureau report indicates that it reached an altitude of about 50,000 feet.

The Albuquerque V.H.F. Club certainly deserve a vote of thanks from the v-h-f gang for undertaking such an interesting venture. It was made possible through the active cooperation of the Air Force MARS, The New Mexico Army MARS, the ARRL and many friends and well-wishers. By the way, the HA-2 launched in August, 1951 still hasn't been heard from!

ON4BZ 144-Mc. Converter

Shown in schematic form on these pages is the latest 2-meter crystal controlled converter design from ON4BZ. It uses a single 6BQ7 in a grounded-grid r-f stage and mixer, a 12AT7 in a crystal oscillator/multiplier stage (suggested crystal frequency is 8.425 Mc. although this might put some beats and whistles above 146 Mc.) and a 6J4 as a cathode follower output. As constructed by ON4BZ this converter had a claimed noise factor of 3.3 db. without the 6J4 (EF80 was substituted).

The only alignment data (reported in **SHORT WAVE MAGAZINE**) was to particularly note that the mixer plate voltage should be about 40 volts when the oscillator is dead and crystal pulled out. With the crystal in the circuit the voltage should rise to about 60 volts (measured with a v.t.v.m.). Condenser, C17, is the "gimmick" type and should be quite low in capacity for optimum injection. Coils L2 and L3 are spaced about ¾ inch apart and the coupling adjusted through the link coil L4.

Several unusual ideas are incorporated in this circuit with particular emphasis on the "L" type of matching network in the antenna input. It would appear that a d-c path is necessary in the antenna feed system to provide plate current to the first half of the 6BQ7. Obviously this could be a stub, folded dipole or gamma (see page 15 of this issue). We conclude that the plan was to save the tube by opening the grid circuit during "transmit" when the same antenna is used with coaxial switching.

It is hoped that I can secure some further details on this converter as it does look interesting, although I question the necessity of using a 6J4 in that cathode follower stage. Although especially constructed for cathode follower operation it would seem possible to replace the 6J4 with any of the better, but lower-priced triodes, if some care is exercised to reduce the possibility of the stage oscillating. Some of the sharp-eyed readers may also note that the circuit is similar to the converter described in the November, 1952 issue by W2PAU (p. 20).

Modification of the WN2IHM Transmitter

The article, "Putting the 6146 on Two Meters" (CQ, November 1952, p. 43) described a 144-Mc. transmitter employing a three-tube lineup, 12AU7/5763/6146, which showed great promise. Unfortunately a number of constructors encountered difficulties in obtaining sufficient drive to the final and neutralizing the final.

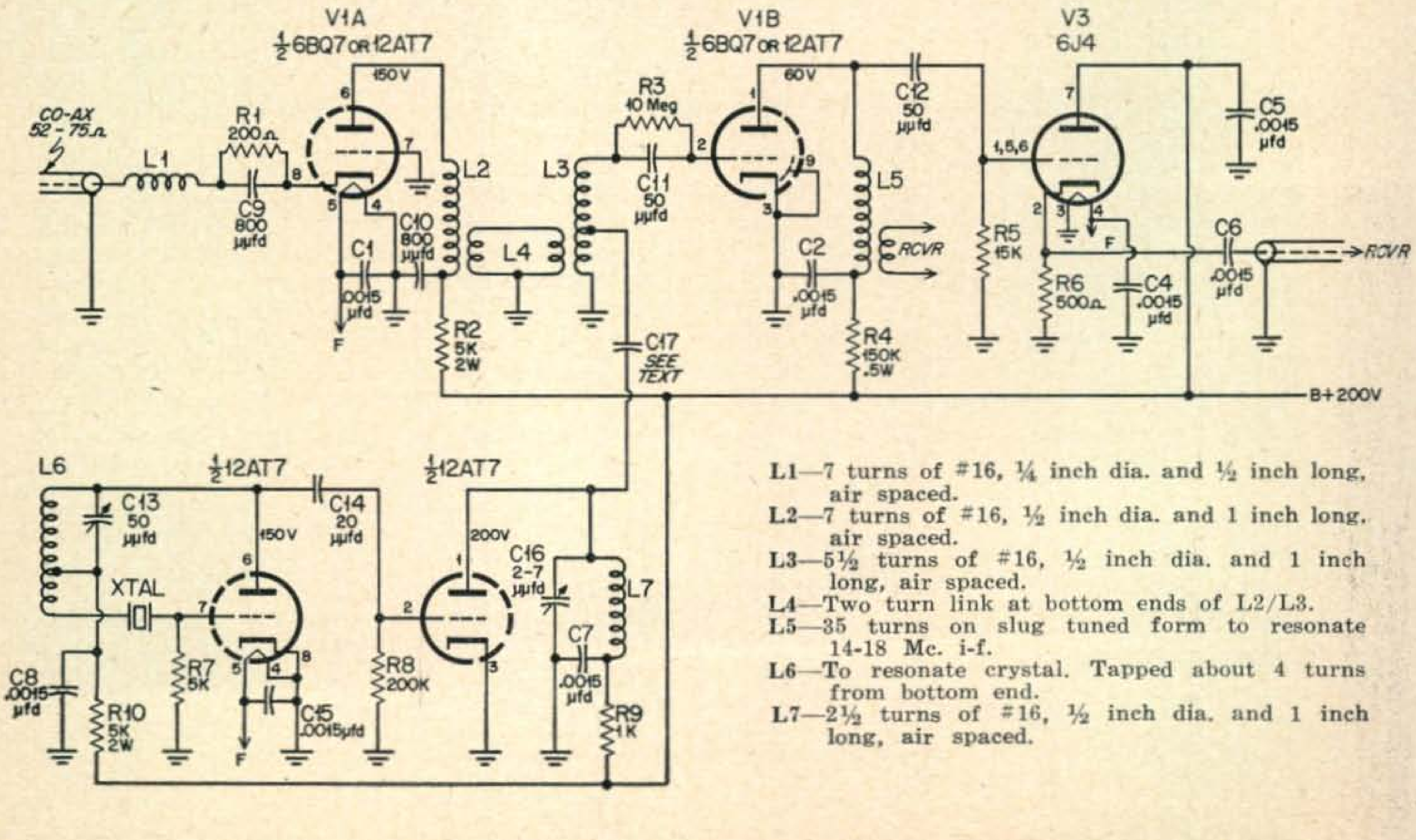
W2PAU has suggested the modifications shown in the accompanying schematic as a means of overcoming these problems. The plate/grid method of neutralization has been replaced with a screen grid neutralization system. L5, L6, C13, C12 and R11 have been removed, or replaced. Brownie also reports that some trouble may be experienced in getting the final grid coil (L4) to dip on 146 Mc. The most practical method seems to be tuning it up using a grid-dip meter, **before** the center tap is attached (of course, both the driver and final tubes must be in their sockets with the filaments off). Locate the "cold" spot on the coil by touching it with a pencil point to determine the spot producing the least effect. Attach the center tap and replace L5 with a 270-ohm 2-watt resistor. At about the same time, replace R11 with L5 and locate the plate coil center tap by the method outlined above.

The proper way to neutralize the final when using screen grid neutralization is to start with the capacitor set a full value and the final loaded with a dummy load. Kill crystal oscillations (by touching the oscillator grid with a screwdriver) and note that the final will probably keep right on going. Retard the capacitor setting until the final stops oscillating and at the same time there is reasonable drive when the rig is tuned up.

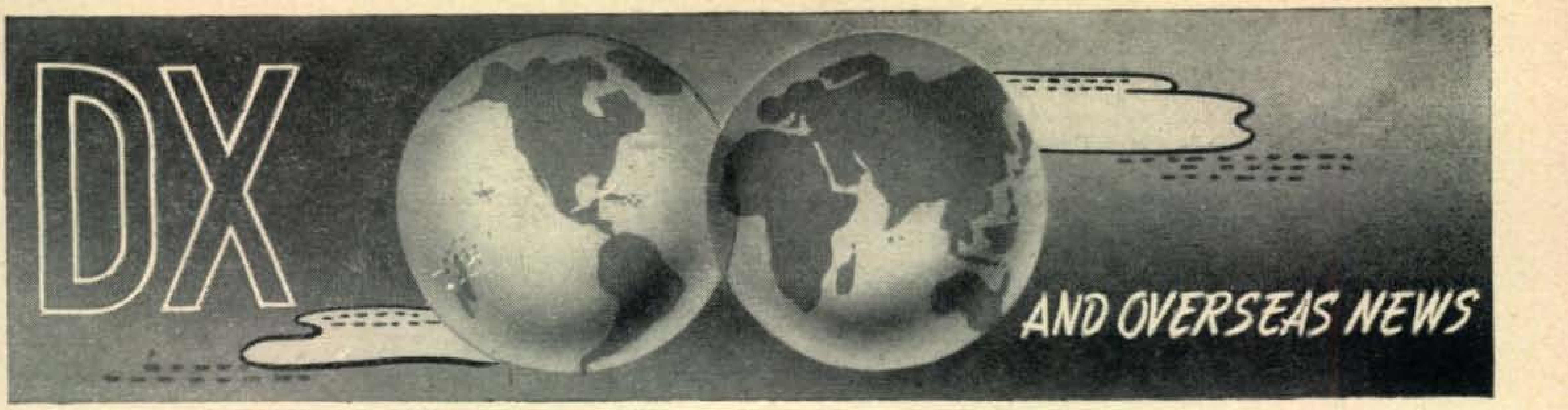
It might also be appropriate to mention that it is important to properly ground the cathode of the 6146 to obtain the smallest possible lead inductance. The tube has been provided with three separate cathode leads. Each should be grounded directly to the chassis near the socket. The neutralizing capacitor should also connect into the circuit with virtually no leads between the screen grid terminal and the same general grounded area as the cathode.

(Continued on page 68)

Popular European v-h-f worker ON4BZ designed this converter and claims that it has a noise-ratio of 3.3 db. See the text for discussion on that input circuit.



L1—7 turns of #16, ¼ inch dia. and ½ inch long, air spaced.
L2—7 turns of #16, ½ inch dia. and 1 inch long, air spaced.
L3—5½ turns of #16, ½ inch dia. and 1 inch long, air spaced.
L4—Two turn link at bottom ends of L2/L3.
L5—35 turns on slug tuned form to resonate 14-18 Mc. i-f.
L6—To resonate crystal. Tapped about 4 turns from bottom end.
L7—2½ turns of #16, ½ inch dia. and 1 inch long, air spaced.



Gathered by DICK SPENCELEY, KV4AA

Box 403, St. Thomas, Virgin Islands, U.S.A.

Our heartiest congratulations to the following station upon his achievement of WAZ:

No. 288 VE7KC A. H. Miller 40-133

We also welcome the following newcomers to the Honor Roll:

KV4AA	**39-225**
W6LW	**39-191**
W6GPB	**39-179**

To the DX-minded newcomer of today, who is subjected to a steady diet of moans, groans and caterwauling regarding DX conditions, the present DX scene might well be pictured as a pretty hopeless one. Our upstart, absorbing such phrases as "sun spot minima," "dead bands" and "oh! for the days of '47 again" might, with some justification, decide to "give up the ship."

Not so! we cry. Our contention is that you can go right out and work darn near as many countries as in "the good old days." True, conditions are nowhere as "consistently" good as they were but, round the year and at the right time of day, those rare ones will come sneaking through and your contact will be delayed only by the QRM of DX competitors in your own vicinity.

An excellent resume of what may be expected on each particular band is given by W2PAJ in the August issue. I think you will agree this gives a far from pessimistic picture.

Recent examples bear us out, i.e.: AC4NC puts on a brief appearance and is immediately nabbed by G's, W6's and W7's . . . ST2UU, operating from CR7, FB8, VQ7 and VQ9, with a 6L6 final, throws readable signals as far west as W9 . . . ZC5VS and C3BF work W5s and CEØAA's attainment of WAZ in a week's operation was only limited by lack of Russian stations and W QRM.

Yep! conditions are sure stinko but, before you bury your head in the sand, be sure to take your headphones along!!

At Time of Writing

EASTER ISLAND, CEØAA: This long awaited expedition materialized when Luis, CE3AG, departed from Valparaiso on July 24 and after a cold and stormy voyage, with a stop at Juan Fernandez Island, arrived at Easter Island on August 6. It might be well to mention, at this point, that Juan Fernandez, better known as Robinson Crusoe's Island, is not a separate one but comes under the CE2, Valparaiso, district. CEØAA came on the air, 14 Mc. at 2330GMT August 7. First QSO was with CE3AB followed by a contact with CE3AG, manned by CE3DG. The first W worked on CW was W6GDJ while the first phone-to-phone W contact was with W1FH. Other early first night QSO's were noted with W6SAI, K2EDL (ex-W6IBD), W4CEN, W2LVS, W6AOA, W8WZ, W2SAI, W2AGW, W2WZ, W5NW, W4KFC, W3CTJ, W6NZW, W5KUC, W6SYG, W5UCQ, W6DFY, W6RW, W3BES, W6MUR, W3GRF, W3NOH, W6LW, W6AM, W3ALB, W3DRD, W6BUD, W3KT, W1CWX and W2UNR. On 7 Mc. first W's were W8ZY, W6AM and W1ZL. At 0610 GMT, August 11, Luis appeared on 3502 kc. and contacts, through bad QRN, were noted with W1ZL, WØNWX, W6ZAT and KV4AA. Conditions on 21 Mc. were generally low but a few QSO's were made, one being with Lindy, W8BHW, for his 87th country on that band. Some European and other DX broke through on the night of August 9/10 resulting in contacts with PAØGN, TI2RC, G3FGT, DL7BA, G5DQ, DL1AU, G8KP, G5BJ, G8KP, G8DR, YS1O, ZS6DW, YU1AG, DL7DF and KL7PI. Up to August 12th at 2230 GMT, with two or three days to go, Luis had completed some 1100 QSO's and hoped to reach the 2000 mark before his QRT. Operations at CEØAA were well handled and, for most part, the boys kept his frequency clear. Luis periodically announced his plans to QSY phone, 7 Mc. etc. which was extremely helpful in keeping his customers informed. All QSL's should be addressed to CEØAA/CE3AG, Casilla 761, Santiago, Chile. It is requested that one dollar accompany each QSL. Funds, so collected, will go towards establishing a permanent amateur station on Easter Island for use by a resident Doctor. On his return trip CEØAA/MM will be heard. To Luis, who carried through this trip in spite of disruption to his own plans, go our sincere thanks and WELL DONE!!

ALDABRA ISLANDS, AMIRANTE ISLANDS, VQ7UU/VQ9UU: This trip of Jim Jamie, ST2UU, ex-YA3UU, from August 1 to 15, provided thrills, frustrations and not a few grey hairs to the DX gentry around the globe. Jim, operating a 6V6/6L6 twenty-five watt rig, put in consistent signals as far west as W9 (he was

heard S2 in W6-land) during his stops at CR7UU, FB8UU, VQ7UU and VQ9UU. He was on between the hours of 1700 and 2100 GMT and usually "hit the sack" just about the time his signals were building up around the W5 area. Jim's receiver was of the type not containing a crystal filter which must have hampered him "no end" and surely cut down on the number of possible contacts. His arrival at the Aldabra Islands, VQ7UU, on August 6, was greeted by the expected deluge of calls and, during his four day stay, QSO's were noted with G6ZO, G3ATU, G5DQ, G5BZ, W8HGW, W1FH, W3BES, W8NBK, W4DQH, G2LB, W2AGW, W1ZL, W4CEN and KV4's AA, AQ and BB. Jim left this spot on August 10 bound for the Seychelles Islands but turned up instead on the Amirante Group. He seemed to be somewhat at a loss about what prefix to use so a rapid QSP via W1FH and VQ4AQ brought the following message from the ARRL:

> "If the Amirante Group does not count separately then they will definitely be counted with the Seychelles Islands. Use prefix VQ9."

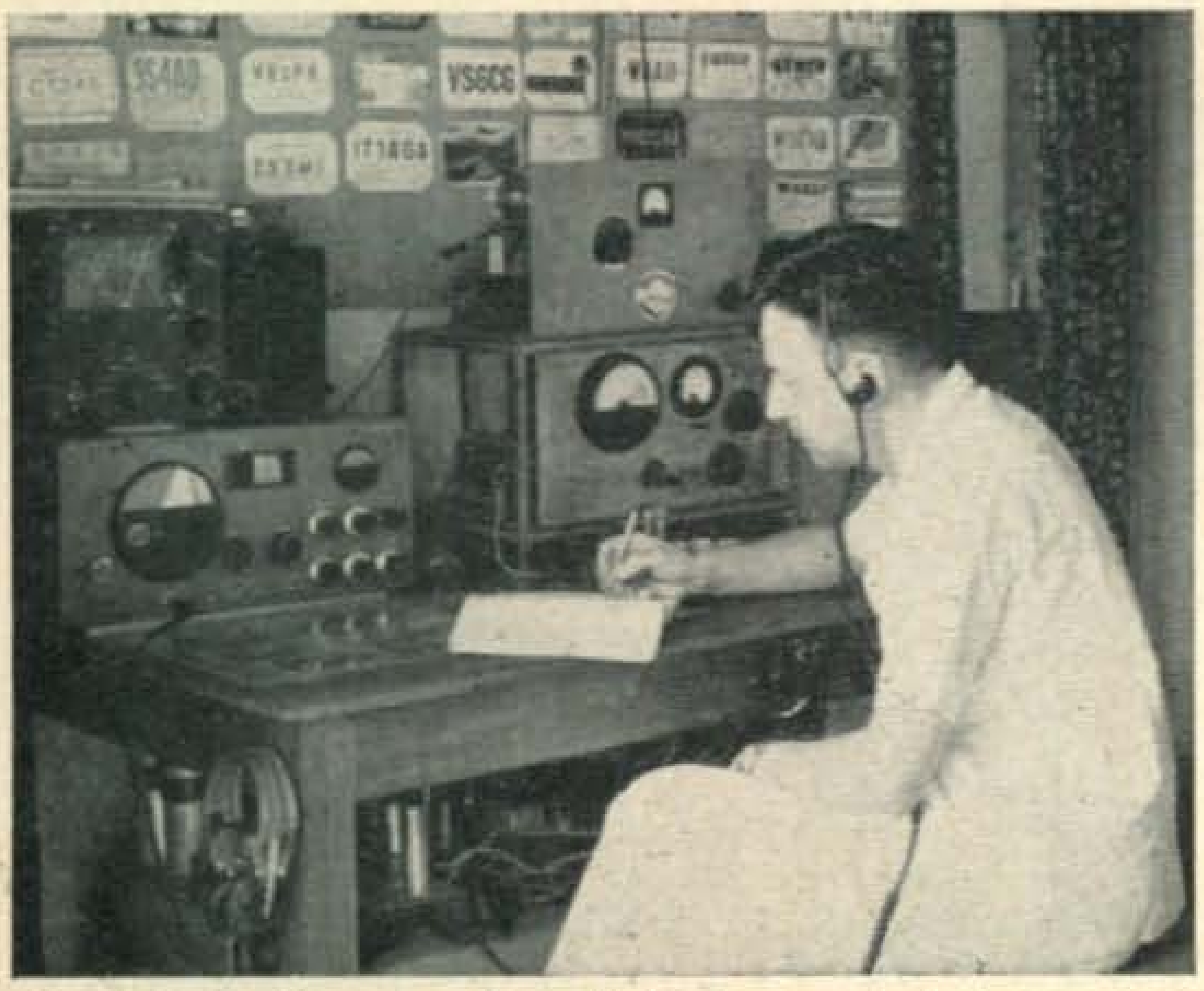
This was followed and VQ9UU came into being. (We would have suggested VQØ). Four days at this QTH resulted in many European QSO's and a few W. Further stops were scheduled for I5, Italian Somaliland and possibly the Sultanate of Oman. Best bet for QSL'ing seems to be via RSGB altho cards may go via ST2UU, Jim Jamie, Box 801, Khartoum, Sudan.

AMERICAN SAMOA, KS6AB: This station has been reported on 14060 by W6NZW who says that he will be active on phone and CW.

DUTCH NEW GUINEA, JZØKF: Activity from this station, using the new prefix, was reported by W5MPG. His CW frequency is 14025 kc. and he is on around 0600 GMT. He skeds VK3AHH.

ITALIAN SOMALILAND, I5FT: This one recently showed on CW, 14073 kc., 1900 GMT, with a strong, drifting, signal. Name is Francesco and QSL's go via Box 173, Mogadishu, It. Somaliland.

FRENCH TOGOLAND, FD4BD: This station has resumed activity on 14023 and may be found around 2200 GMT. He was on last year as FD8AB. QSO's were noted with W8PQQ and W3BES.



FF8AG, Bamako, French Sudan, rolled up over 10,000 contacts in 131 countries during his two year stay. Ivan's 100 watts were also responsible for 63 countries of 21 Mc. and a score of 207,-276 in the 1952 CQ World-Wide DX Contest.

(Photo by WØPRM, ex-DL4LQ)

DJ1BZ, Lothar Woerner, Stuttgart, Germany.

HONDURAS, HR1AA: Jack is active on the low end of 14 Mc. with a strong signal. HR1AA was issued to him instead of the call HR1JO as expected. QTH appeared in the August issue.

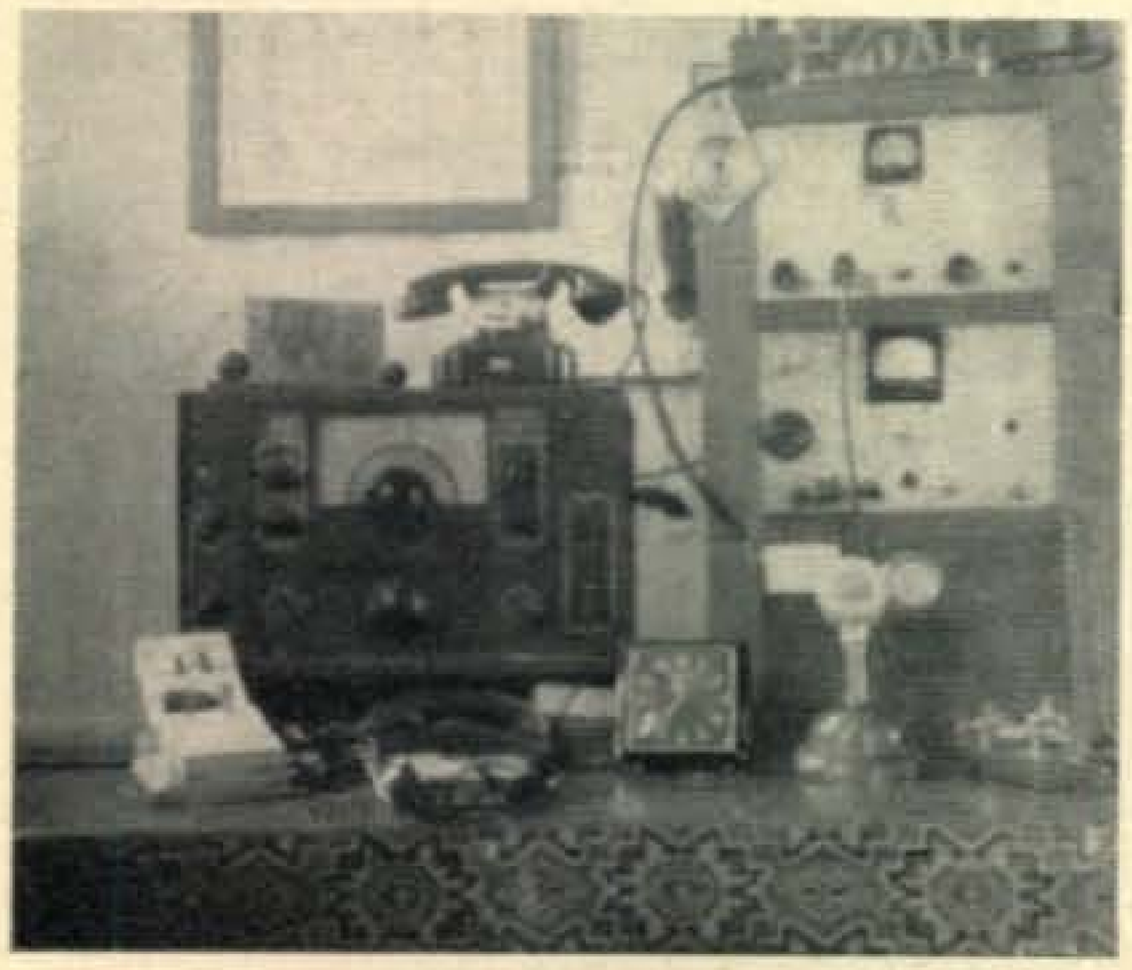
G2RO DX TOUR: Confirming last month's report on the travels of G2RO we have received a letter from Bob Roberts who advises that he has been commissioned to visit **ALL** British Colonial Territories throughout the world in a series of rapid and almost continuous tours which will last until 1955. There will be about 55 territories to visit and Bob hopes to operate from each of them. This covers about 50 different prefixes!!! Trips will average three months each followed by three weeks at home. To date two tours have been completed the first covered ZC4, VS9, VQ6, VQ4, VQ3 and VQ5. The second covered VQ2, until Aug. 6. ZE2, until Aug. 13. ZD6, until Aug. 20. Overnight in VQ3, Aug. 20. VQ1, until Aug. 30. VQ4, until Sept. 2. VQ8, Mauritius, until Sept. 10. As this is read Bob will be vacationing in Monaco until Oct. 12 and will **NOT** be on the air. Tour No. 3 is as follows: Leave for New York on Nov. 6, spend five days in New York then three weeks or more through the Windward and Leeward Islands, Barbados, etc. Then two weeks in VP1 followed by one week in VP3. One or two weeks in the Falkland Islands according to transport. Tour No. 4: Leaving about April '54 for Southeast Asia, VS2, VS6, VS5 (Sarawak), ZC5 (Br. No. Borneo), etc. Tour No. 5: Three months in the South Pacific Territories. Tour No. 6: Two to three months in West Africa. Bob's receiving equipment will be whatever he can borrow at the particular QTH as transport of this item is impossible by air. The transmitter runs 15 watts on 14016 and 14020 with the latter being the most used frequency. QSL's to all are assured. See QTH column. (Possibly Bob could be furnished with a compact 6V6-6146 rig of, say 40 watts input. This would help. I'll furnish three 6146's and could deliver the rig when Bob passes this way. What say?).

DX News in General

Notes from KX6UZ, Majuro, Marshall Islands: KX6 calls from KX6AA to KX6MZ are assigned to military amateurs in Kwajalein who use the FPO 824 address. Calls from KX6NA to KX6ZZ are assigned to employees of the Trust Territory and others. Carl says the latter calls are U.S. assigned but the territory is not U.S.A. (If you don't believe it just try and get in without a passport.) Cards for KX6NA and KX6UZ should be mailed direct to Majuro, Marshall Islands. KX6UZ is ex-KH6UZ while KX6NA is ex-KH6JI. The former will be active on 14-Mc. CW upon his return from temporary duty in Guam around Sept. 1. Licensing has been extended to include the native Marshallese who should be heard from in the near future. **KC6KU** is located on Kusaie Island some 300 miles south of Ponape. **KC6AA** is active on Yap island (Pelew Is.) . . . W1HX confirms via CN8MM that Leslie, JY1XY, will be on as **YA3XY**, Kabul, Phone and CW . . . **TI2ES** reports that another treasure expedition to Cocos is possible around Nov./Dec. and if it materializes TI2ES will go along as **TI9ES** . . . **ELJDFX**, active on 14 CW in July, was a Liberian ship, Greek owned, bound for Cuba . . . Word was received via radiogram to W6KYG that W6UXX was unable to pause at Clipperton on recent trip. We have it that prospects for a brief stay at TI9UXX look bright on a subsequent trip which, we estimate, should take place around the latter part of September.

Our old friend **PR3WI** showed up again recently working a number of W1's he still claims to be on Washington Island, VR3 group. Someday we will get the real low-down——I guess . . . **CS3AC**, Azores, may be found on A3 in the vicinity of 14190 . . . W4ZAE reports one **VQ1AX**, T6, 14008 (Aug. 4) . . . **4X4AS/MM** has embarked on a round-the-world trip. His first stop was Rhodes according to 4X4DF . . . W8NBK reports **ZD8AU** on 14068 kc. (??) . . . From TI2TG we hear that **KS4AU**, Swan Island, is active on phone, 14213 kc, and will be on till the end of the year. See QTH's . . . OK1MB heard **AC3NP** on 14080 and **YA3AB** on 14036. We understand YA3AB and YA3AC are licensed. **YA3FOV**, 7030, claims Kabul as QTH, name Eric, occupation RAF and call, ex-G3FOV . . . Another squib on **ZC3AA** via ZL2FA says that a VK reported working him on 14006. QSO's with **LB8BD** have been reported by W6KYG and GW3ZV. This station claims Christmas Island, ZC3, as his QTH and says he will be there a month (August). This smacks of ship operation and we await further details. (14105 kc., 1855 GMT) . . . **HS1WR**, a Major, in the Thailand Army, has now returned home after American training. He advises that Thailands acceptance of the U.S. point-four program will legalize Ham radio in Siam and he will be on soon. (We've heard stations calling him) . . . From FI8AD via F9RS we are advised that statutes authorizing and making regulations for Ham radio in Viet-Nam were signed on June 22 by H. M. Bao-Dai. The prefix will be 3W8. FI8's will retain their FI8 prefix for a while and then shift to 3W8. A society abbreviated "R.E.V.N." will be set up and affiliated with the R.E.F. . . . Further notes from F9RS follow: **FW8AB** (Mr. Monjoie) is now possibly active on Wallis Island. He runs 70 watts with VFO and is mainly on CW . . . **FU8AC** is active on 14-Mc. phone . . . **FR7ZA**, Reunion Is., left Orly (France) on July 7 and expects to return on the air, from FR7, in September . . . **FF8AG** returned to France in August and will be heard as **F3AT** . . . **FF8GP** leaves in October . . . One Mr. Desjardins awaits his FN8 call in Pondichery, French India . . . **FN8AD** should now be considered a "pirate". His real call is VU2AX.

Notes from the West Gulf Bulletin: Via VK2QR, **ZM6AA**, Pat, is on looking for W's at 0400 GMT Sats. and Suns . . . Via W1NWO re operations in CR5, Port. Guinea: **CR5AC**, running 50 watts is active on 14010. He also has a 14156 xtl for phone contacts. QRO to 100 watts will be made shortly. **CR5AA** (CR5AC's brother-in-law) runs 50 watts on 14056 daily at 1900 GMT. **CR5AD** (CR5AC's brother) is not very active . . . G2MI reports that East Germans will soon be on with the prefix of DM2. The last letter of their calls will denote the district as follows: A-Rostock, B-Schiverin, C-Nev.



Much sought after is PZ1AL, E. C. Van Leeuwaarde, Paramaribo, Surinam. Van runs 45 watts on 14 Mc. and 25 on 21 Mc. phone/CW.

This neat layout shows where the potent signals from Tom Brandon, W4CEN are put on their way. That happy look resulted from contacts with VQ7UU, VQ9UU and CEØAA. The transmitter (on the right) uses a pair of 4-250A's with a pi-network tank. A band-pass exciter ending in a 6146 is in the cabinet on the other side of the National receiver. The antenna is a three-element 20-meter beam with a quarter-wave 21-Mc. whip extending above it.

Brandenburg, D-Potsdam, E-Frankfort/Oder, F-Cottbus, G-Magdeburg, H-Halle, I-Erfurt, J-Gera, K-Suhl, L-Dresden, M-Leipzig, N-Chemnitz and O-Berlin . . . Via W5FXN. **YO3RA** says the Russian ban is definitely off. (To date silence still persists from the UA side) . . . Via VK2EG ex-VK1BS: I have been chosen as one of the radio operators for our new expedition to establish a base on the Antarctic Continent. Departure should take place sometime in December. Inquiries have been made to ARRL as to the possibilities of being a 'new' country. My call will be, in all probability, VK1EG altho I am striving to have the call of VKØEG assigned. The new base will be due south of Heard Island and the power 15 to 20 watts. All QSL's will be dispatched upon my return to Australia in December '54. See QTH's . . . Via VE3KF: **ZD9AA** will not go to Marion Island, ZS2MI, as reported. His tour of duty at ZD9 is not up until April 1954 after which he hopes to come to Canada to live. **ZD9AA** has just received a new batch of QSL's, via ZS1FD, which should have made their appearance by now . . . We learn that **JZØKF** is none other than Henry, PJØX. Remember him? . . . **ST2UU** operated from 5-land on Aug. 15th. and from **VS9UU** (Sultanate on Oman) on Aug. 16th . . .

Last Minute Items:

CEØAA closed down at 1900 GMT on August 15 after holding a final QSO with CE3DG. Some 1600 QSO's were made with approximately 50 countries. Luis says conditions were good for North and South America but poor for the rest of the world and especially poor for Europe. It is possible that another Ham station may be established on Easter by next January . . . Further word about **LB8BD**, Christmas Is., comes via PAØUN who advises that his name is Harald and that his station is ON SHORE. The QRG is 14105 kc. 1700 to 1900 daily and he will probably follow PAØUN's suggestion to sign "LB8BD/ZC3". See QTH's . . . Pending the outcome of the question of whether or not the Amirante Group will be counted separately from the Seychelles Group we feel it would be well to print some details of **VQ9UU's** locations between August 11 and 14. This comes from ZC4IP after a direct QSO with Jim: VQ7UU took off from Aldabra Island, bound for the Seychelles, but was forced to turn back on account of bad weather and landed on one of the Admirante Group where he was on the air one day only, August 11. He then took off from this QTH and landed on the Seychelles on August 12. He was unable to obtain a power source that day but, subsequently, he opened up on August 13 through August 14 at the Seychelles QTH. We hope this will clear up some points of who worked who, and when, on those dates.

(Continued on page 64)

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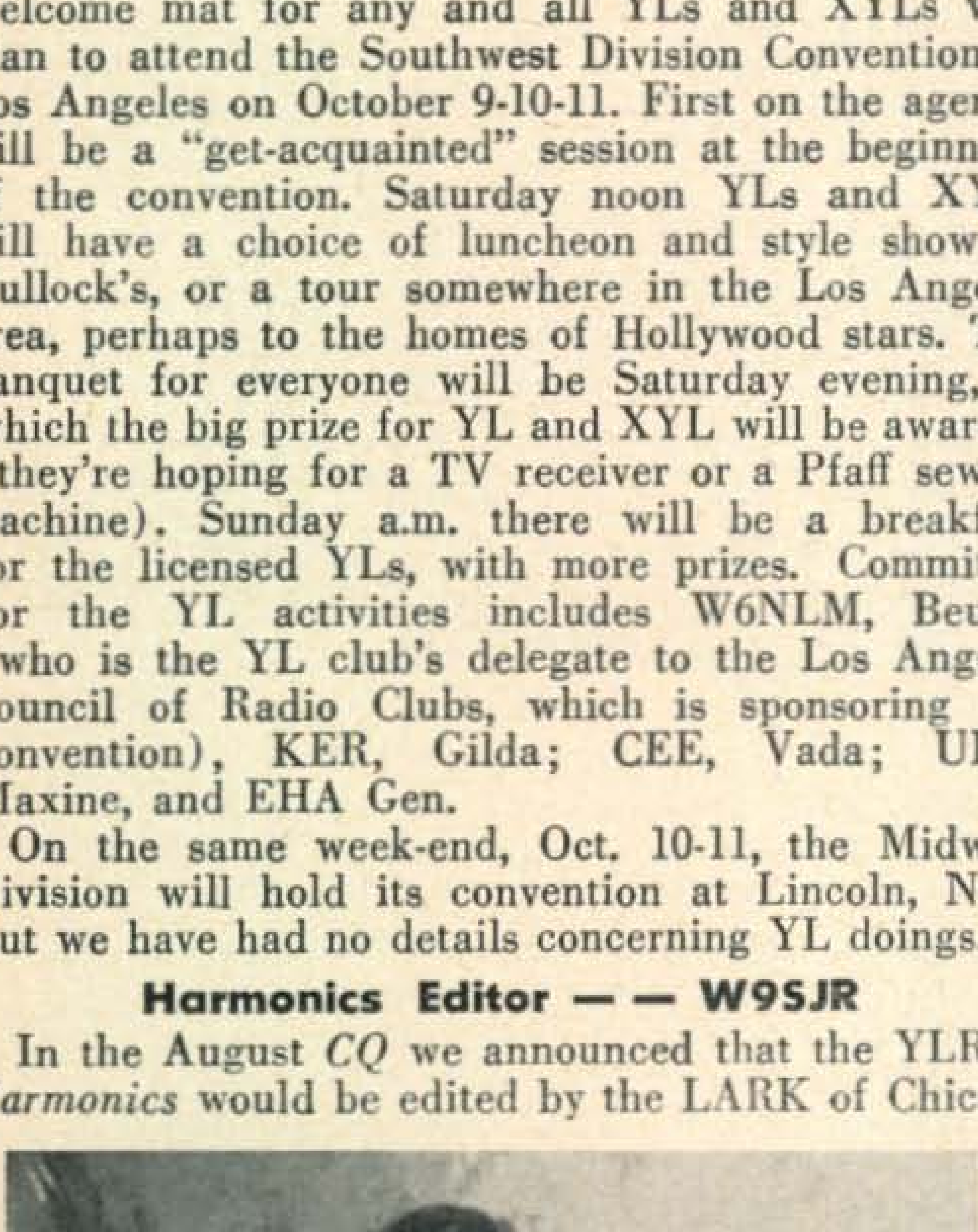
YLs of the Los Angeles area are rolling out the welcome mat for any and all YLs and XYLs who plan to attend the Southwest Division Convention in Los Angeles on October 9-10-11. First on the agenda will be a "get-acquainted" session at the beginning of the convention. Saturday noon YLs and XYLs will have a choice of luncheon and style show at Bullock's, or a tour somewhere in the Los Angeles area, perhaps to the homes of Hollywood stars. The banquet for everyone will be Saturday evening, at which the big prize for YL and XYL will be awarded (they're hoping for a TV receiver or a Pfaff sewing machine). Sunday a.m. there will be a breakfast for the licensed YLs, with more prizes. Committee for the YL activities includes W6NLM, Beulah (who is the YL club's delegate to the Los Angeles Council of Radio Clubs, which is sponsoring the convention), KER, Gilda; CEE, Vada; UHA, Maxine, and EHA Gen.

On the same week-end, Oct. 10-11, the Midwest Division will hold its convention at Lincoln, Neb., but we have had no details concerning YL doings.

Harmonics Editor — — W9SJR

In the August *CQ* we announced that the YLRL's *Harmonics* would be edited by the LARK of Chicago as a club project. Now from YLRL Prexy W1BCU we learn that not LARK itself, but the club's president, W9SJR, Bernice Schmidt, will be the editor. But Bernice comments that with the cooperation of the LARKs she hopes to do a successful job as editor, so maybe they'll be helping after all.



W9SJR, Bernice Schmidt, editor for YLRL.

Bernice started out as a Novice, with the call WN9RWV. Her praise of Novice activity is warm indeed. She says, "My Novice experience on 80 CW will always be a happy memory. The enthusiasm and interest among the Novices is so high that one cannot help but find even greater enjoyment than could be anticipated."

When she got her General ticket she got the call W9SJR—and is very pleased with it (unlike many of us—hi!). She calls hers the "little family station" for the *S* is for Susan, her 10-yr. old daughter; *J* for Jack, 11½ yr. old son, and *R* for Ray, her OM.

Bernice has a fixed station on 10 meters, running up to 500 watts and using a doublet antenna. She also has a separate fixed monitor and transmitter, using a vertical antenna, on the emergency frequency of 29.640 Mc. She has her own mobile rig on 10 meters, plus a mobile monitor on the emergency frequency. All of her equipment was built by her OM, W9SSK, and of course he keeps it perkin' for her.

Good luck to you, Bernice—we'll be looking forward to the next issue of *Harmonics*.

All Women's T.A.R.

Public service is one of the prime reasons for our existence as amateurs. Nearly 100 amateurs gave just such public service during the All Women's Transcontinental Air Race which started at Lawrence, Mass., at 5:30 a.m July 4th and finished at sundown in Long Beach, Calif., on July 7th. This was the seventh year of the race, and the second for assistance from an amateur network. So successful was the radio network last year that W2JZX, Vi Grossman, was again asked to organize a net for the TAR.

An amateur in each stop-over city was appointed chairman and he or she organized a staff of radio operators. Portable stations were set up at each airport to broadcast the arrival and departure time of the contestants (there were 49 planes making the flight) and this information was retransmitted to the entire net. During the week prior to take-off the net handled many messages to the pilot's families and friends. One of the biggest helps was alerting the pilots as to weather reports—the flight was held up a day due to the high winds. Each evening, since one of the rules decrees that no pilot can fly after sundown, all planes were accounted for before the net closed down.

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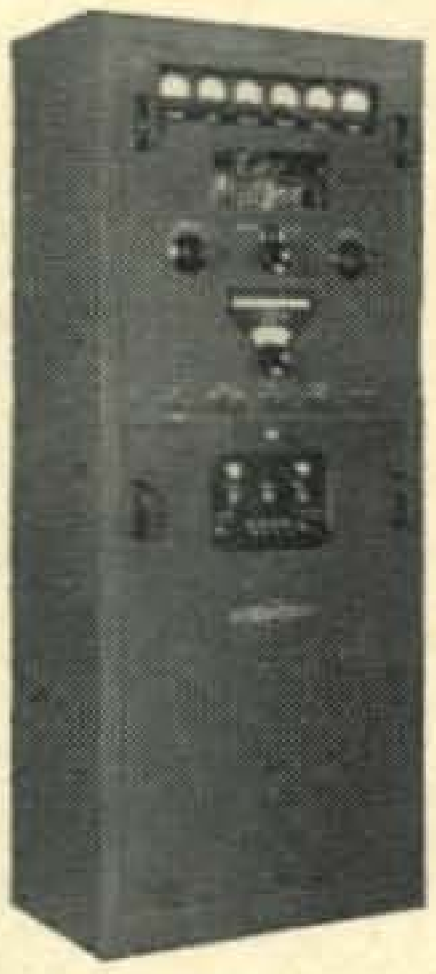

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Complete with tubes $3,850.00

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148C-1 NBFM ADAPTOR

Available as 75A-2 and 75A-3 accessories. Plug into completely wired sockets on top of chassis. Both units controlled by switches on receiver front panel.

8R-1 Plug-in Crystal Calibrator ... $25
148C-1 Plug-in NBFM Adaptor $20

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Type F455A-31 — 3.1 kc bandwidth (solder terminals).

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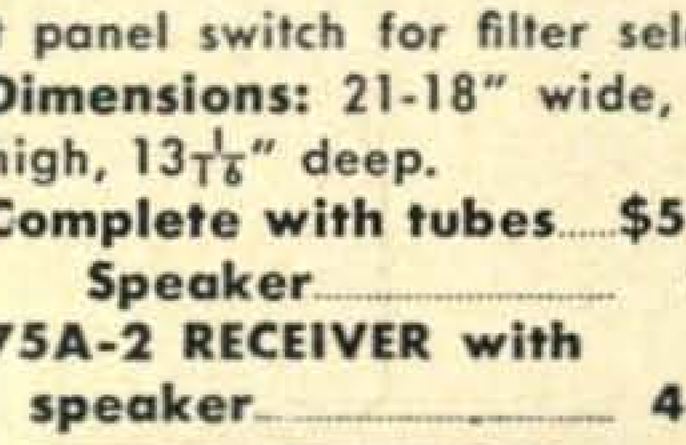

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The very FB setup of YLRL's editor, W9SJR, and her OM, W9SSK.

Chairman of the air race was W6QPI, Betty Gillies. Chairman of the radio net was W2JZK, Vi. Stop-over city chairmen included W1PFA, W2NAI (Marge), W2QAA, W8ZGT (Lillian), W9ZIB, W9GME (Grace), WØZGK, WØOZN, W5RRA, W5LFT, W7REO, W7RTE, and W6NZP (Evelyn).

The staff of operators, many of them YLs, included: W1QON, QNC, LBH, MME, BLO, KNU, TVD, YYM, AW, W2DXY, GRI, EFU, BQU, UKA, UNF, EEO, CYK, EOM, NOC, BTB, ZOL, MSE, UTH, VOU, K2BKU, WAO, ABZ, BD, W2ZRV, IJG, W3DEC, QPQ, W5SFW, RZJ, UOC, UEO, FPB, K5NRX, W6KSV, LMQ, SK, TDL, HCI, FEA, UHA, KER, NLM, DQD, PJU, CEE, GAU, W7BFA, KOY, JGZ, PJY, W8FWC, AHM, QGZ, CYL, W9AB, USA, TXC, FM, CC MAM TCS, ZGC, ZBK, RE, DIY, DGP, RWY, JWC, WØHUI, JTX, KXL.

All of the girls making the flight appreciated the feeling of security that the radio net provided and were grateful to the Hams for their time and effort.

The "girls" piloting the planes sound much like the "girls" of Ham radio—they are grandmothers, schoolteachers, housewives, business women, mothers —air enthusiasts all, and all members of the 99's, the international organization of women pilots.

Here and There

Remember the OM from Ohio (Dec. '52 **CQ**) who was looking for YL contacts? A recent mail brought an invitation to his wedding! He didn't meet his gal through Ham radio; in fact she had no interest in radio then, but he tells us that now she insists on having the rig in the main part of the house and wants to get her own ticket. Congratulations to you both! To other bachelor Hams—apparently the only way to do it is to sell your XYL-to-be on Ham radio right from the start!

Also in the mail a card from W3CDQ, Liz, from London, on the occasion of a luncheon Hilda, W4HWR, had for visiting YLs. Also signed by G3ACC, G2YL and K6ADG. . . . Retiring YLRL Veep, W3JSH, now has her new call—**K2DYO.** Dot and her OM, K2DYN, have been busy putting up antennas and curing the rig of spurious radiations. . . . **W2KDP**, another Dot, besides being president of the Long Island YLRL group, has been elected secretary of the Nassau Radio Club. . . . **W1MCW**, Lou, is now on with a new kw., the gift of her OM. Lou is well over her 200th country, all on phone. . . . **WN4ZMA**, Mary, writes that in the first three months of holding her Novice ticket she had worked 45 States on 40 and 80—and all confirmed!

Congratulations to **W2KQL**, Claire, and OM W2JCI, on the arrival of a jr. YL, Nancy Beth, on July 23rd. . . . **W7SBS**, Luryne, is very happy over her OM, W7JRU, being chosen "Oregon's Most Outstanding Amateur of '53" at the convention at Salem. . . . **W6WRT**, Ruby, reports that new officers of the Los Angeles YLRC for the coming year are **W6KER**, Gilda Shoblo, president; **W6PJU**, Mildred Griffin, secretary; and **W6QGX**, Harryette Barker, treasurer. . . . Due to band conditions the **NYLONS** (Northwest YL Operators Net) have changed their net time from 0830 to 0900 PST (Wednesdays on 3820 kc.). They probably will keep it at this hour throughout the winter as it is more convenient during school time, especially since W7QYN, Lois, the net control, drives a school bus. Some new check-ins have been 7RXT, Inez, in Tacoma; 7NJS, Beth, in Portland, and 7RAX, June, in Albany, Ore. They are looking for some of the VE YLs to check in.

YLs enjoying the National Convention at Houston, Tex., in July included W1RYJ, W3MSU, W4WTJ, TIE, UDQ, VKL, VGO, W5BKG, QXR, YCV, PWN, UUS, SPV, PDU, PKL, RYX, TYX, DQF, DUR, DRA, EUG, WN5UJD, W8FPT, and WØLHP.

From **Harmonics** we hear of a newly organized YL net in the South called the Southern Belle Net. It meets Friday mornings, 7 o'clock, on 3838 kc. NCS is delegated to a different YL each Friday. All who can hear the net are invited to check in and get acquainted. . . . On July 26th mobiles from all over New Mexico converged on Santa Fe and afte rputting on an emergency drill descended on the home of Will Harrison, columnist for the **New Mexican.** Seems Will had commented in print that he'd never seen a mobile station and the Hams' vanity was their reason for wishing special license plates. We're happy to say Will did a complete "about face" and was most hospitable, even to furnishing the Hams and their families Hamm's beer and other refreshments. He was made an honorary member of the New Mexico Mobile Assn. and was escorted "burro-mobile" on a little grey burro, loaded with transmitter, antenna and receiver—much to the delight of everyone present. Of the 70 Hams in attendance, there were 7 YLs: **W5ZUD**, Verona; **W5RTS**, Cleta; **W5PKL**, Billie; **W5DRA**, Teev; **W5TLI**, Frances; **W5RQK**, Lil, and **W5RZJ**.

What a coincidence—the OM of Verona is named Vern. He is W9QXZ. Verona started nearly two years ago as a Novice with the call WN9QYG. Now W5ZUD is on 10 and 40 using a **Viking II** and an **AR88** receiver. . . . We'd no sooner put down the latest issue of **Harmonics** in which we read of W9FZO's trip West than we received a card from Helen in Washington. Then a few days later the phone rang and a familiar voice we'd heard so many times on 10 meters saying, "We're here but we can't get in!" After passes were arranged we settled down to a good day of rag-chewing. Helen and her OM, 9FSS, and their two sons (daughter Pat was at home), had already visited W7HHH, Bea; W6HTS, Mildred; W5DRA, Teev, and many other Hams they had contacted over the air. Ralph sold his business in Chicago and they were looking for a place to settle down. At this writing they're in Florida and we may be having some W4 calls for them soon. Good luck, folks!

33, es CUL—W5RZJ

(Photo by W5VWZ)

Here is Will Harrison, columnist for the Santa Fe NEW MEXICAN going "burro-mobile." Will originally criticized the need for special call-letter license plates by the New Mexican Hams. He repented after a demonstration of Ham radio during an emergency communications drill. Mid, W5CA, West Gulf ARRL Director presented Will with an Honorary membership in the New Mexico Amateur Mobile Association. Will in turn posed for pictures on his burro-powered mobile under the self-assigned call of W9SNAFU.

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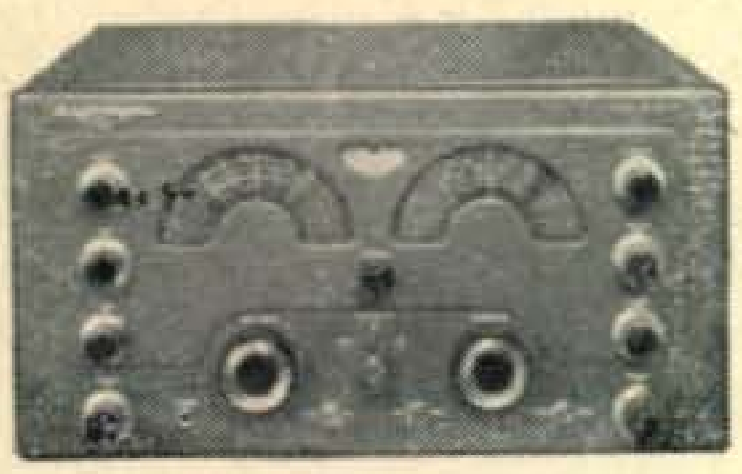

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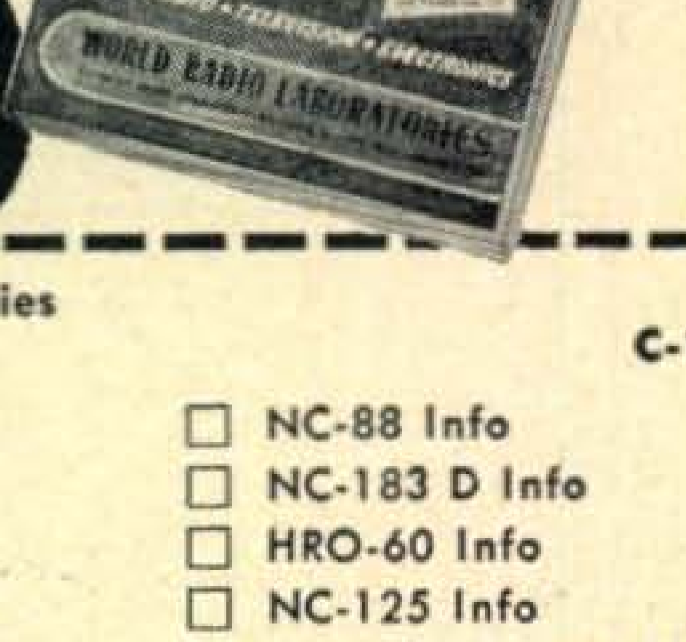

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A major problem facing prospective amateurs is that of equipping a station on a limited budget. Good radio communications equipment is not cheap. Manufactured communications receivers cost between $50 and $1,000. Code transmitters in the Novice power class (up to seventy-five watts) cost between $50.00 and $125.00. And more elaborate, phone/CW transmitters cost from two to six dollars a watt.

Conceding that one can have a lot of fun and make many successful contacts with the simplest of equipment, there is no question, however, that better equipment (particularly receivers) is an advantage. This knowledge, combined with the comparative high price of new equipment, makes it logical to invest in used equipment.

Buying Used And Reconditioned Equipment

The suggestion to buy used equipment brings forth different reactions from different people. Some believe that it is a good way to buy other people's trouble. Others insist that it is foolish to pay a high price for new equipment, when used equipment performs every bit as well. The true picture is usually somewhere between these extremes.

Unquestionably, the easiest way to insure trouble-free operation of an amateur station is to buy the very best new equipment that you can afford. You know exactly what to expect, and, should you have trouble, both the manufacturer and the dealer will stand behind it. However, satisfactory results can be obtained from used equipment, if proper care is exercised in its purchase.

Probably the first thing to realize is that, new or used, you very seldom get any better equipment than you pay for. Secondly, there is always a certain element of risk in purchasing used equipment, whether it be automobiles, cameras, or radio equipment. The following paragraphs discuss some of the disadvantages involved and how to minimize them.

Besides the possibility of component failure, there is the problem of obsolescence. Assume that you have an expensive receiver purchased just after the war and the latest model of the same receiver sitting side by side on your operating table. Also assume that each receiver is in perfect condition. A careful comparison of the two will probably reveal the following differences between them: The newer model will undoubtedly have better selectivity and greater sensitivity, especially on the higher frequencies. Its crystal filter will have a wider selectivity range, with a smoother "phasing control." Its noise limiter will be more effective. It will be fully calibrated with greater accuracy over all the amateur l-f bands in use today.

Obviously the older receiver would be worth less than the new one, even if it were in perfect condition. From this depreciated value an additional

(Continued on page 58)

Fig. 1. It keeps several men busy at World Radio, Council Bluffs, Iowa, to inspect and recondition used equipment before it is offered for resale.

Fig. 2. Did you say you were interested in a used transmitter or receiver? This is a view of the reconditioned equipment racks at World Radio Laboratories.

PROPAGATION

(from page 41)

power upon which the *Propagation Charts* are based, and you would therefore subtract 1 from the ratings.

Correspondence received from numerous readers during the past two years indicates that the "work plan" devised for the 1951 and 1952 Contests was a big help to many operators in compiling scores. These "work plans" are devised from the *Propagation Charts* and show, at any particular time, the band that has the best possibilities of providing contacts with the maximum number of Continents and Zones. A typical work plan can be found on page 34 of October, 1952 *CQ* or in the *Ionospheric Propagation Conditions* column of *CQ*, September, 1953.

The long-range ionospheric disturbance forecast for the past two DX Contests were quite accurate. Ionospheric disturbances, unfortunately, have occurred during the last three Contests. This year, however, the long-range forecast is for normal propagation conditions to occur during the Contest period with conditions from fair to good on all circuits.

Remember that the World-Wide DX Contest is truly a *world-wide* Contest. Scores are based upon the number of countries worked, the number of zones worked and also the continents worked. For full Contest information, see pages 36-37 of August, *CQ*. Good luck to you all in the Contest—and let me have your observations concerning the accuracy of the predictions and their usefulness.

General Propagation Conditions—October

10 Meters—DX Fair to Poor, some daytime DX openings expected on certain North—South paths.

15 Meters—Steady improving as Winter approaches, Fair world-wide DX during the daytime hours.

20 Meters—Band closing earlier in afternoon, but DX conditions Fair to Good.

40 Meters—DX conditions steadily improving, Fair to Good dark hour world-wide DX possible.

80 Meters—Night-time DX Fair and improving as band becomes quieter.

160 Meters—DX Poor but improving, occasional DX possible during same hours as 80-meter openings.

THE NOVICE SHACK

(from page 54)

amount would have to be deducted to compensate for the wear and tear of normal use in setting a fair price for such a receiver.

The old timer would still probably outperform a new model of one of the less-expensive receivers, but it will undoubtedly cost more too. For example, a *National HRO*, that is fifteen years old, but in good condition, would undoubtedly outperform a new *SW-54*, but you would be lucky to buy the *HRO* for less than $125.00, compared to $50.00 for the *SW-54* And what would the comparison be with a new receiver costing around $125.00?

Taking a more recent example, a new *Collins 75A-1* cost $275.00 a few years ago. Because of inflation and the excellence of the construction a used

Terry Dietrich and his neat Novice station, WN3VKW, Hamburg, Pa. The receiver is a National NC-125 and the transmitter is an Eldico TR-75. The dog on top of the transmitter is actually an electric clock. His left eye tells the hour and the right one the minute.

one still costs about the same amount. You can buy a new receiver (*SX-71, Hammarlund 140,* etc.) for that amount and get some change, too. Which would be the better buy? Probably no one could answer these questions to the satisfaction of everyone, because personal preference has much to do with the answers.

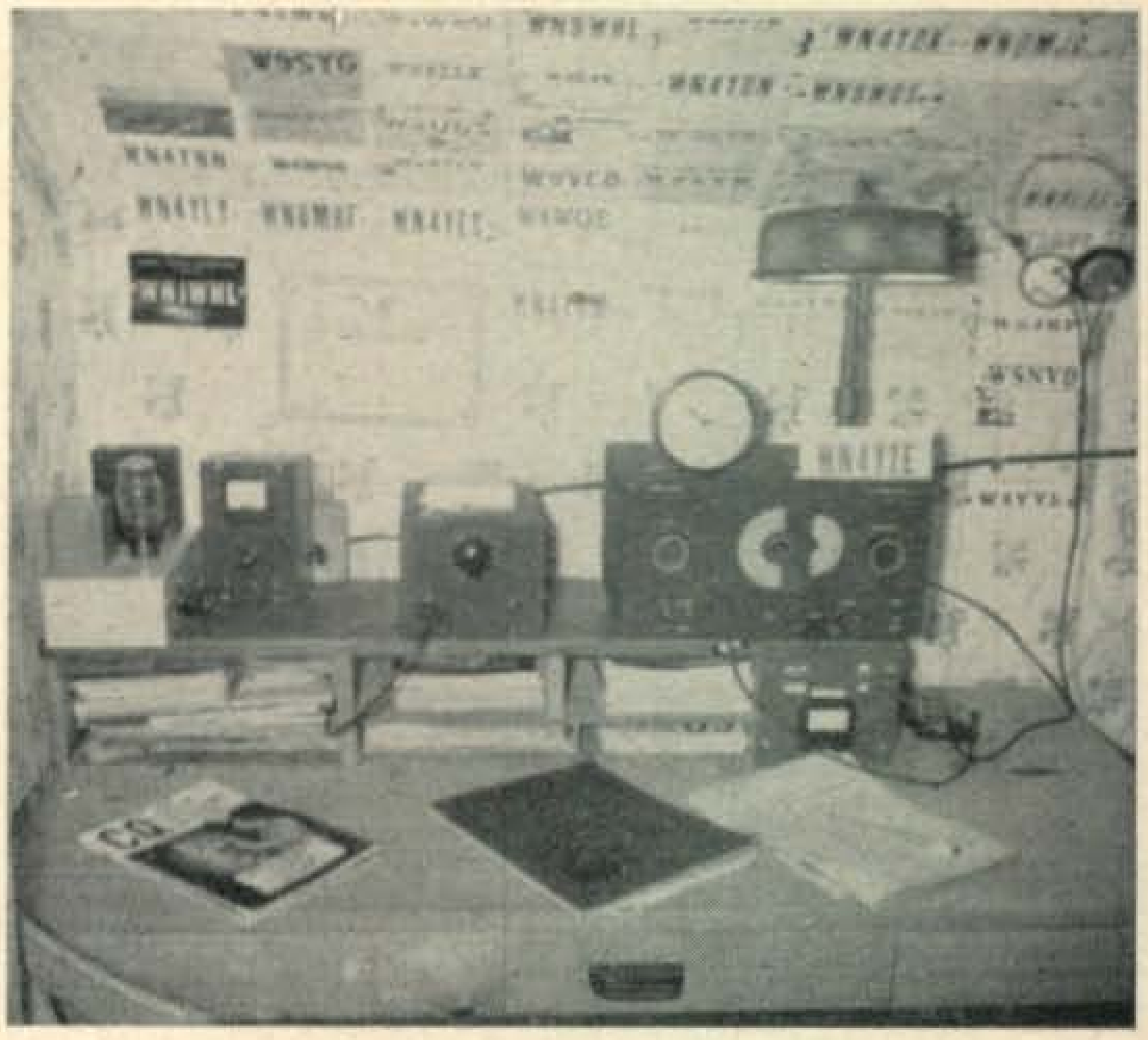
The only really safe way to buy used equipment is to buy it from a reputable dealer with the option of returning it for credit, if it is not satisfactory. His advertised prices reflect quite accurately the true worth of the equipment, based on current market values compared to the price of new equipment. If he prices it too high, no one will buy it, and if he prices it too low, he will lose money.

(Continued on page 60)

Dealers in Used and Reconditioned Equipment

Most companies that sell used and reconditioned amateur radio equipment are not primarily in the used-equipment business. The equipment they sell is acquired as trade-ins, which must be disposed of. It is doubtful if they do better than break even on such business.

It is interesting to see what happens to a piece of used equipment before it is offered for resale by these companies. The following applies primarily to *World Radio Laboratories*, Council Bluffs, Iowa, but other companies follow essentially the same routine. Assume that it is a receiver.



This forty-watt station worked 347 stations in thirty-eight states and Canada in 2½ months. Call: WN4YZE. Operator: Pete Gaddie. Place: Taylorsville, Ky. The transmitter, in the center of the picture, uses a 6AG7 and an 807, feeding either a folded dipole or a T2FD. Receiver is an S-38B.

Upon arrival at the reconditioning department, the receiver chassis is removed from the cabinet, and both are carefully cleaned. The chassis is then set up on the service bench (*See Fig. 1*) and carefully inspected for broken or missing parts and loose connections. At the same time, the circuit is inspected for unauthorized changes fróm factory wiring.

Any defects found are corrected, and, if necessary, the circuit is restored to its original condition. The receiver is then turned on. If nothing starts to smoke, it is given a preliminary check for excessive hum, proper functioning of all controls, and for selectivity and sensitivity on all bands. The receiver is then allowed to operate for several hours and again checked for overheating, oozing condensers, evcessive drift, loss of sensitivity, inaccurate calibration, etc.

After any repairs and adjustments found necessary in the second inspection have been made, the chassis is replaced in the cabinet. The receiver is then allowed to operate for another several hours before being tagged o.k. for resale and placed on the rack of reconditioned equipment. (*See Fig. 2*)

Used transmitters, test instruments, and other types of equipment receive a similar thorough going over before being resold. Such reconditioning is expensive, but it is the reason that the equipment can be sold on a "free-trial" basis—it can stand inspection.

Buying Used Equipment From Individuals

It is rather difficult to offer intelligent advice regarding the purchase of used equipment from individuals. Obviously, there is more risk involved than in buying from a dealer. Even assuming that the seller is perfectly honest—normally a safe assumption—sales are usually final, and the equipment is not overhauled before being sold. As a result, I believe that, generally speaking, used equipment purchased from an individual should cost somewhat less that that which is purchased from a recognized dealer. Whether the individual will agree with me is something else.

Letters And General News

In the November, 1952, **Novice Shack** I printed a letter from WN8KAO telling of his experiences as the first Novice to operate in Canada under the reciprocal agreement between the United States and Canada authorizing such operation. A few weeks ago, W8KAO (he had been promoted to a General in the interim) wrote again to report that a WN1 had had his application for authority to operate in Canada rejected. I immediately wrote to the Department Of Transport, Ottawa, Ontario, Canada, for the official ruling on this point. I quote the pertinent parts of the reply.

> Sir: . . . I wish to advise that under the terms of the Convention between Canada and the United States of America relating to the operation by citizens of either country of certain radio equipment or stations in the other country, amateur radio stations shall be operated in accordance with the laws and regulations of the country in which the station is temporarily located. Therefore, since the qualifications necessary to obtain a United States Novice or Technician Class Amateur Radio License do not meet the Canadian requirements, we are not prepared to permit holders of such licenses to operate their amateur radio stations in Canada.
>
> "It is true that when the Convention first came into effect, one or two United States amateurs holding Novice or Technician Class licenses were given temporary authority to operate their radio stations in Canada. However, this was before it came to our attention that their qualifications did not meet the Canadian requirements." for G. C. W. Browne, Controller of Telecommunications.

Doug, **WN6SOU**, says, "Dear Herb, I have heard of sons following in their father's footsteps, but here is a switch. Eddy, W6KHS, holds a General Class license and got his dad interested in radio. Dad's call is KN6AMS, and he has done pretty well on the 7-Mc. Novice band. His first two contacts were with Hawaii and Ohio. Pretty good for forty watts, hi. . . . Eddy also got me interested in amateur radio. I run forty watts input to a 6AG7-807 rig. Have worked eight states on 3.7 Mc."—Doug, WN6SOU.

WØIMJ asks, "Dear Herb, How about reminding the guys with **BC-454**'s and other receivers with rather poor selectivity about Aircraft Range filters (**FL-5, FL-8**, etc.) A few of the **Surplus** houses still advertise them. One connected between the output jack and the phones will increase selectivity of the receiver a lot. 73"—Bob, WØIMJ/9.

Chic, **KN2BVM**, reports, "Dear Herb, I have worked twenty-four states, including California, with my 6V6/6L6 with fifteen watts input and a **surplus Collins TCS** receiver. . . . My brothers, W2DVI, KN2BVQ, and I are the only Hams in Newport, N. J. No local QRM, hi, hi. Oh yes, I am sixteen years old. 73"—Chic, KN2BVM.

Don, **WN9ZOS**, brings us up to date on Novice activities in Elgin, Illinois. "Dear Herb, Thanks for using my letter and the picture in the June **Novice Shack**. Bill Anderson and Doug Jensen shown in the picture have now gotten their calls. Bill is WN9YOA and is on 3.7 Mc. with a home-built 807 transmitter and a **BC-348** receiver. Doug's call is WN9YPZ, but is not yet on the air. . . . Another member of our club, Huck Johnson, passed his Technician and Novice Class examinations and got the call WN9YWR. But he never used it before getting his General Class license. I guess, though, he really couldn't with a 400-watt **Globe King**, hi. . . . I just got my call, WN9ZOS, today. I have a **BC-348N**

(Continued on next page)

(from preceding page)

and thirty-five watts input to an 807. My antenna is an 80-meter, off-centerfed doublet. . . . I'll have some more Novice calls for you when Ev, W9OWD, starts up his code classes again. 73"—Don, WN9ZOS.

First Novice WAC?

Apparently no one told Jim Henderson, **WN3UAD** that conditions were now so bad that it was impossible to work DX. He writes, "Dear Herb, I'm not much at letter writing, but I just had to let you know about some of my Novice activities since I got my license last March. My rig is a 6L6/6L6/6146 running thirty watts on 3.7 Mc. and 21 Mc. Receiver is a five-tube superhet that I built myself. Antennas are two folded dipoles fed about ninety degrees out of phase on 21 Mc. and a tilted dipole thirty-five feet high on 3.7 Mc. . . . I have worked thirty-seven countries, thirty of them confirmed. When 4X4CE's QSL card arrives, I will apply for my Novice WAC (Worked All Continents) certificate. Ten of the countries were worked on 3.7 Mc. and the rest on 21 Mc. I have also worked forty-five states, mostly on 3.7 Mc., with forty-one confirmed. I sure would like to work Vermont, Nevada, and North Dakota; so that I could get both WAC and WAS before my Novice license expires. . . . For those who are interested, here are the call letters of the DX stations I have worked: 3.7 Mc: VO1B, KL7AHR, XE1CX, ZL2BO, VP9CC, VP1AN, KZ5MN, CO1KR, VK6PY, ZS1BW. On 21 Mc: TF3EA, ZB1AA, PR3WI, ZD9AA, PJ2AD, OE13RC, CE3DG, HB9GV, LUØAW, 4X4CE, HR1AT, G4BBX, DL1PO, F7WR, GD3UUC, GM3CSM, 5A1JM, CN8ET, FA8RO, OX3GM, PY2CA, VP3LK, TG9AD, FP8AW and AH, KG6FAC, CT1CS, YU3AE. . . . I have had two complaints of TVI on 21 Mc., but investigation showed that both were the fault of the TV receiver. I am sixteen years old and a senior in high school. . . . I was PR3WI's first Novice contact. He is the same as VR3—Washington Island, and his QSL card is very colorful. Well, that's about all. I would be glad to correspond with any of the gang. 73"—James C. Henderson, WN3UAD, 1406 Bellvin Drive, N. W., Washington, D. C.

Cliff, **WN4AKQ**, writes, "Dear Herb, I have just received my license and have worked twenty-five stations in two states. The rig uses a 6AG7 with 2¾ watts input on 7 Mc. Receiver is an **SW-54**, and the antenna is a ½-wave doublet. . . . I borrowed the transmitter from W4YZC. Old timers W4MKE, W4YE, and W4ROE have also helped me. And I would be glad to help others to get their Novice licenses. I am working on another 6AG7 rig, running fifteen watts, which I hope to have on very soon. . . . I am very interested in exchanging honest reports. My first twenty-five reports were T9, but then I got T7 from WN4——. I would like to know his reasons. 73"—Cliff Steadman III, WN4AKQ, 146 Taylor St., Winston-Salem, N. C.

Another offer of help. "Dear Herb, I will be happy to assist prospective Novices in this section of N. C. and S. C. in any way possible. Will also administer Class C and Novice (C) exams to those qualifying. 73"—Eddie, W4SOD/4, Box 126, Lumberton, N. C.

> Those requesting help this month in obtaining licenses are:
> Donald Perrier (14), 135 Broad St., Whitman, Mass. Tel. 1123-M
> Donald Anderson (17), 91 Winter St., Whitman, Mass. Tel. 1337-R
> Morton H. Schlesinger (26), 701 West 177th Street, Apartment 37, New York 33, N. Y.
> Allan Gaynor, 6200 Tremont St., Dallas, Texas.

Fred, **WNØPKS**, writes, "Well Herb, my ticket finally got here after thirteen weeks. My first QSO was with WØGBV. When I called CQ, the perspiration was rolling off my hand, not to mention my face, hi. The transmitter is running about three watts, and the receiver is an S-53A. . . . I have been meaning to write to you ever since I read your article about SWL cards. I used the method you recommended—stamped postal cards. I put all the information on the card, then mailed it in an envelope. The Ham would then sign and return the card. I was after confirmations of my reports, rather than collecting QSL cards, and my percentage of replies was over ninety percent. . . . I am sixteen years old. 73"—Fred, WNØPKS.

Evelyn, **KN2CUQ**, writes, "Dear Herb, Would like to add a postscript to KN2AZA's letter, which appeared in the July Novice Shack. I worked him a while ago, and he certainly practises what he preaches about sending slower when requested. Not only did he slow down for me, but he also changed from a bug to a key to make copying easier for me. . . . A point I would like to add is that when you ask a fellow to QRS (Send slower), it helps if you specify your copying speed. 'Please QRS to six wpm,' gets more satisfactory results than a plain QRS, especially when the guy is sending twenty-five w.p.m. He might think that QRS meant twenty w.p.m., which isn't much help when I'm the one that is copying, hi. It's also a good idea to name a speed that is a little slower than your actual copying speed. Allow a slight margin for the human element. . . . We (the OM, KN2DBB, and I) have an old **S-20R** receiver and have found that it works better than we realized, now that we have read your article on getting the most out of a receiver. Even the best equipment isn't much good if it isn't operated properly. We plan a new and better receiver some day when we can afford it, but in the meantime, the old **S-20R** is giving us plenty of good contacts. . . . We have worked twenty states and some VE3's in the three months we have been on the air, running a maximum of thirty watts, and aren't a bit anxious to have a more-powerful rig. Surely its more of a thrill to get those DX contacts through good operating than by blasting your competition off the band. . . . Aren't there any YL's operating on 7-Mc. Novice band? I haven't met any yet, and many of my contacts say I'm the only YL they have worked on 7-Mc. CW. Are the girls all on phone? 73"—Evelyn Twining, KN2CUQ, Aurora, N. Y.

Dave Chartier, **WN1YRM**, secretary for the Sky Wave Net sent me an operation sheet for the net, with a request that I print the pertinent facts about it. WN1YQF is NCS. The net meets on Tuesday nights at 11:00 p.m., eastern time, on 7184 kc. The net has five rules, which could very well serve as a guide for reporting into any directed net.

1. Transmit only when invited to do so by the NCS, even though you only want to help.
2. Report into the net at the appointed time.
3. Answer promptly when the NCS calls you, and do not leave the net without first notifying the NCS.
4. Know your Q signals and keep them handy.
5. Save all remarks until the net is free.

News about another net and a few suggestions from John, **W4YRF**. "Dear Herb, I now have my General Class license. I have worked thirty-two States with thirty-five watts input to a **Lysco 600S**, which belongs to my brother, W4VZD. . . . Cliff, WN4ZFL, and I are planning a Gulf coast Novice Net. (**As reported in the July column**—Herb) We would like to hear from fellows interested in it (they do not have to be on the Gulf Coast) and to receive suggestions about how to conduct the net. I shall be NCS at first, and the net will meet on 3.7 or 7 Mc. at a time we can all be on. . . . I would like to make some suggestions to the Novice on how to get more contacts. 1. Leave the Bug alone. 2. Send only as fast as you can receive. 3. Make CQ's short. 73"—John, W4YRF, 731 West Jordan St., Pensacola, Florida.

Terry, **WN3VKW**, writes, "Dear Herb, Since writing to you last I have acquired an **Eldico TR-75TV3**. With it I have worked eighteen states on 3.7 and 7 Mc. I hold a fifteen w.p.m. code proficiency certificate, but can copy twenty now, and will try for that sticker next qualifying run. . . . My greatest beef is the guy who calls CQ till doomsday and by the time he gets around to his call letters, it's time to QRT. . . . Age here is fifteen. I hope to pass my General Class examination in a couple of days. 73"—Terry, WN3VKW.

There is room for just two more notes this month. The first is from another searcher for a YL operator. You know, I have just about decided that the lad who wrote the song "Chloe" was a Novice at heart. He, too, is calling for a YL, like most Novices, with no reply. . . . The searcher is Art, **WN1YQF**, who, I just noticed, is the NCS of the Sky Wave Net mentioned a little further back. He says: "Dear Herb, I am fifteen and have been on three weeks and three days. I have had 137 QSO's with twenty-seven states and VE3, with twenty-one states confirmed. I am on 7184 kc. almost every day, and I would like to have a real QSO—about an hour and a half long—with a YL between the ages of thirteen and fifteen. 73"—Art, WN1YQF.

Eddy, **WN5ZBC**, writes, "Dear Herb, I have worked about twenty states, with many thirty minute to one hour QSO's, but hardly any of the Novices QSL. I have confirmations from only eight states. Rig is a **Viking II**, running sixty watts and the receiver is an **S-38B**. . . . I would like to form a Novice net in and around northwest Ark., eastern Okla., southern Mo., and southern Kans. If interested, please write Eddy Shell, WN5ZBC, 403 Wayland, Springdale, Ark. 73"—Eddy.

Keep writing and sending pictures. Until next month,

73—Herb.

DX and Overseas NEWS

(from page 45)

Exploits

With the help of CEØAA, VQ7UU and VQ9UU, **W1FH** reached 256, **W3BES** went to 248 and **KV4AA** settled on 225 . . . The same trio put **W8NBK** on 240 . . . CEØAA raised **W6SN** to 242 and **W4RBQ** to 192 . . . **W6AM** upped to 241 with CEØAA and VS9AP/SO while Luis raised Dons A3 total to 168 . . . **W2AGW** reports a modest 239 with CEØAA and VQ7UU while **W6MX** went to 237 with Luis and OD5AB . . . **W6GDJ** was the first CEØAA/W CW contact giving Al his No. 229 . . . **W6SAI** comes up to date with nine additions putting Bill on 224 . . . **W6TI** dug up a forgotton HS1SS which, along with OD5LX and CEØAA, gives Horace 217 . . . **ZL1BY** adds eleven with such morsels as VR3C, VK1HM, VS9AW and CEØAA to reach 214 . . . **W6CYI** ups to 213 with OD5AD, CS3AC and VR3C . . . **G8IG** goes to 207 and 181, A3, with MP4ABW (Qatar) . . . **W6MHB** settled for an even 200 with HH3DM, C3BF and CEØAA . . . **W6JK** came up to date with eight additions for 173 . . . **W6ID** added CN8EJ, FN8AD and KJ6AR for a total of 141 . . . Rex, **W5MPG**, rose to 209 with ZC5VS, 3V8AN and VS9AP while **W1ZL** stopped at 203 with CEØAA and VQ7UU . . . Ev, **KP4KD**, nabbed 3A2AY for No. 201 . . . **W3KDP** added LZ1KAB and CEØAA for 196 . . . Pat, **W2GVZ**, ups to 176 with OD5BH, CEØAA . . . **W4EPA** continues the upward trend with EA9AP, CEØAA, CR6CS and EAØAB for 144 . . . **W2ZVS** shot up to 157 with EA6AF, ZK2AA, ZC4IP, CEØAA, FO8AC and FK8AE . . . Luis gave **W3BES** his No. 190 on A3 . . . **W6PXH** added six on phone to reach 159 . . . XYL Lou, **W1MCW**, jumps into the A3 36 Zone lead courtesy of MP4ABW. Score 203 . . . **WØANF** A3'ed to 142 with ZB1BR.

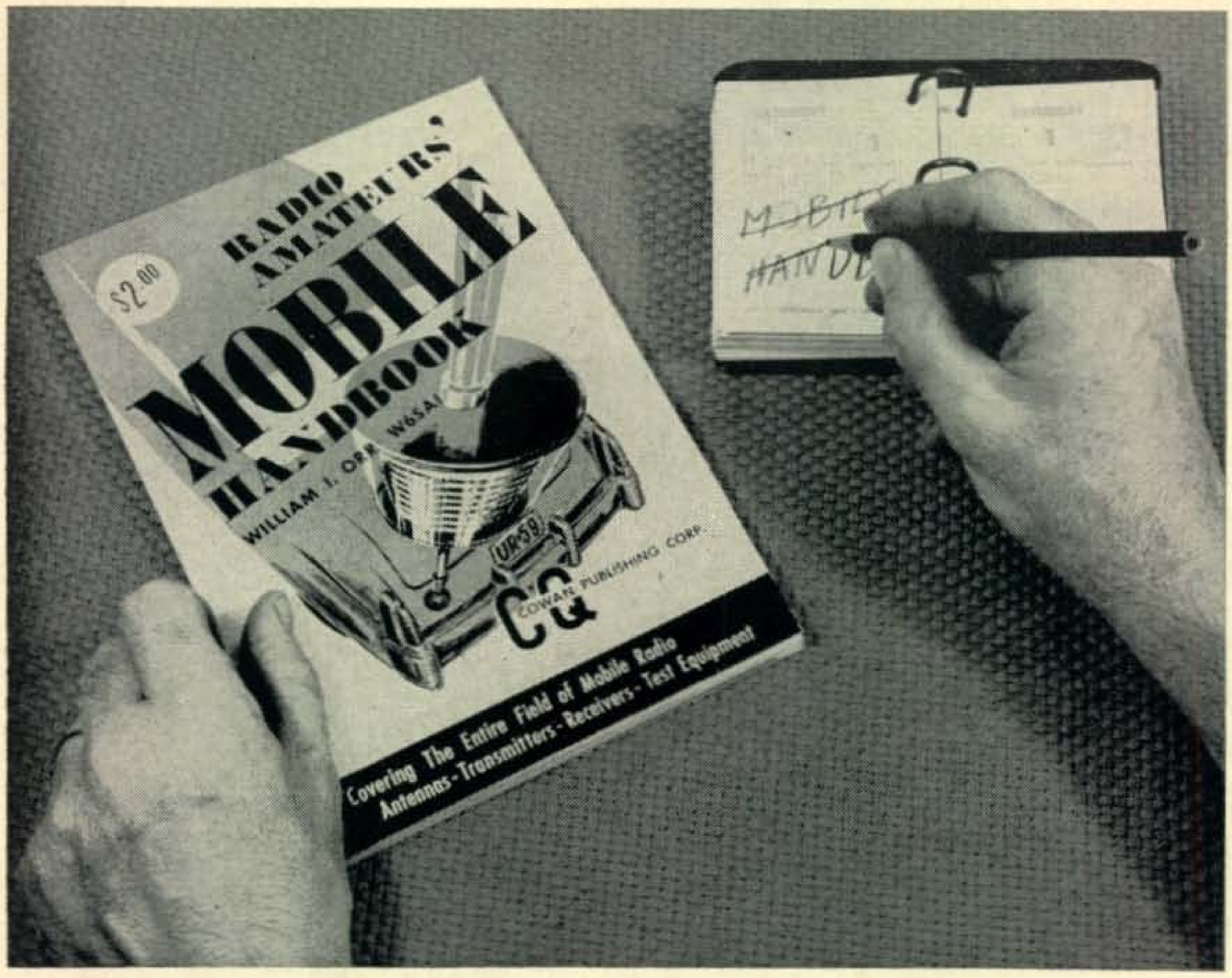
W5MIS nabbed VR3C and advises that VR3C will be glad to give the CW boys a break via phone/CW QSO's . . . **SM5KP** nabbed VK1HM, A3 . . . **W7VY** made it 240 with CEØAA . . . **W2QHH** added YI2AM for No. 217 . . . **W6DLY** received his AAA (South Africa) certificate No. 75 . . . Dewitt, **W9WKU**, ex-W6WKU, added EAØAB and OD5XX to rerch 75. He now has his kw. and 3-element beam going so progress should be rapid . . . **LU5AQ** reaches 147 by adding such as UAØKFA, LZ1KAB, KAØIJ, MF2AG, ZS7H, VP5BF, MP4BBD and VS9AS . . . **W4ZAE** comes up with the following on 7 Mc.; EA8BF, FP8AA, CE3DZ, HR1KS, 3A2AY and GD3IBQ . . . **KV4BB** latched on to MP4KAC and MP4K on phone. The latter station advised Bill that he was H.R.H. The Sheik of Bahrein Island and further said that OD5AD had just installed a BC-610 for him . . . **W1ORP** nabbed FK8AO on 7 Mc. for a new one . . . **W8DMD** hooked VQ7UU . . . **W9NN** rec'd BERTA Certif. No. 697 while brother-in-law, **W9RIL**, rec'd his WAS . . . **GM3EST**, ducking TVI periods, got up to 194 with ST2HK, HR1FV, VP2AJ, HK1DZ, OQØDZ and HI8WF. The last five being on 14 Mc. A3 . . . **W6GEB** nabbed PZ1WX on 7 Mc . . . **W1FH** rec'd QSL from MP4ABW and **W4TO** got one from LZ1DX/ZA!! . . . **W4YZC** pulled in Ted, OP1BX for a new one . . . **W5AVF** worked VK9YY, VK9GM (Norfolk Is. 0830 GMT 7011 kc.) and ZK2AA . . . **W1DSF** recd his WASM certificate . . . **TI2TG** went to 214 with VR3C A3 . . . **W7HXG** nabbed ZC5VS, VK1BJ and AC4NC. A card from the AC4 or from C8YR will give him WAZ . . . **W3EH** worked W4ROK/KG6 for his first KG6 . . . **W8PQQ** landed CEØAA, FD4BD and VP5BH . . . Bob, **W1WPO**, has gone over the 100 mark. He is in the DXCC Awards Section, ARRL . . .

Fifteen Meters

This band has been rather poor for the past two months but now shows signs of picking up. We have a few reports as follows: **W6ZZ** has received the first WAS for CW on this band. Miles has 39 states on phone and TG8IH was country No. 44. Not bad for a young feller! . . . **G6QX** went to 43 with CT2AP, KZ5IL, PJ2AD, IS1FIC and SU1GG . . . SVØWE gave **DL7AA** his No. 82 . . . **9S4AX** made it No. 53 with YO5LC . . . YO5LC also pushed **G6ZO** up to 83 . . . **TI2TG** went to 72 with CEØAA and claims to be the only phone contact on this band for Luis . . . PZ1AL and CEØAA upped KV4AA to 60 . . . **W8BHW** reports an imposing 87 with 68 of them on phone. Lindy worked OQØDZ and CEØAA. He has

(Continued on page 66)

The Only Publication of its Kind on the Market . . .



Put a note on your desk calendar today—see your distributor or Ham parts dealer about a copy of the RADIO AMATEURS' MOBILE HANDBOOK. Packed into this 192 page book is all the information needed to put the simplest or the finest mobile station on the air. Supplementary topics such as noise suppression, ignition interference, battery care and maintenance, etc., are thoroughly discussed.

Price—$2.00 using the coupon below, or order directly from your dealer.

(Jobbers write for quantity discounts)

CQ MAGAZINE — CQ-10

67 West 44th St., New York 36, N. Y.

Enclosed find $............ for .... copie(s) of the Radio Amateurs' MOBILE Handbook at $2.00 each.

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a 12-element beam!! . . . **KP4KD** went to 60 with ZB1BJ, SU1GG, ZP9AY and OD5BH. Ev's openings for Europe were all after 2000 GMT . . .

160 Meter TransAtlantic Tests

(Via G6QB, **Short Wave Magazine**) The dates for the next 160-meter tests have provisionally been fixed for the following dates: December 20 (dummy run), January 3, 17 and 31; February 14 and 28; March 14. Time: 0500 to 0800 GMT. The success of last season's event has already assured plenty of cooperation from the W's and VE's and it is hoped that several more "exotic" spots will also be taking an active part this year.

Here and There

Doc, KA9AA, was "reprieved" from his stay on Hokkaide in July and, since then has been on as **KA2AA.** As this is read KA2AA should be very active on 21 Mc. See QTH's . . . **W5MPG** vacationed a month in W6-land, visiting several W6's. Rex says some of the rigs and beams out that way just "can't be true" . . . **EA9DC** should not be judged too harshly as we understand, upon his return home, he found three of his kids down with a serious illness. We feel that Ifni QSL's will eventually come through on a "better late than never" basis . . . Bill, **W6SAI**, says W4LVV informed him that QSO's with FG7XA around Oct. '52 were legit as there was visiting a PAA boy there. Bill also logged a visit from VU2KJ. Seems from his tales that the Calfornia Kilowatt is also well known in India . . . **W9NN** seeks a QSL from YN1AA or VP2SH to complete his WAA . . . We regret to report the passing of **GM5BA.** He was on of the first licensed G stations . . . G3AGQ is now **VE7BS.** Bob studies the TV biz in Vancouver . . . Fred, VK3YS, seeks the present whereabouts of Bill Christian who was **KP6AE** in '48 . . . **4X4RE** advised KP4KD that the 4X4's may get the 160-meter band for this season . .

Honor Roll Endorsements
(Up to August 15)

W1FH	40-256	W5MPG	39-209
W3BES	40-248	W1ZL	39-203
W6SN	40-242	KP4KD	39-201
W6AM	40-241	W3KDP	39-196
W8NBK	40-240	W4RBQ	39-192
W2AGW	40-239	W6LW	39-191
W6MX	40-237	W6GPB	39-179
W6GDJ	40-229	W2GVZ	38-176
W6SAI	40-224	W4EPA	37-144
W6TI	40-217	W2ZVS	36-157
ZL1BY	40-214	PHONE ONLY	
W6CYI	40-213	G8IG	39-181
G8IG	40-207	W6AM	38-168
W6MHB	40-200	W3BES	37-190
W6JK	40-173	W6PXH	37-159
W6ID	40-141	W1MCW	36-203
VK7KC	40-133	WØANF	35-142
KV4AA	39-225		

Last complete HONOR ROLL appeared in the September issue.
Next complete HONOR ROLL appears in the January issue.

The FCC made short work of a WP4 Novice who was signing KP4ZZ . . . Any missing QSL's from **ZS4AK** will be sent upon receipt of another QSL. His log book went astray . . . **K6BLL** is the new call of the Delano Radio Club. Among the members are W6BYH, W6EFV, W6BVM, W6ZEK, W6HT and W6UZJ . . . **HR1AA,** ex-W3VBG nabbed W9HUZ for QSO No. 1 . . . **W6TSD/2** now operates from Roslyn, L.I. See **QTH's** . . . Jim, W5TFD, operated at **W4YGO/5,** Lacomba, La. . . . Larry, ex-KAØIJ, is now working in Biloxi, Miss . . . W4IA is now **KA2AW** while W4VE is **KA2AA** . . . **W2UGL** is a ONE-watt specialist. Jim has worked out to FA8, ZL1, DL7, CO and KV4 with this power.

W8JBI, Ted, seeks QSL from KP6AE for '49 QSO . . . **WØELA** still hopes for cards from ET3AM and OY5EL . . . The set up at **CEØAA** consisted of a Collins 75A-2 and 32V-3 powered by a gasoline plant. Antenna was an off-center single-wire fed . . . **G2RO/VQ2RO** paid a visit to Buggy, VQ2AB . . . Doc, **ZS8MK,** spent some time with G5RI. He will return, this time probably to ZS7-land, around the second week of October . . . **HC1FG** visited W2LS . . . **W6DLY** moved to Arcadia, Calif. near to some heavy competition in the form of W6PFD and W6SYG . . . Ed, **W6BLZ,** complains of the "lack of faith" in the FEARL in sending out Certificates for the working of five JA stations since '49. QSL's sent to them eight months ago along with two subsequent letters of inquiry have gone unanswered . . . **W8BRA** moved to Cincy in Sept . . . **W4LVV** advises us that he has all the logs of VP5BF (Caicos) for all W and VE QSO's up to July '53 with the exception of the 1951 CQ DX contest. He will QSL upon receipt of postcard request to Box 104, Miami, Fla. Chuck also says that VP5BF may not return after his present two month's vacation which will leave Caicos blank for a spell . . . The new call for Warren, ex-W6IBD is **K2EDL.** It was christened with a KV4AA QSO. See QTH's . . . **W4LZF** rec'd KF3AA card back from ARRL: Sorry no count . . . **W2UNR** spends a couple of weeks in KL7 . . . During the recent Cuban flare-up CM9AA's car with mobile gear vanished . . . **W1FYV** dropped in on KV4AA for a visit.

21 Mc. Standings

W8BHW	87	DL7BA	69	KP4KD	60
G6ZO	83	G6QB	68	KV4AA	60
DL7AA	82	DL1FF	68	FA8IH	59
DL7AP	81	W3AYS	67	G3TR	57
PAØJJ	79	W4COK	66	W2WZ	56
G3GUM	79	PAØKX	65	G2VD	55
G5BZ	72	FF8AG	63	G2BJY	55
TI2TG	72	W1BUX	62	WØHVN	55
KZ5IL	72	G6GN	61	G4ZU	55
DL3RM	70	G8II	61	G2CHL	55
W4KRR	69	PY4RJ	60	W1RY	54

Latest QSL Addresses

CEØAA—	Via CE3AG, Casilla 761, Santiago, Chile.
CS3AC—	M/Sgt. Joe Paradise, 1936 AACS Sqdn. APO 406, c/o P.M. N.Y.
G2RO (Plus all prefixes—	W. A. Roberts (Please forward), Colonial Advisory Broadcasting Engineer, Colonial Office, Sanctuary Bldgs, Great Smith Street, London, S.W. 1, England.
LB8BD/ZC3—	Harald, c/o B.P.C. Christmas Island, Indian Ocean.
K2EDL ((ex-W6IBD)—	Warren Davis, Kings Highway East, Haddonfield, N.J.
KA2AA (W4VE)—	Fred B. Westervelt, Med. Sect. AFFE, APO 343, c/o P.M. S.F.
ex-KM6BG—	Ross Cade, 1756 Roll St., Santa Ana, Calif.
KS4AU—	Jim Price, Swan Island, Via Tampa, Fla.
KZ5TH—	Box 407, Balboa, C.Z.
OD5LX—	P.O. Box 1217, Beirut, Lebanon.
OD5XX—	Armin H. Meyer, American Embassy, Beirut, Lebanon.
ST2UU—	Jim Jamie, Box 801, Khartoum, Sudan.
VK2EG (ex-VK1BS, future VKØEG (?)—	W. J. Storer, 17 Brook St., Muswellbrook, N.S.W. Australia.
VQ7UU/ VQ9UU/ VS9UU/ CR7UU/ FB8UU—	Jim Jamie via RSGB.
VS2DW—	Tan Bin Hussain, Supreme Court, Ipoh, Malaya.
W6TSD/2—	Tim, 7 The Dogwoods, Roslyn, L.I., N.Y.
YS1ZG- YS1ZA- YS1ZM—	U.S.A.F. Mission, American Embassy, San Salvador, El Salvador.
ZP5DC (ex-ZP7AW)—	Capt. Antonio Sanchez, 0-413751, c/o U.S. Embassy, Asuncion, Paraguay.
5A1TM—	Chas F. Bennett, 580th Comm. Sqdn., APO 231, c/o P/M/ N.Y.

Thanks to the West Gulf Bulletin, Roy Waite, W5WI, W5FFW, W5DML and TI2TG.

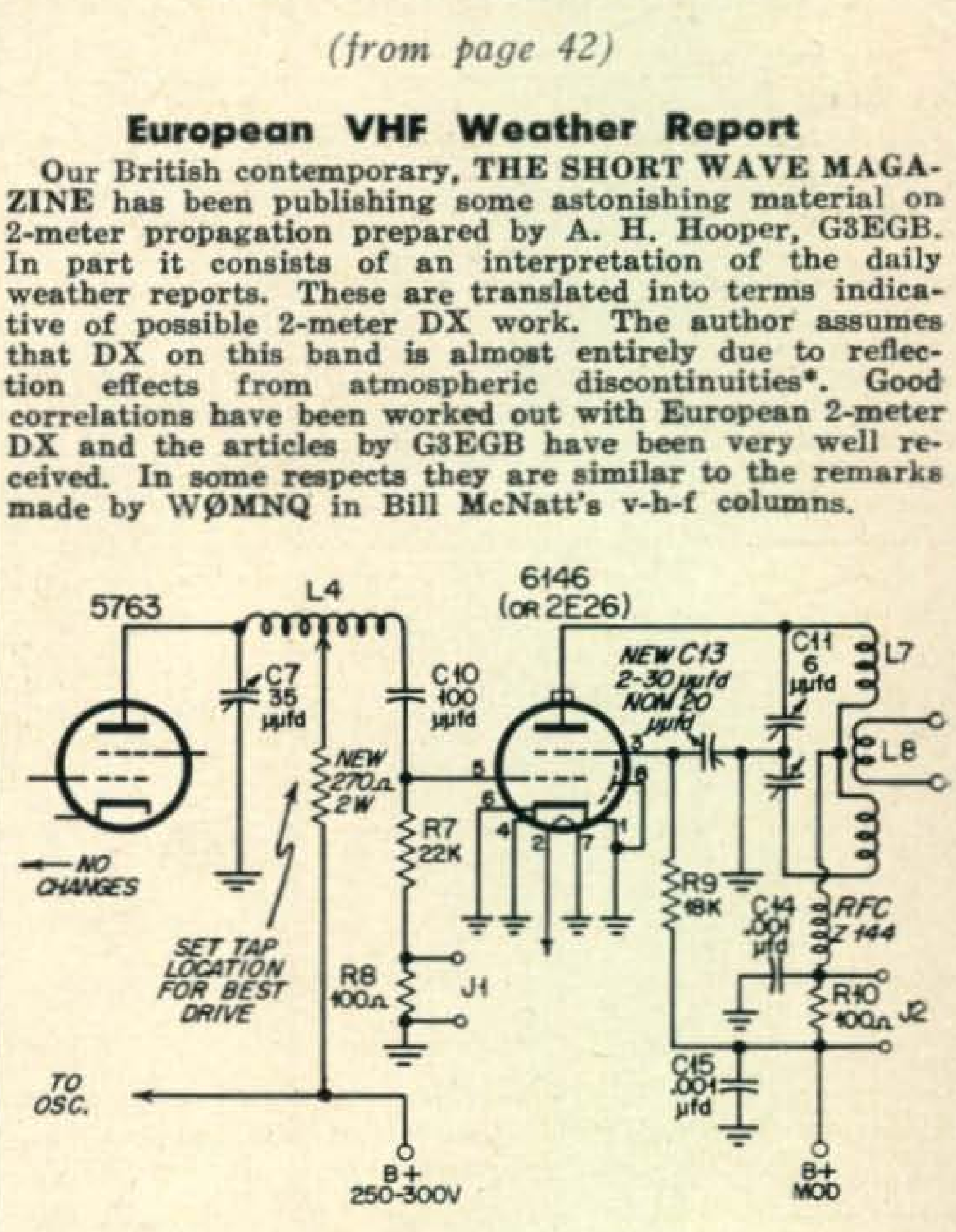
G6YQ reports negotiations are under way to secure EA9DC cards and signs are hopeful . . . **DL4JN** is W4LAP while Hank, **OE13USA,** is W2ZSO ex-W2JPI . . . **W5VSS/6** starts another DXCC at La Crescenta, Calif. Dale gathered 113 confirmations during his stay in Tulsa. See QTH's . . . Rumor reports one **FB8WU** on Antarctica . . . **W8EEB,** who is traveling with a revue company, visited ZL3JA in Christchurch N.Z. . . . **TI2TG** says TI8EP is /MM and ng for DXCC credit . . . W5SLC is now **WØQBA** . . . **W8PQQ** reports VR6AC, CW about 14015 . . . **ST2UU** (via G3AAM) doubts YA3FOV, Jim said he had an awful job getting them to license him as YA3UU as they stick to alphabetical sequence when issuing calls. YA3AB and YA3AC are presently licensed . . . **W4TO** moved to a better QTH in Atlanta. Instead of S9 plus his sigs are now S9 plus-plus-plus . . . **W5TKB** writes that an organization has been formed in Shawnee, Okla. for the purpose of donating needed radio gear to foreign Hams who, in many instances, are unable to obtain parts in their particular QTH's. Foreign stations are invited to write Bob Hicks, W5TKB, at Box 431, Shawnee, Okla., USA. W Hams, who would take time out to send in lists of their available, junk box, parts etc., would help matters considerably.

The VHF-UHF News

(from page 42)

European VHF Weather Report

Our British contemporary, THE SHORT WAVE MAGAZINE has been publishing some astonishing material on 2-meter propagation prepared by A. H. Hooper, G3EGB. In part it consists of an interpretation of the daily weather reports. These are translated into terms indicative of possible 2-meter DX work. The author assumes that DX on this band is almost entirely due to reflection effects from atmospheric discontinuities*. Good correlations have been worked out with European 2-meter DX and the articles by G3EGB have been very well received. In some respects they are similar to the remarks made by WØMNQ in Bill McNatt's v-h-f columns.



W2PAU's modification of the WN2IHM 2-meter transmitter.

The most striking aspect recently published was an examination from a meteorological point of view on the 1900-mile path between Valentia, Ireland and St. John, Newfoundland. G3EGB reports that on occasion it should have been possible to extend a 2-meter signal across the Atlantic over this path and on at least one date during 1951 and 1952 it would have been possible to put a signal from Ireland into the New England States! Remember this is not guesswork, but apparently a carefully conducted analysis using material drawn especially from the Meteorological Office in London.

G3EGB is now emphasizing the path from the Cornwall section of the British Isles to the Azores (about 1300 miles). If a consistently active CT2 station can be put on the air from this area, G3EGB feels that the European 2-meter DX record can be broken (it is now about 750 miles) by a sizable margin.

All in all, this is the type of enthusiasm we would like to see once again here in the States. There is plenty of work to be done regarding 2-meter propagation and it seems only just that the American and Canadian station should be in there pitching. What say fellows—any takers? By the way, if you're interested in following up the work going on in England through the various British publications I can put you in contact with their American subscription outlet.

Well, fellows I would have liked to give you more information on activities Stateside in this column, but space is at a premium in this issue. Don't forget to write me about what you particularly want to see in these columns.

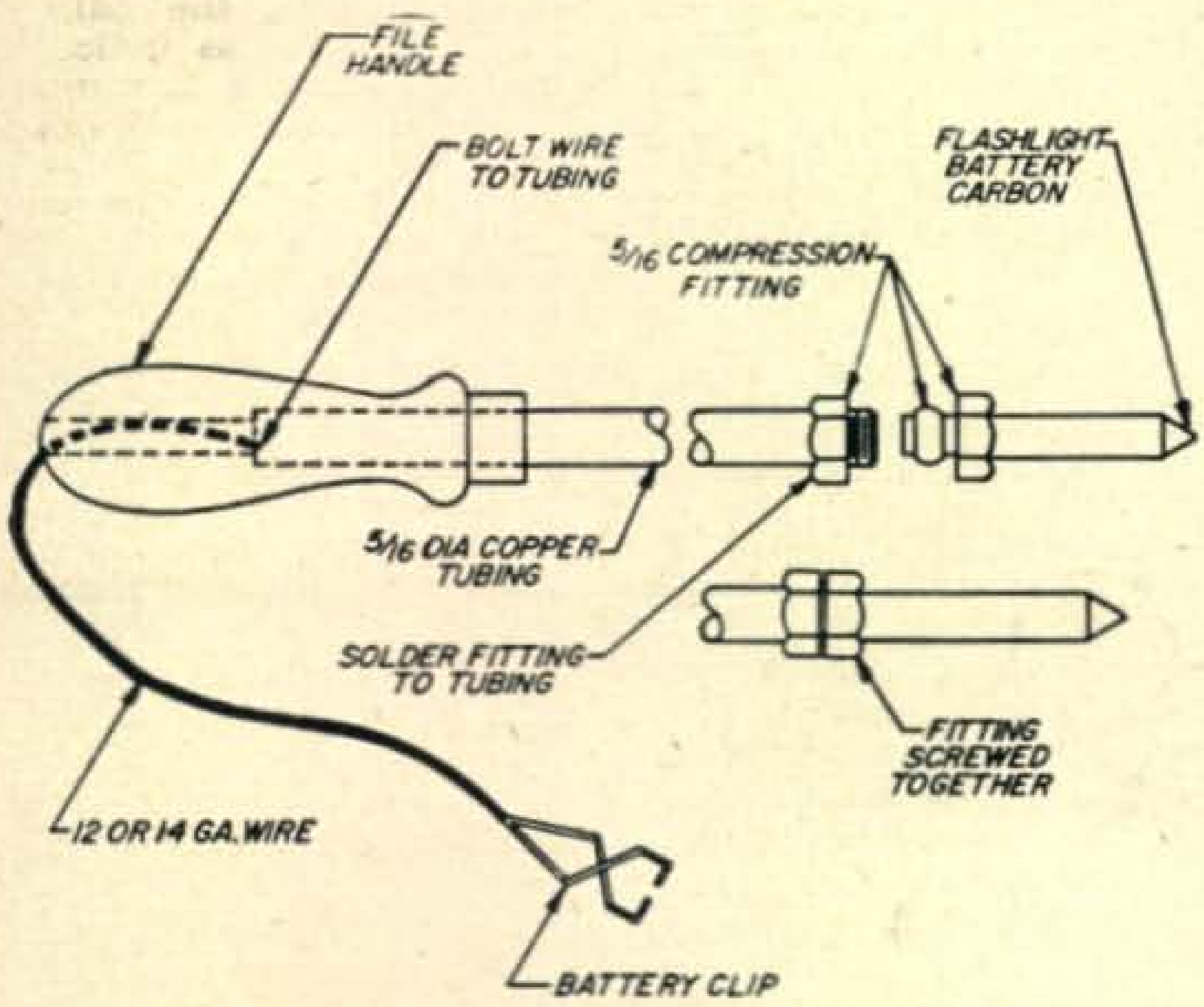
* See, "Near Grazing Incidence Reflection at 144 Mc.," O. P. Ferrell, CQ, December 1948, p. 35 and "Radio Wave Propagation," C. R. Underhill, CQ, January 1951, p. 26.

Inside the Shack and Workshop

Quick Heating Soldering Iron

Here is a quick heating soldering iron that is just the thing for use on the mobile rig or around the car. A few parts usually found in the junk box are all that are required to construct it.

To use: Connect clip to hot side of batter and



touch tip to car frame until hot enough for soldering. If the job is large and requires a sizable amount of heat ground the work being soldered to the car frame and generate heat at area to be soldered with tip of iron.

Hugo P. Gruener, W3UJS

Reflection Call Letter Plate

"Scotchlite" reflecting tape, available at most auto supply stores, is an inexpensive medium for the construction of your own call letter plates. This pressure sensitive adhesive type of tape is available in either silver or red. It comes in a 1-inch width and is light reflecting. The price is about one cent per inch.

To construct: Obtain a piece of backing material —Plexiglass, Masonite or an old scrap metal panel will do. If wood or metal is used, give it a coat of paint to contrast with the tape color. The plate may be of any size, 4 by 8 inches being of average size. Your call may be made up by cutting the strip down lengthwise and using the half-inch width to shape the letters or building up an area for the letter by laying out the full inch width and cutting out the letter with a sharp knife or razor blade. The finished plate is given a coat of "Krylon" plastic spray, and mounted on the back bumper splash pan with a pair of dime store angles.

If one does not care to go to the trouble of making up the plate, you may apply the letters directly on the back bumper of the car, the end result is the same: A set of reflecting call letters that identifies you as a Ham.

Bill Bowers, W2EGP

CLASSIFIED ADS

Advertising in this section must pertain to amateur radio activities. Rate 25c per word per insertion for commercial advertisements. 5c per word for non-commercial advertisements. Remittances in full must accompany copy. Phone orders not accepted. No agency or term or cash discounts allowed. No display or special typographical setups allowed. "CQ" does not guarantee any product or service advertised in the Classified Section. Closing date for ads is the 25th of the 2nd month preceding publication date. Write: Jeanne Gillespie, Classified Ads, CQ. 67 West 44th Street, New York 36, N.Y.

For Sale:

HQ129-X RECEIVER and SPEAKER, perfect condition, $145., Ed Waldman, Old Lyme Road, White Plains, New York.

75 FONE TRANSMITTER, 150 watts, VFO in gray cabinet. Rig and transformers built by Frampton! Best offer over $100 steals xmtr. complete with spare tubes express collect. Chas. Maupin, W5HQM, 909 N.W. 23rd, Oklahoma City, Okla.

FOR SALE: 400-watt transmitter, $125 includes Millen exciter, 42" metal cabinet, 1400-volt supply, and VFO. Cash and carry only. V. Carver, 6053 South Major Avenue, Chicago 38, Illinois.

ANTENNA ROTATOR, for FM and high frequency work. Powerful induction-type motor, weatherproof, approx. ¾ rpm, built-in potentiometer for remote indicator. Uses 110-VAC with resistor cord or series lamp. Circuit diagram included. Have sold over 700 and only 50 left. Last time will be advertised. $3.00 each, $5.00 pair, postpaid in U.S. Paul Swan, 2801 Ohio, Topeka, Kansas.

FOR SALE, my 60-watt, fone-CW rig, 815 final, 815 mod., complete with RME45, $150. Cash. W6REG, 331 So. 1st Street, Burbank, California.

SELL: Harvey-Wells TBS 50D, Hallicrafters S76 and S40, 630 chassis, meters, 813's. John Urban, 140-34 Holly Avenue, Flushing, New York.

FOR SALE or TRADE: Mon-key; pair 807's modulator and power supply; SX-71, one year old. All in good condition. Trade for shotgun, tape recorder, power tools, etc. WØOUU, 2314 Burnett Road, Topeka, Kansas.

SWR BRIDGE $11.; R-f impedance bridge $15.; Heath TV sweep generator $25. W2RLN, 1141 Garrett Avenue, Niagara Falls, New York.

SELL: Complete mobile installation; new 45-watt 75M transmitter, Gonset Tri-Band converter, new 6-volt dynamotor, relays and cables. $125 takes all or sell separately. Like new Hammarlund HQ129-X receiver with speaker. $169. Ralph E. Queen, Route 7, Spartanburg, S. Car.

FOR SALE: Hallicrafters S-72 portable, excellent condition, spare tubes, $55. Eimac 450TL, never used, $12. Sola kw. modulation transformer, primary 6600 ohms, secondary 2400 and 4800 @ 800 ma., $13. Johnson Viking, factory wired, $200. Hallicrafters SX-71, $100. WØEHF. 2558 Ida, Omaha, Nebraska.

QUICK CAPACITOR CHECKER. Shows open, shorted, leaky. Capacitors and electrolytics, and circuit continuity. Kit $6.75 p.p. Vemaline Co., Box 22, Hawthorne, N. J. Dept. A-4.

FOR SALE: HQ129-X, $125. Jensen "Triplex" loudspeaker system, best offer over $200. Want: 220 Mc. equipment, Vitessa camera. Herrmann, W9OIT, 6119 Greenwood, Chicago 37, Illinois.

SELL OR TRADE: #21A midget tape printer, #12 page printer, 32V-3, BC1031 panadaptor, LM frequency meter, T-23/ARC-5, RA-62, BC610-E. Want: ART-13, DY-17, APN-9, APN-4, APR-4, BC221, BC348-Q, technical manuals, TS or I test equipment. Tom Howard, W1AFN, 46 Mt. Vernon Street, Boston 8, Massachusetts, RIchmond 2-0916.

LYSCO 600—TVI suppressed with Lysco antenna tuner. 8 months old. $125. WØEKZ, Robert Maxton, 427 North Quentin, Wichita, Kansas.

REAL BARGAINS: New and reconditioned Collins, Hallicrafters, National, Hammarlund, Johnson, Elmac, Gonset, Babcock, Harvey-Wells, Morrow, RME, Millen, Lysco, others. Reconditioned S38 $29; S40A $69; S36A $99; S76 $129; SX71 $149; SX42 $179; SW54 $35; NC125 $129; NC173 $149; NC183 $199; HRO50 $249; VHF152 $39; VHF152-A $49; Meissner 9-1090 bandswitching VFO $49; Collins 75A1 $259; 75A2 $329; 32V2 $495; HQ129-X, NC183-D, HRO50T1, HRO60, Vikings, HT9, many others. Shipped on approval. Terms financed by us. Write for free list. Henry Radio, Butler, Missouri.

COLLINS 32V2 for sale. Original packing, manual. Used very little and in excellent condition. $450. C. Atkinson, Jr., 2433 Stanmore, Houston 19, Texas.

BARGAIN: 250 watt phone-CW transmitter in 6-foot rack with phone patch and other extras, $150; Collins 310C-2 exciter, $100; BC348-R converted to 110, ANL, speaker $60; 1500 volt 350 ma. supply, $43; Heathkit 0-7 oscilloscope, $33. All guaranteed to be in excellent working order. Donald McNamara, Anamosa, Iowa.

NOVICES: Am cleaning house. Transformers: 600 v. 300 ma, $6.95; 400v 150 ma. 5v 2.5v, $5.95; 6.3v 3 amp., $2.95;. Chokes: 6 h. 200 ma., $2.95; 10 h. 250 ma., $4.25; 14-4h. 300 ma., $6.95. Will send list: tubes, meters, other gear. W2FDJ, Willsboro, New York.

FOR SALE: Custom built 800 w. 813 PP final, used 10 hours $950; Collins 32V2, completely de-TVI'd and 75-A2 $800 or $1650 complete. W2RLX, 881 Cambridge Road, Woodmere, L.I., N.Y. FRanklin 4-4942.

SELL or SWAP: Complete kw parts for final, modulator and power supply. Never used. Write W8UIA, 521 East Townview Circle, Mansfield, Ohio.

JOHNSON VIKING II transmitters available in kit form at $279.50 or wired and tested for $319.95. Viking VFO's wired and tested, with tubes, for $34.95; we take other equipment in trade and offer terms if desired. Also have quite a variety of used equipment. Write for latest list to W1BFT, Evans Radio, Concord, New Hampshire.

FOR SALE: Motorola TV 7" good condition $35., also Radiart TR-2 rotator with 100 ft. control cable perfect $25. TV boosters: Regency $10, Anchor $7. W7NOM, R. L. Westcott, Ontario, Oregon.

FREE LIST. Used Collins, Elmac, Hallicrafters, Lysco, Hammarlund, Harvey-Wells, National, RME, Sonar, etc. Lowest prices. Liberal trades. Dossett, W9BHV, 855 Burlington, Frankfort, Indiana.

FOR SALE: Guaranteed like new Hunter 20B Bandit, Gang tuned 6 band multiplier $40. postpaid. Going SSB here. WØABS, West Plains, Missouri.

SELL or TRADE: 150 w. 75 and 40 phone; 150 w all-band CW rig; 75 ECO; BC342-N AC receiver; SX43 with speaker; SX-9; 6" telescope mirror; assorted parts. Want: photostat equipment, camera, wire recorder, radar test equipment, oscilloscope, typewriter, or you name it. W9NVC, 1161 Eaton, Beloit, Wisconsin.

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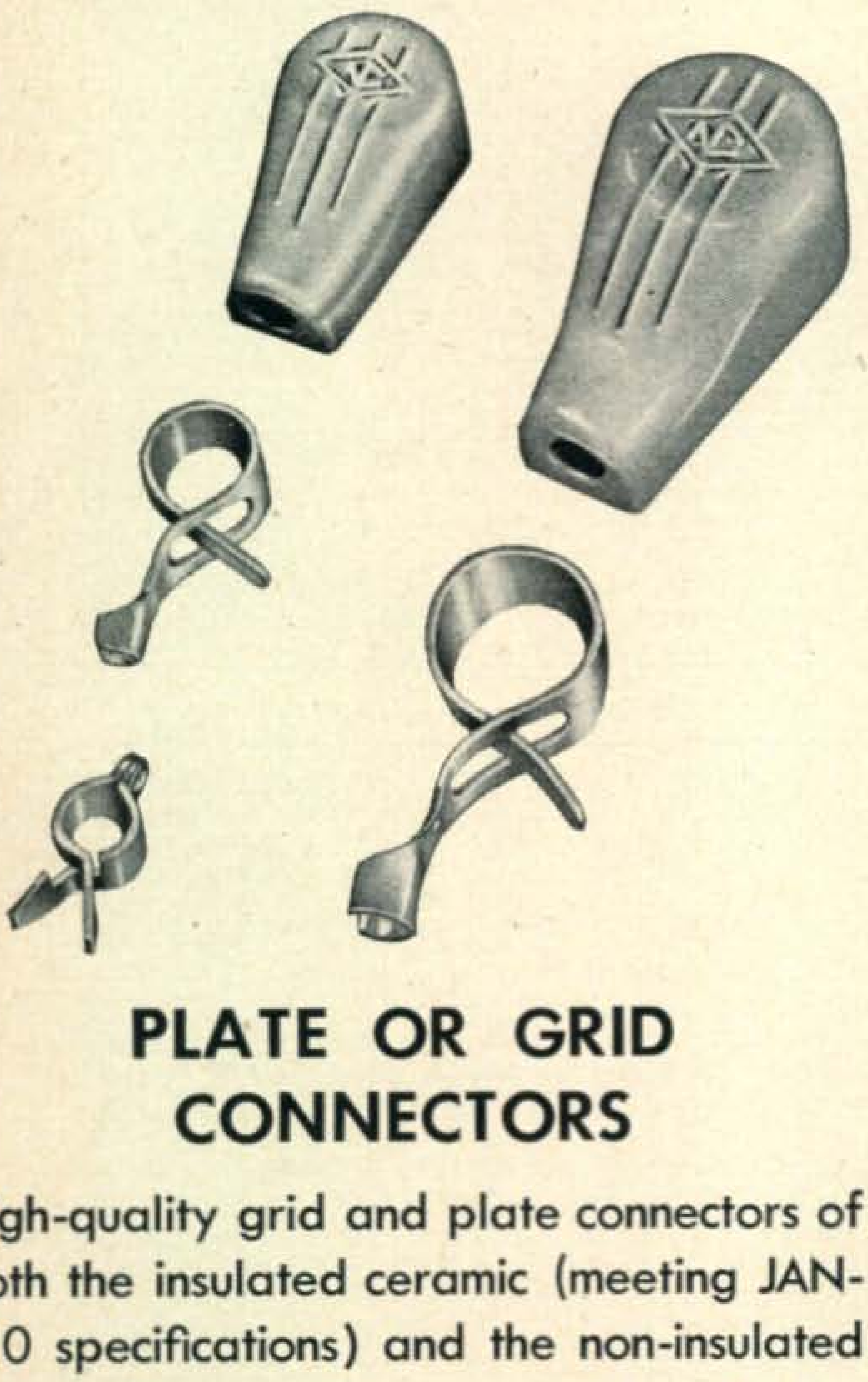

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