

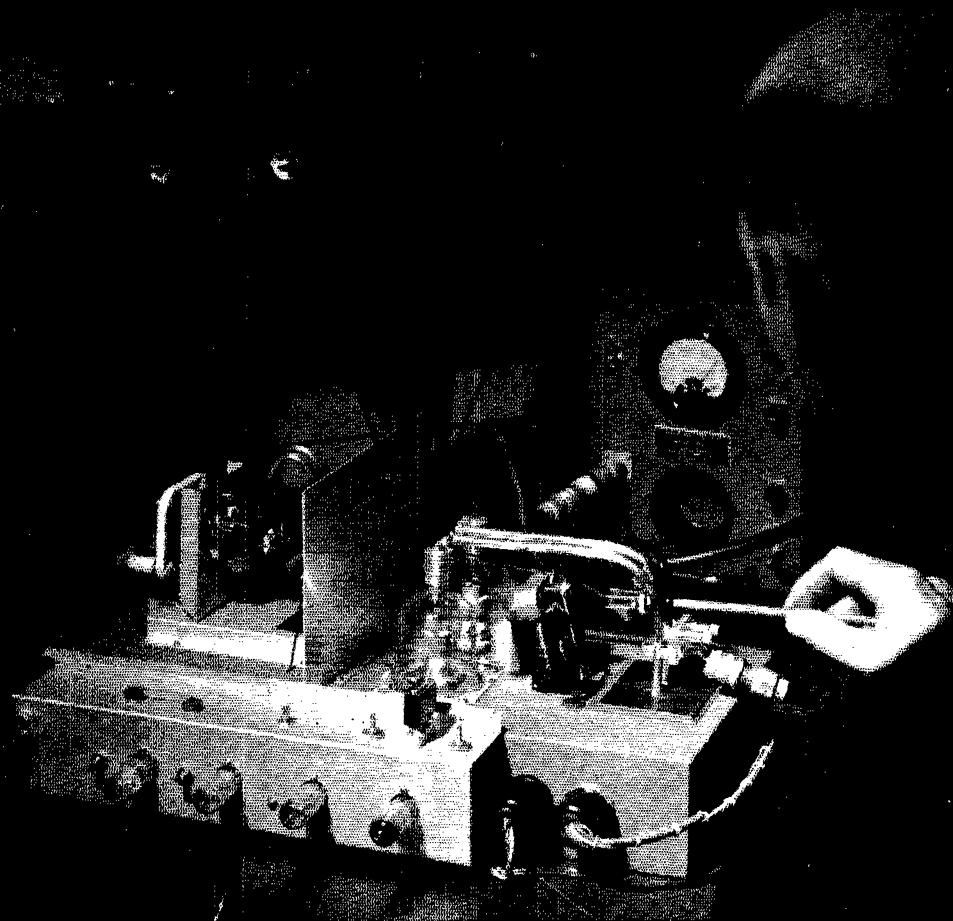
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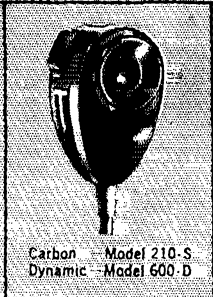
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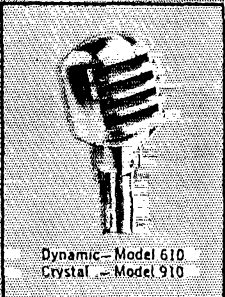
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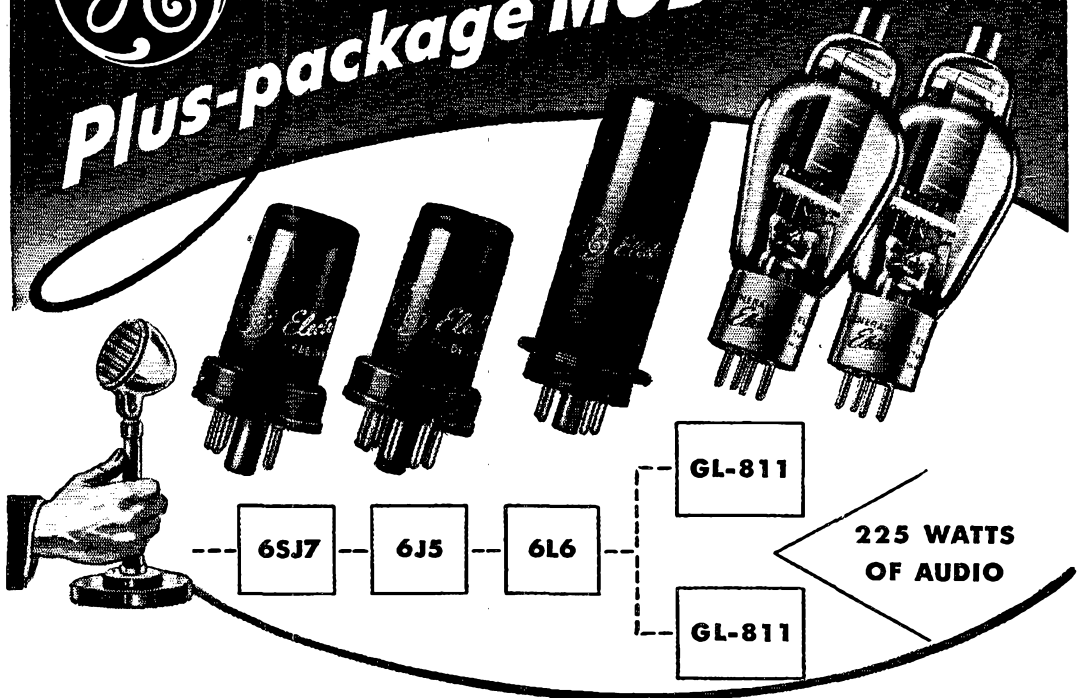


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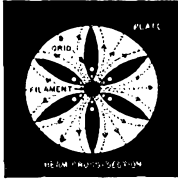
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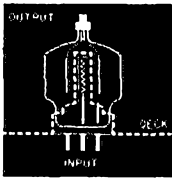


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MAY 1948

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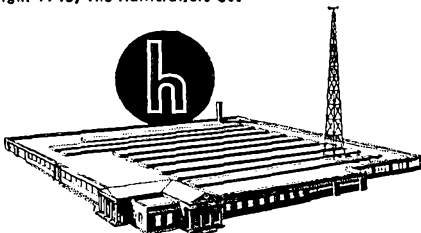


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Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio Club reports are also desired by SCMs for inclusion in *QST*. All ARRL Field Organization appointments are now available to League members. These include ORS, OES, OPS, OO, and OBS. Also, where vacancies exist SCMs desire applications for SEC, EC, RM, and PAM. In addition to station and leadership appointments for Members, *all amateurs* are invited to join the ARRL Emergency Corps (ask for Form 7).

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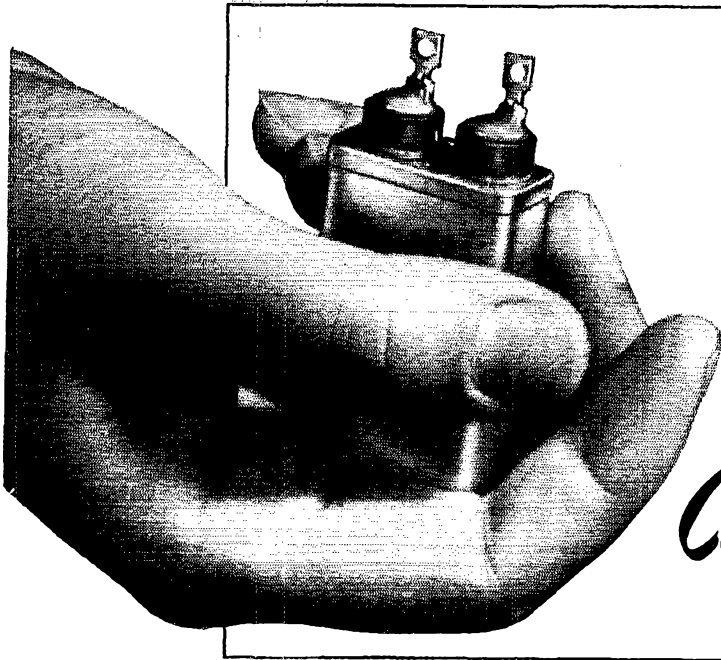
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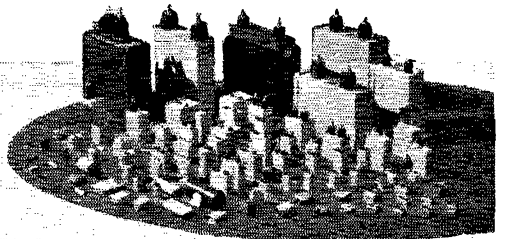
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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

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Alternate: J. Frank Key W3ZA
Box 707, Buena Vista, Va.

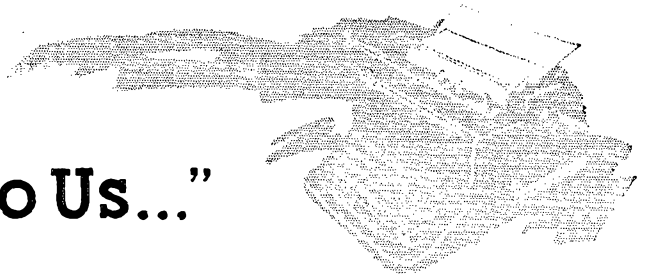
Rocky Mountain Division
FRANKLIN K. MATEJKA W8DD
P. O. Box 212, Estes Park, Colo.
Alternate: P. Arthur Smoll W8KVD
529 No. Nevada Ave., Colorado Springs, Colo.

Southeastern Division
WILLIAM C. SHELTON W4ASR
527 Hevillo Blvd., Daytona Beach, Fla.
Alternate: William P. Sides W4AUP
Fleming Road, Montgomery, Ala.

Southwestern Division
HANS R. JEPSEN W6KEI
6837 Ethel Ave., No. Hollywood, Calif.
Alternate: Arthur E. Schlferman, sr. W6CGI
1445 Raymond Ave., Glendale 1, Calif.

West Gulf Division
WAYLAND M. GROVES W5NW
P. O. Box 586, Odessa, Texas
W5NW at Humble Pipe Line Camp, Odessa
Alternate: Jack T. Moore W5ALA
4531 Fairway Ave., Dallas 4, Texas

"It Seems to Us..."



TVI

The American public in the vicinity of our biggest cities is going for television with an avidity reminiscent of the early days of sound broadcasting. Receivers are selling by the thousands, construction permits are now being issued even for the smaller cities, coaxial cables and microwave relay systems for networks are going in, and in the foreseeable future the interest will cover most of the nation. People a hundred miles from a television transmitter are putting up hundred-foot towers and buying custom-made four-stage preamplifiers to scoop up almost nonexistent signals. That they also hear the trolley cars in Topeka, the washing machines in Walla Walla and the ignition systems of most of the automobiles in the county does not seem to deter them — it's television! The frequency allocation is a defective and insufficient one, all of the services are in each other's hair, ISM ("diathermy") interference is rampant — but it's television. It's financial news, stage news, industrial news. It's as exciting as a Klondike gold-mine camp — and just as jerry-built.

In short, fellows, the television boom is here and it brings to us and the other radio services the same sort of interference problems and public-relations problems that the blossoming of sound broadcasting did in the mid-'20s — only this time the difficulties are much greater because of the broad-band characteristics of television and because that service is on higher frequencies than most others, consequently receiving hash, harmonics and corruption from most of the usable spectrum. Television reception is getting a great deal of interference and tempers are running high. There is much in this situation to anger an amateur. We are blamed for most of the interference, with the set-dealers frequently helping to spread that impression, while every amateur knows that in truth we cause only a small fraction of the trouble. Amateurs know, too, that the television allocation is an unwise and practically unworkable one, and that ARRL has made recommendations for changes that would ease the lot of all the services concerned. We all know that some receivers are deficient in se-

lectivity and shielding; that remote lookers-in are attempting the impossible and squawking about results and blaming us; that the whole business is experimental and there are as yet no FCC standards for the protection of television reception. Amateur indignation over absurd charges and unreasonable demands is understandable. Nonetheless, men, we have here a condition and not a theory and there are some things we ought to do about it, as individuals. The League and the other communication services have made strong recommendations to FCC concerning the inadequacies of the present allocation but there can be no assurance that the Commission's decision will solve the difficulties. The League for years has maintained contact with the receiver committees of the industry, looking to higher selectivity standards, but we cannot rely upon that for protection. We have to look after ourselves. It is our feeling that, despite the lousy allocation, the open front ends of receivers, the lack of field-strength standards, the dumb and sometimes vicious blaming we receive, our duty to ourselves requires that each of us makes sure that his transmitter is not at fault.

We fear that the understandable irritation amateurs have felt over the unreasonableness of the situation has sometimes got the better of their judgment and has resulted in some instances in undiplomatic actions and a reluctance to do anything about a bad local situation. We won't get anywhere that way, fellows. Although it is true that this whole situation is messy and confused and that there are some problems that we don't yet know how to cure, we know enough about it now to be able to say that many of our transmitters *are* at fault and that in the average case the trouble can be satisfactorily reduced. We should be working on those rigs instead of sitting back and yelling for ARRL to conjure up something that will take care of the situation by political magic without the need to houseclean our sets. The same energy put on the rigs would clean up half of the QRM. We visit FCC constantly and we can tell you that there is now a well-defined feeling there that from here on out *all* services are going to be under the necessity of

spending a lot more attention on the elimination of spurious emissions, harmonics, hash and so on than they ever did before. It is not at all a case of singling out amateur radio for persecution or special disfavor. It is something affecting every service, simply including us. Such spurious emissions aren't supposed to exist, of course, but in the past it hasn't made too much difference whether they did or not. The advent of television has made it necessary for us all to clean up — not only amateurs but the host of fixed and mobile services, the broadcasters, the Government stations.

Harmonics and overmodulation are our main troubles. Most of us have them in varying degree. It seems to us that we must now regard those dear days as passed when we could afford to run a disorderly "heap" and not care what its effects were in the higher reaches of the spectrum. The very fact that some amateur transmitters cause little or no television interference while others of less power and at greater distance but on the same band and mode do cause serious trouble shows that the latter ones need working on. Particularly in respect of the most prevalent difficulty, harmonics, there is sound and practical help to be found in one of this month's articles, "TVI Can Be Reduced." The whole art is moving onward and upward, OM. The days of breadboards and bad techniques are over. It is a practical necessity for each station in each service to observe the highest attainable standards. Until we have shielded, filtered, screened and adjusted to reduce harmonics to negligible strength and to eliminate overmodulation products, we haven't done our part.

Don't try to laugh off TVI — or grouse it off. Ten to one you can fix it — sufficiently to live happily ever after.

Edgar

OUR COVER

Firing up a new rig in the Headquarters lab, WIHQ records an output of 200 watts on 225 Mc. The exciter unit appears in this issue, and a description of the buffer-amplifier will follow shortly. An 832 amplifier drives a pair of 4-65-As running up to 500 watts input with forced-air cooling.

Strays

Constructors of J. L. A. McLaughlin's "Simple Simon" s.s.s.r. adapter unit (April *QST*), please note: Recent tests in the labs of the Bliley Electric Co. have indicated that connection of a 10- μ fd. capacitor across L_1 helps reduce the drive on the 405.5-ke. crystal.



AH SPRING! — antenna time. May 1923 *QST* anticipates the vernal exodus to trees and rooftops with a jam-packed Antenna Number. Will yours be a "T" or an inverted "L" this season, OM? And by the way, you'd better watch the resonant length of your guy wires — we'll be working down to 50 meters shortly!

A score of top-notch antenna articles gives us the authoritative opinions of the experts. The losses of 200-meter antennas, cage antennas *versus* multiwire flattops, the theory of multiple-tuned aerials, the use of loop antennas for transmission, mast construction and erection, down leads and earthing systems, and the ratings of antenna insulators all come in for a goodly share of discussion. Contributing to this issue's store of knowledge are Stuart Ballantine, L. C. Young, H. H. Newell, L. C. Smeby, Albert F. Murray, M. Adaire Garmhausen, John L. Reinartz, Ross Gunn, Dr. A. N. Goldsmith, F. M. J. Murphy, Parker E. Wiggin, Dr. J. H. Dellinger, John C. Warner, C. P. Sweeney, and the entire *QST* staff under the direction of Technical Editor Kruse.

Our antenna fancyings are grounded by this month's announcement of the stringent frequency proposals of the Second National Radio Conference, a meeting called by Secretary of Commerce Hoover in a move to end the confusion caused by the rapid growth of the commercial radiophones. For the first time our licenses would permit operation within a band of frequencies, 150-200 meters for c.w. and 176-200 meters for spark. There would be special authorizations for operation in the range 200-220 meters by stations located in the Rocky Mountain area, to expedite traffic handling. It is also recommended that the radiophone broadcasters be assigned the waves 222 to 545 meters, and that nighttime operation of ship stations be shifted from 450 to above 600 meters. ARRL President Maxim was the amateur representative on Secretary Hoover's commission, and was assisted by the testimony of League Secretary Warner and Paul F. Godley.

The ever-growing importance to the amateur of reliable test equipment is emphasized by the description of two laboratory-type radio-frequency oscillators. One unit, built by Elliott White, 1YB, covers the range 50-375 meters, while the other, the handiwork of H. J. Walls, of WWV, has a scope of 100 to 1000 meters. A novel thermo "battery" for WD-11 tube filaments, detailed by 9ECT, should intrigue the experimentally-inclined ham.

Amateurs turned in outstanding operating performances during the late winter months.

(Continued on page 118)

What About Single Sideband?

What It Offers in Amateur 'Phone Communication

BY DONALD E. NORGAARD,* W2KUJ

• If you operate a 'phone transmitter you can't afford to pass up this article. It tells exactly why and how single sideband steps up the effectiveness of your transmitter — equivalent to at least an 8 times power increase — and at the same time increases the effective width of the 'phone bands by several times.

This is the first of a series of three articles. The second and third will cover a new, simplified method of generating and receiving s.s.s.c. signals.

RECENT articles in *QST*^{1,2,3,4} have indicated that the time is ripe for single-sideband amateur telephony. Actually, in one sense, it always has been the time for single-sideband operation because of the congestion of our amateur bands, but single-sideband techniques of the past have not been very well suited to amateur use. This article, the first of a series of three, is presented in the hope that the concepts of single sideband can be explained in as easily-assimilated form as possible, and to incite enough interest among QRM-weary hams so that our 'phone bands finally become useful property. These bands can become so *only if we all get together and clean house.*

Fortunately, "house cleaning" on the 'phone bands is going to be easier than many of us secretly think. New techniques of generating and receiving single-sideband signals have been developed, and these techniques are of such a nature that the change to single-sideband operation will become a real pleasure. Remember this: twenty years ago we did clean house in the case of c.w., and everybody shared the benefits when T9x signals became the order of the day. At least, nobody was hurt except the guy who wouldn't or didn't follow the trend.

Goodman¹ and Grammer⁴ along with others have indicated that there are selfish motives to be served in changing over to single-sideband 'phone.

* Research Laboratory, General Electric Co., Schenectady, N. Y.

¹ Byron Goodman, "What Is Single-Sideband Telephony?" *QST*, January, 1948.

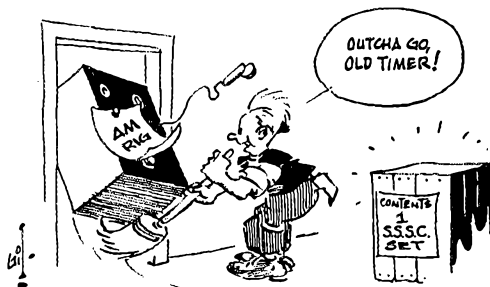
² O. G. Villard, jr., "Single-Sideband Operating Tests," *QST*, January, 1948.

³ Arthur H. Nichols, "A Single-Sideband Transmitter for Amateur Operation," *QST*, January, 1948.

⁴ George Grammer, "Single-Sideband Power Gain" (Technical Topics), *QST*, March, 1948.

Good sportsmanship also demands that we do so, now that it is going to be relatively painless. Even this point of view serves our selfish motives, too, since QRM is the wrecker of most 'phone contacts, and it is definitely true that single-sideband 'phone is capable of resisting QRM better than any other known system, as well as being least offensive in creating QRM. What are we waiting for?

Let's get down to facts and details. How and why can single sideband "buy" us better communications? First of all, a single-sideband signal uses up *less than half the space in the band* than that occupied by *properly-operated a.m. or n.f.m.* transmitters, regardless of power. Next, it doesn't "waste any steam blowing the whistle"! By that is meant the relatively tremendous amount of power devoted to transmission of the carrier com-



pared to intelligence-bearing sidebands. There just isn't any V-J day "whistle blowing" to blot out the other fellow and rob yourself of "steam." These things are mentioned first because they should be obvious and we want to start out agreeing with one another in this discussion.

Carrier and Sideband Relationships in A.M.

Some of the best heads in the country have been scratched bald by their owners in trying to figure out the best way to predict on a theoretical basis how single sideband stacks up alongside our old acquaintance, amplitude modulation. The head scratching is over now, and the following analysis, which is backed up by thorough laboratory investigations aimed at finding the facts, should give us an idea of what to expect.

To keep things on a simple basis at first, assume that an ideal a.m. transmitter has a carrier *output* of 100 watts. We know that when this carrier is

modulated, sidebands are generated in proportion to the strength of the modulating signal (until we reach 100% modulation), and that the carrier strength itself is not affected *at all* by modulation. A plot of the frequency spectrum (voltage versus frequency) of the simple case of steady 100% modulation of the carrier by a single tone (sine wave) of 1000 cycles would look like Fig. 1. The envelope (a plot of voltage versus time) would, of course, have the appearance of Fig. 2. All right, so far? Our *Handbook* tells us⁵ that in a resistive circuit where the resistance stays constant the power is proportional to the square of the voltage applied. In the case we are talking about, three voltages are applied; one is the carrier, and the other two are the upper and lower sidebands, respectively, in accordance with Fig. 1.

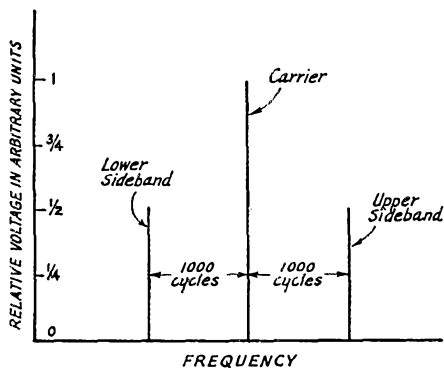


Fig. 1 — Example of 100% modulation of a carrier by a single tone of 1000 cycles per second.

The voltage of each of the sidebands is half that of the carrier. Therefore, the power in each sideband is $(\frac{1}{2})^2$ times that of the carrier. Since it was assumed that the carrier output was 100 watts, the power in each sideband is 25 watts, and the *total* sideband power is 50 watts. This, incidentally, is the maximum single-tone sideband power that can be generated by amplitude modulation of a carrier of 100 watts. No one has ever been able to do better, because it just isn't possible to do so. (It doesn't help to overmodulate! This *cuts down* the desired sideband power and generates spurious sidebands called splatter. Hint: check your own sideband splatter.)

We can represent the information in Figs. 1 and 2 by means of a vector diagram and make some more calculations. In Fig. 3 the carrier voltage is given one unit length. Therefore, the upper and lower sideband voltages have one-half unit length, and are so indicated. Now, watch out for this one: In Fig. 3 the carrier vector is assumed to be standing still, though actually it makes one revolution per cycle of carrier frequency. Imagine

you are standing at the origin of the carrier vector and are spinning around with it at carrier frequency. What you would see are the upper- and lower-sideband vectors rotating in *opposite* directions at the modulation frequency in such a way that the terminus of the last vector in the chain of three lies along the line of the carrier, bobbing up and down at 1000 cycles per second. As far as you could tell, the carrier vector does not move or change at all, and that is the impression Fig. 3 is intended to convey. At the instant of time (T_0 , Fig. 2) chosen for Fig. 3 the three vectors are all in line and add up to two voltage units. One two-thousandth of a second later the sideband vectors have rotated one-half turn each, and the three vectors add to zero, since $1 - \frac{1}{2} - \frac{1}{2} = 0$. This should make it easier to understand the relationship between Figs. 1 and 2 without too much trouble.

Now, here is the point of all this: The carrier vector is one voltage unit long — corresponding to a power of 100 watts. At the instant of time shown in Fig. 3, the total voltage is two units — corresponding to $(2)^2$ times 100, or 400 watts. One two-thousandth of a second later, the answer is easy — the voltage and power are zero. Therefore, the transmitter *must* be capable of delivering 400 watts on peaks to have a carrier rating of 100 watts. Stated differently, the excitation, plate voltage, and plate current must be such that the output stage can deliver this peak power. What about this? We are already up to 400 watts on a 100-watt transmitter! Yes, we are, and if the transmitter won't deliver that power we are certain to develop sideband splatter and distortion.

Under the very best conditions that can be imagined we need a transmitter which can deliver 400 watts of power on peaks to transmit a carrier power of 100 watts and a total maximum sideband power of 50 watts. What does this 100-watt carrier do *for* the transmission? The answer is it does nothing — for the simple reason that it does not change at all when modulation is applied. The carrier is just like a hatrack — something to hang sidebands on. It seems silly to carry a hatrack around with us just so that we can say that we have brought two hats along. Yet, that is just exactly what we do when we hang two sidebands just so on a carrier and go out with the whole thing into our crowded 'phone bands to be jostled about. Far better to put on a hat and leave the hatrack home where it belongs! One hat? Certainly. It is ridiculous to go around trying to wear two dinky hats at the same time — especially in the rain!

Leaving the Carrier at Home

Sure, take a look at Figs. 1 and 3. Suppose we leave the carrier home and double the amplitude of each of our sidebands. This will still run our transmitter at its peak output capacity of 400 watts, all it can do. Well, the sideband power

⁵ ARRL *Handbook*, 25th Edition (1948), p. 25.

goes up all right. The sideband voltages are doubled, so our sideband power is four times what it used to be. That means each sideband is 100 watts, and our transmitter is not overloaded on peaks. The total sideband power is, of course, 200 watts. But this sideband power doesn't do much for us if it can't all be put to work. That is the situation with two sidebands and no carrier; nobody can take advantage of this sideband power, for it is in such a form that it doesn't lend itself to readability, no matter how you try to use it. Yet, the power is there and it can be read on a meter, but that's about all.

What if we leave one of the sidebands home, too? If we do, we can increase the voltage on the remaining one to two units and run our transmitter at its maximum peak power output of 400 watts. This time it is *all* sideband power. It so happens that sideband energy in this form is usable. Yes sir, all of it can be used, for it is just like c.w.! It is indeed, and we receive it in just the same way. All that is necessary is to set the b.f.o. in our receiver so that it is at the same frequency as the carrier we left home. Good. We don't have to carry our own hatrack around, and we don't have to go out with two little pint-size hats on either. Your host will let you hang your hat on his hatrack, and your hat won't know the difference, either, because the hatracks we are talking about are *identical*. What a fine thing that is. We put out 400 usable watts with a transmitter that could put out only 50 usable watts in the form of amplitude modulation.

Expressed in decibels, the ratio of 400 watts to 50 watts (8:1) is 9 db. How big an antenna would it take to get 9 db. gain on the 75-meter 'phone band? Even on 10 meters this is *quite* an antennal. Make no mistake about it, 9 db. antenna gain is valuable, but the same gain attained without

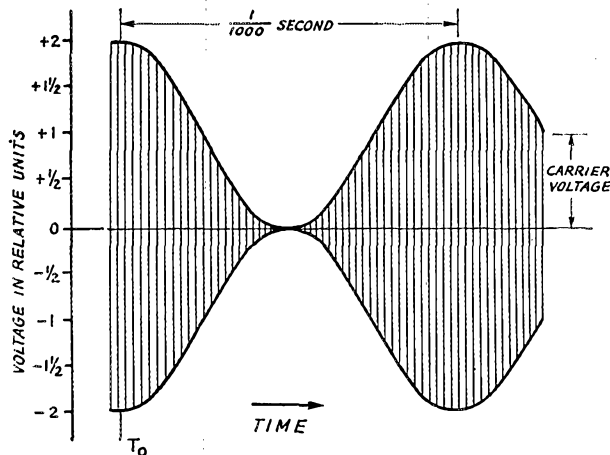


Fig. 2 — Envelope of carrier 100% modulated by a 1000-cycle sine wave.

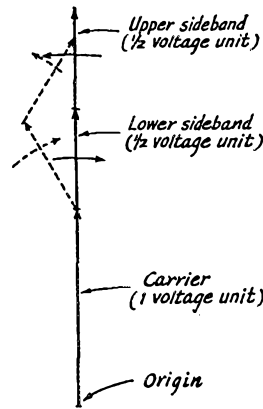


Fig. 3 — Vector diagram of 100% modulation of an a.m. carrier at the instant (corresponding to T_0 in Fig. 2) when peak conditions exist. The broken vectors show the relationships at an instant when the modulating signal is somewhat below its peak.

even touching the antenna has the same value. Any antenna gain is additional gain, of course. But this isn't the complete story. The transmission covers only half the spectrum of the a.m. transmission and isn't blowing a loud whistle in the middle of it all. This kind of 9-db. gain doesn't bother the other fellow as much as if it were obtained with antenna gain on a.m. transmission. But why should we worry about the other fellow? We should, because far too frequently, "the other fellow" is yourself, and that hurts!

Before climbing down from the ivory tower of theory we ought to see what hanging our hat on our host's hatrack really means. First of all, his hatrack has not been dragged through the mud and rain of propagation. It has our wet hat hanging on it and the hat won't fall off unless the hatrack is unsteady — it won't provided we are not careless about how the hat is put there. The point is this: The sideband must be based on a good clean carrier of immaculate frequency stability, and our host's carrier must be stable, too. There is nothing difficult about either of these things any more. A good crystal-controlled oscillator or a really stable VFO is a necessary part of a present-day transmitter, anyway, so there is no worry on this point. Receiver stability has become increasingly important through the years and it is quite likely that our host is today in possession of a fairly good receiver. At least, to hear him tell about it over the air or at the club, there never was a better one! But even if he doesn't have the very best that can be constructed, he might be willing to steady it a little bit by hand or to do some tinkering with it in the free time between rag-chews and schedules (or CQs) so that he doesn't have to coax it along constantly. There is no denying that it can be done.

Transmitter Ratings

Back to earth again, we might worry about the little 100-watt transmitter straining itself to put out 400 watts, for that is what we said we wanted it to do. It can do it for a short percentage of the time, but it probably would burn up if we kept that one sideband generated by the 1000-cycle tone pumping through it steadily. Fortunately, speech is used for 'phone modulation (well, most of the time, anyway) and speech waveforms have a high ratio of peak to average power. It is average dissipated power that burns up tubes, so there is nothing to worry about on this score until we learn how to talk with waveforms having a



much lower ratio of peak to average power. Actually, the steady 100-watt carrier of an a.m. signal causes most of the dissipation in the 100-watt transmitter, but it was built to stand up under that kind of treatment. If dissipation sets the rating of the 100-watt a.m. transmitter, it is quite reasonable to expect that we may be able to get over 600 watts peak power out of the same final amplifier when it handles a single sideband of speech input. Dissipation usually does determine the carrier power that a final amplifier can deliver in the case of a.m.

While shrouded in theory, we were talking about *output* power, and managed to show that we could get 400 watts of sideband power output with single sideband at the same peak power that gave only 50 watts of sideband power in the case of a.m. That's fine for comparison purposes on a theoretical basis, but there is the practical matter of efficiency to consider. Let's lean over backward and say that a *good* Class C plate-modulated amplifier such as the one in our ideal 100-watt a.m. transmitter runs with an efficiency of 80%. Neglecting the fact that the total input under modulation with speech is somewhat higher than the carrier input (which is $100/0.80 = 125$ watts), the dissipation in the output stage is 25 watts. Let us say, however, that the modulation still drives the transmitter to its peak output power of 400 watts, but has very low average power. Therefore, the peak sideband power output is 50 watts, with very low average power.

Here is a strange way of rating things, but it means something: The peak *useful* sideband power is 50 watts obtained with a final-stage dissipation of slightly over 25 watts in the a.m. transmitter. The peak input power is, of course, $400/0.80 = 500$ watts, since the efficiency of 80% is pretty nearly constant with this type of operation. You have already guessed what the next thing is. The peak useful efficiency is

$$\frac{\text{peak useful power output}}{\text{peak input}}$$

or $50/500 = 10\%$. Who says high efficiency? This figure is not the true efficiency of the output stage — that's the assumed 80% — but it is the "communication" efficiency. The transmitter, of course, cannot tell the difference between carrier and side-band signals it deals with in the unholy combination called a.m., so we must be satisfied with 10% "communication" efficiency as we have defined it.

Now let's look at the single-sideband situation. The output stage must be a linear amplifier. This linear amplifier will have characteristics quite similar to Class B modulators used, for instance, in the little 100-watt plate-modulated a.m. transmitter. Suppose we put into this transmitter the same speech waveform we used in the example above. This wave had a high peak-to-average power ratio, if you recall, and we were concerned only with conditions during the peak period. Things are adjusted so that the peak *output* is 400 watts in order to fall into our theoretical pattern. The theoretical maximum peak efficiency of a linear amplifier is 78.5%, but nobody ever got that much out of such an amplifier. However, with modern tubes we can get 70% peak efficiency quite comfortably, so let's use that figure in our calculations. All right, the peak power input is $400/0.70 = 572$ watts, which, if sustained, would get some tubes mighty hot at 70% efficiency, if they could dissipate only 25 watts. This signal isn't sustained, however, for we assumed a speech input wave having a high peak-to-average power ratio, and it is average power that makes plates incandescent. Well, all of this 400-watt peak output is useful "communication" power, and it is obtained at 70% efficiency. Thus we can say that the communication efficiency of the final stage of this single-sideband transmitter is 70%. Did somebody say something about low efficiency in a linear amplifier?

All this does sound wonderful. What about plate dissipation in the final stage? If we neglect the average dissipation during modulation with our speech wave, then one might say that the total dissipation is close to zero. It certainly would be if we had vacuum tubes with linear I_p -vs.- E_R curves right down to cut-off. At the present time it seems impossible to buy tubes like that because of a critical shortage of linear vacuum curve extractors in the tube-manufactur-

ing business. But there are plenty of tubes that make good linear amplifiers, and they do not have linear I_p-E_g curves at all. This generally means that the linear amplifier is operated in such a way that there is d.c. input even though there is no signal input. This d.c. input power, of course, heats the tubes when no signal is there, and represents most of the dissipation that the tubes are called upon to stand under conditions of speech modulation. In most cases good linearity is obtained when the no-signal input plate current is about 5% of the maximum-signal plate current. This means that the no-signal dissipation is about 5% of the maximum input power, since the d.c. input voltage is held constant. Therefore, the total dissipation would be something close to $572 \times 0.05 = 28.6$ watts.

That's within gunshot of the 25 watts which our a.m. transmitter burned up in the plates of its tubes. You have guessed it again; the output stage of the single-sideband transmitter delivering 400 watts peak communication output can use the same tubes that are necessary in the 100-watt-carrier-output a.m. transmitter which delivers 50 watts peak communication output. This is good enough to interest almost any red-blooded 'phone man.

The foregoing comparison isn't absolutely accurate, since the actual waveform of speech input is unknown. But it is a fair comparison, and experience and tests support the argument. That is what really proves the point.

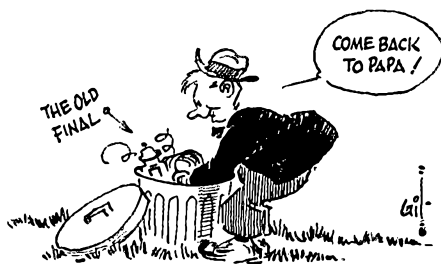
Signal-to-Noise Ratio

The business of receiving a single-sideband signal probably needs a little clarification yet. Let us examine the characteristics of receivers and find out what happens when a signal is received. To do this let's take a receiver to the ivory tower of theory for a few minutes.

Theory says (and experience bears this out) that noise power is proportional to the effective bandwidth employed in a system. The noise we are considering now is "thermal noise," frequently called "receiver hiss." This is not to be confused with man-made noises of the impulse type such as automobile ignition, commutation noises, or even an interfering radio transmission. No, it is just pure "theoretical" noise, which, however, is no figment of the imagination, since it can be measured, and, equally important, heard in our receivers. The single-sideband signal requires only half as much i.f. bandwidth as the a.m. signal requires to provide a given audio bandwidth. Therefore, we should not use more receiver bandwidth than the type of transmission requires us to use, since we do want to deal with pertinent facts in comparing one system with another. Reducing the effective receiver bandwidth by a factor of two cuts down the noise power output of the receiver by the same factor, when only thermal noise is considered. But this

reduction in bandwidth does not affect the ability of the receiver to respond to all of the sideband power it receives from a single-sideband transmitter. At least nothing is being wasted. This begins to look as though we receive all of the single-sideband power available at the receiving location and hear only half the noise power that would be heard when receiving an equivalent a.m. transmission with the same receiver gain. This is absolutely true, so in haste we might put in another 2:1 factor of improvement in signal-to-noise ratio simply because we measure half the noise power when the bandwidth is cut in half. Apparently, this would then give the single-sideband system a 12-db. (16-to-1 power ratio) signal-to-noise ratio gain over the idealized a.m. system. In one sense this is true when considering power relationships alone, but before we reach any conclusions we should see how a detector responds to signals furnished to it by an i.f. amplifier.

We see from Figs. 1, 2 and 3 that the two sidebands in our idealized a.m. system each have 25% of the carrier power, but 50% of the carrier voltage. In an idealized a.m. receiver the detector is a linear or envelope detector, and linear detectors respond to voltage — definitely not to power as such. Therefore, the detector output corresponds to the envelope voltage, giving a demodulated signal voltage having a peak value equivalent to one voltage unit if we assume that each sideband is $\frac{1}{2}$ voltage unit at the detector. The demodulated signal in this case is our modulating signal, a 1000-cycle sine wave. This may be expressed as one unit of 1000-cycle audio power at the detector output. The characteristics of thermal noise, however, are such that this same detector produces noise power output in proportion to the i.f. bandwidth, which, of course, is necessarily twice



as great for a.m. reception as it is for single-sideband reception. So we can say that the a.m. receiver detector output (or audio output) has one signal power unit and two noise power units when two sidebands totaling one-half a power unit are applied to the detector. (These units are not necessarily the same, but are in the same classification. Obviously, this depends on the relative strengths of the signal and the noise.)

In order to produce the same detector output when only one sideband is applied to the detector (along with a sufficient amount of locally-generated carrier at the correct frequency) its voltage must be the same as the combined voltage of the two sidebands that were applied in the case of a.m. reception. The power in this one sideband is twice the combined power of the two sidebands which produce the same voltage output from the detector. This is the same thing we saw when comparing total sideband power of two sidebands with the power of one sideband having the same voltage as the combined voltage of the two sidebands, when we discussed the transmitters. At the receiver we can say that we get one signal-power-unit audio power output from the detector with one unit of sideband power input applied to the detector, and one unit of noise power, since we can slice the i.f. bandwidth in half to reduce the noise power output by half.

It doesn't take much figuring to see that if it requires twice as much single-sideband power as it does double-sideband power, to get the same signal output power from a receiver with the noise power output half as much for single-sideband operation as for double-sideband operation, nothing has been gained in *signal-to-noise ratio*. But nothing has been lost, either. Since measurements confirm the reasoning we have just been through, we should give back that 3 db. we thought at first we had earned by reducing the bandwidth by two to one. Therefore, on an idealized theoretical basis we must conclude that *single-sideband operation can give 9-db. signal-to-noise ratio improvement over amplitude modulation operating at the same peak power output*.

Back again from the ivory tower we begin to wonder what significance this 9-db. system gain has, since we arrived at this figure on an *idealized basis*. This idealized condition included consideration of only the necessary facts in order to avoid confusion. But to the amateur, confusion in the form of QRM is not avoidable except under idealized conditions, which seldom, if ever, occur in the ham bands. In fact, commonplace man-made disturbances so completely mask out thermal noise in a good receiver operated on our low- and medium-frequency bands that we should try to evaluate the performance of single sideband working under the conditions we know we do have.

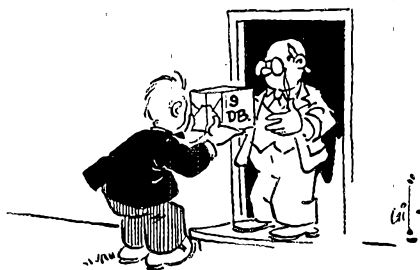
Impulse noise — the clicks and pops we hear — produces detector output voltage more or less proportional to bandwidth. Immediately we can say that single-sideband reception at half bandwidth will give us almost 3 db. receiver s/n gain with this kind of noise, provided we cut down the bandwidth in the right way. That's fine, because we can get a practical gain of almost 12 db. over this type of noise when we use single-sideband transmission. That's the kind of noise we want to beat!

QRM in A.M. and S.S.C. Reception

Another type of QRM is the usual one — interfering radio transmissions. These fall into several classifications which deserve individual consideration. The first case is that of interference which has a signal strength definitely lower than that of the desired transmission. (Quite a rare thing, but sometimes it does happen that way.) With conventional receiver conditions (a.m. reception), all of the interfering energy that reaches the detector heterodynes with the carrier of the a.m. signal being received and produces a beat note between the two carriers, along with "monkey chatter" caused by the voice sidebands of the undesired transmission beating with the relatively strong desired carrier. A crystal filter may be used to put a notch in the i.f. passband so that the carrier heterodyne is practically eliminated, but most of the monkey chatter remains. (This depends, however, on the shape of the i.f. passband when the crystal filter is switched in.) In almost every case of this kind the heterodyne between carriers is much more bothersome than the monkey chatter, so it pays to notch out the interfering carrier. With single-sideband reception, the exposure to interference is cut down to half, but any interfering signals (carriers or sidebands) that lie within the band occupied by the desired transmission will cause heterodynes and monkey chatter in proportion to their strengths. The crystal notch may be used to eliminate one carrier heterodyne, but that is about all it can do. The advantage of single-sideband reception in this case is principally that, on the average, only half the number of heterodynes will be heard, where interference is the only disturbance to otherwise flawless reception. Well, that helps.

The case of an interfering signal of about the same strength as the desired signal is next. If nothing is done to eliminate the interfering carrier before it reaches the detector, all of the sidebands that are passed by the i.f. amplifier are demodulated against each carrier, and there is as much monkey chatter caused by the desired sidebands beating with the interfering carrier as there is from the undesired sidebands beating with the desired carrier. In addition, there are usually equal amounts of halfway-intelligible speech outputs from each transmission. Of course, the heterodyne of the carriers is by far the loudest signal heard, and it consists of a fundamental heterodyne note and a series of fairly strong harmonics throughout the audio band. Add a little QSB on both signals to this picture and not much is left of either signal — especially, it seems, to the desired one! When the carrier of the interfering signal is put in the crystal notch a lot of the curse is removed. The remaining monkey chatter is, of course, more bothersome than in the case where the interfering signal was not so strong. With single-sideband reception under the

same conditions, an interfering carrier produces a single-tone heterodyne, and the interfering sidebands produce monkey chatter, but nothing intelligible. Use of the crystal-filter notch can eliminate the carrier heterodyne, leaving only monkey chatter. Here again, the exposure to QRM is cut in half, since the receiver bandwidth can be cut in half without sacrifice of audio bandwidth, so the situation is similar to the first case (interference weaker than the desired signal) but, of course, worse. When the desired transmission is besieged by more than one interfering signal of equivalent strength only one of the carriers can be put in the crystal notch, and the others have to be tolerated along with monkey chatter. The remaining heterodynes, however, are definitely less disturbing since they are not distorted in the detector. What is left is then purely a fight on the basis of strength and intelligibility. Single-sideband intelligibility is definitely of a superior nature.



When the interfering signal is stronger than the desired one, the only intelligible one is the stronger in a.m. reception, since the situation is the reverse of the first case. This is true until at least the undesired carrier is notched down so that it does not reach the detector. But all the troubles are not so easily disposed of. The low-level speech sidebands of the interfering transmission appear as monkey chatter, while the stronger ones which exceed the level of the desired carrier serve as virtual carriers against which the desired carrier and its sidebands are demodulated to produce whistles, groans, and monkey chatter of a kind that is horrible. It's all a weird mess in spite of anything that can be done with the very best conventional receiver. With single-sideband reception of the desired weaker signal, all of the undesired noises are, of course, louder than in the previous cases, but that is the only difference. Notching out the chief offender — the interfering carrier — frequently wins the battle, but it is not certain to do so. After all, there are limits, but you have a fighting chance, because somewhere there in the background is perfectly clean intelligible speech without distortion. The only trouble is that the monkey chatter may be louder, but not funnier. Of course, two strong interfering transmissions partly or wholly within the receiver pass-

band make just that much more trouble. Here again, the fact that the receiver bandwidth can be cut in half cuts down the average probability of trouble by a factor of two to one.

It has been assumed in the discussion of the QRM problem that the receiver is not overloaded by signals, and that the interfering signals are of good quality and frequency stability. The difficulties are greatly compounded when "rotten" signals are involved. The rotten signal not only does more damage than necessary to others using the band, but is out of luck when it is the recipient of QRM from other transmissions.

When single-sideband signals are in the rôle of interfering signals, the principal effect is monkey chatter unless the sideband strength is sufficient to put the interference in the class of a signal which exceeds the carrier strength (of an a.m. signal). Single-sideband reception clears up this difficulty, but does not eliminate *all* interference. Single-sideband reception of standard a.m. and n.f.m. signals with exalted carrier is possible and feasible. Such a receiving method improves the present situation tremendously, but the full advantages cannot be exploited until single-sideband transmissions are the only ones involved. The techniques for this type of reception will be the subject of one of the articles of this series.

Laboratory tests and on-the-air experience with single-sideband transmitting and receiving equipment indicate that single-sideband signals are the most QRM-proof signals that are known, as well as the least troublesome in creating QRM. This makes it sound as though amateur telephony, when based on single-sideband operation exclusively, could be a great deal better than it is now. It can be, and will be. As Art Nichols said, "It's up to you."³

Strays

We haven't tried it yet, but an ardent practitioner of the worm warmer's art, who prefers anonymity, writes: "For a good underground transmitting antenna use Type USE-8-600-V Impervex Trenchwire, made by Crescent Wire and Cable Co."

W6AGO was instrumental recently in handling a message from an overseas G.I. to his mother in this country, giving her power of attorney. The message was held legal, and the serviceman's desires subsequently recognized by a large banking institution, which speaks well for the esteem in which amateur traffic handling is held.

If you're searching for strap-iron "U" brackets to brace that new antenna boom or mast, contact your local railroad signal depot and get permission to look over their scrap heap. W2VP found just what he needed on such a jaunt — discarded pipe-line hangers that fit a 2 × 4 snugly.

Crystal Control on 220 Mc.

An Exciter or Portable Transmitter Using Miniature Components

BY EDWARD P. TILTON, * WHDQ

• Not so long ago we thought of crystal control on 144 Mc. as something difficult to achieve, yet today it is the accepted standard. Now, as we prepare for the 220-Mc. band, we find that it is still no great problem to make a multistage transmitter perform there. Actually, as this little rig demonstrates, it need not be much more difficult to employ crystal control on 220 Mc. than on any lower-frequency band.

THOUGH our v.h.f. bands at 50 and 144 Mc. have been enjoying unprecedented popularity, and even our 420-Mc. band is beginning to show signs of life, activity in the intermediate band has been relatively low. This has been attributable, at least in part, to doubt as to the permanence of our assignment, as the 235-Mc. band was authorized on a temporary basis. Now that we are about to receive permission to operate in the 220-225-Mc. band we can get down to business.

The new assignment has at least one definite advantage over the old: a considerable portion of it can be covered with crystals which are also suitable for 144-Mc. use. The transmitter herein described uses crystals in either the 8- or 12-Mc. ranges; if they are selected to lie between 8148 and 8222 kc. or 12,223 and 12,333 kc. they will be useful for both 144- and 220-Mc. operation.

Contrary to expectations, there are quite a few tubes that will operate satisfactorily on 220 Mc. In the miniature line, particularly, lead length and tube capacitance are generally low, and by proper selection and placement of other components it is possible to build compact and inexpensive gear that will deliver reasonable efficiency in the new band. The employment of push-pull stages is one means of achieving effi-

* V.H.F. Editor, QST.

cient performance at these frequencies, so push-pull circuits, with 6J6 dual triodes, are used in the v.h.f. stages.

Circuit Details

The first 6J6 operates as a combined triode oscillator and frequency multiplier. The oscillator section employs 8- or 12-Mc. crystals, the second section doubling or tripling, depending upon the crystal frequency. Tuning is less critical, and the various stages operate more efficiently, if the higher frequency is used, but it has been found that the rig may be tuned up for optimum settings with an 8-Mc. crystal, and then a 12-Mc. rock substituted without additional adjustments. Center-tapped permeability-tuned coils are employed in the oscillator and multiplier plate circuits, the end of the oscillator coil opposite to that connected to the plate serving as a convenient means of coupling to the succeeding stage.

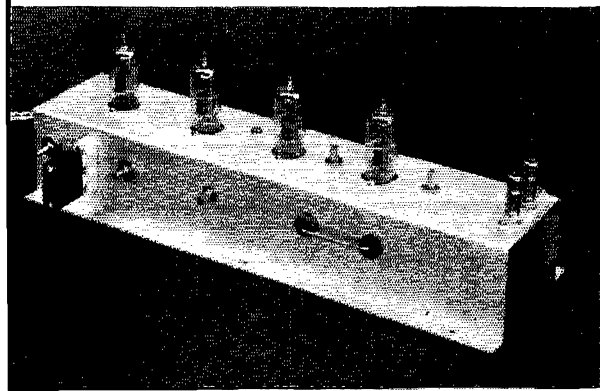
The second and third 6J6s serve as push-pull triplers from 25 to 75 Mc. and 75 to 225 Mc. The output stage is a neutralized amplifier on 225 Mc. Capacitive coupling is used throughout between stages. If this seems strange, it should be remembered that the principal barrier to the use of this coupling arrangement at high frequencies is the loading effect of the tube's input capacitance across the plate circuit of the preceding stage. The input capacitance of the 6J6 is low enough so that, even on 225 Mc., the plate coil of the preceding stage is of reasonable dimensions, provided the smallest possible components and the shortest possible connecting leads are employed. The combination of push-pull circuits and capacitive coupling makes for a neat and compact layout, and the bottom-view photograph demonstrates that the unit itself is actually simpler than the schematic diagram.

To assure minimum lead length and stray capacitance, the tuning condensers used for C_9 , C_{13} and C_{17} are the smallest available, the new miniature butterfly units recently announced by



Front view of the 220-Mc. transmitter-exciter. Across the front of the chassis are the oscillator plate-coil adjustment, crystal, multiplier-coil adjustment, first-tripler plate condenser, and tip jacks for final cathode metering. Second-tripler and final plate condensers are mounted on the top portion of the chassis. Output terminals are at the far right.

QST for



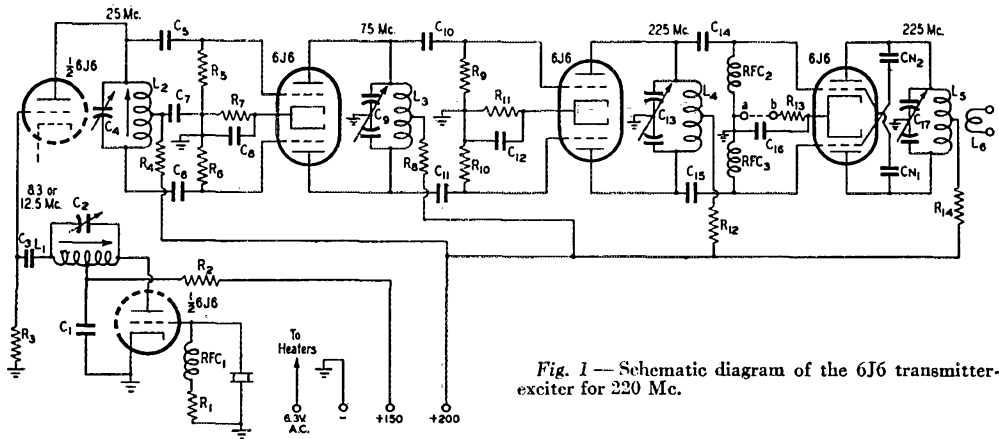


Fig. 1 — Schematic diagram of the 6J6 transmitter-exciter for 220 Mc.

- C_1, C_7 — 680- μ fd. mica.
 C_2, C_4 — 3-30- μ fd. mica trimmer.
 C_3 — 68- μ fd. mica.
 C_5, C_6 — 47- μ fd. mica.
 C_8, C_{12} — 330- μ fd. mica.
 C_9, C_{13} — 2.7-8.5- μ fd. midget butterfly variable (Johnson 160-208).
 $C_{10}, C_{11}, C_{14}, C_{15}$ — 50- μ fd. ceramic (National XLA-C).
 C_{16} — 200- μ fd. ceramic.
 C_{17} — 1.7-3.3- μ fd. midget butterfly variable (Johnson 160-203).
 C_{N1}, C_{N2} — Neutralizing capacitors made of 75-ohm Twin-Lead; see text.
 R_1, R_3 — 6800 ohms, $\frac{1}{2}$ watt.
 R_2 — 470 ohms, $\frac{1}{2}$ watt.
 R_4 — 3900 ohms, 1 watt.
 R_5, R_6, R_9, R_{10} — 22,000 ohms, $\frac{1}{2}$ watt.
 R_7, R_{11}, R_{13} — 470 ohms, 1 watt.

- R_8, R_{12}, R_{14} — 1500 ohms, 1 watt.
 L_1 — 34 turns No. 28 d.s.c., close-wound on National XR-50 slug-tuned form, center-tapped.
 L_2 — 12 turns No. 24 d.s.c., close-wound on National XR-50 slug-tuned form, center-tapped.
 L_3 — 7 turns No. 16 enamel, $\frac{5}{8}$ -inch inside diameter, spaced wire diameter, center-tapped.
 L_4 — 2 turns No. 16 enamel, $\frac{3}{4}$ -inch inside diameter, spaced $\frac{1}{4}$ inch, center-tapped.
 L_5 — $1\frac{1}{2}$ turns No. 12 enamel, $\frac{3}{4}$ -inch inside diameter, center-tapped. Space turns about $\frac{3}{16}$ inch apart. Coil $1\frac{1}{2}$ inches long over-all. See bottom-view photograph.
 L_6 — Hairpin loop No. 16 enamel inserted between turns of L_5 .
 RFC_1 — 250- μ hy. r.f. choke (Millen 34300).
 RFC_2, RFC_3 — Solenoid v.h.f. choke — No. 28 d.s.c. wire wound on $\frac{1}{2}$ -watt carbon resistor, $\frac{1}{8}$ -inch diameter, $\frac{3}{16}$ inch long.

Johnson. The coupling capacitors in the last two stages were also selected for their small physical size. They are National XLA-C ceramic condensers. Neutralization of the final 6J6 is accomplished through the use of short lengths of 75-ohm Twin-Lead approximately $1\frac{1}{2}$ inches long.

The chassis is $2\frac{1}{2}$ inches wide, 2 inches high, and 12 inches long, with $\frac{1}{2}$ -inch edges folded over. It was made from a single piece of sheet aluminum $7\frac{1}{2}$ by 12 inches in size. A standard chassis of somewhat similar dimensions may, of course, be used. The first 6J6 socket is $1\frac{1}{2}$ inches in from the left end and the other sockets are spaced along the chassis, $2\frac{1}{4}$ inches center-to-center. The tuning condensers are spaced equally between the sockets, the last two, C_{13} and C_{17} , being mounted on the top surface of the chassis for minimum lead length and symmetrical layout.

Tuning Up

For the sake of compactness and simplicity, no jacks or other provision for metering were provided, except for the pin jacks on the front wall of the chassis. These are labeled *a* and *b* on the schematic diagram and are connected in the cathode lead of the final 6J6. They may be used for metering or keying of that stage. Individual

metering jacks were not considered necessary, since there will be little occasion to shift frequency in this band ordinarily, and once the rig is properly adjusted there will seldom be any necessity for further tuning. Initial adjustments were made by opening the circuits at the desired points and measuring with a portable meter.

Starting with the oscillator, the meter is connected in series with R_2 . The core in L_1 is set at an intermediate position, and with the crystal in place, the trimmer C_2 is adjusted for minimum current, or about 10 ma. The frequency and note should be checked in a receiver, to be sure that the crystal is determining the oscillator frequency. The operation of the second section should be checked similarly, by inserting the meter in series with R_4 . The output frequency should be checked with an absorption wavemeter. Adjustment of the multiplier plate condenser may be critical if fundamental-type crystals are used, the crystal tending to pop out of oscillation if C_4 is tuned on the nose. With "overtone"-type 12-Mc. crystals this trouble is not in evidence and the setting of C_4 (or the core in L_2) will not be fussy. It may be set for minimum plate current, or for maximum output from the stage as indicated by the grid current in the second 6J6.



Bottom view of the 6J6 220-Mc. rig, showing the simplicity of the layout.

Adjustment of the push-pull stages is merely a matter of resonating the circuits for maximum output, as indicated by grid drive in the stage following, and checking to be certain that the proper frequency multiplication is taking place. This is important — we found that our first attempt at a coil for L_3 was giving us a fair amount of output on the *fifth* harmonic, or 125 Mc., rather than tripling to 75 Mc. With such small components and low circuit capacitances, coils turn out to be surprisingly large. Each of the push-pull stages has sufficient cathode bias so that it will not be harmed if operated without excitation, but adjustment will be found easier if the plate voltage is applied only to the stages under test, as one progresses toward the final stage. Input to each push-pull stage will run about 20 to 25 ma. at 200 volts.

Neutralization of the final stage is accomplished in the customary manner. The length of the sections of 75-ohm Twin-Lead should be reduced a small amount at a time until tuning the plate circuit through resonance (with no plate voltage on the final) produces no downward kick in the final grid current. The neutralizing "condensers" will be approximately $1\frac{1}{2}$ inches long, but it is well to start with about 2 inches to be safe. Very small portions should be removed at each operation when the correct length is approached, as a difference of $1/32$ inch will be noticeable.

Performance

With the voltages shown, the output on 225 Mc. will be about two watts, as indicated by a full-brilliance indication in a No. 46 (blue bead) pilot lamp. Considerably more output can be obtained by raising the voltage higher than the 200-volt level, but the increase is hardly worth the extra strain on the tubes. At 200 volts all stages operate well below ratings, and the unit has seen continuous service for hours on end in the ARRL lab without tube failures, and without indications of drift or deterioration. Using a single 6V6 the final has been modulated satisfactorily, delivering a potent signal locally. The output is sufficient for portable or mobile work, and the unit serves admirably as an exciter for an 832-A amplifier, which will raise the power level to about 12 watts output.

Though the excitation is somewhat lower, and the plate dissipation is slightly higher all along the line, it has been found that there is no appreciable difference in the output from the last

6J6, whether 8- or 12-Mc. crystals are used. However, because the latter make for less critical adjustment, they are to be preferred.

The unit is designed so that it may be used separately, for operation as a low-powered transmitter, or as an exciter unit for a driver-final combination, running inputs up to 500 watts. Details of the high-level stages will appear in a subsequent issue.

HAMFEST CALENDAR

CALIFORNIA — The San Joaquin Valley Radio Club is sponsoring the 1948 Fresno Hamfest on Saturday, May 8th. Registration starts at 9 A.M. at the Hotel Californian, Fresno. Tickets are \$3.65, and include the dinner Saturday night at the San Joaquin Light & Power Bldg. Registration chairman: Ed Andress, W6KUT, 1915 Harvard Ave., Fresno, Calif.

MICHIGAN — Sunday, May 23rd, is the date of the Annual Hamfest of the Detroit Amateur Radio Assn., which is to be held at the National Guard Armory, Ypsilanti, Michigan, 30 miles west of Detroit, on the route to Chicago. Contests, short talks, traffic meetings, and YF and YL doings are scheduled. Registration: \$1.00. Further information may be obtained from G. H. Goldstone, W8MGQ, 1745 W. Boston Blvd., Detroit 6, Michigan.

MISSISSIPPI — The Mid-South Hamfest, under the auspices of the Jackson Amateur Radio Club, will be held on Saturday and Sunday, May 15th and 16th, at the Edwards Hotel, Jackson, Miss. An excellent program has been arranged, including many speakers of note. Hotel reservations and advance registration can be made through Secretary J. P. Brown, W5ITL, 1108 Central Street, Jackson, Miss.

NEBRASKA — The North Platte Amateur Radio Club announces its Second Annual Free "Gabfest," to be held on Sunday, June 6th, at North Side Park, North Platte. Bring your own picnic lunch — everything else is free. For further particulars write to G. N. Sinclair, W8ZQ, 1802½ West 3rd St., North Platte, Nebraska.

NEW YORK — Rochester's Liederkrantz Club will be the scene of this year's Hamfest of the Rochester Amateur Radio Assn., which is to be held on May 8th. Registration is at 2 P.M., dinner at 7 o'clock. A gala time is assured all who attend. For reservations write: Rochester Amateur Radio Assn., P. O. Box 1388, Rochester, N. Y.

TEXAS — A business meeting and convention of the Southern Texas Emergency Net will be held at Cuero, Texas, on May 29th and 30th. Headquarters will be at the American Legion Hall, with activities starting promptly at 1 P.M. Further information may be secured from B. B. Thorn, W5CIX, 601 E. Main Street, Cuero, Texas.

WASKATCHEWAN — The Regina (Canada) Amateur Radio Assn. is staging a Hamfest-Field Day on Sunday, May 23rd. A large list of activities has been scheduled, and all hams are invited to attend. Secy.-Treas. A. Driver, VE5CM, will gladly handle advance registrations.

**SWITCH
TO SAFETY!**



Establishing Antenna Resonance

Checking the Match by Standing-Wave Observations

BY MARK L. POTTER,* W9FQU

• If you know your standing waves, it's easy to tell which direction to go in making adjustments to an antenna and matching system. This article discusses the interpretation of commonly-encountered conditions.

It is possible to resonate an antenna by observing the positions of the current minima of the standing wave set up along the transmission line. If the current minima occur at integral multiples of a quarter wavelength from the antenna, as shown in Fig. 1 at A and B, then the antenna is resonant and only a mismatch in impedance exists. In Fig. 1-A the impedance Z_L of the transmission line is greater than Z_A , the impedance of the antenna (generally the case with parasitic beams), so a current maximum exists at the point where the transmission line connects to the antenna. The first I_{min} , therefore, occurs at a distance of $\lambda/4$ from the antenna. In Fig. 1-B the line impedance Z_L is less than Z_A (quite possible when a folded dipole is used for the driven element), so a current minimum exists at the point where the line joins the antenna; the second I_{min} occurs at a distance $\lambda/2$ from the antenna. Referring to Figs. 1-A and -B, the following rule can be formulated: If the current minima occur at *odd* $\lambda/4$ s from the antenna, the antenna impedance is less than that of the transmission line (Fig. 1-A); if the current minima occur at *even* $\lambda/4$ s from the antenna, the antenna impedance is greater than that of the transmission line (Fig. 1-B).

If the antenna is nonresonant (i.e., of improper length), the current minima will not occur at integral quarter wavelengths from the antenna but at points between these distances, as shown in Figs. 1-C and -D. When the antenna is too short (Fig. 1-C), its impedance Z_A is not a pure resistance; it contains a capacitive-reactance component $-jX_A$, whose value increases as the antenna is made shorter. The first I_{min} , for such a condition, will occur at a point between $\lambda/4$ and $\lambda/2$ from the antenna, as shown in Fig. 1-C. On the other hand, when the antenna is too long (Fig. 1-D), its impedance Z_A contains an inductive-reactance component $+jX_A$, whose value increases with antenna

length. The first I_{min} , for this condition, occurs at a distance between 0 and $\lambda/4$ from the antenna, as shown in Fig. 1-D. From Figs. 1-C and -D, the following rule can be formulated: If the current minima occur at points on the antenna side of the *even* $\lambda/4$ points (Fig. 1-C), the antenna is too short; if the current minima occur on the antenna side of the *odd* $\lambda/4$ points (Fig. 1-D), the antenna is too long.

Resonating an Antenna When a Matching Transformer Is Used

If possible to do so, it is better to adjust the antenna length before installing the $\lambda/4$ matching section, because the magnitude of the standing

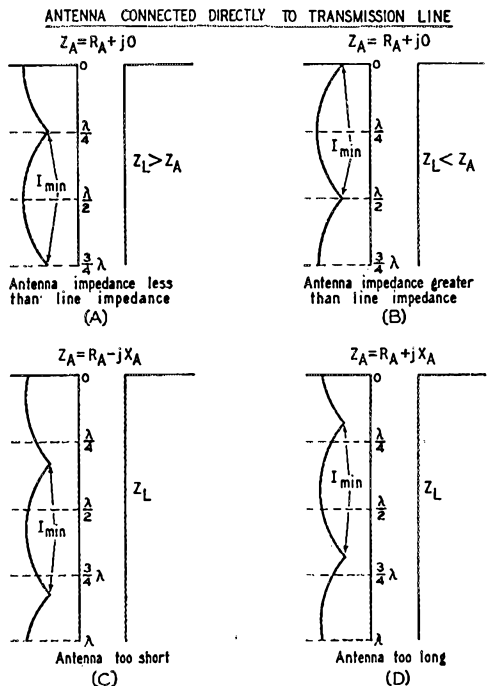


Fig. 1 — Standing-wave patterns with the transmission line connected directly to the antenna. In A and B the antenna is exactly resonant.

waves is much greater and the location of I_{min} is, therefore, much easier. However, it isn't always convenient, or possible, to do this. Fig. 2 illustrates the positions of the current minima for different conditions; in Fig. 2, the junction of the

* Gordon Specialties Co., Chicago, Ill.

transmission line and the $\lambda/4$ matching transformer is taken as the reference point from which the distances are measured. Comparing Figs. 1 and 2, it is observed that, if the distances are measured from the antenna in both cases, the positions of the current minima are essentially the same. If this is done, the rules formulated in the previous section are applicable. In Fig. 2, the dotted portions of the standing waves do not represent the actual conditions along the $\lambda/4$ matching transformer; they were included merely to illustrate the similarity between Figs. 1 and 2.

In Fig. 2, the impedance, Z_S , is the input impedance of the $\lambda/4$ matching transformer; it should be a pure resistance and equal to the transmission-line impedance, Z_L .

Figs. 2-A and -B illustrate the effect of improper impedance, Z_T , of the matching transformer. In Fig. 2-A, the impedance Z_T is greater than that given by the relation $\sqrt{Z_A Z_L}$; and in Fig. 2-B, Z_T is less than that given by this relation. The antenna is assumed to be resonant for these two cases.

Two other conditions should be considered: (1) that in which the length of the matching transformer is greater than a $\lambda/4$; and (2) that in which it is less than a $\lambda/4$. If the antenna is resonant and the length of the matching transformer is greater than $\lambda/4$, the impedance Z_S contains a capacitive-reactance component $-jX_S$ and a condition similar to that of Fig. 2-D exists. If the antenna is resonant and the length of the matching transformer is less than $\lambda/4$, the impedance Z_S contains an inductive-reactance component $+jX_S$ and a condition similar to that of Fig. 2-C exists. In fact, if the standing-wave observations were made and the position of I_{min} was as shown in Fig. 2-C, it would indicate either a short antenna or a matching section less than a $\lambda/4$ long. This suggests that the antenna should be resonated by some other method — such as using an r.f. ammeter at the junction of the antenna and the matching transformer to indicate antenna resonance; or the antenna length can be adjusted with the transmission line connected directly to the antenna as shown in Fig. 1. Once the antenna is resonated, then the length of the matching transformer can be checked as outlined above.

In taking measurements of one's own antenna system, it is necessary to take into consideration the velocity of propagation of the transmission line (generally 0.975 for open wire and 0.657 for coaxial cable); also, the indicating device for locating I_{min} should be one that measures current — not a neon bulb, which indicates voltage — current and voltage always being 90° or $\lambda/4$ out of phase.

ANTENNA CONNECTED DIRECTLY TO IMPEDANCE-MATCHING TRANSFORMER;
TRANSMISSION LINE CONNECTED TO OTHER SIDE OF MATCHING TRANSFORMER

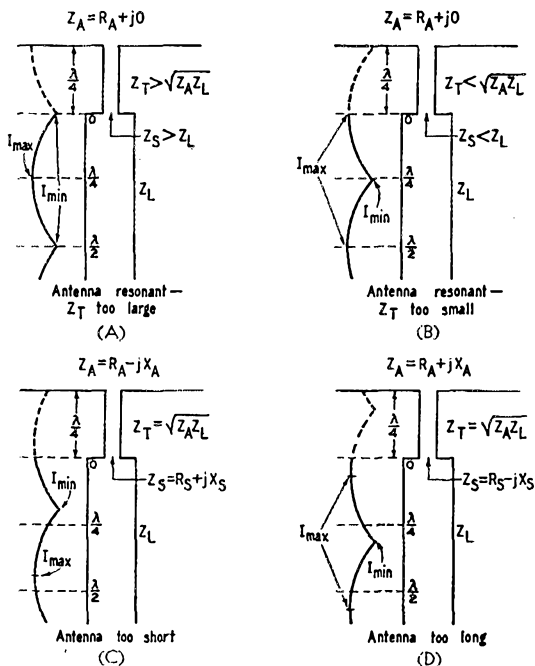


Fig. 2 — Transmission line and antenna connected through a quarter-wave matching transformer.

Fig. 2 indicates a $\lambda/4$ matching section which could be either coaxial cable, parallel tubes, or parallel wires, depending upon the characteristic impedance desired. However, any impedance-matching network can be used, in which case the information given in this article can be followed with equal success without any changes.

COMING CONVENTIONS

- June 5th-6th — Atlantic Division, Hotel Statler, Washington, D. C.
- August 21st-22nd — West Gulf Division, Rice Hotel, Houston, Texas
- Sept. 4th-5th-6th — NATIONAL CONVENTION, Hotel Schroeder, Milwaukee, Wis.
- Oct. 2nd-3rd — Southwestern Division, Los Angeles, Calif.
- Oct. 8th-9th — Eastern Canada, Mount Royal Hotel, Montreal, Que.

**SWITCH
TO SAFETY!**



A Beginner's C.W. Transmitter

Two Methods of Starting Right with a 40-Watt Rig

BY RICHARD M. SMITH, * W1FTX

If you've ever juggled both a single-tube transmitter and an antenna, you'll know what this is all about before we begin. But if you haven't, and are searching for something "simple," look before you leap! Yes, those single-tube 6L6 rigs look awfully simple on paper. And they are just as simple to build. If you've ever operated one, however, you know that simplicity ends right there. Oscillators have a way of misbehaving when coupled to an antenna, and experience has shown that the only way to eliminate all possibility of trouble is to isolate the oscillator from the antenna.

Described here are two 40-watt transmitters that avoid all of the headaches that are often encountered with single-tube rigs, yet the desired simplicity is maintained. Each is a complete, self-contained transmitter, with built-in power supply, antenna coupler, and key-click filter. The same circuit is used in each, one built in a miniature rack-and-panel made of scrap 1×2 lumber from an old packing case, the other in the more conventional metal-chassis style. In both units, the accent is on compactness, yet all parts are readily accessible and the wiring is not complex.

The Circuit

The circuit, shown in Fig. 2, uses a 6AG7 oscillator-buffer, capacitance-coupled to an 807 amplifier. Excellent isolation between the oscillator and the output circuit is obtained by using the screen grid of the 6AG7 as the anode of a triode Pierce oscillator, with electron-stream coupling to the untuned plate circuit. The output obtained from the oscillator in this arrangement is not great, but is sufficient to excite the 807, which, for reasons of power-supply economy, is operated at about 400 volts. Only one tuning control is required in the transmitter itself, thus

equaling the simplicity of most one-tube rigs and surpassing it in the case of the Tri-tet oscillator.

The oscillator circuit was first tried with a 6V6, and then a 6F6, but in both instances results were unsatisfactory, because crystal current was excessive and the resulting signal chirped badly. The 6AG7, however, is very easy on the crystal, and keys well without chirp. Keying characteristics are controlled to a certain extent by the value of the regeneration condenser, C_4 , which is connected from screen to ground instead of the usual grid-to-ground connection.

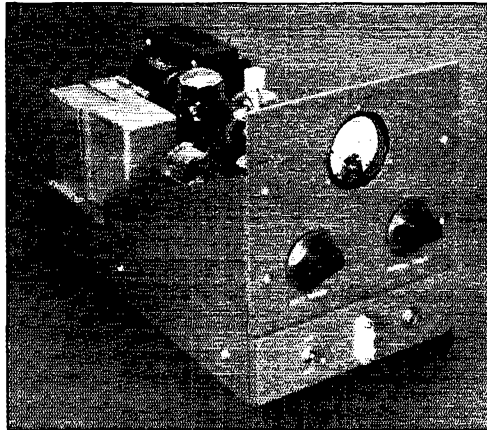


Fig. 1 — A compact 40-watt c.w. transmitter. The entire transmitter, power supply, antenna coupler and key-click filter are contained in one unit that measures only 14 by $7\frac{1}{4}$ by $8\frac{1}{4}$ inches.

The 807 circuit uses a series-fed plate circuit, link-coupled to a parallel-resonant antenna coupler. Also included in the 807 circuit are a small grid choke RFC_4 and a suppressor resistor R_5 , used to eliminate a v.h.f. parasitic oscillation in the 140-150 Mc. region.

The antenna-coupler circuit shown is designed to permit coupling to any balanced antenna system, such as a center-fed half-wave. An alternate arrangement for instances where an end-fed single-

wire antenna is used is suggested at the lower right in Fig. 2.

Keying is made "soft" and clean by the addition of an 8- μ fd. condenser, C_3 , connected across the key. It was found that the crystal oscillator did not need the usual lag circuit to insure a soft "make" when the key was closed, but required additional capacitance to eliminate a heavy thump which occurred when the key was opened.

Output in either the 3.5- or 7-Mc. bands may be obtained by using crystals in the 3.5-Mc. range. It should be remembered, however, that the frequency of any 3.5-Mc. range crystal to be used for 7-Mc. output must be below 3650 kc. or the resulting output frequency will be outside the high-frequency limit of the 7-Mc. band. When doubling to 7 Mc. from 3.5-Mc. crystals, the output of the 807 is somewhat less than when

* Technical Assistant, QST.

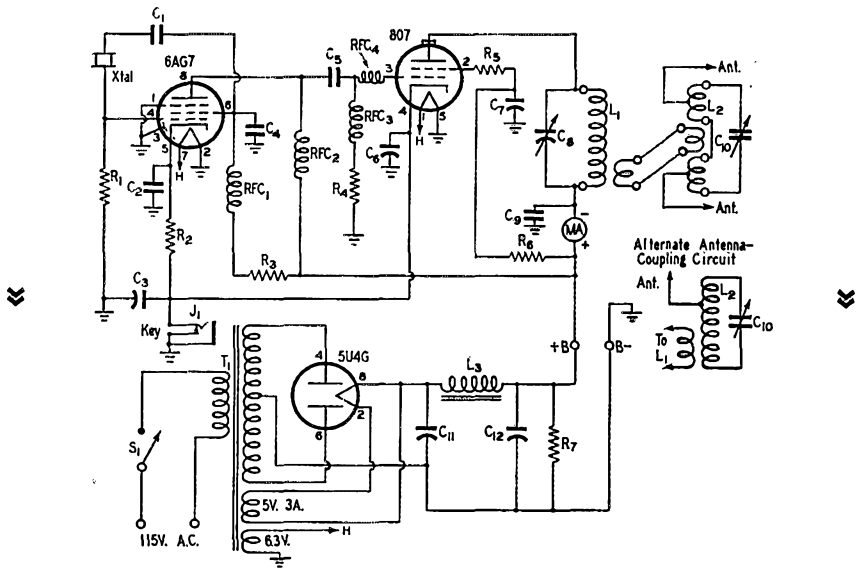


Fig. 2 -- Circuit diagram of the beginner's low-power c.w. transmitter.

- C₁ — 680- μ fd. mica.
- C₂ — 0.0068- μ fd. mica.
- C₃ — 8- μ fd. 150-volt electrolytic.
- C₄ — 100- μ fd. mica (see text).
- C₅ — 100- μ fd. mica.
- C₆ — 0.01- μ fd. 400-volt paper.
- C₇ — 0.01- μ fd. 600-volt paper.
- C₈ — 140- μ fd. max. receiving-type variable (Hammarlund MC-140-M).
- C₉ — 0.0022- μ fd. mica.
- C₁₀ — 250- μ fd. max. receiving-type variable (Hammarlund MC-250-M).
- C₁₁, C₁₂ — 4 μ fd., 600 volts.
- R₁ — 56,000 ohms, $\frac{1}{2}$ watt.
- R₂ — 330 ohms, 1 watt.
- R₃, R₄ — 22,000 ohms, 1 watt.
- R₅ — 68 ohms, $\frac{1}{2}$ watt.
- R₆ — 20,000 ohms, 5 watts, wire-wound.
- R₇ — 50,000 ohms, 20 watts, wire-wound.
- L₁ — 3.5 Mc. — National AR-80-E with 20 turns removed — 35 turns No. 24 d.s.c., $1\frac{1}{8}$ inches long, $1\frac{1}{4}$ -inch diam., 3-turn link.

- 7 Mc. — National AR-20-E — 14 turns No. 18 enam., $1\frac{1}{4}$ inches long, $1\frac{1}{4}$ -inch diam., 3-turn link.
- 14 Mc. — National AR-10-E — 8 turns No. 18 enam., $1\frac{3}{8}$ inches long, $1\frac{1}{4}$ -inch diam., 3-turn link.
- L₂ — 3.5 Mc., 7 Mc. — National AR-40-S, 20 turns No. 20, center-tapped, $1\frac{5}{8}$ inches long, $1\frac{1}{2}$ -inch diam., 5-turn variable center link.
- 14 Mc. — National AR-20-S, 12 turns No. 18 center-tapped, $1\frac{3}{8}$ inches long, $1\frac{1}{4}$ -inch diam., 4-turn swinging center link.
- L₃ — Receiver-type filter choke, 8 hy. at 150 ma., approx. 150 ohms d.c. resistance.
- J₁ — Closed-circuit 'phone jack.
- MA — 0-200 d.c. milliammeter.
- RFC₁, RFC₂, RFC₃ — 2.5 mh., 100 ma.
- RFC₄ — 17 turns No. 18 d.s.c., wound on 1-watt 1-megohm resistor.
- S₁ — S.p.s.t. toggle switch.
- T₁ — Replacement-type power transformer, 400-0-400 v. a.c. at 160 ma., 5 volts at 3 a., 6.3 volts at 2 a. (Stancor P-4081).

it is acting as a straight amplifier, but it is still entirely adequate for good operating results. (In fact, contact with a Virgin Ids. station was made in just this manner!) Crystals in the 7-Mc. range may be used to produce output in either the 7- or 14-Mc. bands. When the transmitter is working straight through its output is approximately 25 watts. When doubling to 7 Mc. from 3.5-Mc. crystals, output is about 20 watts, and when doubling to 14 Mc. from 7-Mc. crystals, output is about 10 watts. It should be noted that it is not possible to use third-harmonic type 14-Mc. crystals to obtain output in the 14-Mc. band with this transmitter. While such crystals will not be damaged, their output at the third harmonic is insufficient to drive the 807.

Construction

The metal-chassis version of the transmitter is pictured in Figs. 1, 3 and 4. The parts layout is shown in the top view. The three tubes are arranged in a line down the center of the 7 x 13 x 2-inch chassis, and the remaining parts are grouped around them, with the plate condenser for the 807 at the right of the oscillator tube and the antenna condenser at the left. Both condensers are mounted on ceramic stand-off insulators (National GS-10). Insulated couplings are used to bring the tuning shafts through the front panel. The sockets for the plug-in coils are mounted at right angles to each other, immediately behind their respective tuning condensers.

• Single-tube transmitters look simple on paper, but they often prove unruly on the air. Here's the way to avoid trouble. Two tubes are used, yet only one control is needed, and the resulting signal is better.

The link line between the two coils is a short length of 75-ohm Twin-Lead, although a pair of twisted insulated wires may be substituted with equal results.

The panel is a $7\frac{1}{4} \times 6\frac{1}{4}$ -inch piece of $\frac{1}{8}$ -inch tempered Presdwood with a gray-enamel finish. Metal may be used if desired, but it is more difficult to work, and is not needed for shielding. The panel does not overlap the front of the chassis, but is supported above it, flush to the surface, by two standard 8-inch panel brackets. To add to the appearance of the unit, the panel is recessed slightly from the front edge of the chassis as shown in Fig. 1.

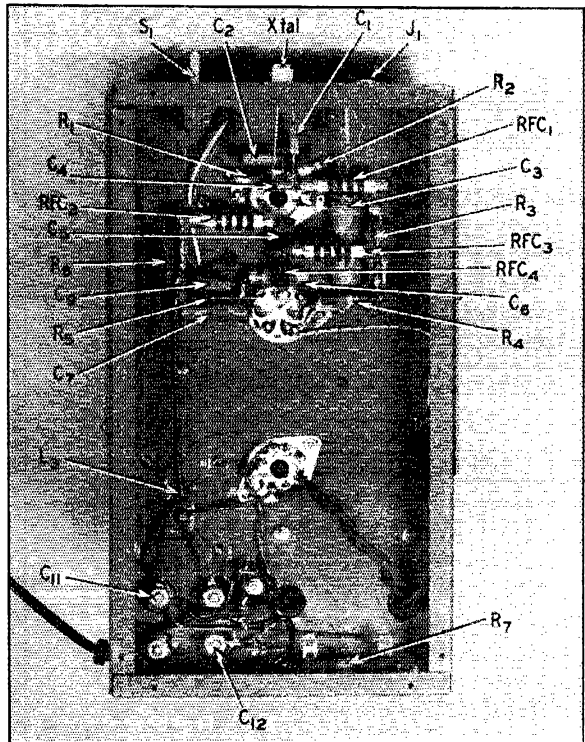
The power-supply components are arranged on the rear of the chassis. They may be grouped in any manner that is convenient, but some care should be taken to keep adequate space between them and the plug-in coils.

The wiring is shown in Fig. 3. Two 6-terminal tie-strips (Jones No. 2006), mounted near the tube sockets and spaced about 5 inches apart, are used to support the various components, each of which is identified by symbol designation in the photograph. The leads to the meter pass through a grommet-lined hole visible to the right of the a.c. line switch. A similar hole passes the +B supply lead through the chassis to the stator connection of the 807 plate-tuning condenser. The grid choke, *RFC*₄, is mounted right at the grid pin on the socket for the 807. All ground connections are made to the screws that hold the sockets to the metal chassis. The ground ends of *C*₇, *C*₈ and *C*₉ are all returned to the same screw, as shown.

All wiring in the tank circuits associated with the antenna coupler and the 807 plate coil is made with No. 14 bare tinned wire. All other leads are No. 18 stranded insulated wire.

The wooden rack-and-panel version of the transmitter is built in two separate units. The frame unit contains the power-supply components, while the transmitter components are all bolted to the $7 \times 13 \times \frac{1}{8}$ -inch Presdwood panel. Slats are nailed across the side rails of the wooden base, spaced to permit the tube socket, the filter condensers, and the choke to be mounted with their terminals occupying the space between slats. The rack is also finished with gray enamel.

The 807 is mounted in a shield-and-bracket assembly (Millen 80009) which is bolted to the panel as shown. The socket for the 6AG7 is supported between two brackets made by bending two $\frac{1}{2}$ -inch strips of $\frac{1}{16}$ -inch aluminum. Ordinary dime-store brackets may be used if desired. A 12-terminal tie-strip with a metal mounting base (Jones 20012) is mounted across the bottom of the panel, spaced about two inches below the tube sockets as shown in Fig. 6. Most of the components are then connected between the socket terminals and adjacent points on the tie-strip. The metal base that runs the full length of the tie-strip serves as a ground buss, and all ground connections are soldered to it. Where necessary, jumpers of insulated wire run from one terminal to another to complete the electrical circuits. Grounding jumpers of heavy wire connect the ground strip to the 807 shield assembly, and to



◆
 Fig. 3 — Bottom view of the metal version of the transmitter.
 ◆

one of the angle brackets that holds the 6AG7 socket.

The r.f. chokes (Millen 34102) are mounted with their threaded mounting screws passing through the tube brackets, serving to bolt them to the panel. The crystal socket is mounted on the front panel between the two brackets that support the 6AG7 socket, and the small mica condenser C_1 that connects the crystal to the screen of the tube is mounted between one of the crystal-socket terminals and the screen connection on the tube socket. This, and screen dropping resistor R_8 in the 807 circuit, are the only parts not visible and identified in the photograph. The dropping resistor is tucked under the "arch" formed by the components associated with the 6AG7 stage, and is supported between the left-hand terminal of the tie-strip (+B) and the terminal adjacent to the screen connection on the 807 socket. From this point a short insulated wire runs to a smaller tie-point that is bolted to the base of the 807 bracket. The suppressor resistor is connected from this tie-point to the screen connection on the 807 socket.

The plate tuning condenser C_8 and the socket for the plug-in coil L_1 are mounted directly above the 807, with just enough space allowed to permit removal of the 807 from its socket. The shaft of the tuning condenser is not insulated from the panel. For this reason, a well-insulated tuning

TABLE I
Representative Voltage and Current Measurements

Conditions: 3.5-Mc. crystal, 7-Mc. output, 25-watt lamp used as dummy antenna, 807 stage loaded to 100 ma.

807 stage:	6AG7 stage:
Plate volts: 420	Plate volts: 420
Plate ma.: 100	Plate ma.: 35
Screen volts: 310	Screen volts: 260
Grid volts: -65	
Grid ma.: 2.9	

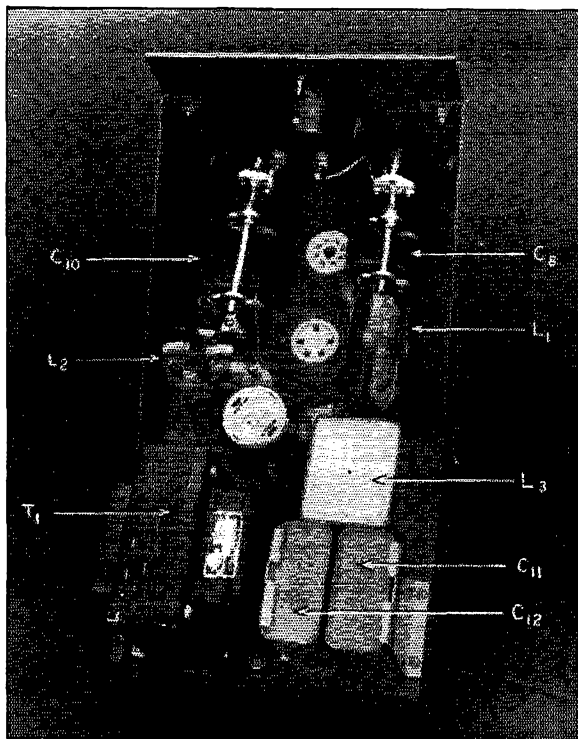
knob is a *must* because the condenser shaft carries the full d.c. plate potential. The knob should not have a metal flange, and its setscrew must be well recessed.

The antenna condenser C_{10} and the antenna coil L_2 are mounted side by side at the top of the panel, with the axis of the coil at right angles to that of the plate coil.

The arrangement of the power-supply parts and their wiring is shown in the photographs. For neatness, all leads are grouped and run close to the wooden frame wherever possible. The three leads that connect the power supply to the transmitter panel are grouped and are tacked in position with insulated staples. Enough slack should be left in these leads to permit the panel to be removed from the rack without unsoldering the leads, so that the transmitter may be worked on while still connected to its power supply, if desired.

Adjustment

Operating ease and simplicity of adjustment are features of these transmitters. The procedure is the same for both. After checking the wiring, plug in the coils specified below Fig. 2. The a.c. line switch must always be *off* when L_1 is being plugged in or removed, because it carries the full plate voltage. Plug the key into the keying jack, and turn the a.c. switch on. Wait about twenty or thirty seconds for the cathodes of the tubes to come up to operating temperature. Close the key, and tune the plate condenser until plate current dips sharply as the circuit is tuned to resonance. Off-resonance plate current will be about 120 or 130 ma.,



◆
Fig. 4—Top view of the metal version of the transmitter.
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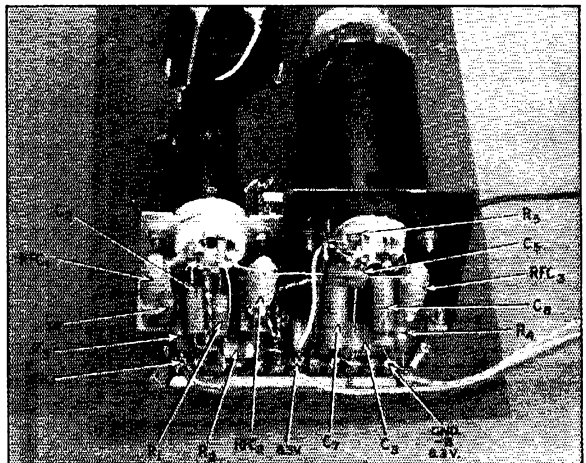


Fig. 5 — Front view of the rack-and-panel version of the transmitter. Strips of 1×2 are used for the uprights and side rails of the frame, while the side brackets are made of $\frac{1}{4}$ -inch Presdwood. Thin strips nailed across the side rails support all of the power-supply components, and all of the transmitter parts are bolted to the front panel. The framework is 13 inches high, 11 inches deep, and 7 inches wide.

dipping to about 5 ma. when the 807 is used as a straight amplifier, and to 10 or 15 ma. when it is used as a doubler. A 25-watt lamp bulb may be used as a dummy load for test purposes. Connect the bulb across a few turns of the antenna coil, and tune the antenna tuning condenser. As

resonance is approached, plate current will rise and the lamp will glow. It should be possible to light a 25-watt bulb to full brilliance by this method. Another 25-watt bulb, connected to the 115-volt lines, may be used as a basis of comparison. If the dummy load does not seem to light to full brilliance, yet the plate current has increased to 90 or 100 ma., it is possible that the lamp bulb is not absorbing all of the energy, and some of it is being dissipated in the plate coil itself. If this is the case, the coil will become hot. To correct the condition, change the position of the taps on the coil until maximum loading, as evidenced by plate current, and maximum output as shown in the lamp bulb, coincide. When the amplifier is full loaded, current will be between 90 and 100 ma. If it is not possible to load to this figure, push the swinging link on the antenna coil in. If still unable to load to maximum, relocate the points at which the dummy load is connected to the antenna coils. To check keying, listen to the signal in a receiver, after first disconnecting the antenna from the receiver input. Keying should be clean and chirpless. If a chirp is present, reduce the size of regeneration condenser C_4 , substituting first a 75- μ fd. capacitor and then a somewhat smaller size, until chirpless keying is obtained. With the crystals used in the laboratory models (Biley AX-2), keying was found to be best with the value shown beneath the circuit diagram, but with other crystals a slightly different-sized condenser may be required. It should be possible to obtain good keying with almost any active crystal. The best method of checking for key clicks is to listen to the signal in a near-by receiver with the b.f.o. turned off. Key the transmitter slowly, listening first for a click on "make" as the key is closed, and then for a click or thump on "break" as the key is opened. If clicks or thumps are present, they will show up immedi-

Fig. 6 — Close-up view of the wiring of the rack-and-panel version of the transmitter. A 12-point tie-strip is used to hold most of the small components.



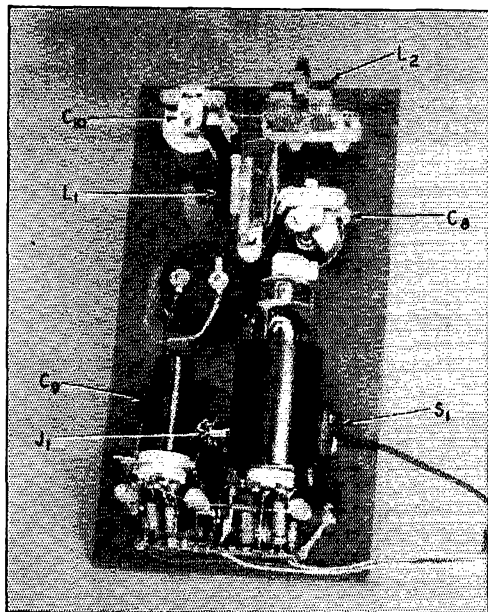
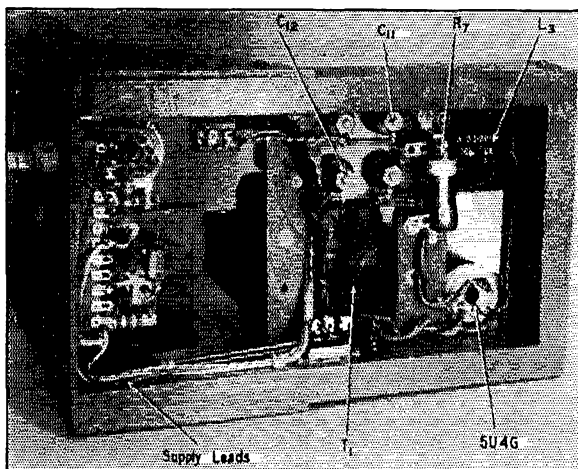


Fig. 7 — Rear view of the panel assembly. All transmitter components are mounted on a 13 × 7-inch sheet of $\frac{1}{8}$ -inch Presdwood.

ately when the b.f.o. is turned off, but will be screened somewhat if the b.f.o. is left on. With the circuit constants shown in the diagram, keying should be "soft" and clean.

Table I shows representative voltages measured at important parts of the circuit. These measurements were made with a 20,000-ohm-per-volt meter, and were made under the conditions outlined above the chart. Departure from the tabulated voltage is permissible except in the case of the screen voltage of the two tubes.

Fig. 8 — Bottom view of the rack-and-panel transmitter. The power-supply parts are identified. For identification of other parts see Figs. 6 and 7.



Operation

Adjustment for operation is exactly the same as described above, except that the antenna, instead of the dummy load, is connected across a portion of the antenna coil. It is impossible to specify the exact locations of the taps on the antenna coil, as they will vary depending on the nature of the antenna used. Several conditions should be tried until the one that produces maximum antenna current is found. In the absence of a low-range (0–1 amp.) r.f. ammeter, a small flashlight bulb may be inserted in series with the antenna to serve as a temporary current indicator. The bulb should be removed, or shorted out, when the transmitter is used on the air. If a single-wire antenna is used, an end-linked coil should be used for L_2 instead of the swinging-link coil specified, and the antenna should be tapped on the coil as shown in Fig. 2. The proper location of the tap must be determined by trial, using maximum antenna current as an indication.

In actual on-the-air checks, both transmitters have performed well. Their signals are husky enough to provide reliable contact with most W districts, and on several occasions European stations have been worked from W1 in the 3.5-Mc. band. More important than this, however, is the fact that voluntary reports indicate that the signals are clean. They are free from the clicks and chirps that often plague single-tube rigs, and are unaffected by tuning adjustments. The power output is sufficient to produce many solid QSOs if a reasonably efficient antenna is used. Thus we seem to have accomplished the primary purpose of our project. No, you don't have to spend weeks building an elaborate rig in order to have a clean signal right from the start. You can build either of these rigs in a few evenings, get yourself on the air, and be free of the worries you might have encountered if you had built a one-tube rig.

TVI Can Be Reduced

Transmitter Treatment That Has Given Results

BY PHILIP S. RAND, * WIDBM

• There's a big difference between causing general interference to television reception and confining it to within a couple of hundred feet of your transmitter. The general interference certainly can be eliminated — and by relatively simple means, as this article shows. You may even wind up by having no TVI at all, if the TV receiver isn't backed up against your transmitter!

MY investigation into TVI, and what could be done about it, started during a rather heated battle in our local newspaper between myself and some television dealers. Every few weeks our local paper would print a short paragraph on the front page blaming local amateurs for all the interference to all television sets in town, and asserting that the dealers were going to have amateurs put off the air. An investigation showed that only three or four of the 36 amateur stations were causing general interference to about 50 receivers. It also showed that practically all of the 1000 television receivers in town were bothered by other types of interference, such as diathermy.

In order to make this check a receiver was built that tuned from 50 to 100 Mc. and the television channels were monitored aurally. A few surprising facts turned up. A 1-kw. amateur station about eight miles and two towns away put in an S7 signal stripped of modulation while a 500-watt job at 1½ miles could not be heard.

The kilowatt station was contacted and requested to turn off his final and disconnect his antenna — after which he was still S6, showing direct radiation of the second harmonic from his buffer stage. (That was why there was no modulation.) But how come the 500-watter located at 1½ miles couldn't be heard at all? Further investigation showed the 500 watts caused no television interference, even on Channel 2, to a receiver 300 yards distant. No wonder we couldn't hear it!

In the case of two of the stations that caused general interference, it so happened that there was another station across the street from each with equivalent power. Listening tests on Channel 2 showed strong signals from the two stations known to cause interference and no trace of a

signal from the stations across the street from them. By this time our interest was thoroughly aroused in the whole problem.

A spot survey was made to determine types of TVI encountered by many television receivers in different parts of town. It was interesting to find that, with the exception of those living in close proximity to a ham station, very few were ever bothered to any extent by amateurs. Those who were, however, were plenty burned up about the whole thing.

In view of the above findings I wrote the local paper defending the radio amateur and pointing out the many causes of interference to television other than amateur; and, while admitting that some amateur stations do cause some interference, stated they were not the main cause. This brought a scathing reply from an unknown writer two nights later claiming I didn't know nothing from nothing and should buy glasses. I hear from the underground that there will be no more publicity on TVI here in town as the dealers have lost some sales because of the publicity given to interference.

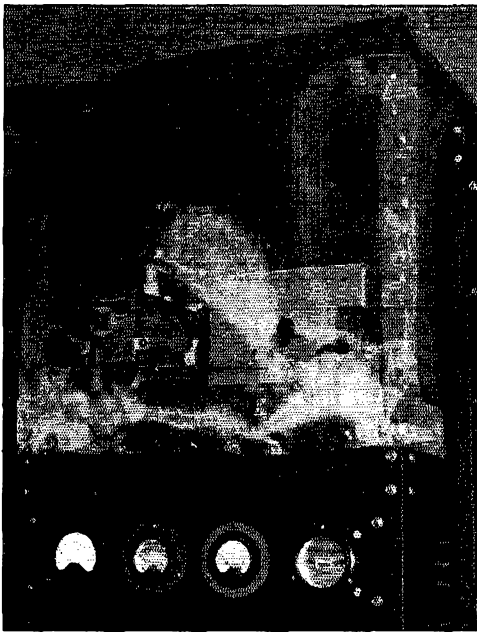
Handling the TVL

All of the above — and a little listening to TVI discussions on 10 meters — reveals two fundamental points that need clearing up. First, the amateur definitely can clean up his rig to reduce harmonics and spurious radiations. Second, the amateur needs a course in diplomacy in dealing with TVI.

While this article will deal chiefly with the first point, a few words concerning the second will not be amiss. Go out and find out if you are blocking Channel 2 on near-by sets.¹ If you are, do not assume that nothing can be done about it. This applies not only to 10-meter stations but also to other bands as well. There are plenty of cases of 3.5- and 7-Mc. rigs causing TVI. Above all, make no remarks about your TVI customers over the air, either personal or otherwise. Don't say, for example, that you guess you'll get off the air in an hour or so "to give the TV set-owners a break." A TV looker hearing such a statement always interprets it — wrongly — as an admission of deliberate interference. You know you are going out of your way to observe quiet hours,

¹ The author has in mind here, of course, those areas where Channel 2 is in use. In those areas where Channel 2 is not assigned the chief problem is likely to be Channel 3. — Editor

* RFD 1, South Norwalk, Conn.



A copper-screen shield can easily be constructed about the exposed r.f. circuits, using aluminum angle as the support. Machine screws threaded into the angle hold the screening in place.

without being required to do so. But the listeners assume you have been knowingly and deliberately spoiling their programs and are now bragging about it to your radio friends, and about this time they hit the ceiling. I have had this one statement held up to me, in my battle with the press, more times than I can count, as proof that amateurs delight in interfering with TV programs.

We all know from past experience with BCI that close cooperation between the receiver owner and the amateur is necessary for the successful elimination of the interference. This is doubly true for TVI, so don't let things get to such a state that you are not on speaking terms with your TV neighbor, or that amateur radio is being given a black eye in the papers. Use utmost diplomacy on the air as well as in your personal and telephone contacts with him. Remember that visual interference in the picture is much more annoying than audio interference on the broadcast band. Also remember that it is possible to jam the picture for a mile or more and never once be heard in the sound channel. In this way you may have been causing interference for a year, unknowingly, and you can rest assured that when it becomes known that it was you, you won't be very popular. So check your harmonic at regular intervals with your nearest TV set-owner to be on the safe side.

Kinds of TVI

Now to get down to types of TV interference

from amateur stations, as found in Norwalk. The worst type is the second harmonic from ten meters falling in Channel 2, the old five-meter band. It may be strong enough to louse up completely the front end of the TV set and cause cross-talk, jamming all channels. As you reduce the strength of the harmonic the interference to adjacent channels usually clears up, leaving just Channel 2 jammed. Further reduction of the second harmonic will clear up Channel 2 so that it will at least be usable, in many cases, to within a few hundred feet of the transmitter.

Twenty-meter rigs also cause trouble, although not to the same extent as ten. One way of clearing up this type of TVI has already been covered in *QST*,² although I believe the principles to be outlined here will work on twenty as well as on ten.

Forty-meter rigs can produce a third harmonic which may fall into the TV i.f. channels and cause interference. Here again it is a problem of eliminating or reducing harmonics.

Eighty-meter rigs put out soup right in the video range and may require different treatment — possibly r.f. filters in the power lines at the transmitters and more adequate shielding in the receivers. Wavetraps for 3.5 Mc. will probably help in the receiving-antenna lead.

Key clicks from c.w. on any band bother. Here, more efficient key-click filters are in order, plus r.f. filters in the power line.

Starting to Work

It was decided to see what could be done at home before venturing afield, so all the literature was gone over again³ and League headquarters contacted for any red-hot dope. The latest dope was that filtering all leads and thorough shielding, as applied in the FCC tests with an oscillator for diathermy use (September *QST*) showed great promise, and that good filtering was at least as important as shielding — possibly more so.

Before we get into the actual delousing of the rig, let me point out that WIDBM has never had a TVI complaint of any kind from anyone at a distance of over 250 feet. We have consistently operated on ten right through the evening with an input of 600 watts. At a distance of 250 feet we did take out Channel 2 on an RCA projection set, while at 150 feet we took out Channels 2, 4 and 5 in various degrees at various times on a home-made receiver. This set used a rhombic antenna to make up for lack of gain because of the omission of an r.f. stage and an i.f. stage. We had always assumed that all rigs produced harmonics in pro-

² See third reference in footnote 3.

³ J. W. Paddon, "Parallel Standing Waves," *QST*, January, 1948; G. Grammer, "Interference with Television Broadcasting," *QST*, September, 1947; M. Seybold, "Curing Interference to Television Reception," *QST*, August, 1947; G. Grammer, "Keeping Your Harmonics at Home," *QST*, November, 1946.

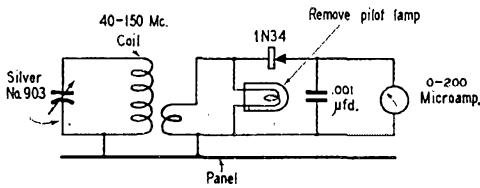
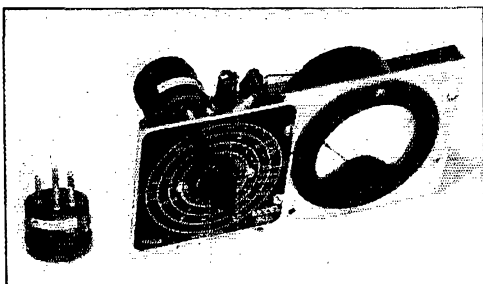


Fig. 1—The "gimmick" for checking the presence and strength of harmonics. It's the same old "Little Gem" that has proved so valuable in past battles with harmonics. Without one, you're trying to work in the dark with your hands tied. W1DBM uses a commercially-available wavemeter for the tuned circuit, but anything that will tune to the necessary range (56 to 88 Mc.) can be used. A 25- μ fd. variable and a 10-turn coil 1 inch long and $\frac{1}{2}$ inch in diameter will be satisfactory. The crystal detector can be coupled to the tuned circuit by one or two turns of the same diameter.

portion to their power input and that the above conditions were normal for 600 watts. Since there was nothing that could be done about it we had so informed our neighbors and everybody was apparently happy. Only one little thing kept bothering us: the observed signal strength of harmonics from local stations bore no relation to the plate input to the final amplifier. And then we kept thinking of that buffer stage eight miles away that we heard S7.

Obviously if we were going to be able to tell where we had made an improvement we needed some kind of a "gimmick" or indicating device that would tune sharply to our harmonic and give an indication of relative power or signal strength. It cannot be stressed too strongly that you will get nowhere fast without such a gadget. Being already the owner of a Silver 903 set of wavemeters, we mounted a 0-200 microammeter on a small panel and bolted them together as shown in the photo. The circuit is shown in Fig. 1.

The gadget can, of course, be built up from junk-box parts and the meter can be obtained surplus for \$1.60 (blind-landing indicator). By using the Silver 903 unit with its calibration you can check other bands, too, as it covers from 1.5 Mc. to 500 Mc. with calibrated plug-in coils.



The "gimmick" all ready to go. It's a commercial wavemeter set to which a crystal detector and microammeter have been added.

Before we started using our newly-built "gimmick" we sat down and did a little thinking. Where would we look for a second harmonic first? We recalled again hearing the buffer S7 from eight miles away; and for a double check we called an amateur about $1\frac{1}{2}$ miles away whose harmonic we had logged at S9 and asked him to come on and rotate his antenna. No difference in the harmonic signal strength. We next asked him to cut off his final and disconnect his antenna. Still no change in the signal. Next we had him "kill" everything except his exciter and could still hear him, although the signal was somewhat weaker.

You probably have reached the same conclusions that we did: (1) Harmonics are not necessarily radiated by the antenna. (2) Strong harmonics are not necessarily generated in the final or buffer stage. (3) The amount of harmonic

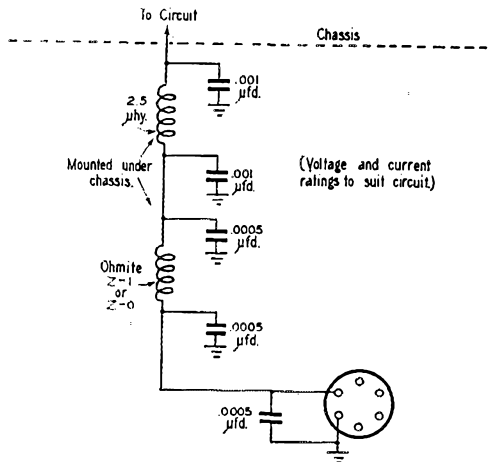


Fig. 2—Filter for reducing harmonic currents in supply leads. It will attenuate other stray r.f. as well, keeping it in the transmitter where it belongs. These filters should be grounded to the chassis at the point of exit, and should be separately shielded if they have to be placed near a part of the circuit where the filter itself can pick up r.f.

power radiated may bear no relation to the power input to the final.

Now, if your final amplifier and antenna are not necessarily the cause, what is? What would make a good antenna for 57 Mc.? The answer is easy—most any length of wire, especially one about four feet long. Lengths of wire are called leads or cables in a transmitter. Remember September QST said the FCC filtered all external leads? Ketch on? OK. The first place to look for harmonics with our "gimmick" is in external leads. Leads to meters, d.c. leads, a.c. leads, B+ leads, filament leads, bias leads, in fact all wiring that leaves the chassis. You will probably find plenty of second and third harmonic. About this

time you will be finding 57-Mc. stuff in the wiring to bridge lamps and the kitchen clock. I did.

Now is the time to start your filtering, and don't be stingy. When you filter one lead you chase the r.f. over into another, so if you're going to make headway you'll probably end up — as I did — by filtering every lead twice, once for h.f. and once for v.h.f. The basic filter is shown in Fig. 2.

Now we assume you have all interconnecting leads double-filtered in your exciter, buffer, and final amplifier, so let's take a look at where the harmonics might be generated and reduce them too for good measure. How would you design a good frequency multiplier? Well, let's do just the opposite now in all stages where we are not multiplying. Reduce your grid biases so they are not excessive; reduce your grid currents so that no stage is being overexcited. Check your L/C ratio to be sure you have a high- C circuit. If it isn't, take a turn or two off the coil and mesh that condenser farther in.

Now check any possible way for a weak second harmonic in a low-power stage to be passed on and amplified by the next stage. A good way to pass on all harmonics from a frequency multiplier is to capacity-couple its plate to the grid of the next stage, so let's change over to link coupling and install a tuned grid circuit in the following stage. Keep your weak harmonics weak and confine them where they belong. Don't drive the final with a doubler. It is better to multiply up to 28 Mc. in very low-power stages, and then amplify with one or two straight-through buffers, running conservatively, until you get enough power to drive your final.

Remember that no matter how perfectly you

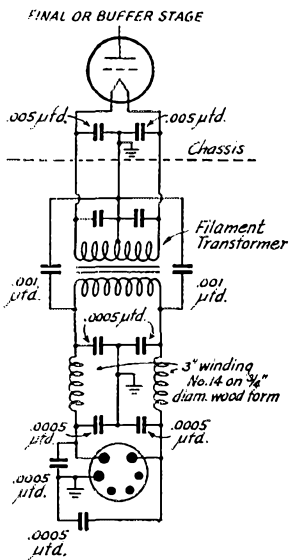
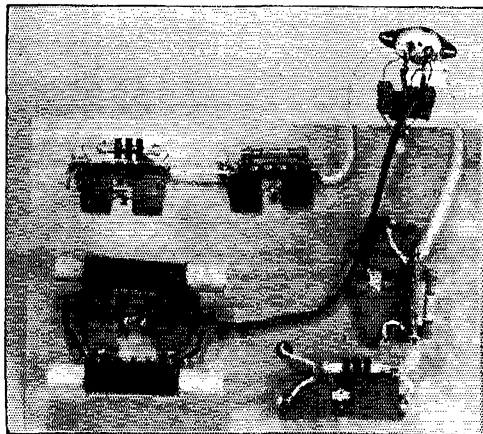


Fig. 3 — Filament-supply filter for use in cases where the filament transformer is mounted on the r.f. chassis. If the filament transformer is remotely located, chokes such as those shown in the primary circuit above should be installed (along with the by-passes) in the r.f. chassis. Use wire heavy enough to carry the filament current without excessive drop.



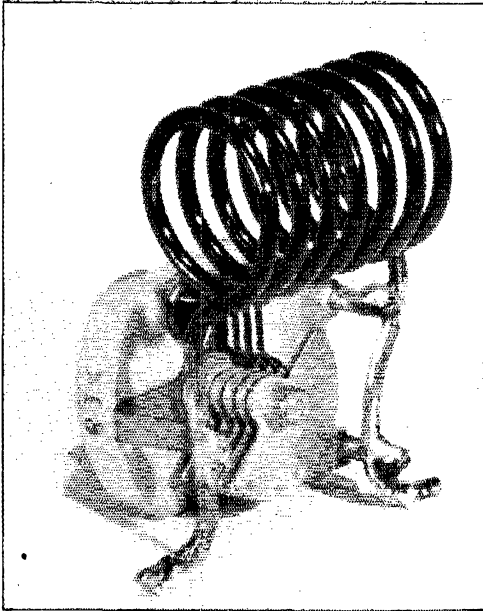
A collection of filters constructed by the author.

have balanced a push-pull amplifier there are two kicks or pulses of plate current, grid current and screen current, and hence cathode current, every cycle. This means that all these leads are carrying pulsed d.c. at second-harmonic frequency. So keep your plate, grid and screen r.f. returns to cathode short, heavy and to one point, and filter the d.c. leads well. This is probably why the 115-a.c. feeding the final and buffer filament transformers is so hot with 57 Mc. Fig. 3 shows the type of a.c. filter found to be helpful in cooling it off. It should be mounted under the chassis if the filament transformer is in the r.f. unit.

At this point two things made marked improvements on two entirely different rigs in Norwalk; things that before filtering had made no difference. The first was additional by-passing on the frame of the final tank condenser. In both transmitters the B+ lead was taken from the rear end-plate of the condenser and by-passed at that point. An additional by-pass at the front end-plate very noticeably reduced the second harmonic in the vicinity of the final tank. Mica condensers of 0.001 to 0.005 μfd . did the trick in both cases. The probable reason is that it balanced up the circuit for the harmonic (remember that the tubes are effectively in parallel on the second harmonic) and possibly also broke up any tendency of the leads and the tank condenser itself to resonate at the harmonic frequency.

The second thing that became effective after the supply leads had been filtered was the use of harmonic traps in the plate leads.² These traps can reduce the harmonic considerably, but to make them work they must be tuned while watching the harmonic strength on the "gimmick."

Another thing: Look for series- or parallel-resonant circuits at second- and third-harmonic frequencies around the final. Lead lengths, placement of parts, etc., may result in inadvertent resonances. If any are found, break them up by



A 57-Mc. trap for installation in plate leads. The photo is larger than full size; the condenser is the familiar APC type, the wire No. 14.

detuning or rearrangement. A grid-dip meter is handy here.

By now your neighbors should not hear or see your buffer stage at all, and even your final should bother only Channel 2 for no farther than 100 yards or so. Further improvement can be made, however, by shielding if your final is not already thoroughly shielded, and by looking to your antenna. Contrary to what might be expected, it has been my experience that a folded dipole radiates a second harmonic better than a "T" or "Delta" match, and therefore the latter is preferable.⁴ A low standing-wave ratio is helpful on the feedline because the chances are that an antenna properly matched at the fundamental will not want to accept much power at the second harmonic. A quarter-wave shorted stub should be tied across your feeders $\frac{1}{8}$ wave from your antenna coil (both lengths in terms of the fundamental frequency). This will tend to short-circuit any even harmonic coming from the transmitter via the feeders. As shown in Fig. 4, the stub may be made of 300-ohm ribbon. It is only effective if your final is actually putting out the harmonic and if the harmonic is traveling up

⁴ A folded dipole should act like a closed transmission line on its second harmonic. The circulating current under these conditions can be high, but the radiation should be negligible if the whole system is balanced. The probability is that much of the second-harmonic radiation from this type of antenna results from capacitive coupling between the feeder and final tank. This, in effect, causes the whole system to operate as a single-wire system and can result in pronounced harmonic radiation. — Editor

your feeders 180° out of phase in each wire. If you are capacity-coupling the harmonic to the feeders it probably is acting as a long single-wire antenna so the stub won't do any good. We included it in our set-up on general principles and it seems to have given us a better standing-wave ratio and a stronger fundamental signal! The center of the antenna coil should be tied to ground to reduce harmonic transfer to the feeders by capacity coupling. A Faraday shield is also good.

The writer also found it helpful to run a $\frac{1}{4}$ -inch copper-tubing ground lead from the water-pipe ground in the cellar up to the rig. All units in the transmitter are grounded to this lead.

Last but not least, a good r.f. filter should be placed close to the rig in the main a.c. supply line. Fig. 5 shows the one used. This prevents fundamental and harmonic from feeding to the TV set via the power lines.

Hard Work?

The reader may think it a major operation to put the above principles into use. However, such is decidedly not the case. All r.f. filters were installed in about two hours the first evening, leaving a couple of hours for a few QSOs. The following night the antenna coil was center-tapped to ground, the $\frac{1}{4}$ -wave shorted stub put in the feeders, and the final tank-condenser rotor bypassed. The third evening L/C ratios of the tank circuits were made higher C and harmonic traps put in plate leads. The fourth night bottom pans were put on chassis that didn't already have them and a copper-screening box was put around the final for shielding. Every evening the rig was on the air with plenty of QSOs.

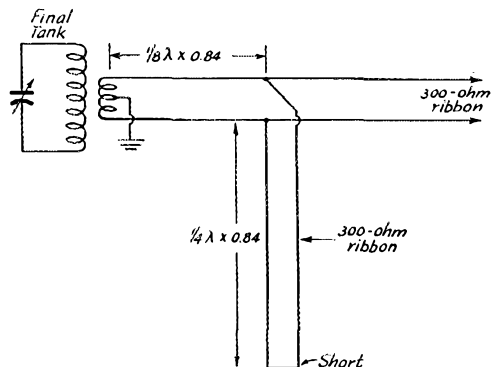


Fig. 4—Shorted stub for trapping even harmonics along the transmission line. Other types of line than that shown can be used by making proper allowance for the velocity factor. The stub has high impedance at the fundamental frequency but acts as a short-circuit at the second harmonic. Placing it one-eighth wave from the transmitter (a quarter wave at the second harmonic) frequently gives best results because a voltage loop on the harmonic standing wave sometimes appears at this point. It is worth while to explore the line with the "Little Gem" to determine where the harmonic voltage loop occurs and connect the stub there.

One result that appeared, entirely unsuspected, was much better and smoother operation on the fundamental. Our reports on DX went up and locals reported much improved quality of modulation.

One local station two miles distant, who formerly was S8 on 57 Mc., has applied these principles and no longer can be heard here. Another, at one mile, who used to be S9 on 57 Mc., has also made a marked improvement.

Since delousing our rig we no longer cause any interference to any channel on the RCA projection set at 250 feet, and have eliminated all interference to Channels 4 and 5 on the homemade set (not a kit) at 150 feet. It is hoped that the remain-

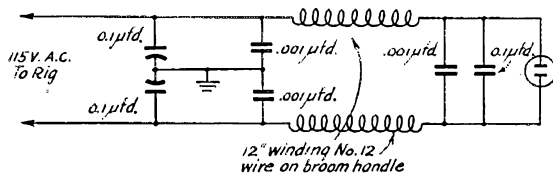


Fig. 5 — Power-line filter. This goes in the main a.c. line, close to the transmitter.

ing interference on Channel 2 will be helped by a preamplifier and a better antenna on this receiver. There is a possibility that in this case the 28-Mc. fundamental is causing the trouble because of lack of preselection.

It is fully realized that television interference is a lot more complicated than ordinary broadcast interference, and that in the above discussion we have only touched on one type of TVI, harmonic interference. However, this type is by far the commonest — and it can't be blamed on the TV receivers.

In closing, let me suggest that radio clubs have meetings to discuss TVI, its causes and cures, and instruct members on how to handle the TV set-owner diplomatically. The clubs also should see to it that the amateur gets favorable publicity in the local press.

If you are active on 10 meters, monitor Channel 2 occasionally, as some station a mile or more away may unknowingly be causing TVI in your neighborhood for which you get the blame. A friendly call on the telephone to the fellow at the other station should bring results. It has happened here a number of times.

Strays

Rightfully-deserved national fame has come to two accomplished Omaha amateurs:

One of these Nebraskans, Harold Parr, WØAYT, has been selected by Horace Heidt to become a member of the famous Musical Knights, heard over the NBC network every Sunday evening. Hal previously was a vocalist on WOW.

The other Omaha amateur, La Von P. Peterson, WØTCM, founder and director of the Omaha Radio Engineering Institute, has been named by the United States Junior Chamber of Commerce as one of America's ten most outstanding young men of 1947.

Hamdon may well applaud the recognition of these amateurs — they are totally blind.

— WØVHR

Heard the one about the s.y.t. who became all confused when she went shopping for one of those new-fangled wire bras? Poor gal, she didn't know whether she was a.c. or d.c.!

— W3KLR

What is claimed to be the world's smallest electric motor, the "Electrotor," has been invented by the Eurich brothers of England. Measuring $\frac{3}{16}$ inch in length and diameter and weighing less than one gram, the miniature device turns over at 7000 r.p.m.

When an emergency arose and the need for a special drug from the United States developed, CE2BQ worked W2HFS and asked for assistance. W2HFS contacted officials of Pan American Airways and La Guardia Field, and was successful in getting their cooperation in safely transporting the drug to Chile in 65 hours flat.

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Caption in *Broadcasting*, trade paper of the broadcasting industry: "WORM licensed!"

— —

We quote from the S.A.R.L. *Rag Chew*:
 "A Cape Town ham, being troubled by buzzing noises in his SX-28, took his courage in both hands and decided to investigate. Between the chassis and the cabinet he found a heap of approximately 2½ million ants; they had been entering via the earth lead and due to a faulty connection were neatly electrocuted as they bridged the gap to the terminal."

— —

A neat, workmanlike job of making socket holes in bakelite can be accomplished with a Greenlee socket punch. Use the tool in the same manner as for cutting metal chassis. — Earl F. Hart.



Happenings of the Month

PORTABLE ABOVE 25 MC.

It is no longer necessary to notify your FCC Engineer-in-Charge when operating portable on frequencies above 25 Mc. FCC action March 10th, canceling its postwar Orders 132 and 132-A, had the effect of restoring in their entirety the provisions of §§12.92 and 12.93 of our regulations dealing with portable operation, under which it is provided that notification is not required when operating portable above 25 Mc.

GET THAT MODIFICATION NOW!

Amateurs who have changed their permanent location and who have not yet applied for modification for change of address should now immediately do so. It will be remembered that when we resumed operation after the war, FCC, faced with a huge workload, suspended the requirement for modification, in case of change of location, and authorized amateurs to use the original license with observance of portable procedures, indefinitely (Orders 132 and 132-A). Now current in its handling of our applications, FCC has reinstated the normal procedures by canceling Orders 132 and 132-A. This means that henceforth all amateurs changing permanent location should immediately apply for modification. Procedure for operating on a "fixed-portable" basis at the new location is that specified in paragraphs (a) and (c) of §12.93 of our regulations. Note this requires notification only to the FCC Engineer-in-Charge of the district of the new location. Another effect of the cancellation is to require use of the portable designator by all stations operating on fixed-portable basis, while awaiting action on applications for modification, whether in the same district as that specified in the original license or another.

BOARD AGENDA

The main feature of the 1948 meeting of the ARRL Board of Directors will be the consideration of recommendations to FCC about 'phone frequencies, as a result of the study of the proposals of the Planning Committee published in February *QST* and the poll of amateur opinion thereon which was taken at that time. As companion problems the Board will also consider the Planning Committee suggestion of a regulation that would substantially confine 'phone radiation to a bandwidth of 6 kc., what to do about continuing authorizations for n.f.m. 'phone, whether there should be any changes in the authorizations

for various types of 'phone emission in the 50-Mc. band, and what should be done to encourage s.s.s.c. In view of the fact that the advantages of s.s.s.c. cannot be obtained in a band full of carriers, and that it will take time to convert any existing 'phone assignment to s.s.s.c., it has been suggested that the new 21-Mc. band be started out right next year on an exclusively-s.s.s.c. basis. . . . The Board is also to elect a president and vice-president of the League for two-year terms. . . . The Secretary proposes the incorporation of the Canal Zone in the voting membership of the Southeastern Division. . . . Plans will be made for the participation of the League in the Inter-American Regional Radio Conference at Bogotá early next year.

Several of the directors have given advance notice of some of the proposals they will advance at this meeting. Mr. Canfield proposes an amendment of Article IV of the Constitution to provide for special meetings of the Board at the demand of a majority of the directors. Mr. Joseph Johnston proposes amending the By-Laws to provide ARRL division boundaries coinciding with FCC call areas. Mr. Noble proposes amending the By-Laws to provide for special elections in the case of vacancy in the office of alternate director; he also suggests a \$500 limit on the annual appropriations for directors' administrative expenses. Mr. Richelieu proposes amending Article IV to expand the Executive Committee (now the five officers) to include three elected directors. He also proposes separate League employees for secretary, general manager and editor; adoption of a plan to provide scholarships; a re canvass of the appointive officers of the League; cancellation of any negotiations to locate Hq. other than at a central point; investigation of advertising policies; League advertising manager as a salaried employee; establishment of a branch office at Washington, with full-time legal counsel therein; and a poll of amateur operating hours, by a firm of

ARE YOU LICENSED?

- When joining the League or renewing your membership, it is important that you show whether you have an amateur license, either station or operator. Please state your call and/or the class of operator license held, that we may verify your classification.

accountants, to serve as the basis for 'phone-c.w. divisions, no recommendations to be made to FCC until that is accomplished. Mr. Collett proposes amending Article IV to provide that Board meetings convene on a Monday morning and last not less than two nor more than three days, with some detail concerning the content of meetings; that the League reclassify the office of advertising manager, engage a salaried advertising manager, and review advertising policy; that the proceedings of Board meetings be recorded and that the Secretary keep no minutes of meetings; that there be monthly reports from each director to his division membership in *QST*; that amateur opinion be polled annually on the ten most-frequently-occurring proposals advanced by affiliated clubs; that a number of Board committees be created, including: one to study labor relations at Hq. and make recommendations for a form of civil service in the Headquarters staff; one with authority to ask FCC for the restoration of amateur service, in whole or part, in 1800-2000 kc.; one on frequency allocations, to include two members of the Executive Committee, to plan defense of frequencies and plans for acquiring additional ones; one to recommend means to solidify the amateur's position with the public and the Government; one to study a plan for the formation of five supervisory committees to supervise various departments of the League. Unquestionably other directors will have additional proposals but these are all that are known at this writing.

The directors desire the comments and suggestions of members prior to the annual meeting on May 7th. Your director's name and address appear in the directory in the front pages of every issue of *QST*.

FCC'S AMATEUR SERVICE SECTION

Among interesting occupations of amateurs, W4IQR's ranks high. His job is the writing of text for our regulations, the Rules Governing the Amateur Radio Service, the handling of special FCC orders affecting amateurs, amendments to our rules — and, in fact, most all regulatory matters concerning amateurs. W4IQR is Robert W. Percy, chief of FCC's Amateur Radio Service Section, one of three sections in the new Radio Operator & Amateur Division¹ headed by George K. Rollins, W3GA.

Actually Bob has been handling this work ever since the war, but only recently has Civil Service got around to granting him the official title, and naturally we grasp the occasion to tell you something about him. Bob's first ham rig was back in 1931 at W8DZU, Rochester, N. Y. — the then popular TNT transmitter circuit, a regenerative-and-two-step receiver. Prominent in NCR and AARS drills, he went on active Navy duty in 1941; assignments included a communications

¹ *QST*, October, 1947, p. 32.

billet on Admiral Halsey's staff in the South Pacific, and more than a year as coördinator of inter-theater frequency assignments in the Navy Department. When he left the Navy as a lieutenant-commander in early 1946, he joined the staff of FCC. W4IQR is on 80 c.w. and 10 n.f.m. — Bob has long been especially interested in all types of audio circuits. He recently signed up for active participation in the new Naval Reserve communications program.



Robert W. Percy, W4IQR

Although radio regulations are, of necessity, written in somewhat complex legal form, it's a reassuring feeling to know that the guy writing them has a first-hand familiarity with and understanding of the actual operations they are intended to govern.

220-225 MC.

The shift of our 1¼-meter band from 235-240 Mc. to 220-225 is now under way, moving slowly through the formal FCC procedure. In late March the Commission gave notice of proposed rule-making, with April 10th as the deadline for objections. The matter having been well coördinated with all Government agencies and the British, no objections are expected at this writing. We are unsure of the future scheduling but, if all goes well, it is quite possible that the change in the band location will occur before the next issue of *QST* appears. In that event, announcement of details will be made by a WIAW broadcast.

It is part of the proposal that the operation of DME at U. S. gateways for international air routes and for flight training in the RCAF in Canada in the band 220-231 Mc. must be protected from amateur interference. No trouble is expected but it is provided that if it does occur the amateur allocation will go back to 235-240 in such areas for the next 2½ years, until the DME agreement expires — and the old allocation is

being held in reserve for that length of time for that contingency.

We shall expect to have further news on this subject next month.

CANADIAN REGULATIONS

The Canadian amateur regulations for the new license year beginning April 1st carry a 50-kc. expansion of both the 3.5- and 14-Mc. a.m. 'phone assignments and some similar expansions of n.f.m. assignments. The frequency assignments of Canadian amateurs, from 3.5 to 22,000 Mc., are precisely those of the United States and, as in this country, the full widths of all bands are assigned to A1. A0 emission is permitted only above 144 Mc. and not in the 11-meter band as in U.S. A2 may be used on 11 meters and above 50 Mc., and every amateur license carries rights to use A3 'phone and f.m. 'phone and telegraphy above 50 Mc. A4 and A5 are not permitted anywhere. Portable stations are permitted only above 28 Mc.

Except on special authority, Canadian amateurs may not use 'phone below 50 Mc. Upon special application, licensees who have been active for at least six months on frequencies below 29.7 Mc. may be authorized to use A3 and n.f.m. 'phone in the 11-meter band and in the 10-meter band above 28.2 Mc. Licensees whose stations have been in active operation at least a year and who pass an advanced 'phone examination and higher-speed code test can get special authority now to operate A3 in the frequencies 3750-4000 kc. and 14,150-14,350 kc., and n.f.m. 'phone in the ranges 3800-4000 and 14,150-14,250 kc. In n.f.m. the deviation must not exceed 3000 cycles. All 'phone stations operating below 50 Mc. must possess a visual means of indicating overmodulation.

NATIONAL CONVENTION

Don't forget that the first national ARRL convention in ten years is to be held in Milwaukee on the Labor Day week-end, September 4th, 5th and 6th. See the article on page 30 of our last issue for the first announcement of the major outlines of the convention program. Twenty-one committees in the Milwaukee Radio Amateurs' Club are now hard at work licking plans into shape and there is every promise of the biggest and most interesting convention that has ever been held in amateur circles. Reserve the dates and start your plans!

Jack Doyle is the general convention chairman. Joe Collins is chairman for registration and attendance. The registration charge, for everything on the program, is \$7.50 per person, no extra for children accompanying parents. For registration, reservations, business questions and inquiries of all sorts, address The National A.R.R.L. Convention, 4331 No. Wildwood Ave., Milwaukee 11, Wisconsin.

"QSL via ARRL"

Strange as it seems, when a foreign amateur tells you to "QSL via ARRL" he only means that you should send your card via the QSL Bureau for his country, not necessarily direct to him. He commonly has the misapprehension that the bureau system works transoceanic in both directions. It does not. W and VE amateurs send their outgoing cards either direct to the amateur or to the bureau for his country. A list of the bureaus of the world may be found on pages 126 and 128 of this issue. Do not send cards to ARRL Hq. nor to your W or VE QSL Manager.

How to obtain your *incoming* QSLs is explained in alternate issues of *QST* under the heading "ARRL QSL Bureau." See page 124 of the April 1948 issue.

N.Y. AMATEUR MOBILE

Section 1916 of the Penal Law of the State of New York provides that a local police permit must be secured before an automobile may be equipped with a radio receiver capable of receiving on police frequencies. It is directed at criminals and "ambulance chasers" and the like, but it has an incidental effect on amateurs inasmuch as there are several police channels adjacent to amateur bands in that portion of the spectrum where we are permitted mobile operation. Now, it's a perfectly proper law, even in its effects on amateurs, because it is provided that a ham has merely to make application to his local police, supported by showing his amateur license, and he gets a permit. However, very few amateurs were aware of the existence of the law, and those who did know about it and made applications found their local police similarly unfamiliar with it; the result was very few permits were ever issued. But occasionally an enterprising police officer would encounter an instance of amateur mobile operation on the highway and dig old Section 1916 out of the archives, making everyone unhappy about the whole thing.

ARRL was not in a position to take a formal stand against the law, because it provided for permits in amateur cases; the difficulty was in local administration. But last year Gay Milius, W2N.JF, a New York attorney and assistant director of the Hudson Division, arranged to have introduced into the New York Assembly an amendment to the law excluding amateurs from its provisions. Aably assisted by many other amateurs and club groups throughout the state, the bill passed both houses and became law on March 11th. The amendment provides, "Nothing in this

(Continued on page 124)

The Simple Approach to Narrow-Band F.M.

N.F.M. Exciter Using Resistance-Variation Modulation

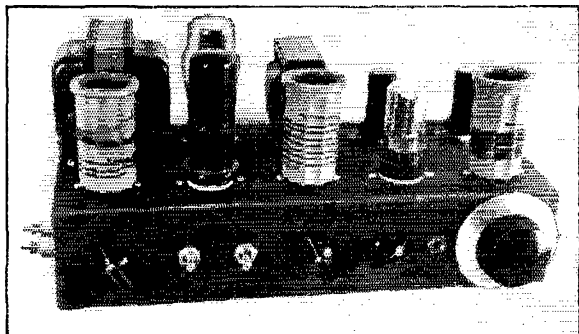
BY SIDNEY LIPMAN,* W2PGZ

LIKE so many other hams located in apartment houses and congested areas, it was found that the BCI problems encountered when using amplitude modulation could not be solved by any of the many remedies suggested. Finally one of the commercially-available f.m. units was borrowed and tried out, to see if it would be the cure so many claimed it would be. This demonstration was more than enough proof that n.f.m. was the answer, and it resulted in the determination to convert or alter the existing a.m. equipment to an n.f.m. system. The resulting circuit is the subject of this article. It has successfully solved the problem of BCI, it is equally effective for both local and DX operation, and it used parts of the existing a.m. equipment with no new parts. Coupling an oscilloscope to the output showed no trace of a.m., thus indicating that the system delivers true n.f.m.

The Circuit

The system is quite simple, and it is easy to apply to any transmitter using a VFO. Any VFO-controlled a.m. transmitter can be converted to the system by a single connection from the speech equipment to the VFO. A description of the exciter unit at W2PGZ will illustrate the principle. Referring to the circuit diagram in Fig. 1, it will be seen that the audio amplifier consists of a conventional 6SJ7-6J5 arrangement working from a crystal microphone. The first two audio stages in most a.m. rigs often use the same, or similar, tubes. The plate circuit of the 6J5 is coupled across part of the VFO grid coil, L_1 , by coupling the plate of the 6J5 to the cathode of the oscillator tube (a 6V6 in this case) through the 0.01- μ d. condenser, C_4 . Thus the plate resistance

* 98-120 Queens, Forest Hills, N. Y.



• Here is just about the simplest narrow-band f.m. circuit you will find. All it requires is a VFO and a speech amplifier, with no reactance modulators or mumbo-jumbo.

of the 6J5 is shunted across part of the 6V6 tank circuit. The audio signal on the 6J5 changes the plate resistance, and these changes in turn modulate the oscillator.

To continue with the description of the exciter, the oscillator is followed by a 6L6 doubler stage. The output from the 6L6 is quite sufficient to drive a pair of 807s, or it can be loosely coupled to an existing crystal-oscillator stage and used as a "crystal substitute."

The circuit is conventional in every other respect. The condenser C_{17} may be necessary in some instances to reduce r.f. picked up on the microphone cable. The switch S_1 can be used to turn the plate power on, or an external relay can be used for the same job by proper connections to the terminals shunting S_1 . The metering switch, S_2 , allows either the oscillator or doubler plate current to be read.

Construction & Tuning

The exciter is built on a standard $14 \times 6 \times 3$ -inch chassis. A cover, not shown in the photographs, is used over the transmitter, and it is one of the usual covers supplied for this size of chassis. The layout was made from the standpoint of simplicity, and no special precautions were observed in the wiring of the unit, although it is good practice to shield the microphone jack and the "hot" lead from it to the grid of the 6SJ7.

The arrangement of the parts can be identified from the photographs, and it is enough to point out that the various tuning condensers are mounted close under the coil sockets they are associated with.

A small narrow-band f.m. exciter unit using the resistance-variation method of modulation. The oscillator tuning dial is at the right — the small knobs control the two other tuning controls and the audio gain control. The power supply and audio amplifier are at the rear of the chassis.

• Technical Topics —

A High-Stability Oscillator Circuit

A RECENT paper by J. K. Clapp¹ of the General Radio Company discusses a type of oscillator circuit that, from our preliminary experience with it, has stability of such a superior order that we wouldn't be surprised to see it become the standard amateur VFO circuit. It has "super-high-*C*" characteristics but, paradoxically, gives best stability when the tuning capacitance is made as low as possible.

The basic principle is loose coupling between the oscillator tube and a high-*Q* tuned circuit, a method of stabilizing suggested some years ago by G. F. Lampkin.² The Lampkin arrangement used inductive coupling (or a coupling tap on the tuned-circuit coil) between the tuned circuit and the tube, a system which, as Clapp points out, is prone to set up parasitic oscillations. The Clapp oscillator, a Colpitts circuit, avoids difficulties of this sort.

The circuit in its simplest practical form is shown in Fig. 1. The complete tuned circuit consists of L_1 , C_1 , C_2 and C_3 in series. The voltage drops across C_2 and C_3 provide the feed-back necessary to maintain oscillation; the ratio of the capacitances of these two condensers determines the amount of feed-back just as in the normal Colpitts circuit. The secret of the high stability of the Clapp oscillator lies in the fact that condensers C_2 and C_3 are made very much larger than C_1 . This does two things: it makes the coupling between the tube and the tuned circuit very loose, so that the circuit *Q* can be kept high; and the large capacitances at C_2 and C_3 "swamp" the grid-to-cathode and plate-to-cathode capacitances of the tube to such an extent that the effects of any changes in these capacitances, from whatever cause, become almost negligible. The principal causes of such changes are variations in the plate voltage applied to the oscillator tube, and thermal changes caused by heating. The combination of a high-*Q* tuned circuit and swamping of tube effects results in an oscillator whose frequency is almost independent of plate voltage and tube thermal effects.

Fig. 2 is the voltage-vs.-frequency characteristic of an oscillator built in the *QST* laboratory, using the circuit of Fig. 1. The component values given were the first ones tried; no attempt has been made as yet to determine the optimum constants because of lack of time. As an arbitrary, but

reasonable, guess, the shunting condensers, C_2 and C_3 , were made 0.001 $\mu\text{fd.}$ each. C_1 was a 150- $\mu\text{fd.}$ variable, and L_1 a small transmitting coil taken from the junk box, its principal qualification being that it looked about right to tune somewhere in the 3.5-Mc. range. By actual measurement it tuned to 3550 kc. (the frequency at which the data for Fig. 2 were taken) with a capacitance of 88 $\mu\text{fd.}$ C_4 , C_5 and R_1 are the usual blocking condensers and grid leak. The circuit is of the grounded-plate type, but could easily be rearranged to operate with the cathode grounded, if that arrangement is preferred; it is only necessary to insulate the tuning condenser from ground, leave the -B grounded, ground the cathode, and shift the choke to the +B lead. The output then can be taken from between

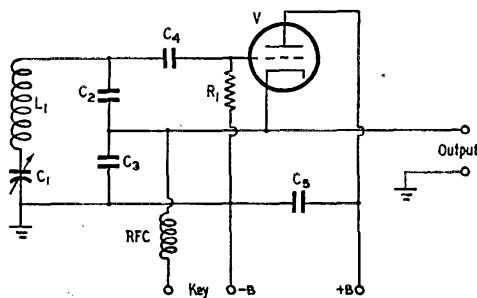


Fig. 1 — The "series-tuned" Colpitts oscillator circuit described in the text. Values used in the experimental oscillator are as follows:

- C_1 — 150- $\mu\text{fd.}$ variable.
- C_2 , C_3 — 0.001- $\mu\text{fd.}$ mica (silver mica preferable).
- C_4 — 100- $\mu\text{fd.}$ mica.
- C_5 — 0.001 to 0.01 $\mu\text{fd.}$
- R_1 — 0.1 megohm, $\frac{1}{2}$ watt.
- L_1 — Approximately 24 $\mu\text{h.}$ (see text).
- RFC — 2.5-mh. r.f. choke.

cathode and plate as before, except that the plate connection then becomes the "hot" output lead. It will also be necessary to ground the cathode through another by-pass condenser if cathode keying is to be used.

C_2 and C_3 in series have a total capacitance of 500 $\mu\text{fd.}$, which is about what we normally use in a high-*C* circuit at the same frequency. However, the high-*C* effect is greatly stepped up by the loose coupling to the tank. It is doubtful if a conventional high-*C* circuit of equivalent *C* could be made to oscillate, because of the difficulty of constructing a coil with reasonable *Q* when the inductance is very low. However, it is not difficult

¹J. K. Clapp, "An Inductance-Capacity Oscillator of Unusual Frequency Stability," *Proc. I.R.E.*, March, 1948.

²G. F. Lampkin, "An Improvement in Constant-Frequency Oscillators," *Proc. I.R.E.*, March, 1939.

to make large coils with a Q in the vicinity of 300, and there is no trouble at all in making the circuit of Fig. 1 operate with such a coil. The coil we used was an air-wound affair $1\frac{3}{4}$ inches in diameter and $1\frac{1}{2}$ inches long, having 27 turns of No. 18 wire. Another coil of the same inductance, but close-wound with No. 28 wire on a 1-inch diameter bakelite form, also operated well although its Q was slightly under 200.

Different values of capacitance were tried in shunt with both C_2 and C_3 to see whether anything was to be gained by changing the feed-back ratio. Apparently the 0.001 condensers were about optimum, because increasing either C_2 or C_3 raised the plate current of the oscillator and tended to increase the frequency change with varying plate voltage. Using a 6J5 oscillator tube, the plate current was approximately 6 ma. with a plate voltage of 150.

The circuit shown is quite good from the standpoint of isolation. As a check, this circuit was substituted for an ordinary ECO driving a 6SK7 tuned amplifier in a simple VFO. The frequency change when the amplifier was tuned through resonance in this particular set-up (which was not too well shielded) was approximately 50 cycles, roughly 5 or 6 times better than when the oscillator was a 6SJ7 ECO with choke coupling from its plate to the following amplifier. The amplifier output was the same in both cases, although the Clapp oscillator using the 6J5 triode was operated at 150 volts and the 6SJ7 ECO had 250 volts on its plate.

The pay-off with this oscillator was the way it keyed. We have had, as might be imagined, a considerable number of oscillators under test at one time or another in the lab. Many of them have keyed very well — even under the acid test of heterodyning with a crystal oscillator on 28 Mc. and checking for chirp with a low beat note — so long as no key-thump filter was used. But until this circuit came along we have never seen one that didn't go chirpy when keyed through a lag circuit. This one was just as good with the thump filter as without it, using cathode keying, and even the most critical ear could detect no sign of a chirp. It promises to be the long-looked-for answer to really good break-in keying.

The writer has not made more than a cursory attempt to use the circuit in ECO style. A quick trial showed rather negative results, in that an ECO arrangement with a choke-coupled plate circuit seemed to show greater frequency sensitivity to changes in the following amplifier than the cathode-output triode circuit. However, no really serious attempt was made to determine optimum constants. Further work will show whether the ECO has any advantages over the triode.

The Clapp circuit has been used in a ham-band VFO described by W1NXM and W1DDO in the program for the Boston Hamfest held last Oc-

tober. The authors used somewhat different circuit constants, and although no performance data were given the stability was reported to be excellent. Just as with other VFO circuits, mechanical

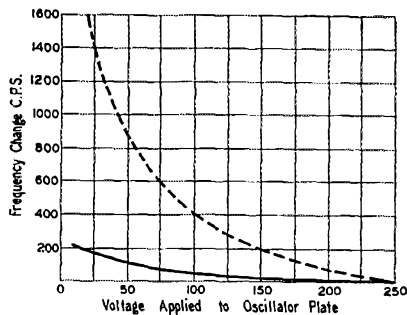


Fig. 2 — Frequency-vs.-plate-voltage characteristic of the oscillator of Fig. 1, using a 6J5 tube (solid curve). The oscillations stopped at approximately 13 volts on the plate. The broken curve shows a similar run on a 6SJ7 ECO of conventional design using a tank capacitance of approximately 600 μfd .

considerations are most important; even the best electrical characteristics can be completely spoiled by "floppy" construction.

When trying the circuit, the following points should be kept in mind:

1) The higher the L/C ratio the better the stability, up to the point where the circuit ceases to oscillate. The higher the coil Q , the higher the L/C ratio that can be used, for fixed values of C_2 and C_3 .

2) The higher the values of C_2 and C_3 , the better the stability for a given value of coil inductance.

3) A 1-to-1 ratio of the capacitances of C_2 and C_3 seems about right for triodes of the medium- μ class, such as the 6J5, 6C4, etc., but is not necessarily the optimum combination for other tubes.

4) Use an air-wound coil, or one wound on a ribbed ceramic form, for highest Q and lowest inductance variation with temperature. Variations in frequency caused by temperature effects are principally attributable to the coil, since the oscillator tube has so little effect on the frequency. The oscillator we tried had no temperature compensation, but nevertheless had very little drift. Listening on the 28-Mc. harmonic showed that the tube warm-up only caused a few hundred cycles frequency change from a cold start, and after a minute or so the frequency settled right down to its final value.

5) The tuning capacitance is the total of C_1 , C_2 and C_3 in series. In calculating the capacitance required for tuning over a band with a given coil the effect of C_2 and C_3 must not be neglected. A fixed capacitance can be shunted across C_1 so that the latter will spread the band as desired.

— G.G.

They Always Come Back

BY J. P. JESSUP, * W2GVZ

VIRUS RADIO is indeed a strange, malignant and chronic malady. Case histories occasionally show temporary recoveries, but more often than not, the disease is merely lying dormant and apt to recur virulently at any time.

In my own case, I became accidentally exposed in my early teens. Innocently enough, I learned the code in the Boy Scouts, little dreaming that this was the first tottering step toward sleepless nights, DX-itis, contest-icitis (including the deadly SS-jitters), operations (net and AARS), second-degree traffic-tremens, and chronic collapse of the wallet.

How was I to know that the first shack I visited was a gleaming den of electric iniquity which was to change my whole life and make me forever different from normal mankind? (Has your wife ever asked, "Why can't you be like other men and have a hobby that takes you out-of-doors?") Unfortunately, instead of fleeing from the clutches of the inmate of that first shack, I was lured all unsuspectingly into the presence of a fearsome rotary spark gap and infected with *virus radio* without even realizing it, beyond all hope of cure.

At first the symptoms were mild and barely noticeable. I did things with a spark coil and

(1921). But it was not to be. The college had a dot-and-dash emporium capable of reaching any point in the country, and beyond. I was dazzled. I became greedy and handled messages by the hatful. It became common practice to move traffic all night, sit through lectures in a daze, and sleep afternoons.

I really became alarmed when I realized I was passing up all-night bridge games in favor of this weird form of self-punishment. But I was lulled by the pernicious praise of the Brass Pounders League (BPL—a group of men who haven't seen a movie in years). I did nothing to escape the clutches of this obsession which was now becoming a serious threat to my welfare.

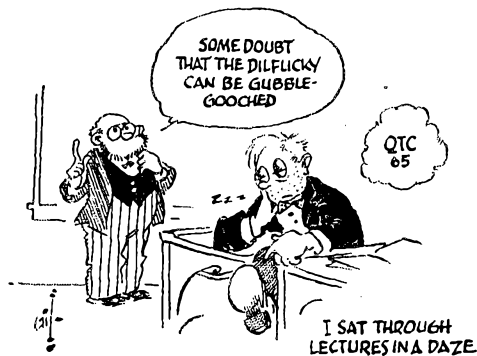
One club operator flunked out and another got pneumonia, but I paid no heed. Instead, I became president. (Radio club: an organized group of the afflicted who, unlike lepers, are permitted to run at large.)

Summer vacations gave me my first big chance to recuperate from the traffic-handling form of contagion. From my home ham shack came the first feeble DX attempts and then an epidemic of transoceanic contacts, a different kind of fever. (A DX man is a peculiar individual who has delusions of distance and spends days trying to talk across the ocean but does not talk to the neighbor across the street.)

I got a mild case of the new germ, but I mourned the collapse of traffic work and developed a kind of temporary immunity toward DX. The two germs finally neutralized each other and by 1927, although scarred and weakened, I was completely out of ham radio and entirely rational again. Once more I could hold up my head as a free man. Never again!

The fatal relapse occurred in 1931. An otherwise innocent newsstand was contaminated with copies of the germ carrier, *QST*. Within a week I visited a house of radio barter and returned with a careful gear. In short order the Government legalized my departure from normal behavior and I was a ham again.

It wasn't bad at first. Cautioned by past experience, I decided to avoid all schedules, obligations, etc., and merely rag-chew as the spirit moved me. An evil reprobate induced me to try 80 meters again. One message led to another. This led to ORS. RM came soon. Finally I was tricked into SCM. There I was again, a slave to skeds, responsibilities, contest ambitions and all the familiar shackles. So help me, I even made a speech to the town officials and put the mayor in his place during my term as EC!



crystal detector that brought contacts with other sufferers, many in a very advanced stage of radiation illness. Not a single one warned me of my peril. On the contrary, they all subtly increased my desire, either directly by fiendish advice or indirectly through accomplishments that a wicked rag called *QST* held out to be laudable and worthy of emulation.

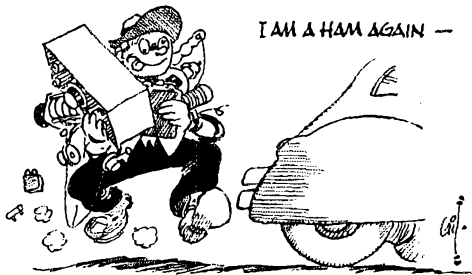
It was still a relatively light case of brass in the blood up to the time of my arrival at college. I might even have recovered from sparkemia then

*337 Hamilton Ave., Glen Rock, N. J.

About the Author

• J. P. "Pat" Jessup, W2GVZ, should need no introduction to the fraternity after his recent excellent offerings. Pat is old-time 2AUG (1920-27). During 1934-40, as W2GVZ, he made the DXCC with 125 countries confirmed, WAC, WAS, Al Operators Club, RCC, OTC, ORS, RM, EC, SCM, SNC2-AARS, and BPL. He is a graduate of Princeton University, class of 1925, with a B.S. degree. While there he served as president of the Princeton U. Radio Club and as operator of 3XM 3DH, a station handling 2000 messages a month. An inveterate c.w. operator, Pat works, of all places, as manager and supervisor in the Commercial Department of the New York Telephone Co.!

As though this weren't enough, I fell victim to the worst of all germs, DX. At first you could work DX stations or not, as you wished. Long rag-chews with DX guys were really fun. Life was not unpleasant.



Then came the crowning invention of a sadistic mind, the DXCC. Gone was all sleep, all tranquility. Only a hog would hold a DX station beyond two minutes. Life became a restless fear of missing a new country or black despair when you did, or you suffered the exquisite long-drawn-out torture of waiting . . . waiting . . . waiting for QSL cards. (To quote friend wife, "It isn't bad enough that you waste all that time in the shack, but we have to sit on the doorstep waiting for the postman!") At long, long last, I made DXCC, but I lost 20 pounds in the process.

It took World War II to release me from a state of mind that had made me a marked man in business and social life. Once more I reverted to a semirational condition. This time I was really finished with ham radio for all time.

However, I reckoned without the alluring postwar government-surplus bargains. So I compromised. I foolishly believed I could go back on the air "just to work a few old friends." No more DX. Why should I beat my brains out when I already had a prewar DXCC? Why should I get ulcers trying to keep up with a five-

ring traffic circus? I was older now and had more sense. I'll just take it easy, I thought.

The sad and highly-inexplicable fact is that the wallet is once more gasping for breath. I am ORS again. I only missed one contest all year and worse by far, I have worked 60 countries and am hot on the heels of the other 40. The most dangerous symptom yet seems to be tendency to assist *QST* in its perversion of the young by articles such as this. Surely it's a wise ham who knows his own harmonics!

BOOK REVIEWS

Drafting for Electronics, by L. F. B. Carini. Published, 1946, by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York City. 182 pages + 9 preface pages + 24 appendix pages + 5 index pages + 186 illustrations. 6 × 9 inches.

Dr. Carini has packed into this small book all the information any draftsman needs if he wants to know the proper way to make schematic diagrams easy reading. This is done in sixteen chapters telling in detail such important phases of the draftsman's art as essentials of lettering, drawing symmetry and balance, schematic-circuit projection, schematic patent drawing, technical outline drawings, various types of graphs. There is also an excellent appendix. The book is done with the latest IRE-recommended symbols.

For the amateur who isn't interested in drawing, the book has no appeal but for the draftsman who works at this business, the book is a "must."—*E. B. Redington, W1AM*

Electronics and Their Application in Industry and Research, by Bernard Lovell. Published by the Pilot Press, Ltd., London, England. 1947. 641 pages + 23 appendix pages + 7 subject index pages + 5 author index pages + 404 illustrations. 6 × 9 inches.

This book is a compendium of information, the various chapters having been written by specialists in the fields covered. Dr. Lovell has done a good job of editing and his choices of subject matter are comprehensive. The book is similar in make-up to such American texts as Henney's or Terman's *Handbooks* except that the scope is along somewhat different lines as the title suggests. The various sections are written by British experts in the fields discussed in the separate chapters.

The book deals with electron physics, photocells for use in both the visible and invisible parts of the spectrum, television pick-up tubes, v.h.f. vacuum tubes, radar, control applications for cold-cathode tubes, high-frequency heating and moisture-content control apparatus, electronic servo-mechanisms, medicine and physiology, the betatron, and the electron microscope. Mathematics has been used liberally throughout the book and a reasonable rigor is evident. The use of typically British words and phrases will occasionally obscure the meaning to an American reader but this is not of too great seriousness. The book has been written with the usual British thoroughness.

The level of the content and its almost complete lack of subject matter dealing with applications of electronics to communications gives it small appeal to the amateur group. However, it should have wide appeal to men of science and industry and will bring the reader up to date on the fields of electronics with which it deals as seen by the British eye.—*E. B. Redington, W1AM*



United States Naval Reserve



IN connection with the sesquicentennial anniversary of the establishment of the Navy Department on 30 April, 1798, the months of April and May, 1948, have been designated as a period in which to acquaint the public with the Naval Reserve and its mission in safeguarding our national security. Coupled with this informational program will be a recruiting drive in all sections of the country.

Naval Reserve Electronic Warfare Company 9-129 at Alpena, Mich., is doing its bit in the above program by sponsoring the appearance of the U. S. Navy Band at Memorial Hall in that city on 14 May, 1948.

The following Naval Reserve amateur radio calls have been issued since the list appearing on this page last month:

- | | | | |
|-------|------------------------|-------|---------------------|
| K4NAK | Richmond, Va. | K7NRQ | Missoula, Mont. |
| K4NAL | Columbus, Ga. | K7NRU | Reno, Nevada |
| K4NAM | Wilmington, N. C. | K8NAB | Waverly, Ohio |
| K4NAN | Elizabeth City, N. J. | K8NAC | Port Columbus, Ohio |
| K4NAO | Vero Beach, Fla. | K8NAD | Akron, Ohio |
| K4NRG | Charlotte, N. C. | K8NRN | Akron, Ohio |
| K4NRN | Macon, Ga. | K9NAD | Eau Claire, Wisc. |
| K5NAG | Alexandria, La. | K9NAE | Alma, Wisc. |
| K6MCA | Oakland, Calif. | K9NAF | Rhineland, Wisc. |
| K6NRJ | Santa Clara, Calif. | K9NRM | Madison, Wisc. |
| K6NRK | San Bernardino, Calif. | K9NRZ | Anderson, Ind. |
| K6NRT | San Diego, Calif. | K9NAI | Aberdeen, S. Dakota |
| K6NRY | Richmond, Calif. | K9NAJ | Iowa City, Iowa |
| K7NRD | Tacoma, Wash. | K9NAK | La Crosse, Kans. |
| K7NRG | Eugene, Oregon | K9NAL | Crystal City, Mo. |
| K7NRJ | Nogales, Ariz. | K9NAM | Minot, N. Dakota |
| | | K9NRN | Duluth, Minn. |

W5QI has received a letter of appreciation from Admiral Riefnsider, commandant of the Eighth Naval District, for services rendered during the

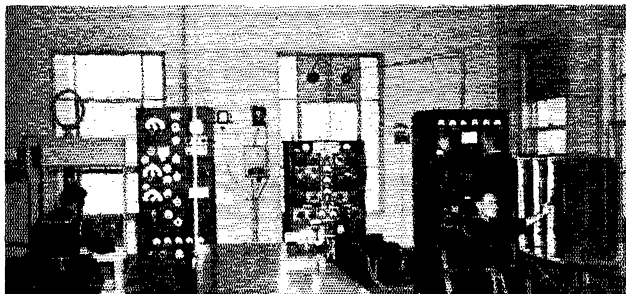
recent disaster at Camden, Arkansas. W5QI handled vital emergency traffic on the circuit he established with the Naval Reserve radio station at Camden. The letter states in part, "The Commandant wishes to take this opportunity to extend his sincere appreciation for this demonstration of your patriotic and unselfish interest in your local community, which reflects the spirit of amateur radio operators throughout the nation and of which the Navy is justly proud. . . ."

KH6NR, Naval Reserve Training Center, Pearl Harbor, conducts 90 minutes of code practice every Tuesday on the 40-meter amateur band, starting at 2000 Honolulu Time. At the key is either W7ACS/KH6, Lt. Piety, USNR, or KH6CE, Cmdr. Frank Fullaway, USN. KH6CE is director of training for that Naval district and is actively assisting Reserve communications training there.

Reservists-amateurs W6PQ (N12AWN) and W6GNV (N12ACF) are temporarily on duty in the Naval Reserve Communications Office in San Francisco, Calif.

Amateur radio stations in the Ninth Naval District who have qualified for a Naval Reserve Radio Station certificate are each being supplied with several hundred QSL cards by the Reserve.

Naval Reserve radio amateurs are invited to send information suitable for this page via official channels to Commander D. S. Wicks, USN, Room 3062, Arlington Annex, Navy Dept., Washington, D. C.



Transmitter room at the Naval Reserve Training Center, Michigan City, Indiana. The TBW transmitter at the extreme right is easily transported, with its own emergency power, and is kept in readiness to meet disaster relief needs.

I.A.R.U. News



ARGENTINA-CHILE

The radio amateurs of Argentina and Chile cooperated with the automobile clubs of their respective countries in reporting the progress of contestants racing cross-country for the Grand International Award of 1947. Amateur stations were set up along the 5374-kilometer route through Argentina and Chile and information concerning the progress of the racing automobiles was relayed to the officials of the two automobile clubs. CE3AA, station of the *Radio Club de Chile*, and LU4AA, headquarters station of the *Radio Club Argentino* were key stations in the chain. Amateur radio participation in the event was considered a huge success.

IRELAND

The *Irish Radio Transmitting Society* has inaugurated an official journal, the *I.R.T.S. News*. The first number appeared in January, 1948, and high-lights the activities of EI amateurs. I.R.T.S. officers for 1948 are listed, various contests of international interest are announced, and available amateur radio literature is mentioned.

The editor's chair is occupied by W. Howard Coombs, EI6J, and, judging by the excellence of the initial issues, OM Coombs is to be congratulated for a fine job.

PHILIPPINE ISLANDS

At a recent meeting of the *Philippine Amateur Radio Association*, Secretary of National Defense Ruperto Kangleon, who was made an honorary member of the association, spoke in favor of encouraging amateur radio in the Philippines. Members of P.A.R.A. unanimously agreed to make their amateur radio equipment and services available to the Philippine Red Cross in the event of any emergency.

GREAT BRITAIN

The Scientific Observations Committee of the *Radio Society of Great Britain* announces a co-ordinated program of radio-propagation observations in conjunction with the International Scientific Radio Union. Amateurs participating in the program will be divided into four working groups, each under the direction of a British amateur of recognized standing in the field concerned. The four categories are ionospheric effects (work group headed by G6DH), tropospheric

propagation, solar radiation and aurora and meteor effects and the Luxembourg effect. Appointment as Scientific Observation Station will be open to all qualified members of R.S.G.B., whether or not they are transmitting amateurs.

KOREA

Amateur radio stations in Korea are now identified by a new prefix, HL, replacing the J8 designation previously used. Calls in the series from HL1AA through HL1ZZ, allocated by general headquarters of the Far East Command in Tokyo, will be assigned to those of the officers, enlisted men and civilians attached to the U. S. Army Forces in Korea who are amateur radio operators.

HONG KONG

Application for membership in the I.A.R.U. has been made by the *Hong Kong Amateur Radio Transmitting Society* of Hong Kong, China. The society advises that the following bands are open for c.w. operation: 7.0-7.3 Mc., 14.0-14.3 Mc. and 28.0-30.0 Mc. Other types of emissions are not presently permitted. For the first year of issue of all postwar licenses, power input is limited to 25 watts.

SOUTH AFRICA

Some confusion has resulted as a result of some of the native territories of southern Africa having the same call prefix as the Union of South Africa but being considered as separate countries in connection with DX awards. Accordingly, the Council of S.A.R.L. made representations to the P.M.G., resulting in the allocation of the following new prefixes, effective April 1st: ZS7, Swaziland; ZSS, Basutoland; ZS9, Bechuanaland.

South African amateurs are now permitted the use of the 50-54 Mc. band as a permanent allocation.

JAPAN

The *Far East Amateur Radio League* has announced that servicemen-amateurs in Japan may employ the frequencies 14,150-14,200 kc. for transoceanic radiotelephony, subject to the limitation that these frequencies shall be exclusively for communication to the nation of legal domicile

(Continued on page 126)

Early-Reported High C.W. Scores — 14th ARRL DX Competition

As has been our practice in the past, the dust of a battle finally having settled somewhat, we present a cross section of claimed c.w. scores plus a few high lights from this year's 14th ARRL DX Competition. The radiotelegraph phase of the affair concluded on the week-end March 14th, one week previous to the radiotelephone finale. So, while we await further returns of claimed 'phone scores, the following available details of the code fracas will be of interest.

This year's contest was featured by an unusually fine DX performance of our two lowest-frequency bands. Several WACs have been reported on 3.5 Mc. and many more on 7 Mc. Indeed, during the contest periods it was difficult to find a spot on any of the bands below 30 Mc. where DX was *not* being worked.

As for individual performances outside W/VE, that of XF1A (XE1A) is, as usual, outstanding. This station is reported to have made well over 3000 contacts with a multiplier in the vicinity of 85, indicating a final score of over 700,000 points! Another notable, VP7NG, was put on the air by Expedition "Gon Waki" which included W9NWX/4, W3GRP and W4NND and accomplished over 1700 contacts on all DX bands.

The three highest claimed scores in the W/VE category available at the present time are those of W2GWE, W3BES and W6SZY who report totals of 302,000, 276,000 and 233,000 respectively. W2GWE, last year's W/VE high scorer, appears certain to repeat for '48. A tentative breakdown of Pete's log discloses some 422 contacts with a multiplier of 239 -- including 23 countries on 3.5 Mc., 53 on 7 Mc., 97 on 14 Mc. and 51 on 28 Mc. plus 15 countries on eleven.

Fourth high and the only other available score of over 200,000 is the outstanding effort of W6LHN — 208,000 points. A list of other claimed scores of over 100,000 follows, wherein is W4FU who nailed 116 countries!: W8WZ 198,403, W6GRL 185,000, W4FU 178,000, W1BPX 170,000, W6HZZ 168,000, W1NMP 139,400, W1VDY 136,000, W4BRB 136,000, W8FGX 133,000, W6CEM 131,500, W8BHW 125,000, W8BTI 121,000, W6HB 118,000, W9AEH 113,832, W0AIW 110,000, W9LM 108,486.

As to general operating tactics and procedures employed by all participants, it did seem to be a fairly cleanly-fought shindig. Because of the inevitable problem of supply and demand pile-ups were unavoidable, particularly since so many rare-DX operators will have nothing to do with the revolutionary practice of ignoring callers smack on their frequencies. The gentlemanly

(and productive) use of short calls and good timing under these circumstances is essential and appears to have been observed in most instances.

In considering the general quality of W/VE signals, it was not difficult to perceive that many fellows had put a lot of work into their finals but not quite enough into their VFOs and buffers. The contest coat of arms might well have been assorted key clicks rampant on a field of pentode parasitics and backwaves! But the tremendous amount of activity involved was bound to precipitate a small percentage of such goings-on. Unfortunately, it takes but a hairy signal here and there to make a whole band sound ragged.

Be the above as it may, a great time was had by all and sights are already being set for the next one! — R. N.

ATLANTIC DIVISION CONVENTION

Washington, D. C.,
June 5th-6th

It's been a long time since there was an Atlantic Division Convention, but this year the Washington Radio Club is planning an affair that will make up for lost time. Activities start about noon Saturday, June 5th, at the Statler Hotel, with technical sessions, organizational meetings, and traffic and emergency-communications planning discussions running throughout the afternoon. The convention banquet is Saturday evening, and the day's activities will culminate in an initiation of the Royal Order of the Wouff-Hong at midnight (this open to ARRL members only).

Sunday will be a day of informality, the "hamfest" section of the convention. On the schedule is a chuck-wagon breakfast, series of transmitter hunts, visiting Washington amateur stations, and tours of broadcast and television transmitters and studios. For the wives and YLs, a strictly nonradio program is being arranged.

Registration is \$3 for the convention alone, \$7 including the banquet. Get your reservations in early to Warren M. Andrew, W3AM, 3660 Southern Ave., S.E., Washington 20, D. C.

How's DX?

CONDUCTED BY ROD NEWKIRK, * W9BRD/1

How:

A motley group of us would-be big DX men were discussing the DX situation over a few of Jeeves' vaporous Manhattans one recent evening. The Selsyns were swinging the receivers back and forth across the bands in search of an unwary CM2 but all we could hear was QRM. And most of the time the QRM was QRMd! So the conversation naturally shifted to suggestions for steps that might possibly be taken to aid in the reduction of this wholesale slaughter of QSOs. Each of us ventured an intended witticism as a remedy, all of which were too corny to be repeated here. Then it got around to Jeeves' turn.

With all his usual correct propriety, the ear-tufted gentleman batted not an eye but uncorked a soft-spoken yet astounding proposal. This, in effect: Abolish DXCC and DX contests!

We were stricken to silence while Jeeves removed our dropped and broken glasses. Then we realized that it would work! And since none of us, with one exception, was anywhere near DXCC (with various alibis) we decided then and there to do away with the whole thing. The exception was a W3 who had 97 valid confirmations; he promptly pulled a Gromyko and vetoed the whole business. But Jeeves fed him a Mickey and we were then free to continue our plotting.

It occurred to some of us that this cure was a little similar to the ancient Spartan remedy for athlete's foot, i.e., using an axe. Nevertheless, it was resolved that, since the necessity was so urgent to prevent good old 20 from being scorched right out of the spectrum, DXCC was a goner. Before we could decide whether this move would be immediate or subject to time limit, the W3 awoke and forced a compromise. He pointed out that should a rigid time limit be set, the great last-minute DX rush would find all DX men either quitting or losing their jobs. So we decided that as soon as the first DXCC man verifies his 1000th country the curtain shall be rung down.

Now, Jeeves, pass the seltzer and that sheaf of DX mail . . .

What:

Eighty: This turn of the solar cycle certainly gave 3.5 Mc. a shot in the arm! At this writing WACs on 80 are practically a dime a dozen. Pressure built up by DX Contest activity is probably responsible. First to shout "Eureka!" was W9BMV. Bob raised his band total to 27 countries and CE3AG, KL7CZ, ZS6DW,

VK3HG, OK3DG and J3AAD were the WAC sextet. Among other WACs tentatively reported is W4BRB's 17-hour job with CE3AG, KL7OK, MD5KW, KH6NE, GW3ZV and J3AAD participating. Gene is nearing the 50-country mark on 3.5 Mc. Others worked: HC1JB (3580), ZK1AL (3560), LA7Y (3535), OK1MB (3512), ZL3FA (3525), TG9JK, EI9J, VP7NG, SM5FU, OZ9Q, FM8AD, GI6TK and the usual heap of Cs and ZLs. J2AHI is reported to have assisted J3AAD and UAØKAA in dispensing difficult Asiatic contacts to the Continent-hunters. W4BRB informs us that VP9E, HP4Q, YN1AA and VR5PL are to be heard on 3.5 Mc. shortly. W4BPD fired up a rhombic or two to close in on UC1RN (3505). Two perspiring 6L6s at W5LAK caught up with KZ5OJ, KZ5AX, KS4AI, PAØNG, F8ZF, G2EC, G6BQ and XF1A. W3JAK had 25 watts into an ARC-5 for PAØEP, ON4QF, G6ZO, HB9FF, FA8BG, FA8IH and KS4AH. W1HV's 807 has about 25 Europeans to its credit the past month or so and WIDEF worked a new one in VP6CDI (3790 f). In Iowa, WØCFB managed ZLs 1MB, 1IB, 1HM, 1DI, 1CI, 2MM, 3KR, 4BQ, 4GM, 4DU and 4DY. Evidently rotating his rhombic the other way, Gerald also bagged GW8CT, ON4AU, VO2AH, and miscellaneous Europeans besides. G3AGQ wants to let it be known



* DX Editor, QST.



The tropical gang have an additional spot for installation of the shack — a nice comfy veranda, as used at PK4VD, in Sumatra. When the Far East is coming through you will usually find this station among them. The receiver is a BC-342 and the transmitter a home-built job of moderate power.

that W1BPX has the most consistent W signal over there on 80. G3AGQ normally uses 50 watts but has fun with a 7C5 at 6 watts when conditions are right. W2QHH is still gunning for 3.5-Mc. stuff with his 17 watts. He has over 30 countries and 5 continents so far. Howy wants to know if anyone can beat his QSL average of 103 verified out of 111 worked postwar. PA0LC, G8VG, ON4HC and some ZLs entertained W2CAY recently. W9AND reports a visit from SM5LK and also contacts with G5BM, G6CJ, G2PL, KH6LF, KH6LJ, KL7LP and F8EO. The 6L6 at W7JGU blasted its way to KS4AF and XE1DX and Clem heard ON4AU.

Forty: As to whether this band has kept anyone happy, we will let the following reports speak for themselves! W8YGR upped power to 50 watts to hook KL7HR (7022), HH2BL, XE2L, KV4AA, HAIV, KS4AI (7263) and VE8OY (7128). At W2TQR we have VK2CX, HB9FT, D4AZZ, SM6DB, ZS1M and many other Europeans. W5ACL came upon J2SCS (7050). Lost without his 14-Mc. beam, W2GUR loitered on 7 Mc. for a bit and snared FA8BG (7010), HR1AT (7008), FM8AD (7060), HC1JB (7100) and the questionable VR5R (7015). A BC-459-A at W8ZFW did nicely with PY7WS, OX3ME, VK3MC, VK2CS, VK2YS, HH2HF, ZS1GV, TI2KP, OK2SO and KH6IV. W4DHZ worked a pile of good ones, the best being HA4EA, CT1AZ, KP6AA, EK1AA, LA6U, UB5KAB, ZC6SM, VK6HW, HC1ES and MD5KW. Nap works his best catches on 40 in daylight, afternoons preferably. Baby-sitting while hamming slightly cramps W1HV's style, but he accounts for GW3BQY, ON4VAM, some Gs and a PY

. W2BRC and his inside wire untangled XAFQ (7055), ON4QF (7050), PA0EP (7047) and G5LI (7050). A semivertical (or semihorizontal if you wish) antenna and some 6L6s helped W2FRK with ZL4DU, HB9BJ, OK1NS, OK1DC, KH6DK and GW3BCY. KZ5PB, GM3BST, HAXZ, SM7GT, SM6DB, OK1ZM, OK1DC, OZ5HQ, VK2TG and ZL3LL answered W1EFN's 813. W7JGU let his WAS hunting slide for a while because of KS4AH, KL7HI, KL7ET and XE2LT. Thirty-five watts at W2OWX ensnared ZS2CR, SM5BX, ZS3EP, PY2AJT, TI2EXO, KZ5ND, KZ5CB, VP9E, HH2LR and many others. Out west, W6VBE messed with RV2, ZL1MG, ZL3LL, KL7BZ, W2JPI/KL7, KH6FG and W9IYQ/KJ6. This total might not be impressive in itself, but Joe runs only six watts! Claiming that his antenna practically scrapes the ground, W2TRB nevertheless put his 35 watts to work on VK2SS, GI6TK/A, F9EZ, GM3BCD and GM3AWF. W2KIR has about 60 postwar countries on 40 and has gone down to 20 for the summer. W2DKF has some dainties in XU1RT, W0MCF/C1, KP6AA and a J2. An exceptional list from W2UZS is so extensive that we'll merely select the better ones: UA1AB (7059), PY7WI (7037), D2JK (7065), VK7OM (7059), OX3MG (7066), ZS2G (7055), ZL4AW (7059) and GI6TK (7063). Ed center-feeds a half-wave and runs 100 watts to 807s. W9KFO submitted frequencies of over a hundred nice catches via radio to W1QVF. Some of the more juicy: UA3BD/UP2 (7045), GC2FMV (7030), VO6EP (7020), OX3RD (7060), CN8BI (7050), EA3OO (7020), CT1AZ (7055), J3AAD (7050), ZK1AS (7010), VR5PL (7080), K6SBU/KG6 (7050) and PA1XU (7070). Mr. Rhombic, W4BPD, gave 40 a whirl to the tune of J2AHI (7020 t9), YU7LX (7045 t8), HA5X (7050 t8), VQ3HJP (7010 t9), W7JEF/KG6 (7045 t9), and UG6WB (7001 t9). Dropping down from 80, W0CFB accumulated SPIAR, ZS2A, VR2AX, VE8OS, PY2IZ, UA1KFA, CE4AD, W0OZW/KS6, HR1AT, G5UB/MM near VR5, KM6AA, LA4P, VO2R, VO3Z, VK5JE, VK6RU, VK6WT and VK7LZ. A small cross section of W3JAK's neat list brings forth LA3V, UR2KAA, UB5KBC, FA8ZZ and CN8MI. It used to be that anything worked besides VE and W on 40 constituted choice DX. Nowadays we can afford to be a bit choosy with everybody and his brother WACing all over the place! But coming summer conditions with QRN and shorter nighttime skip should bring back the old values of comparison before very long.

Twenty: Steadying down for a bang-up summer season, 14 Mc. is once more packing the house around the clock. VE1EA got out of the hospital in time to pick on ZC6SM, ZD4AO, J2USA,

CR6AN and VQ4EHG We'll give the boys who are good enough to mention frequencies a little priority this month. Here's W5ACL's Vee-beam 800-watt list: VQ3HJP (14,070), KP6AA (14,100), ZS4BJ (14,030), OA4CJ (14,024), UB5KBC (14,020 t3), MI6ZJ (14,100), OK1AA (14,012), ZC1AL (14,005), SM7YW (14,085) and UJ8AE (14,035) "I am going to put up two or three more rhombics designed for 40 instead of 20 meters for next year. . . ." Thus reads W4BPD's letter this month! No wonder Jeeves is going around here whistling "Could Anything Be Finer Than To Be in Carolina in the Maw'nin'"! Gus unraveled UL7BS (14,055 t7), UI8AE (14,060 t9), UH8KAA (14,105 t8), UQ2KAA (14,115 t7), VS1BG (14,085 t9), VS6AR (14,020 t9), VS6BA (14,015 t9), VS7WN (14,060 t8), ZC6AA (14,088 t9), C1JC (14,065 t9), CIDK (14,060 t9), C3LT (14,075 t9), C3YW (14,095 t9), C6HH (14,105 t7), C6YZ (14,050 t9), C7FP (14,070 t9), CR6AN (14,071 t6), CT3AB (14,060 t9), CP1AQ (14,038 t7), VU2BX (14,080 t9), VU2DR (14,050 t9), VQ8AY (14,068 t7), VR6AA (14,155 t9), VP8AD (14,030 t9), PX1E (14,025 t9), ZD8B (14,035 t9), ZK1AJ (14,080 t5), GC2CNC (14,025 t9), YU7UU (14,100 t9) and ST2FU (14,095 t9) W2UFT has a few that Gus hasn't, namely, VU2GI (Pakistan) (14,030), VS6AY (14,042), ZD3B (14,052), EA7AV (14,063), CR9AG (14,090), CR9AN (14,110), ZE2JN (14,095), KA6FA (14,039), GD2DF/A (14,083), KB6AD (14,090), VP8AI (14,043), YN1OC (14,040), MD1I (14,055), ZB1AI (14,115), FQ3AT/FE (14,105), VP1AA (14,050), XZ2KN (14,085) and MB9AJ (14,110) A simple doublet at W3NOH worked wonders with CR6AI (14,095), VQ2DH (14,145), OA4CS (14,052), CN8BK (14,032), TF3EA (14,051), ZB2A (14,085), CT1JU (14,100), CR7BC (14,009), VP2AA (14,045), YV1AZ (14,075), TI4AXR (14,018) and UA1AL (14,070) W1AB mentions a few in passing, ZM6AF (14,075), ET1IR (14,070), YN1AA (14,010) and C6PS (14,095) An excellent report from good old Nebraska in the person of WØFWW comments upon TF3AB (14,022), FO8AA (14,008), UA3AM (14,028), UA3FA (14,006), UA3TA (14,006), UA4QA (14,008), UA6LK (14,008), UA9DP (14,040), UG6AB (14,041) and UA1BE (14,012) A few not previously mentioned are in the log of W2CYS: MD3AB (14,160), YA2AB (14,000), UI8AA (14,100), UAØSF (14,120) and C7OK

(14,135) W4MZ is up over the hundred mark now with UA1KEC, EA1A, YI2AM, FT4AN and EL3A An exclusively-phone report from XELAC dwells upon OK3ID, XAFG (Trieste), I1AYN (Sardinia), HA4AB, ZE1JX, EA9AI, ET3AE, MT2E, VR6AA, RV2, WØSQS/Iwo, KG6AW/VK9, PK2GA, C3CY, HR1CE and HR1PD Trying damp twine for an antenna wasn't too successful so WIIN went back to the copper-weld on VO6X (14,010), FA8IH (14,005), VP7NG (14,040), FT4BM (14,004), LA1M (14,010), LA2OA (14,040), EK1AA (14,004), CE2BC (14,004) and CE3EO (14,020) When not answering Ws, D4ATL fooled around with KH6CT, YV5AY, UQ2BD, MI6BC, PY1ACQ, CP5EP, CR7BB, VP2GE, HL1AE and AR8AB W1AH would like someone to put a few additional hours in each day. Twenty-four just don't seem enough for proper attention to DX. But Bill has W2WMV/C9, OQ5AS, MB9BA, UI8KAA, EK1FP and CP1AS to keep him happy. Also worked was VS9ET, the long way 'round in early afternoon Going to higher power, from one to twenty watts, gave VK2AHM pleasant sessions with SV1RX, VR2AU, UJ8AD, UD6AC, UAØSG, MX2A, FA9JB, PK6XA (Morotai), CR7VAL, ZK1AE and MI6AB. Aided and abetted by some nice long wires, Jeff has rolled up 117 postwar with 97 on 28 Mc. alone A 45-minute WAC tickled W5ASG; YI2AM, FT4AB, KL7MH, CX1FB, ZL3FY and OZ7SN were the fall guys. Bill also collected VQ2HC, MD1E, OE5RA, CP1AQ, MI3ZJ, ZK1AL, C1MY, MD7DA, UAØOA, UAØPA on c.w. and KA1ABX, CX2EL, KH6KH/KB6, W6YOT/C6, VQ3HGE, MD2B, CP1AQ, ZD4AH, ZD2KC, HL1AN, VK6KW, ZC6LA, VQ2FR, W9IYQ/KJ6, MD1H, VP2DC and ZS4P on voice A new 2-element job at W8DMD performed well for PX2A, FF8RV, CR6AQ and UA1KED Mediocre conditions restricted WØNUJ's activity to TF3MB, UA9CH, UA9CC, T12FG, YN1EP and gobs of Europeans WØCFB nailed G2JT on 4 bands within 6 hours time. No contest, either. Gerald also conversed with KX6AF, C7AT, RAEM, UAØKQA, UA1PA, KB6AG, CT1JS, LB9BA, HE1CE, TF3AB, HP4Q and PZ1OY In the phone department, W7EYS yodeled for PY1CQ, J2AGA, OX3MC, OZ9AB, VQ4ASC, MB9AI, ZM6AF, D4APA and ZS1W. Bob tried the code on many more, including OH2NB, KH6OC,

Aspirants to the Baker Street Irregulars will spot this fellow as a dead ringer for what Sherlock Holmes should look like, but it's really Les Hill, G5WI, in his station in Bristol. Running 50 watts and using an assortment of directional antennae, Les has accounted for over 90 countries while still managing to keep us Ws happy. With a fixed beam on W6, G5WI has had over 200 post-war contacts on schedule with W6AY!

May 1948



LA8LA, YU7KX, VS4WL, C7HY, VQ3ALT, UH8AA, ZC6JJ and an MD7. Bob knocked off a two-hour WBE during early February. A new 8JK duplex fixed up W3JMO with CT1AY, EK1AD, ZD3B, OX3GG, HR1MB, VQ4NSH, CN8AL, D4AVF/EL, OQ5CF, CT2AB, ZB2A, VP9F, TR1P, MD5AM, ZC6JM, ST2CH and ZS3F, all on 'phone. Recent diggings at W4DHz resulted in YI2FDF, UC2BB, MD2G, VK6RF, VP2KS, OH3NA, UD6BM, UA3HL, UA6LK, VP9D and OX3UD. W2HMJ gripes about conditions a little but uncovered CT1AC, TG9FC, CN8BC, T12BF and had four contacts with EA7AV in an effort to get a passable QSL from him. Aug is up near 120 and should be DXCC by now after being held up at 98 for a long time. A line from G6RH indicates that he has been associating with KM6AB (14,075), EA8CR (14,100), GD3BBS (14,012), and UL7BS (14,100). Another guy who is mighty close to DXCC. W3QLW has been hitting the band for a few countries and reports good results using a 75-meter half-wave with 46-foot feeders. Dr. Hamm, W9UAZ, netted some nice voice-users in PK2GA (14,185), J2GIL, J9ABB, KA1AI, EI2L, EL5A, VQ4ERR, AR8AB and CN8EI. The quarter-wave ground-plane job out at W0NUC is going to make way for a rotary soon but he has 130 confirmed out of 158 worked — that whip ought to go over big at some club auction! Leo piddled the bug with ZA7AA (13,997), PJ9XX, AR2LD, ZC6WF, ZS3D, VS4VR and UA0KGA. W2HAZ stopped shouting for DX long enough to participate in the Delaware Valley Radio Association's WAS contest. Bill says it's just as tough to pry a pasteboard loose from some of these Ws as from some of the rare DX. No slowpoke at this WAC business, W8WWU reeled one off in less than two hours. A very good average at W6ZZ is 92 confirmed from 98 worked. Among the latter, ZS4BX, ZS6KT, VO2BR, TG9JK, ZM6AF, HH2BL, UA6AA, VP3TY and OX3BC. W6ZCY now has the necessary cards, 104 to be exact, and 160 worked. A late good one is KH6LX/VR1.

Ten: This is the pocket-sized-antenna band or as near as you can come to it without winding up as a customer of Mr. Tilton. At W9RBI it's 148 worked, 114 of these on 'phone, including a three-and-one-half hour WAC with ZC6JP, VP3TR, VE8MB, G6FW, ST2CH and ZL2BE. W6ZZ was available for J9ABL, J9ABS, J9ABT, J9ABR, J9AAR, J2GHQ, J2VFW, J2ACS, J2AMA, W3IVT/C6, W6FMZ/C6, W6JIM/CI, KG6AW/VK9, HLIAN, HLIAR, KA1ACE, KP6AA, VO6AD, VQ3HGE, VQ4EHG, VP9F and KP4EZ. W9AND enriched the log with FQ3AT/FE, D2JH, VQ4FCA and CR9AG on c.w. VU2DG in Bombay worked W2CAY on voice and then left for England. Just 14 years old,

W6AGT warmed up with GC2RS, I1GX, HP1A, VR6AA, VK7LZ, CT1IP and EI9G. W5ALA has a recent 10-hour 'phone WAC in the persons of ZE2JN, G3RI, OA4BG, J9AAI, KA1AZ and a W5. Being in Vermont doesn't help W1EKU raise VQ2DH (28,350) on voice. But Vern is up to 98 on ten 'phone with stations like HI6EC, FF8FP, HK3GB, CM9AA, ZC1AF, CP1AP, ZD4AS, VP4TAX, J2POY, ZE2JA, PZ1M, VP6ZI, VP6CDI, EL5A, VP2GB, YV4AM, AR8AB, HZ1AB, ZS4P, T12MY, HH1HB, CE3DW, CX2AX and HC1KP. Forty-eight watts and a three-element wide-spaced contraption gave W6HG easy contacts with W2EJV/PK3, KA1FH, D4ABF, G8UG, J2ROC and HLIAN on voice. W0EYR is from Missouri, but he was easily convinced by OQ5AR, ON4DM, CP1JB, I1SR, HL1AW, CN8BA, KH6KQ/KP6, CT1QA and VQ2DH. An 809 and two-element merry-go-round snatched ZS1BF, ZS2A, ZS5U, ZS6CZ, ZS6GO, YR5W, MI3ZJ, KV4AA, KS4AI, FA8IH, VP7NG, OA4AK, I1LD, HC1JB, PY2AC, CE3AG, HB9CX and CX1FB for W2KZE on c.w. W2PMQ gives BCI the go-by using 200 watts of n.f.m. and WACd in one week-end with KP4FJ, ZL3AR, J2ACS, ZS6JB, G2RL and HC1KP. James also grabbed ZC6JS. It shows that f.m. can push through even though helped by a three-element beam in this case. That man is back again. W4BPD merely dropped in for VQ4JMT (28,030 t9) and then went back to 20. Determined to stick to the vocal until he gets the DXCC sticker, XE1AC went over big with D4AAZ, MI3ZJ, EL2A, ZE2JV, KA1ABZ, CN8AB and PA0MJH. The band is passable in Germany, too, since D4ATL was able to hook CR9AG, CR9AM, VP2KS, KA1ACA, VS7SV, GC2RS, VS1AK, TF3EA, KG6AAF, J2DND and HLIAE on voice and VS6AE, OE7AH, and other dignitaries on c.w. W0NUJ marked time with CR7AD, LA6DA, ZS6LW, HLIAD, CT1NT, YV5AC and ST2CH. VP5EM (28,390) and HH2ME (28,300) enthralled G6RH with soft-talk.

Eleven: This is the band where you *don't* find the diathermies that should be here instead of on ten or twenty. The Contest brought out quite a bit of activity on 27 Mc., but previous to that affair, W9AND scraped up VP6CDI, VK2ADT, PY2AC, HH2CW, KL7LG, KL7NA, CM9AA and XF1A. Lastly, W6ZZ found the band full of HLIAA, XF1A and HH2CW.

Where:

Help yourselves to the following. If you can work 'em, that is.

AP4A	S/Ldr. G. Howard, MBE Signals, Air Hq., Pakistan, Peshawar Armed Forces, Pakistan
C3CY	P.O. Box 193, Canton, China

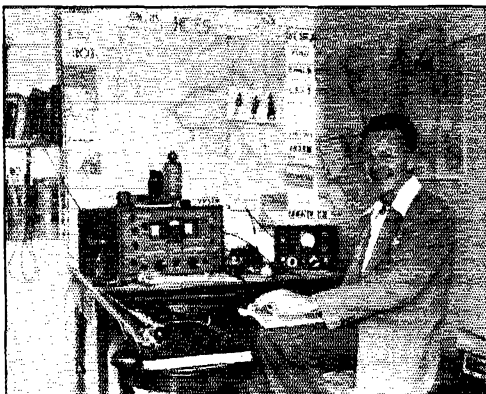
C6PS Box 20, Tsingtao, China
 C9JW Bank of China, Mukden, Manchuria
 CR6AN Carlos Mendes, Posto de Angola, Qui-
 lengues, Angola
 D2IU Phantom Radio Curb, #3 Indep. Sigs. Report
 Sqdn., BAOR 15, Germany
 D4ATL Officers' Mail Section, APO 208, % PM,
 New York, N. Y.
 EA3ZT Mario Plaque, 268 Aragon, Barcelona,
 Spain
 EA5AF Lorenzo Navarro, Puerto Rico No. 37-20,
 Valencia, Spain
 EK1AD Italie 33, Tangiers (I.Z.N.A.)
 EK1FP Box 57, British Post Office, Tangiers
 EL6A Firestone Rubber Plantation, Harbel Hills,
 Liberia
 EQ2L Ray Ball, % American Embassy, Teheran,
 Iran
 ET3AE P.O. Box 145, Addis Ababa, Ethiopia
 FT4BM Ahab Lesser, Mateur 12, Tunisia
 HA5EW Via MRRE, Box 185, Bucharest, Rou-
 mania
 HR1PD % Empresa Dean, Tegucigalpa, Honduras
 H1AYN P.O. Box 83, Cagliari, Sardinia
 KA1ABX CMC, APO 707, % PM, San Francisco,
 Calif.
 KA1ACA USIS, APO 900, % PM, San Francisco,
 Calif.
 KA1ACD Harold A. Gilberts, % 14th Comm. Sqdn.,
 APO 74, % PM, San Francisco, Calif.
 KH6KH/KB6 % CAA, Canton Island, Phoenix Group,
 South Pacific
 MLB Mario Graziani, Republica di San Marino,
 Italy
 MD5AM RAF, MEF, Fayid, Egypt
 MD5KW (via Box 360, Cairo)
 MD7DA Major D. MacDonald, Cyprus Signal
 Sqdn., Nicosia, Cyprus
 MT2A P. W. J. Joubert, Del Mehari Hotel, Tripoli-
 tania
 MT2C (via RSGB)
 MT2D K. L. Williams, 4 via Capranica, Tripoli-
 tania
 MT2E H. T. Orrell, 2 Lungomare Badoglio, Tri-
 politania
 MT2F A. E. Gover, 48 Lungomare Badoglio, Tri-
 politania
 OX3RG 5th Weather Sqdn., APO 858, % PM, New
 York, N. Y.
 PX1E Charles Roi, Box 12, Andorra
 VE8OY Fort Smith, N.W.T., Canada
 VK4RL P.O. Box 638J, GPO, Brisbane, Queensland,
 Australia
 VQ6AD APO 677, % PM, New York
 VQ4FCA Aeradio Station, Mombasa, Kenya
 VS4WL Col. Wellspring, RAF Detachment, Labuan,
 British North Borneo
 VS6AW Box 541, Hong Kong, Asia
 VU2BK RAF Transmitter Station, Mauripur,
 Karachi 13, Armed Forces, Pakistan
 W4HCF/KP4 James T. Street, P.O. Box 3036, Santurce,
 Puerto Rico
 W8LZE/KP4 C. A. McCullough, P.O. Box 3036, San-
 turce, Puerto Rico
 W91YQ/KJ6 Navy 311, % PM, San Francisco, Calif.
 XAAE Thomas Coleman, 1208 4th Avenue,
 Watervliet, N. Y.
 YN1OC Otto Cabezas, Calle Central No. 708,
 Managua, Nicaragua
 ZB1BD Royal Signals, Freetown, Sierra Leon,
 West Africa
 ZC6JP (via RSGB)
 ZC6LA P.O. Box 4150, Tel Aviv, Palestine
 ZD4AS West African Signal Regiment, Accra,
 Gold Coast Colony, Africa
 ZE2JV Plumtree, Southern Rhodesia

Muy gracias, amigos W1s AB, AH, BPH,
 EKU, HDQ, KRV, PEK, QMI; W2s GUR,

QKS, UFT, WZ; W3s JMO, NOH; W4s BPD,
 DHZ, FVR; W5s ALA; W6s AGT, WCQ; W7EYS;
 W8YGR; W9NDA; D4ATI; XE1AC.

Tidbits:

Word has come from various sources to the effect that FQ3AT/FE is plenty worried. This is because he is receiving much too much mail with "Amateur Radio Station FQ3AT/FE" plastered all over it. It's a bit late in the game to remedy any damage done -- Ivan's QTH was banded about for many weeks before this latest angle arose. A lesson might be drawn from the incident, though. If in the future anyone plans operation of an amateur station in any area unfriendly to the game, *don't* pass your mail address out over the air. Have your correspondence handled by someone else who knows the score, the ARRL



Charles "Chic" Fuller, HC1ES, has been an active ham since 1911 and still gets a big bang out of the hobby. Here he is beaming proudly over his gear. To the right of the HQ-129X is the rig -- 100 watts of 14-Mc. r.f. from an SW3 cabinet! Chic likes his rag-chewing and advises all hams in need of an HC contact to be patient -- he expects to be operating from Ecuador for some ten years or more! You may remember him as W6ZVL or former W9DUP.

if necessary. . . . Blush, blush. VQ3EDD's "buddy," Andy, whom we high-lighted in a recent picture caption, now turns out to be Mrs. VQ3EDD. She sent us a *snapshot* to straighten us out. Anybody wanna buy a DX column cheap? IIAAA, ex-XADW, makes a familiar comment. It appears, the Major says, that the best way to raise a certain area, like N.Y.C., is to call "CQ no NYC." It is revoltin' the way W8s and W9s try to make like they're Gotham boys in answering these directional calls. . . . This YA2AB is telling people to "QSL via ARRL" but so far we haven't heard a literal peep out of him. Come out, come out, wherever you are! DX credited to W4IWJ last month was really worked by W4INJ. This Yankee mill always trips over those W4 calls. . . .

W2WQY really gets around on shipboard. Haden remarked that ZD4AP and AO are now QRT. But some of these calls seem to get passed along, so someone else may be at the keys. Also, FF8PD is about the only active station in FF8 right now (definitely undercover). Someone has been using W6VRS/KG6 on about 29,135. 'T aint cricket, says the real W6VRS via W0TLG W6RBQ is mad because W6CIS got some better reports on 7 Mc. than he did. Bill's about ready to move a few local hills from around his antennae. ZS5YF has sailed to become G3BYF in the near future. Don't look now, but you birds who worked W6RWQ/VR6 last year *may* get a country out of it, after all. HC1KW spend; his spare time climbing inaccessible mountains when not on the air. As can be seen in the Airmail Directory, AP is the new prefix for Pakistan. AP4A is former VU2GH. That Mellen guy, W1FH, is *still* working new ones. ZD8B and CT3AB are responsible. Charles lent us an interesting epistle from Bob Ford, ex-AC3SS. Mr. Ford is going back to AC4 and will undoubtedly be on 10 and 20 sometime soon. But he says there is no AC3 activity at present although there is a possible chance that there will be in due time. The bad news of the month is the fix that KP6AA and KP6AB are in. The building on Palmyra shared by their families burned down and Steve took some second-degree burns. Because of excessive rates, nothing was covered by insurance — QSLs, personal effects, ham gear and furniture were destroyed. If you've worked them, they'd appreciate another card to help restock the file. Also, you can help these swell guys get back on the air if you'll part with some of your old unused gear and tools. Use air mail as the boat situation is as slow as one of Goodman's left-footed CQs out there. [Quit picking on my old boss, boss. — *Jeeves*] EA1A is still being ably handled by W1AZW as regards QSL. All cards checking with the log will be answered. HS1LA is taking no chances for the present; no QSLs will be sent and none is desired until circumstances over there are altered. When W4LXJ was KB6RWZ he used to sked AC4YN *daily*. Now, of course, he can't even hear the guy when it would really be a catch. Such is life. DXCC NY4CM, who is really that old DXer from away back, W8LZK, in disguise, has now moved to KP4 with CAA. Guess who his boss turns out to be. Oh, no! Yes, KP4KD. Looks like Ev will have to keep this guy working overtime every night if he doesn't want to lose a few juicy ones from under his beezee. That Australian Antarctic Expedition is going to use the call VK1AA, according to W6TE. A new country or two may be in the offing. W1DX got a big bang out of listening to a W8 and a W9 going 'round and 'round while calling UJ8AE. This involved the

supposedly subtle trick of letting the other station raise the DX for you — you start to call, zero-beat, just as the other hopeful starts to sign. But these characters kept chasing their tails this way for several long minutes. The UJ8, no doubt bewildered by this squirrel-cage technique, came back to nobody, pulled the switch and probably went back to stamp collecting. The Canal Zone Amateur Radio Association will pass out a nice certificate upon the receipt of ten KZ5 QSLs, c.w. or 'phone on any band. Address them to the society named, Box 407, Balboa, C.Z. If you should hear AR1PC and AR1RJ on 14 Mc. soon, don't pass them up. They probably will be on c.w. and 'phone respectively. PA0UM had a friendly visit with that old director-DXer, W5ALA. The PA hopes to have PK4DA on the air by October on 10 and 6 meters. Scratch VP4TAF and VP4TAH from your list of eligible Trinidad fellows. The former is now in KV4 and the latter, W4HCF, is gunning for a KP4 call. W8WEA is going back to Truk and expects to be quite active on the air. His address will be: Harry T. Phillips, Y1c, USN, Civil Administration Unit, Truk, Caroline Islands, Navy No. 3410, FPO, San Francisco, Calif. These MEF calls are getting more complicated day by day. For instance, MI6s now become MI3s. We had better go down the list and straighten things out, as follows: For military personnel — Cyrenaica, MD1; Tripolitania, MD2; Eritrea, MD3; Somalia, MD4; Canal Zone (Suez), MD5; Iraq, MD6; Cyprus, MD7; Palestine, ZC6; Greece, SV; Sudan, ST. Special civilian prefixes — Cyrenaica, MC1; Tripolitania, MT2; Eritrea, MI3; Somalia, MS4. There appears to be activity in all areas named with the exception of Somalia. Thanks to MI3ZJ for the above synopsis and also many Ws who volunteered information. MI3ZJ is now quite active on 14,122, 28,120 and 28,244 kc. George notes that G5DZ arrived in Eritrea and should be popping up with a new MD3 call soon. Thanks to W9NDA, we learn that ZD6DT expects to get on as VQ2DT shortly. His address will be: Dave Taylor, P.O., Fort Jameson, Northern Rhodesia. W1AB's dog didn't even know him when Horace finished with the DX Contest. Horace ran his postwar total up to 133 as well as doing well by score. This guy may not be as old as his call indicates — he says that UA6KOB is a YL. Here's another for W2QHH's YL DXCC. Belying a previous Tidbit, W4FVR states that he worked FF8RV on 14 Mc. recently. "QSL via REF." All right, let's all take a deep breath and dive into the Weird Calls Dept. W6OMC and W9MXP got back their cards to YA3B unopened. VR5R is a bird with a lot of nerve, according to VR5PL and VR5IP, and they should know. Noel says that there will, however, be another active VR5 soon.

(Continued on page 130)

May V.H.F. QSO Party

Fun for All in This May 22nd-23rd Activity—Certificate Awards in Each ARRL Section

BY F. E. HANDY, * WIBDI

THE all-out program for giving the v.h.f.s their due — the May V.H.F. QSO Party — starts at 2 P.M. local standard time Saturday, May 22nd, and ends at midnight local standard time Sunday, May 23rd. During this v.h.f. jamboree contestants are to use any of the amateur bands above 50 Mc. and either 'phone, m.c.w. or c.w.

The aim of this activity is to work as many v.h.f. stations at as great distances as possible. New states for your v.h.f. WAS are bound to show up on the bands! You will renew old friendships, and at the same time your station v.h.f. equipment will get the best test possible — a communications workout under practical operat-

ing conditions. Mark this contest week-end on your station calendar now!

Exchanges, Scoring, and General Call

Participants need exchange only one bit of contest information — names of their ARRL sections. Page 6 of this issue is a register of the League field-organization set-up, and will serve as a convenient section check-off list. You compete only with amateurs in your own ARRL section for the certificate award. ARRL staff members are ineligible for awards.

For contacts on 2 or 6 meters, count *1 point* for successfully-confirmed two-way exchanges of section information. A one-way exchange, confirmed, does not count; there is no fractional

* Communications Manager, ARRL.

SUMMARY OF CONTACTS, MAY V.H.F. QSO PARTY

Station..... ARRL Section.....

Freq. Band (Mc.)	Date and Time	Station Worked	Section	Record of New Sections for Each Band					Contact Points Claimed	
				50	144	235	420	Other		
50	May 22 2:15 P.M.	W1CLS	E. Mass.	1					1	
		W1AEP	W. Mass.	2					1	
		W2OQI	N.Y.C.-L.I.	3					1	
	144	3:00	W1CLS	E. Mass.		1				1
			W1OOP	E. Mass.						1
		3:16	W1HDF	Conn.			2			1
		3:24	W2OHE	N.Y.C.-L.I.			3			1
		3:30	W2OQI	N.Y.C.-L.I.						1
		3:39	W1NY/1	W. Mass.		4				1
		3:48	W2AMJ	N. N.J.	4					1
50	3:55	W2GYV	E. N.Y.	5					1	
		235	W1CTW	E. Mass.			1			5
			W1OOP	E. Mass.						5
50	4:45	W2ER	N.Y.C.-L.I.			2			5	
		May 23 8:10 A.M.	W9ALU	Ill.	6					1
W0QIN	Minn.		7					1		
8:43	W6OVK		Santa Clara V.	8					1	

Number of contacts: 50 Mc. 8 144 Mc. 6 235 Mc. 3 420 Mc. Other....

Total contacts: 17 Total contact points: 29 Multiplier: 3+4+2=14

Claimed score: 29 X 14 = 406 Points Final Score

Names of operators having a share in above work.....

I hereby state that I have abided by the rules specified for this contest and that, to the best of my knowledge, the points and score as set forth in the above summary are correct and true.

Transmitter:..... Signature.....

Receiver:.....

Antenna:..... Address.....

breakdown of the basic 1-point unit. Should the complete exchange (two-way) be accomplished with your transmitter on the 235-, 420-, 1215-Mc. or higher bands, you may record 5 points per QSO.

Simply use "CQ contest" to advise other contestants of your participation.

One further suggestion: Many of the gang will be trying out new antennas and gear. Though not a contest requirement, it would be an excellent idea for operators to exchange signal-strength and readability reports.

Multiplier

The sum of station points earned is multiplied by a section multiplier. Each time a new section is worked two-way it adds one to the multiplier.



The multiplier grows by one if you rework this same section on another band. This scoring differs from other League section-wide competitions in order to encourage everyone to make use of as many v.h.f. bands as possible.

Rules

- 1) Name-of-section exchanges must be acknowledged by both operators before either may claim the point(s).
- 2) All claimed contacts must fall in the contest period and must be on authorized amateur frequencies above 50 Mc., using permitted modes of operation.
- 3) Contest score must represent points earned from operation exclusively within a given ARRL section.
- 4) Fixed-, portable- or mobile-station operation under one call and by one operator is permitted.
- 5) The band your transmitter is on determines whether a QSO counts 1 or 5 points. Crossband work shall not count.
- 6) A "contestant" is a single operator working without the help of any other person. Results may be presented with names of all participating persons, for listing, but only single-operator scores will be considered for certificates.
- 7) Scoring: 1 point for completed two-way exchanges on 50 or 144 Mc.; 5 points for completed two-way section exchanges on the higher v.h.f. bands. The sum of these points will be multiplied by the number of different ARRL sections worked, i.e., those with which at least one point has been earned. Reworking sections on additional bands for extra section credits is permitted.
- 8) A contact per band may be counted for each different station worked. Example: W1AQE (E. Mass.) works W1XYZ (R.L.) on 50, 144 and 235 Mc. for complete ex-

(Continued on page 130)

'Phone-Band Phunnies



"El Lobo"

Did you ever wonder why we have so few chicks on our 'phone bands? I can tell you one reason: it is because we have too many wolves like El Lobo who scare 'em away.

El Lobo is strictly a mousy character in his own home town; but when he happens to get into QSO with an unlucky YL or NYL, he is a curly-haired wolf. Don Juan, Bluebeard, and Henry VIII were positively girl-shy compared to this crystal-mike Cassanova.

At the first sound of a feminine voice on the band, our hero begins to twirl his mustache with one hand and to set his VFO to the frequency with the other. He QRMs the frequency until he is admitted to the QSO, and from then on his transmissions are directed exclusively to the distaff member of the party. Fulsome praises are heaped upon her voice, her wit, and her unquestioned beauty. He scampers wildly about trying to scare up mutual interests, and with startling speed he establishes himself — quite unilaterally — on grounds of the greatest intimacy with the embarrassed lady. He never signs off without doing his sticky best to extort 88s from her.

The poor gal is almost helpless to do anything about the situation. After all, she wants to be a good sport; and if she does try a mild reproof, El Lobo retreats behind that "Can't-you-take-a-little-kidding-Sister?" routine.

El Lobo ought to reread his "Little Red Ridinghood" and see what happens to big bad wolves.

— John T. Frye, W9EGV

**SWITCH
TO SAFETY!**



Surplus Corner

Operating the APS-13 on 420 Mc.

By Joseph W. Addison,* W0PKD

THE APS-13 is a low-powered transmitter-receiver designed for airborne radar service. Its frequency range covers the 420-Mc. range without alteration of the tuned circuits, but, like other units built for radar and allied purposes, it contains many parts which are of no use to the amateur, and its circuits require considerable revision to make the rig useful for communication service.

The APS-13 transmitter section uses a pair of 6J6s in push-pull-parallel. Bias values are set up for pulse operation, and must be altered for continuous service. Frequency control is by means of a shorting bar which is adjusted through the front panel with a screwdriver. The receiver section has a 6J6 oscillator and a 6J6 mixer, the oscillator being tunable in the same manner as the transmitter. The mixer lines are tuned by means of screwdriver adjustment which varies the capacitance across the line. The i.f. system has five stages using 6AG5s followed by a 6AG5 detector and two video-amplifier stages using

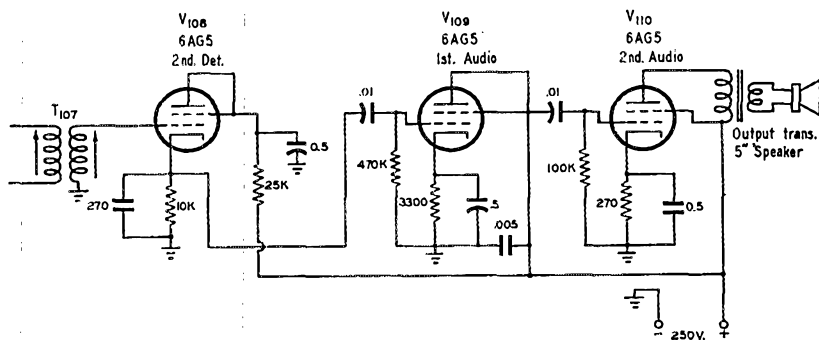
plainly marked with its part number and the instructions given below can be followed readily. So, with the screwdriver and cutting pliers handy, let's get to work.

Remove the motor-generator, D_{107} , and pulse units T_{111} , T_{112} , T_{113} , T_{114} and T_{115} . Remove resistors R_{154} , R_{157} , R_{158} , R_{159} , R_{161} , R_{162} and R_{163} . Remove R_{155} (in the oscillator compartment) and ground the 6J6 oscillator grids. Replace R_{156} (oscillator cathode resistor) with 2700 ohms. Remove R_{165} , R_{171} , C_{207} , C_{160} , C_{208} and connect to R_{156} (previously removed) in place of C_{208} , to provide screen voltage for the first i.f. amplifier, V_{103} . Remove R_{111} , R_{167} , C_{148} and C_{146} . Do not disturb the wiring to T_{116} , but remove the wire from the grid terminal of V_{116} .

Connect the i.f. screens to the output of the regulator tube, V_{117} , and remove resistors R_{142} , R_{143} , R_{144} , R_{147} , R_{148} and R_{173} . Remove J_{101} (power receptacle) and associated wiring. Remove R_{172} . Remove R_{174} from the cathode of V_{103} , the first i.f. amplifier, but leave R_{117} connected as it is.

The second detector and video stages require

Fig. 1 — Revised audio amplifier for the APS-13, using the two video stages. The 0.01- μ fd. coupling condensers are those removed from the unit at C_{162} and C_{208} . The 0.5- μ fd. by-passes are sections of C_{157} and C_{158} .



6AG5s. Four additional tubes, two 2D21 thyatrons, one 6J6, and one 6AG5, also are in the unit, but these do not enter into use of the outfit for communication purposes, and may be removed. Other surplus components include the 28-volt dynamotor, numerous pulse transformers, a gate-forming line, and a delay line.

If a schematic diagram can be obtained it will be helpful during the conversion process, but it is not absolutely necessary, as each component is

complete revision, so all wiring except the heater leads should be removed from the circuits between V_{108} , V_{109} and V_{110} , rewiring these stages as shown in Fig. 1. This is not an attempt at high-quality audio, but it does have the virtue of using some of the components left over from the removal process outlined above. The 5-inch speaker shown in Fig. 1 was mounted in the top of the cabinet. If desired, the interstage video transformers T_{108} , T_{109} and T_{110} may be taken apart and the cases used to house the interstage coupling components of the audio stages.

* 302 S. College, Salina, Kansas.

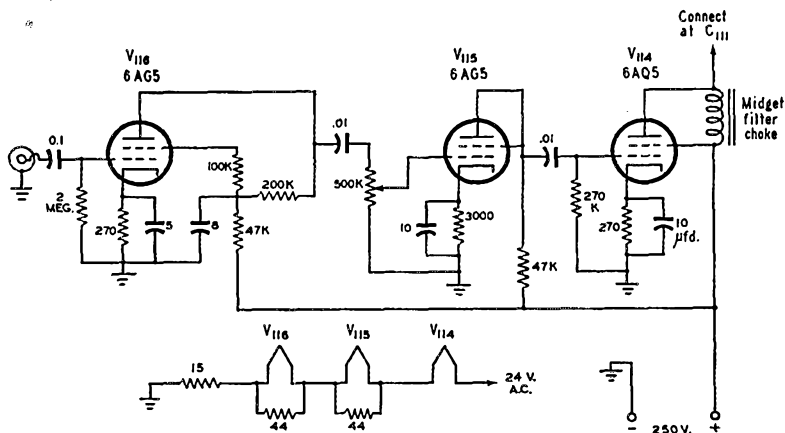


Fig. 2—Speech amplifier and modulator circuit suggested by W0PKD. The three tubes are used in the sockets formerly occupied by V114, V115 and V116. The socket for V111 is bridged by a 15-ohm resistor. Operation of the heaters is from a 24-volt a.c. source.

A suggested circuit for use as a speech amplifier and modulator is given in Fig. 2. This uses the sockets marked V₁₁₄, V₁₁₅ and V₁₁₆, with a resistor substituted for the heater of V₁₁₁. The space formerly occupied by J₁₀₁ can be used for mounting a gain control, and the adjacent space is sufficient for a microphone jack and a send-recv switch. The gain of the speech amplifier is adequate for a crystal or dynamic microphone.

The receiver gain control is left as it is, except that an extension shaft was added to provide knob control. The same may be done for the re-

ceiver and transmitter tuning adjustments. An audio gain control may be installed in place of the regulation potentiometer, if desired.

This conversion was designed to be about the minimum amount of work that can be done on the APS-13 to make it suitable for amateur use. Many refinements are possible, but the procedure outlined will provide satisfactory communication. The large number of these units available, and the low cost at surplus prices, should help to populate the 420-Mc. band in many sections of the country.

Conversion of the SCR-522 for 28 Mc.

THE SCR-522 is known to all v.h.f. enthusiasts as the unit that transformed the 2-meter band almost overnight, but most hams have not realized that the transmitter portion (BC-625) can be made to work on other frequencies. Two different methods of conversion for 10-meter operation are given below, and either process might be followed for use of the unit on 50 Mc. as well.

By Leonard H. Smeltzer,** W4KZF

IN getting the 522 to work on 10 meters it was first decided to check its operation on the frequency range for which it was intended; namely, 100–156 Mc. The conversion process outlined in CQ for July, 1947, was followed to attain this end. The following changes were then made to obtain 10-meter output:

1) Add a 3–13 μ fd. trimmer condenser across the 12A6 tank coil (119). This trimmer will be set at approximately 8 to 10 μ fd. to tune this tank to 10 or 11 meters.

2) Replace the v.h.f. r.f. chokes (127-1, 127-2, 127-3, 127-4) with 2.5-mh. chokes. These are the

** R.R. No. 2, Ludlow, Kentucky.

r.f. chokes in the grid circuits of both 832 stages.

3) Replace the 2-meter hairpin loop (120) in the first 832 plate circuit with a 10-meter coil consisting of 12 turns of No. 14 wire, $\frac{3}{4}$ -inch diameter, $1\frac{1}{4}$ inches long. Connect the coupling condensers (109-1 and 109-2) four turns in from each end of the tank coil. If these condensers were connected at the ends of the coil it would result in excessive grid current in the final 832 stage.

4) Replace the final grid coil with another consisting of 14 turns of No. 14 wire, $\frac{3}{4}$ -inch diameter and $2\frac{1}{4}$ inches long, with a $\frac{3}{8}$ -inch space at the center for the link, which consists of 5 turns of No. 14 wire on the same diameter as the tank. If it is desired to tune both 10 and 11 meters it will be necessary to add a 15- μ fd. air padder in parallel with the final tank condenser.

Crystals in the 7-Mc. range are used in the oscillator, doubling to 14 Mc. The second stage doubles to 28 Mc. Both 832s operate as straight amplifiers on 28 Mc. Substituting 50-Mc. coils in the 832 plate circuits, and operating the second stage as a tripler, should make it possible to obtain 50-Mc. output as well. In this case, crystals between 8334 and 9000 kc. would be employed.

By Bertram D. Aaron, *** W4JXH,
and Clyde E. Clark ***

IN converting the BC-625-AM it was thought that operation of the relays was a desirable feature, and since the d.c. supply presents no very great problem, changes were made only in the r.f. circuits, leaving the control circuits intact. This conversion process utilizes the first 832, eliminating the second, which may then be used for other purposes.

The final 832, its socket, the final coil and antenna coupling, and the tripler hairpin and its associated components are first removed. In taking out the final 832 socket remove the condenser between Pins 1 and 7 carefully, reconnecting this condenser between the now-free heater wires and ground.

Remove the 832 tripler tube from its socket, and wire a 100- μ fd. variable condenser in parallel with the butterfly condenser in the plate circuit of the first-harmonic-amplifier stage. The purpose of the additional capacitance is to change the stage from a tripler to a doubler. Running this extra condenser all out will permit the stage to operate on 50 Mc., when suitable crystals are used, the stage then operating as a tripler, in the original fashion.

Next a 75- μ fd. air padder is wired across the plate butterfly of the first 832 stage. The plate coil for this stage should have seven turns of No. 12 wire, each side of center, $\frac{5}{8}$ -inch diameter, with a $\frac{3}{8}$ -inch space at the center. The over-all length of this coil will be about $2\frac{1}{2}$ inches. It should be soldered in place on the 832 butterfly condenser so that it projects over the hole which formerly housed the final 832 socket. Loop the lead that formerly carried the modulated B-plus to the final back under the chassis and connect it through the r.f. choke (previously removed from the final) to the center-tap of the new plate coil. The first 832 now serves as the final stage for 10-meter work.

A three-turn loop of No. 14 wire, for antenna coupling, is connected by a short length of 300-ohm line to the two antenna terminals at the top of the transmitter. After removing the original link, a lucite rod was used as a support by inserting it through the two lower ventilating holes, and a piece of 300-ohm line was used to connect it to the antenna terminals.

Normally this completes the conversion process. Care must be exercised in tuning up the rig, and the harmonic amplifier, particularly, should be checked to see that it is operating on the correct frequency. The oscillator uses 7-Mc. crystals, doubling to 14 Mc. The two parallel capacitors added in the conversion process may be set at a point where tuning from one frequency to another may be accomplished with the regular butterfly tuning condensers.

*** 6811 Huntington Avenue, Newport News, Virginia.

Your QSL Manager

FRED ALLEN, W8GER, QSL manager for the 8th Call Area, was a full-fledged ham as a 15-year-old lad in 1920. He and his brother were licensed junior operators of 8BEP, their father's station. Shortly thereafter, Fred was assigned the call 8AQS but had to give it up because the licensing authority — then the Department of Commerce — would not license more than one call for the same address.

During the early days, Fred was ORS as well as city correspondent, city manager, and assistant district superintendent — ARRL appointments long since abolished or renamed. He was an active traffic man and made Brass Pounders League consistently.

Although Allen has been QSL manager since the very inauguration of the system, with attendant inroads on his spare time, he has found time to make WAS and WAC as well as to work 67 countries of which 64 have been confirmed. He is a member of the Old Timers Club and Rag Chewers Club.

His first consignment of cards — about 1000 — convinced Fred that he had all of the QSLs in the

◆
When Fred Allen, W8GER, was born July 17, 1905, his mother probably hoped he would become president of the United States. Probably W8 amateurs think that his present avocation as W8 QSL manager is much more important.
◆



world but there have been many weeks since during which he has received over 5000 cards. Fred sends out an average of 800 envelopes per month. In spite of that, he has approximately 15,000 uncalled-for cards on hand. Many of the uncalled-for cards are for former W8s who have moved to other call areas. Moral: All past and present W8s should have addressed return envelopes on file with Fred.

Allen has had many unique experiences in his managership of the QSL bureau. For instance, one of his clients drove a hundred miles for his cards and then discovered he was out of gas and broke. So Fred bought a crystal from him so that he could buy gasoline to get home. Not so very long ago, Fred had a long-distance telephone call from a ham in West Virginia who had just worked his

(Continued on page 138)

Thirty Watts – Mobile

A Remote-Control 10-Meter Rig for the Car

BY ADELBERT KELLEY,* W2V SX

THE average ham does not like to clutter the interior of his car with gadgets that take up room and spoil the appearance of his shiny dash. Here's a simple rig with plenty of "sock," and perhaps the best feature is that it can be installed without drilling or otherwise reducing the trade-in value of the car. The control head takes panel space of only 8 square inches at the bottom of the dash. The rest of the equipment can be mounted in the trunk, while the microphone can be parked in the glove compartment between QSOs.

This transmitter was designed around one of those surplus PE-103 dynamotors that can be had for a ten spot — hash filters, remote-control relays, circuit breakers and all. It's quite a bargain for the ham who is looking for a power source for his mobile rig.

A few modifications have to be made on this power unit. First, ten to one you don't have the connector that fits the socket on the end of the dynamotor. It's best to take it out and substitute a tube socket for the Cannon connector. Four contacts are needed for B-minus, B-plus, A-plus,

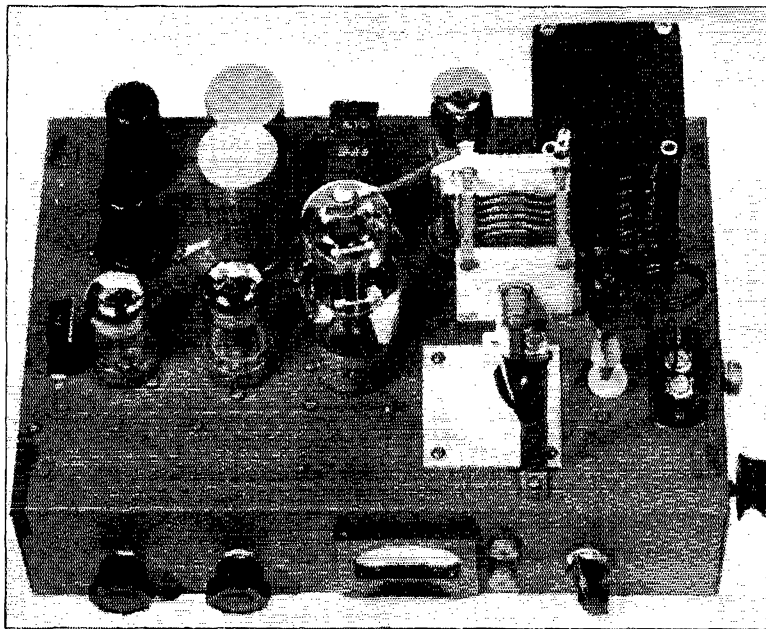
*% Radio Station WINR, 58 Exchange St., Binghamton, N. Y.

• A 10-meter transmitter for the car doesn't have to be complicated and bulky. The 30-watt installation described in this article is simple and compact and causes a minimum of depreciation to the value of the car.

and the control lead to the dynamotor (see Fig. 2). These four circuits are connected by a short cable to the transmitter which is mounted near the dynamotor.

The transmitter is built in an amplifier foundation cabinet, the chassis measuring $8 \times 12 \times 3$ inches. The cabinet cover of course is necessary to protect the transmitter tubes from damage from tires, tools, and other junk also usually kept in the trunk.

The layout can be seen from the photos. While there is little waste space, there is plenty of room to mount everything and wire it easily. A good wiring job is a necessity; joints must be soldered securely and lockwashers used under every bolt if this unit is to withstand the beating it is to receive.



The r.f. section of the 30-watt mobile transmitter occupies the front of the chassis with the crystal, oscillator tube, frequency-multiplier tube, 807, and output tank circuit from left to right. At the rear are the audio tubes and transformers and the 8- μ f. by-pass condensers.

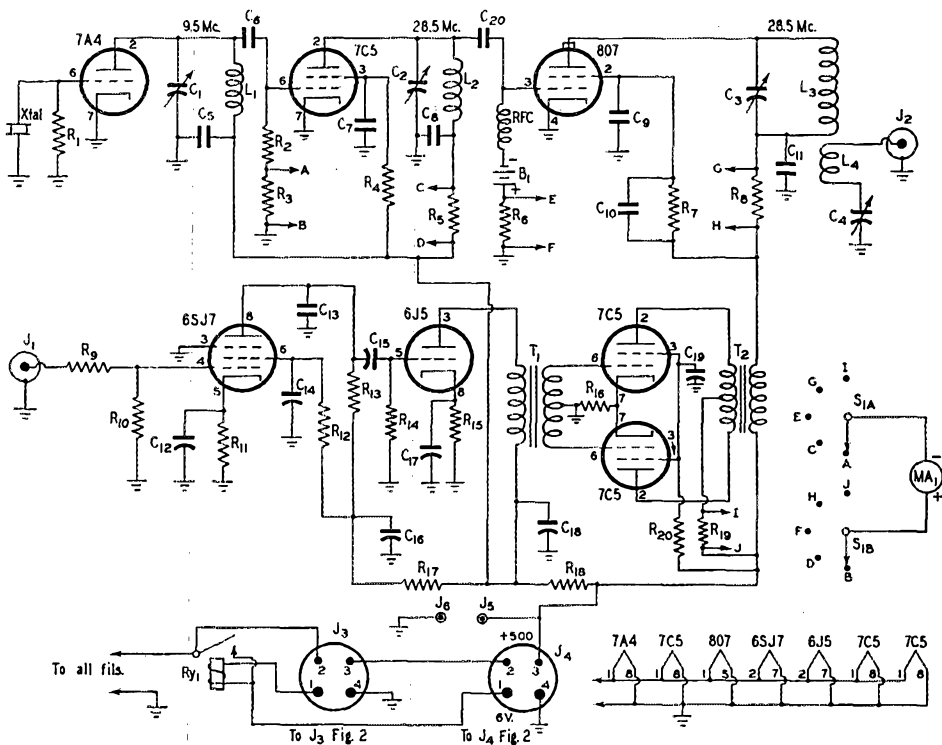


Fig. 1 — Circuit diagram of the 30-watt mobile transmitter.

C₁, C₂ — 35- μ fd. midget variable.

C₃ — 50- μ fd. variable.

C₄ — 100- μ fd. variable.

C₅, C₈, C₉, C₁₁ — 0.001- μ fd. mica.

C₆, C₂₀ — 47- μ fd. mica.

C₇ — 100- μ fd. mica.

C₁₀ — 0.01- μ fd. bathtub.

C₁₂, C₁₇ — 10- μ fd. electrolytic.

C₁₃ — 470- μ fd. mica.

C₁₄ — 0.1- μ fd. paper.

C₁₅ — 0.02- μ fd. paper.

C₁₆, C₁₈, C₁₉ — 8- μ fd. electrolytic.

R₁ — 68,000 ohms, 1 watt.

R₂, R₉ — 0.1 megohm, $\frac{1}{2}$ watt.

R₃, R₆ — 100 ohms, 1 watt.

R₄, R₇ — 25,000 ohms, 10 watts.

R₅, R₈, R₁₉ — Meter shunts (see text).

R₁₀ — 4.7 megohms, $\frac{1}{2}$ watt.

R₁₁ — 1200 ohms, $\frac{1}{2}$ watt.

R₁₂ — 1 megohm, $\frac{1}{2}$ watt.

R₁₃ — 0.22 megohm, $\frac{1}{2}$ watt.

R₁₄ — 0.68 megohm, $\frac{1}{2}$ watt.

R₁₅ — 2200 ohms, $\frac{1}{2}$ watt.

R₁₆ — 750 ohms, 10 watts.

R₁₇ — 47,000 ohms, $\frac{1}{2}$ watt.

R₁₈ — 5000 ohms, 10 watts.

R₂₀ — 50,000 ohms, 10 watts.

L₁ — 18 turns No. 30, $\frac{5}{8}$ -inch diam., close-wound.

L₂ — 5 turns No. 12, 1 $\frac{1}{2}$ inches diam., 1 $\frac{1}{2}$ inches long, self-supporting.

L₃ — 6 turns No. 12, 1 $\frac{1}{8}$ inches diam., 1 $\frac{1}{2}$ inches long, self-supporting.

L₄ — 2 turns No. 12, 1 $\frac{1}{8}$ inches diam., self-supporting.

B₁ — 45-volt "B" battery.

J₁, J₂ — Amphenol connector, 75-PC1M.

J₃, J₄ — 4-prong male plug.

J₅, J₆ — Tip jack.

MA₁ — Milliammeter, 10-ma. scale (see text).

RFC — 2.5-mh. r.f. choke.

Ry₁ — 6-volt s.p.s.t. relay.

S₁ — 2-section 5-position rotary switch.

T₁ — Interstage transformer, single plate to push-pull grids.

T₂ — Modulation transformer, 10,000-ohm p.p. plates to 8600-ohm 807 (Kenyon T-489).

As the circuit diagram of Fig. 1 shows, a standard ten-meter crystal is used but it is operated at its fundamental frequency of about 9.5 Mc. The addition of a tripler means a few more parts, but it pays off in extra stability and ease of adjustment. After all, you don't want to unlock the trunk and retune the transmitter every time you use the rig. The 7C5 tripler floats along and supplies plenty of drive to the 807 final.

The oscillator plate coil, L₁, is wound on a $\frac{5}{8}$ -inch bakelite form mounted solidly on the chassis. The tripler plate coil, L₂, is an air-wound job mounted on the outside terminals of a three-lug terminal strip, the center terminal being used to mount the multiplier for the meter used to measure plate current of that stage. Don't worry about the losses here, since there is lots of drive and the bakelite is a lot easier to mount than a pair of stand-offs.

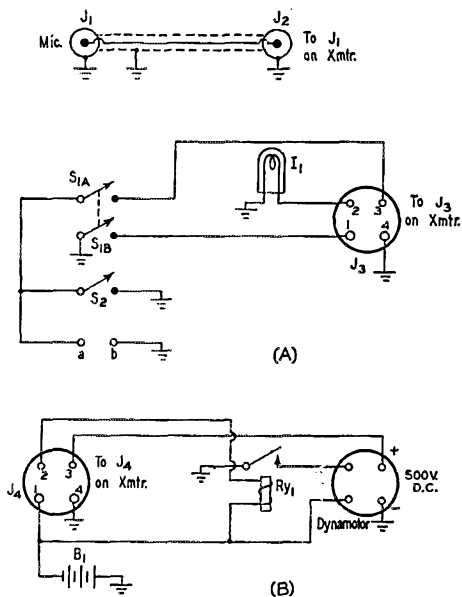


Fig. 2 — Diagram of control (A) and power connections (B) for the 30-watt mobile transmitter.

- B₁ — 6-volt storage battery.
- I₁ — 6-volt indicator lamp.
- J₁, J₂ — Amphenol connector, 75-PC1M.
- J₃, J₄ — 4-prong female plug.
- Ry₁ — Relay in PE-103 unit.
- S₁ — D.p.s.t. toggle.
- S₂ — S.p.s.t. toggle.

Terminals *a* and *b* are for connection to handset-cradle switch.

The final tuning condenser, *C*₃, and its associated tank coil, *L*₃, are mounted up on a 3½-inch steel bracket to shorten the lead to the 807 plate. This puts the tank coil itself close to the top of the cabinet cover and this must be considered when making the layout. The arrangement also places the tuning-control aperture above the vents in the cover. If the pick-up-loop assembly and tank coil are constructed as shown in the photos, adjustment of the coupling may be made by inserting a screwdriver through the vents to push the loop into position. A tuning lock for the final tuning condenser was found necessary and is mounted on the cabinet cover so the condenser can be locked after tuning the rig.

All r.f. circuits are metered with an altered 100-ma. meter through a range switch, *S*₁. The internal shunt supplied with the meter was removed from the case and installed at one of the positions of the range switch. Its value was measured with a bridge and two more shunts wound with fine copper wire using high-resistance one-watt resistors as winding forms. This meter had a 10-ma. movement which made it just right for measuring the grid currents. Any 10-ma. meter, with proper shunts, could be substituted, of course. The range switch is wired so it reads

tripler grid current, tripler plate current, final grid current, final plate current, and audio plate current in succession.

A 45-volt battery mounted under the modulation transformer supplies fixed bias for the 807. This takes up little room and protects the final tube. The screen of the tube is modulated through a 0.01- μ fd. condenser shunting the screen voltage-dropping resistor. This resistor is mounted by its leads to a bathtub-type condenser, all the rest of the 10-watt resistors being mounted on end to the chassis by bolts. This makes a solid mounting and helps them run cooler.

The audio components are mounted along the back of the chassis. No volume control is necessary since the gain is about right for use with a crystal microphone. If desired, a high-resistance volume control can be installed in the control head on the dash. Those who wish to use a carbon microphone can eliminate the 6SJ7 tube and mount a transformer in its place.

Since there is a lot of r.f. floating around the chassis, a few measures must be taken to make the audio system stable. First, make all grounds around the speech tubes short and direct. Bypass the 6SJ7 plate with a 470- μ fd. condenser, *C*₁₃, and also by-pass the filament supply right at this socket. Insert *R*₂ in the hot microphone lead at the connector where it comes through the chassis.

A plate voltage of 500 is rather high for the 7C5 tubes, but they take it without overheating. Of course, it is necessary to reduce the screen voltage and to increase the grid-bias voltage by using a high value of cathode resistor. They supply plenty of audio for the final.

The filament relay can be seen in the bottom view. This is used to reduce the voltage drop that would occur if the hot filament went all the way up to the dash for switching.

The antenna-tuning network is simply a 2-turn pick-up coil and a 100- μ fd. variable, the output of which is connected to an Amphenol 75-PC1M chassis connector.

Installation

The installation is the toughest job of all. First, mount the dynamotor. This comes complete with shocks and a mounting plate. It is mounted along the side of the trunk. The rig was mounted on steel straps directly over the dynamotor to conserve space. Now the battery is mounted in a battery case and firmly anchored to the trunk floor. To do this, it may be necessary to weld it. The heavy battery leads that come with the dynamotor should be shortened and regular battery terminals soldered to the leads. A blowtorch will be needed for this job, as these leads are good and heavy and the work takes a lot of heat. If you wish, a little battery charger can be installed permanently in the trunk to keep the battery up to snuff. You can figure that the

full-load battery drain will be about 25 amperes.

The antenna is an ordinary 100-inch car antenna which was mounted on a 1½-foot piece of 1-inch steel strap vertically attached to the bumper with bolts. This type of mounting results in less damage to the car than the mounting over the rear wheel which the police use, and it does not affect the range too much. RG-58U concentric cable is used to feed the antenna. Ground the outside braid at the steel strap at the base of the antenna and connect the center conductor to a tapped-screw arrangement which can be made at the base of the antenna. The connection at the transmitter end is conveniently made with a microphone-connector plug.

Now all you have to do is run a four-conductor battery cable and a single-conductor shielded microphone cable up front to the dash control box and terminate them in plugs. Receptacles for these plugs, the control switches, microphone connector, and pilot light, wired as in Fig. 2-A, are mounted in a small 4 × 4 × 2-inch box which is mounted under the dash. The pilot light is a reminder that the filaments are on and is a battery-saver.

If you are able to get a hang-up type of telephone handset, it can be used. The one used with this transmitter had the carbon button removed and the insides of a crystal microphone substituted. The fit was perfect. The 'phone mount itself may be used as a place to park the handset when not in use if you don't mind mounting it in this manner. The contacts on the mount can be used to turn the dynamotor on when the 'phone is removed from the hook.

Tuning

While tuning up, the transmitter power may be controlled locally by the breakers on the dynamotor. These breakers, by the way, are very good and will trip the instant an overload occurs in either of the power circuits. There is enough leeway in the current consumption in this rig so the breakers should not trip while you are tuning up; if they do, check your wiring.

Meter readings should run about the following values:

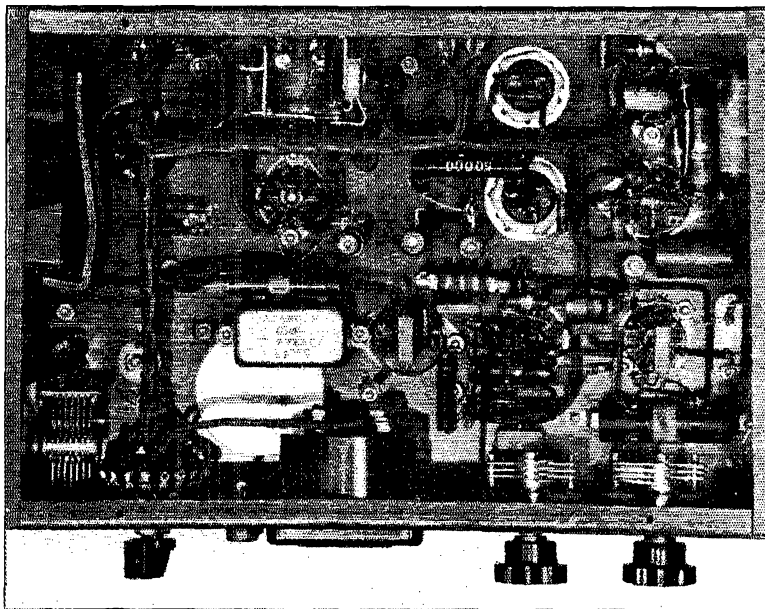
Tripler grid	1 ma.
Tripler plate	20 ma.
807 grid	4 ma.
807 plate	60 ma.
Audio (resting)	30 ma.

For hamming fun, nothing beats having a rig in your car. One advantage is that you don't have to tear down your station to change your QTH!

About the Author

• Not content with a full working day's diet of radio as chief engineer of WINR, Adelbert Kelley doesn't miss a chance for pursuing the game along hobby lines. Besides operating his home station and the splendid car rig just described, W2V SX is now deep in plans for a v.h.f. set-up to be installed in his recently-purchased Ecoupe plane. Mr. Kelley received his ham ticket in 1941, and is also holder of a commercial radiotelephone first-class license.

Bottom view of the 30-watt mobile transmitter showing the oscillator and tripler tank condensers and coils to the right and the antenna condenser to the left. The meter and its switch are at the center. The control relay is mounted against the rear edge of the chassis.





The World Above 50 Mc.

CONDUCTED BY E. P. TILTON,* WHDQ

SOUTH AMERICA — take it away! With amateurs all over the world watching for signs of 50-Mc. DX during March, our friends in Latin America seem to be catching most of the openings. Beginning in mid-February, and continuing as we write, the 6-meter band has been open for one kind of DX or another almost continually below Latitude 20, and alert operators in Argentina, Chile, Uruguay, Brazil, Peru, Surinam, Guatemala and Mexico have been making the most of it.

By what appears to be sporadic-E skip, inter-country work over distances from 700 to 3000 miles has been an almost nightly occurrence, and two-way work between Mexico and Argentina, a 4500-mile hop, has been almost equally consistent. W4s and W5s have also worked Argentina and Peru on several occasions. But the high spot of the month came on March 12th, when KH6PP worked LU9EV — the first 50-Mc. work between the Hawaiian Islands and South America. The distance is more than 7500 miles, second only to the CE1AH-J9AAO contact of last fall in the list of long hauls covered on 50 Mc.

That new call, KH6PP, should not be hard to figure out — who but ex-W7ACS/KH6 would be making the first South American contact from KH6? Gene had been looking for South Americans for some time, but the first sign of amateur signals from that direction since last fall came when a Spanish-speaking voice was heard at 2:52 P.M. Hawaiian Time on the 12th. A CQ at 3:07 netted LU9EV, followed by LU6DO. Intermittent checks were made with LU9EV until 4:10, when LU4BO and LU1DO were worked, the opening fading at 4:30.

This seemed a little late for work in an easterly direction (it was 11:30 P.M. Argentine Time by then) so KH6PP was on hand earlier on the 13th. Nothing was heard until 11:00 A.M. HST when more Spanish voices came through. A CQ brought an answer from CX3AA, Montevideo, Uruguay, with S9-plus signals both ways until 11:20. At 11:24 Gene worked W6CDQ, despite a beam bearing more than 60 degrees south of the States. W6ZBZ was worked at 11:36 and the beam swung toward the States at this point. W6BOS, W6UOV and W6QFT followed, up to 12:06 P.M., when the band appeared dead. Then, suddenly, at 12:11 LU5BJ was heard

* V.H.F. Editor. QST.

S9-plus, and another string of contacts ensued, including LU5CK, LU9EV, LU1AN, LU9AS and LU6BO. The opening ended at 1 P.M.

On the 14th the band opened at 10:42 A.M., and contacts were made with LU6DO, LU1DO, LU3BD, CX1AA and LU9EV between then and noon. During these openings many other stations were heard, but identification was impossible because of the rapid-fire Spanish. A number of the LUs do not speak English, and Gene knows no Spanish, so quite a few were left out in the cold. Signals were heard as high as 51.3 Mc.

March 14th was a big day for the Florida W4s also. Beginning about 1:30 P.M. EST the signal of LU7WA, Comodoro Rivadavia, Argentina, less than 300 miles north of Cape Horn, broke through in Orlando and Jacksonville. W4EID hooked him first, followed by W4GJO, W4FLH, W4IUJ and W4JEP, the signal fading out at about 2:50 P.M. These were the first Argentine contacts from W4, and are of particular interest in view of the far-south location of LU7WA, about 1000 miles below Buenos Aires. LU7WA has not appeared in any other DX reports received here to date.

An opening to Argentina on March 18th is reported by W5VY. Operating portable in Laredo, Texas, Pat worked LU9MA at 7:55 P.M. Several Spanish-speaking stations were heard which could not be identified, except that they included a PY and a number of LUs. Spanish-music broadcast harmonics were heard up to about 50.4 Mc. at the same time.

March, 1947, was a tough period for OA4AE and OA4BG, Lima, Peru. They were watching 50 Mc. carefully for signs of an opening, but only a few contacts were made. March, 1948, was quite a different story. With new stations showing up almost nightly, there was no dearth of activity on 6. From Feb. 17th to March 14th, the log of OA4AE shows 50-Mc. DX worked on 18 out of a possible 26 days, with prefixes worked including LU, PY, XE, W4, W5, CX, CE and PZ, not to mention W5BSY/MM in the Pacific, off Costa Rica! Buz is on almost every day between 12:30 and 2:30 and 7 P.M. to 1 A.M. EST, testing for 5-minute intervals every 15 minutes, beginning at 5 minutes past the hour.

OA4BG reports that the band has been open practically every evening for six weeks, up to March 21st, to LU, CX, CE, PZ, or XE, with less

frequent daylight openings to W4 and W5. W5JTI, Jackson, Miss., was worked with S9-plus signals on March 6th at 3 p.m., and W4s were worked on several occasions. TG9JW was contacted on the 21st, and on Feb. 25th KZ5AY was worked crossband, with the latter on 28 Mc.

Champion in the maritime-mobile class is W5BSY/MM, aboard the S.S. *Dolly Turman*. On a trip from the Gulf to Shanghai, China, and return, Trav worked his first 50-Mc. DX of the trip on March 9th, while approaching the Panama Canal off the West Coast of Costa Rica. Beginning at 8:30 p.m. EST, contacts were made with OA4AE, OA4BG, LU1DO, LU4BO, LU6DO, LU6DJI, LU9MA, CE1AH and CX3AA in a 2½-hour opening. The next night LU5CK and LU9EV were worked. Previous to the first South American contacts, Trav had heard Southern California, Arizona, Texas, and Mexico stations, while farther out in the Pacific.

The CRPL prediction charts for March looked good for a 50-Mc. contact across the South Atlantic, the predicted m.u.f. for the path from parts of South America to South Africa being about 46 Mc., higher than the prediction for the North Atlantic hop from W to Europe on at least two occasions when the latter path has been open. CE1AH has been monitoring 50 Mc. almost constantly, in this direction as well as north and west. On March 19th, between 8 and 8:20 a.m., Ida heard two stations in the 6-meter band, both apparently harmonics. One, on 50.52 Mc., was carrying a musical program, with announcements in English, the announcer having a definitely "English" delivery. The other, on 50.64 Mc., had no apparent modulation. Both signals came in only with the beam on South Africa. On the 29th a signal, believed to have been ZS1P, who was testing at the time, was heard around 2 p.m. EST.

The location of CE1AH has some peculiar characteristics. Up in the mountains at about 10,000 feet elevation, Larry and Ida have had results on 10 meters almost exactly opposite to those of other South American stations. The same seems to be true on 6. Ida hears the LUs and CXs working Mexico and Peru night after night, but she has never heard XE1KE, and her contacts with the OAs are few and far between. When the LUs were working KH6PP she was hearing them, but could find no sign of Gene. Almost all of her contacts on 6 have been late at night, despite your conductor's protestations that 6-meter DX is a daytime phenomenon!

◆

Moving day presented no problems at W1FLQ. With his shack built inside a windmill tower, it was merely necessary to pick up the structure bodily and set it down on foundations at the new QTH.

The band is often still open at 1 a.m. or so when Larry and Ida finally call it a night.

After having been trying for about a year, PZ1A, Surinam, made 50-Mc. DX contacts on March 11th. Listening on 6 around 9 p.m., Rene heard his first 6-meter signal, an LU. Having taken his 6-meter beam down temporarily, he was listening on the 10-meter beam, which could not be made to load in a hurried check on 6, so he hung up a 6-meter dipole on the ceiling of his basement shack and connected a 72-ohm line to it. It loaded up, so despite its being practically underground, Rene called LU6DO, who was coming in S9, and a contact resulted at 9:30. LU9MA was heard (Paramaribo to Mendoza is 2700 miles) and OA4AE and OA4BG were worked between 10 and 10:30. Again on the 12th, LU9MA, LU1DO and LU8HE were worked between 9 and 10 p.m., after which about ten broadcast harmonics were coming in all through the 6-meter band. The band has been open almost nightly since, usually between 8:30 and 10:30 p.m., and Rene worked LU, CX and OA stations on the 16th, 17th and 21st.

If the 4500-mile hop from Mexico to Argentina is being made by means of sporadic-E skip, it is certainly much more consistent than long-haul E_s DX has ever been in this hemisphere. Between February 18th and March 11th XE1KE found the band open to South America, usually to Argentina, on 18 nights out of a possible 21!

(Continued on page 132)



Nuts & Bolts

How To Get That "Commercial" Appearance

BY JOHN ALVIN WEBER, * WSJL

IN ham radio gear it is often necessary or desirable to alter the manufactured unit, using odd-shaped holes and brackets for parts mounting. In any metal under $\frac{1}{16}$ inch thick, holes are best cut with a sharp chisel and a metal backing plate. For metal thicker than this, it is often necessary to drill holes around the outline, knock out the metal with a small chisel, and file around the edges. An even better method, where a small power-driven jig saw is available, is to drill one hole, slip the blade through, and saw the desired outline. Believe it or not, an ordinary run-of-the-dime-store three-for-a-nickel jig-saw blade is good for cutting a 2-inch meter hole in $\frac{1}{8}$ -inch steel panel!

For the boys who like suitcase-size hearing aids and pocket-size kilowatt rigs, there is usually the problem of special chassis and shield sizes. The job is right next to impossible without a good bench vise, a 5- or 6-inch "C" clamp, and assorted sizes of metal blocks. The metal is clamped

• This article is a collection of hints and kinks which will be found of more than usual interest to the constructor. They are the little things which spell the difference between haywire and a job with a finished appearance.

the next new circuit comes out), it is desirable to paint the chassis and panel to prevent corrosion. Commercially-painted units will have bare edges and chips after the metalwork is completed. The best way to repair these is to use a small bottle of automobile touch-up enamel *before* corrosion begins. In the case of unpainted units, all corrosion and pencil marks should be removed with fine emery paper. Then the metal should be thoroughly cleaned with unleaded ("white") gasoline or lacquer thinner. It is not good practice to put enamel over bare metal, and never advisable with lacquer. Use a coat of auto-body undercoat on the bare metal and put the lacquer or enamel over this. If there are many holes, it will be necessary to spray on the paint to prevent build-up around the holes and to allow proper drying. A small Flit gun or Windex sprayer works nicely and is inexpensive. Slosh a little thinner around the container when finished and spray it out the nozzle to clean the gun.

Proper storage of leftover paint represents a big saving if much work is done. If the can is over half full, put the lid on tightly, turn the can over a minute, then turn it back and put it away. This leaves a thin film of paint around the top which dries and keeps scum from forming in the can. If the can is less than half full, there is enough air in the can, even with the lid on, to form a scum. In this case, carefully pour a little thinner over the top of the paint and then close the can and put it away. In case scum forms, pouring the paint through cheesecloth will get rid of the lumps. (This is hard to do with fast-drying lacquers, however.)

Just as with locating the "key" positions on tube sockets, the careful constructor will visualize his circuit, measure the available terminal-board space, and shuffle the small parts on that space until the best electrical and mechanical design results. Once the layout is determined, mark the junction points on a piece of $\frac{1}{8}$ -inch bakelite of appropriate size to fit the space, drill holes at

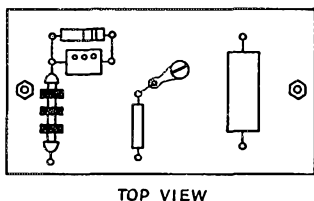
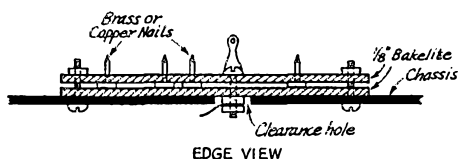


Fig. 1 — Homemade terminal or tie-point board.

between two of the blocks, using the vise at one end and the clamp at the other. The metal is folded as far as possible and then bent the rest of the way using a rawhide mallet or part of the YL's croquet set. In general, bend the long lips, long sides, short lips, and short sides in the order named. For special shapes, careful thought is necessary in order to allow for metal thickness and to make the bends in such an order that the piece can be finished successfully.

In case the equipment is to be permanent (until

*908 West 30th St., Austin, Texas.

these points, and push small flat-headed brass nails through. A $\frac{1}{16}$ -inch bakelite "back-up plate" is then bolted on over the heads to hold the nails in and to insulate the connections from the chassis, as shown in Fig. 1. In case a feed-through is needed, merely drill a clearance hole in the chassis and use a small bolt with lugs on each side, instead of the brass nail. This method is handy on the back side of a chassis, allowing neat mounting of parts as well as providing external tie-points.

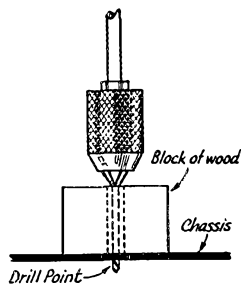


Fig. 2 — Method of limiting the travel of a drill to prevent damage to parts which may have been mounted underneath the chassis before drilling.

Even in the most careful designs, it is often necessary to drill an extra hole or two after some of the parts have been mounted. To keep from ventilating some of the parts with the drill, start the hole, then remove the drill and slip a metal tube or wood block of the correct size over it, as shown in Fig. 2, and resume drilling without danger of punching through. Unless an intermittent, low-resistance connection is specifically desired, it is advisable to remove the metal shavings after drilling. This is pretty hard to do unless some vaseline or cup grease to hold the chips has been spread over the point where the hole is drilled. The grease is wiped off with a clean linen handkerchief after the drilling is complete.

Lockwashers are a necessity where vibration is a problem or where a good ground must be maintained. In some cases close spacing of parts makes nuts and washers difficult to reach. The use of self-tapping screws is one solution. Another one is to glue all hard-to-reach nuts and washers down with "speaker-shim cement or similar material. This will hold them until the screw is engaged, saving unnecessary finger exercise and possible nervous frustration.

In locations where salt air or corrosion is a serious problem, a new material called "Silicone" can be used to advantage. It provides a tough, airtight film on switch contacts, condenser bushings, and socket terminals. It is applied over the clean metal with a small brush and promptly forgotten.

And now for a couple of general design notes. Always place wire-wound resistors and electrolytic condensers where they can be easily re-

placed — they may go bad before you decide to rebuild. Isolate grid and coupling circuits as well as possible (in audio equipment), and fit d. c. leads and decoupling circuits in the remaining space. In r. f. circuits, a trial-and-error layout based on experience and a wee bit of luck is advisable. It is necessary to remember that the layout with the neatest appearance is not always best; the return circuits are often thought of long after the top half of the circuit is wired. Power circuits should be designed with easy servicing, proper insulation, and good mechanical layout in mind. Fuses are still a good investment, especially when wired into the circuit and not replaced with $\frac{1}{4}$ -inch extension shafting!

Silent Keys

IT is with deep regret that we record the passing of these amateurs:

W1OTO, Herbert C. Barnes, New Bedford, Mass.

W1PLI, E. W. Hugli, Milford, Conn.

W1SB, ex-W2SB, Richard H. Depew, jr., Garden City, L. I., N. Y.

K2AA, ex-NU3JW, ex-W3AQM, ex-W2AQM, William R. Ebensperger, Gloucester City, N. J.

Ex-W2HQO, Chauncey Shean

W2JUK, Howard W. Keil, Buffalo N. Y.

W2OXD, Stephen T. Van Esen, White Plains, N. Y.

W3BIT, ex-XW8BIT, ex-XW8FIR, Howard Jamison, Pittsburgh, Penna.

W3GB, Otis B. French, Philadelphia, Penna.

W3OVD, Ludwig Snyder, Dravosburg, Penna.

W6HY, Henry Travis, San Diego, Calif.

W7CMB, Sgt. Harold G. Ingledue, ACS

Ex-W8NEO, Floyd J. Van Buskirk, McKeesport, Penna.

W8TPV, Robert B. Bradley, Midland, Mich.

W9EZT, Maurice N. Driscoll, Antigo, Wisc.

W9LUA, Dr. J. P. Hotchkiss, Chicago, Ill.

W9VH, Fred C. Booty, Naperville, Illinois

W0KQA, Lyle A. Wood, Ironton, Minn.

W0THD, Newell F. Weber, Forest City, Iowa

Henry L. Yoder, Treasurer, Delaware Valley Radio Association

KP4DY, ex-K4FAB, Santos Ramirez, Sub-Treasurer of Puerto Rico, Santurce

VE7FX, ex-VE5AP, Fred Butterfield, Victoria, B. C.

VK5WR, W. Richards, Menindie Gardens, South Australia



Hints and Kinks

For the Experimenter



ADDING TONE MODULATION TO THE BC-221 FREQUENCY METER

[There are several versions of the BC-221 frequency meter in existence, each differing slightly from the other, but all being basically the same instrument. Models that are not equipped for tone modulation of the output signal may be modified without difficulty, thus adding greatly to their utility. Here are the details needed for making the necessary changes, as sent in by W3NHA and W3MIHW. — *Ed.*]

THE Model BC-221-M differs from others in that resistance coupling is used in the audio amplifier output instead of transformer coupling. The original circuit and the modifications are shown in Fig. 1. A push-pull-output-to-line trans-

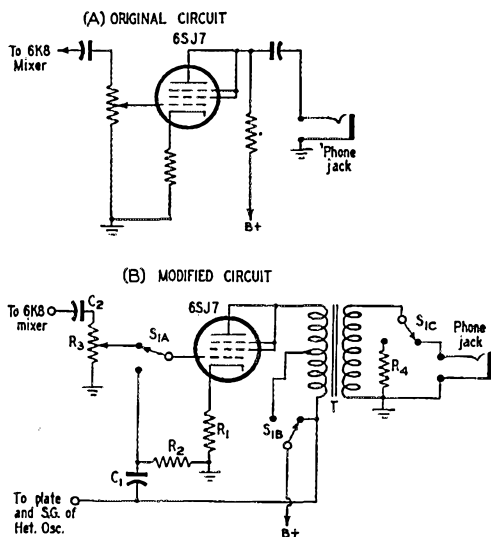


Fig. 1 — The original circuit of the BC-221-M is shown at A, the modified circuit at B. Tone modulation is provided by using a center-tapped output transformer and a switch to convert the audio amplifier to an oscillator.

- C₁ — 0.001- μ fd. mica.
- C₂* — 0.02- μ fd. paper.
- R₁* — 300 ohms.
- R₂ — 0.22 megohm, $\frac{1}{2}$ watt.
- R₃* — 0.5-megohm potentiometer.
- R₄ — 6200 ohms, $\frac{1}{2}$ watt.
- S₁ — 3-pole double-throw rotary switch.
- T — Push-pull output transformer.

* These components are included in the original circuit.

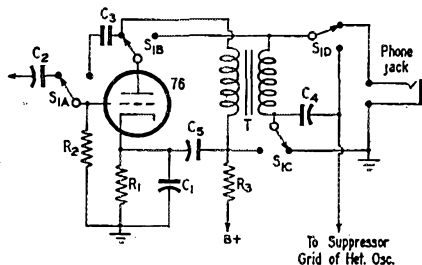


Fig. 2 — In models having transformer-coupled output, such as the Navy Model LM, tone modulation may be installed as shown here.

- C₁ — 25- μ fd. electrolytic.
- C₂ — 0.02- μ fd. paper.
- C₃ — 470- μ fd. mica.
- C₄ — 0.04- μ fd. paper.
- C₅ — 0.05- μ fd. paper.
- R₁ — 3000 ohms.
- R₂ — 1 megohm.
- R₃ — 22,000 ohms.
- S₁ — 4-pole double-throw rotary switch.

former (500 or 600 ohms) is connected as shown. A three-section two-position switch is then used to convert the audio amplifier to an oscillator, and to apply the resulting audio tone to the heterodyne oscillator in the signal-generator section of the unit. The change-over switch is mounted in place of one of the extra 'phone jacks on the panel.

Some variation in the percentage modulation and the modulating frequency can be obtained by selection of the value of the loading resistor R₄. The value shown produces about 50-percent modulation and a frequency of about 800 cycles.

In other units, transformer coupling is used, but the transformer does not have a tapped primary. The Model LM (Navy version) is in this classification. The connections shown in Fig. 2 can be used to advantage with these units.

— *Herb Carlson, W3NHA*

ANOTHER way of accomplishing tone modulation of the BC-221 is shown in Fig. 3. As in the method described above, the audio amplifier is converted to an oscillator, and the audio is applied to the screen grid of the variable-frequency oscillator. A volume control is added to vary the amount of feed-back and the tone. The VFO frequency is not noticeably affected by the varying screen voltage. The following modifications are necessary:

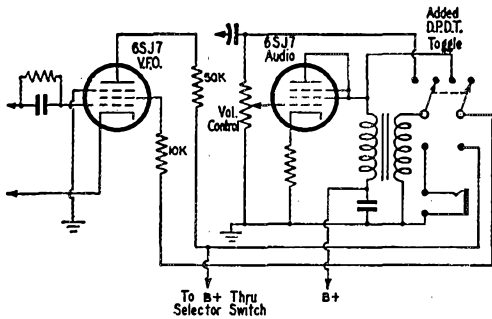


Fig. 3 — A third method of adding modulation to the BC-221. This method applies to transformer-coupled models. The only additional part required is a d.p.d.t. toggle switch.

Remove the upper of the two 'phone jacks and its associated wires. Ream the panel hole to pass the shaft of a d.p.d.t. toggle switch. Reverse the secondary connections of the output transformer. Make the wiring connections shown in Fig. 3. With the toggle switch in the lower position, the BC-221 is in its original condition. When the toggle switch is in the upper position, the r.f. output of the variable-frequency oscillator is tone-modulated at about 400 c.p.s.

— Chester B. Cunningham, W3MHW

HIGH-VOLTAGE WARNING BLINKER

IN line with the slogan "Switch to Safety," some form of warning indicator light for the high-voltage supply was needed on the transmitter at W6GM. While indicator lights are useful, one is apt to become accustomed to a steady pilot lamp and make the wrong move anyway. A blinker lamp does a much more

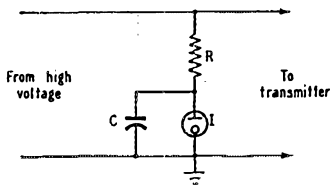


Fig. 4 — A neon blinker for addition to the transmitter as a high-voltage warning. The rate at which the neon tube blinks may be set by the value of the resistor used.

C — 0.5- μ fd. 400-volt paper.
R — 30 megohms (10-meg. $\frac{1}{2}$ -watt units in series).
I — $\frac{1}{4}$ -watt neon lamp (G.E. NE-45).

effective job of keeping one's subconscious informed that the high voltage is on.

A very simple neon blinker can be made as shown in Fig. 4. The value of resistance shown is about right for a 1200-volt supply, and produces a blinking rate of about one per second. This resistance must be adjusted according to the

voltage of the power supply and the desired rate. If the neon light glows steadily, the resistance is too low. A clear-glass jewel should be used instead of a colored one to permit maximum effectiveness of the neon glow.

— George W. Ewing, W6GM

IMPROVING THE MEISSNER 150-B FOR C.W. WORK

THE first attempt to work c.w. with this surplus transmitter is very disappointing, for it is quite evident that break-in operation was not required by the military, and was not contemplated in the design of the rig. The primary difficulty is a very strong signal received at the transmitting frequency when the key is open. This is caused by continuous operation of the VFO, keying being done in the doubler stage. In addition, some form of screen control is required to prevent the screen

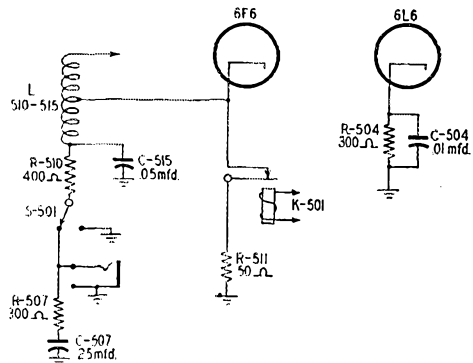


Fig. 5 — Method used by W0ARH to obtain oscillator keying in the Meissner 150-B transmitter. The symbols are those of the original transmitter diagram. No new parts are required, but rearrangement of the keying and grid circuits is made as shown.

voltage of the 813, which is obtained through a dropping resistor from the plate supply, from soaring when the key is open.

The exciter unit can be adapted readily to oscillator keying with a minimum of modification. The stability of the oscillator is in no way affected, and keying is clean and chirpless. The modified circuit is shown in Fig. 5. In making the conversion, refer to the instruction book for the transmitter for the original circuit. Disconnect the ground lead from the socket X-508. Remove the wires from switch S-101. Remove R-510 and C-115, and unsolder so that they are available as separate units. Connect a wire from the cathode of socket X-506 to the bus strip from which R-510 and C-515 were removed. Disconnect R-504 and C-504 from the keying line and ground. Connect the keying line to the left-hand terminal (viewed from the bottom, front panel facing you) of

(Continued on page 146)

A Peak-Indicating Modulation Monitor

Flasher-Type Indicator Adjustable for Any Modulation Percentage

BY JOHN S. DENHAM, * W6NPO

If you are operating a 'phone transmitter (and I understand about half of us are) it may have occurred to you that your method of checking modulation percentage could be more effective. Probably one ham in ten has a modulation monitoring system that is capable of accurate results, and only a small proportion of these make use of it.

The cathode-ray oscilloscope is capable of accurate measurement but requires that the operator constantly watch the screen, and the screen may not be visible if the shack has enough light for reading the log and call book. With the trapezoid 'scope pattern only the little tail extending from the point of the triangle indicates the presence of modulation over 100 per cent. This is easily overlooked when the peak which produced it was of short duration. When using the envelope-type pattern, 100-per-cent modulation

• The peak-type indicator that is used in many broadcast stations has not found very much use in amateur 'phone. Here is a simplified version combining positive indication with a high order of accuracy.

line, or the output of a detector which rectifies some of the r.f. output from the transmitter. The meter reads the *average* value of the applied a.c. Only when this a.c. is of known waveform can any relationship be established between meter readings and *peak* a.c. voltage. It is the *peak* voltage that causes overmodulation. If the modulation is of sine-wave form, the situation is very simple, but speech is another critter. Speech has an entirely different ratio between average and peak voltage from that of a sine wave, so as a modulation-percentage indicator the meter is of limited usefulness, unless the operator happens to speak in pure sine waves!¹

A third type of modulation indication is that which the broadcast stations use — by FCC requirements, I believe. This indicator flashes a light every time the modulation on peaks exceeds a preset percentage. This indication does not require the constant attention of the operator, as does the oscilloscope, because the flash can be seen even though the operator is not looking directly at the light, nor does it suffer any of the inaccuracies of the meter type of indication. The purpose of this article is to describe a simplified version of one of those expensive and complicated broadcast monitors.

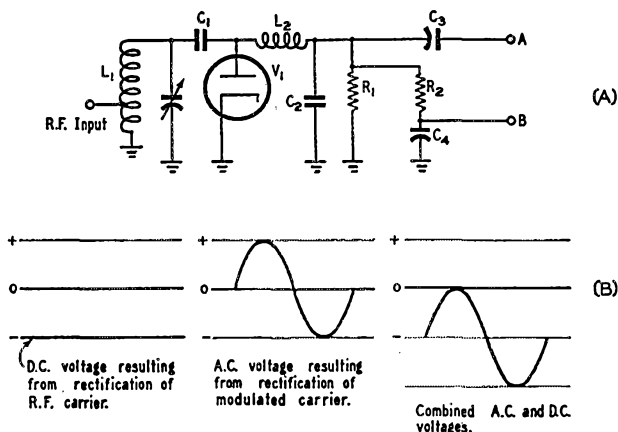


Fig. 1 — A — Diode-rectifier circuit with provision for separate a.c. and d.c. outputs. B — D.c. and a.c. voltage outputs of the diode and their combination. The d.c. voltage from the circuit at A is negative with respect to ground.

is indicated by a row of small brightened spots along the center of the pattern. These spots are not very bright, and unless 100-per-cent modulation is considerably exceeded, they are practically unnoticeable. These factors reduce the effectiveness of the 'scope for continuous modulation monitoring.

Probably the majority of hams make use of a meter driven by audio. This meter is operated by Class B plate current, voltage across a 500-ohm

* Route 1, Box 425-A, Colma, Calif.

Operating Principles

The indicator operates by comparing the d.c. and a.c. components that result from the detection of a modulated carrier by a diode. The relationship between these voltages is such that the

¹ Such a meter can be made reasonably accurate when calibrated for a particular voice with the help of an oscilloscope. However, because of the variability of voice waveforms, it is chiefly useful as an indicator of "average" percentage of modulation, rather than for catching instantaneous peaks. — Editor

audio peak voltage is proportional to the percentage of modulation and just equals the d.c. voltage when the carrier is modulated 100 per cent. This relationship is independent of carrier strength, so a meter operating on the comparison basis will be independent of its r.f. input voltage and will operate with accuracy without readjustment for various transmitter input powers.

Fig. 1-A shows a diode detector with means for separating the d.c. and a.c. output voltages. Capacitor C_2 is an r.f. by-pass. The audio component is taken off through the coupling capacitor, C_3 , which blocks the d.c., the audio appearing between point A and ground. The mixture of d.c. and a.c. that appears across R_1 is applied to a filter, R_2C_4 , which removes the audio component and leaves pure d.c. if the resistance and capacitance are large enough. The d.c. output then appears between point B and ground. This detector, which is arranged so that the d.c. voltage is negative with respect to ground, is essentially the same as the second detector in a superhet receiver, where the d.c. output would be used for automatic gain control.

If we were to superimpose the a.c. voltage on the d.c., the result would be as is shown in Fig. 1-B. At 100-per-cent modulation the a.c. voltage will alternately drive the d.c. to twice its normal value and reduce it to zero. If this combination of d.c. and a.c. is applied to the grid of a suitable tube, the grid can be held at a negative voltage, cutting off the plate current, until a 100-per-cent modulation peak comes along. This will reduce the d.c. voltage momentarily to zero, at which time the tube conducts and we can use its plate current to operate an indicator.

An instrument that will indicate only at the point of 100-per-cent modulation would be of value, but it would be much more useful if it could be made to read at any desired percentage between zero and 100 per cent. Fig. 2 shows how this can be done. R_1 of Fig. 1 has been replaced by a potentiometer. Any desired percentage of the d.c. voltage can be taken off simply by setting the potentiometer to the proper point. With the contact halfway down, half the d.c. is taken off and the peak a.c. output from the detector will equal the d.c. at only 50-per-cent modulation. If the potentiometer is linear, a 0-100 scale can be used on the dial and the instrument calibrated for any modulation percentage in the range from 0 to 100.

One possible way to make the plate current of V_2 give an indication also is shown in Fig. 2. Potentiometer R_5 is adjusted to the point where the neon bulb is just extinguished when no signal is applied. When a modulated r.f. signal is applied to the diode detector, V_2 remains cut off

until a modulation peak comes along that exceeds the negative voltage applied to the grid. Then the tube conducts, lighting the neon bulb. This type of indication has the drawback that with a modulation peak of very short duration, as many

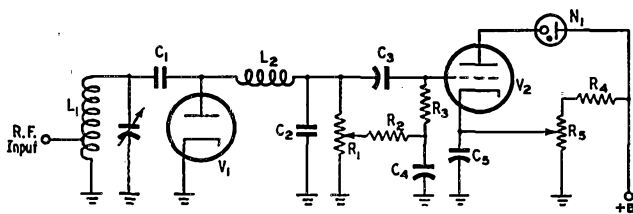


Fig. 2 — Rectifier circuit combined with a control tube and neon-bulb indicator.

of the peaks in speech are, the flash will be so short that the eye will scarcely notice it. With a few parts added here and there, the length of the flash can be made independent of the duration of the modulation peak which caused it. This is done by adding an audio transformer, a gas tube, and a resistor-capacitor network, as is illustrated in Fig. 3.

The Practical Circuit

If the patient reader is no longer patient — bear with me, OM, and I'll get this thing explained as soon as I can! Back to Fig. 3, please. When plate voltage is applied, C_6 charges to practically 250 volts through R_7 and R_9 . R_8 and R_9 form a bias network similar to R_4 and R_5 . R_9 is adjusted for cut-off, indicated by extinguishing the neon bulb. When the modulation peak occurs, V_2 conducts, as has been explained before. It has in its plate circuit a transformer with the windings polarized so that the grid of the gas tube goes positive when the plate of V_2 starts to conduct. If the polarity of the transformer is reversed, the gas tube is driven more beyond cut-off and nothing happens. Trusting that you were lucky and the transformer secondary has been properly connected, the gas tube conducts, discharging C_6 through the neon bulb. Gas tubes have the characteristic that the grid no longer has any effect on plate current once the plate starts conducting, so the bulb remains lit until C_6 has discharged to the point where it no longer has enough voltage across it to maintain conduction through the gas tube and the neon bulb. R_7 is high enough in resistance so that sufficient current cannot be supplied to maintain conduction either, so the neon bulb becomes extinguished and the gas tube deionizes. The grid then regains control and C_6 leisurely charges up again while the circuit waits for another peak to come along. This whole cycle takes a short time and the bulb can flash brightly about twice a second. If another peak occurs before C_6 becomes fully charged, the flash will occur but it will be of shorter duration; if the

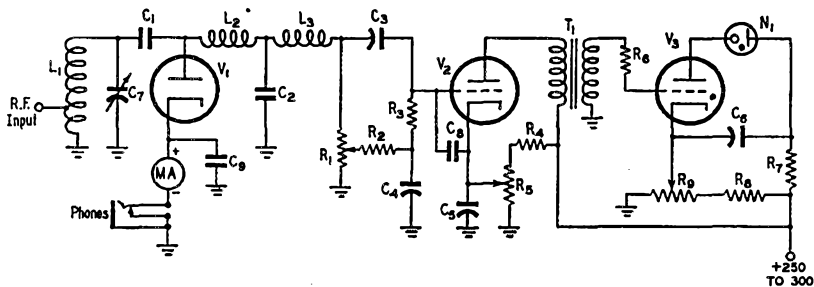


Fig. 3—Circuit diagram of the flasher-type modulation indicator.

C_1, C_2, C_8, C_9 —100- μ fd. mica.
 C_3 —0.01- μ fd. 600-volt paper.
 C_4, C_6 —0.1- μ fd. 600-volt paper.
 C_5 —10- μ fd. 50-volt electrolytic.
 C_7 —100- μ fd. air variable.
 R_1 —50,000-ohm wire-wound linear potentiometer.
 R_2, R_3 —1 megohm, $\frac{1}{2}$ watt.
 R_4, R_5 —0.1 megohm, 1 watt.
 R_6, R_9 —10,000-ohm potentiometer.
 R_8 —10,000 ohms, $\frac{1}{2}$ watt.
 R_7 —0.22 megohm, $\frac{1}{2}$ watt.

L_1 —Tune to operating frequency with C_7 .
 L_2, L_3 —2 $\frac{1}{2}$ -mh. r.f. choke.
 MA—0-2 d.c. milliammeter.
 N_1 —115-volt $\frac{1}{4}$ -watt neon bulb.
 T_1 —Interstage audio transformer.
 V_1 —Any diode.
 V_2 —High- μ triode.
 V_3 —Gas triode (884, 885, 2050, 2051, etc., triode-connected).
 (V_1 and V_2 may be the two halves of a 6SL7, the half used for V_1 having grid and plate tied together.)

meter was set for 100-per-cent modulation, you had better back off on the speech gain because you are overmodulating. As you can see, the length of the flash is independent of the modulation peak, because the gas tube loses control once it starts conducting.

In Fig. 3, two more gimmicks have been added for good measure. The meter, MA, indicates carrier shift, and the 'phone jack allows you to listen to your melodious voice as you call CQ, or gives you a chance to listen to the carrier when you are trying to locate the source of hum or distortion.

It requires very little r.f. to operate the unit. A short piece of wire near the feeders, in the field of the antenna, or near the final tank, will pick up enough r.f. to swing the meter to nearly full scale. The larger the signal applied, the more accurate the flash indication will be.

Construction & Adjustment

No constructional data are given because parts locations are not critical and the builder will probably lay them out to suit himself in any event. The unit can be operated from the receiver power supply, can be built into the rig, can have its own power supply, or can otherwise be adapted to fit into the station arrangement. Any diode can be used for the detector, V_1 , and this includes the crystal types such as the 1N34. The triode V_2 should be of the high- μ variety, so that cut-off voltage is low, resulting in better accuracy. The audio transformer can be any type of interstage transformer you may happen to dig out of the junk box, but you may have to reverse connections to the primary or secondary, as described earlier. The gas tube can be any of the types used for oscilloscope sweep generators, or one of the

types used in relay circuits, such as the 2050 or 2051 (triode-connected). The potentiometer R_1 should be a wire-wound linear type. It can be calibrated and a special dial made, if you desire, by reading resistance with an accurate ohmmeter and marking the dial according to percentage of resistance between ground and the moving contact.

The tuned circuit L_1C_7 is left up to the builder. Coil-and-condenser combinations will depend on the band to be covered, and what the builder has on hand. The tap should be at about a third of the turns from the ground end.

The only precaution in construction is to isolate the grid of V_2 to prevent r.f. from getting into it. This causes inaccuracy when the grid gets down to nearly zero voltage. Isolation is not difficult, and r.f. probably will cause no trouble at all if a 100- μ fd. mica capacitor (C_8) is connected directly between grid and cathode. The unit in operation on the author's 10-meter 'phone rig uses one half of a 6SL7 for the diode and the other half as V_2 , and no trouble was encountered so long as the mica r.f. by-pass was used.

Before applying any r.f. adjust the bias on V_2 so that the plate current is $\frac{1}{4}$ milliamperes or less. A milliammeter can be connected directly across the primary of T_1 for this adjustment, since the transformer-winding resistance will be high enough to have practically no effect on the meter reading. Then adjust the bias on V_3 , the gas tube, to the point where the neon bulb is extinguished, but the bulb will flash when the grid lead is touched with a screwdriver. Touching this grid lead induces enough voltage through stray pick-up to trip the gas tube and flash the neon bulb. The value of R_7 may have to be increased when

(Continued on page 148)



Correspondence From Members-

The Publishers of *QST* assume no responsibility for statements made herein by correspondents.

STARTING RIGHT

207 Thames Street, New London, Conn.

Editor, *QST*:

Today was my Day of Days. I received my ticket! Believe me, from now on my advice to anyone having trouble with the code will be to build or to buy a receiver and copy W1AW.

I started off by half-learning the code when I was six — a member of "Dick Tracy's Secret Service." When I got into Scouting, I picked it up and came away with merit badges in signaling and radio. I had built a 6-tube super to get the radio badge. This I tried to use to boost my speed but no soap. (I didn't know about W1AW.) I fooled around until I found another fellow, also with no one to help his practice. As he lives out in the country, we could only get together noons up at school. Last September, W1QFQ told me of the practice transmissions from W1AW. I stuck to it faithfully for four months, missing only three nights. By the time I got up courage enough to tackle the exam, I could copy 18 per.

Well, judge for yourself; I'm enclosing tonight's copy for a proficiency certificate.

— Ned Raub, W1RAN

[EDITOR'S NOTE: He passed.]

University of Idaho, Moscow, Idaho

Editor, *QST*:

This is a kind of anniversary note. I have been a ham for just one week. Now I can be a full member of ARRL. I also address my note to *QST* to express my gratitude to the writers thereof, and to say thanks to hams and handom.

My log contains evidence of 14 contacts in my seven days on the air. All have quickly and willingly responded to my "PSE QRS"; more than half of them slowed down without the QRS when I told them I was a new operator. Almost every one, on learning I was new, said "Welcome to the greatest game going." Several offered suggestions on my technique, several offered help to me in tuning my signal to a better degree by suggesting what I could do and then monitoring the signal and offering further help. Three of them asked me to call again (I have done so and they were there). Not a one was impatient when I erred and had to repeat. None said "hello and goodbye" in one breath. My 14 contacts are spread from Woodland, Calif. to Elizabeth, N. J., from Calgary, Alberta, Canada to Enid, Okla. So I know that hams must be swell guys everywhere. To them all, I'm eternally grateful. From the chaps here in town, who helped me learn the code and set up the rig and even gave me my exam (I am Class C), to that far-distant contact with New Jersey, I have had the same fine, courteous treatment, along with complete assurance that they, the hams, wanted me in. I promise I will try to pass it along. I'm really not surprised at this; I knew all along that hams were generally swell. Thanks, fellows.

— L. G. R., "Doc" Tompkins, W7MAS

PUBLIC SERVICE

Cochran, Ga.

Editor, *QST*:

Today I received the Public Service Certificate issued by you, and I feel honored. However, the ones that deserve merit in emergencies such as existed during the Florida Gulf Coast disaster never receive these prized certificates. Please in some near future issue of *QST* thank the boys that helped so much to make these endeavors successful by staying clear of the emergency frequencies and by keeping their trans-

mitters off the air to prevent QRM. These are the boys that deserve awards. Thanks.

— Lamar Hill, W4BOL, P.A.M., EC

ALL SOLID, EXCEPT . . .

524 W. Main, Puyallup, Wash.

Editor, *QST*:

Am I on the wrong track? Do I have the erroneous impression that you should tell the truth when having a QSO? I heard a W2 calling CQ. A W6 answered before I could get going. The W2 acknowledged the W6 and after the usual preliminaries, turned it back to the California station. The W6 then held it for some three minutes or so. But I heard the W2 call him a second time to tell him to "GA" and to explain that he (W2) had lost him (W6) in the QRM. They both signed at about the same time. The W2 heard the W6 signing and came back with, "FB, OM, solid, solid — all except . . ." Now the W2 had not heard one word of the W6's transmission!

Please, someone, is that the way you do it? Is that what you do to me? Is that what you want me to do to you?

— Adrian Piquette, W7LEC

THE DX CONTEST

Quito, Ecuador

Editor, *QST*:

When the going gets tough in DX competition, the general characteristics of a band stand out markedly: 7 Mc., on the whole, showed more sportsmanship; 14 Mc. was dog-eat-dog.

"Well, the same hams work both bands! How come?" The reply is, yes, a lot of hams in a contest work all bands, but for regular day-to-day operating we have our favorite band or bands. When we band-hop we take with us the operating characteristics we have absorbed from that band. But the regular on twenty, hopping to forty, lands with the regulars there, and his characteristics are submerged, on the whole, by reason of the always-greater proportion of regulars who rarely if ever leave one band. Hence, the predominant characteristic of any band is set by its devotees.

As a professional writer and explorer, one of my big jobs is the constant observation and evaluation of human nature, one of the most complex and cantankerous things in the world. In the recent contest I took numerous rest periods which I devoted to an attempt to analyze intelligently the operating tactics of both forty and twenty. My absolutely unbiased opinion, based on considerable observation, is that there is a markedly greater percentage of sportsmanship on 7 Mc. than on 14 Mc. . . .

Another point which was evident in the test was the all-too-frequent unsporting misuse of gallons hooked to a beam. Again and again I heard known full gallons sit down on small fry and blast them out as effectively as our A-bomb took Hiroshima. Perhaps the low-power lad was fairly new to the game, and hadn't yet learned evasive tactics against kilowatts. On the other hand, some of the smartest operating I observed was — by sheer necessity — on the part of the "peanut-whistle" gang. And you may be sure I did my best to work as many of them as possible. . . . Good operating is not a matter of how much power one has, but is a matter of how wisely whatever power one has is used.

And with no matter what power we have, I believe of all single factors the one which will better a score over all others, is true, full break-in. Many of my exchanges were made in

(Continued on page 148)



Operating News



F. E. HANDY, WIBDI, Communications Mgr.
I. A. MOSKEY, WJIMY, Asst. Comm. Mgr.
ALBERT HAYES, WIIIN, Natl. Emerg. Coordinator

GEORGE HART, WINJM, Communications Asst
A. F. HILL, JR. WIQMI, Communications Asst
LILLIAN M. SALTER, Communications Asst.

Coming Up! — May V.H.F. Party, May 22nd-23rd. All stations who can work on 50 Mc. or any higher-frequency amateur band are cordially invited to try for new QSOs and records in the May ARRL V.H.F. Party. See the simple detailed rules for this activity elsewhere in this issue.

The idea that all of us can get improved results in operations during those times when more of the gang are on the air together was amply demonstrated in January. Now we're ready to try it again. The "V.H.F. SS" exceeded all expectations. Twenty-five per cent of the entrants used both 50 and 144 Mc. while 61 per cent of our 300-or-more reports came from 2-meter-only workers and 10 per cent from 6-meter-only stations. Four per cent used bands above 50 and 144 Mc. If enough operators want it, we may schedule another V.H.F. Sweepstakes for 1949. In the meantime, with the coming months bringing spring and an opportunity to get up those new directive antennas and polish off new gear, it is time for another spot test of v.h.f. capabilities. More stations and generally better conditions are anticipated for the May week-end. This is a chance to add more states and ARRL sections to present records. There will be certificate awards for each section leader. It is only necessary to keep track of your QSOs using the form given in the rules on another page of this *QST*. Make sure you give the name of the section you reside in and receive the section name from each v.h.f. station contacted in the contest period. The official designations of these sections are given on page 6 of this issue, which can be used as a check list. For scoring information consult the full announcement. Remember, the May Party starts at 2 p.m. local standard time Saturday, continuing until midnight Sunday. See you on!

ARRL-Message Checking. All amateur radiograms should carry a check or group count. No different policy prevails on numbered-text messages! For amateur purposes and on many other systems as well, the message check is the word count of the number of words and numerals sent in the text. W4KYD, ARRL RM, raises the question sent him by W2OXG about whether count of texts in ARL (ARRL-numbered) radiograms should be based on the number of figures sent or the word count of the texts for which these stand. Since the purpose of checking messages is to help operators see that no words are dropped in transmission,

the groups sent in the text govern. If a single spelled-out numeral constitutes the text of a message, the check is one. Such a message as FIFTY STOP FIFTY ONE should carry ARL4 in place of just sending the numeral. Any ARL designation must be relayed along by every handling station. This is so that all "delivering" stations will not deliver a number but substitute the appropriate complete text from the ARRL list of sixty texts in the back of each League logbook. Page 13 of the booklet *Operating an Amateur Radio Station*, free to members on request, gives some of these texts and an example of use.

Frequency Tolerances in 'Phone Subbands. A W2 writes, "Was surprised to learn that FCC sends notices to amateurs whose carriers are measured within three kilocycles of a subband edge. Concerning the fellows I talked to on 14-Mc. 'phone, none knew how close to the edge one can operate using A3 with normal modulation. From now on I'll be 5 kc. inside!" FCC §12.133 states that there must be no radiations "outside the frequency band of emission normal for the type transmission employed." For general information and guidance we reprint an FCC interpretation from September 1946 *QST*:

... amateur radio stations, utilizing A-3 emission within the portion of the band assigned for A-3 emission, should operate in such a manner as to confine all such emissions within the portion of the band so designated. Operation should be conducted so as to avoid the possibility of sidebands falling within any portion of any amateur band within which A-3 emission is not authorized.

No Change in Counting Numerals and Calls in Message Texts. Thanks to W5AHT and W2ITX for advising us of an error in the 1948 *Handbook* (Chapter 21) on counting numerals and calls in the texts of messages. There is no change in checking policy, which was adopted for simplicity in counting and for uniformity with other communications services. Examples are correct in the booklet *Operating an Amateur Radio Station*. Correct counting of figures regards each group of five digits or less in a text as one word. A radio call, as explained in April 1940 *QST*, may be sent as a unit to count "one," although mixed letters and figures sent together otherwise count as "one" for each such letter and numeral. All call signals except those sent as three groups (W ONE AW) will, when sent in close formation (W1AW), continue to count as one word only.

Correct examples of ARRL count for numerals and call signals follow:

Transmission in Text	Correct ARRL Count	Transmission in Text	Correct ARRL Count
W1BDI.....	1	85.32	1
W ONE BDI...	3	54½	1
12345.....	1	23B5	4
123456.....	2	23B5	3

Band-Bound? W1DJC, in *Short-Skip*, publication of the live-wire Manchester (Conn.) Radio Club, offers some thought-provoking comments. He raises a perennial question. Are we individually getting the *greatest possible* return in enjoyment and self-improvement and communication from our time spent in amateur activity? Instead of the narrow viewpoint that thinks in terms of our little private band or corner in amateur radio, and instead of a prejudiced stand that the band allocations should be revised for more of this or more of that (which means less for somebody else, and perhaps an amateur radio that provides for less amateurs) shouldn't we all start thinking in terms of accepting the fact that we have quite generally-useful over-all allocations that each of us can use *all* of, provided we put the right kind of equipment and skill into the yet-uninvestigated parts of amateur radio? Like the rest of the world, we are too prone to neglect best development of what we have in our house. Even though our Directors recommend some appropriate changes in allocations this May for reasons all identified with the good of amateur radio, some of us may continue to miss the larger opportunities for benefits from our hobby. We sometimes even have cause to fear that if it were not for wise Government provisions that make the basic form of communications available to everybody, that we would be vulnerable to attack. If we simply subdivide ourselves into little groups, interested only in our particular spots and working only to enlarge those, producing a situation in which one group may be attacked and its frequencies lost under the military principle of "divide and conquer," we are most unwise. Without more discussion on our part let's move to a consideration of W1DJC's comment, rearranged with his permission, on the subject of amateur operation: "Many 10-meter operators have little knowledge of the joys of 40 c.w. Likewise 14-Mc. c.w. fellows seldom know what can be done with 75 or 10 'phone. Some amateurs today are missing a lot of personal contacts in the many available bands. How many of our club members operate 7- and 3.5-Mc. c.w. other than on Field Days? How many have never been on any other band than 10? With modern band-switching and a simple long-wire or multiband antenna, it is a delight to choose the band for the job you want to do. 'Rock-bound' is a popular expression these days to signify a ham who is limited to a few or even one crystal for his work in the amateur bands. It seems to us that even a

greater majority are band-bound, that is, limited to or preferring to work in one band . . . and that in spite of the development of bandswitching gear. Let's get acquainted with, and place proper values on, communications accomplishment in *all* our bands."

FD Coming, June 12th-13th. Don't forget the biggest annual ARRL event of the years . . . the 12th ARRL Field Day is scheduled for early June. *Individual battery-powered* equipments should play a bigger part than in recent years, with provision for a "battery credit" in the multipliers this year. Clubs are laying the usual big plans for organized group participation. *Emergency-readiness for public service* in communications emergencies is the reason for it all. The FD is the annual tryout date for every rig that *could* be pressed into service in either "planned" or unexpected emergency patterns. Be sure to try out something. Even if you have only a small or token score, it's the spirit of the FD that counts. One more month to get battery and other rigs ready. Start getting emergency sets ready now. BCNU in the FD. — F.E.H.

GOOD COÖRDINATORS NEEDED!

All SCMs are encouraged to cancel, at once, the appointments of all Emergency Coordinators who cannot make an immediate showing that they are working closely with their local Red Cross officials, municipal officials, and others.

In the selection of an Emergency Coördinator, SCMs seek *organizers* rather than strictly operators. Too many ECs regard their jobs as accomplished when they have "organized" themselves and have their own emergency-powered stations on the air. One of the major duties of the EC is to get out and meet local Red Cross and civic officials, explain what amateur radio has to offer, and sell our product, *communications*.



The on-the-air activities of the EC are definitely secondary to the major job of organization. Since the section traffic nets generally com-

prise the most experienced traffic men in a given area, and since, through their daily drills, they have become the most proficient traffic handlers in each section, the section-wide AEC organization should be keyed in closely with the section net, and should, generally, be under the direction of the RM or other traffic leadership-appointee. *Emergency organizing* is the top function of each EC and is strictly a community proposition. On-the-air activities in a community, such as local 144-Mc. nets, should be under an assistant EC who can devote his entire energies to leading such a group, and who will not have to bear the liaison burden naturally falling on the shoulders of the EC. The EC, of course, should maintain final authority in all local AEC matters, and will be assumed to work closely with his assistant ECs.

Liaison with local Red Cross chapters needs improvement in many communities. This is attested to by the fact that after nearly every emergency, letters come to Headquarters saying, "The Red Cross didn't work with me. I went to them and offered to handle traffic and they didn't pay any attention to me." Complaints of this type indict their authors only, since we have stated repeatedly that it is up to the EC to go to the Red Cross, meet the Red Cross communications people, explain amateur radio, and sell our service before disaster strikes! — A.H.



Neal Huntley, W6AGT, lost little time getting into amateur operating in a big way. Thirteen years old when his ticket arrived last November, he chalked up 50 countries with 300 watts on 28-Mc. n.f.m. in his first thirty days of operating. In November, Neal plunged into the Sweepstakes with the best of the old-timers and came up with a total of 233 contacts and 51 sections worked on 28-Mc. 'phone in 28½ hours total operating time. An ardent DX hound, he also handles traffic frequently on 'phone and c.w. His dad, W6LIP, can feel proud of an up-and-coming amateur!

TRAINING AIDS

Training Aids Policy. We are sorry to have had to turn down many requests for ARRL Training Aids from nonaffiliated clubs and other non-eligible groups and individuals. There are something over 400 clubs affiliated with the League, and they are keeping things humming at the Training Aids desk. Only affiliated clubs are eligible for ARRL Training Aids. We wish we could grant all requests, but for the present it is too wide a field to embrace. If yours is a bona fide amateur radio club and wants to use the material and equipment we talk about in this column, there is but one course of action open to you if you are not affiliated — apply for affiliation. It is simple, painless, costs the club nothing. The requirements are not hard to meet.

Summary of Available Material. From time to time we have listed additions to material and equipment available to ARRL-affiliated clubs. The complete list is growing long, but a copy of it is available in mimeographed form for the asking. Meanwhile, let us summarize just what is available:

- 25 motion-picture films (16 mm. only)
- 16 film strips (35 mm.)
- 2 slide collections (2 × 2)
- 2 albums of code records (78 r.p.m.)
- 1 code recorder with separate tape puller
- 2 BC-1016 recorders (built-in tape pullers)
- 3 TG-10 keyers (use inked tapes)
- 10 inked tapes
- 22 motion-picture film reviews
- 18 film-strip and slide-collection reviews
- 7 mimeographed quizzes (i.e., 7 subjects)
- 4 operating aids (cards)

The only charge the club pays for the use of any of this material is the shipping charge. In some cases even that is prepaid. In anticipation of the customary slump in club attendance during the summer months, it might be well to plan now to have complete and interesting programs available to keep attendance at a maximum.

BRIEF

VE2LA called CQ on 75 'phone and VE2TM (new on the band) answered. A successful contact resulted. LA passed on the usual information concerning his rig, etc., and mentioned that he worked at a local broadcasting station as operator. TM, seeing that LA did not recognize him, asked many questions about the broadcast station and LA replied with a description of the layout from microphone to antenna. After several minutes of this, TM asked LA to look in the *Call Book* to see if he (TM) was listed. That's when LA nearly fainted. He saw the name of TM and realized that TM had been pulling his leg. TM and LA have been working together as broadcast operators at the same station for eight years!

PRIZE-ARTICLE CONTEST

• The article by Rev. Joseph A. Terstegge, W9LQE, wins a prize in the CD Article Contest.

You are invited to submit entries in this contest. The author of each article used is awarded a \$10 prize, consisting of \$5 in U. S. Savings Stamps and \$5 in ARRL supplies or publications (except *QST*). Contributions may be on any subject of interest to amateur radio operators. Articles are selected on originality and value to the fraternity.

Give this contest a try. You may wish to write on Emergency Corps planning work and drills; 'phone or c.w. operating procedures; work on radio-club committees; organizing or running a club; the most interesting band for you; code-proficiency techniques; DX activities; traffic work; getting the most out of ham radio; or some subject we haven't mentioned. You are not limited; make your contribution on any topic of interest to radio amateurs. Please mark your contribution "For the CD Contest."

WANTED: GOOD C.W. OPERATORS

By Rev. Joseph A. Terstegge,* W9LQE

The reason I am losing some of the hair on the back of my head is not so much because of old age creeping up on me as it is to the operating I have been hearing on the c.w. bands. In recent months I have been plagued to the point where my nerves almost gave out, and have come to certain inevitable conclusions. Amateur c.w. would be far more enjoyable and satisfactory if more of the stations, and especially the low-powered stations, would use a straight key and stick to it until such time that the operators have learned to send with the proper rhythm and correct spacing between letters and between words. I believe many voice-only operators shy away from c.w. because they have to make too much mental effort to copy most of the stuff the boys send. It should not be that way, and it *need* not be that way. The *ARRL Handbook* gives some excellent advice on "Using A Key" to which I say "amen." Listening on the c.w. bands today indicates that few amateurs are following this wholesome advice.

It is my opinion that the operators (if any) who have rhythm and correct spacing with a bug, developed without perfection first on a standard key, are so few that they are the exception that proves the rule: Perfection first on the standard key is of paramount importance.

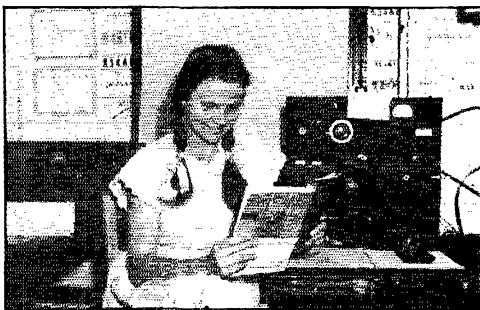
C.w. is fascinating when every letter is perfectly formed, when spaces between letters and between words are correct. W1AW official bulletins and tape transmissions, and commercial tape transmissions, are the standards by which to be guided. Studying them, one can get the sense of "time" and rhythm into his mind, and after that it is not as difficult to emulate them. You have to know how perfect sending *sounds* before you can imitate it.

There is one very important thing regarding the

* Dubois, Indiana.

sending of code that I have never seen in any book: a first cause for so much poor sending and so many mistakes is the position at the desk or table. I have watched operators send c.w. who assumed a position that was anything but comfortable. They thought it was comfortable, but one cannot be physically and mentally at ease when even a single muscle in any part of the body is strained. In fact, physical discomfort of *any* kind is an obstacle to good sending. Try to do good typing, for example, when sitting in a slouchy position. It just cannot be done, at least not for any length of time. The body must be erect, and *every* muscle in *every* part of the body must be without the slightest strain. Anything short of this will cause needless mistakes.

Then there is the mental side of it. Again, a parallel example is to be found in typing. The experts tell us that typographical errors are made in the mind before they are made on the paper. It is true. Especially must one *definitely know* what he is going to say with the key before the muscles can positively and unerringly carry out the orders of the mind. It is like making a speech. The speaker must *know* what he is going to say. Strict adherence to these and the other basic principles of good sending can improve one's "fist" beyond belief. A good c.w. operator rarely has a mistake to correct; his sending is musical because it has rhythm. He does not send as though he had a fifty-word message to the fire department to get off in fifty seconds; he considers how it would be if he were on the receiving end and the other operator were sending just as he sends. He never runs letters together and he never runs words together. Unfortunately, such operators are rather rare on the ham bands, yet occasionally they can be heard. Their work is the mark of an orderly mind, of a considerate human I want to know, a ham whose friendship I want to cultivate.



Fourteen-year-old Jane Hodgson, W4MKP, of Miami, Florida, is the youngest known holder of an ARRL appointment. Shortly after receiving her ticket last July, when she was still thirteen, Jane applied for OBS and has been sending out the official bulletins regularly on c.w. Early this year she applied for and received appointment as ORS. The W4MKP receiver is a BC-224 and the transmitter a 6L6-807 combination which Jane built with her own hands.

TRAFFIC TOPICS

Many nets are now practising shifting stations 5 or 10 kc. off the net frequency, to clear traffic during periods when the load is heavy. This system expedites the clearing of a maximum of traffic within a given operating period, but, unfortunately, causes interference to other nets in some cases. NCSs should check adjacent frequencies to which they direct members to insure that same are not in use by other traffic-handling groups. Cooperation in this regard will make for a minimum of QRM to all concerned.

Trunk Line K has now taken its place on the active list. The line operates on 3755 kc. with connections from Illinois to Texas, and also ties into TLL and TLJ.

The United Air Lines Employees Net is being formed on 3510, 7020 and 14,040 kc. It is hoped that all employees who are active amateurs will congregate on these frequencies Tuesdays at 8:00 P.M. local time. Call "CQUAL" and meet the gang!

As the summer season approaches, more and more amateur stations will be active at fairs and hobby shows. If your group is anticipating such operation, write ARRL Hq. for suggestions.



W4FQQ, Frankfort, Kentucky, has excellent traffic connections to practically anywhere. Operator Jack Gates, jr., is active on Trunk Line J, Atlantic-Pacific Trunk Line, National Trunk Line, and is a net control station on the Kentucky C.W. Net. The transmitter is a home-constructed 6SJ7 VFO-exciter driving an 807 buffer and p.p. 810s final.

BRASS POUNDERS LEAGUE

(February Traffic)

Call	Orig.	Del.	Rel.	Extra Del.	Credit	Total
W4PL	6	36	2031	30		2103
W4CFL	62	64	978	28		1132
W7FST	59	93	657	90		899
W5IGW	19	8	792	1		820
W0HMM	12	25	766	16		819
W7BED	32	13	655	8		708
W8NOH	34	140	400	123		697
W6REB	12	16	628	10		666
W5LSN	9	24	806	17		856
W2TYU	27	15	582	4		628
W5WZ	2	10	606	6		624
W7CKT	3	24	577	0		609
W4FXU	23	34	486	27		570
W9EVJ	9	33	483	25		550
W5LAK	3	3	528	0		534
W6IOX	4	27	480	21		532
W9LFK	16	50	407	39		512

The following make the BPL with over 100 "deliveries plus extra delivery credits":

W9SYZ 272	W8UPB 142	W8FFK 108
W8SCW 245	W3ECP 134	W1AW 102
W2RTZ 200	W5MN 122	W6QXN 102
	W8CMN 114	

A message total of 500 or more, or 100 "deliveries plus extra delivery credits," will put you in line for a place in the BPL. The Brass Pounders League listing is open to all operators who qualify for this monthly "honor roll."

Trunk Lines G, L and I are now maintaining through schedules from coast to coast. Route your traffic through these trunks for fast handling.

National Trunk Line is the meeting place for the trunks to exchange traffic. Have your trunk representative check in with W1AW at 9:00 P.M. EST on 3670 kc. daily, Monday through Friday.

Trunk Line H is getting under way, with W0FAM as manager. This trunk will operate on a line from North Dakota to Louisiana. Look for it on 3605 kc.

There seems to be some question as to the best way to route messages to Newfoundland, Canal Zone and West Indies. Newfoundland traffic should be routed through Trunk Line I, and Canal Zone and West Indies traffic through the Rebel Net.

The Pacific Phone Net is in operation throughout the Pacific Islands on 14,280 kc. Traffic for this area may be routed through the trunk lines to the West Coast, where it will be forwarded by Pioneer or Mission Trail Net.

The Eastern Shuttle Net is now under way on 7120 kc. This is a daylight net for those who work night shifts. The net meets Sunday, Wednesday and Saturday at 9:30 A.M. EST. All interested are urged to contact W3MWD, NCS.

W5VT, Shreveport, La.

Traffic handling and ARRL field-organization work have occupied the interest of W. J. "Dubs" Wilkinson, Jr., continuously over many years. An ORS of long standing, he has also held appointment as RM, OBS and OO. At present he is Louisiana SCM, an office he has held off and on since 1932. During recent emergencies he contributed valuable assistance as a member of the Rebel Net and received four Public Service Certificates in recognition of his efforts. His other accomplishments include WAS, a 35-w.p.m. Code Proficiency Certificate, several Sweepstakes section awards and membership in the A-1 Operator Club.



AMATEURS ASSIST IN REPAIR OF BROKEN GAS LINE

When a gas main broke on the outskirts of Independence, Mo., on February 26th and the gas company called upon the AEC group of the Heart of America Radio Club to provide emergency communications between the various repair crews, the 28-Mc. mobile units which the club had kept in readiness for just such an occasion proved their value to all concerned. Working all night and part of the next day, the ham group provided liaison between the headquarters of the gas company and their field crews such as had never been available before, and the cooperation of amateur radio has been declared to be partly responsible for the speed and efficiency with which the break was located and repaired. The following are known to have taken part in this activity: W0S BBQ, BQU, DDX, EQW, GCT, GVL, JRJ, JXJ, KHX, LRU, NNK, TNA, UBR and VRF.

SUPPLEMENT TO DIRECTORY OF ACTIVE NETS

FARM Net	3935 7:00 P.M. MST Mon.-Fri.
Florida Emerg. Phone Net	3910 6:00 P.M. EST Tues.
Missouri Traffic Net	3755 7:00 P.M. CST Mon.-Fri.
New Hampshire C.W. Traffic Net	3685 7:00 P.M. EST Mon.-Fri.
North Carolina Net*	3605 7:15 P.M. EST Mon.-Fri.
N.Y.C.-L.I. A.E.C. 80 C.W. Net	3600 8:00 P.M. EST Mon.-Fri.
Pacific Phone Net ¹	14,280 0400 GCT daily except Wed.
QMW (Midwest Net) ^{2*}	3565 7:30 P.M. CST Mon.-Fri.
South Texas Traffic Net	3750 8:00 P.M. CST Mon., Wed., Fri.
Southern California Net*	3765 8:00 P.M. PST Mon.-Fri.
Swing-Shift Net (New England)	3640 1:00 P.M. EST Mon.-Fri.
Tennessee C.W. Net	3737 7:30 P.M. EST Mon., Thurs., Fri.
Trunk Line A ³	3565 10:00 P.M. CST Mon.-Fri.
Trunk Line G ⁴	3600 10:30 P.M. EST Mon.-Fri.
Trunk Line K ⁵	3755 9:30 P.M. CST Mon.-Fri.
WARTS Net (Wash.)	3970 7:00 A.M., 12:00 noon, 6:00 P.M. PST daily

* Change in listing.

¹ Japan, Okinawa, Iwo Jima, Saipan, China, Guam, Korea, Philippines, U.S.A.

² N. Dak., S. Dak., Minn., Iowa, Mo., Kans., Nebr., Ill., Wis., Ind., Ohio, Mich.

³ Wash., Idaho, Mont., N. Dak., Wis., Mich.

⁴ Mass., N.Y., Mich., Wis., Minn., Idaho, Ore.

⁵ Ill., Iowa, Mo., Texas

BRIEF

Ev Mayer, KP4KD, comes up with what is believed to be a record of some sort. After a schedule with G2PL at 0645 GCT on 3560 kc., he worked G6ZO at 0700 GCT. At 0843 G6ZO answered Ev's CQ DX on 7050 kc. and a 14-minute contact ensued. At 1315 G6ZO contacted KP4KD after the latter signed with G2HPF on 28,010 kc. The fellows decided to shift to 14,100 kc. The 14-Mc. contact materialized at 1439 GCT. Net result: 4-band DX QSO in less than eight hours, without prior arrangement.

DX CENTURY CLUB AWARDS

DXCC Certificates based on postwar contacts with 100-or-more countries have been issued to the amateurs listed below. The countries-worked totals indicated have been certified by examination of written evidence under the award rules as published in March 1947 QST.

HONOR ROLL

W1FH.....	183	W3BES.....	162
G2PL.....	168	G6ZO.....	161
W8HW.....	167	W3GAU.....	161
W6VFR.....	164	W2BXA.....	158
W4BPD.....	164	W8RDZ.....	155

NEW MEMBERS

LU6DJK.....	128	W3FGB.....	103
G500.....	116	G4TZ.....	101
W1DX.....	112	W2QHH.....	100
W2HZY.....	112	W3FIU.....	100
G8IL.....	110	W2GNO.....	100
W2CZO.....	110	W5ENE.....	100
W4FPK.....	106	W4KIT.....	100
W2TQC.....	104		

ENDORSEMENTS

W1IAS.....	182	HB9CE.....	130
W9ANT.....	181	W0NUC.....	130
W8ASG.....	142	W2MEL.....	124
W2CYS.....	140	VE3QD.....	121
W2GUM.....	138	W2DS.....	120
W8NBK.....	136	W8CVU.....	114
HB9CX.....	132	W5CPI.....	110
W0YXO.....	112	W3DKT.....	110

RADIOTELEPHONE HONOR ROLL

W1FH.....	144	W2BXA.....	111
W1JCK.....	130	W2ZW.....	110
W4CYU.....	128	WINWO.....	110
W1HKK.....	121	V04ERR.....	109
G2PL.....	116	SUIHF.....	108

NEW MEMBERS

T120A.....	100
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RADIO-CLUB PUBLICITY

A report from Ed Enderle, W8MDX (Columbus Amateur Radio Association), contains significant pointers for club officers interested in maintaining appropriate local arrangements for publicity on the club and amateur radio.

"For nearly 12 years or since January's flood of 1936, the *Columbus Dispatch* has published a 'ham' radio column as a regular Sunday feature. Originally known as 'Short-waving,' this column since the war has assumed the 'heads' of regular news items, often rating seven- and eight-column 'heads.'

"This publication, written by yours truly, has been looked upon by amateurs of Central Ohio and the entire state as well for authentic reports of happenings of interest in the amateur world. It has served as an outlet for news of the ARRL and the Columbus Amateur Radio Association, Columbus' affiliated club, and is believed to be the oldest and most unique column of its kind in the history of American journalism."

— *Edward G. Enderle, W8MDX, ex-W8BBC*

Enderle, first interested in amateur radio in 1917, has been an active member and officer of the Columbus Amateur Radio Association for many years. Back in the '30s he was first asked by officers of the CARA to write a column for the Sunday edition of the *Columbus Dispatch* (Ohio's greatest home daily). Although the Managing Editor was reluctant at first, a complete account of ham activities during the flood of January 1936 broke the ice and resulted in a regular Sunday amateur column being published ever since. Usually appearing on pages B7 or B8 along with the broadcasting-station program lists, the column in recent weeks included such significant items as the following:

"Ground to Plane Tests Planned by Hams This Week" — one column 4 inches.

"Foreign Governments Fight To Cut Amateur Frequencies; U. S. and Canada Agree to Only 50 Kc." — seven columns 10½ inches.

"First Trophy for WAC on 50 Mc." — three columns 11 inches.

"New Allocations Table Approved at Radio Conference" — one column 8 inches.

"Amateurs Invited To Enter in Australian DX Contest" — two columns 9 inches.

"Plan To Maintain All Present Bands for U. S. Amateurs" — one column 7½ inches.

"Amateurs To Observe National Radio Week" — two columns 11½ inches (includes CARA item on elections and technical-meeting program).

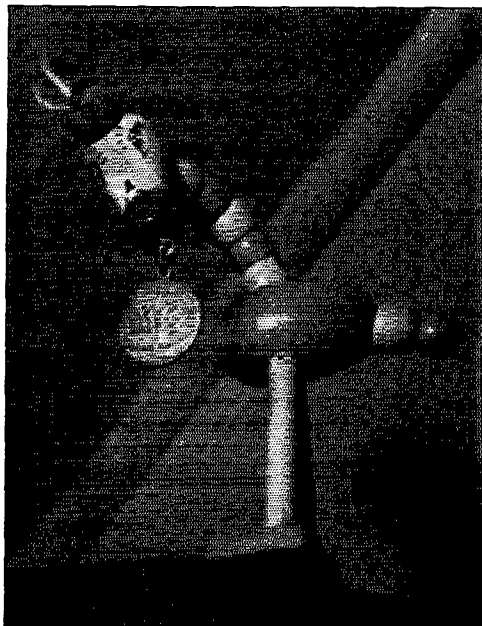
"Emergency Communications Tests Planned by Amateurs" — two columns 10½ inches.

Source of numerous items is the regular weekly mailing of ARRL Official Bulletins to the radio club. At least one item carries the by-line "Received by radio direct from ARRL Headquarters through W8WZK." Articles pointed toward

amateur technique have to be revised to emphasize certain angles for public consumption. Those covering the Palm Beach V.H.F. Trophy and data to the public on television-interference surveys (pointing to ISM as the top present difficulty) were based on data in our Quarterly CD Bulletin as sent affiliated clubs. The careful cultivation of relations with the local press and appointment of a qualified and responsible club member to make a *weekly* contact for regular treatment of local and national amateur activities is a useful idea. We believe it should receive study and action in every club group.

WPR-50 AWARD

The Puerto Rico Amateur Radio Club now issues a WPR-50 Diploma in addition to the WPR Certificate which they will continue to issue upon confirmation proof of working 25 KP4 stations. The new Diploma requires 50 confirmations. Cards submitted in application for either award should be sent to Secretary, Puerto Rico Amateur Radio Club, P. O. Box 73, Hato Rey, P. R., with sufficient return postage.



Here's "Squeegee," station mascot and general overseer at VESUN, the station of Bill Mertz, Weyburn, Saskatchewan. According to Bill, Squeegee usually parks atop the transmitter with his eyes open. He sees all. What's more, he *tells* all — a desirable characteristic where there are junior operators about who may at times feel inclined to do a little tuning on their own when the chief operator is absent. Squeegee is a very handy threat! He serves also to perform various and sundry other jobs around the shack, within his somewhat limited physical capabilities. At the time his photo was taken, for example, Squeegee was proudly carrying the medallion won by VESUN in the 1946 ARRL SS.

A.R.R.L. ACTIVITIES CALENDAR

May 14th: CP Qualifying Run
 May 22nd-23rd: V.H.F. Party
 June 12th-13th: ARRL Field Day
 June 21st: CP Qualifying Run
 July 14th: CP Qualifying Run
 July 24th-25th: CD QSO Party
 Aug. 19th: CP Qualifying Run
 Sept. 14th: CP Qualifying Run
 Sept. 25th: V.H.F. Party
 Oct. 16th-17th: Simulated-Emergency Test
 Oct. 18th: CP Qualifying Run
 Oct. 23rd-24th: CD QSO Party

Jan. 1st-Dec. 31st: Most-States V.H.F. Contest
 First Saturday night each month: ARRL Officials Nite (Get-together for SCMs, RMs, SECs, ECs, PAMs, Hq. Staff, Directors, Alt. and Asst. Dirs.)

CODE PROFICIENCY CERTIFICATES

The ARRL Code Proficiency Program provides the opportunity for you to increase your code-copying ability. Special code-practice transmissions are made each evening, Monday through Friday, at 10:00 P.M. EST, from Headquarters Station W1AW. See the W1AW schedule on this page for details on frequencies and speeds.

Once each month special transmissions are made to enable you to qualify for an ARRL Code Proficiency Certificate. The next such qualifying run will be made on May 14th at 10:00 P.M. EST. Identical texts will be transmitted simultaneously from W1AW, W6OWP and WØCO. Frequencies of transmission from WØCO will be 3534, 7053 and 14,040 kc., from W6OWP 7248 kc. W1AW will transmit on the same frequencies as those used for code practice. Send your copies of the qualifying run to ARRL for grading, indicating whether you copied W6OWP, WØCO or W1AW. If you qualify, you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m., you may try later for endorsement stickers indicating progress above the first certified speed.

References to texts used on several of the practice transmissions are given below. These make it possible to check your copy.

Date: Subject of Practice Text from March QST:

May 4th: *500 Watts of Audio from AB1*, p. 13
 May 6th: *Coaxial-Line V.H.F. Receivers*, p. 20
 May 10th: *A Single-Control 180-Watt Transmitter*, p. 25
 May 12th: *Adjusting the Matching Stub*, p. 31
 May 14th: Qualifying Run, 10:00 P.M. EST
 May 18th: *A Bandpass Converter for 144 Mc.*, p. 34
 May 20th: *Public Relations for the Amateur*, p. 38
 May 26th: *Single Sideband Power Gain*, p. 42
 May 28th: *Ten Elements; Ten Meters*, p. 48
 May 31st: *Improved Break-In Keying*, p. 64

W1AW OPERATING SCHEDULE

Operating-Visiting Hours

Monday through Friday, 8:30 A.M.-1:00 A.M.
 Saturday, 7:00 P.M.-2:30 A.M.
 Sunday, 3:00 P.M.-9:00 P.M.

A mimeographed local map showing how to get from main state highways (or from Hq. office) to W1AW will be sent to amateurs advising their intention to visit the station.

Official ARRL Bulletins containing latest information on matters of general amateur interest are transmitted on regular schedules:

Frequencies: 3555, 7215, 14,150, 28,060 and 52,000 kc. (voice — 3950, 14,280, 52,000, 146,000 kc.)

Times: Monday through Friday, 8:00 and 11:30 P.M. EST (0100 and 0430 GCT, Tuesday through Saturday)

Sunday 1:00 A.M. and 8:00 P.M. EST (0600 Sun. and 0100 Mon., GCT)

Bulletins are sent simultaneously, first at 25 w.p.m. and then repeated at 15 w.p.m., on all frequencies during the early schedule to facilitate code practice. Telegraph bulletins are followed, in turn, by voice transmissions on 3950 kc. and 52,000 kc. simultaneously, and then on 14,280 and 146,000 kc. simultaneously. Any changes from this schedule will be announced.

Code Proficiency Program: Practice transmissions at 15, 20, 25, 30 and 35 w.p.m. are made Tuesday and Thursday on the above-listed frequencies, starting at 10:00 P.M. EST, and on Monday, Wednesday and Friday at 9, 12, 18, 25 and 35 w.p.m. Approximately ten minutes practice is given at each speed. Next certificate qualification run is scheduled for Friday, May 14th.

General Operation: In addition to performing the services already mentioned, W1AW engages in two-way work with amateurs on the various bands. You are always welcome to call the Headquarters station, especially during the periods listed below, whether to relay a message or just to rag-chew with the operator on duty at the time.

Monday through Friday, all times EST —

10:00 A.M.-10:30 A.M.	14,150-kc. c.w.
10:30 A.M.-11:00 A.M.	14,280-kc. voice
11:00 A.M.-11:30 A.M.	28,060-kc. c.w.
11:30 A.M.-12 noon	29,150-kc. voice
3:00 P.M.-3:30 P.M.	14,280-kc. voice
3:30 P.M.-4:00 P.M.	14,150-kc. c.w.
5:30 P.M.-6:00 P.M.	3850-4000-kc. voice
6:00 P.M.-6:30 P.M.	7215-kc. c.w.
7:30 P.M.-8:00 P.M.*	3555/7215-kc. c.w.
11:00 P.M.-11:30 P.M.	3555-kc. c.w.
12:15 A.M.-1:00 A.M. (Tues. through Sat.)	7215-kc. c.w.

* Traffic schedules are kept during this period.

Saturday and Sunday (excepting dates of official ARRL activities).

Saturday: Midnight-1:00 A.M. (Sun.)	3555-kc. c.w.
Sunday: 1:45 A.M.-2:30 A.M.	7215-kc. c.w.
6:00 P.M.-7:00 P.M.	3850-4000-kc. voice
7:00 P.M.-8:00 P.M.	7215-kc. c.w.

W1AW is not open on national holidays.

The station staff:

R. H. Newkirk, W9BRD, "rod"
 T. F. McMullen, jr., W1QVF, "fm"
 Richard N. Eidel, W2MHW, "re"

Station Activities

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, Jerry Mathis, W3BES — About 65 members and guests attended a meeting addressed by John L. Reinartz on the subject of f.m. at the Lancaster Radio Transmitting Society. LN, KBZ, and KIE are getting effective results with n.f.m. There are 20 active 144-Mc. stations in Lancaster area. The LRTS members are collecting gear for their club station, NMR. ELL will be QRT a few weeks due to moving to his own QTH. The OOs of the section had plenty of difficulty in the Frequency Measuring Test because of poor conditions and QRM generally. EU is QRU installing t.v. sets. Muriel, VEBIG, visited the West Philly Club. ITZ has new QTH, 746 So. 60th St., where he will at long last have antennas to suit him and a comparatively quiet location. KFA is a new ORS and is on the EPA Net every night. HTO has his 14-Mc. beam working again after being put out of commission by the wind. MLY worked 70 miles on 3.5 Mc. with only 3 watts. LDF now is "sparks" on a cargo ship. KJJ lacks three countries for postwar DXCC. NNV now has a Signal Shifter pushing his BC-610. He complains that the 'phone men he works fade away when he fires up on code. AXA is back in business with a mighty 6L6 crystal on 3.5-Mc. c.w. OCU, son of ZN, worked 90 countries and 33 zones in his first month on the air. ZN got his 100 cards for DXCC. DEM has his 100 cards for 'phone DXCC. The lack of reports this month no doubt is due to DX Contest phobia. The W3 QSL Bureau is circulating by mail all hams who have unclaimed cards in the files. The fewer cards they have to look through each time the faster service they can give. To date the number of "dead" cards has been reduced 50 per cent. Keep an envelope on file at Box 34, Philadelphia 5, Pa. Traffic: W3VMF 351, DZ 121, QEW 117, ELI 101, QV 83, KFA 74, AQN 26, EU 12, HCT 10, CAU 10, 2.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, Eppa W. Darné, W3BWT — The Potomac-Rappahannock Valley Net now runs an additional net on 144 Mc. with five members active in same. FV is Net Control, and 3.9-Mc. 'phone liaison. The Blue Ridge Amateur Radio Association is a very active group in the Frederick, Md., area. Meetings are held on the first Tuesday of each month. Details may be had by contacting WN. The Club Emergency Corps group conducts regular drills on 28 and 144 Mc. The Washington Radio Club's first February meeting featured "Mobile Night" with talks and equipment on exhibit. "NL," president of the Mobile Club, conducted the Symposium. The Washington Radio Club's second meeting for February was an auction of spare parts and gear, with FVD as auctioneer. The Capitol Suburban Radio Club officers elected the first of the year are: NOL, pres.; AHQ, vice-pres.; MGM, treas.; BDU, secy.; KNU, corr. secy. The Industrial Home School Amateur Radio Club of Washington has the call NWT and has applied to the League for affiliation. A complete ham station is in operation at present by JTZ and LTS. Also provided for the members is a work shop and code practice equipment. JTZ is trustee and instructor; LTS is assistant instructor. LVJ has worked 95 countries on 14 Mc. using 60 watts to an 807. WV is on 14 and 28 Mc. using c.w.; he formerly was 9WU. MWD is on 7 Mc. KCA is getting ready for portable work this summer. NZR is on 144 Mc. LFF, BII, and FLG are trying out new preselctora. KOU, KCA, and MQF have a 35-kw. television station near them. BEJ is rebuilding his 144-Mc. rig. IMBS/3, 3NQI, 3AVL, and 4LBP/3 are on 144 Mc. at Patuxent, Md., and have named their group the "Forest-quitto Net." MAX's new QTH is 109 Seneca Drive, Forest Heights, Washington 20, D. C. MUG has a new daughter. KAM is rebuilding and installing speech clipping. 6TCA/3 gets out well with 40 watts on 7 Mc. GEB is on 14-Mc. c.w. CIC gets out nicely on 14-Mc. 'phone. AGV is building a new 'scope. JZY is on 14, 7, and 3.5 Mc. with both 'phone and c.w.; he has had receiver troubles. KJF is returning to the West Coast. KUH is on 144 Mc. JCR is on 3.9-Mc. 'phone. CDQ is on 7- and 14-Mc. c.w. Emzie has been appointed Assistant Division Director. ECP takes top honors

in traffic-handling this month, with 2NDL/3 running a very close second. QL has been appointed Route Manager for the Southern Maryland area. EYX is again on 3.5 and 14 Mc. at his Washington location. EFZ is on 14-Mc. c.w. "AM," Andy Andrew, is committee chairman for the Atlantic Division Convention to be held in Washington, D. C., June 4 and 5, and sponsored by the Washington Area Clubs. Traffic: W3ECP 388, 2NDL/3 373, AKB 112, BWT 92, MJQ 36, QL 30, LVJ 6, AQV 4, EFZ 4, JZY 4.

SOUTHERN NEW JERSEY — SCM, G. W. (Bill) Tunnell, W2OXX — Club election returns are still coming in with the latest as follows: Lakeland Amateur Radio Association — BDL, pres.; RGV, vice-pres.; SEZ, secy.; PEV, treas.; FQS, act. mgr. South Jersey Radio Association — OQN, pres.; PAU, vice-pres.; UCV, treas.; PNA, corr. secy.; PWM, rec. secy. Cumberland Radio Club — PAU, pres.; EXB, vice-pres.; PFQ, secy.; SPN, treas. The Hamilton Township Club presented a very interesting speaker on antennas at the March meeting. RPH is a new RM with special emphasis on internet relationships and new traffic outlets. ZI says that the Delaware Valley Radio Association 4th Annual "Old Timers Nite" should exceed last year's attraction. BEI claims more contacts with G6BY than anyone else. Any bets? RG is testing automatic roll call with the SNJ Net. ORS drove twenty miles to deliver a traffic report to yours truly from QUH. CFB is planning a new home and a kilowatt. BAY is active on 14-Mc. c.w. OSB is going to school again. OYL is supervising student training at his club. ZX is again active in the 3700-kc. Net. A considerable amount of cross-band operation has been tried by the Sunday morning 75-meter 'phone net, better known as the Sunday Breakfast Club. Traffic: W2RPH 268, SUG 118, ZI 83, QUH 33, BEI 18, SXK 9, RG 8, CFB 6, ORS 6, BAY 5.

WESTERN NEW YORK — SCM, Harding A. Clark, W2PGT — SEC: SJV. Utica Amateur Radio Club has named the following new officers: QFG, pres.; GWP, vice-pres.; VUP, secy.; WUV, treas.; and QXA, chief operator of the club station. New ECs are GWY for Washington, Warren, and Saratoga Counties; EAF for Jefferson; and NAI for Schoharie County. QWS spoke on Propagation of Radio Waves at RAWNY meeting. PWT spoke on 28-Mc. antennas at KBT meeting. SBI spoke to Syracuse Club on s.s.a.o. HNN has 150 watts on 144 Mc. ROK is going strong on 144 Mc. ERCA has installed 144-Mc. station in State Tower Bldg., Syracuse, for local Red Cross Chapter. OPS has moved to Binghamton, where he is teaching school. Congrats to FMF and PKL on the new harmonics. GWY, PYC and ZJ had fine reports in recent Frequency Measuring Test. OVP is working 7 Mc. RYJ has gone for high power on 28 Mc. HNN had to send rush call for welder to repair top of 60-ft. tower. ELF will have separate kw. and new beam when (?) spring gets here. QHH has DXCC Certificate using maximum of 40 watts and 31 countries on 3.5 Mc. PPS has daily schedule with OX3BE and is handling lots of traffic. The Syracuse University Amateur Radio Club has been formed with the following members: OXK, PIV, PP, RFB, 8FZ, TCU, TJK, UNV, VIQ, VIL, VSF, and WAW. PPB is out of the Navy and lost no time getting on the air with a gallon. The recent touch of spring must be the reason for lack of reports this month. Keep them coming, gang. The XYIs are giving the OMs plenty of competition in traffic work. Nice going, gals. Traffic: W2RUF 398, PGT 350, NAI 137, SJV 90, VIQ 86, BLO 82, FCG 72, AOR 61, WPU 55, SZK 44, GWY 43, ELF 26, PZC 24, WOE 21, UYG 16, QNA 8, QHH 7.

WESTERN PENNSYLVANIA — SCM, Ernest J. Hlinsky, W3KWL — SEC: UBT. The Pittsburgh Area Radio Club Council was host to Atlantic Division Director QV at Roosevelt Hotel on Feb. 28th in Pittsburgh. Your SCM urges all ARLR official appointees to check their certificates for expiration dates. Appointments must be endorsed annually. Congrats to VNE, AER, LGK, and MBF on their fine showing in the recent Frequency Measuring Test. Upper Ohio Emergency Net has new members in JW, WGX, 8UTO, 8PHY, NUG says his 9-r is too sharp for traffic net work. RAP is well again. In Horseshoe Bend country, RFM won a club prize for first 144-Mc. out-of-town QSO with a surprising DX of 20 miles. SFF, KQD, LQD, and KTB also ran. Altoona's contest man is BWL. RBH and KWA are cited for blessed third harmonics. The ATA of Pittsburgh raffled off a nice BC-321 frequency meter. The Wesco Amateur Radio Society is going full guns, according to club reporter, UVD. Our sincerest condolences to OMG, whose dad passed away. OIW, TTN, and OMG are credited with the success of Wesco. FIH and NJH have BC221s. LIW reports lots of interest in Johnstown on 144 Mc. They transmit from top of mountain under call CHR. Up north LOD reports that the Red Cross and Citizens Disaster Com-

(Continued on page 84)



THE PATH to perfection is a thorny one. This truism was forcibly impressed on us by a recent and rather unnerving experience.

It all started when Carl Horton, of Athol, Mass., asked our opinion on the relative DX ability of the HRO-7 and the NC-2-40D. We replied that both were fine DX receivers but that the HRO probably had the edge.

We were gratified not long after that to learn that Carl had taken our advice. He sent us, in fact, an enthusiastic letter. Detailing his listening activities on the broadcast band, he wrote:

"I have been able to stay up about five nights since purchasing the HRO and here are the results:

601 kc	RABAT	Morocco	Logged	1:00-2:00 A.M.	Q4/R7
638 kc	PRAGUE	Czech.	"	1:35-2:00 A.M.	Q4/R6
704 kc	ANDORRA	Andorra	"	5:05-6:00 P.M.	Q5/R8
941 kc	ALGIERS	Algiers	"	1:00-2:30 A.M.	Q3/R6
1167 kc	SWITZERLAND		"	1:00-2:05 A.M.	Q4/R6

Also BBC on 668-767-804-877-1013-1122

Also France on 648-776-832-856-958-1040-1185-1393-1456

550 kc	KMVI	Wailuku, T. H.	Logged	3:42- 4:06 A.M.	S/O
630 kc	KPOA	Honolulu, T. H.	"	3:05- 4:30 A.M.	S/O
985 kc	YSR	San Salvador, Sal.	"	10:50-11:20 P.M.	
1380 kc	CB-138	Santiago, Chile	"	3:10- 3:50 A.M.	

"All but the BBC verify and I have reports out to them.

The following may be of interest also:

	<i>Sensitivity</i>	<i>Signal-to-Noise Ratio</i>	<i>Calibration</i>	<i>Drift (after 1/2 hr. warm-up)</i>
HRO-7	1	1	100%	NIL
NC-2-40D	2	2	100%	NIL
(RECEIVER "A")	4	3	90%	5 kc
(RECEIVER "B")	5	4	75%	40-70 kc
(RECEIVER "C")	3	5	60%	20-35 kc
(RECEIVER "D")	6	6	60%	10-15 kc

"For what it's worth, the above was a side by side test. Without a question, the HRO-7 is the best receiver I've used in the past twenty-seven years . . ."

Frankly amazed, we swelled our chest with pride. Such performance was better than anything we had expected! We kept right on thinking that until one morning about a month later. We were reading our newspaper at the breakfast table when this small advertisement caught our professional eye:

RADIO MARKET

FOR SALE — HRO-7, with coils from 500, — 30,000 kc., used about two months, reason for selling, losing too much sleep. f.o.b. Athol, Mass., \$250.

CARL L. HORTON

Shaken but sobered, we reflected that the ultimate is probably unattainable, human frailty being what it is.

ERRATA: March QST P. 61, Al King's MB150 transmitter specified an incorrect value for RFC₁. It should have been 750 microhenries, as many pointed out to us.

W. A. Ready
THE NATIONAL COMPANY
Malden, Mass.



mittee is looking to the McKean County Radio Club for communications. NDE is going strong with the Boys' Club of St. Marys. From Erie our ace reporter, TFX, reports the following: WF is testing oscillator on 50 Mc. for model aircraft control. DXN gets more DX QSLs than any other W3 according to QSL Bureau. LTY QSOs on 28 Mc. with an 829B. MBT has p.p. 807 modulating with 807s on 28 Mc. KQB says if you have 60-cycle hum, look for a bad fluorescent lamp. There are 30 Erie stations on 28 Mc. Mercer County is well represented on 144 Mc. The gang is on nightly from 9 p.m. on, all crystal-controlled. MWV, LIF, KQA, KWL, and MGW have VHF-152 converters. MCRA is making plans to become affiliated with ARRL. Traffic: W3MJK 309, YA 273, KWL 203, KKA 114, NCJ 92, PY 32, LOD 23, NUG 22, AER 18, GJY 17, LQQ 13, LIW 9, RAT 8, QN 2.

CENTRAL DIVISION

ILLINOIS — SCM, Wesley E. Marriner, W9AND — Chief RM: EVJ, RM: SXL, PAM: UQT. State Nets: "ILN," 3765 kc.; "IEN," 3940 kc. Egyptian Radio Club, Inc., AIU, recently purchased seven-room club house near Chain of Rocks Bridge and has 1-kw. rigs on 14 and 7 Mc. New officers are: @EKY, pres.; @LLN, vice-pres.; @THB, secy.; @VEE, treas. DJG and THB have new Collins ART-13s. THB and DZU have SCR-522s and will be on 144 Mc. shortly. The club has a new three-element beam on 14 Mc. Rock River Radio Club officers are: AWA, pres.; OMA, vice-pres.; UNG, secy.-treas. Meetings are held the first Thurs. of each month. 8M5LK flew over from Stockholm and spent several days with AND. Hams visited were AWA, AHV, GNU, VJN, UNG, HGO, ERU, BRY, WOP, QWT, and ZHB. GBT, FUR, AAU, AWA, AHV, GNU, VJN, UNG, and DEH attended reception and dinner for SM5LK. AWA and AND have new RME HF 23- and 14-Mc. converters. DEH is new in Dixon. VJN purchased ARC-5 transmitter and receiver. Illinois Valley Radio Assn., Inc., officers are: IQC, pres.; JVC, vice-pres.; ACJ, secy.; YIF, treas. Meetings are held the second Friday. The club is obtaining radio gear from the Navy for the organization of the Platoon. Club nets were organized on 29,000 kc. for 28-Mc. 'phone men and on 3790 kc. for c.w. 'Phone Net meets Mondays at 9 p.m. C.W. Net meets Sundays at 9 a.m. PBV is on 144 Mc. The Starved Rock Radio Club Field Day operation will be held in the pasture behind the shack. Net frequency is 3765 kc. With the help of @MCX, BIN is on 7 Mc. with a BC-459A. NGG is running 40 watts to an ARC-5 rig. AEZ is having harmonic trouble. JGC is doing a little work on 7 Mc. now that BIN lent him the SW-3. EVJ is busy with Red Cross and emergency-organizing. K9AAN is interested in traffic work. KQL is new Sagamon County EC. PEK worked ZLIFX on 28-Mc. 'phone with 40 watts. VES is attending U. of Ill. and has renewed ORS. He made 106,778 points in last SS and worked, UA9, VQ3, KB6, KM6, ZB1, ZE1, EL4, VR2, VR6, J9, VK9, C9, YN, CP1, 16, FT4, CNS, and ZK1 with 100 watts. SM5LK visited MXP in Chicago. RSM is on 3765 and 7135 kc. His rig is a Sonar VFX-680 into Hallcrafters HT-18 and a long wire antenna, and an RME-45 receiver. BRX had to work both DX week ends so no DX. BUK soon will operate both ILN and IEN c.w. and 'phone nets. Florida State Fair traffic kept EVJ busy. SYZ will replace 144-Mc. "J" with 3.5-Mc. antenna. QBH has had T.V.L. trouble and has to change OBS schedule often. The Chicago Area Radio Club Council has completed an eight-day stand at the World Hobby Exposition in the Chicago Coliseum operating 9MWV/9 using a BC-610 on 28 Mc. The Army had W9USA on 7-Mc. c.w. and the Navy K9USN on 14 and 3.85-Mc. 'phone. New officers for the Council are: HFX, pres.; HFG, vice-pres.; NGD, secy.; BAN, treas. The Chicago Mobile Operators Club and the Lake County (Indiana) Amateur Radio Club joined the Council making sixteen clubs affiliated. HPG sent in the CARC information. Statistical Quality Control Job has kept DXL busy but he says hello to ILNers. The Illinois National Guard station of the 33rd Sig. Co., CNH is on 3962, 3520, and 3525 kc. GAI is chief operator. CNE is located at Northwest Armory, 1551 North Kedzie Ave., Chicago, and welcomes calls and schedules. LNI visited hams in Boston. KQL has new antenna pole and new relay control panel, eleven 12-volt d.c. relays and power supply! He is on Trunk Line "L." Traffic: (Jan.) W9PEK 35, (Feb.) W9EVJ 550, SYZ 322, KQL 275, ZPC 61, FKI 44, YTV 28, FST 23, IFM 17, CTZ 14, QZL 14, WFS 14, SXL 12, NIU 9, RSM 8, BUK 2, BRY 2, EBX 2.

INDIANA — SCM, Ted K. Clifton, W9SWH — SEC: WNM, QIN, 3656 kc., and INP, 3905 kc. UIA now has 55 countries on 28 Mc. Newcastle Amateur Radio Assn. elected the following new officers: VVT, pres.; SQW, vice-pres.; and DRE, secy.-treas. PRO won first prize in the WFW (Worked Ft. Wayne) by working 50 stations. UNI is working as engineer at the Cannelton h.c. station. MHE, of New Haven Atomic Club, has new Class B 3.85-Mc. 'phone rig. DHJ is on 144 Mc. PTW has graduated from Purdue with BSEE and now is at RCA in Camden, N. J. New officers of the Purdue Radio Club are 4JBY, pres.; Roy Dennison, vice-pres.; and WEZ, secy.-treas. WQP now is at Hastings, Neb. VTG is in Lebanon, Ind. UC gave

an interesting talk on his experiences as a ham for the past thirty years at the Feb. 20th meeting of the Ft. Wayne Club. New on 144 Mc. are FNP, BHE, and MLX, at Elkhart; URX and NGJ, at South Bend; 8ZZF, at Niles; and ECH, at Mishawaka. JDW has a new Duroc sow. Your SCM is the only amateur in the State with a transmitter-equipped horse. UKT reports 37 out-of-band stations during the first week of the DX Contest. CZO is Indianapolis's newest amateur. APM has a new arrival. OVF now is married. KYM, of Electro Voice Microphone, gave a fine talk at the Ft. Wayne Radio Club on Mar. 5th. USU and his XYL are living at Toledo. FWP is moving into new home. UKV spent two weeks in the hospital. IDZ has 28-Mc. mobile rig. PMT and UUN lost their antennas in storm. EGQ has passed your SCM in 3.5-Mc. DX by working two Gs, FAS, two KH6s, TG9, KV4, KP4, DS4, and XF. Herb was using 100 watts. NXW, who is considered an authority on antennas, had his antenna chopped down. YDA reports spring in Bloomington. TT celebrated his eleventh birthday on Feb. 29th. VKH now is in Texas. UGH had an auto accident on the way back from Florida. Traffic: W9BCB 132, TT 132, HUV 116, PMT 50, BKJ 33, KTX 31, DHJ 28, YDA 25, UKT 17, PIQ 12, HZB 5, IYI 4, LXI 2, CLF 1.

WISCONSIN — SCM, Reno W. Goetsch, W9RQM — LZU now is SEC. QFC is on 14- and 28-Mc. 'phone with p.p. 5514. TQV and CYN work 3.5-Mc. c.w. and 28-Mc. 'phone with 50 watts. LBC, BZU, and DDG work 50 Mc. nightly at 1830 between Manitowoc and Sheboygan and are looking for other stations. The Manocrad Club held an activities contest which was won by DKH, with LBC second, and OVE third. AFT lost sixteen-element 144-Mc. beam in wind storm. RUF has done an FB job of organizing Milwaukee AEC with 144-Mc. net operating on spot frequency using 8111-kc. crystals. Congratulations to LFK, who makes BPL this month. IQW and HDJ keep schedule with 6CG to keep in touch with HDJ's father in California. CWZ is active on State Net. YCV received 35-w.p.m. Code Proficiency Certificate on W1AW copy. Although CHS spent some time in the hospital, his OO report still lists 47 stations operating out of bounds! EBJ is getting gear ready for Field Day. UFX, Madison area EC, reports on Madison flash flood in which the following participated: HZS, QPJ, NLX/9, FVX at fixed stations, UFX mobile, and MFR standing by to go mobile if needed. CFT has been making the W9 boys happy with DX QSL cards from his W9 Bureau. DIH is a new call at Wausau. LZU is working out details on emergency net to report river levels for U. S. Army Corps of Engineers. CGO is blasting away on 50 Mc. CTD's low power really bags the DX. We regret to report EZT as a silent key. ZVO now is ZVZO at Biloxi, Miss. JNU had an accuracy of .001 per cent in Frequency Measuring Test. JBF, CFT, QJB, VHA, and HEE have SCR-522s on 144 Mc. Traffic: W9LFR 512, DKH 187, UFX 98, SZL 69, ESJ 67, IQW 32, RQM 19, DND 15, MUM 17, SZL 13, CWZ 9.

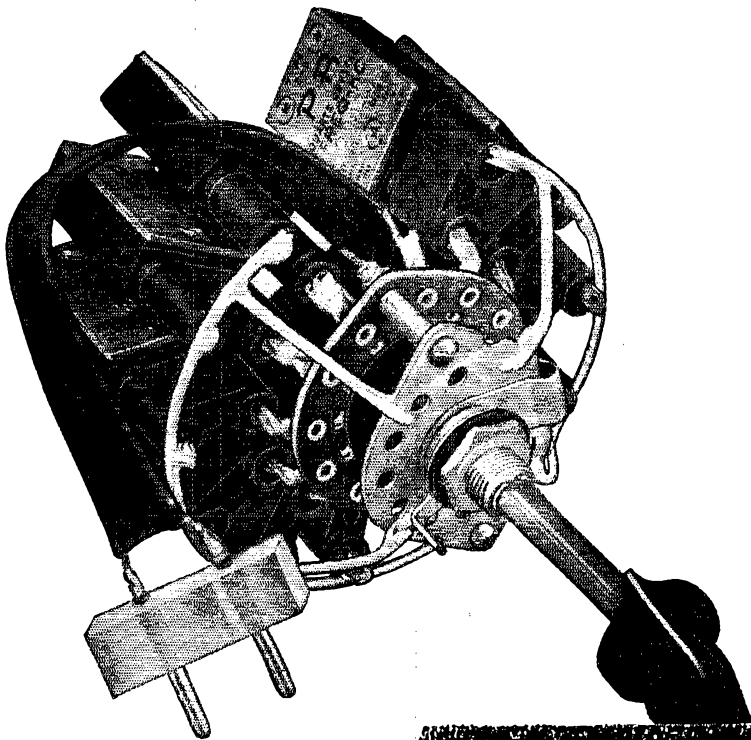
DAKOTA DIVISION

NORTH DAKOTA — SCM, Paul M. Bossolotti, W9GZD — TSN has a 50-144-28-Mc. stacked rotary. Beam is going up higher at RG. New calls in Fargo are GBE and EST. SPC is building new rig. KHG has Park River for new QTH. RRV is back from Iowa and on 3.85 Mc. Fellows are kept busy working VQ4BHG. Red River Radio Amateurs have lined up gasoline-power generators and balloon antennas for Field Day. The Fox Club has new call, FVT. USN station, K9NAM, puts out FB signal with 125-ft. vertical in Minot. BZJ, YSI, TSN, and EGC are perking up SCR-522s for 144 Mc. OUH has confirmed over 70 out of 110 countries on 14-Mc. c.w. DAO is trying to trick his 807 into 28-Mc. output. USNR will have station in Grand Forks. U. of N.D. is building p.p. 250THs for kw. all-band 'phone-c.w. rig. The University needs traffic and schedule outlets for Engineer's Day celebration. Drop me a line. Traffic: W9BCB 27, GZD 14.

SOUTH DAKOTA — SCM, J. S. Foasberg, W9GMP — HDO is the new president of the Mitchell Club; GCP is secretary. GCP boasts an e.c.o. to an 813 final. ZZX is on 3.85-Mc. 'phone. CWC is going hot on 28 Mc. PHR has weekly schedules with KSAH on 3.5-Mc. c.w. The Sioux Falls Club members have gathered parts to build a 200-watt transmitter, which is now in the construction stage. BLK has a pair of 814s ready to go on 14- and 7-Mc. c.w. and has enlarged his shack to house the new rig. ILL is rebuilding his rig into a deck with locks to keep out the overzealous jr. operator. YTN is on 7- and 3.5-Mc. c.w. PVE reports a lot of DX on 28 Mc. VQC is going fine on 28 and 14 Mc. with hour-long contacts on 14 Mc. UVL made the local news by a report of coming in on a neighbor's bathtub. FLO has a single 809 final and will be on the South Dakota Net on 3720 kc. with a Black Hills outlet. Traffic: W9PHR 27, UVL 19, BLK 13, GCP 10, NGM 2.

MINNESOTA — SCM, Walter G. Haasskamp, W9CWB — During February one of the biggest snowfalls in years fell in Minnesota and many antennas were reported down. Our Director, TSN, is ready to go on 144 Mc. Following are new hams: PQD at Hutchinson, EYW at Evanville on 7

(Continued on page 88)



NOW YOU CAN GO PLACES!

QSY is as easy as pie! Yes, the Crystal Shifter illustrated above gives you **INSTANT SELECTION** of as many as eleven crystal controlled frequencies within a 100 kc. or so range on phone . . . without removing excitation, turning off plate current, or retuning of transmitter stages . . . without danger of getting out of the band . . . with positive knowledge of where you are **ALL THE TIME!** You can build this PR Crystal Shifter in a half hour or less with a soldering iron and a pair of pliers. You can follow the construction easily from the above photo. Components needed are: Centralab 11 position rotary switch assembly No. 1402;

eleven (or less) Cinch No. 9827 single crystal sockets; a length of No. 12 tinned copper wire; a Mosely 75-5 adaptor plug; a piece of 300-ohm Twin-lead; and a group of PR Precision Crystals. Use PRs you now have and add more frequencies as you want to. Mount the completed assembly on the front panel, plug into your crystal socket and you're ready to flit from frequency to frequency at will! It occupies less than 3½ inches of panel space. Many 10 meter phone men are already using the Crystal Shifter. Make it! Try it! — Petersen Radio Company, Inc., 2800 W. Broadway, Council Bluffs, Ia.



SINCE 1934

PR Precision
CRYSTALS

10 METERS
PR Type Z-5.

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Mo., BQK at Kensington on 3.5 Mc. K9NAH is the Naval Reserve station at St. Cloud. Vic Voltz, an old-timer now at Cannon Falls Sanatorium, has received his Class C ticket with the call GPH. YKD and ORJ have built modulation percentage indicators. VIP is back on 4-Mc. 'phone. SV has 700 watts on 144 Mc. TOZ and 9GDD keep weekly schedules on 50 Mc. WAO must want to be on the net frequency — he is putting in e.c.o. Ex-9MCF is operating as 9MCF/C1 from Shanghai, China. RJF has joined T.L. "G." DSF used his "California Kilowatt" in the DX Contest. BOL has qualified for a 25-w.p.m. Code Proficiency Certificate. JRI keeps schedules with KL7MH Sundays and NCS on Saturdays. AXG and a friend dropped in at ORJ's for a visit via airplane. QXI is building a new secondary frequency standard. LNV completed a new portable 144-Mc. t.r.f. receiver while NRV made a new 28-Mc. broadband converter. BBN has his new final on 144 Mc. running about 200 watts. TLE now is on the air with an s.s.c. rig! MXC is giving code practice on 29.3 Mc. Mon., Wed., and Fri. at 9:00 p.m. BMX isn't sleeping nights because the station he worked in Saudi Arabia was aboard ship and therefore can't be counted as a country for DXCC! A Dakota Division Council of the Air meets on 3886 kc. Contact RPT for details. Watch for and listen for details and further announcements on the Gopher Hamfest to be held in the Twin Cities, June 18-19th. PJP now is 9CSO. Rochester reports a total of 30 licensed amateurs. Don't forget the Dakota Division QSO Party to be held on the 3.5-4-Mc. band during April. Is there no one in Minnesota who can qualify as OO? Traffic: W9VJH 130, ITQ 119, RPT 74, CWB 48, JIE 44, RJF 40, HEO 22, YBM 17, KXC 11, YUN 11, EPJ 9, HEN 9, BBL 6, ORJ 6, HJ 5, BGY 4, FAH 4, JRI 4, IZA 3, MZU 3.

DELTA DIVISION

ARKANSAS — SCM, Marshall Riggs, W5JIC — FMF is having QRM getting crystal for net frequency. BJH is building 144-Mc. rig. MRG and HDR are new members of C. W. Net. Conway is really stepping out and has a brand-new club with eight members. AOU is president. JIN is re-vamping 812 rig for 28 Mc. KYQ is working an 829B for 28 Mc. NGB is on 7 and 28 Mc. with 6L6. OCX is building 829B rig for 7 and 28 Mc. NCM is on 28-Mc. 'phone with 829B. The Harrison Club has 21 members now. OCV and OCX are new calls. LUX is building n.f.m. kw. NCL is on 3.5 and 7 Mc. with 50 watts. LZQ has new QTH. Traffic: W5FME 135, EA 33, JIC 14, MRD 14, LUX 11, BJH 1, DSW 1.

LOUISIANA — SCM, W. J. Wilkinson, Jr, W5VT — KTE, the SEC, has been rebuilding his shack. JET reports that Naval Reserve Unit is being set up in Monroe. IVF has a new doublet on 3.85 Mc. HOS is busy on 28 Mc. DXL is active on 7 Mc. along with GMD, who is confined to his bed most of the time. EGK has kilowatt on 14 Mc. JRI keeps schedules with LUN and KME. BPL has new rectifier and 350 watts on 7 and 14 Mc. You will find Pop on Friday nights mostly. JJP has a new VFO going. Ex-KUG now is 4MVJ. KRX is active on Rebel Net and is handling traffic. QH is getting emergency system worked out for Shreveport. JOK has a beautiful signal emanating from Barksdale. ASJ was killed in a fall while his ship was docked in London. BAF is undergoing an overhauling and some new equipment is coming in. LQO and LQV report activity. The CARC of Shreveport is putting on some very interesting programs at their meetings the second and fourth Friday of each month. FYS works 14-Mc. DX. GHF will soon be on 7-Mc. c.w. KTD is active on 7 Mc. HHT is heard as NCS on the Pelican Emergency Net. Certificates have been issued and any member of this net who may have been overlooked should advise the SCM. Net certificates for the Louisiana members of the Delta 75 also are being contemplated. BSR, Director Canfield, wants to hear from all of you before the Board meets in May. VT will be looking for more dope from all of you for these reports. Traffic: W5KTE 188, VT 6.

MISSISSIPPI — SCM, Harold Day, W5IGW — SEC: JHS, PAM: LN. RM: WZ. ANP uses a BC-654 with a PE-103 dynamotor for emergency rig. DLA has a 28-Mc. mobile rig that can also work 3.85-Mc. 'phone, using a PE-103 with which to power it. WA has an a.c. gas-driven power unit that can drive his 200 watts independent of commercial power. IBO, Biloxi EC, uses a BC-459 for 7-Mc. c.w. and a BC-896 for 3.5-Mc. c.w. and a 2 1/2-kw. gas-driven a.c. generator. OBC is chief operator and DT, GIA, and IBO relief operators of Biloxi High School station. MJL has Class A ticket. NYP is on 28 Mc. NYV is running 45 watts to a rotary beam. JHS is a brand-new grandpa. The Gulfport boys entertained the fellows that helped them during the September hurricane. We need a good EC at Jackson, the focal point for rail and wire communications. Three Mississippi stations of the Rebel Net had a combined Feb. traffic total of 1978. Traffic: W5IGW 820, WZ 624, LAK 534.

TENNESSEE — SCM, James W. Watkins, W4FLS — The NARC is putting out a monthly paper named the *Handspread*. The prize-winning name was suggested by GQQ. The NARC was called upon by the American Red Cross to supply emergency communications during emergency caused by flood waters on the Cumberland River on the night of Feb. 13th. An Emergency Net has been organized on 28 Mc. meeting each Wednesday at 2000. LRK

has new ARC-5 VFO for chasing that elusive DX. JSM is experimenting with a BC-348 as a Q5-er. MOV is trying for out-of-town contact on 50 Mc. FWH plans to attempt 144-Mc. contact with Memphis. HOJ uses his 807 buffer to answer roll call in the Tennessee Net. Tennessee now has a c.w. net operating on 3737 kc. at 6:30 and 8:00 p.m. CST each evening. 4FCU is Net Control. LHQ has new Diamond antenna. GCS is new AEC member. LNF is planning a new 810 rig. MCZ has new HT-6. PL had his annual traffic agree with the Florida State Fair station, DUG, but missed three days when he operated U. S. Engineers station, AEDK, during flood emergency. 5MKL/4 is waiting for a new relay for break-in operation. FCU is new RM. DTI hopes to be back on soon with 150 watts on 'phone and c.w. The following members of the Tenn. 3.85-Mc. 'phone net have been issued Net Certificates: AFI, BAO, BD, BDB, EAL, EBQ, EDC, EYO, FCC, FEI, FGD, FLW, FY, GHL, GQQ, HHQ, HQM, IUC, JD, JMW, JHE, JMZ, KME, QT, ZZ. Traffic: W4PL 2103, FWH 168, FEI 129, LNN 85, HOJ 15, LHQ 10, 5MKL/4 5.

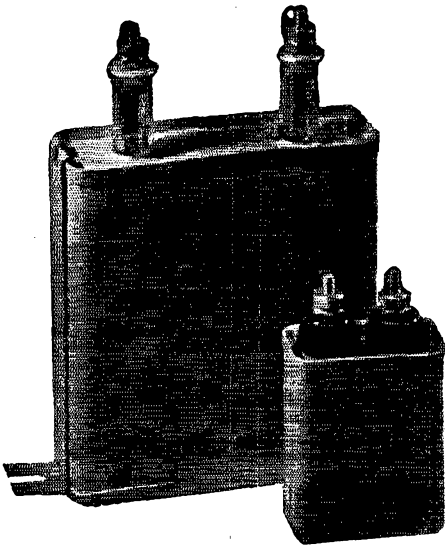
GREAT LAKES DIVISION

KENTUCKY — SCM, W. C. Alcock, W4CDA — Kentucky stations handled 834 radiograms during February to break all postwar records. The KYN and KYP Nets are getting bigger and better, with BPE and FBJ developing 144-Mc. net. MRI is building 144-Mc. converter and 832 final. LNU is re-converting ARC-5 and SCR-532 for 144-Mc. work. MSC has increased power and has excellent signal on KYNet. CDA is working on p.p. 813 final. FKM had 100 per cent attendance for KYNet and is a regular on KYNet. BPE and FBJ were appointed Official Experimental Stations. KKG is going in for 144-Mc. work, and offering trophy cup for best DX this summer on 144 Mc. JGN works a high-power amplifier is discouraging when he gets good reports on using 10-watt Signal Shifter. CIS worked North Africa with Millen exciter. BAZ works 7 Mc. occasionally. He has Collins VFO and says KYNet is so big it may have to run two shifts. UWR has new four-element 28-Mc. beam and three-element 14-Mc. beam in operation. JRO works high end of 7 Mc. FQQ works Trunk Lines "AP" and "J" and schedules K8BFG on 7 Mc. JHU is liaison operator for KYN and KYP Nets. Owensboro's club put on ham reunion Feb. 29th, attended by Kentucky and Indiana amateurs. MRI, KMX, and LVL are regulars on the 144-Mc. net. Applications are invited for Emergency Coordinator. We need one in every community! Mail activity and traffic reports to SCM the last day of month. Traffic: W4CDA 332, BAZ 205, FQQ 107, NBY 57, JCN 46, MWX 23, FKM 18, UWR 12, MSC 11, FBJ 8, KWO 8, JRO 5, BPE 1, KKG 1.

MICHIGAN — SCM, Joseph R. Beljan, jr., W8SCW — SEC: PVB. RM: NOH, PVB, and UKV. CPY is new OBS appointee. KRS and UUS now are OO. ARJ is on QMW Net and NOH is with T.L. "G." The Central Michigan Amateur Radio Club played host to delegates from other Michigan clubs at Lansing on Feb. 22nd. The main purpose was to give our Director, DPE, the thoughts and ideas of the clubs within our State on frequency allocations and other pertinent questions regarding amateur radio. The meeting was well attended and proved to be such a success that it was decided to organize a Michigan Council of Clubs with UJS as chairman. Congrats to DOI and UJS for their fine work in arranging the meeting. The Adrian Amateur Radio Club is rapidly gaining ground and has been recommended for ARRL affiliation. The gang out Royal Oak way are QRL organizing a new club which promises to be a livewire organization. PVB is doing a nice job as SEC. CYH has 350 watts on all bands. NCB is doing fine with 500 on all bands. DNM is building a new p.p. 813 final. Congrats to AQU on the arrival of the new YL operator. The Allegan gang is organizing a 28-Mc. 'phone net. The Muskegon gang has a 28-Mc. 'phone emergency net in operation, with UCG as NCS. UAL is trying for WAS on 7 Mc. IV has 1948 car license "FB-73-83." By coincidence of course! YAD is having motorator trouble. YMG now is Class A. TIC is sporting a new SX-43. NZU has returned from his trip out West. YKT is back on the air after shack alterations. OGJ is moving to Saginaw. UKV has started operation of the slow speed trunk line on 3545 kc. at 7 p.m. We regret to announce the passing of OGT of Lewiston. Our deepest sympathy to WUT, who lost her young son, and to YBU, who lost his infant daughter. TBP is acting as relay between the Eastern and Western sections of the Canadian Net. QVF has 350 watts with n.f.m. TRN has new Sonar CFC VFO. UBF is rebuilding. SZW, UES, UUS, and WOV are new calls on QMN. The DARA again will sponsor the Michigan Hamfest, which will be held on May 23rd at Ypsilanti. Plan to attend, meet the gang, and have a swell time. See you there. Traffic (Jan.) W8TBP 59, BCX 9, UUS 5, YCT 4. (Feb.) W8NOH 687, GSJ 451, SCW 287, PVB 223, ARJ 181, ZWN 127, UKV 122, DNM 101, TBP 81, ATB 53, SH 50, TRN 46, QBO 36, VPE 33, AQA 31, AIZ 20, DPE 20, IHR 17, RJC 17, IV 15, FX 13, UES 11, DWB 7, RYP 3, QF 1.

OHIO — SCM, William D. Montgomery, W8PNQ — February was good traffic month again — the total handled was 1772. Keep it up, fellows. OPC reports the

(Continued on page 88)



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MFD.	Volts DC	List Price Paper Capacitor	List Price Plasticon AOC	Saving
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2	3000	22.78	15.40	7.38
1	4000	33.54	27.50	6.04
2	5000	48.73	41.25	7.48

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... cost less to manufacture, give better performance**

2. Smaller — Lighter

MFD.	Volts DC	Approx. Weight		Approx. Cubic Dimensions	
		Paper Capacitors	Plasticons	Paper Capacitors	Plasticons
10	1000	1.95 lbs.	1.7 lbs.	31 cu. in.	30 cu. in.
4	2000	2.0	1.23	31	23
2	3000	2.0	1.21	31	19
1	4000	1.77	.94	28	19
2	5000	5.2	2.9	70	60

3. Better Electrical Characteristics

	Paper Capacitors	Plasticons
Power Factor at 85°C 60 cycles	0.7%	0.3%
Resistance at 85°C megohms per Mfd.	40	100
Capacitance Temp. Coefficient 100% at 25°	-40°C = 73% +85°C = 97%	-40°C = 94% +85°C = 103%
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formation in Cleveland of the South East Amateur Radio Club, which was organized by BAG. They meet twice a month and expect to be affiliated with ARRL as soon as possible. From the DARA Bulletin we see that TQT was transferred to Vaughan General Hospital at Hines, Ill., for a year's additional treatments, which should just about cure him. Good luck, OM. ENH and RCA are proud possessors of new YLs. New DARA officers for '48 are: ATQ, pres.; OJF, vice-pres.; ACE, secy.-treas.; YEV, asst. secy. CIT is well along in his recovery from a broken rib and back injuries suffered in a fall on his ice-covered porch. From Columbus, via the CARASCOPE, we see that TO and NPF have recovered from recent operations, and that IVC worked Knoxville with .18 watts to a 30 tube, thus taking the micro-flea power rating away from WAB (who did it with .38 watts). AI, ex-1LV, recently moved to Fremont from Connecticut. DAE recommends the Command VFOs as being neat and stable. EFW finally made WAC after 17 years of trying. JFC reports that FAU has a new jr. operator, and that RY has a new Collins transmitter and receiver to go with his new beam. AQ gave up his folded dipole on 3.85 Mc. and went back to his Zepp, which paid him an immediate dividend with the working of ZSGDW. LJE has been reporting into the Buckeye Net from his RJD where he is tied. At present it runs from Newport to Southway 144 Mc. in Cincinnati has apparently folded up again after what appeared to be a good start. Traffic: WSTKS 309, EBJ 223, UPB 205, FFK 304, PZA 129, WXIA 112, CBI 87, RN 79, PNY 71, PVC 63, ZAU 52, EQN 51, TQA 49, EIU 22, QBF 19, BEW 17, PUN 17, WAB 15, LJE 13, QIE 13, DAE 10, UW 9, EFW 3.

HUDSON DIVISION

EASTERN NEW YORK — Ernest E. George, W2HZL — NYS Traffic and Emergency Net is now covered by 27 member stations. Forty additional stations report in. This is one of the finest nets going. New members in February were BSH, USH, and VP. Stations still are needed in Albany, Greene, Columbia, Orange, Putnam, and Rockland Counties. Anyone interested, please get in touch with ITX. The Westchester 144-Mc. Net now has 28 stations. The Atlantic Coast Line 144-Mc. Net has been successful each time it has tried. At present it runs from Newport to Eastbury Park. Early March saw Philadelphia's through to Boston in operation. USH reports seven DX countries on his 6L8 final. JZK reports he is another ham who lost a good 8JK to Old Man Weather the other day. What a winter! BSH has his new 300-watt rig going now and apparently battling off quite a few QSOs. Officers of the Amsterdam Radio Club for '48 are: VDQ, pres.; Dick Gibson, secy.-treas.; and RMD, trustee of club station. Meetings are held the last Monday of the month and temporarily are held at 17 Pine St. A little 144-Mc. work and a lot of building in this area keep Amsterdam ham-conscious. Schenectady boys will miss their old friend, MB, who has retired and is now roving the country in his trailer. Look for him on 28 Mc. Traffic: W2ITX 381, WFO 124, RH 114, EQD 82, TYC 44, NHY 38, BSH 33, USH 14.

NEW YORK CITY & LONG ISLAND — SCM, Charles Ham, jr., W2KDC — The Suffolk County Radio Club has been invited by the Suffolk County Amateur Radio Club to work together at Rock Hill, Eastport, on Field Day. All those interested in this activity are asked to contact MZB, SCR chairman, or OQI, SARC chairman. LCU is ready to go with a 522. PDU is making his 522 do until a bigger rig is on the air. ZV can be heard on 3.85-Mc. 'phone and 3.5-Mc. c.w. CRZ is back on the air and has added an XYL to his staff. AYJ, formerly of Oyster Bay, now is on the h.f. bands and is operating from Babylon. In Nassau during February, thirty 144-Mc. stations were active with an average attendance of twenty stations for the weekly drills. Those heard were CMU, FQW, VL, GG, OBH, CET, CHK, QBS, OUL, IGP, ANN, NI, JPY, RH, ADT, QAN, KB, NBS, LJP, WKR, QXY, MBB, RB, HOL, OXM, WJS, SFV, SMX, and FI. New stations in the 144-Mc. net are MBB, KB, OXM, and WJS. Old stations returning after long absences are SMX, SFV, and NBQ. SMX, RH, QAN, and FQW are busy building gear for 420 Mc. City College Radio Club, HJ, is planning technical talks on a wide range of subjects for the coming months. RTZ is slowing down on traffic a little and giving the family a break. Hope plans to visit local vets' hospitals and solicit traffic. She also is helping to organize the Daylight Net on 7 Mc. CJZ has a Super-Pro preceded with a 152 converter. He and LWE are on 144 Mc. and are organizing for Field Day; LWE is concentrating on c.w. USG, on 3.85-Mc. 'phone, is welcomed to Port Jefferson. The Gompers Vocational H.S. is forming a radio club and can be heard on all bands, including 144 Mc. The Staten Island ARA has been reactivated with GHK, AMO, SGO, and NQO as officers. Meetings are held the first and third Monday of each month at the Masonic Hall in Great Kills. LQP is busy installing telephones. Lou lost an antenna recently under peculiar circumstances. NYC-LI is going stronger than ever with individual members branching out into other nets. Contact OBU or QYZ for monthly bulletin. PWJ is doing a good job on 3.85-Mc. 'phone with 30 watts. HYT was QRL because of ice on antenna. OUT is joining the 8UKV 15-w.p.m. net and is seeking ORS ap-

pointment. TUK has been forced to leave NYC-LI Net temporarily because of change in college work. EC is busy building screens. KV4AF/2 can't seem to get hold of enough traffic. Ted now is ORS and uses 10 watts on 3.5 and 7 Mc. UZX worked 13 countries on 3.5 Mc. in three weeks. RQJ is working on n.f.m. adapter with miniature tubes. QYZ has made arrangements to schedule vets' hospitals to help the boys keep in touch with home. VOS is having note trouble. He is trying out a new antenna on 7 Mc. Ex-IWV now is 4MZZ at Winston-Salem, N. C. OUT is helping to organize slow-speed trunk line and is representing NYC-LI. TYU's 866 caught cold and he lost several thousand in traffic total in three days. PZE is QRL on NYC-LI Net because of putting kids to bed; he suggests a slightly later period. Cal is trying n.f.m. on 28 Mc. MZB has worked 48 countries with 36 confirmed on 28 Mc. KJY has a new YL. He is waiting for the bonus so he can get an NC-173. BO has installed new commercial transmitter, all bands, 450 watts. Macis ready for any emergency. Traffic: W2TYU 628, RTZ 251, QYZ 229, OBU 155, TUK 121, UZX 113, KV4AF/2 99, W2BO 87, EC 71, MJO 66, BGO 41, KDC 30, OUT 24, VOS 17, PWJ 7, RQJ 7.

NORTHERN NEW JERSEY — SCM, John J. Vitale, W2JIN — Asst. SCM, T. J. Lydon, 2ANW. SEC: GMN. NNJ Net (c.w.), 3630 kc., 7 p.m. daily except Sunday. NJ 75 'Phone Net, 3900 kc., 9 a.m. Sunday. The NNJRA turned over one of its recent meetings to the organization of AEC, with the SCM and Asst. SCM as speakers. DZA, Bergen County EC, reported that a county-wide emergency net is in operation. NUL was appointed EC for Passaic County. NNJRA officers are: DIB, pres.; NUL, vice-pres.; DZA, treas.; FKA, secy. UWK is doing a swell job as program chairman. PIQ is club's emergency committee chairman, assisted by NLN. UWK is running 300 watts to a 810 on 28-Mc. 'phone. DJT is working 7 Mc. BLI is active on 3.5 Mc. TLW's new rig is on 14 and 28 Mc. HXU has 150 watts running on 14 Mc. EOG is DXing on 28-Mc. c.w. WLJ is on 144 Mc. with 522. RE and VTD are interested in traffic-handling. NCY is n.f.m. on 3.9 and 28 Mc. JKH finished his 14-tube superhet. UWN, FFO, and IRE are on 144 Mc. UWN is using a six-element beam. LTP made WAVE, a Canadian award. APL is working some F and Gs with his MK2 on 7 Mc. NNJ is opening its postwar 7-Mc. net on 7070 kc., 7:30 p.m., Mon.; Wed.; and Fri. BLS, BRC, and ANW will alternate as NCS. Others in the net are RE, JUC, and VTD. The UCARA gang is installing equipment at its new QTH at Red Cross Headquarters, Elizabeth. The Union County 144-Mc. net is progressing nicely. CQD is County Coordinator. VQR, Monmouth County EC, has a swell turnout every Monday at 8 p.m. on his emergency net, and ties in weekly with Nassau, Kings, and Manhattan-Queens Emergency Nets in New York on 145.8 Mc. T.L. "A" is looking for N. J. outlet. Ocean County ARA recently elected BYM, pres.; MMG, secy.; DYR, treas.; and LHN, chairman of the House Committee. Tri County ARA meets on Mondays at 8:30 p.m. in the Plainfield City Hall and is cranking up the generators and gear for Field Day. EUI is finishing his ARC-4 for three-band operation 28, 50, and 144 Mc. with crystal-controlled transmitter, using a converter on the three bands to the 28-Mc. i.f. of the receiver. CMC is back on 3.5 Mc. with 809 in final and BC-348R. Wanted, two men to act as County Coordinators for Hudson and Ocean Counties. The Tri-County officers are: BU, pres.; QJR, vice-pres.; KHK, secy.; MGF, treas. HIA is organizing the Emergency Corps Net in the vicinity of Perth Amboy in conjunction with Raritan Bay Radio Club. The Union County Net is operating on 144.138 Mc. at 11 a.m. Sunday. BWI and DJT pounded brass in the DX Contest. The E-K Net for high speed practice operates on 3775 kc. nightly. PQG and QLF are in charge. MUF is now Class A on 14-Mc. 'phone. UCARA 144-Mc. boys are PIX, PIY, LKN, LIQ, BTZ, OSQ, CQD, TH, MUP, IHR, HNY, MLF, EUI, NLY, DFV, AUL, AZL, MXV, JMX, GJC, CRW, and IIN. Traffic: W2CGG 382, ANW 259, LFR 131, CQB 125, NKD 114, BLS 78, NCY 55, NLY 48, DRV 43, MTJ 26, OXL 24, CJX 18, PPH 17, APL 12, IIN 12, BZJ 10, UWK 9, ANG 7, OOC 4, DRA 3, GVZ 3, BRC 2.

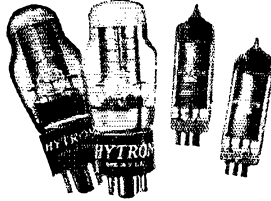
MIDWEST DIVISION

IOWA — SCM, William G. Davis, W6PP — QVA logged his 5000th QSO since getting on the air in 1938, with CNK on TLOCN Feb. 23rd. WNL is new president of Iowa-Illinois Amateur Club. AUL suffered a breakdown allegedly as a result of reporting on Iowa 75 'Phone Net. QVA and TIU are busy NCSing. LAGN while AUL is off the air. WNL built a new scope. LAGN is getting new telephone pole for one end of his 3.85-Mc. doublet. HMM says his February traffic total is the biggest for Iowa as far back as 1932. WML and Vern Brown visited FP and dragged some new 650-mill chokes back for PP. TWX enjoyed a vacation in W6 Land. New ECs: UL, AFQ, FKB, and TWX. EFI and CPU renewed EC appointment. HKN is new ORS. ADQ and NQM are sporting new Class A tickets. DUH broke several years silence by getting on 28 Mc. There are 17 new Collins 75A receivers now in use in Cedar Rapids. The Cedar Rapids gang held a fine meeting for Mr. Budlong of ARRL.

(Continued on page 80)

TUBES ARE KNOWN BY

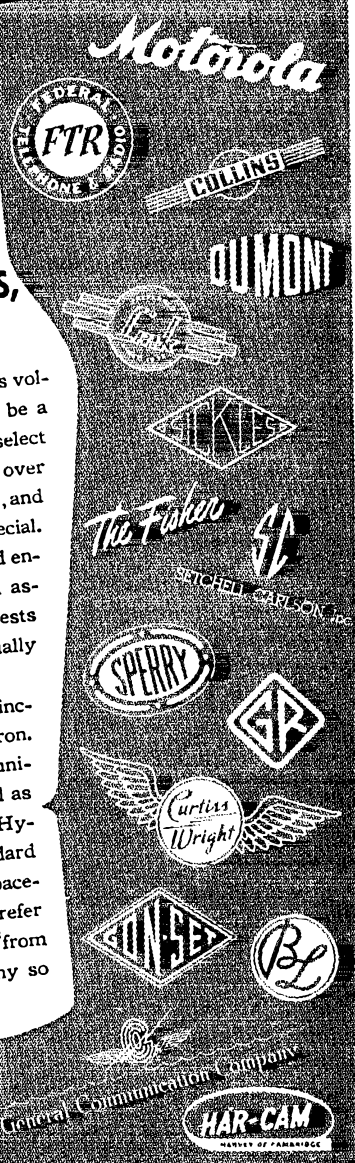
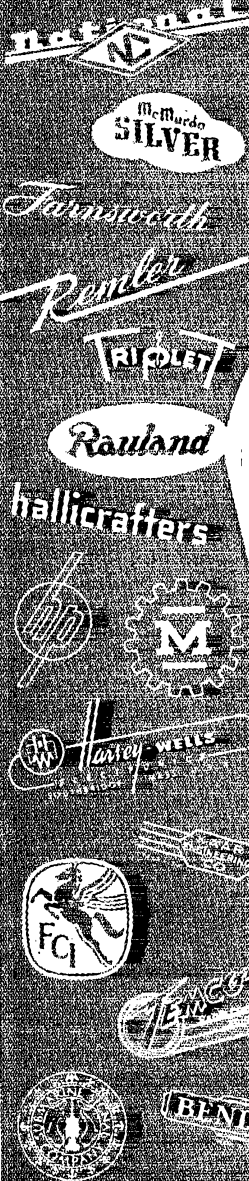
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b. If a rectifier is used in your pack, check that tube; it may be shorted, or its emission may be down.

c. Check the circuits of your portable transmitter and receiver for high voltage shorts (watch those screen bypasses in particular).

d. If your plans include mobile operation from your car or plane, be sure to check the voltage regulator on the charging circuit. (If this regulator puts out much more than 7 volts, you're heading for trouble. It takes a very slight increase in primary voltage to shoot that secondary voltage way up.)

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MALLORY

They held another for new Midwest Director, DEA, Mar. 31st, attended by KTQ, Alternate Director; PP, SCM; and FP, SEC. HMM is clearing house for four Trunk Lines into Iowa. He's also reorganizing Trunk Line "K" on 3755 kc. BFY has new 28-14-Mc. amphenol beam. SWY is showing another nice collection of QSLs. AEH is getting results on 144 Mc. TIU says farming is going to interfere with his ham radio. SQQ is working on a pair of 304TLs for his final. Thanks to the c.w. boys for the additional news. Traffic: W6HMM 819, SEF 70, TIU 69, QVA 54, PP 46, FP 36, AYC 14, FKB 12, WMU 6.

KANSAS — SCM, Alvin B. Unruh, W6AWP — SEC: PAH, PAM: IGV, RMs: NJS, KSY, OZN, OUU, AHA, and IZJ are new ORS-QKS Netters, all using BC-696 VFO rigs. FER renewed ORS appointment, has 6L6-TZ-40 rig, and is converting Command VFO. IFR has schedules with Kansas City. MAE increased modulation to 100 per cent. CXF has new Collins 32-V-1 rig. AEI is on 3.85 Mc. at Ft. Scott. EPX has rigs at two locations. IGV has had a siege of flu and cold. PZF is reporting into QMW Net: FER will act as alternate. WKA is representing the section in T.L. "L," because of the resignation of NCV. OZN has been working more DX with new two-element 14-Mc. beam. FTK is new call at Hugoton. LQS has n.f.m. VFO/exciter, single dial control to 810 final, and 28-Mc. mobile. KLK has Class A ticket. AEY has returned from Texas and again is active. Northwest Kansas Radio Club has 21 members. CUL is president. CC, will assist CUL as Assistant EC. H.c. station KXXX (CC, chief engineer) has been plugging the club on h.c. program. AEM reports more selectivity with Q5-cr. OHX is on 3.5-Mc. c.w. and 28-Mc. mobile with all-battery power. WKA originated message to New England asking each handling station to add its call — nine did! NCV is member of National High-Speed Emergency Net on 3550 and 7100 kc. KSY has new traffic rig with 803 final to augment the p.p. 813 rig. Traffic: W6PZF 133, NCV 68, OZN 34, NCS 31, KSY 23, AWP 20, IGV 20, FER 8, CXF 6, AHM 4, CC 4, EPX 4, IFR 4, OUU 2.

MISSOURI — SCM, Mrs. Letha A. Dangerfield, W6OUD — ERU reports that AGB, ADL, MXS, and he operated a 28-Mc. rig at the Springfield High School hobby show, using the call ERU, GOB, 14 years old, just received his ticket and has made 19 contacts. NCG made an exceptionally fine showing in recent Frequency Measuring Test. INK, Poplar Bluff EC, has a pair of 6L6s on 3734 kc. and is trying hard to put his AEC on the map. ZZW tells of the new message service for students at M.U. Members of the radio club collect the traffic and take turns reporting into MON, using either their own stations or the club station. ZLN. Operators are GEP, HSR, MIE, AFC, DWQ, and ZZW. QXO is top traffic man again with his early morning schedules. ARH climbed pretty high along that line this month. He has been made EC for Kirksville. SKA finally got on 3.85-Mc. phone, then the rig got peevish at being over-modulated and went dumb and the VFO wouldn't v.f. until he put in a variable condenser. VRF sends an FB printed outline of the AEC program for Kansas City. DPO renewed ORS appointment. His present headache is the conversion of a BC-453 to a Q-Fiver. DEA is trying to handle some of his very heavy correspondence as Director through traffic routes. GCL replaced the 813 that burned out after three contacts in the DX Contest and is back on 3.5 Mc. for the spring QRN. EYM lost his 3.85-Mc. antenna pole, but has a vertical for 27, 38, and even 14 and 7 Mc. if necessary. ZAO has been extremely busy writing letters and making plans for Missouri AEC, but managed to get up the antenna. OUD, YSM, and 5BMI/ø are on the National Emergency Net on 3550 and 7100 kc. The phone net on 3905 kc. is doing FB. VMO has his AEC gang on 3.85 Mc. Traffic: W6QXO 331, ARH 169, SKA 144, YSM 109, OUD 63, ZZW 32, DPO 31, VMO 30, KIK 29, DEA 14, GEP 8.

NEBRASKA — SCM, William T. Gemmer, W6RQK — FQB says, "VIG built a dandy 28-Mc. mobile rig using 6V6-6V6-2E26 final. EEH is new in Omaha. EAO has new Elinor 28-Mc. beam. MKP built revised edition of a twin three beam for 28 Mc. ROK is trying to get BC-459A hooked to HT-9 rig. SHH changed to 809s in modulator and added BC-459A. GPE, GJP, EJP, and EJY are new licensees. QXR is chasing bugs in antenna with Micro-Match. VHR, WIP, and CZK are new members of the Ak-Sar-Ben Radio Club. FQB is trying a new antenna per week on 28 Mc. besides feeding his pedigreed colles at midnight." GTW would like to get a Nebraska National Guard net started. NXF snagged Vermont for WAS on 7 Mc. with his 807 final. 9WII/ø is working 14 and 7 Mc. with a 14-Mc. ground plane vertical at Lincoln. EIC transferred to Wilmington, Ohio. POB is sending code practice on 3640 kc. OEU will conduct classes for local beginners on 27,250 kc. BBS has 75 countries verified out of 81 worked. PLK just got his Class A. DHO is using a new Globe King. JED has two-element beam, both elements driven on 14 Mc. MLB says, "The Midway Amateur Radio Club has shown several ARRL films, holds technical talks every third meeting, and has four oode machines for loan to beginners." ERM has 813 final under construction. Those interested in doing their part in emergency preparedness should contact SEC MLB.

(Continued on page 82)

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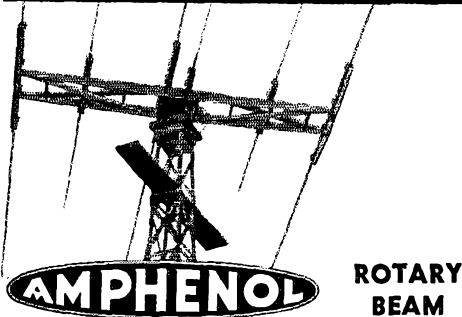
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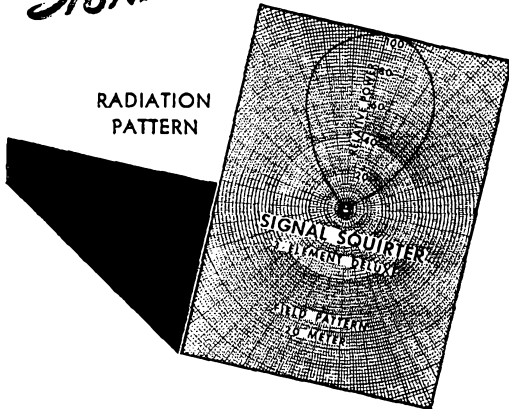
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Traffic: W0FAM 74, FQB 33, JED 22, GTW 10, HLX 10, NZ 9, VMP 9, ZNI 8, NVE 6, OZC 3, YCG 2.

NEW ENGLAND DIVISION

CONNECTICUT — SCM, Walter L. Glover, W1VB — The OO reports this month are very gratifying. Keep up the good work, fellows. IKE is building a four-element 14-Mc. beam and has added a BC-453 to his receiver. We regret to hear of the death of PLL, treasurer of SARC. The BRAC held its annual hamfest and dinner on Feb. 21st with about 75 present, including the mayor of Bridgeport. Ex-LV now is 8AI in Fremont, Ohio. CQF and IQE are trying 144 Mc. AJS has 300 watts on 28-Mc. phone. LZE reports 90 countries on 14-Mc. c.w. OMW is back from Florida. KUO has television troubles, but hopes to stick to the traffic nets. TD is working on a driver for that new final. BDI worked 28 on LO Nite. He is working on a 420-Mc. rig, and has new OES appointment. ON and AH have new BC-221 frequency meters, and intend to qualify for Class 1 OO appointments. We hear JMY and LOP are proud papas. The SCM acknowledges from LKF, EC for Hartford, a copy of his detailed February report to the SEC. Rod, of AW, and Al, of INF, seem to be battling for delivery totals. May the best man win. Unofficial results of ARRL Party show ORP first for Connecticut and fourth for the nation. IQE renewed OPS appointment. PEK is new OO, Class 1I and IV. HDQ attended BRAC dinner. SARC officers elected on Feb. 11th are: BRL, pres.; AZP, secy.; Wm. Walker, treas.; and A. Dietz, activities chairman. QVE reports into Nutmeg Net. Traffic: W1DAV 371, NJM 236, EFW 217, VB 183, AV 171, INF 127, LKP 119, BDI 117, ORP 86, DXT 54, KUO 45, FTX 38, ADW 36, HYF 10, CTI 8, DWP 7.

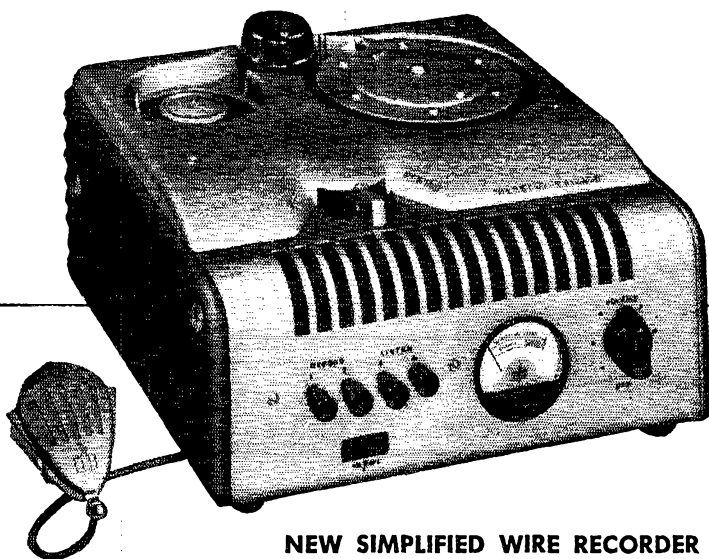
MAINE — SCM, F. Norman Davis, W1GKJ — SEC: LNI, RM: NXX, PAM: FBI. PAWA News: The club is buying a BC-348 receiver, conversion to be made by NXX. The code and theory classes are proving popular. The exciter unit of the club transmitter is on the air and first postwar contact from KVI was with JAS. EFR gave a demonstration of his homemade 144-Mc. walkie-talkie. 6SH and GJJ were visitors at recent meetings. RAX is new amateur in South Portland with a 300-watt rig on 28 Mc. and an RME-45 receiver. Deering High School, in Portland, now has the call RBG. Now that his e.c.o. is pending NKM is enjoying his freedom from one crystal. NXX tried to stretch the 14-Mc. band, but found out it still starts at 14 Mc. OAC operates 3.5- and 14-Mc. c.w. with a pair of 812s in the final. PWD works 3.5 and 7 Mc. with a pair of 809s. The PTN has BAD, BIG, GHK, GKJ, LKP, NXX, ODA, OHT, POD, and QHA reporting in regularly. Let's have more on 3550 kc. at 7 P.M. LIC is on 3.5-Mc. c.w. with a 167BY transmitter. ODA is building a modulator using a pair of 809s. OIL has been giving 7 Mc. a whirl. A Northern Maine emergency phone net is being formed and will operate on 3980 kc. A c.w. net is also contemplated. Both nets plan to work in conjunction with our existing c.w. Pine Tree Net and phone Sea Gull Net. Make your Field Day plans now. Traffic: WINXX 180, GKJ 71, OHY 43, AFT 32, BIG 32, JAS 29, PTL 27, VV 20, LKP 19, AWN 18, NVA 12, QHA 9, AMR 8, FXA 5, AI 3, KVI 1.

EASTERN MASSACHUSETTS — SCM, Frank L. Baker, jr., W1ALP — GAC is EC for Hopkinton; BVL is EC for Beverly. On Feb. 16th the Eastern Mass. Net gang held a meeting in Boston. Those present were: EMG, QGD, QYR, NBS, PLQ, BDU, MTQ, EK, JCK, AQE, BL, FGT, BB, NYH, QMJ, TY, CCF, LLY, ALP, GAC, QXE, and EPE. On Feb. 29th a joint emergency drill was held by this section and the Western Mass. Section. 50, 144, 3.5 phone and c.w., and 28 Mc. were used. WC is ex-PWE. RAD is a new ham in Quincy. EXU and BPK are on 3.5-Mc. c.w. DHX is president and GDJ vice-president of the Fall River Amateur Radio Club. PXH and KNI are OES. FGT, NBS, and PLQ are new ORS. The following renewed appointments: COX as OBS; COX, MRK, IN, and MME as OPS; COX as OES; COX, NBS, and IBF as EC; RCQ as ORS; IN as PAM for 50 Mc.; MIT as OO Class 2-3-4. The Framingham Radio Club has started to work on its hamfest. MXG will be on 28 Mc. from SS James J. Corbett. FPN has McMurdo Silver 701 and is quite active on 7 Mc. New Officers of Parkway Radio Club are: LYL, pres.; NRS, secy.-treas.; JRN, vice-pres. IIM and KVH are on Planning Board. KTE has weekly schedule on 28 Mc. with his brother 4KKY in Tampa, Fla. HOB will have 1/2 kw. on 3.9 Mc. KNI is working on rigs for 420 and 2300 Mc. FSK, in the Melrose Hospital, has a rig set up beside his bed. IBF has built a 3' scope. LMU reports that the Newton gang had an emergency meeting on 144 Mc.: BL, RM, PX, OIW, OMU, and LMU. AGR has a 522 on 144 Mc. BR has his 522 receiver hopped up. KVX is running 829 final with 90 watts. QNC has new HT-9. RAP is new ham on 28 Mc. RAI is new ham on 144 Mc. Those on 28 Mc. in Lawrence are: QNC, CBY, PFA, BLO, PNE, QKH, LBB, NIQN, IGO IQH, and the MVARC Emergency Net. OPP has 150B. NNG is on 3.9 and 14 Mc. KNU is on 14-Mc. c.w. The Brockton Amateur Radio Club had a talk on Nat. H.F. Superhet. T-9 Radio Club held a meeting at BVL's. Eastern Mass. Club had talks by McMurdo Silver and John A. Csepely. QGO has a BC-459A. ORT is using

(Continued on page 94)

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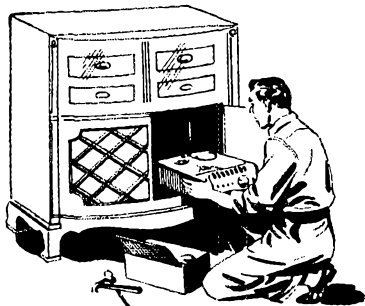
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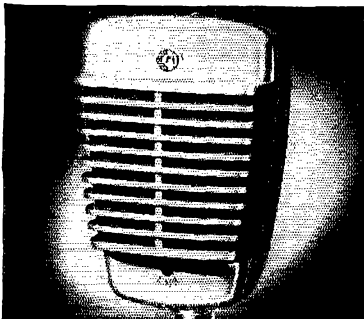




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ART-13. DDO gave a talk at South Shore Club. GAD has 8JK beam. LAO has new bandswitching doubler. QPG has new rig. ASN worked Hallieraters-Gatti expedition. JFH will have 813 final. KDC is on 28 Mc. with 813. The Yankee Radio Club held an auction. ORT has BC-640 on 144 Mc. PYM has an SCR-522. QMJ has worked 29 states on 3.5-Mc. c.w. LXQ has daily schedule with 2NRM. GDY has Sonar VFO. BIV also is NIRA. HLL has 522 on 144 Mc. PSF is Asst. EC for 144 Mc. DWQ has BC-696 on the air. AXG is setting out on 7 Mc. NF is working on 420 Mc. UE is quite active on 3.5 Mc. MDU is working on methods of antenna coupling. CCF and EPE are trying to keep Trunk Line "G" open from Massachusetts to Oregon. DTS, ex-CN8EE, is living in Lexington. Traffic: (Jan.) W1EPE 68, UE 27, QOD 8, LXQ 2, (Feb.) W1CCT 255, BDU 247, EPE 197, JCK 172, LM 128, NBS 88, EMG 80, BL 53, DWO 51, MTQ 46, KTE 38, BB 37, TY 37, PLQ 31, QMJ 21, AHP 18, PYM 17, ORT 15, BIV 14, UE 11, GDY 8, QOD 8, ALP 5, LXQ 5, HIL 3, MDU 3, PZ 3, MRQ 2, NF 1.

WESTERN MASSACHUSETTS—SCM, Prentiss M. Bailey, W1AZW—RM: BVR, SEC: UD, PAM: NY. The Eastern Mass.-Western Mass. emergency drill on Feb. 29th was a success and much was learned. More than fifty West. Mass. stations participated. BVR handled the 3760 Emergency Net efficiently. BL, AHP, QNS, and ALP handled the traffic for East. Mass. QQC, Worcester EC, did a wonderful job. NLE, IJT, and NY made Springfield tick with wonderful coordination between bands. LUD had Pittsfield organized in jig time. Thanks to all ECs and AEC members who took part. West. Mass. has a glow net at 9 p.m. on Mon., Wed., and Fri. All stations who wish to build up their code speed and handle traffic are invited to participate. The frequency is 3760 kc. IJT controls 28-Mc. phone net each Thursday at 9 p.m. in Springfield and vicinity. DXW and GBC are on 28-Mc. phone. BIV now is in Lewisburg, Tenn. JE controls WMN on Tuesday nights. Hal is hot after a daytime New England Net, either on 3.5 or 7 Mc., for night workers who wish to handle traffic. JGY has VFO working smoothly. HFO is waiting for good weather to put up a skywire for all bands. AMI keeps weekly schedule with 8DAE. BDV has new F8135C frequency standard and is building test equipment. IBZ has new VFO with an f.m. unit. Fitchburg Radio Club officers are: QEY, pres.; MSV, vice-pres.; JYA's XYL, secy.; IBZ, treas.; and JYA, act. mgr. EOB picked up three new countries in DX Contest. NY has new 522 and UHF-152. QGG reports into WMN often. COI has BC-453B working and is working on a BC-457A for VFO. JLT received his 100 DX cards postwar. HNE worked HH2CW on 3.5 Mc. Traffic: (Jan.) W1GVJ 17, (Feb.) W1BVR 174, AZW 77, JE 76, NY 68, EOB 21, IJT 21, NLE 21, BDV 15, UD 15, AMI 6, JGY 5, IGY 4, KUE 4, BIV 3, QGG 3, KINRU 2.

NEW HAMPSHIRE—SCM, Gilman K. Crowell, W1AQO—The second annual QSO Party was a great success. Results are as follows: High c.w. in State, BFT; high c.w. out-of-state, BJP; high phone in State, CNX; high phone out-of-state, GKJ; combined phone and c.w. winner in State, BFT; combined phone and c.w. out-of-state winner, GKJ. Active nets are as follows: Phone Net 3980 kc. Sun. 9:30 a.m.; N. H. C.W. Net 3685 kc. Mon. through Fri. at 7:00 p.m.; N. H. 23-Mc. Emergency Phone Net 29,200 kc. Mon. and Thurs. at 8:00 p.m., with CNX as Net Control. A 50-Mc. Emergency Phone Net is in the making. HTO has his WAC. NMB received his 2nd-class telephone commercial. PVF is working on an SCR-522. KEX, OFR, MUJ, GJJ, and LSN are on 50 Mc. nightly from 8 to 10 p.m. The 144-Mc. boys are on nightly from 7 to 8 p.m. LSN is building a new 50-Mc. converter. APK is our new SEC. AXL is active on 144 Mc. KEX and EIO established 144-Mc. contact with OFR using five-element beams. MRN is on 3.5-Mc. phone week ends. The Coos Radio Club is active again with TP, as pres.; Leo Pouliot, vice-pres.; JIY, as secy. Traffic: W1CRW 207, AOQ 51, QEU 26, PVF 23, MXP 15, GMM 14, QCY 10.

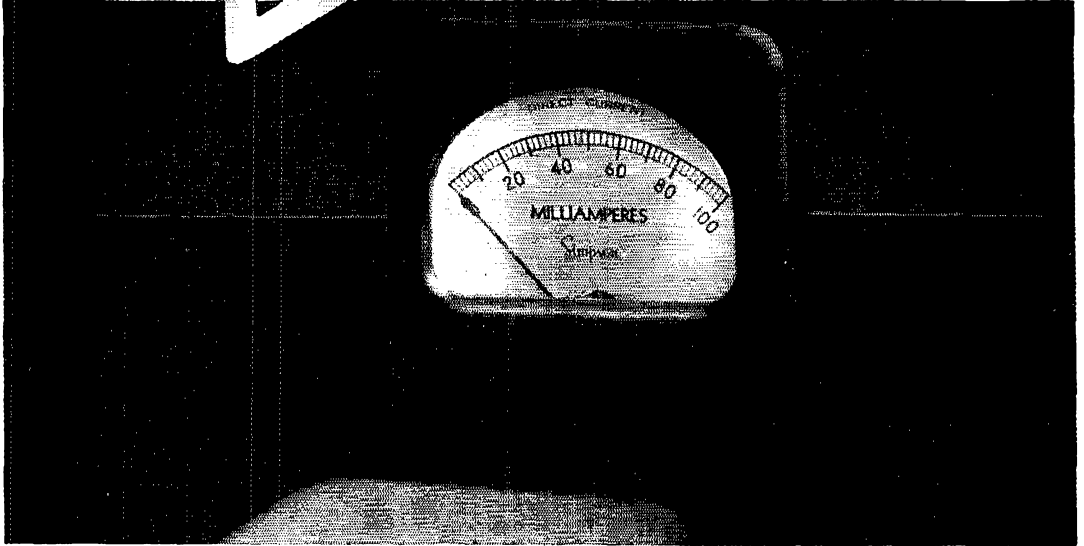
RHODE ISLAND—SCM, Clayton C. Gordon, W1HRQ—The Cranston Radio Assn., which meets the first Monday of every month at the Cranston Police Headquarters Building, elected the following new officers: EWT, pres.; OOX, vice-pres.; POP, secy.; and John Faulkner, treas. AJQ, who was one of our OOs until recently, took a parting shot at frequency measurements before leaving Rhode Island and came up with an error of only .00145 per cent. PXI measured on the Frequency Measuring Test for a result of .00191 per cent error. BTV, your new RM, is putting on p-p 812 final. He says the R. I. Net consists of QR, HLY, ODJ, and BTV at present and he wants a much bigger net. The net goes to town on 3540 kc. at 7 p.m. Monday to Friday, and if you don't know how to handle traffic, they will be happy to teach you. Really, fellows, you should support this activity; it is only when a good sized net from several points in the State is running that deliveries of traffic can be made with any worthwhile dispatch. You may think you are going to be hot stuff when an emergency pops up, but just listen to the net some night and see how much procedure you can remember. Traffic: W1BTW 51, JDX 37.

VERMONT—SCM, Gerald Benedict, W1NDL—QQ is on 50 Mc. with SCR-522 and 19 watts, 50.55 Mc. QQ has

(Continued on page 98)

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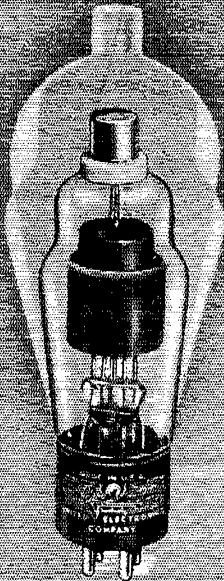
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ARC-5 for 144 Mc. PSD reports more interest in traffic and OKH is link between nets on 3.5 Mc. and Green Mountain 28-Mc. Net. PXZ reports into 28-Mc. net that takes in Windsor, Springfield, Brattleboro, Claremont, and surrounding territory. KRV needs Arizona and Utah to make 7-Mc. WAS. The statement concerning Emergency Fire Net mentioned in March QST was aimed at those stations that were asked to help and gave no aid whatever. Your SCM and LKF greatly appreciate the fast and sincere response by Vermont amateurs to the request for members for the Connecticut River Net. Thanks again. Traffic: WIPSD 125, OKH 20, EKU 8, MCQ 8, NDL 5, MMV 2.

NORTHWESTERN DIVISION

ALASKA—SCM, August G. Hiebert, K7CBF—An informal communications meeting of all Alaskan Communications Officials was held Feb. 10th to coordinate an emergency disaster network throughout Alaska. Included among representatives from CAA, FCC, Army Airways Communication System, Alaska Communications System, Alaska Native Service, Tenth Rescue Squadron, ARRL, and local standard broadcast stations, were KL7UM, NT, DQ, IB, MQ, AH, BK, AL, and CBF. The net will work closely with the regional director of the American Red Cross, NT, DU, a new arrival at the Gustavus CAA station, reports working Stateside DX on 3.85-Mc 'phone after midnight Alaska time. W4HXF has been transferred to Alaska and will be on 14- and 7-Mc. c.w. and would like to arrange schedules with friends. He has constructed and almost mastered W9DED's Electronic Key (Sept. '46 QST).

IDAHO—SCM, Alan K. Ross, W7IWU—Nampa: ETU is EC and OPS. Kuna: EMT meets with T.L. "G." Don't forget the Gem Net on 3745 kc. can relieve you of your traffic. American Falls: The FARM Net will be inactive about May 1, and will reconvene about Oct. 1. DMZ obtained an airplane and a dozen used power line poles for rhombics, and says, "Guess the airplane will go up before the rhombics." Twin Falls: The club now is affiliated with the ARRL. JMX's house burned up but he saved most of his stuff. KRK is looking for a plate transformer that doesn't "sizzle." KEK worked a ship off Yokohama on 29 Mc. JPP's hot water tank burst and almost flooded him out. LNC is on 29 Mc. with a.m. or n.f.m. at will. Boise: A meeting was called to meet our Northwestern Director. He wants letters from you regarding your ideas on the 'phone-c.w. divisions, etc. Don't forget the June Field Day. Traffic: W7GNT 39, IWU 15, EMT 13, DMZ 11, GFW 9.

MONTANA—SCM, Albert Beck, W7EQM—SEC: EMP, LCM has been officially appointed honorary mayor of Huntley. KGJ is on 28-Mc. 'phone running about 275 watts input. HVB and FMV, both c.w. men, are heard on 28-Mc. 'phone. GFV is building an electronic key. KGF is in the process of winding a 1.5-kv. transformer. Thumps, the club paper of the SMARA, is always jam packed with news. EQM and EMF are trying to organize a permanent traffic net in Montana. BSU, ORS in Valier, has umbrella antenna. CAL and FTO have Lazy Man's Q5-ers in operation. HBM and QB are building theirs up. LEK is super-snooping power line interference for the Montana Power Co. HXK is working out the bugs in his tank transmitter. BRMS now is DLVJ. QB made a trip to Spokane and came back with a flock of radio gear. FTO has new speech console with electronic channel mixing and clipper filter system. GT had SMARA members at his QTH to see movies of Jenny Lake Hamfest taken by AYG. Butte Amateur Radio Club now holds meetings at Naval Reserve new building. Traffic: W7CT 17, FGB 8, EQM 3.

OREGON—SCM, Raleigh A. Munkres, W7HAZ—Burns: Ed Penny reports that Burns now has a ham in the person of FJD, Astoria; Schedules are being held with Tillamook on 28 Mc. HCV has installed mobile rig in new panel delivery. EBQ is hard at work on a single side-band receiver. COZ is very punctual with the monthly report. JKU, ex-K6CIB, reports from Lyons that he expects to be on the air shortly. Larry reports the passing of BUF. Our deepest sympathies to XYL DVT. LaGrande: VO2AY visited his folks as well as a few of the ham shacks in LaGrande. IGI is busily engaged ridding this portion of the country of coyotes. He figures one coyote, one 28-Mc. QSO, LMW is finding 28 Mc. lots of fun. HBO is taking care of the traffic for this vicinity. Salem: MAO is an old-timer with a brand-new call. The gang enjoyed GXJ's job as social chairman during February. AWE has been off the air because of a trip to the hospital. JAA and BVV are the Salem 144-Mc. Net. Portland: Only report from Portland is from DIS. There is a mighty fine 144-Mc net operating in and around Portland. "Snake-Eyes," a very fitting name for a 144-Mc. net, is fast becoming a big organization. During February sixteen stations from Portland, one from Vancouver, one from Salem, three from Albany, three from Corvallis, one from Richfield, Wash., and one from Battleground, Wash., were logged. Check in with the "Snake-Eye" Net on 146.25 Mc. GWE is on in Sweet Home. Traffic: W7AFP 179, JMZ 37, HBO 15, LT 15, LBV 13, FNZ 6.

WASHINGTON—SCM, Clifford Cavanaugh, W7ACF—The Cascade Radio Club in Everett sends in following news: Recent wind storms damaged beams of 51ZV/7 and

(Continued on page 98)

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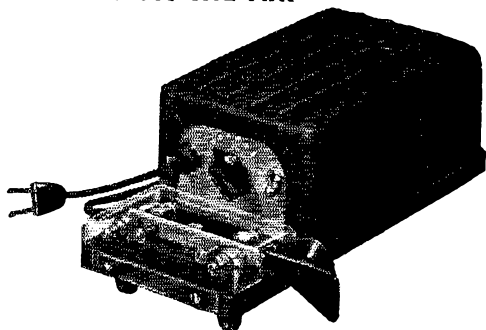
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JNC. EK has new e.c.o. received from J2AMA as a gift. He also worked WAC on a recent Sunday, but says he used to get more kick out of it on 7 Mc. back in 1926. DYD, DF, and BTN are very active on 144 Mc. using 522s. JFB is busy handling traffic over WARTS Net. FTM is operator on convoy of LSTs to Buenos Aires. JOO is portable mobile on 28 Mc. IOQ is handling lots of "J" traffic. MH is teaching electronics class at Everett Jr. College. HWB is building a kw. UX is on all bands with new Collins rig. Thanks JJY, that's a nice report. 2IYR/7 is busy building modulator and making ARRL Frequency Measuring Tests. GP, the new SEC, sent out nice circular letter to all ECs. On March 7th he had all Western Washington AEC Nets alerted and reports were relayed to him via WSNET and WARTS F'B. Red. HGC reports on WSNET and wants to handle some of the traffic going into Seattle. CWN is building new rig. CKT makes the Brass Pounders League. He states that the WARTS Net has 50 stations on now and is looking for more. CZY, who is in Riverton Hospital, writes that he is getting along OK and hopes to be back on the air by this summer. LEN is studying astronomy at Washington State. FRU works KH6LP regularly on 3.5 Mc. KWC operated portable at Hobby Show in Bellingham and with the help of EYS, KVA, GNR, LXP, and KCZ handled nice batch of traffic. BTY reports his beam blew down and he is hard at work building another. DGN holds schedules with BYG at Stevens Pass for skiing conditions. ETO, WSNET Wenatchee outlet, reports VFO trouble. DXZ is running the SCM ragged trying to keep him supplied with OO report forms. FWD is overhauling his emergency gear. Tate says he's getting ready for anything. ZU is busy keeping 6BYC, ex-7AGE, in San Diego in touch with his folks in Seattle. BG is on 3.5- and 7-Mc. c.w. with 500 watts. (Almost as loud out here as that spark you used to run, Karl.) HIX puts out FB WSNET Bulletin. Traffic: W7CKT 609, FRU 300, KWC 97, FIX 83, ACF 58, FWD 48, RAO 32, ZU 25, DGN 14, HGC 5, ETO 4, BG 2, CWN 2.

PACIFIC DIVISION

NEVADA—SCM, N. Arthur Sowle, W7CX—Asst. SCM, Carroll Short, jr., 7BVZ. SEC: JU. ECs: OPP, BED, TJY, QYK, JLV, JVW. RM: PST. PAM: KHU. BIC has gone to n.f.m. on 3.85 Mc. with 304TL final. KHU has new 46-ft. poles. LXF is on 28-Mc. n.f.m. with a kw. and ground plane antenna. MAH raised power on 28-Mc. n.f.m. KWA is active in DX circles on 14-Mc. c.w. JLV boasts a kw. in his trailer home. QAY is modifying his 28-Mc. beam to include 50 Mc. KSR is on 3.85 Mc. with 100 watts. Boulder City and Reno report five- to ten-station round tables on 28 Mc. after the band folds for outside contacts. Southern Nevada ARC meets 1st and 3rd Thurs. at Assembly Hall, Victory Village, Henderson. JUO has a pair of 304TLs in final. SXD is on 7-Mc. c.w. BED reports lots of traffic moving through Tonopah. LCK is on 420 Mc. CX worked a J and a couple of KLTs with 15 watts mobile. Traffic: W7BED 708, TJY 117, CX 30, JU 11.

SANTA CLARA VALLEY—SCM, Roy E. Pinkham, W6RPT. Asst. SCM, Geoffrey Almy, 6TBK. RM: CIS. PAM: QLP. ECs: GFK, TFZ, JSB, RBQ, Pacific Division Director, gave the PAARA a talk regarding the administrative function of the League and the duties of the director & members of his division. ZZ is using HIC 10/20 converter and says that he is hearing stations better now. Miles added six new countries to his list, making 97 total with 92 confirmed. According to WJM the Salinas club is still awaiting the day it receives affiliation notice from ARRL. TBK has added Lazy Man's Q5-er to his receiver with very good results. VJL is also using Q5-er. RFF reports two new countries on 28-Mc. c.w. MLY's totals at the half-way mark in the DX Contest were c.w., 23,400; phone, 17,900. AVJ comes up with a Virginia station worked on 28-Mc. phone by using 0.6 watt input. OVK is building Superhet for 420 Mc. Jim puts about three watts into a square corner reflector antenna on that frequency. BWB is the new call of ex-7KSA. ALN converted 274-N transmitter for e.c.o. operation. NYS has his 28-Mc. beam tuned at last and is getting very good reports in W Land. MUR is in Washington, D. C., awaiting a new assignment. HC gave an interesting discussion on Class C amplifiers at club meeting. WUI is working the early trick at station KEEN. LEE says it sure is tough getting to work at 0530. Traffic: W6WJM 128, BO 77, NNX 73, VZE 8, ZZ 7.

EAST BAY—SCM, Horace R. Greer, W6TI—Asst. SCM, C. P. Henry, 6EJA. SEC: OBJ. ECs: AKB, EHS, NNS, IT, IDY, QDE, WGN. Asst. EC u.h.f.: OJU. RMs: ZM, FDR. The Hamilton Field Amateur Radio Club, ZOE, held a big hamfest on Mar. 20th. The El Cerrito gang formed a new club on Jan. 20th known as the East Bay Radio Club. Following are officers: CTL, pres.; QUL, vice-pres.; KEK, secy.; JK, treas. Meetings are held the 1st and 3rd Fri. of each month at 8 p.m. at the El Cerrito Pre-School, Norvell St. and Fink Lane. WAB reports the following: WAB has QSYed to 14-Mc. c.w. VSV, UOV, and VNI are working over the Berkeley hills to Sacramento on 144 Mc. RXW has high power on 14 Mc. The NBARA president, RVU, spent 46 out of 48 hours of the first week in the DX Contest. RPC is vice-president and RRG is secretary of this wide-

(Continued on page 100)

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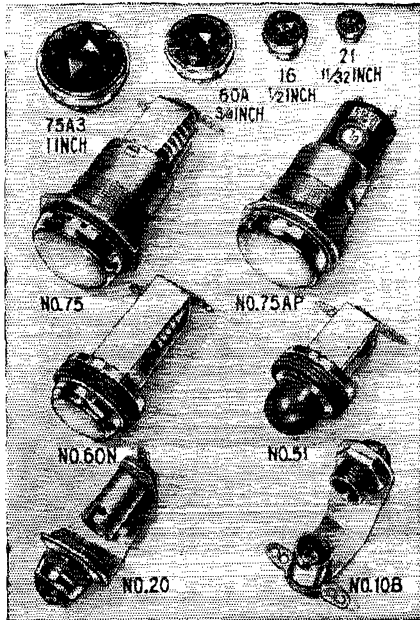
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awake organization. The gang spent the ARRL V.H.F. Sweepstakes week end on Mt. St. Helena with 144- and 50-Mc. equipment and had 75 contacts. AIM is on 28-Mc. mobile and YHJ is on 28 Mc. UUYX and UYX have opened up a radio wholesale supply house on 1746 Shattuck, Berkeley, known as the Applied Electronics Supply. ZM is on 3.5-Mc. c.w. and checks into Mission Trail Net. FDR is new RM and is a member of the Navy Amateur Net, signing N12AAX. QXN has rig built on 6-ft. rack and panel running 500 watts to a 125A Eimac tube in final. EJA knocked over two new countries on 14-Mc. c.w. RMM is going strong on 14-Mc. phone. BF finds time to get on the air and report traffic. YDI picked up his traffic award and was surprised to have won. UPV has new NC-183 receiver. Ray and IKQ are getting tired waiting for someone to put out a good Signal Shifter so they are building twins. NZ bought a Collins receiver. PB is busy rebuilding new finals. GEA added an FS-L35C to his HQ-120. OT expects to be on soon with high-powered gear, according to KZN, Oakland Radio Club president. DUB and TT are figuring out means of working bigger and better DX. The SARO boys are getting ready to knock off first place in Field Day this summer. The No. Calif. DX Club contest hounds did all right for one-operator stations during the ARRL Contests. Officers of the Mt. Diablo Radio Club are: CUG, pres.; CX, secy-treas. San Leandro Radio Club is making good progress. Richmond Radio Club is very emergency-minded. Traffic: W6QXN 381, FDR 196, VDR 38, YDI 31, ZM 19, TI 18, BF 10, EJA 7, RMM 6, LMZ 2.

SAN FRANCISCO — Samuel C. Van Liew, W6NL — Phone JU 7-6457. The highlight of the month's activity centered around the first leg of the DX Contest, as was to be expected. Most of the old guard, along with a lot of new talent, were in there pitching and some good scores can be expected, in spite of the not-too-good band conditions. Reports from the Eureka area show the following activity: FYY is going high power on c.w. IYN is doing lots of brass-pounding. AEY is rebuilding a new rig. YUH is doing a lot of radio repair work. NAO is trying to find time to get on the air. OWR is new Naval Reserve Station in Eureka. SLX is working on surplus gear rebuilding. AUB is putting lots of time on b.c. station. QHW is new member of Humboldt Radio Club. QCB has new rotary antenna beam and is working DX. From Minneapolis #DSF, ex-6HJP, reports he now is using two Eimac 450TH tubes running California kilowatt input and working plenty of DX on 14-Mc. c.w. Capt. Walling, 7JEA, paid a recent visit to San Francisco calling on many of his amateur friends. WB is constructing new 25-ft. tower for beam antenna. PIF is building new 1-kw. rig for 'phone and c.w. on all bands. His new QTH proves to be a very fine location. CDT, newly-licensed amateur, is using a 522 on 144 Mc. He also can be found on 28-Mc. 'phone and 7-Mc. c.w. MBG is using a TSC rig on 3.5-, 7-, and 14-Mc. c.w. and 'phone and says this piece of gear works mighty fine without any modification. UOQ has successfully installed a 144-Mc. transmitter and receiver on his scooter. MRV reports new round table net operating Wednesday evenings at 8 p.m. on 29,300 kc. The feature of the net is the discussion of technical subjects. The subject under discussion is assigned the previous week to allow for collection of information. The following are members of the net: MRV, ZBW, VAV, NBD, BWH, WEK, AYB, YTR, WCA, ZML, 1OKG/6. Anyone wishing to join the net may do so by getting in touch with MRV. The February meeting of the San Francisco Radio Club was favored with a very fine talk on the popular subject of antennas. The speaker was WB. Thanks for the reports and let's have more of them. Traffic: W6JWP 45, NI 12, REQ 12.

SACRAMENTO VALLEY — SCM, John R. Kinney, W6MGC — Asst. SCM, R. G. Martin, 6ZF, SEC; KME, RM; REB, OES; PIV. The Mt. Shasta Amateur Radio Club elected CAT, pres.; NCV, vice-pres. and act. mgr.; ARR, secy-treas. At its February meeting the Golden Empire Radio Club met at the QTH of VZK with 30 present. LYQ is Net Coördinator on 144 Mc. KUI has portable mobile 144-Mc. rig in his plane. New members in SARC are HMS, VLI, BND, TZF, CAS, and ASI. A past associate member is BTY. ZF is manager of California State Fair activity for SARC. OWM is QSL Manager. AP has charge of news clippings and MGC is new coffee-brewer and chairman of refreshments. ZF is publisher and manager-editor of the new *SARC News*. An old friend of the gang at SARC meeting was KH6HB. LTU is on 144 Mc. in Winters. PIV operates a PE75U, an emergency power generator, on Red Cross Net on 144 Mc. weekly. ARG had a filament transformer and new BC-348 go up in smoke. OJW needs Sierra, Amador, and San Benito Counties for SARC Contest and is building an electronic key. AF is on 14,050 kc. calibrated QSY to 14 Mc. by QSOs with a KL, VK, ZL, CB, and KH. YLO reports hearing a Van Nuys station 360 miles on 144 Mc. CA8 and KVT are new 144-Mc. stations in Sacramento area. WTL worked KH6HV, KH6IB, KL7NK, KL7LG, VK3YS, VK2ALJ, VK2AFB, W6VRF/KG6, and W6UXX/MM on 28-Mc. c.w. AK has crystal rig on 144 Mc. Traffic: W6REB 666, ZF 47, PIV 43, RYJ 35, OJW 3, WTL 3.

(Continued on page 104)

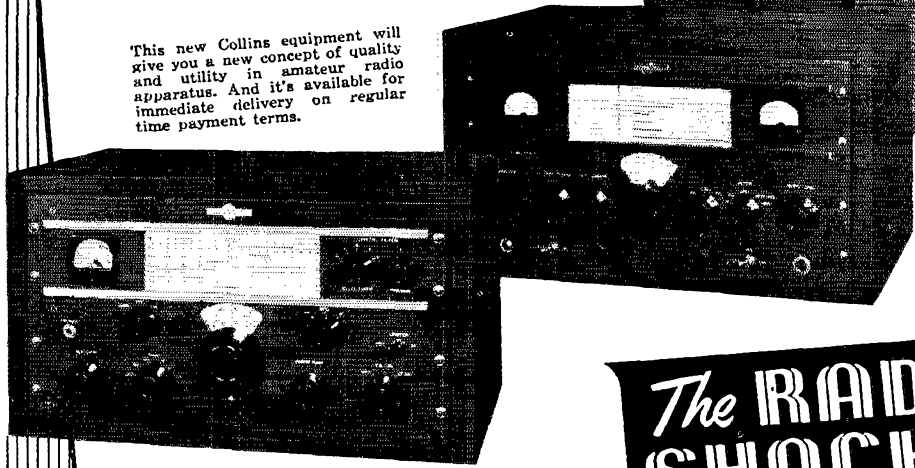
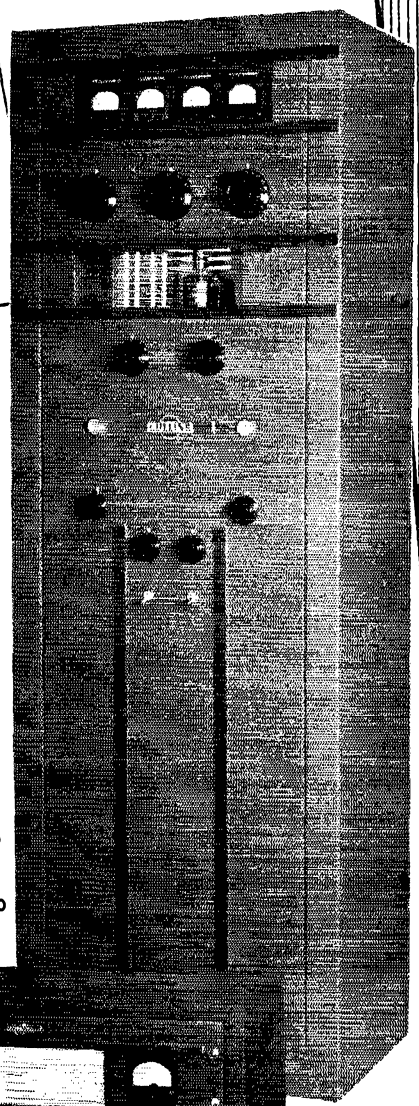
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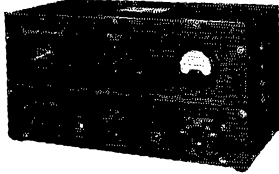
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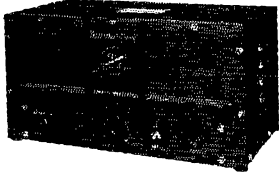
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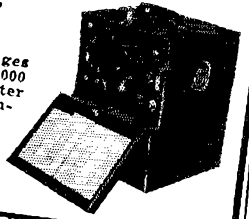
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HT-9		79.50	7.95	15.90
HT-17		49.50	4.95	27.83
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HT-18		69.50	6.95	5.53
Coils: 80M or 40M—\$3.50 per set; 20M or 10M—\$7.00 per set				
		110.00	11.00	8.75

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NC-183		269.00	26.90	21.30
NC-240D		241.33	24.13	19.20
HRO-7		311.36	31.14	24.75

Model No.	Equipment Code	Net Price	Down Payment	Per Mo. for 12 Months
HAMMARLUND				
HQ-129X		189.15	18.92	15.04

Model No.	Equipment Code	Net Price	Down Payment	Per Mo. for 12 Months
R.M.E.				
RME-84		98.70	9.87	7.85
RME-43		198.70	19.87	15.80
RME-152A		36.60	3.66	6.89 or 13.77*
RME-DB-22A		60.00	6.00	5.25

Model No.	Equipment Code	Net Price	Down Payment	Per Mo. for 12 Months
MEISSNER				
Signal Shifter		60.00	6.00	5.25
Coils: any band — \$4.00 per set				
Power supply — \$13.00				

Model No.	Equipment Code	Net Price	Down Payment	Per Mo. for 12 Months
SONAR				
VFX-680		87.45	8.75	6.95
MB-611		72.45	7.25	5.76
Coils: any band — \$1.50 per set				

Model No.	Equipment Code	Net Price	Down Payment	Per Mo. for 12 Months
HARVEY-WELLS				
TBS-50		90.50	9.05	7.91
50-watt xmtr with tubes and coils for 8 bands; low power supply				

Model No.	Equipment Code	Net Price	Down Payment	Per Mo. for 12 Months
WEBSTER				
Wire Recorder		149.50	14.95	11.89
7" Scope		124.50	12.45	9.90

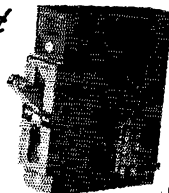
Model No.	Equipment Code	Net Price	Down Payment	Per Mo. for 12 Months
SYLVANIA				
VoltOhmyst 195A		79.50	7.95	6.32
VoltOhmyst WV75A		125.00	12.50	9.94
Chemalyst 1621		162.50	16.25	12.92
3" Scope 155C		115.00	11.50	9.16
3" Scope W079A		55.00	5.50	43.73

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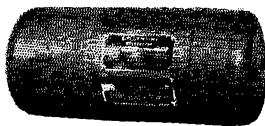
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 each
 10 for \$8.50

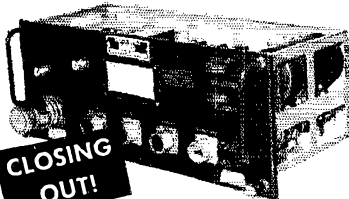


Better than fuses. Carries starting surges but trips on sustained overloads. Resets at finger touch. Can be tripped manually and used as on-off switch. SPST; 20 amp., rating at 117 volts. Brand new.

PE-103 DYNAMOTOR
 BRAND NEW—only **\$5.95**
 (less base)
 2 for \$10.50



Here's your opportunity to get one of these popular units at a rock-bottom price. Operates from 6 or 12 volts d-c; delivers 160 mils at 500 volts d-c.



CLOSING OUT!

FM ALTIMETER RCVR-XMTR RT-7/APN-1 \$5.95

2 for \$10.50

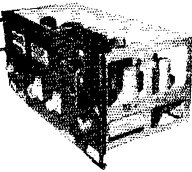
Complete outfit for 418-462 mc operation includes dynamotor and 14 tubes: 4 — 12SH7, 3 — 12SJ7, 2 — 12H6, 2 — 955, 2 — 9004, 1 — VR150. Size 18 x 7 x 7 1/4". Used but in good condition.

DON'T PASS THIS OVER!

BC-788-AM XMTR-RCVR for 420 mc.

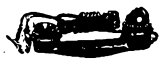
\$11.95

Complete with tubes



Here's a real bargain — a complete transmitter-receiver for 420 mc. work. Fourteen tubes include 3-2J6, 9-6A5, 1-6L6, and 1-5Y3. Six wide-band I.F. stages. Has 98.356 KC crystal. Details on page 53 of QST for November 1947.

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Type	Net	Type	Net
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2C34	.45	931-A	1.87
2C40	.45	954	.25
2X2	.30	955	.25
211	.38	957	.30
311	1.50	958	.38
3AP-1	1.50	959	.38
3BP-1	1.50	1619	.15
3B24	.75	1624	.45
3E29	1.50	1625	.15
5BP4	1.73	1626	.25
6A5	.68	1626	.15
6A5	.60	1629	.15
6A5	13.50	1651	.75
6C21	.53	8005	3.15
615	.75	9001	.25
801	9.00	9002	.30
803	1.50	9003	.25
809	1.50	9004	.25
811	1.95	9006	.25
813	6.00	VR105	.75
830-B	5.25	VR150	.75
836	.75		

BC-222 RCVR-XMTR

only \$8.95



Here's a beautifully built Rcvr-Xmtr. Used as a walkie-talkie by the Signal Corps. Covers 28-38 and 38-52 MC. Can be converted to other ranges. Uses one Type 30 and one Type 38. Complete kit of tubes for BC-22290c

RADIO PHONE HANDSETS



Carbon mike, push-to-talk switch, rubber cord, plugs.

TS-11 \$3.50 H-23-U\$4.95

BRAND NEW GE SELSYNS \$4.95 PER PAIR

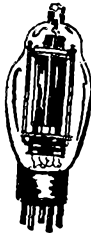
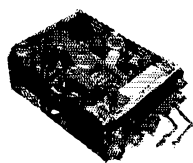


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Get going on 420 with this "hot" xmtr-rcvr for phone and i.c.w. Originally priced over \$2000, they cost you less than the price of the 15 tubes you get with the outfit. Full conversion instructions furnished.



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316A45 each	
805 3.75 each	
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plus a limited number of
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BC-455-B 6-9.1 MC each

XMTRS Furnished with 4 tubes, including 1629 magic eye, 1626, and 2-1625's; also calibrated crystal.
BC-457-A 4-5.3 MC \$5.95
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MODULATORS BC456 \$5.95

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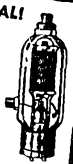


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Fil. 1 — 6.3 v., 3.5 a.
Fil. 2 — 5 v., 3.5 a.



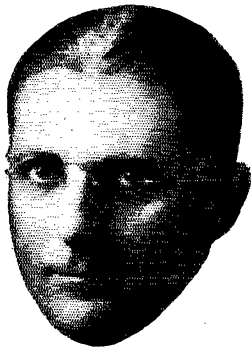
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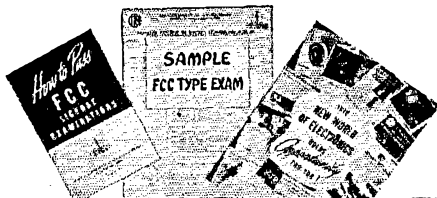
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(Continued from page 100)

ROANOKE DIVISION

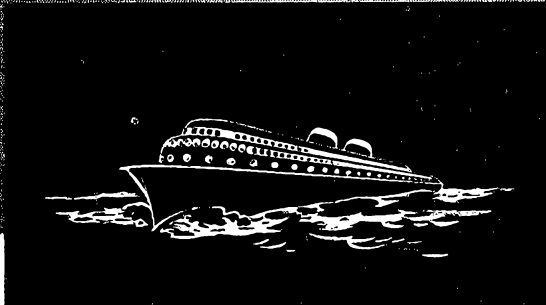
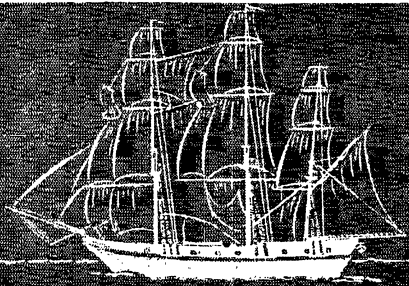
NORTH CAROLINA — SCM, W. J. Wortman, W4CYB — Thanks to OG for the dope on WSARC. The club is progressing FB with new transmitter. Watch for the opening. LZP ran up a good score in DX Contest. AHF is working plenty of DX on 14-Mc. 'phone. ABT is busy on 3.5-Mc. c.w. OG had a sky wire down during the DX Contest but worked a few countries with an inside folded dipole. NI built an automatic beam rotator, while BCS possesses a Munger rotator. JRZ is kicking out with new 300-watt rig on 28 and 14 Mc. HUL worked in the Wilmington ice-storm emergency. LPY works 28 Mc. KJS is busy with net operation. LAH spends most of his time rebuilding. DCW had a visit from YN4DT. The Key and Mike Club holds meeting on 28-Mc. 'phone on alternate Monday nights after the band goes out. GJS works 28 and 3.85 Mc. KMZ has finished school and is back on 28 Mc. KUV is rebuilding for 28 Mc. and LWU for 50 Mc. KFM has worked some DX with very low power and is busy on a 300-watt rig. MOE, the Asheville Club station, is on Tuesday nights. WL, MUV, and KTB — get it going more often! What happened to those Greensboro reports? No dope has been received from Raleigh in some time. Considerable work was done during the ice-storm emergencies at Wilmington. You are still invited to take part in the NGN on 3605 kc. ECs still are needed in many localities. Clubs are invited to recommend stations for appointment. Traffic: W4CFL 1132, FXU 570, IMH 248, KJS 95, EZN 44, CYB 37, JPY 32.

SOUTH CAROLINA — SCM, Ted Ferguson, W4BQE/ANG — ANK is active on T.L. "C" and asks that the fellows meet the 3.5-Mc. c.w. net on 3732 kc. at 9:00 p.m. week nights. LMB is PAM for 28-Mc. 'phone and is interested in forming a 28-Mc. 'phone net. AZT has a dual 28-14 Mc. beam on a 25-ft. mast. BFQ, now SEC, is looking for ECs in various cities. IZQ now is XARC and is looking for contacts on 28, 284 kc. mornings EST. CZA works 3.5- and 7-Mc. c.w. and 28-Mc. 'phone. HTR is on 7- and 3.5-Mc. c.w. LMB and FCK work 28-Mc. 'phone. BWV is on 28-Mc. 'phone and 14-Mc. c.w. ABO is rebuilding as usual. BIZ has a new 500-watt job on 3.5, 7, and 14 Mc. IZD is building 28-Mc. antenna. MRJ can be found on 3.5- and 7-Mc. c.w. DNR sticks to 7- and 14-Mc. c.w. DBK is on 28-Mc. 'phone. DFC is on 28-Mc. 'phone and 14-Mc. c.w. New officers of the Charleston Amateur Radio Club are DFC, pres.; and ANK, secy.-treas. MAQ has a new final with 813a p.p. MAP made the National Society in his school work. MAS worked 7-Mc. c.w. MAR has new 813 final on 7-Mc. c.w. If interested in ORS appointment, contact CZA or FNS. If interested in ORS appointment, contact AZT or LMB. Traffic: WAANK 166, AZT 33, BFQ 1.

VIRGINIA — SCM, Walter R. Bullington, W4JHK — IYU and BCO are trying a little 144-Mc. work. IYU also is on 14 and 28 Mc. NAD is on 28 Mc. with an 807 and a "McCoy beam." He has worked 30 states and 19 countries since receiving his ticket Christmas Eve. The "McCoy beam" mentioned above is one of those made by MZR, and yours truly can vouch for 'em. NFQ is the new call of the Hampden-Sydney College Radio Club. The club is using a Signal Shifter for rig with 10 watts and so far has worked 17 countries and 35 states with it, and schedules V.N., 3GQF, Baltimore, and the T.O. Nets. 3IEM/4 is chief operator. KYD was issued Naval Reserve call N5ZZD, and has finally gotten his antenna up at new QTH. Buss will publish V.N. Bulletin in the future. BZE is on from his new QTH. What an antenna farm he has! He is on 3.5-Mc. c.w. mostly. IYC was off only 20 parts per million in the last Frequency Measuring Test. Anyone need a frequency check? CYW, FI, MEV, and KCM are on 144 Mc. in Richmond. JHK has 40 watts on 28-Mc. 'phone. BSM is on 28-Mc. 'phone. The Virginia Net is going strong on 3890 kc. 7 P.m., Monday through Friday. Anyone interested in traffic-handling is cordially invited to report in. Traffic: W4KDE 156, 1A 107, RFC 48, KYD 30, NFQ 28, NAD 5.

WEST VIRGINIA — SCM, Donald B. Morris, W8JM — Congratulations to CSF, ANCS for the West Va. C.W. Net, on the swell map and station roster he prepared for net members. GBF, our only Class I O O, ranked high on the Frequency Measuring Tests in 1947 and reached a new postwar high in traffic. WSI has new Collins 75A-1 receiver and will be confined to his home for a long period of time because of illness, with radio activity very limited. DNN reports 144-Mc. activity quite high in Parkersburg area and plans a tie-in with the 3770 Net. BTV reports swell traffic total and found time to work several countries on 3.5-Mc. c.w. LIL, new ORS, works West Virginia and Trunk Line Nets. AUJ, a new station, made a fine showing his first month on the air. 2QHH has worked YL stations in 47 states and needs West Virginia. Does West Virginia have an active YL-operated station on the air? OXO is back and has a rig on 3.5 Mc. QG's schedule with a ship from U.S. to KA Land was maintained daily on 28-Mc. 'phone. KWL, FMU, and YGL made excellent showing in AEC Emergency Test. KWI, with kw. rig and rotary beams, has passed the 150

(Continued on page 100)



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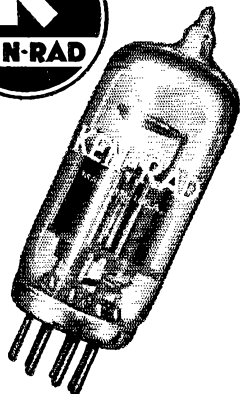
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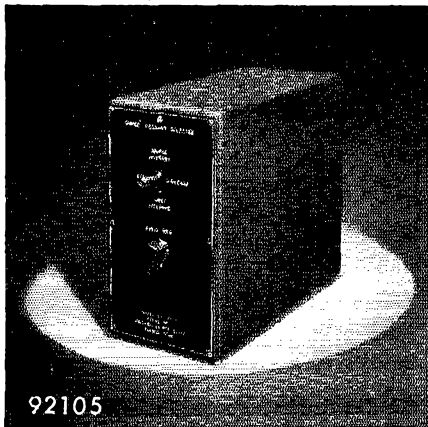
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ROCKY MOUNTAIN DIVISION

COLORADO — SCM, Glen Bond, W0QYT — DRB has moved to Olathe, Kans., for an indefinite stay. Colorado is losing one of its best traffic-handlers. DYS is NCS and manager of IUN Net. LZY is running 150 watts to a pair of 807s on 7 and 3.5 Mc. KHQ took his Class A exam recently so should be on the Coffee Club with 'phone soon. PGX visited in Denver for a few days. SGG says a new club is active in Colorado Springs, known as the Amateur Pervericators Club, which will QSL and make it worth while for anyone working Colorado Springs. QHI is building the 5-inch 'scope, details of which were in QST. Dick is EC of the Pueblo AEC net and also a member of the Interstate Utility Net on 3540 kc., which operates at 6:30 p.m. Monday through Friday. MOM has received his ORS appointment. The Colorado Wing of the Civil Air Patrol has received a new BC-610E and has installed it in 1½-ton Chev Army truck with BC-312 battery and BC-342 a.c. receivers and BC-221 frequency meter. The set-up is known in the Army as an SCR-299. This rig is powered by 110-volt a.c. plant on a trailer towed by the truck. The station will operate on 2374 kc. as well as all of the amateur bands. Amateur operators are needed to operate this and other radio equipment in case of emergency. Anyone interested, write Civil Air Patrol, Lowry Field, Denver. The Denver Radio Club and the Electron Club are planning Field Day activity. Traffic: W0DRB 97, SGG 16, LZY 2, PGX 1.

UTAH-WYOMING — SCM, Alvin M. Phillips, W7NPU — The UARC has a club station at the Boys and Girls Club. It is reported that the first 144-Mc. contact between Salt Lake and Ogden was made by UPI and KMR. SP, at Salt Lake, has worked UPI several times. QDD worked a W1 on 50 Mc. KIY is conducting a high school code class but finds time to knock off 3.5-Mc. DX such as NY4CM, KS4AI, and K5BLF. UTM and KIY received their 30-w.p.m. certificates. DLR is using converted Army and Navy Surplus gear on 3.5 and 3.85 Mc. LWC is building up a pair of 813s. HDS has a pair of them on now. Officers of the Casper club are LKQ, ACG, and IDO. IJW and LKQ are sporting new beams. Wyoming NCS, AMU, has a new HT-9. CBL has 10 watts on 7 Mc. EUZ, JHL, and OWZ plan to be on 50 Mc. soon. New arrivals in Cheyenne are EGD, LXC, LLA/7, STB, and 8WKY. 9ALN now is 7DI. A 28-Mc. round table is held every Sunday night in Cheyenne. EYH is using VFO. IRX has rebuilt his audio and CGK is building a "Plumber's Delight" beam. Thanks to Elmer at JHL for his Cheyenne reports and to Duane at LKQ for the dope on the Casper gang. Traffic: W7FST 899, UTM 91, KIY 86, TST 54, RPX 31, DLR 28, LWC 2.

SOUTHEASTERN DIVISION

ALABAMA — SCM, Dr. Arthur W. Woods, W4GJW — A SEC, KCQ, PAM; BA, DXB works 7 Mc. daily with half-kilowatt input, in addition to being part-time engineer at WGNH. FIO now is in Florida as a.c. engineer. MXU is an apartment-dweller and is stationed with the Army at Mobile. MCF and MRL, of Mobile, are regular users of 7 Mc. AGI has written to inform us that he has left Georgia and again is living in Montgomery. JYB schedules J2ROC, J8AFK, and KP4CZ for person-to-person contacts for non-amateurs. KSE addressed the Montgomery Club to make a very interesting meeting. GJW has burned up everything but the antenna trying to get on 28 Mc. ECI serves notice he soon will be on with a king-size kilowatt (R. L.: take note). D4AAE, W4EXF, returned from Germany for a short time and has now returned to his position as civilian technical representative for the AACCS. Lack of monthly reports from North and South Alabama is in sharp contradiction to copious reports from the central area. Will the silent areas let themselves be heard? Traffic: W4DXB 17, GJW 5, JYB 3, MXU 2.

EASTERN FLORIDA — SCM, John W. Hollister, W4FWZ — Daytona: KXF tape-recorded a religious message from OQ5AE, Belgian Congo missionary, and re-broadcast it with FCC permission over WROD, where he is chief engineer. Gainesville: Club station DFU sports, p.p. 250. On 50 Mc., 144 Mc., and 3 cm. are 5LQY, 5LFO, and 4EID. They believe they have broken the 3-cm. distance record. EID works Orlando's GJO and NEE regularly on 144 and 50 Mc. with ten-element, 2 over 6. Jax: 6WID, of USN, is on 14- and 28-Mc. c.w. RU is working everything on 144 Mc. IPL is on 144 Mc. A CQ Two in Jacksonville will get quick QSO. LLT is on 14 and 144 Mc. AWE, FRP, and IPL truly can brag about their FB beams. Lake City: AGB reports NN is busy with 152-Mc. gear for Forestry Service but is rebuilding on 3.85 Mc. while active on 14 and 28 Mc. Miami: DEP is on 3675 Net. BYF, OO, reports RV2 near 14,130 kc., IYQ on 14125-kc. 155 Mc., KB6s on 14,100 kc., VP3TY at low end of 14 Mc. His 310B-3 is FB to kick his V7ODs. New Port Richey: KJ is EC, has replaced p.p. 813s with 810s, has Class A license, and is on 3.85 Mc. Ocala: IYP is on 3875 Net. Palatka: QR is EC. Sanford: IMJ has Collins receiver. HGO is on c.w. to brush up.

(Continued on page 108)

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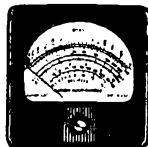
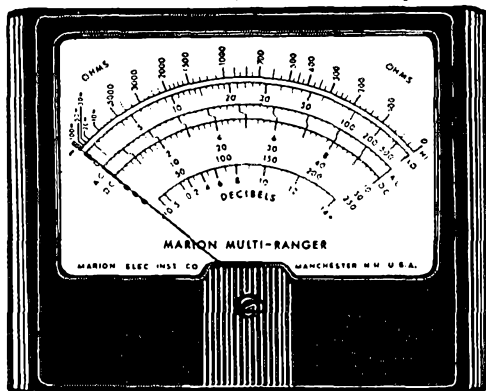


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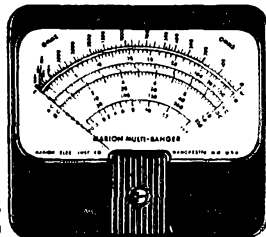
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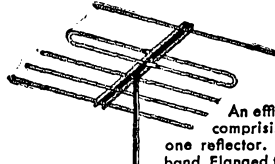
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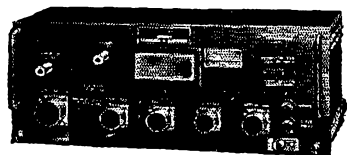
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Tampa: Tampa Fair traffic set all records. Daily message from Doc. "Is PB on the air?" St. Pete: LTE is on 3.5-, 7-, 14-Mc. c.w. Club officers are KQR, FPC, EWS, KLF, DBA, and EYI. Umatilla: AYV missed making BPL by six messages. General: ES reports C07CX has beam to get on Florida 3910 Net and CM9AB on 3.85 Mc. DCN is on 3.85 Mc. JYG is sporting new two-letter call, RP. Others with Collins receivers are: PEI, BYF, JU. Active OBS are BYF, GIP, PB, MKP. Traffic: W4AYV 488, DQW 324, IQV 208, FWZ 174, AAR 100, MNT 76, IKI 32, RP 31, MKP 30, ZC 30, LZC 18, PEI 18, BYF 13, ES 12, KHV 7, GIP 6, BXL 4.

WESTERN FLORIDA — SCM, Luther M. Holt, W4DAO — MS bought new Panadapter. DAO got BC-459A which he plans to use on 7 Mc. FHQ schedules CBA in Chattanooga. MSX uses 811 final modulated with pair 811a. NFX is new call in Crestview. DSR moved to Milton. LJQB, at Eglin Field, schedules Alaskan station daily. NFN, NGA, and NGS are new Pensacola calls. AXP increased power to 500 watts. MEN works Gs on 28 Mc. ACB promises early report on Tallahassee gang. BKQ has new frequency meter. JPA works mobile exclusively. QK soon will have his new mobile rig in operation. BGI built butterfly condenser. NDB works short skip on 28 Mc. and makes recordings to prove it. DLO is heard consistently on 7 Mc. Your SCM needs reports from Panama City, Tallahassee, and other cities in the section. Traffic: W4AXP 69.

SOUTHWESTERN DIVISION

LOS ANGELES — SCM, Vincent J. Haggerty, W6IOX L — Asst. SCMs: W. J. Schuch, 6CMN, 6707 Beck Ave., North Hollywood; I. O. Hege, 6FYW, P. O. Box 352, Paso Robles. Reports are welcomed from all active amateurs in the section. Send them to the SCM or to either Asst. SCM listed above. A card containing news of your activity will suffice. Get reports to the SCM by the 4th of month if possible as his deadline is the 7th. KEI, Southwestern Division Director, is active on Golden State Net, 3085 kc., and is making plans for the ARRL Southwestern Division Convention which convenes in Los Angeles on Oct. 2 and 3. MU is new OZ operator's Delight. QJW is new ORS and active on SCN. AAE had ORS appointment renewed and is installing remote control equipment. Paso Robles Radio Club doings: FYW is president and HFY is secretary; HKF is getting bugs out of club rig; POD gave the club an PB lecture on antennas. DSP had EC appointment endorsed and reports Glendale Club's new meeting place is 602 East Wilson, Glendale. LY is club proxy and meetings are held the first and third Tuesdays. CMN is busy with traffic nets and assisting KCP in southern part of section. PSX is on 3.9-Mc. phone. KPM has beam on 28 Mc. and works DX with 4 watts. HP is rebuilding 14-Mc. beam tower. EP is repairing beam after a heavy wind storm. MEP works traffic on Mission Trail Net and has 144-Mc. mobile rig working. FB. How about more reports from MTN members? JQ renewed ORS appointment, rebuilt his final, and is going after DX. IWU holds OC and OPS appointments and is working 3.9-Mc. phone mostly. PAP has applied for OBS appointment; he is chairman of publicity and ticket sales for Southwestern Division Convention to be held in October. The San Fernando Valley Radio Club meets at Woman's Club, on Van Owen Blvd., North Hollywood, on first and third Fridays. The Santa Barbara Amateur Radio Club's new meeting place is the Naval Reserve Armory at the Breakwater. It is a wonderful set-up, with ham rigs installed, code tables, and plenty of room. Meetings are held monthly on the last Friday at 7:30 p.m. AMD is working 28-Mc. phone portable-mobile, experimenting on 50 Mc., and is building for 420 Mc. IUI is on 28-Mc. phone with new Collins receiver and transmitter. NCT is back in Santa Barbara after extended sojourn in the East. QOX is QRL with police radio, emergency gear, and Field Day plans. The YLRL Radio Club of Los Angeles has had many YL operator visitors; the latest being 2RNJ. YL visitors from W2, W7, and Z56 have attended meetings. UFI, YZU, UHA, and UXF are DXing successfully. WVR moved to Arcadia and is on 7 Mc. with BC-459A. WSV and her OM, WSW, have BC-459A transmitter and BC-458Q receiver. Congrats to LKE, who became father of a jr. harmonic on Feb. 22; it is reported he experimented at night with invisible antenna at his apartment. TRU was guest speaker at Pasadena Short Wave Radio Club. The Pasadena Club is planning for Field Day. ZPV is active on 7 Mc. with BC-459A. RXT, traffic man on SCN, is new ORS. Traffic: W6IOX 532, CMN 191, ZMZ 75, FYW 56, RXT 42, FMG 23, MEP 18, MU 8, QJW 7, KEI 4, VAQ 2.

ARIZONA — SCM, Gladden C. Elliott, W7MLL — LHD has his beam on a 40-ft. pole. JFY reports he was high W7 for c.w. in the VK Contest and high phone for Arizona. New Tucson calls: MAP, MAT, MAW, and MBK on 28 Mc.; LZL on 420 Mc. JGV reports good results at Casa Grande with an 807 on 28 Mc. LVG has a new HRO. UPP, LFE, WKC, and MAT have new NC-183's. The Gila Valley Radio Club plans Field Day participation. KXB is chief operator for Catalina Jr. H.S. station. LAD has a new "V" beam. PEY reports 86 countries and a "V" beam.

(Continued on page 110)

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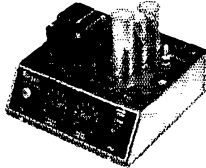
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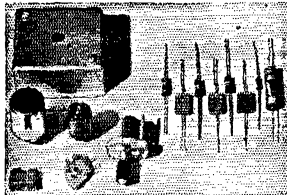
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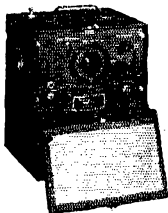
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LFE is on 7-Mc. c.w. JXL/KRH is on 7 Mc. KAE has a BC-459 on 7-Mc. c.w. PBD keeps daily schedule with the ZLs. JMQ proved that 3.85 Mc. is a DX band by getting in a G round table. The Tucson gang has formed an emergency corps. The first Tucson Annual Ham Banquet was attended by 45 OMs and XYLs. JGU reports 41 states and 9 countries on a 6L8 and four KS contacts. LIH is on 28-Mc. 'phone. LQK is looking for 144-Mc. contacts at Globe. UW is back on the DX trail after blowing out a transformer. 0GNW is working all bands, c.w. and 'phone, in Tucson. QAP's new rhombic sure works the Europeans. LLO and KWW transmit official bulletins on 28 Mc. at 8 p.m.

SAN DIEGO — SCM, Irvin L. Emig, W6GC — Asst. SCM and SEC, Gordon Brown, 6APG. BGF has been appointed RM while CNQ is new ORS. BAM schedules 1AW each Sunday and reports CDV is new call in Santa Ana. FMJ is operating on Mission Trail Net on 3854 kc. BOD reports for the Marine station, YDK, with a fine traffic score and some fine schedules with C6, KG6, and KH6 areas. LRU manages to snag those elusive ones on 28 and 14 Mc. and has 90 countries with 79 confirmed. The San Diego YLRL meets each Wednesday at 8 p.m. on 29.440 Mc. BYC works low power on 3.5-Mc. c.w. New call on 28 Mc. is BPB. 4TZ, of DX fame, is representing Raytheon in San Diego. NA is putting finishing touches on precise frequency measuring gear. KW gets on 28- and 3.85-Mc. 'phone now and then. YYM is leaving for Hawaii to join hubby, YYN, who is working for CAA. A radio club at Hoover High School is being organized by ZST, ZVQ, and ZLF. CNQ reports the Imperial Valley Club handled lots of traffic at its radio booth at the Valley Fair. BGF is holding down southern end of SCN Net on alternate week days. APG, the SEC, with MI and MHL visited the Imperial Valley Club to coordinate emergency functions. CCK is new call on 28-Mc. 'phone. The outstanding hamfest in the Section this year was the 13th Annual Palomar Radio Club Birthday Party held in La Jolla, which was enjoyed by more than 500 amateurs and friends. VMU is relieving YYW as president of Imperial Beach Radio Club, which meets 1st Tuesday of each month at Ream Field. WUV reports fine traffic score for himself and XYL. BCU. TVM works 28-Mc. 'phone with 600 watts and four-element beam. VWL and KH6BZ/W6 are on 28-Mc. 'phone while VMU works 3.5-Mc. c.w. OBD went almost over the top for his DXCC. VCD and YTH are building equipment. Traffic: W6YDK 81, CNQ 55, BCU 31, WUV 19, BGF 15, BAM 6, FMJ 6, TVM 4, MI 4.

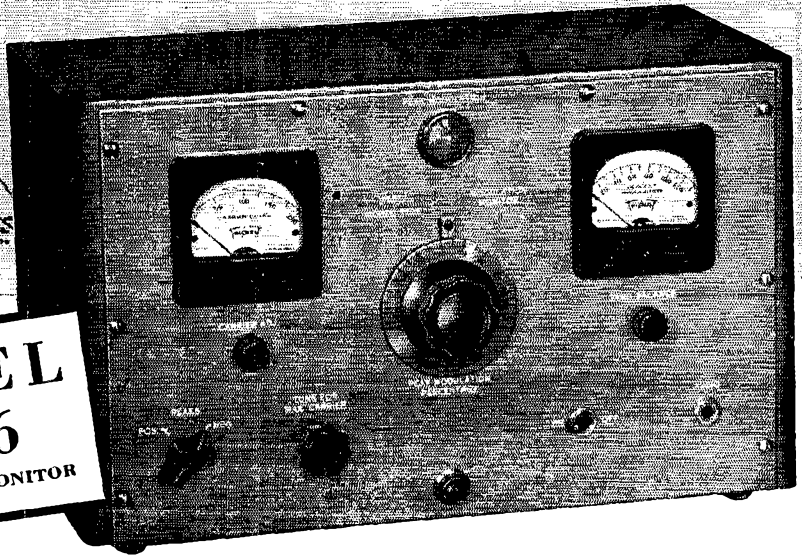
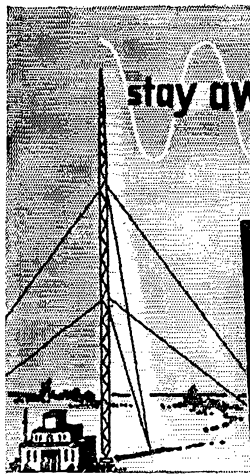
WEST GULF DIVISION

NORTHERN TEXAS — SCM, N. C. Settle, W5DAS/MNL — 5CRQ now is 6CRQ. DQW now has his old call PS. LSN makes BPL again this month. DAS set a record on 28 Mc. by contacting Waco. CAE maintains activity on 144 Mc. Hamilton High School has 30 potential hams in the radio class. CAA Net meets Wednesday on 3620 kc. at 1900 CST and Sunday net schedule is on 7260 kc. at 1330 CST, with BYX as NCS and ASO as Alternate NCS. DZ and LHF made first 144-Mc. contact between Waco and Ft. Worth. DZ used four-element beam and 25 watts input with 100 per cent QSO for 40 minutes. GDV is secretary of Waco Radio Club. JLU works 7- 14- and 28-Mc. c.w. BIN is active on 'phone. LLD is building new rig. LYX is going to town on 28 Mc. OL teaches code class and had rig set up at Boy Scouts exhibit. HAJ is wrestling with an electronic bug. Ft. Worth Radio Club operated the club emergency rig at the recent stock show. Dallas Radio Club is striving for an early test of the new emergency rig. HAJ missed Silent Keys by a very narrow margin when HV line crossed up with speech equipment and put 2000 volts on the microphone. IJC is getting an ART-13 on the air. LNK is active on 7 Mc. EFC and ENE are hauling in the DX on 14-Mc. 'phone and c.w. Traffic nets are busy. BYP is VFO now. NSG now has an HT-9. NJU works 7 Mc. Traffic: W5LSN 656, GZU 126, CDU 95, BYX 92, ISD 40, ARK 39, NDR/5 27, ILZ 20, BBH 10, ASA 5.

OKLAHOMA — SCM, Bert Weidner, W5HXI — Asst. SCM, George Bird, 5HG. SEC: AHT, MWT is mobile on 28 and 144 Mc. DRE and BBS attended EC organization meeting at Norman. JFY/0 reports to OLVZ from Minnesota. NMM/0 reports into Minnesota Net. The Enid Club has a 2.5-kva. emergency generator ready to go. EGR and BLW are building 50-Mc. emergency-powered gear to replace 144-Mc. equipment. JHA has a new rig on OLVZ. TARC is making plans to operate a station at the Petroleum Exposition. AIA and HFX are Naval Reserve at Oklahoma City. NUT has 150 watts on 7 Mc. NLD is the Oklahoma Baptist University station with 1 kw. on 14. 7, and 3.5 Mc. JMM is one of the regular operators. GNQ has 32 states confirmed on 50 Mc. NDK has a new rig with a pair of HK54s in final. The newest publication to hit the shack is VHF News. EIO is editor and publisher. There are 17 stations active on 144 Mc. in the Oklahoma City area. Tulsa has at least 10 regularly-operated stations on 144 Mc. Hats off to CNK, who arranges schedules on 28 Mc. with D4AXB and then keeps them when the folks arrive to talk. FME, at Ft. Sill, schedules his father, FMF. IGO is a member of the Pioneer Net of California and holds two schedules each day. FRD is

(Continued on page 112)

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65-w.p.m. fame, now is 6FRD. ADC now is Class A but cannot leave c.w. after 17 years of operating. GZM, MBZ, NVO, BTU, CPC, and DG are new OIZ members. AST has been heard on 3.9-Mc. phone. Traffic: W5IGO 208, GVS 123, NMN 111, AST 66, MBV 64, AQE 38, IOW 21, GOL 12, FRB 11, LBP 11, ADC 10, AAJ 9, ADB 9, YJ 9, KDH 8, EHC 7.

SOUTHERN TEXAS — SCM, Ted Chastain, W5HIF — RM: DAA. SEC: BUV. PAM: EYV. Networks: STEN ('Phone Section). STEN (C.W. Section): STTN. JBZ, editor of *STENSCOPE*, is EC at New Braunfels. LWV has recovered from recent illness. DAA has separate rigs from 144 to 3.5 Mc. MNV moved to new QTH and is active in STTX. 4MYV/5 is active in Austin. DAA and JKB are already planning for Field Day. All stations in Kingsville are using 453A Q-5ers. LGL is working nice DX on 28 and 14 Mc. EWZ has picked up 5 new countries. JPC is installing mobile units in taxis. BGG has repaired the damage caused by disastrous fire in his home. HRN left Valley for new CAA appointment. Brownsville Radio Club furnished very successful communications for CHARRO DAYS Boat Races. NSR is new call in Brownsville. LGG is back in San Antonio and active as OO. HNH is back in Austin after a long sojourn at sea. EYV and CLX are on 50 Mc. BCF, in Port Arthur, contacted MSI, in Orange, on 144 Mc. Also on 144 Mc. in Port Arthur are EQK, EWP, FCD, HRU, IBX, LTU, NLE. The Orange Amateur Radio Club is now affiliated with ARRL. Officers are: CLV, pres.; NSY, vice-pres.; NMW, treas.; JMX, act. mgr.; NMV, secy. The clubroom is located in the Chapter House of the local Red Cross. CLV has 150 watts f.m. on 28 Mc. ND works 7-Mc. c.w. and 28-Mc. phone with 150 watts. NMV has new 552 and HT-9 and SX-42 as main gear. MSI has new TBS-50 on all bands. NQW is the first YL operator in Orange. EZC is new secretary of the Corpus Christi Radio Club. HQR has 522 and a five-element beam mounted on telephone pole and is looking for 144-Mc. contacts. All ARRL appointees, please check the date on your certificates and send them to me for renewal where necessary. Don't forget, we all have a date May 29-30 at the STEN Convention in Cuero. See you there. Traffic: W5SMN 371, DAA 78, NY 19, JPC 14, LWY 8, ACL 5, HIF, K3W 4.

NEW MEXICO — SCM, Lawrence R. Walsh, W5SMA — BQE is back in Albuquerque operating 3.5-Mc. c.w. VWU is blasting the traffic net with his 5 watts from Sandia Park. 6UVA/5 is operating 7 Mc. with 5 watts and NJR is on 3.5-Mc. c.w. with 10 watts — both from Los Alamos. G8VB gave HJF a listener's report of Q4-5 S5-6 one night and DVJ Q3-4 S4-5 the next on 3855-kc. phone. NSZ, of Las Vegas, believes in keeping ham radio in the family — daughter Betty is NQT and son Harold is NQU. All three operate 3.5-, 7-, and 14-Mc. c.w. and 14- and 3.85-Mc. phone. NYA is on 28- and 27-Mc. phone/c.w. and 7-Mc. c.w. Barney wants to contact other New Mexico hams on 7.1 Mc. NKG is operating 7 Mc. from Bayard. HOX, with OBV's assistance, is helping EYV get a rig on the air. Rusty is interested in forming a ham club in Alamogordo. KWP is building a gang-tuned VFO. NQZ is gradually overcoming a severe case of "bras fever." OCD is on 7- and 3.5-Mc. c.w. with a 6L6. The introductory issue of the *New Mexico Bulletin*, edited by NXE, was sent out in March. Any New Mexico amateur who did not receive a copy should notify the SCM. Traffic: W5ZU 76, NXE 72, HJF 24, HOX 22, NRK 11, KWR 6, DUH 4, SMA 2.

CANADA

MARITIME DIVISION

MARITIME — SCM, A. M. Crowell, VE1DQ — Acting RM: GL. SEC: FQ. EE is president of LCARC. The Fundy Net is divided into c.w. on 3750 kc. and phone on 3803 kc. PC wants to contact his brother at ROE, Nottingham Island. GP is improving the beam to England — and G3AOW. FV would like to raise a YV on 14 or 28 Mc. CG is asst. supt. East Coast Radio Services (Chief R.I.). DV is senior inspector of the St. John area. QU reports nice contacts on 3.8-Mc. phone. MD and MN have been worked regularly. When BB's home town of Shediac was threatened by fire, he put out a call via Alaska and Boston on 14-Mc. phone for assistance from the town of Moncton. LY had nice long QSO with his brother, TAJB, on 28-Mc. phone. HD has some plans for 144-Mc. work. 8OE/8NB is working well through DQ, FQ, and PX. PX handles the St. John traffic on his new n.f.m. 3.8-Mc. phone. ET piled up record score in the DX 'Phone Contest using 28 and 14 Mc. DB holds Sunday schedules with EY and VO2AJ. EX built new amplifier and divides time between 3.6 and 14 Mc. QZ worked TR on 50-Mc. ground wave, and got 8 points on two bands in VHF SS. Traffic: VE1HJ 31, DQ 28, PX 24, FQ 16, RB 12, DB 6, QZ 3.

ONTARIO DIVISION

ONTARIO — SCM, David S. Hutchinson, VE3DU — VD schedules W5AQE and W3MWD on 7 Mc. and QSOs LA, C, F and PY with 60 watts. New officers of Frontier Radio Assn. are BUR, pres.; AWJ, vice-pres.;

(Continued on page 114)

McMurdo
SILVER

the "NEW LOOK"

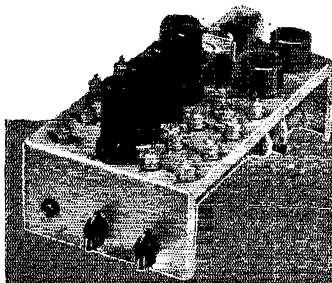
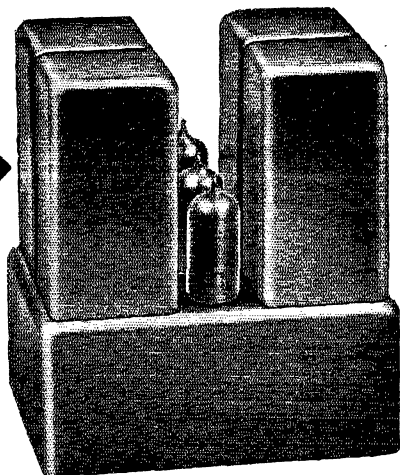
in **SELECTIVITY**

Philip Rand started a new trend to real, badly-needed receiver-selectivity with his Q-5er. Byron Goodman carried it forward with his "Lazy-Man's Q-5er". We applaud both steps, but felt that even more could be attained by *special design* to really give every ham super-hot, new or old, the "New Look" selectivity QST advocates.

Our answer is Model 805, 100kc. I.F. Amplifier. Connect it between your last i.f. secondary and your audio volume control and you get a small boost in gain. But what you *really get* is single-side-band selectivity — a selectivity curve 2.4kc. wide across the flat top, skirts falling so steeply as to be only 4.7kc. broad 1000 times (60 db.) down, only 7.2kc. wide 10,000 times down! As Byron Goodman says of this *new look* selectivity, it will "cut thru the QRM and pull out the desired signal like nothing you ever saw or heard".

Take Model 805, only 3 7/8" wide, 4 15/16" long, 5 5/8" high, make 6 simple connections to your 455/465 kc. i.f. receiver, (which can usually supply 6.3 V. a.c. at .75 Amps. and 110 to 250 volts d.c. at 25 ma. to the 805) and you *have that* post-war receiver with the "new look"

Model 805 Price, less 1-6BE6, 1-6BA6, 1-6C4 tubes, only \$18.90
Model 805K — kit complete less tubes, \$15.90



703 FREQUENCY MULTIPLIER Model 703 Pre-Tuned Band Pass Frequency Multiplier is now in stock at all progressive amateur jobbers. All you need is an 80 meter v.f.o. or xtal oscillator putting out about 1 watt to drive 703 — which, at the flip of two knobs, gives you 40 watts output 80 thru 10 meters, 20 watts on 6 meters. Whether you use it to feed an antenna tuner directly, or to drive a kilowatt "final", Model 703 short-cuts all usual intervening doubler stages — replaces them with a compact, *quick* means of getting anywhere in any band 80 thru 6 meters in a jiffy. Net price, less 2 — 6AG7, 2 — 6L6, 1 — 807 tubes, and 300 volt, 250 ma., 400 to 600 volt, 100 ma. power supply is only \$49.90 net, ready to go.

903 WAVEMETER & 903A FIELD STRENGTH METER That Model 903 absorption wavemeter nicely meets a basic amateur need is proven by the thousands in use. "HAND-BOOKS" have recommended such a wavemeter with crystal rectifier and meter for visual indication and field strength measurements. We are glad to offer Model 903A companion meter-rectifier unit — for direct attachment to top of 903 panel.

Model 903A matches, and becomes part of 903 wavemeter, to which it adds 1N34 rectifier, new Silver 0-1 ma. 0/100 division meter, meter sensitivity control and phone jack — to make the sweetest wavemeter and field-strength meter we've seen. 903 wavemeter is \$3.30 net; plug in coils, 1600 kc. to 500 mc., \$.65 each net. Model 903 A Rectifier-Meter Panel is \$14.50 net.

701 TRANSMITTER, 75 WATT CW, 30 WATT PHONE Following "HAND-BOOK" teachings for maximum transmitter efficiency vs. cost and complexity. 701 Transmitter has proven itself in tens of thousands of QSO's. Compact to save space in home or mobile installation, it's the sure-fire answer to 75 watts of clean CW, 30 watts of AM phone signals. A 6AQ5 xtal Tritet drives an 807, 80 thru 6 meters. Two 6AQ5's turn out 14 watts audio to 100% speech modulate 807 plate/screen. Power supply requirements are satisfied by Model 301 Power Supply for 40 watts input or by a simple "HANDBOOK" assembly for 75 watts input. We think you'll agree that 701 is the trimmest, smallest "power-house" you've ever seen. Price less tubes, coils, power supply only \$36.95; coils (3 per band) \$.50 ea.

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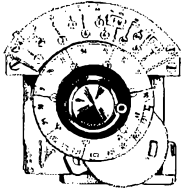
EXECUTIVE OFFICES: 1240 MAIN ST., HARTFORD 3, CONN.

FACTORY OFFICE: 1249 MAIN ST., HARTFORD 3, CONN.

Resco Has It!

Red Hot for Television! DUMONT INPUTUNER NOW AVAILABLE FROM STOCK!

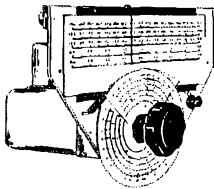
The complete front end, continuous tuning from 44 to 216 MC. Covers all 13 television channels, as well as FM, amateur aviation, telephone and commercial services within the range. Complete with dual edge-lighted lucite dial and carries different colored targets designating TV, FM and other bands. Usus a 6V6 grounded-grid input, a 6AK5 mixer, 6J6 separate oscillator. Overall gain approx. 15. Operates from a low-impedance or 73-ohm unbalanced line.



Price Less Tubes **58⁶⁵** Amateur Net

3 Tubes, Escutcheon, Wiring Diagram and Tuning Knob to Complete Above Unit **700**

Get Immediate Delivery! COLLINS 70 E-8



PERMEABILITY TUNED OSCILLATOR

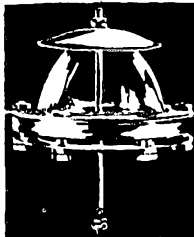
Has a linear range of 1600 to 2000 KC. Can be used as an exciter or in many types of measuring instruments such as heterodyne frequency meters. Stability and accurate calibration distinguish this unit as a good V.F.O. Dial calibrated to 1 KC on 80 and 40 meter bands, 2 KC on 20 meters, and 5 KC on 15, 11 and 10 meters.

PRICE—Complete with tube, slide rule and vernier dial assembly and instruction book

\$40 Amateur Net

SPECIAL! PYREX ENTERING INSULATORS

- NUMBER—67076
- BOWL—67037
- GLASS — OPAQUE
- LENGTH, CENTER PIN — 1 1/2"
- OUTSIDE BASE DIAMETER — 8 3/4"



A Resco Special!

Furnished with a template ring 1/16" thick for locating mounting holes for the 2-9/16" studs. Template can also be used as backing ring or washer. Equipped with two 3/8" jamb nuts for lower end of center pin and two 1/2" jamb nuts for each stud. Same as illustration, but opaque.

REGULAR PRICE **\$5**
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ANP, secy.; BPB, treas.; FP, WA, and AHL, executives. BPB and BOB are new calls on 7 Mc. FP and LA purchased SCR-522. The Hamilton 144-Mc. Emergency Net is on every Sunday noon. AWI gets good reports with his 12 to 18 watts. BMG worked DX Contest on 28 Mc. The Hamilton Club collected \$16 for food for Britain. AHL, ATR, AWE, AWJ, BME, BMG, DH, DU, BCS, GI, OI, TM, and XO keep BN going. AWE, TM, and DU are on T. L. "I." BBQ, Kirkland Lake, reports the club held annual meeting and banquet April 8th. AZN is on all bands with 250 watts 'phone or c.w. AQW is doing well on 28 Mc. BHU has 6L6 on 14 Mc. with dipole in attic. BJE is on 14-Mc. 'phone and BG1 is on 28 Mc. BNI is a new-comer on 14 and 7 Mc. PA has three Command transmitters as VFO to T35s on 14, 7, and 3.5 Mc. BTC, with MKIII, has gremlins. ANH and BBQ worked WAS in a month. BBQ has p.p. 811s in place of 813. API says all he can hear from Kirkland Lake is BBQ. ALU has cigarette-packet-size rig for local QSOs. Toronto East AFARS consists of AFW, ALO, AUW, AXQ, BCE, BCZ, EF, and IR. The latter is NCS. AFW got 35-w.p.m. and ALO 30-w.p.m. Code Proficiency Certificates. BCZ is on 3.5-Mc. band. EF has incorporated the "silent break-in" system, as per Feb. '47 QST. RCAF at Trenton has call BRG with 300 watts on 3545 kc. In Hamilton ABP, AQA, BQF, BIK, CJ, AVK, BKR, BMG, and BFF are on 28 Mc., with BHS, SP, AYW, KM, YR, JU, and ARB on 14-Mc. 'phone. BHX has 32 countries and QU has 78, with 60 postwar. DC, BHX, and FT are on 7 Mc. AQA, KM, and BMG, are on OPN. Traffic: VE3TM 61, XO 56, ATR 54, DU 49, GI 47, AWE 31, AWJ 23, BMG 20, KM 16, VD 16, DH 14, AWI 7, BCP 5.

QUEBEC DIVISION

QUEBEC—SCM, Gordon A. Lynn, VE2GL—BB maintains schedules with W2OUT and VE2LO. LO schedules WILM and is interested in ORS appointment. ACZ is new-comer in Lachine and is one of NR's trainees. ACS has 260-ft. long skywire. KT has p.p. 6L6s. WR now has pair of 807s with 150 watts, is on 14 Mc., is planning to erect a flock of half-wave dipoles, and is off tuned lines for keeps! EC continues schedules on Quebec 'phone net and reports that DD now is n.f.m. ZG in Grand Mere, has regular schedule with BY on 144 Mc. YP has 100 watts into a long-wave antenna on 7- and 3.5-Mc. c.w. and uses CSR-5 and NC-240D receivers. CA still is using nothing but n.f.m. and has worked 5 continents and 22 countries and is searching for the Asian to complete WAC on n.f.m. GM is reported rebuilding and plans push 807s with 100 watts. AB and JN took part in Frequency Measuring Tests and made good showings. XB, on 3.5-Mc. c.w. is interested in traffic. He is on during early mornings with the dawn patrol. JS reports that AFARS c.w. net operates weekly between there and Dawson. EO has departed for VE7 Land. TQ now is in Seven Islands. ZA, in Mont Joli, is on 28-Mc. 'phone. ACA is DY's XYL. Regular schedules are being maintained on 50 Mc. by many of the Montreal gang, including LP, AG, OS, AAV, and KH. The Montreal Amateur Radio Club continues to send food parcels to British amateurs. Traffic: VE2BB 50, EC 35, GL 32, LO 15, XB 9, CA 3, HH 3, RJ 3, WR 3.

VANALTA DIVISION

ALBERTA—SCM, W. W. Butchart, VE6LQ—RP is a new Edmonton call. WB is showing interest in getting back on the air. HM has Hammond beam up and ready to go. EE, ex-2EE, needs Africa for WAC. MJ finally worked not one, but two Africans. FG heard SOS from VP6RC on 7 Mc. PE works 7 Mc. HI is on 7, 14, and 28 Mc. 8AV, of Watson Lake, visited NARC meeting. WS is rebuilding. AK says, "It's a boy this time!" AH landed in the hospital. DF is sporting new 1948 model jr. operator. She also is new ORS. RL met with an auto accident. OD, HZ, MP, and TA handled QRR traffic when snow storms knocked out telephone and telegraph lines in South Alberta. CARA will hold a skating party. The club will raffle off its C2 frequency meter and turn the proceeds over to CAROA/RSGB aid to British amateurs. WG is new RM for Alberta. CJ is new ORS in Raymond. IN wants to know the best formula for working DX with flea power. Can anyone get him started with a DX contact? LQ has low-power rig finished and finds it works FB on all bands. NR hit 28 Mc. recently. VB is the call of HQ's jr. operator. He's been after DX already! Traffic: VE6LQ 34, QS 13, MJ 11, BN 10.

PRAIRIE DIVISION

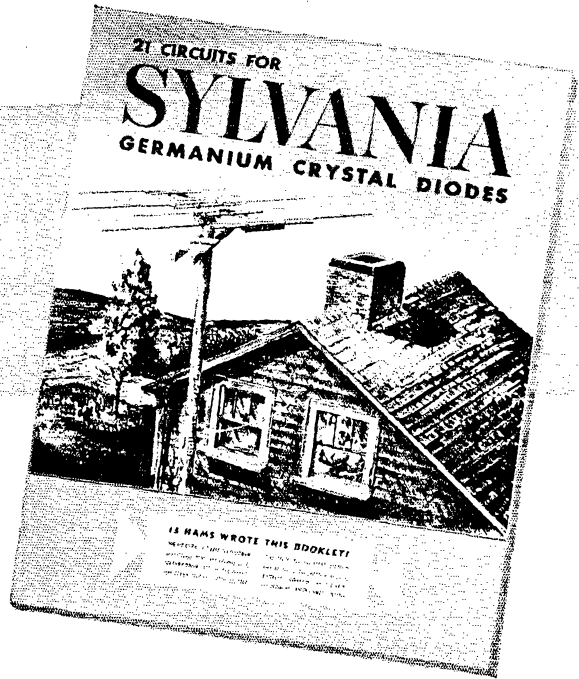
MANITOBA—SCM, A. W. Morley, VE4AM—Congrats to YW, of Brandon, who handled the first emergency traffic out of Wilmington, N.C., and acted as a relay station between Wilmington and Raleigh until the deck cleared. When Cec had to go to work he got AO to carry on. A Manitoba 'phone net has been started and HIS, MM, CI, AP, GE, AW, and AM have shown interest. The net meets on approximately 3805 kc. each night at 7 p.m. DT has 811 final finished. EH and MX have returned from

(Continued on page 118)

New dope on germanium crystal circuits

written
by and
for hams . . .

Here at last is a compilation of outstanding practical applications for Sylvania Germanium Crystals. Circuits were designed and tested by leading radio amateurs and submitted in a recent nationwide contest sponsored by Sylvania Electric. This new 8-page Sylvania booklet shows 21 receiver, transmitter and test and control circuits. Get your free copy—you'll find plenty of ideas in it to spark your thinking on Crystal Diodes.



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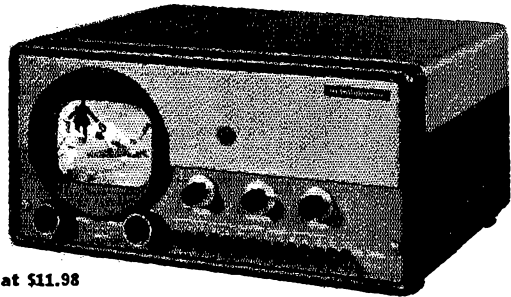
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This TV Receiver is really a "knockout." It offers quality Television at a price everyone can afford, in a streamlined, handsome cabinet. A complete unit, ready to operate—No Special Installation Required—No Extras—No Additional Costs! And a world-famous name to back it up. Here are some of the outstanding features: Uses inter-carrier modulation type FM sound system with 4" x 6" oval PM dynamic speaker • 19 tubes including 7" Picture Tube, plus 3

Rectifiers • 13 Push Buttons for instant channel selection • 23 square inches of sharp, clear pictures • New type automatic gain control circuit assures minimum noise interference, steady reception and excellent sensitivity • Front panel controls: Contrast, Brightness, Volume, Horiz. Hold, Vert. Hold, Fine Tuning, Channel Selection • Tubes: 2-6AG5, 2-6CA, 6-6AU6, 6H6, 5-12SN7, 6AL5, 25L6GT, 25Z6GT, 6X5, 1B3GT and 7JP4 • Size: 20" W x 16" D x 9 3/4" H.



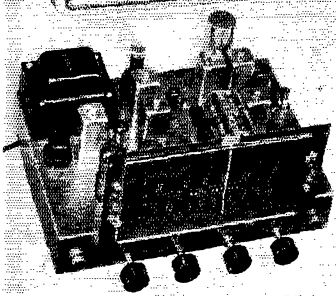
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S-56 AM-FM Chassis, complete with tubes, built-in power supply, less speaker. 12 1/2 x 7 1/2 x 11 3/4" D. Wt. 18 lbs. No. A-2074. **\$99.50**
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S-55 AM-FM receiver with cabinet, tubes and built-in power supply, less speaker. 18 1/2 x 8 1/2 x 12 1/2" D. Wgt. 25 lbs. No. A-2073. **\$119.50**
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Terrific Value! Pri. 105 to 250 V, 50-60 Cy. Sec. 6.5 V @ 20 A, 6.3 V @ 3 A, 5 V @ 3 A. Supply power to 80, 83, 524, 513, 5V4, 5W4, etc. 4 1/2 x 6 3/8 x 6 3/4". Wgt. 12 lbs. No. S-541 **\$3.49**

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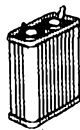
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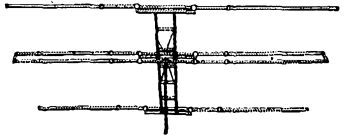
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S-747 — SPST, normally closed. Steel mtg. Frame. Handles 10 amps @ 125 V. Very sensitive, very handy. Only..... **29¢**
Micro-Switch Assembly—Complete housing for Mtg, above or any standard micro-switch. Plunger assy. for oper. thru panel, h/dware. No. S-748..... **12¢**

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Model 400 EA. Folded di-pole driven element. Complete with aluminum ladder. Elements are 3/4" alum. tubing telescoping to 3/8", supported by 2 1/2" stealite standoff insulators — adj. over several feet. Fed directly with 50 ohm coax cable. Wgt. 17 lbs. No. A-30007... **\$31.20**



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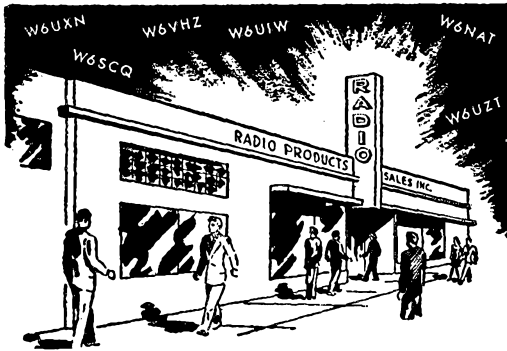
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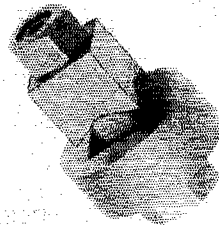
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9309	0-200 D.C.M.A.	1.45
9310	0-300 D.C.M.A.	1.45
9311	0-400 D.C.M.A.	1.40
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9402	0-6 A.C. Volts	2.50
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(All new and boxed)

6J5GT.....	\$.44	5T4.....	\$.79
6K6GT.....	.49	6H6.....	.30
6K7G.....	.49	77.....	.39
6K7GT.....	.49	6AC7/1852.....	.69
12SK7GT.....	.49	VT127.....	3.50
83.....	.89	872A.....	2.25
VR-90.....	.89	5D21.....	4.50

All prices F.O.B. Los Angeles (California Purchasers add 2 1/4% sales tax). Include 25% with order—balance on delivery. Foreign orders cash. Minimum order..... **\$1.00**

Get YOUR NAME on our mailing list. We'll keep you posted on merchandise available, new equipment and special bargains: Address correspondence to Dept. C5.

When in Los Angeles drop in for a rag chew.

RADIO PRODUCTS SALES INC.

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(Continued from page 114)

visiting the GMs but neither ran across the other while over there. AW reports for the Dauphin gang. He is active on 3.8, 14, and 28 Mc. with p.p. T740s to folded dipole on each band. RH is running 810 to 200 watts on 14-Mc. c.w. PA is rebuilding to 6E5-6L6-904. TQ has HK54s on 14-Mc. XP is rebuilding to 813. AD and LH visited AW. RX is in new QTH and is fighting power line noise. 144 Mc. is going to town in Brandon and Shilo. Six-element beams and SCR-522s are being used by YW and DN. RT was heard testing on 3.8 Mc. Someone commented recently that he was never mentioned in this column. All I got for an answer when I requested information on what he was doing was "nothing new." Please send in your dope. AJ, LS, BF, and 3AWZ visited AM. Traffic: VE4AM 82.

SASKATCHEWAN — SCM, Norman Thompson, VE5CO — The Saskatoon Club has a strong turnout these days, with JF on 28- and 14-Mc. 'phone and c.w. FL, new XYL member of the club, is going to town on 3.5- and 14-Mc. c.w. YF, another XYL in the club, was active on 3.5- and 7-Mc. c.w. until her rig blew up. FY put up a 3.5-Mc. folded dipole. DR is working DX on all bands. EE is graduating to c.w. OB is on 28- and 3.8-Mc. 'phone. KQ is on 14-Mc. c.w. and is heating up 813s on 28 Mc. UC is working all bands now that his new aerial is up. RC is running the new rig on 3.5, 7, and 14 Mc. RC worked a KL7 on 7 Mc. with the new 19 set. The annual Christmas Party of the SARC was held Jan 16th in the I.O.O.F. Hall. The Saskatoon gang wishes to express its deep sorrow at the passing of 6WE. HI is running 2 watts on 3.8-Mc. 'phone. IC is running 300 watts. AQ's XYL is on c.w. CE has a regular schedule with 7YI on 3.8-Mc. 'phone every night. GC and YF are on 7-Mc. c.w. FD is handling traffic on 3.8 and 14 Mc. RV is most consistent on 3.8 Mc. MW keeps OBS schedules on Mon., Wed., Fri. 7:30 p.m. CST, 3839-kc. 'phone. KJ kept TLI schedules 19 out of 20 nights in February. Traffic: VE5KJ 60.

25 Years Ago

(Continued from page 12)

With Operating Department traffic totals reading like the Treasury Department balance, SZD, Pittsburgh, operated by Parker E. Wiggin and F. B. Westervelt, rolled up the all-time-high traffic total of 2855 messages. On the emergency front, SAUV and 8AJO, cooperating with the Coast Guard, were instrumental in saving the life of a man dangerously ill and stranded on Lake Erie, off Cleveland.

To round out this issue, the Who's Who in Amateur Radio section pays its respects to Parker E. Wiggin, already reported in this issue as Traffic Handler and Antenna Designer Supreme, and to W. D. Wood, Canadian 9BD.

Strays

You've heard this one before: "Heck, I could have worked him with a piece of string for an antenna!" Well, W11IN has proved that it can be done. Doc took 15 feet of clothesline, soaked it in salt water, and then hauled the "antenna" into the air. The transmitter end was connected to the pi-section antenna coupler in the usual manner and the half-kilowatt 7-Mc. rig fired up. Adjustment of the coupler produced an ampere of current and clouds of steam from the "skywire." Putting the lash-up to test, a short call raised W2GB for a solid QSO.

Witnesses to the test were W1JMY, W1NJM, W1QMI and W9BRD/1 — but W2GB still thinks he was being kidded.

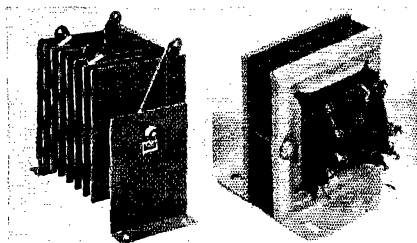
**SWITCH
TO SAFETY!**



RADIO PRODUCTS SALES Inc. is *FIRST TO* Announce the *NEW — R. P. S. POWER* *CONVERSION UNIT*

"CONVERTS ALL WAR SURPLUS d-c RECEIVERS AND TRANSMITTERS, etc., INTO a-c USE." NO REWIRING NECESSARY—INSTALLED IN A FEW MINUTES—UNITS AVAILABLE FOR ANY RATING—A FEW POPULAR MODEL SETS EASILY ADAPTED TO THE R. P. S. POWER CONVERSION UNIT: BC-453, BC-454, BC-455, BC-312, BC-348, BC-433, BC-624, BC-733, BC-946, BC-1206, R-89/ARN-5A, ARB, BC-457, BC-458, BC-459, BC-375, BC-625, BC-654, SCR-522, SCR-274-N, ARC-4.

★
INSTANT
WARM UP
SELENIUM
RECTIFIERS



★
NO
MAINTENANCE
NO TUBES
LOW COST
COOL OPERATION

FREE INSTALLATION DIAGRAM SENT WITH EACH PURCHASE—R. P. S. POWER CONVERSION UNITS ARE AVAILABLE FOR ANY VOLTAGE AND AMPERAGE RATING. The R. P. S. POWER CONVERSION UNITS were designed especially for the radio amateur by VICKERS ELECTRIC DIVISION, Vickers Inc., a unit of THE SPERRY CORPORATION, manufacturers of selenium rectifiers. The transformers were designed by The Thermador Electrical Manufacturing Company and operate efficiently in conjunction with the rectifier prescribed.

IMPORTANT—HOW TO ORDER—The input rating of your dynamotor must not exceed d-c output rating of the rectifier. For example, dynamotor series DMDX—12 v. 2 amps.—requires Rectifier No. S-295A and Transformer RPS-8883.

Shipping weights are listed—please contact your local freight agent for cheapest means of shipment—and include shipping charge with remittance.

ALL NEW—FULL WAVE VICKERS SELENIUM RECTIFIERS

ALL NEW—THERMADOR TRANSFORMERS 50/60 Cycle—117 Volt Primary Rating

Code Number Rectifier	d-c Output Volts Amps.	Ship. Wt. in Lbs.	Amateurs Net Price	Code Number Transformer	Secondary Volts Amps.	Taps See Note A	Ship. Wt. in Lbs.	Amateurs Net Price
S-295A	14 2	1.25	\$ 6.95	RPS-8883	18 3		3.5	\$ 3.65
S-458A	14 4.5	1.75	7.25	RPS-8884	18 5.2		5.5	4.15
S-167A	14 10	3.75	10.95	RPS-8885	18 12		12	5.95
S-292A	14 40	12	29.95	RPS-8886	18 46		35	19.35
S-296A	28 1.8	1.25	5.75	RPS-8888	36 2		5	3.95
S-344A	28 5	5.75	11.50	RPS-8889	36 6		12	6.55
S-172A	28 10	6	16.50	RPS-8892	36 12		25	11.35
S-291A	28 20	12	29.95	RPS-8890	36 23		32	18.65
S-297A	28 40	23	45.00	RPS-8891	36 46		78	50.25

NOTE A: All transformers have 3 extra tappings—for example: 20, 19, 18, 17 volts and 38, 37, 36, 35 volts.

All prices F.O.B. Los Angeles (California purchasers add 2½% sales tax). Include 25% with order—balance on delivery. Foreign orders cash.

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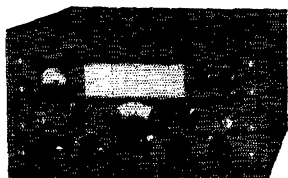


HARRISON HAS*

*By "HAS" I don't mean "at the Factory" or "on order"—but right here, Now, waiting to be immediately shipped to you.

Bil Harrison, W2AVA

COLLINS 75A-1 RECEIVER



It's sweet! It's HOT! It has everything you could possibly want! —

Low noise level—high sensitivity—dual conversion (triple detection)—crystal controlled HF oscillator—directly calibrated dial reading frequency accurately to 2 kc on 10 and 11, to 1 kc on 15, 20, 40, and 80—image rejection better than 50 db—practically drift-free, even from cold start—plus many other features that put it in a class by itself.

Such a honey you don't tune stations—you just caress 'em in! Just listen to the Ham who is fortunate enough to own one.

Complete, with speaker — **\$375**, and worth it!

NOW ON DEMONSTRATION AT BOTH OUR
NEW YORK AND JAMAICA STORES

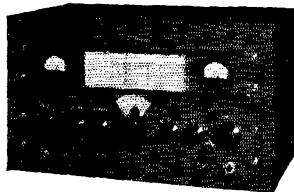
COLLINS 32V-1 TRANSMITTER

A triumph of Engineering skill!

150 Watts of clean CW, 120 Watts crisp phone (that's typical Collins' ultra-conservative input power rating!)—complete band switching, no plug-in coils—stable "PTO" VFO and multipliers tuned by single dial showing exact frequency of output—antenna matching network—push-to-talk control—chirpless keying even at high speed—and lots more F.B. features.

All this in a handsome cabinet only 21 1/2" wide, 12 1/2" high, 13 3/4" deep (same as the 75A-1 Receiver!)

This compact, completely self-contained Transmitter is ideal for permanent or portable installations. It will also easily drive a full KW final (modulation transformer has 500 ohm tap). Complete, less only key, high impedance microphone, and antenna. **\$475**



ALSO

COLLINS 30K-1, 500 Watt CW, 375 Watt Phone input. Complete with 310A desk control PTO unit. **\$1450**
(We can't keep enough of these F.B. transmitters on hand at all times, so we may have to slip yours from the factory.)

COLLINS 70E-8, Permeability Tuned Oscillator. The VFO heart of all Collins Transmitters. Complete with direct calibrated dial and instructions. **\$40**

COLLINS 310C-1, regulated, better-than-crystal-stable VFO. Output can be fed into your present 80 meter crystal socket or used to drive an 807, etc. **\$85**
With built-in AC pack, model 310C-2. **\$100**

COLLINS 310B-1 Exciter. Puts out 15 Watts on all bands, 10 to 80. Has all the very desirable Collins features. **\$190**

If you would like more information before ordering please write to me. I will be happy to answer your questions and send you literature. Prompt shipment to any part of the world direct from our New York warehouse or from the Factory in Cedar Rapids, Iowa, as you prefer. Prices are F.O.B. Factory.

Remember, the best costs less in the long run! Send your order to me NOW! Liberal trade-in allowance for your old Transmitter and Receiver.

Tnx, 73, Bil

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PHONE—BArclay 7-9854 — EXPORT DEPT.—CABLE—"HARRISORAD"

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THE VERY BEST TRADE-IN DEAL FOR YOU!

Nobody, but **NOBODY**
can give you a better one than Harrison!

I have all Receivers and Transmitters in stock—
Let's do business. **73, Bil Harrison, W2AVA**

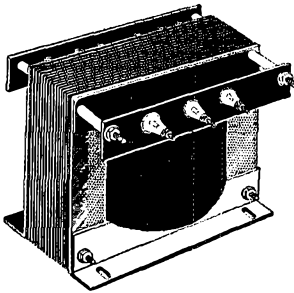


PLATE TRANSFORMER SENSATION!

A Harrison Super-Value in a rugged former to power your entire rig. 1170 volt center-tapped secondary will deliver up to 750 mils at 500 Volts DC with choke input filter or 600 mils at 600 Volts with condenser input (delivers 750 volts at 300 ma load). Use branch or duplex rectifiers and filters for added flexibility and stability. With half-wave or bridge rectifier will give 1200 volts, 300 ma. TWO, with secondary windings in series will economically make available 1200 volts at 600 ma!

Primary is 115 or 230 volt, 60 cycle, with taps to reduce output 10% and 20%. With 115 volt line on 230 tap output at 500 ma is 300 volts DG; 300 ma, 350 volts.

FB regulation!—plenty of good grade iron and copper!
Compact!— $6\frac{3}{4}'' \times 6\frac{3}{4}'' \times 6''$ high (overall).
Husky!—22 $\frac{3}{4}$ lbs., unpacked.
Dependable!—made to Gov't specs. by reputable manufacturer.
Sensationally priced!— **\$5.94** /item 7% (add packing charge of 80c each)

Don't forget to include in your order the rest of the items you need for that new power supply—filament xformers, rectifiers, sockets, bleeders, condensers, switches, chassis, etc!

Harrison has it!

TIME TO FIX UP THAT ANTENNA!

WIRE — Best grade enamelled copper. Full coils.
14 ga: 100' — \$2c 250' — \$2.10
12 ga: 100' — \$1.24 250' — 3.25
B&W CG-50. Weatherproof insulator and housing to suspend coaxial cable from center of wire flat-top. A necessity for a permanent splice that will keep moisture out of the cable. \$5.00
300 OHM RIBBON LEAD. Newest brown type.
100' coil — \$2.49 500' spool — \$10.95 1M' — \$19.50
ANTENNA INSULATORS. Strong, glazed white ceramic 1" dia., 12" long. List price \$1.25. Three for \$1

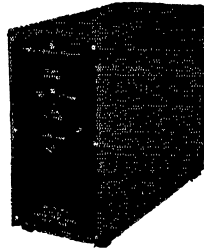
ELEMENTS: Per pair to make one half-wave —
10 Meter 20 Meter
Hy-Lite \$4.40 \$8.95
Premax "Corulite" 5.40 11.40
Gordon 10.50 16.00
HY-LITE BEAMS — Well designed, with sturdy aluminum castings, heavy steatite insulators, strong adjustable elements with secure locking clamps. Easily assembled and tuned.

Band	THREE ELEMENT		FOUR ELEMENT	
	Junior	Standard	Junior	Standard
6	\$18.50	\$24.00	\$24.00	\$29.00
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(Standard has much more rugged construction)
Folded Dipole radiator, or T match — \$4 extra each.
MIMS. Amphenol Dual 10/20 beam, complete with rotator and indicator. \$358.00
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ABBOTT BM-2 Five element 2 meter beam. All aluminum. T-match for 300 ohm feed. List \$23.50.
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FRIG TOWERS. Sturdy, yet lightweight. Good design, all dural. Self supporting, climbable. Complete with hardware.
10' — \$90 20' — \$147 30' — \$216
DIRECTION INDICATOR RHEOSTAT. Ohmite RB-2. Use with 1 or 2 ma meter for inexpensive fool-proof indicator. \$4.85
MICROMATCH. An indispensable instrument for tuning beams, measuring output, etc.
JONES — \$29.50 SILVER — \$29.90

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Selectable Single Sideband Reception adapter. Designed by Jim McLaughlin (see April QST), built by Jim Miller (see us) it's a JIM-DANDY device to cut down QRM! The "Simple Simon" is attached to your receiver in a few minutes and gives you razor-edge selectivity. Complete with tubes and crystals, ready to lift your QSO's far from the madding \$75 crowd!



ALUMINUM CHASSIS

New, clean — a joy to behold! Die cut and welded, heavier gauge, hard stock gives strength and rigidity — yet easy to work.

7x5x2	\$.72	12x10x3	\$1.54	17x10x5	\$2.92
7x7x2	.79	13x7x2	1.10	17x11x3	2.33
9x7x2	.93	14x10x3	1.61	17x12x3	2.37
9x9x3 1/2x2	.82	15x7x3	1.46	17x13x2	2.49
10x3x3	1.05	17x2x3	1.32	17x13x3	2.74
11x7x2	1.10	17x10x2	1.61	17x13x4	3.22
12x7x3	1.30	17x10x3	1.82		

ALUMINUM BOTTOM PLATES

17" x10 — 90c, x11 — 94c, x12 — \$1.00, x13 — \$1.07
● The space inside these chassis is mighty handy for packing in some condensers, tubes, transformers, etc! How about including them in your order, too? Remember, Harrison has all standard lines in stock at lowest prices. THANKS.

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Since 1925!

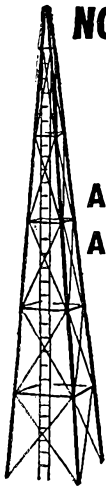


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Attractive — Self-Supporting

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- COMPLETE—Ready to Assemble
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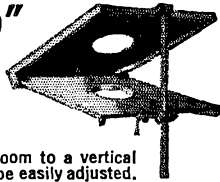
LOOK AT THESE LOW PRICES!

Three popular sizes. Assembled on the ground with a wrench in a few hours. Made by one of the oldest manufacturers of steel towers.

33 ft.—\$89.75 **39 ft.—\$107.25** **61 ft.—\$199.75**
 Ship. Wt. 516 lbs. Ship. Wt. 616 lbs. Ship. Wt. 1246 lbs.

Shipped FOB Kansas City, Mo., 4th class freight. Prices subject to change. Send check or money order or write today for complete FREE information!

Vesto "Tilt-Top" MOUNTING HEAD



Makes it possible to swing boom to a vertical position where elements may be easily adjusted.

- Easy to attach to any type pole or tower
- Any Rotary Head will fit it
- Made of heavy cast aluminum, 16" x 16", hinged, with automatic steel stop bar. Heavy steel hinge rod.

Shipping Weight 22 lbs. Price \$24.50 fob Parkville, Mo.

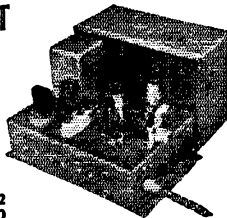
VESTO CO., PARKVILLE, MO.

"MOBILE MIDGET for 144 MC."

February QST, p. 21

ADAPTABLE FOR
MANY BANDS

144 Mc. Kit, unwired..... \$41.32
 4 miniature tubes..... 4.30
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 Plug-in forms for other bands 75c each



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Revised WWV Schedule

STANDARD-FREQUENCY transmissions are made continuously, day and night, as a public service by the National Bureau of Standards over its standard-frequency station, WWV, on the following frequencies:

Mc.	Power (kw.)	Audio Freq. (cycles)
2.5	0.7	1 and 440
5.0	3.0	1 and 440
10.0	9.0	1, 440 and 4000
15.0	9.0	1, 440 and 4000
20.0	8.5	1, 440 and 4000
25.0	0.1	1, 440 and 4000
30.0	0.1	1 and 440
35.0	0.1	1

A 0.005-second pulse may be heard as a faint tick every second, except the 59th second of each minute. These pulses may be used for accurate time signals, and their one-second spacing provides an accurate time interval for physical measurements.

The audio frequencies are interrupted at precisely one minute before each hour and each five minutes thereafter (59th minute; 4 minutes past hour, 9 minutes past hour, etc.), resuming after an interval of precisely one minute. This one-minute interval is provided to give Eastern Standard Time in telegraphic code and to afford an interval for the checking of radio-frequency measurements free from the presence of the audio frequencies. Ionospheric-disturbance warnings applicable to the North Atlantic path are given at 19 and 49 minutes past each hour. If a disturbance is in progress or is anticipated within 12 hours, the time announcement is followed by 6 Ws; if conditions are quiet or normal, the time announcement is followed by 8 Ns. The announcements of the station's services and of the station's call (WWV) are given by voice at the hour and half hour.

The accuracy of all the frequencies, radio and audio, as transmitted, is now better than a part in 50,000,000. Transmission effects in the medium may result in slight fluctuations in the audio frequencies as received at a particular place; the average frequency received, however, is as accurate as that transmitted. The time interval marked by the pulse every second is accurate to 0.000001 second. The beginnings of the periods when the audio frequencies are resumed are synchronized with the basic time service of the U. S. Naval Observatory.

Strays

Photostats and microfilm — and in a few instances mimeographs — of instruction books of war-surplus apparatus may be purchased at cost, on special order, from the Office of Technical Services, Department of Commerce, Washington 25, D. C. It is necessary to contact this office first for information as to the availability and price of desired reproductions. — W2MOL

Hams everywhere acclaim
STANCOR'S ST-202-A TRANSMITTER KIT...



- "VERY FB KIT" . . . Mexico
- "AM VERY PLEASED" . . . Rio de Janeiro
- "IT'S WONDERFUL" . . . New York
- "BEST I HAVE EVER SEEN" . . . Honolulu
- "WELL WORTH \$92.80" . . . Washington
- "EASY TO BUILD" . . . Dallas
- "PERFECT PERFORMANCE" . . . Spokane
- "100% SATISFACTORY" . . . Los Angeles
- "FINE JOB OF ENGINEERING" . . . Capetown

YES! Literally hundred's of enthusiastic amateurs have written us praising this versatile transmitter.

**AND
 HERE'S
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These important features have made the ST-202-A the most up-to-date, talked about kit on the market!

- 100-125 WATTS INPUT TO FINAL AMPLIFIER
- CW OPERATION
- ALL AMATEUR BANDS BETWEEN 3.5 and 30 MCS.
- BAND-SWITCHING OF EXCITER STAGES
- ONLY TWO TUNING CONTROLS (*Exciter and Amplifier*)
- SELECTION OF SIX CRYSTAL POSITIONS
- ADJUSTABLE LINK OUTPUT CIRCUIT
- TWO SEPARATE POWER SUPPLIES INCLUDED
- EASE OF CONSTRUCTION (*Cabled Wiring Harnesses Supplied*)
- COMPACT DESIGN — APPROX 14" X 13" X 9"
- AMPLITUDE OR FREQUENCY MODULATOR MAY BE APPLIED
- PRICED TO PLEASE THE AMATEUR AT ONLY **\$92.80**

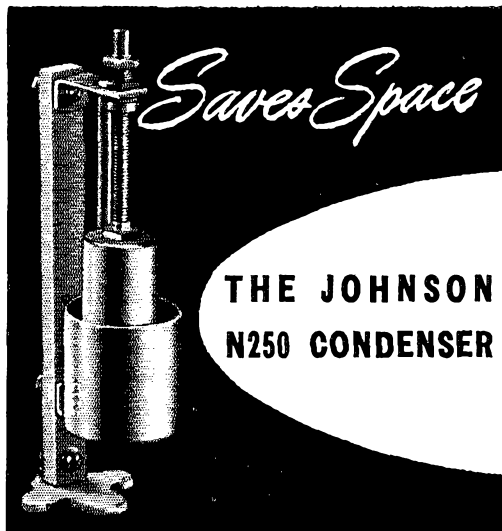
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**Extremely High Voltage Rating
In Proportion to Size**

WHEN space is limited, yet you need extremely high voltage rating, fine adjustment with uniform voltage breakdown rating throughout the full capacity range, the JOHNSON Type N Neutralizing Condenser is the perfect answer.

Because of their design, these condensers will withstand much higher voltage than conventional flat plate condensers of the same spacing.

High in quality — low in cost, JOHNSON condensers are always a wise choice.



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ANOTHER *New* BROWNING DEVICE

**Amateur Frequency
Meter—Model MJ-9**

Now most widely used ham frequency meter. Accuracy: .05% on all frequencies. Direct frequency reading on 7 ham bands

Frequency meters WWV standard frequency calibrator Oscilloscope. Power supply and square wave modulator Capacitance Relay. FM - AM Tuners. FM Tuner.

KNOW THE ENTIRE BROWNING LINE • ENGINEERED FOR ENGINEERS

WRITE TO DEPT. A FOR CATALOG



BROWNING LABORATORIES, INC.
WINCHESTER, MASS.

Happenings

(Continued from page 39)

Section shall be construed to apply to any person who holds a valid amateur radio operator's license issued by the Federal Communications Commission and who operates a duly licensed portable mobile radio transmitter and in connection therewith a receiver or receiving set on frequencies exclusively allocated by the Federal Communications Commission to duly licensed radio amateurs." So a permit is no longer required of New York State amateurs operating their stations mobile.

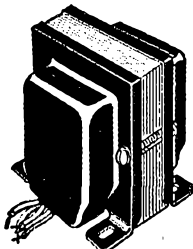
It might be well here to caution amateurs everywhere, regardless of the local existence of such laws, to make certain they have their licenses along when operating mobile. Last year a New York amateur traveling through New Jersey with a mobile installation passed a parked police cruiser and, because their respective frequencies were quite close, caused interference to police communications. The cruiser gave chase, to find out who was causing interference. The ham told the officer he was a licensed amateur, of course, and had federal authority to operate. When asked for his license, the amateur was quite embarrassed to discover he'd left it at home. The officer then asked for identification in the form of a driver's license; but the amateur had left that at home, too. His suspicions thoroughly aroused, the officer made an arrest and trotted the amateur back to the state police station, which needless to say caused a great deal of difficulty for the ham. Don't let it happen to you!

CLIPPINGS WANTED

If you see a reference to amateur radio in your newspaper, magazine or other nonradio publication, please clip it out and send it to your League Headquarters. Many of our friends have been doing so through the years, resulting in a sizable file of such material. We hope that each of you will help keep it growing. Favorable publicity for amateur radio is a factor in promoting excellent public relations, as we've said many times.² The extent of such publicity can be accurately gauged only by collecting press mentions from media in all sections of the country and this we are unable to do without your help. Reference to a file of clippings can also be helpful in determining the effectiveness of a planned publicity campaign or of a particular press release. If a ham radio story is picked up by editors everywhere, it must have had salient features appealing to them as being especially newsworthy and hence deserving of careful examination for possible future application. A bulging file of clippings also constitutes excellent tangible evidence of the good will enjoyed by amateur radio, evidence which can be used to advantage when occasion demands. So cut out anything you see relating to ham activities and send it along. TU, OM.

(Continued on page 126)

² E.g., "It Seems to Us," *QST*, Aug., 1947; "Public Relations for the Amateur," *QST*, March, 1948.



MERIT Model "D"

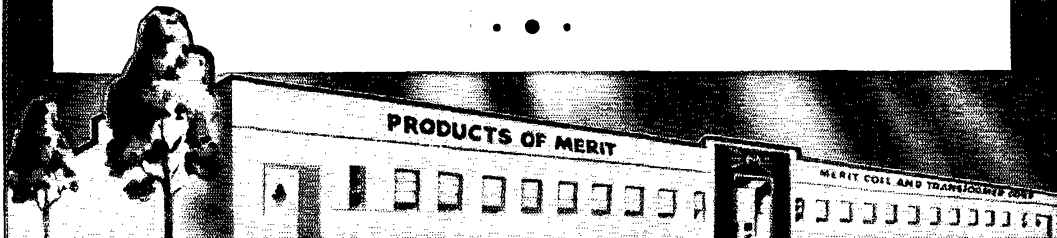
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			Pri.	Sec.	
A-3110	\$10.50	PP801, 6L6, 10, 46, HK-24, HY-25.....	10000-6600CT	4000-5000 7500-10000 12000	
A-3113	15.75	PP800, 809, Tz-40, T-55, HK-54, RK-31, HY-40, 811, 807.....	15000-6900CT	3000-4000 5000-6000	
	Max. Pri.	MA Sec.	Watts	Dimensions H. W. D.	Mtg.
A-3110	175	150	60	4¼ 3½ 3¼	D
A-3113	250	300	175	4½ 3¾ 5½	D

• • •



MERIT COIL & TRANSFORMER CORP.

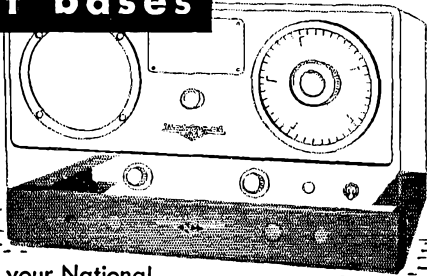
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3500-3600 IN FAR EAST

Word reaches us that, following action by the Philippine government assigning its amateurs the use of both A1 and A3 emission on the frequencies 3500-3600 kc., the Far East Command has similarly opened up these frequencies for both types of emission for U. S. amateurs in all of Japan (J), the American zone of Korea (HL1AA-ZZ), Okinawa, Ryukyu Ids. (KR6AA-ZZ), Bonin Ids. (KG6IA-IZ), Marshall Ids. (KX6AA-ZZ), and the Marianas Ids. (KG6AA-AZ). Frequencies previously authorized by the Far East Command in this band were 3560-3660 kc., which the new figures replace.

RENEWALS

If you are still operating under a valid old-style FCC three-year license that has received successive extensions, both your operator and station license will expire on the 1948 anniversary of the date of issuance of the operator license. You are a candidate for renewal this year. We recommend that you make a note of your date, get your application blank in plenty of time, and send your papers into Washington two months before the expiration date. Don't forget to attach your old licenses.

I.A.R.U. News

(Continued from page 47)

of licensees. That is to say, citizens of the United States can use that band for contacts with the continental United States only, United Kingdom citizens may have communication with British Isles only, and citizens of Australia to Australia only.

Amateurs operating in this additional 'phone band will be required to observe the highest standards of equipment, emission and operating practice. Any violation may result in immediate withdrawal of the privileges.

Effective May 26, 1948, only Class A licensees may employ A3 emission in the 14,150-14,300 kc. band.

QSL BUREAUS

For best service on delivery of your QSLs to foreign amateurs, simply mail cards directly to the bureau of the proper country, as listed below. Do not send foreign cards to ARRL Headquarters except those for which no bureau is here listed.

- Alaska: J. W. McKinley, Box 1533, Juneau.
- Algeria: Via France.
- Argentina: R.C.A., Av. Alvear 2750, Buenos Aires.
- Australia: W.I.A., Box 2611 W., G.P.O., Melbourne.
- Austria: O.V.S.V., Kierlingerstrasse 10, Klosterneuberg.
- Azores: Via Portugal.
- Belgian Congo: P.O. Box 271, Leopoldville.
- Belgium: U.B.A., Postbox 634, Brussels.
- Bolivia: R.C.B., Casilla 15, Cochabamba.
- Brazil: L.A.B.R.E., Caixa Postal 2353, Rio de Janeiro.
- British Honduras: D. Hunter, Box 178, Belize.
- Burma: Via Great Britain.
- Canal Zone: Canal Zone Amateur Radio Association, Box 407, Balboa.
- Canton Island: Kenneth G. Neifert, KB6AD, c/o C.A.A., Canton Island, South Pacific.

(Continued on page 128)

TERMINAL IS YOUR BEST BET for FM, TELEVISION & TRANSMITTING ANTENNAS

ELINCOR FM Antennas are made of $\frac{3}{8}$ " aluminum tubing and furnished with steel pole for easy mounting. Especially high performance and sturdy construction.

200D	Straight dipole	3.49
200DR	Straight dipole w/reflector	6.43
200FD	Folded dipole	4.23
200FDR	Folded dipole w/reflector	7.17

AMPHENOL FM Antennas feature mast, swivel mounting bracket and mast head permitting adjustment in two planes. Strong and light, professional appearance.

107-114	Dipole antenna	3.23
107-113	Dipole w/reflector array	6.17

ELDEN FM Antenna, popular folded dipole with neat, neat and practical with 65 feet of 300 ohm twin lead.

#8320	Folded dipole	4.93
#8321	Reflector kit for #8320	1.93

AMPHENOL'S All-Wave Antenna out-gains best doublet. Combines FM dipole with broadcast and all-wave antenna. Complete with mast, base mtg. bracket, two separate lead-ins, all hardware (except guy wires), guy wire clamp installation instructions.

#124-001	17.69
----------	-------	-------

WARD folded dipole television antenna, complete with mast and 60 ft. 300 ohm twin lead.

TV-94	Folded dipole	7.05
TVR-92	Reflector kit for TV-94	3.79

WE ARE ANTENNA SPECIALISTS — Consult us on your antenna needs — we have them all for every application. Bring your antenna problems here to Frank Miller, W2BUS and Ed Mandelberg, W2OTV.

AMPHENOL "SIGNAL SQUIRTER"

AMPHENOL 140-005—The ultimate in deluxe rotary beam antennas is Amphenol's famous Signal Squirrel, dual 3-element beam for 10 and 20 meters. Kit includes Rotator (117 volts, 50/60 cycles) with double mounted pair Inductostubs assembly, Direction Indicator, center element, insulators and all hardware ready for installation. For economy in shipping; the center section is shipped with cross arms unmounted. Holes are drilled for assembly. The kit is complete ready for installation excepting the tower or other support, motor control wires and the open wire feed line.

35800
Net

AMPHENOL I-LITE Beam ANTENNAS

3E10F—3 element, 10 or 11 meter beam with cast aluminum supporting frame and cross arms $\frac{1}{4}$ " to $\frac{3}{8}$ " aluminum elements may be varied from 12 to 19 feet. Element spacing is also easily and quickly adjustable. Supplied with 5 ft. steel mast.....**32.83**

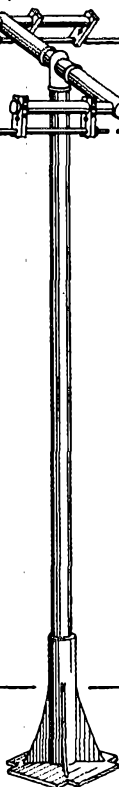
4E10F—Same as 3E10F but four elements.....**40.67**

ELINCOR Television antennas are constructed of $\frac{3}{8}$ " aluminum tubing tapering to $\frac{1}{2}$ ", fully adjustable for length and tilt. Supplied with 1" diameter steel mast. These antennas will give the finest performance possible both electrically and mechanically.

300D	Straight dipole	4.68
300DR	Straight dipole w/reflector	8.82
300FD	Folded dipole	6.44
300FDR	Folded dipole w/reflector	10.58
310FDR	Folded dipole w/reflector $\frac{1}{2}$ " tubing non-adjustable	9.05
250	13 channel Amy Aceves & King type for multi-band television....	17.64
250R	Same as 250 w/reflector	24.69
350SA	"H" stacked array—quality regardless of price	17.64
310SA	Similar to 350SA but $\frac{3}{8}$ " tubing at an economy price	12.64

SHUR Interceptor antennas are popular for dependable television reception. Supplied with $\frac{1}{4}$ " dia. wood poles, impregnated and treated for weather endurance.

I-62	A two element television dipole and director w/mast.....	5.58
ID-62	Same as I-62 but folded element..	7.35
DID-62	Deluxe folded dipole—two element—variable spacing	9.70
JID-62	Two element — folded dipole — simple and almost instant assembly	8.52
3E-62	"Hi-Gain"—3 element	14.11
SH-65	Stacked double "H" array.....	13.52



Most of the antennas listed here are more fully described in recent ads in QST and other radio magazines, but we'll be glad to mail you complete literature on any antenna in which you are interested.

Antenna ACCESSORIES AMPHENOL

300 ohm twin lead, per 100 ft.....	2.85
150 ohm twin lead, per 100 ft.....	2.37
75 ohm twin lead, per 100 ft.....	1.96
75 ohm twin, kilowatt, per ft.....	.07
For twin lead, screw eye standoff09
For Coaxial, screw eye standoff....	.09
For twin lead, polystyrene clip....	.09
Polystyrene Feeder Spreaders	
2" — 9c. 4" — 12c. 6" — 15c.	

SOLID ENAMELED Antenna Wire, per 100 ft.

#14—95c. #12—1.35 #10—2.10

SHUR MC pole mount for most poles of $\frac{1}{4}$ " diameter. Sturdy construction of cast aluminum, permits easy mounting on roof tops, sloping sides, straight sides, anywhere! Complete with universal brackets.**4.98**

(See illustration above)

ELINCOR 10 METER BEAMS

400 EA—3 element 10 meter beam, .1 wavelength spacing for director and .15 for reflector. Driven element is folded dipole for broader response and may be fed with 50 ohm coaxial. Furnished complete with aluminum ladder. Elements are $\frac{3}{4}$ " aluminum telescoping to $\frac{3}{4}$ ". Each element adjustable 14 to 18 feet. Wt. 17 lbs.**30.57**

400 BA—2 element 10 meter beam with .2 wavelength spacing. Designed to be fed with RGB/U or similar cable. Furnished complete with 7 ft. aluminum ladder. Wt. 12 lbs.**19.98**

200 EA—5 element beam for 2 meters. Folded dipole driven element. 3 directors and 1 reflector. All aluminum with steatite insulation.**8.23**



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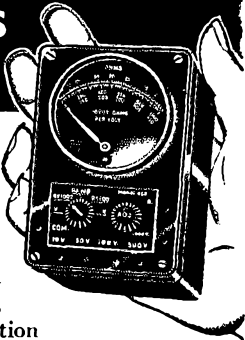



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- Chile:* Radio Club de Chile, Box 761, Santiago.
China: K. L. Koo, P.O. Box 409, Shanghai.
Colombia: L.C.R.A., P.O. Box 584, Bogotá.
Cook Islands: Ray Holloway, P.O. Box 65, Karotonga.
Costa Rica: F. Gonzalez, Box 365, San Jose.
Cuba: James D. Bourne, Lealtad 680, Habana.
Czechoslovakia: C.A.V., P.O. Box 68, Prague I.
Denmark: E.D.R., Box 79, Copenhagen K.
Domínica: VP2DC, Roseau.
Egypt: Box 360, Cairo.
Eire: R. Mooney, "Eyrefield," Killiney, Co. Dublin.
Ethiopia: ET3AF, P.O. Box 858, Addis Ababa.
Fiji: S. H. Mayne, VR2AS, Victoria Parade, Suva.
Finland: P.O. Box 306, Helsinki.
France: Service QSL, R.E.F., 6 rue du Pont de Lodi, Paris 6.
Germany: (D2 calls only) Capt. J. S. Howe, Entries and Exits Branch, 100 Hq. CCG (BE), Bad Salzuffen, B.A.O.R.
Germany: (D4 calls only) M/S A. R. Varney, OPM, EUUCOM, APO 757, c/o Postmaster, New York, N. Y.
Great Britain (and British Empire): A. Milne, 29 Kechill Gardens, Hayes, Bromley, Kent.
Greece: C. Tavaniotis, 17-A Bucharest St., Athens.
Greenland: 1385th AAF Base Unit, APO 858, c/o Postmaster, New York, N. Y.
Grenada: VP2GE, St. Georges.
Guam: G.R.A.L., APO 234, c/o Postmaster, San Francisco
Guatemala: Manuel Gomez de Leon, P.O. Box 12, Guatemala City.
Haiti: Roger Lanois, c/o RCA, P.O. Box A-153, Port-au-Prince.
Hawaii: A. H. Fuchikami, 2543 Namaau Dr., Honolulu.
Hong Kong: Hong Kong Amateur Radio Transmitting Society, P.O. Box 541, Hong Kong.
Hungary: A. Sass, Dohany-u 1/c, Budapest.
Iceland: Islenzkir Radio Amatorar, P.O. Box 1080, Reykjavik.
India: J. Nicholson, c/o Kanan Devan Mills Produce Co. Munnar P.O., Travancore.
Italy: A.R.I., Via San Paolo 10, Milano.
Jamaica: Thomas Meyers, 122 Tower St., Kingston.
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Malta: Via Great Britain.
Mauritius: V. de Robillard, Box 155, Port Louis.
Mexico: L.M.R.E., Apartado Postal 907, Mexico, D.F.
Montserrat: VP2MY, Plymouth.
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Newfoundland: N.A.R.A.A., Box 660, St. Johns.
New Zealand: N.Z.A.R.T., P.O. Box 489, Wellington, C.I.
Nicaragua: L. B. Satres, Bolivar Ave., 106, Managua.
Northern Rhodesia: VQ2DH, Box 93, Livingstone.
Norway: N.R.R.L., P.O. Box 898, Oslo.
Pakistan: Via India.
Palestine: P.O. Box 4099, Tel-Aviv.
Panama: R. D. Prescott, P.O. Box 32, Panama City.
Paraguay: R.C.P., Palma 310, Asuncion.
Peru: R.C.P., Box 538, Lima.
Philippine Islands: Elpidio G. DeCastro, Radio Training Institute, Manila.
Puerto Rico: E. W. Mayer, P.O. Box 1061, San Juan.
Portugal: R.E.P., Travessa Nova de S. Domingos, 34-1º Lisbon.
Roumania: Nestor, Box 326, Bucharest.
Salvador: J. F. Mejia, 7ª Calle Poniente #76, San Salvador.
South Africa: S.A.R.L., P.O. Box 3037, Capetown.
St. Vincent: VP2SA, Kingstown.
Sweden: S.S.A., Stockholm 8.
Switzerland: U.S.K.A., Postbox, Berne.
Trinidad: Edgar H. Borde, 52 Mucurapo Rd., Port-of-Spain.
Uruguay: R.C.U., Casilla 37, Montevideo.
U.S.S.R.: Central Radio Club, Postbox N-88, Moscow.
Venezuela: R.C.V., Apartado 1247, Caracas.
Yugoslavia: H. Oton, Ljubljana-Povsetova No. 1.

Following usual custom, the May and October issues of *QST* each year will carry the above list, with revisions and additions as necessary.

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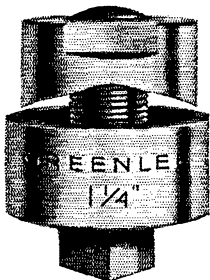


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TOOLS FOR CRAFTSMEN

GREENLEE



How's DX?

(Continued from page 54)

W3GAU can't get any sleep until some light is thrown on PX1V and PJ3X. W6BIL has been playing tag with PIBX, supposed to be a Dutch ship off the coast of FB8. And W6ZEN wants to know who the L is LL2NL whom he bagged on 20. FR3CE turned up to haunt W6ZCY; "QSL to Mr. Le Blanc, Post Office, Papeete, Tahiti." VE1EA makes the team with TL1A who gave his QTH as FTT! We think it rhymes with "Psst!" W1AH reports in with CZ1A on 14 Mc. and W2CYS donates a FPIC from 28 Mc. Golly, there hasn't been such a boom in the phonus-balonus section since the days of that 7-Mc. gadabout, PB4ICU, prewar. . . . From W6HG we learn that W6RLD has gone to put Tahiti on the air. One hundred watts, a States-beamed diamond plus an F08 call are planned. The man plans to inhabit the place permanently so we may all get a shot at him. . . . Military personnel in the French German Zone have been authorized limited operation using the D5 prefix. They can probably be reached through the REF. . . . This DA business over there is unauthorized stuff and until the air clears a bit there'll be no recognition of it in this pillar. Okay? . . . Well, that leaves us tidbitless until next time, gang.

Jeeves is all tuckered out calling CM2s in the Contest and has turned off the filaments. He made some uncomplimentary remark under his breath to the effect that he had just as good a chance with mental telepathy as he had with our heap. He must mean it, too — now he's in the corner with his thinking cap on! We must remind him of what happened to one of the local boys here, a Mr. C. W. Svengali. After 684 calls in the Test without results, Sven resorted to m.t. Did right well, he did, until he blew a concentration fuse trying to raise a ZD9. Then the men in white nabbed him for running over the legal will-power.

May V.H.F. Party

(Continued from page 58)

changes. This gives W1AQE 7 points (1+1+5=7) and also 3 section-multiplier credits. (If more R. I. stations are subsequently contacted on these bands they do not add to the multiplier but they do pay off in additional contact points.)

9) Each section multiplier requires actual completed exchanges with at least one station. The same section can provide another multiplier point only when contacted on a new v.h.f. band.

10) Award Committee decisions shall be accepted as final.

11) All reports must be postmarked no later than June 7, 1948, to be entered for awards.

Reporting

Submit contest logs to Headquarters immediately, even if your score is small, to help in cross-checking the claims of others. Use the contest log form shown in the example or, if time permits, write to ARRL for free ones.

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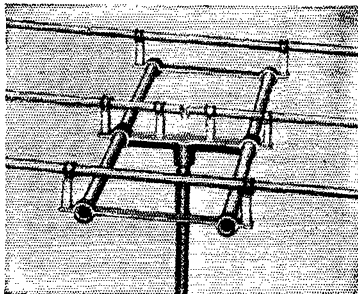
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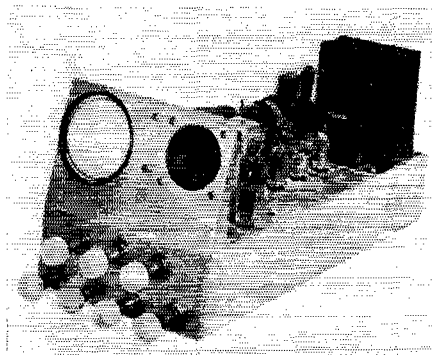


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Your QSL Manager

(Continued from page 59)

first VK and wanted to be sure the system was functioning so that he would get his card on time!

Allen's pet peeves are with the fellows who do not bother to send for cards at all, those who send an envelope without call or who fail to send postage, but these are more than offset by the many letters received complimenting him for his excellent work.

Although his employment at Patterson Field, his duties as QSL manager and his operating consume practically all of his time, Fred still finds time for color slides and movies and, in common with many hams, stamp collecting.

50 Mc.

(Continued from page 65)

Several other Mexican stations have been working the South American DX, including XE1A, XE1GE, XE1QE and XE2C. Most of the signals have a rapid flutter, but they are generally quite strong, though often not more than Readability 3 because of the flutter effect. It is interesting to observe that though XE1KE has worked OA, CX, and scores of LUs, he has as yet been unable to hear CE1AH. The great-circle path from Mexico City to Chuquicamata, Chile, passes almost directly through Lima, Buenos Aires and Montevideo.

With all this DX activity in Latin America, it would appear that there should have been something doing in other regions of the earth in similar latitudes, but only as we write has it begun to show up. Several stations in the Capetown area have been watching 50 Mc. regularly, and ZS1P has been carrying out his previously-established practice of checking m.u.f. and reporting his observations at 15-minute intervals on 28 Mc. for the benefit of the 6-meter stations of Europe. In the early afternoon of March 27th, Henry found the m.u.f. up to 50 Mc., and so reported, announcing that his 50-Mc. rig was partially dismantled, and that he would get it on the air as soon as possible. Thus, it fell to his brother, Charles, ZS1T, to make the first DX contact of the season, with G5BY at 1305 GCT, and to follow it up with one with ZB2A, believed to have been the first 50-Mc. DX worked from Gibraltar. Despite the daily sporadic-E DX in South America, the stations in South Africa report no evidence of such things on the African continent.

To check for possible DX conditions, a station signing PA1KWK is being operated automatically with 800 watts input on 52.59 Mc. at Kootwyk, Netherlands. It is on daily, except Friday, between 0715 and 1600 GCT, with the beam direction being shifted 90 degrees every 15 minutes, starting with north on the hour. A choice bit of DX on 6 is waiting in Java, Dutch East Indies, where PK2RK has 200 watts on

(Continued on page 134)

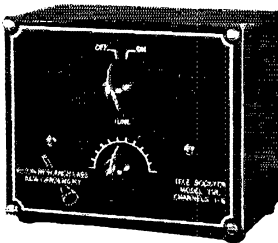
HARVEY *Has Them ALL*

Hammarlund FS-135C Frequency Standard—Makes your receiver an accurate frequency standard with marker signals every 100KC, includes low-drift 100KC crystal, 6AU6G tube complete instructions. Brand New . . . \$6.95
Order one or more spare tubes, 6AU6G . . . each 65¢



RCA Sound Powered Phones—Navy type, self contained, with necessary cords and plug, work up to 2000 feet over any 2-conductor wire; many uses around transmitter, home, barn. Brand New, in original cartons . each \$15.00
per pair \$24.50

TV components, kits and tubes of all makes in stock at Harvey's all the time. RCA coils and parts, Transvision kits, Vision Assembly kits, Teletron coils and transformers, Mallory Inducto tuners, RCA front ends, Essex RF power supplies and many others. Immediate delivery from stock, send your order for same day shipment.

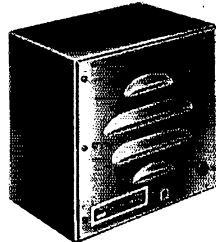


Tele-Booster—pre-amplifier for TV, boosts weak signals, improves contrast, often eliminates outside aerial. Completely self-contained with power supply . . . \$26.95

Type 1616 Tube: Half wave high vacuum rectifier. Filament 2.5 volts, 5 amps; peak inverse 5500 volts; peak current .8 amps; surge current 2.5 amps; average plate current .130 amps. List Price \$7.50. Harvey special price, while they last . . . 95¢



Crystals—You can't beat Harvey for crystals. Not off-frequency surplus but crystals right on your frequency, or within a few kc. 20-40-80 meter and 6 and 13 mc bands for only . . . \$1.00
Special 8 mc crystals for 2 meter xtal control, only . . . \$1.50
Also in stock, a complete line of Bileley AX-2 & AX-3 crystals. When ordering crystals only, include 10¢ postage with your order. All crystals mounted in holder with 1/2" pin spacing, lucite adapter for 5 prong socket . . . 35¢

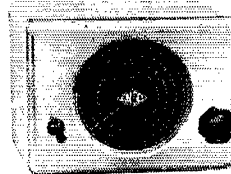


Signal Corps Model LS-3 Speaker—6" PM in rugged, crackle finish steel case, complete with self-contained output transformer to match 4000 ohm load. Originally used with BC-312-314-348 receivers. Ideal for many uses around the shack. Speaker voice coil impedance 6-8 ohms.
Harvey Special . . . \$4.95

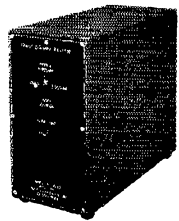
Spartan Hand Transceiver—144-148 mc, battery operated, good bandspread, stable, negligible frequency shift, low noise level, high sensitivity, retractable dipole antenna, weighs only 3 1/2 pounds, net price with tubes and batteries . . . \$38.12



Gon-Set Converter—6-10-11-15 meter bands in one converter without changing coils! 8 tubes, actually 3 separate converters in one with selector switch, large bandspread dial, output frequency 7 mc. Built-in power supply, net price . \$75.00



Millen Single Sideband Selector—Model 92105 as designed by J. L. A. McLaughlin. See article page 11, April QST. This is the miracle unit all hams have been waiting for. Use selectable single sideband reception and remove 95% of your QRM difficulties. This unit is an absolute must for our crowded bands. Can be used with any receiver with 455/456 IF. Use with other IF by changing the crystals to your IF \pm 50WC . \$75.00



Telephone:  Longacre 3-1800

NOTE: All prices are Net, F. O. B. NYC and are subject to change without notice.

HARVEY
RADIO COMPANY INC.

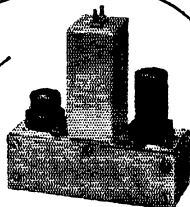
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NFM-73 for NC-173 \$17.95

IF YOU BUILD YOUR OWN:

SA: 4842 discriminator-transformer... \$4.50



50 **WAS** Mc.

Standings as of March 31st

W1CLS	44	W5VY	40	W9ZHL	43
W3CIR/1	42	W5ML	38	W9JMS	36
W1LLL	40	W5AJG	38	W9ALU	34
W1HDQ	39	W5JLY	38	W9QKM	33
W1CGY	38	W5FRD	38	W9ULA	30
W1HMS	36	W5ZZF	34	W9AB	23
W1JLK	35	W5FSC	34		
W1LSN	33	W5LIU	24	W0USI	45
W1CLH	32			W0QIN	43
W1CJL	30	W6UXN	46	W0ZIB	43
W1AF	27	W6OVK	38	W0DZM	42
W1NF	25	W6ANN	38	W0TQK	42
W1EIO	24	W6BPT	34	W0SV	42
W1EIL	21	W6IWS	32	W0BJF	42
		W6FPV	31	W0HXY	41
W2BYM	39	W6WNN	24	W0INI	41
W2AMJ	38	W6EUL	22	W0YUQ	39
W2IDZ	37	W6HZ	13	W0JHS	38
W2QVH	37	W6BWG	12	W0PKD	36
W2RLV	37				
		W7BQX	43	VE1QY	28
W3OR	35	W7ERA	43	VE3AN	27
W1KMZ/3	33	W7HEA	40	VE1QZ	24
W3MKL	33	W7DYD	37	G5BY	24
W3RUE	31	W7FDJ	36	VE2KH	19
W3MQP	15	W7FFE	35	VE2GT	14
W3GKP	12	W7KAD	35	XE1KE	13
		W7JPA	34		
W4GJO	46	W7QAP	30		
W4QN	40	W7ACD	27		
W4GIY	40	W7JPN	19		
W4EQM	40	W7OWX	15		
W4EID	38				
W4WMI	33	W8QYD	39		
W4FBH	31	W8RFW	25		
W4HVV	29	W8TDJ	22		
W4FJ	26				
W4FNR	25	W9DWU	46		
W4EMM	25	W9PK	43		
W4JML	20				

Note: This list covers states worked since March 1, 1946. Send in monthly reports of states worked in 1948 on 50, 144, 235 Mc. and higher, for entry in the 1948 Most-States-Worked Contest. See January QST, page 150, for details. Standings will be published when sufficient entries have been received.

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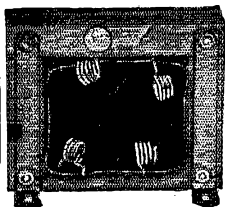
New small units now available at your favorite distributor. Model F 5069 delivers 24 volts at 3 amperes—\$3.90 net. Model F 5075 delivers 24 volts at 1 ampere—\$2.40 net. Other models for 12 and 24 volt operation.

Write for your free copy of the new STACO Relay and Transformer Catalog.

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Staco



50.48 Mc. And speaking of choice DX, Mr. DX himself, AC4YN, is reported by W1PPH/MM to be testing daily on 50 Mc.!!

As far as most Ws are concerned, the possibility of further F_2 DX seems rather remote. Across the southern part of the country there may be chances to work South America through the end of April, and the W6-KH6 path may be open during the same period, but most of us are looking forward to the spring and summer sporadic-E season, which should be the biggest ever this year. There is little doubt that more stations are now equipped for 50-Mc. operation than at any time since we have had the band, and few openings should go unnoticed. Then, too, the spring-summer-fall period brings the best tropospheric propagation, and there will be

(Continued on page 156)

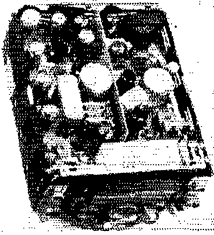
Starting Our

BC-645A—450MC
XMITTER-RECEIVER



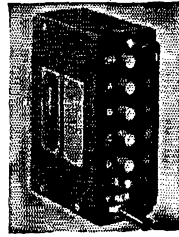
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Remote Control boxes for SCR-522's, Brand New in original packing; consists of 5 push button switches, 5 Western Electric Pilot Assemblies with Pilot Bulbs and Dimmer and lever switch, all finished in Black Crackle. Order yours today.

Only..... \$1.25
Antenna Plug 46-Ps-1 for 522A. Each..... 15¢

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- 1 Mfd., 750VDC. Sprague..... 15c
- 7 Mfd., 330VAC. G.E..... 98c
- 10 Mfd., 330VAC. G.E..... \$1.25
- 10 Mfd., 600VDC. Capacitron..... 98c
- 16 Mfd., 400VDC. W.E. Co..... 98c
- 2 Mfd., 1000VDC. Aerovox..... 69c
- 0.1 Mfd., 7500VDC. G.E..... \$1.50
- 2 x 0.1 Mfd., 7000VDC. G.E..... \$2.00
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- 5-0-5 Amps. D.C., Charge and Discharge Scale 2" Round. 69c
- 0-1 Amp. RF. G.E. 2" Round..... \$2.45
- 100 Amp—6 Volt D.C. 3" Scale, 4 1/2" Square, Gray finish, with shunt. A swell buy..... \$2.95

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- 5BP1, CR Tube 5" Green Screen. New..... \$1.45
- 832, Dual Beam Power Tetrode. New..... \$2.15
- 6J6, Twin Triode Miniature. New..... 50c
- 3C24, Triode, 100 Watt Power Output. New, ea..... 39c
- 10 for \$3.50

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- No. 10, Copper Enamel 100 ft. coils. Each..... \$1.75
- No. 12, Copper Enamel 100 ft. coils. Each..... \$1.25
- No. 14, Copper Enamel 100 ft. coils. Each..... 83c
- 300 Ohm. Twin Lead per 100 ft..... \$2.95
- 72 Ohm. RG-59-U Coax Cable per 100 ft..... \$6.75

CS—DIFFERENTIAL RELAY—S.P.D.T.

Dual Coil with Armature Pivoted between coils. All contacts normally open operates 220-250 volts. 8000 ohms each coil contacts Rated 2 amps @ 110VAC. Ideally suited for balanced or bridge type circuits where limited current or power is available.



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4MA D.C., 5 prong, plug in type, hermetically sealed. Brand New..... 95¢

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| 7 x 13 x 2..... 96c | 11 x 17 x 3..... \$1.86 |
| 5 x 10 x 3..... 87c | 12 x 17 x 3..... \$1.62 |
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| 10 x 14 x 3..... \$1.35 | All Black Wrinkle Finish |

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| 5 x 6 x 9..... \$1.41 | 11 x 12 x 8..... \$2.25 |
| 6 x 6 x 6..... 98c | 15 x 9 x 7..... \$3.35 |

Sloping Front Meter Case, Cut for 3 inch Meter. Size 4 1/2 x 4 x 4..... 92c

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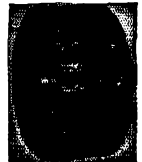
PANELS

Size	Steel	Aluminum
3 1/2 x 19	66c	\$1.38
5 1/4 x 19	87c	\$1.74
7 x 19	96c	\$2.15
8 3/4 x 19	\$1.10	\$2.25
10 1/2 x 19	\$1.22	\$2.87
12 1/4 x 19	\$1.46	\$3.38
14 x 19	\$1.62	\$4.10

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- .003 2000VDC Postage Stamp..... 5c
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 "QST" April, 1948



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Columbus Model 610 Converter...	79.50	McMurdo Silver 908 "Micro Match".....	29.90
Millen 90810 HF Transmitter.....	69.75	Elnicor No. 400EA —10 Meter Beam.....	31.20
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plenty of opportunities for interesting contacts when the band is not open for any sort of skip. We should not lose sight of the fact that this sort of work is really the heart of 6-meter operation, for this band is probably the best one we have for reliable QRM-free contacts over a 100-mile radius, and beyond. DX, whether it is F_2 or E_s , is lots of fun, but the reliability of 50 Mc. for working local and extended-local ranges should not be overlooked. Plan now to include 50 Mc. in your operating program — you'll be glad you did!

2-Meter News

Since there was no phenomenal DX worked on 144 Mc. during March there is little of a headline nature in the 2-meter news as we go to press. In the polarization argument, this department is taken to task in some quarters for having admitted that there may be some merit on the horizontal side of the question. A number of people have pointed out that the considerations which caused commercial interests to standardize on horizontal polarization are not necessarily applicable to amateur work. The numerous tests which have been made under commercial auspices have not been aimed at solving the most important problem with which we are concerned; namely, which polarization is most effective in working over indirect paths several hundred miles long?

There is no way we can expect to get the answer except through our own efforts. Digging through published literature will not help us much, for even there we can find conflicting evidence. We know from our own experience that there is no great difference — some mighty nice work has been done with both types of antennas. But we should find out whether there is any appreciable difference, and then we should all standardize on the method which can be demonstrated to be more effective. We should standardize anyway even if both polarizations are equally good. Somebody has to give way, and we will gain nothing by ill-considered statements which purport to prove that the polarization we happen to be using is best.

Both vertical and horizontal polarization have been given good trials, and both have proven effective. Both have their advantages. It must be admitted that for all-around work in heavily-populated areas, where one likes to be able to listen in all directions with equal effectiveness (high-gain antenna addicts will say "with equal lack of effectiveness!"), the vertical antenna is superior. Vertical polarization best serves the needs of the mobile station. More stations, unquestionably, are using vertical, and thus standardization on it would require less work.

On the horizontal side it may be said that, generally speaking, it is somewhat easier to get 10 db. or so of gain with a horizontal array than with a vertical. In really high-gain arrays there may be little difference, since any array which will provide 15 db. or more gain is bound to be quite a

(Continued on page 138)

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Collins 32V1.....	475.00
Hallicrafters S38.....	47.50
Hallicrafters S53.....	79.50
Hallicrafters S40A.....	89.50
Hallicrafters SX43.....	169.50
Hallicrafters SX42.....	275.00
Hallicrafters HT18.....	110.00
Hallicrafters HT9.....	350.00
Hallicrafters SP44.....	49.50
Hallicrafters S51.....	129.50
National NC33.....	65.95
National NC57.....	89.50
National NC173.....	179.50
National NC183.....	269.00
National NC240D.....	225.00
National HRO7.....	279.00
Hammarlund HQ129X.....	177.30
Hammarlund SP400X.....	398.25
RME VHF152A.....	86.60
RME HF-10-20.....	77.00
RME DB22A.....	77.00
RME84.....	98.70
RME45.....	198.70
Signal Shifter model EX.....	99.50
Bud VFO-21.....	52.50
Millen 90700 VFO.....	42.50
Millen 90800 exciter.....	42.50
Millen 90281 power supply.....	84.50
Millen 90881 RF amp.....	89.50

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Some prices slightly higher on the West Coast.

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construction job. In most locations the signal-to-noise ratio is likely to be better with horizontal, and this can be pretty important if one is working with weak DX signals in a noisy location. The horizontal systems lend themselves to stacking above other arrays for lower frequencies more readily, both mechanically and electrically.

These are all relatively minor arguments. None of them should be sufficient to keep any progressive amateur from changing his position if it can be shown that the change will improve his operating range. Can it be shown that horizontal is better than vertical when considered solely from the standpoint of the strength of the signal at a point 200, 300, 500 or 1000 miles away? We doubt it, but we'd like to know, and so would hundreds of other progressive v.h.f. workers. To find out we will have to try, and that's why we've been urging the boys in the East who have the facilities for doing so to give horizontal polarization a thorough and unbiased trial in the 2-meter DX season now just coming up.

RECORDS

Two-Way Work

- 50 Mc.: CE1AH — J9AAO
10,500 Miles — October 17, 1947
- 144 Mc.: W3GV — W0WGW
660 Miles — September 18, 1947
- 235 Mc.: W1CTW — W2HWX
210 Miles — October 12, 1947
- 420 Mc.: W6VIX/6 — W6ZRN/6
186 Miles — July 27, 1947
- 1215 Mc.: W3MLN/3 — W3HFV/3
12.5 Miles — September 24, 1947
- 2300 Mc.: W1JSM/1 — W1ILS/1
66 Miles — October 5, 1947
- 3300 Mc.: W6IFE/6 — W6ET/6
150 Miles — October 5, 1947
- 5250 Mc.: W2LGF/2 — W7FQF/2
31 Miles — December 2, 1945
- 10,000 Mc.: W4HPJ/3 — W6IFE/3
7.65 Miles — July 11, 1946
- 21,000 Mc.: W1NVL/2 — W9SAD/2
800 Feet — May 18, 1946

We need cooperative tests over long paths, wherein an array which has uniform performance in both planes can be rotated, while the station at the receiving end makes a similar switch. We need to do this many times, under varying conditions, over divergent types of terrain, and over different distances. We cannot put up a 12-element horizontal array after having used a vertical folded dipole, and then claim that the results obtained prove the superiority of horizontal. We cannot even take a 4- or 5-element parasitic array and rotate it from vertical to horizontal, for it may well prove to be better in the horizontal position. We will have to use some sort of array which has a uniform number of elements in both planes, the simplest being made up of two half-wave dipoles side by side (or one above the other depending upon whether

(Continued on page 140)

ECONOMY LINE

OF POWER SUPPLY COMPONENTS

#15634 POWER PLATE XFMR

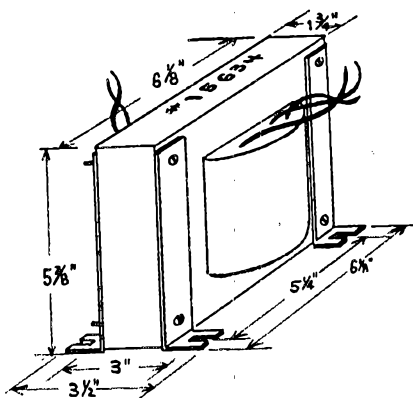
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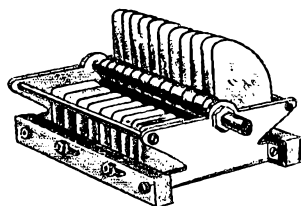
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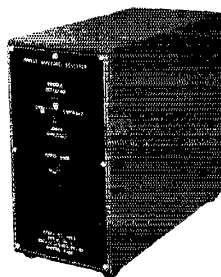
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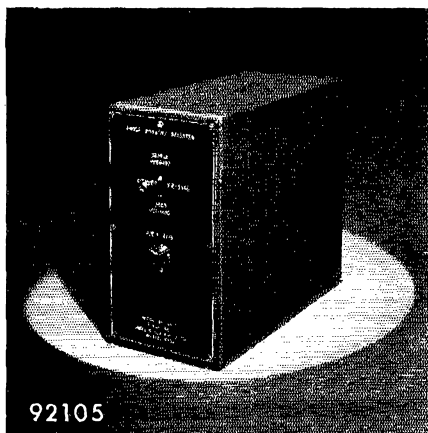


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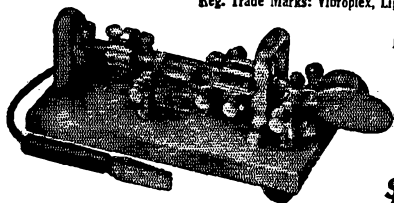
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it is vertical or horizontal) a half-wave apart. Two such arrays, backed by reflectors, would be a logical test set-up. A 12-element array (three above three, backed by reflectors) would be good, as would the 32-element (four high, four wide, with reflectors) jobs now in use at some of our better stations. Until we have tried at least this much, let us not be shouting about which polarization is best!

In reporting results of such tests, let's be sure we have *all* the facts! The gain of the systems used for both polarizations should be known, and the types of arrays used at the other end also. And we should be sure not to let one big night sway us into believing that "this new antenna is it!" In reporting activity of any sort be sure to mention which polarization you and others in your area are using. Not all of us can put up a bunch of antennas, and a lot of newcomers want to know how to start off.

Around the Country on 144 Mc. and Higher

Halifax, Nova Scotia — VE1QZ has heard no W signals on 144 Mc. since last fall, but he is ready to go when conditions are right. He will be active most nights during the spring and summer, and if not actually in communication he will leave an automatic transmitter running when conditions are promising. He asks that we make it known that, if the automatic is heard, it means that he will be on for DX QSOs later in the evening. He has an ARC-5 converted for 6, 2 and 1 1/4, and is getting gear together for 420 Mc. also. Polarization is vertical, except on 50 Mc.

Orlando, Fla. — Will we sweep the Atlantic Seaboard on 144 Mc. this summer? Florida activity to this end is being furnished by W4GJO and W4NEE, the latter having a 16-element vertical array and p.p. 24Gs in the final. They are considering changing to horizontal. Contacts are made with W4EID, Jacksonville, and some of the gang in Tampa. Other Jacksonville stations include W4s JMU, IPL, RU, FBL and K4NAR.

Altoona, Penna. — Ten members of the Horse-shoe Radio Club are active on 145.26 Mc. nightly at 6:30. All use vertical dipoles for the local work, but several have horizontal beams for DX: W3RFM, 3-element; W4KQD, 4-element; W3LQD, 6-element. W3LJQ says that the club will operate from a high location on Field Day, with a 522 and 6-element array hoping to work at least to Pittsburgh and Mechanicsburg over the mountainous country in both directions.

Sacramento, Calif. — W6PIV reports that the operating range has held up to at least 100 miles consistently, with occasional contacts up to 200 miles or more. W6YLO reports reception of stations in Los Angeles and Van Nuys, a distance of more than 360 miles.

Louisville, Ky. — A cup is being offered to the member of the Louisville Amateur Radio Transmitting Society working the best 2-meter DX this year. Twelve stations are active, with conversion to crystal control gaining headway.

(Continued on page 142)

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723A/B.....	3.95
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15E.....	UHF Triode.....	2.95

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250R.....	4.95
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24G.....	UHF Triode—Plate Diss. 25W.—2000V. at 75 ma. good up to 300 Mc.69
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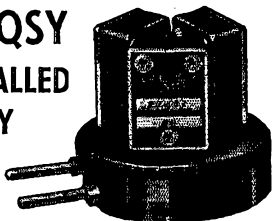
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Richmond, Va. — W4FJ says that several stations are using broad-band converters built by W4JFU and W4CYW. W4CLY, Cape Henry, Va., worked W4HVV, Raleigh, N. C., more than 160 miles distant, on March 7th. W4HVV has a 100-watt rig, 8-element array, and a new converter employing a 6J4 r.f., 6J6 mixer, and a crystal-controlled oscillator. Polarization in that area: horizontal.

Columbus, Ohio — W8WRN reports that the gang gets on 144 each Monday night, with W8s UZ, AER, YBF, YHQ, ZHS, CCS, UJV and WRN usually active. Polarization is vertical, but a swing to horizontal is in prospect, primarily on the strength of the results obtained by W8NBM, Cambridge, Ohio, who is working into Akron and Cleveland, the latter about 100 miles.

Sequim, Wash. — W7BQX ponders the DX records of other sections of the country and wonders whether openings are possible in the Pacific Northwest. Distances of 85 to 100 miles are easy, with their 16-element vertical arrays, but nothing has been heard much beyond this. Wait until late summer and early fall before you give up, Ernie.

Portland, Ore. — Horizontal-vertical tests are being conducted over the Portland-Albany-Corvallis route, a 70-mile hop, according to W7DIS. The Snake-Eye Net operates nightly on 146.25 Mc., with 100% reliable coverage up to 50 miles, and with nearly solid communication up to 90 miles. In the Portland area are W7s AVV, BQD, CUJ, DDG, DNB, DIS, ENU, GAN, GJY, HIK, IIA, JGY, JPQ, JRZ and VT; in Vancouver, GFZ; in Salem, BVV; in Albany, OU, SO and ESY; in Corvallis, GLN, HUY and JMW; and Richfield, Wash., JNQ. Most stations are using 522s, with hopped-up receivers. There are five 16-element arrays, one 24-element, and numerous eight-, six-, and four-element jobs, at this writing all vertical.

Roanoke, Va. — W4CA reports that W4JFV and W4KQC took portable gear to a 4000-foot elevation west of Roanoke and worked into Richmond and Norfolk, 160 and 200 miles respectively, despite adverse weather conditions. Roanoke is now represented on 144 Mc. by W4s KQC, ISA, CYK, JXE, KAK, BTL, KPZ and CA, most of whom are able to work over the mountains to Lynchburg, about 50 miles distant. The DX record locally is held by W4JXE, who has worked W4FJ, Richmond, more than 150 miles to the east.

Houston, Texas — W5FSC says that W5SM, Beaumont, 75 miles, and W5DDJ, Galveston, 48 miles, are consistent signals in Houston. W5NCD, Port Arthur, 82 miles, and W5BD, Angleton, have been worked with strong signals when conditions are good. W5s IGL, KFY, BHO and FSC are all set for the 50-Mc. DX season. FSC has gear for 235 Mc., but no signals have been heard.

Beaumont, Texas — The best 2-meter DX reported since last fall has to go undated for the present. W5SM has worked W5LOW, W5NIF, W5EXO, W5IFU and W5AQK, all of Corpus

(Continued on page 144)

The Radio Amateur's **HANDBOOK**

The twenty-fifth edition of the *Handbook* is featured by the complete rewriting of the material to give a more understandable discussion of those basic facts that an amateur should know to get the most out of constructing and using his apparatus. Owners of previous editions will recognize immediately that the over-all plan of the book has been changed — achieving, we believe, the object of segregating the material so that it can be most conveniently used. A great deal of new equipment has been constructed especially for this edition. As always, the object has been to show the best of current technique through equipment designs proved by thorough testing. As the art grows, the problem of presenting a representative selection of gear grows with it — a state of affairs that is reflected in an *increase of well over a hundred pages* in this edition. New chapters on ultrahigh frequencies, station assembly, and the elimination of interference to broadcasting have been added to round out the treatment of all phases of amateur radio. The material on operating has likewise been greatly expanded. Altogether, this revision is the most comprehensive of recent years.

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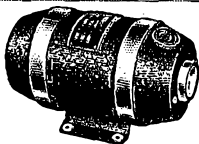
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The Carter Super Converter is a small, fan-cooled unit for changing DC to AC. Weighs only 13 lbs. Ideally suited for radio equipment, PA systems, wire and tape recorders, etc. For 85 to 100% Power Factor, noninductive loads only. Ball-bearing equipped. Models from 40 to 250 watts AC output, 12, 24, 32, and 115 volt DC input. 6-volt input models from 40 to 150 watt AC output. Write for new Bulletin No. 447 and name of authorized Carter distributor.

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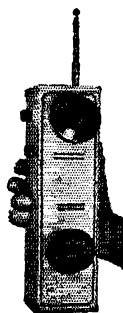
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8 BANDS
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3.5-148 Mc.

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Mc. using
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hour batts



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Christi, more than 250 miles down the Gulf Coast, within the past two months, but he gives no date or time. He lists a total of 43 stations worked in Angleton, Houston, Beaumont, Port Arthur, La Porte, Orange and Galveston, which looks like things are rolling on 144 Mc. along the Gulf Coast.

Rockville Center, L. I., N. Y. — On the afternoon of March 15th, between 4:15 and 4:30, W2CHK heard a station on 156 Mc. signing GOQ and sending Vs. He was S3 on m.c.w. Does anyone know who GOQ might be?

Stratford, Conn. — Activity on 420 Mc. is picking up along the Connecticut shore. W1PBB, W1IYO, W1JKC and W1JW operate on 420 in conjunction with their 2-meter work, and have stirred up interest on Long Island in this way. W1JW has an APS-13 receiver and p.p. 2C44s for transmitting. W1IYO also receives with the APS-13 and has a pair of 8012s in the transmitter, as does W1JKC. W1PBB uses the oscillator-mixer section of an APS-13 as a converter, working into a 30-Mc. i.f., and has a pair of 2C44s for transmitting. Down at Rye and Port Chester, N. Y., are W2BAV and W2RH. Schedules are kept each Sunday at 12:30 p.m., but no two-way work has yet been accomplished over this path. Polarization is vertical at present.

Yarmouth, Nova Scotia — VE1QY, encouraged by his success in working Ws on 144 Mc. last fall, hopes to do it on 420 this spring and summer. He and VE1DW have APS-13s working, and will have beams directed at New England whenever conditions appear good. An all-water path, this one may be good for some surprising distances down the Atlantic Seaboard on 420.

In this connection, it is almost certain that propagation conditions will be more favorable as we go higher in frequency. We know that there are many nights when 2 is hot for tropospheric propagation when 6 is only slightly above normal. On good nights, the signals on 144 Mc. from points 300 miles or more distant hit levels never encountered on 50 Mc. Thus, 220 Mc. should be better than 144, and 420 superior to either. The stumbling block, however, lies in the development of comparable equipment for the higher frequencies.

Results on 144 Mc. really began to develop as soon as we had some efficient transmitters and sensitive and selective receivers. These features come somewhat harder on 220 and 420, but they are not impossible. The key which will eventually unlock the door to greater DX will be the development of sensitive low-noise receivers, and these will come only when we know how to build good r.f. amplifier stages.

The simple mixer-oscillator, as in the APS-13, is no problem, provided it is used with a wide-band i.f., and even such an arrangement is well ahead of most superregens, but it will take some r.f. gain, and a more selective i.f. channel to get the performance we need. Let's hear how these problems are being solved!

One way of getting the r.f. gain was demon-

(Continued on page 148)

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In the greatest purchase of radio transmitting crystals ever made by one wholesaler in the history of the Radio Parts Industry, Sun Radio acquired title to over a half million dollars (\$500,000.00) of Army Surplus, precision built, exactly tooled crystals in moisture proof holders which are shock mounted. Please note that crystal shipments of 6 or less are packed in cloth containers to expedite handling. . . . No worry because all crystals are shock mounted and guaranteed delivered perfect. All crystals have Army M.C. markings on ratings but Sun encloses directions for deriving the correct fundamental frequency in kilocycles.

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413	422	430	438	446	463	470	481	491	498	507	518
414	423	431	440	447	466	472	483	492	501	508	519
415	424	433	441	448	468	473	484	493	502	509	522
416	425	434	442	451	474	485	494	503	511	523	
418	428	435	443	453	475	487	495	504	512		
419	427	436	444		477	488	496	505	515		

49¢
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I.F. Frequency Standards	Crystal Frequency Standards	For Crystal Controlled Signal Generators
kc kc kc	98.356kc	525kc
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451.388 455.856 464.815	kc standard. Mounted	527.777 533.333 537.500
452.777 459.259 465.277	in loss 3 prong	529.166 534.722 538.888
	holder.	530.555
99¢ each	\$3.89 each	99¢ each

ASSORTED MISCELLANEOUS CRYSTALS	FOR HAM AND GENERAL USE
Fractions Omitted	Fractions Omitted
370kc 376kc 381kc 384kc 387kc	390kc 395kc 402kc 405kc 408kc
372 377 383 386 388	391 396 403 406 409
374 379 385 388 391	392 397 404 407 411
375 380	393 398
	394 401
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 • Crystals are shipped packed in cloth bags inasmuch as they are shock mounted. All shipments guaranteed.

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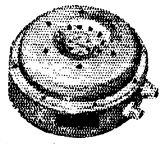
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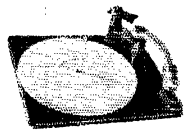


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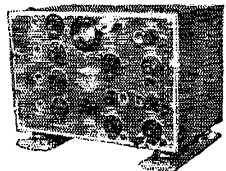
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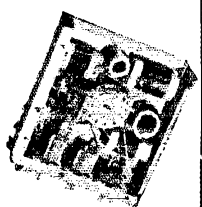
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These can be easily converted to 20-40-80 meters. Crystal required for 10 meters. Each electronic coupled oscillator dial has 3000 divisions enabling quick precision shifting. This transmitter was constructed of the highest quality of precision parts, with laboratory precision. Four separate output tanks; one 4-position selector channel switch having seven sections which changes the ECO, IPA and output tanks simultaneously. — BRAND NEW, complete with tubes. . . . **\$49.95**



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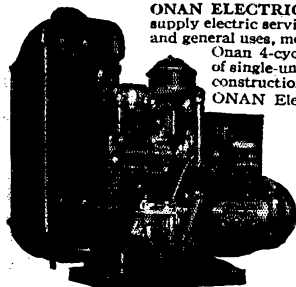
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146

strated to the writer recently by WIPMS and WICTW. The former has a 1 $\frac{1}{4}$ -meter converter employing a push-pull r.f. stage with a 6J6 operating, not as a grounded-grid amplifier, but as a neutralized grounded-cathode stage. It looks good, and we hope to have more dope on it soon.

Hints & Kinks

(Continued from page 89)

S-501. Connect the right-hand terminal of *S-501* to ground. Connect *R-510* between the center terminal of *S-501* and the coil-socket prong from which the ground lead was disconnected. Connect *C-515* between this prong and ground. The unit is now modified for oscillator keying.

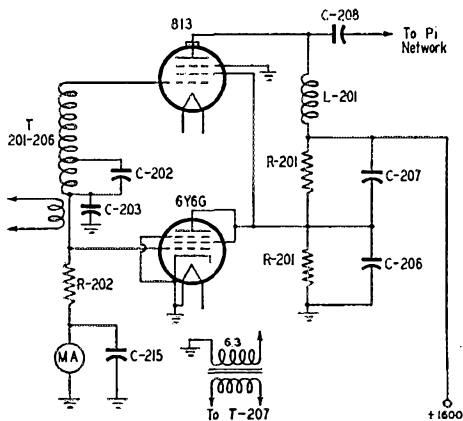


Fig. 6 — Adding a "clamper" tube to the screen grid of the 813 amplifier of the Meissner 150-B for c.w. operation. The 6Y6 holds screen voltage to a reasonable value when the key is open, preventing it from soaring to almost the full plate-supply voltage.

To correct high screen voltage on the 813 with the key open, an adaptation of the screen-clamping system used in the 813 amplifier described recently in *QST** was used, as shown in Fig. 6. It was found necessary to retain the voltage-divider resistor to improve the voltage regulation. In my case the 6Y6 is mounted horizontally below the chassis near the 813 socket. Screen voltage will be of the order of 200 to 300 volts with the key up after modification, and over-all operation is much improved.

— Bob M. Simmons, WØARH

* Smith, "A Stabilized 813 Amplifier," *QST*, February, 1947.

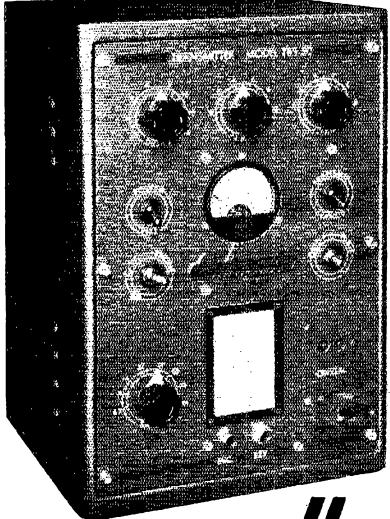
Modulation Monitor

(Continued from page 72)

tubes of types other than the 2051 are used. Next, apply the carrier and tune *C₇* for maximum meter reading, then move the pick-up lead around until the meter reads near full scale. Now *R₁* can be set for any desired percentage of modulation and the neon bulb will flash when that modulation is reached or exceeded. If you are a stickler for

(Continued on page 148)

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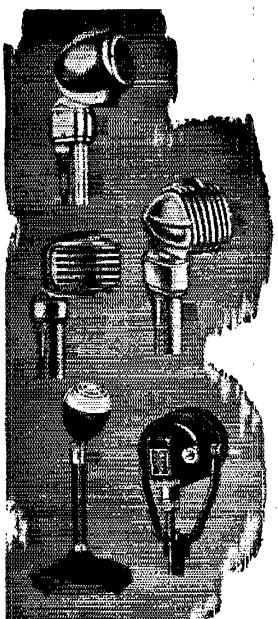
Tnx, Jim Clemens, for those kind words. What you have said, has been echoed by hundreds of satisfied hams throughout the country.

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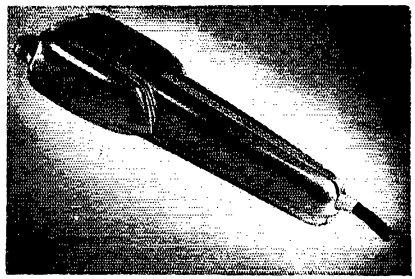
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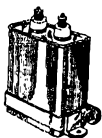
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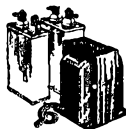
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accuracy, you might apply sine-wave modulation to your transmitter, adjust it for exactly 100 per cent as checked with a 'scope, set R_1 for 100 per cent and then adjust R_5 until the neon bulb just flickers. With the rough adjustment described earlier, the bulb may flash at about 95 per cent. Luckily, the error is in the legal direction and is of small magnitude.

The only caution in regard to adjustment is in connection with the point where the r.f. is picked up. If r.f. is picked up from some stage ahead of the modulated stage, the meter cannot flash at 100-per-cent modulation, because the r.f. can never reach zero as it should, at the negative modulation peak. Once the thing is adjusted it probably can be operated indefinitely without readjustment. Mine has been operating for 18 months and is still accurate enough so that it isn't worth adjusting it. Perhaps when tubes are changed, adjustment should be made.

This instrument flashes the neon bulb when the modulation down-peak reaches the selected percentage. The instrument could have been designed to operate on up-peaks, but it was thought that "negative"-peak indication would be more desirable. Inequality between "negative" and "positive" peaks can be seen by motion of the meter when the carrier is modulated (carrier shift). A slight flicker of the meter occurs when a strong peak causes the grid of V_2 to go positive and draw some grid current, but this is accompanied by a flash of the bulb, warning that the modulation is excessive. Correction of the modulation corrects the slight flicker.

The DX boys should find good use for this gadget because it will give them means of keeping the modulation right up there, and at the same time warn them when excessive modulation is taking place.

Correspondence

(Continued from page 73)

thirty seconds simply because the other fellow got my number OK on this first sending, tapped his bug and broke in. I did the same. The exchange was over one-two-three. Full break-in will do more to eliminate QRM on the bands than anything else. With it you know immediately (with the exception of very weak DX) whether the fellow you're calling is still listening or has come back to someone else, and instantly you can stop and thus eliminate whatever QRM you may be causing. There are many more decided factors in its favor. . . .

—Charles C. Fuller, HC1ES, W6ZVL, ex-W9DUP

SWITCH TO SAFETY

Washington, N. J.

Editor, QST:

Perhaps the following will persuade more of our fraternity to stop taking unnecessary chances.

On the evening of Jan. 28th I got a bad shock and burn from tuning my antenna where I thought there was no voltage. However, my clip for high voltage (2000 v.) leaned over and touched the antenna link, making it hot. Then in pulling the clip off the antenna coil, I moved that coil enough to make it touch the link. With my left hand against the grounded relay rack I got the full 2000 v. into my right fingers, through my arms and out of my left palm. I stiffened

(Continued on page 160)



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right up and the only thought I can remember was, "This is the end." The next thing I can remember was myself on the floor kicking at the 115-volt switches on the panel, trying to turn them off. However, in falling to the floor I had pulled out the plug which fed the transmitter, so the line voltage was shut off already and the danger was over.

My wife, who had been present when it happened, said I was trying to reach the switches with my hands before I started kicking. The whole experience was a terrible shock to her. I have some very sore fingers on my right hand which keep reminding me that even though one may think everything is safe, it may not be! It is safe only when the high-voltage switch is off. Here is my resolution, forced upon me the hard way.

1) Make everything in front of the panel safe to touch with the switches on.

2) Never touch anything in back of the panel or the antenna with the high voltage on.

I hope some of my ham brethren will profit from my experience. Even though you don't care whether you live or not there are others who want you to stick around.

— Arthur E. Fliegau, W2RZO, ex-W3BGL

THE NEW LOOK

General Delivery, Millington, Tenn.

Editor, *QST*:

Your editorial entitled "The New Look" in February *QST* was read with great interest here and I'm sure glad to see Headquarters plugging for a narrower i.f. for selectivity. I myself cannot understand why hams want finer audio quality, etc., when the percentage of completed QSOs would really go up if we had receivers using double conversion and a super-sharp selective i.f. If the major receiver manufacturers would look in that direction in place of "h.c. quality" in their design, the ham bands wouldn't seem so crowded after all.

— C. W. Wade, W6MKL/4

1923 "N" St., N.W., Washington 6, D. C.

Editor, *QST*:

Ever since hearing about a mercury-trough delay line in radar work, I've been wondering if there weren't other "electromechanical" systems that might replace our usual networks made up of impedances purely electrical in origin. In other words, why not find various solutions, emulsions, suspensions or simple compounds which have a sharp cut-off frequency characteristic? It would seem that certain ionic resonances might be possible (in solutions) at usable frequencies. Possibly a system of suspending charged particles in a sort of jelly or soft-flow plastic could be made to have a chosen-frequency characteristic.

Now these are wild ideas, of course, but has anyone ever tried them? Here at Carnegie's Department of Terrestrial Magnetism I asked one of our senior staff members about it and he said, "Now that's an idea, and it might be a good one." So what, so what? Just thought I'd get the idea out of my head by telling somebody. Maybe you can kick it around.

— Don Gleason, W3MVT

POWER

30 Broad Street, New York, N. Y.

Editor, *QST*:

As one of those whose honesty W2POC's power gripe on p. 64 of February *QST* was intended to shame, I just wonder if maybe he hasn't a little sour grapes or just doesn't stop to figure economics. I paid more for Audiotrons and even UV202s than 450THs cost this winter. After all, they are nice tubes and handle well, so why pass up an opportunity just because someone can't believe 450THs are efficient at a half kw. and actually as cheap, dollars per cold watt (surplus), as we have ever had. They are!

— J. A. Stobbe, W2WZ

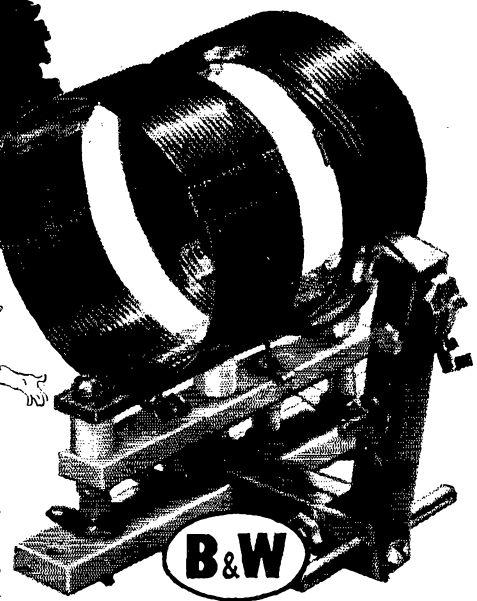
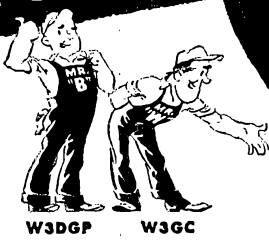
Route 2, Box 501, Lodi, Calif.

Editor, *QST*:

Several hams in W6 have worked out a deal whereby the hams of England send us the names of honestly-needy people
(Continued on page 152)

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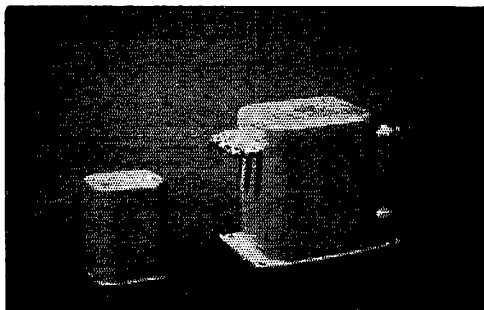
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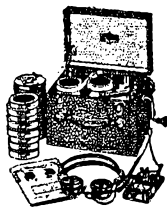
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— W. J. Erich, W6AL

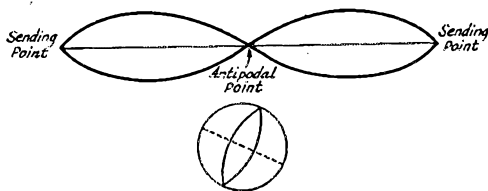
BEAM PATTERNS

Blue Bell, Pennsylvania

Editor, QST:

Your comment at the foot of W7QC's "Hints and Kinks" item, page 48, December QST, crystallizes a thought I've had for some time.

The center line of any beamed signal goes straight to the antipodal point and back to the starting point around the globe. As any line leaving the starting point will pass through the same antipodal point, the distance in feet across the extremities of a signal beam at its point of origin will be the same, roughly, at the antipodal point. Therefore the pattern is not one of constantly-expanding width, indefinitely, but one something like this:



Thus it should behoove us to be much more careful in aiming fixed arrays at stations near our antipodal points, since a slight error might completely nullify our efforts.

Perhaps it would be clearer for some if it were said a little differently: Up to 6250 miles from your station (halfway to the point exactly opposite you on the globe) your beam pattern is as advertised, but from this position on to the 12,500-mile point it narrows down again. It is exactly the way the longitudinal lines run on your globe between the North and South Poles — expanding toward the Equator and narrowing toward each pole.

— John B. Morgan, W3QP

[Editor's Note: Before too many start to worry about their antennas, it should be pointed out that, while the geometry of Mr. Morgan's letter is correct, in practice dispersion effects tend to reduce the strict accuracy of the beam and it never does focus back to a pin point at the antipode.]

PREMIUMS

4529 N. Greenview Ave., Chicago 40, Illinois

Editor, QST:

... Listening on 10 'phone I heard a VE calling "CQ British Isles — the first Britisher to QSO me gets a free Christmas basket." If this is ham radio, goodnight! Why not offer \$50 or so, especially to hams in a country where food is short? Just think of the fun that VE could have bragging that "my WAC cost \$8783 and a new car." I don't remember the call of this particular ham and I'm not so upset by one incident, but I hope sincerely that not many fellows are like this.

— Milton G. Hawkins, W9SRO

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St. Johannsring 132, Basle, Switzerland

Editor, QST:

... I have the intention to begin next year (1948) a round-the-world tour which will last 5 years. Some Swiss newspapers and magazines have assured me their assistance. I have not much money; however, I must have lodgings all over the world. I will visit New Orleans, St. Louis, Salt Lake City, San Francisco, Portland, Seattle, Vancouver, Juneau, Cordova, Seward, Anchorage, Fairbanks, Norman, Edmonton, Churchill, Winnipeg, Toronto, Buffalo, Pittsburgh, Baltimore, Washington, Philadelphia, New York.

— Harry Walser, HB9K D

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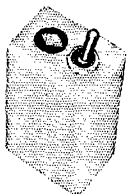
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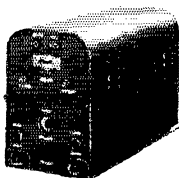
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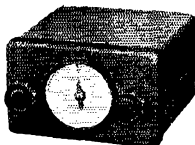
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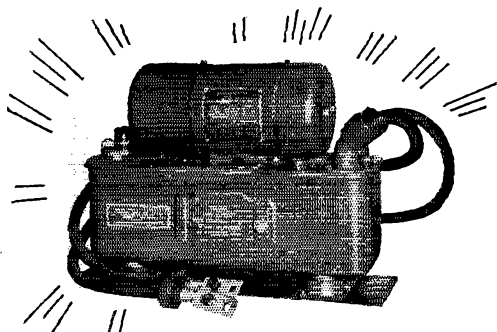
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QUARTZ—Direct importers from Brazil of best quality pure quartz suitable for making piezo-electric crystals. Diamond Drill Carbon Co., 719 World Bldg., New York City.

QSLs, 100 for \$1.50. Stamp for samples. Griffith, W3FSW, 1042 Pine Heights Ave., Baltimore 29, Md.

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AMATEUR radio licenses. Complete code or theory preparations for passing amateur radio examinations. Home study and resident courses. American Radio Institute, 101 West 63rd Street, New York City.

QSLs, Kromkote cards at fair price. Dauphinee, W1KMP, Box 219, Cambridge 39, Mass.

DON'S QSLs: "Leaders in the Field." Samples. 2106 South sixteenth Ave., Maywood, Illinois.

PATENT attorney, Registered U. S. Patent Office, Electronics, mechanics, chemistry. I. Jordan Kunik, 75-S Pearl, Hartford, Conn.

WANTED: Early wireless equipment, and literature prior to 1925. Franklin Wingard, Rock Island, Illinois.

SUBSCRIPTIONS to all radio magazines. Earl Mead, Huntley, Montana, W1LGM.

CRYSTALS: Precision low drift units. Type 100A in 80, 40, and 20 meter bands. Two units plug in one octal socket. Plus or minus 5 Kc. One dollar each. Exact frequency. \$1.95 ea. Rex Bassett, Inc., Ft. Lauderdale, Fla.

ERECO Beam Rotator, 110V Ac., heavy duty, variable speed, selsyn indicator, weatherproofed. Complete indicator and rotator ready to plug in, \$69.95. Satisfied users all over the country. Buy from your dealer or direct. Free literature. Dick Rose, Erecro, 2912 Hewitt, Everett, Washington.

FOR SALE: Practically new Collins 30-K transmitter and HRO-7. Complete. Used as demonstrator only. Kolp, 2209 Azle Ave., Fort Worth, Texas.

10-METER Beams, \$19.50. Send card for free information. Riverside Tool Co., Box 87, Riverside, Illinois.

MEISSNER 150B xmtr., used one month, signal shifter, tubes, spares; f.o.b. Franklin, New Hampshire, \$240.00; Collins KP4BR, Box 257, San Juan, Puerto Rico.

RESISTORS: popular sizes up to 2 watts: \$2.00 per kit of 100 Precision (IRC) 1 watt wirewound $\pm 1\%$ (1.0, 0.5 megs, 40¢ ea.) (0.1, 0.15, 0.2, 0.25 megs, 50K and 30K ohms, 30¢ ea.). Tubes (6AG7, 6AC7, 2050, 6SN7, 6SL7, 6K8, 6N7, 6SK7, 6H6, 35¢ ea.) (VR75, VR105, 50¢ ea.). No orders out of USA accepted. Chalmers A. Klink, Box 122, Verona, Ohio.

QSLs. Design your own, at regular price. Plastics, Bristol, suede and other stocks. 600 cuts, stamp for samples. Reber Print, R.D. 1, Sewell, N. J.

BC-348-J, N, Q OWNERS. Special Service Manual now available. Contains schematic, wiring diagrams, alignment, etc. Martin, 3516 Sacramento, El Paso, Texas.

WANTED: old wireless gear from 1905 on up. State condition, price, details. W1CPI.

DIRECTION indicator kit, consisting of remote magnetic compass indicator, 360 degree transmitter, and instructions. Requires 6-12 volts, 50 Ma. battery or rectified D.C. Price: \$4.50. Add 25¢ for postage in U.S. W. C. Newman, 1728 Hood, Wichita 3, Kansas.

SELL new Wilcox F3 receiver with coils and tubes, fourteen dollars. Wanted: clean RME-69. Harold Miles, W2JKB, 204 Sherman Ave., NYC.

ALL new: power supply 2000/2500 volts 400/500 ma. Thordarson, UTC, Kenyon, Cornell parts cost \$127. Also Class B modulator 250THs, 600 watts audio handles KW Class C including Masco 50-watt speech amplifier, UTC driver, parts cost over \$200. Complete on chassis. Best offer. W5DA, 4425 Bordeaux, Dallas, Texas.

CW Men: double your operating enjoyment with Duomatic keying. Automatic self-completing dots and dashes. Instant speed change. Twelve to fifty WPM. Write for data. Electronic Signal Devices, Ruth Bartlett, Box 283, San Carlos, Calif.

NATIONAL FB7A built-in preselector 80, 40, 20 coils, two sets new blank coil forms and 8" PM speaker, less power supply, \$20. Also S-47 UTC 1000-1250-1500 @ 300 miles plate transformer, \$15 both f.o.b. Montgomery, Alabama. W4KWG, Gunter Air Force Base, Quarters 427-C.

QST file with most years complete, running back to May 1924. Will be sold for best offer. List, description and details free. Houghton, 39 Green St., Jamaica Plain 30, Mass.

MEISSNER 150-B complete original condition. No changes made. Spares, \$200 W1HPS, Earle H. Williams, 34 Heath St., Somerville 45, Mass. Som. 6-6536.

NEW HQ-129-X with speaker and tubes: \$147.50. Full factory guarantee. Ralph Barnett, Engr., Radio Sta. WEW, St. Louis University, St. Louis, Mo.

WANTED: IP501A with or without loading attachment, SE1420 or SE143 receiver. W9DHJ, Crown Point, Ind.

FOR Sale: complete ham station and various surplus equipment. Including PR-16 receiver, Constant converter, mobile tone xmtr, disc recorder, Jensen sound equipment, power packs, rectifier stacks and much more. Inquiries answered promptly. F. F. Knapp, 1316 N. River, Glendive, Montana, W1LXD.

SELL: BC348 converted to 110 Vac. Less power supply, low frequency band. Used 48 hours. \$50. Edward Richards, 266 No. Auburn, Grass Valley, Calif.

STURDY Munzig 4" Polystyrene line spacers, 12¢ ea. plus c.o.d. Earle Curtis, 942 E. Central Ave., Redlands, Calif.

QSLs, SWLs. Samples. W1HJI, Cushing, P. O. Box 32, Manchester, N. H.

RA-20 Power supply for BC-312, \$6.95; New J-36 bug key, \$4.95; QSTs, 1937-1940, others, \$2.00 year, 25¢ each. W3EEH, 6117 Webster, Phila., Pa.

SINGLE sideband: "crystal filters, Nomographs, Group III", using surplus crystals. Lattice, T, and single-element broadband, not the familiar receiver type. Full information, one dollar postpaid. Satisfaction guaranteed. Nomographs, Inc., Lawrenceville, N. J.

ARR-5 receiver, 27-150 Mc, new, \$60. W1CLS, 82 Marianne Rd., Waltham, Mass.

WE rewind burned out transformers reasonably. Guaranteed. Frampton Transformer Shop, Box 109, Blackwell, Oklahoma.

FOR Sale: Sonar XE-10 N.B.F.M. exciter, like new, used 15 hrs, \$34.50. Also inductograph, Senior, with 10 tapes and oscillator, used 3 mos, \$25.00. Robert Sanford, W5OCX, 1705 Independence, Conway, Arkansas.

RME-45 with Cal-O-Matic dial, in A-1 condition. First \$100 takes it. Robert Banks, W8KOS, 455 Fulton, E., Grand Rapids, Mich.

ALMOST complete run QSTs, Jan, 1920-Dec. 1940. A few in the "Ban Off!" 1919 period. Will consider offer partial or complete file. Excellent condition. J. D. Ogle, R.F.D. Avon, Conn.

SELL or trade: BC454, BC455 receivers BC458, BC459 transmitters, all converted. Want Millen VFO 90700. State price and condx. W9FGZ.

WANTED: Aluminum case for BC-221-AA. Must be in excellent condition. C. R. Kendall, Rt. 2, Box 128, Elmhurst, Ill.

WANTED: 80-meter coils for Wilcox CW-3 receiver. Robert Kell, 3410 Clarendon, Louisville, Ky.

SELL or trade: New Mark II transceiver and complete equipment, except antennas. T. Rule, 117 Myrtle, Boston, Mass.

COLORTONE QSLs! Outstanding! Ask the Ham who uses 'em! Color-tone's new cartoon QSLs are "nifty". Reasonable, tool color-tone Press, Tupelo, Miss.

SALE: RCA III, 16-tube receiver, with S meter and speaker, \$75. G. McClellan, 706 Summerlea St., Pittsburgh 6, Penna.

BEST offer: ARRT, Hallicrafters airborne S-36, range 27-144 megacycles. RF, AF gain controls, S meter, BFO, coax input for antenna. Panadaptor, FM and AM all frequencies, converted for 110 VAC operation with power supply and can be converted to 2 meters. In original carton. Used about 3 hours. General radio absorption type wavemeter, Type 758A, range 55 to 400 megacycles, direct reading, lists \$28.00. All above equipment excellent condition. Will consider trades. W9ONO, McKinley, 6149 N. Ozark Ave., Chicago 31, Ill.

BC-610 exciter deck for sale. Excellent condition. Particulars/Best offer f.o.b. W2COV, 220 Bird Ave., Sidney, N. Y.

T-23/ARC-5 with tubes, less crystals, \$10. Conversion data available. W2GVF, 98 Bodine, Staten Island, N. Y.

FOR Sale: SX-24, in excellent condition. New tubes, with speaker, \$55. ARR-5 like S-36, like new, bass boost phono input 27.5 to 149 mc/s. \$105. W9BYG, 1635 Farwell, Chicago.

SACRIFICE: New Meissner deluxe signal shifter, model 9-1090, all coils, slightly used. First \$80 takes it. W. Z. Ferguson, W5LCK, Kosciusko, Miss.

WANTED: Manual BC223AX transmitter, W9OZV

BC348-Q, used six months. External Kenyon power supply. Best offer over \$55. W4MVM, Saraland, Ala.

SWAP Hallicrafters S-38 receiver, used two weeks. Good as new. Will exchange for Abbott TR-43 or similar transceiver. Grady Wood, Rt. 1, Box 141, Jacksonville, N. C.

SELL: Hallicrafters S-40 with S-meter, in excellent condition. \$75, or trade for VHF, 152A. Wanted B.C.-221. J. P. McAtee, 1615 Terrace Way, Bakersfield, Calif.

MOBILE power, p.m. dynamos, 6, 12, 24 v input, no internal changes. 6.3V gives 240 v, 100 Ma. continuous. Rated 12-24 v to 500 V. New, guaranteed, with data. \$4.50. F.o.b. W2SVG, 375 Oak Place, Mineola, L. I., New York.

304TL's, p.p filament xfrmr. New, cased, tapped primary, at cost. Five dollars. W2HMA.

TRANSMITTER: 100-watt CW. Band-switching (no plug-in-coils). 80-40 meters. All stages metered, VFO, voltage-regulated. Complete with power supply, a commercial job. \$125. Also have 30-watt xtal xmtr 80-40 meters complete with separate power supply, coils and xtal: \$30. Larry Steeg, 22 West 91st St., N.Y.C.

QSL'S. Get us from Powell, W0DGH, 2005 N. 3rd Ave., Minneapolis 5, Minn.

WANTED: Pierson KP-81, receiver. Ross, 2105 East 35th St., Brooklyn 10, N. Y.

WALKIE-Talkies: operate on 10-meter band, 28-52 Mc. Complete with battery, tubes, handset, ready to operate, \$45 each. Also civilian "Handy Talkies" operate on 144-148 Mc. \$34.50 each. Robert G. Harris-11336 W. Chase Ave., Chicago 26, Illinois.

WANTED: Howard J40 receiver in good or serviceable condition. W. Kirsch, Box 792, Spangler, Penna.

FACTORY custom-built phone xmtr, one kilowatt, seven foot rack. Completed January, cost \$1400. Gordon rotator with direction-finder, forty foot steel tower, Hallicrafters SX-28A. Will accept best offer or trade for property. W2MWW.

1 KW transmitter: lineup: Temco 75GA, final Pr. 250TH, Pr 0L6 in speech amplifier, Pr 100THs in modulator, 7 meters. Coils for 80 and 10. Temco 75GA is new and so is final, etc. 5 power supplies. B&W butterfly condenser in final. Absolutely complete KW. Nothing else needed. Comes with 6 units and one power transformer. Reason for selling: going to college. Cost \$900. Will sell for best offer over \$600. F.o.b. W9VEO, 365 No. Ohio, Martinsville, Indiana.

FOR Sale: Approved FM tuner. Sensitivity 10uv/m, only \$45. Howard E. Van Winkle, 20 Peoples Drive East, Troy, N. Y.

FOR Sale: like new, in perfect condition, SP-44 Panadaptor, \$37.50, National 1-10 with speaker and AC power supply, \$75. Hallicrafters HT-17 with 40-meter coil, \$40; National NC-100ASD rcvr complete but for speaker, \$50. Must sacrifice. Will pack carefully and ship F.o.b. Brooklyn, W2AOM, 1600 West 5th St., Brooklyn 4, N. Y. Phone Dewey 9-1614.

SUPPER-Pro, SP-400X cabinet, mounted, used short while, in new condition. Power supply and speaker, \$250. WIMP, Ervin, Crandell & May, 356A Longwood Ave., Boston, Mass.

SUPREME AF-100 transmitter. Like new, HQ-129X, good condition. Will sell separately. Make reasonable offer. W2TWK, 61 Hart St., Brooklyn, N. Y.

QSL'S SWLS? Super-gloss stock! No cheap trash! Samples, 10¢. QSL Printer Salkers, W8DED, Holland, Mich. "One-day QSL Service" (Veteran).

TRADE: complete 9 volume set Steinmetz Electrical Engineering library in brand new condition for Simpson signal generator, Model 415A, or Supreme AF-RF oscillator, Model 561, or Hickok AM-FM signal generator, Model 288X. Instrument must be in perfect condition. W0HJ, 724 No. Crescent Heights, Blvd., Hollywood 46, Calif. FOR Sale: Brand new National 183 with loud speaker, used three hours. \$200 cash. Reason: need the money. Irv Fishelberg, 223 Pacific Ave., Atlantic City, N. J.

SELL VHF152 converter, slightly used. \$70. Hallicrafters SX-28 rcvr, used, but in good condition. Needs alignment, \$120. Stancor model, 110C phone/cw xmtr, 100 watts, with tubes, some coils, \$40. Fred Manion, W3DIL, 905 W. First St., Oil City, Penna.

SELL: National 1-10 receiver, all coils. \$35. With matching speaker and cabinet, \$38. W2WHK, 175 Delaware St., Tonawanda, N. Y.

SELLING out: RME HF-10 receiver, excellent condition @ \$155; Sonar XE-10 NBFM unit, not used, @ \$35; Radio City volt-ohm milliammeter @ \$15; Par-Metal cabinet, back-top hinged doors, 36" x 21" x 15" grey crackle finish @ \$15; 700-volt power supply, parts mounted but not wired, Kenyon transformers, circuit ARRL 747 Handbook, fig. 1316, room on chassis for screen-grid bias supply with holes punched, fig. 1315A, sacrifice at \$30. Alan Stein, 552 Parkside Ave., Brooklyn, N. Y.

MICROWAVE receiver SPR-2A, 1000-3100 Mc 115 V AC 60-2600 cps, 15 tubes, 30 Mc, i-f 10 Mc, band-width, plug-in L-O and mixer, video and audio outputs, tuning meter. Like new, with instruction book giving circuits, shock mounting, and 50-ohm 1000 Mc high-pass input filter. \$175. C. P. Smith W1PMJ, 34 Linneau St., Cambridge 38, Mass.

GON-SET 6-15 3-band converter for unexcelled reception, 12" bandwidth complete with built-in power supply and 8 tubes, \$75. Shipped same day. Murray Black, W6UVF, 839 N. June St., Hollywood, California.

WANTED: Jensen JAP-60, JHP-52, A-12 True-Sonic P52FR, or similar speaker. Harry Gingrich, 4613 Derby St., Harrisburg, Penna.

FOR Sale: NC-200, practically new NC-200. Available at sacrifice price, \$175 cash. Will not ship unless at your expense. Dr. W. C. Miller, 4 Bushdill Rd., Winchester, Mass.

PANELS for any QST design. Gupin, Box 638R4, Mt. Clemens, Michigan.

IN Stock: new and used Collins, National, Hallicrafters, Hammarlund, RME, Millen, Sonar, Meac, other receivers, transmitters, parts, etc., at lowest prices. Terms financed by us. Reconditioned S-28, \$35.00; S-40, \$59.00; SX-28, \$139.00; SX-42, \$199.00; HQ-129-X, \$139.00; SPC400-X, \$249.00; NC-240C, \$119.00; HRO SR, \$119.00; RME-69, \$79.00; RME-45, \$119.00; SX-25, SX-24, SX-16, SX-28A, S-36A, NC-46, NC-100A, NC-173, other receivers, transmitters, etc. Shipped on ten days trial. Write: Henry Radio, Butler, Missouri.

SELLING Out: radio service equipment, 800 tubes, bench, all test equipment. Parts, less than net. W0AQI, Howard Burton, Creston, Iowa.

QSL'S! Quality cards priced right. Samples. Beam rotators, propeller pitch changing mechanisms. Descriptive sheet free. W9UTL, 1768 Fruitdale, Indianapolis, Ind.

GENERAL Electric Model 51 wire-recorder. Cost \$600. Ideal for experimenter to make work. Price \$100. Curtis, W5AQC, c/o KREC, Longview, Texas.

FOR Sale: BC610E ECO on 10, 20, and 75. Works beautifully, 750 to 850 v. Guaranteed, with data. \$4.50. F.o.b. C. Sherman, 115-16th Ave., Belmar, N. J.

SELL QST'S: complete from January, 1937 through December, 1946. Make offer. W5ATD, 2605 N.W. 15th St., Oklahoma City 7, Okla.

PHONE transmitter for sale. 250-watt, 10-meter, rack mounted, complete with speech amplifier and ECO. Also D820 Preflector and lot of extra tubes, \$200 complete. C. Deppen, 2634 Fairview Ave., Reading, Penna.

SELL: High fidelity tape recorder. Brush sound mirror. Like new. J. Ridgway, W9GKH, Milledgeville, Ill.

FOR Sale: Meck T60 transmitter, complete with coils, for 10-10-80 M. Best offer over \$75.00 takes it. Shipped collect. J. R. Doherty, WAFRR/4, Station WHLF, South Boston, Virginia.

GET on 2M immediately with this TR-4. Complete including AC power, mike, coax, antenna. Swap for 6M Gonset or make offer. W2M0E.

TRIPPLY receiver racks IFT-220A for 274N. New, \$1.50 each, post-paid. No C.o.d.s. Re Aircraft, 1733 Allerton, Whittier, Calif.

FOR Sale: 470-watt Class B modulator complete with high gain speech amplifier and all other supplies 6C6 -56-56-2A3-2A3-ZB120A (1. B. All Thordarson components, inclosed in steel cabinet. Also RME-69 receiver and speaker. Both \$150.00 F.o.b. New York City. W2IID, Sid Berg, 237-31 Fairbury Avenue, Bellerose 6, L. I., N. Y.

TEMCO 250 GSC xmtr for sale: 250-watts phone, CW, ICW, 2000 through 16,000 Kc. Complete with mike, most spare tubes, 70-in. water-cooled cabinet, remote control panel, manual. Operating on 75 meters at W8QKC. Continuously variable master oscillator or crystal controlled. Photos, description on request. \$400 f.o.b. Wingard, 3706 Sutherland Road, Shaker Heights, Ohio.

SELL 900-watt fone/c.w. xmtr, coils 80-40-20-10, Millen exciter to 812 to Pr. VT127s. Plate mod. Pr 805s, speech compression. Enclosed six foot gear cabinet, fully metered, complete relay control protection, spare tubes, dynamic mike. Selling because joined navy. P. O. Box 1131-A, Austin, Texas.

SWAP: BC221 with calibration book for Amertran transformer (110V, 60A, Pri. 4400 V, 700 Ma. Sec.) or equivalent. W2EXX, 58 Birch Place, Buffalo 15, N. Y.

SELL: 50-watt c.w. transmitter absolutely complete with power supply, antenna tuner, tubes, etc. \$75.00. Robert Gardner, W2VIV, Fulton, N. Y.

FOR Sale: New surplus BC-344D, 150 to 1500 Kc receiver. Used 5 hours, \$55.00. Hallicrafters S-20R, 1 year old. \$60 or best offer. Joseph J. Wormser, 5833 California St., San Francisco 21, Calif.

AN/APR-4 receiver, 38 to 4000 Mc, 110 volt, 60 cycle AC, TN-20 less panel and side plates. Excellent condition, \$125.00. Hallicrafters HT-7 frequency standard, \$15.00. Bud VFO-21, 40 meter coils, \$30.00 A. F. o.b. Detroit. Bob Cross, 13725 LaSalle, Apt. #105, Detroit 16, Michigan.

USE those surplus rig sockets! Plugs for BC-348, 434; 522, 274 (also 2215/4" flexible shaft) 223, 375, others, 20¢. W6ZIJ, Wolfe, 2638 Benvenue, Berkeley 4, Calif.

BEST offer takes untempered SX-42. No speaker. W3TLH, Susquehanna University, Selinsgrove, Penna.

NATIONAL 240-D. Latest model with separate vernier logging dial. Perfect condition. Used only four months. Externally wired coaxial line and fitting for panadaptor. Special factory alignment of IF and Xtal. Best offer accepted over \$180.00. Reason, bought 75A. W0CVU, P. O. Box 234, Cedar Rapids, Iowa.

HAMMARLUND HQ-120-X \$100.00. General Radio 726A, VTM, 1150.00, Millen VFO \$32.00. National, power supply SP1607 for HRO receiver, \$15.00. All above like new, scarcely used. New Triplett 2432 signal generator, \$65.00, also some microwave parts. John Sutter, 2465 Knapp, Brooklyn, N. Y.

SELL: RME-45, Calomac, speaker, excellent, \$140.00. Howard, Model 450, 12-tube rcvr, speaker, \$40. Both sets completely realigned and in top operating condition. Wang Gonset 10-meter converter. H. Sayers, W9NZS, 6804 Northwest Hwy., Chicago, Illinois.

QST'S: September 1930 through 1946, complete. \$35. Edith Rotch, W1ZR, Nonquit, Mass.

SELL Sonar VFX 680 complete, working, fine. Prepaid \$75. Browning E-35, complete with power, less meters, f.o.b. \$45. E. Kelly, W6BSZ, 208 Congress St., East McKeesport, Penna.

BC-348R converted to AC, \$50. W. H. Grant, 35-40 82nd St., Jackson Heights, N. Y.

SELL S40-A, \$60. Trade: S-40A for S-53. W9BAY.

WANTED: Best Kw transmitter \$1000 will buy. Prefer factory built job but will consider good custom job. For something really exceptional and a bargain, will pay up to \$1500. Please no junk, but if you have something really good, write W7ALO, Route 4, Box 336, Salem, Oregon.

W2KYV, Hank Fank, is at your service in Harrison's Jamaica Branch!

QSL'S, SWLS. Newest designs, finest stock. Fairest prices. Fastest service. Write W9BHV, Dossett, QSL Factory, 857 Burlington, Frankfort, Indiana.

SIGNAL shifter, nearly new, 5 bands, power supply, will guarantee. \$80. W2OZS, Tribes Hill, New York.

SX28A, latest production model, with 10-meter improvements. Excellent condition. Best offer over \$125. W1PTE, Bill Robinson, Box 1015, Williamstown, Mass.

SUPER-PRO, Model SP-400-X rcvr, complete, 54 to 30 Mc., \$265. C. Horn, 325 East 163rd St., New York 56, N. Y.

QSLs, SWLs. Write McEachron, 1408 Brentwood, Austin, Texas, for samples of distinctive cards.

USED juke boxes, at prices hams can pay for a good home record-changer. This includes a big 15-inch speaker and a good 20-watt amplifier. All changers are in good working order. For information on prices and type, write WPHHB, 2455 Eaton St., Denver, Colorado.

TECHNICAL manuals, fifty cents up. WIQL, 86 Bohemia St., Plainville, Conn.

WANTED: Enclosed relay rack. State size, condition and price. Don Henrie, 1206 East 7th St., Plainfield, N. J.

SELL pair Eimac 4-125Aa, new, never used. \$20 each. W6KEV, Rt. 1, Box 185, Acampo, Calif.

TRADE: HT-9 transmitter, post-war model, coils, xtals 10-11, 20, 40, and 80 meters for F2 Leica or Contax camera or \$275. W6AOE, Moreno, Riverside Co., Calif.

METERS, new Simpson 0-50 MA Sq. case, like Triplet Model No. 327, \$2.49 ea. Also Rotary beam mountings like Premax, RBM46 but heavier frame, weather-proof bearings, guaranteed. Price: \$6.95. Acme Radio Supply, 516 Quincy Street, Topeka, Kansas.

ALMOST brand new National NC-240-D with speaker, \$175. HC10, perfect, complete, \$695. Dumont 208 oscilloscope, \$100. Kodak Medalist, \$50. RME 152 converter, \$70. John Sutter, 2465 Knapp St., Brooklyn, N. Y.

FOR Sale: BC-348-P, excellent condition, 110v AC, \$65. David Dill, 1513 York St., Sheffield, Alabama.

QSLs, SWLs. Fritz, 1213 Briargate, Joliet, Illinois.

WANTED: Radiola 60 and RCAM 96-1-2 receivers in working condition. Will pay any reasonable price. Farley 140-35-58 Road, Flushing, L. I., New York.

HAMS: Experiment 777 Transvision kits, ready wired, \$159. Radio Hospital, 113 Factory St., Trenton 9, N. J.

SX-28, excellent condition \$137; SP44 Panoramic Adaptor, new, \$39.50; BC348Q, 110 A.C., new, \$65; Six BC690-A (3-4 mc), good, \$6.50 each; new tubes: 810, 813, \$5.00 each; 250TH, \$10.00; 100th, \$7.00; microphones, D104, new, \$10.00; Brush crystal BA-106, new, \$7.50; Shure crystal Stratoliner, 708-A, excellent, \$8.00; 3500 Kc mounted xtals, 75¢ each. E. L. Sielke, W3YQ, Box 6000 Torredale, Philadelphia 14, Penna.

SELLING Supreme AF-100 transmitter, new condition, complete \$325. James Knight, frequency standard, \$45; Miller R-9-er with power supply, \$20. Write Joe Tabor, 20420 Riopelle, Detroit, Michigan.

NC-240-D with speaker. Used less than two months. Perfect. First \$170 takes it. James Leonard, 21 College Avenue, Salem, Va.

WASHINGTON area only: 250 mill 750v choke input, power supply on breadboard, complete \$25. 150-watt p.c. 807 amplifier containing screen power supply, 3 large meters, tubes and coils for 80 through 10 meters. Link input, output, \$30. Bonner, W4MXP, FA 4736.

NEW, different QSLs, stationery, envelopes. Quality printing. Prompt service. Samples, 10¢. Walker, W0OKI, Bartlett, Nebraska.

CRYSTALS: Fine commercial units for SCR-522's, police, taxi, aircraft, marine, geophysical, and other services. Commercial regrading; many crystals can be economically reground to new frequencies. Inquire. Over twelve years of satisfaction and fast service! Try us first. Eidson Electronic Co., Temple, Texas.

VHF-152A, DB22A, Bargain! W8ZTV, Box 218, Holland, Mich.

BEAM motor 110V. AC-reversible Hi-Torque 1/4 RPM. No free swing. Flat mounting surface. Light Weight. Sturdy. Brand new. Surplus. \$5.95. Postpaid in U.S. Alvaradio, Dept. SI-1, 903 S. Alvarado, Los Angeles 6, California.

WIRE recorder (Pierce) for sale. Ideal for ham operators. Complete with headphones, telephone coil and 2 cartridges. Bell & Thorn, Inc., 4259 So. Western Blvd., Chicago 9, Illinois.

\$100 takes all Steel mounted 200 watt phone transmitter; 150-watt modulator, mtr. phone. Tube communication receiver. All my spare parts. Sidney Kaufman, 3023 Mondawmin Avenue, Baltimore 16, Md.

FOR Sale: 600-watt c.w. rig. P.P. 100TH final, and NC 101-X rcvr. Both for \$200. All inquiries answered. Fred Galla, W2LSN, 780 Garden St., Bronx 60, N. Y.

PATTERSON-16 communications receiver with speaker, \$55.00. Good condition. Wong s, Bend, Oregon.

SELL: BC-348-0, 110v AC, noise limiter and added audio stage. \$55. FOB, R. H. Maverman, 235 Ravenwood Ave., Rochester 11, N. Y.

DON'S QSLs, leaders in the field. Samples for stamp, 2106 South 16th Avenue, Maywood, Illinois.

41 Model SX-25 with speaker, fair condition, \$65; Howard 435, fair condition, \$12.00. Swap new type JA, JB, JC, JD general coverage HRO coils for band spread type A, B, C, D. Pay difference. "Doc" Childers, W5ATQ, 2100 Commerce, Dallas 1, Texas.

SELL: Back QSTs, new condition. 1932 and 1933 unbound; 1934 to 1944 inclusive bound, \$45 lot. F.o.b. W3KB, 214 Runnymede, Jenkintown, Penna.

NC-101-X receiver, \$75. Douglas Phelps, Sidney, N. Y.

QSLs, SWLs. Sample free. DeLuxe, 10¢. W6KXL, Meade, 1507 Central Ave., Kansas City, Kans.

NC-173 for sale. Latest model. Original carton. Used four months and in excellent condition. Complete, \$167.50. W1KC, 240 Moreland St., Worcester, Mass.

BARGAINS: new and used transmitters, receivers. Collins 32B, \$75.00; RCA-ACT-20, complete, \$75.00; 60-watt phone, \$99.00; 75-watt, \$120.00; RME-45, \$99.50; SX-28, \$149.00; RME-69, \$79.50; HRO Senior, \$149.00; many others. Large stocks! Trade-ins. Shipped on approval. Terms financed by Leo, W6GFC, Write for catalog and best deal to World Radio Labs, Council Bluffs, Iowa.

HEARING aids make wonderful miniature transmitters and receivers. Reconditioned 3-tube Zeniths, others, complete, less batteries. \$20. Shelby Instrument Co., 321 West 7th St., Long Beach, Calif.

FOR Sale: SX-35 and PM-23 speaker, perfect condition, \$80. Larry Chilton, 2900 Alton Road, Fort Worth, Texas.

FOR Sale: \$300.00: 300-watt rack and panel transmitter, completely metered. Clipper circuit, 812 final. Grey wrinkle finish. Pome. Cw. very stable. All cable wiring, excellent condition. W9OB, 1010 Ironwood Drive, South Bend, Ind.

QSLs for discriminating hams. Distinctive Colorful New Satisfaction guaranteed! Stamps for samples. Firman, W7JFX, 6338 23rd S.W. Seattle, Washington.

WANTED: Factory transmitter, Collins 32V1, Supreme model AF-100, HT-9. W9GLR, Box 14, Mason City, Iowa.

POWERFUL beam motors, operate from 110 V. 60 cycle, gear reduction to 1 R.p.m., schematic furnished, only 200 available, \$3.95. New TUSB's with case, \$3.95. Harris Radio & Sound, 136 South Commercial Street, Steubenville, Ohio.

HQ-129-X with 100 Kc. crystal. Standard and ceramic oscillator trimmers, \$155. E. P. Sadler, 90 Chippewa Rd., Tuckahee 7, N. Y.

SELL-buy-trade: Have Superior 450 tube tester, used 4 months. Want Frecklon E-200-C or similar signal generator; tube tester; cash. W. H. Batur, Ouywood, Kentucky.

NOMOGRAPHs: Send for free catalog and samples. Nomographs, Inc., Lawrenceville, N. J.

QSLs, Samples, Albertson, W4HUD, Box 322, High Point, N. C.

WANTED: APR-5A and APR-4 receivers and tuning units, also other VHF gear, for cash or trade. Charles Littell, 222 Lonsdale Ave., Dayton 9, Ohio.

SURPLUS new 6-volt dynamotor starting relays exact PE103 replacement heavy duty contacts, weatherproof, complete with copper cable connectors, \$1.75. VT127A transmitting tubes HK and Eimac, 2 for \$5.00, heavy duty micas Sangamo F1 0.0047 ufd 2000 volt WKG 8 amps, 3000 Kc. \$1.00; 2 for \$1.75; maps of USA or world, 50¢ ea. 38 1/2" five colors, 75 cents, both, \$1.25. All items postpaid. Powell, W2PLB, 68 Loyal Road, Clifton, N. J.

TRANSFORMERS: 1875-1560, Centertap, 1560-1875, 325MA, 28 lbs. \$14.50. Spear Engineering Co., 3003 121st St., Toledo, Ohio.

SALE: 5" scope converted BC-412, 4 ufd, 3000 v. condensers, SB94 H.V. supply, many other parts. A. Sorensen, 814 4th Ave., Bristol, Penna.

FOR Sale: Hallicrafters S20R, perfect condition, \$50. George Greenstein, 2532 University Ave., New York City, FO 5-4493.

TRADE: Kilowatt phone c.w. transmitter, complete, for late model Contax or Leica camera. Also trade test equipment, RME-69 receiver, parts, for camera equipment, Omega enlarger, Leica lenses, etc. Will answer all inquiries. Burt L. Zimet, W2JUX, 2017 E. 24th St., Brooklyn 29, N. Y.

SELL: Collins 30FX-C 250-watt transmitter, now on 75 phone. \$200. HRO-STAI, \$200. Army Super-pro (BC-779A), \$135.00. W1KCP.

SELL Navy GP-7 125-watt xmtr \$15. Coils cover 80 meters. 129 Hawkeye, Iowa City, Iowa.

WANTED: SX-28A in reasonable condition, with matching speaker. All correspondence answered promptly. W7LRN, 1022 Elrod Ave., Coos Bay, Oregon.

WANTED: ART13 transmitter with low frequency oscillator, dynamotor antenna loading unit and shaft capacitor mounting base. HC-34k with dynamotor. HC-221. Brosseau, W0BSU, 711 West Euclid, Pittsburg, Kansas.

FOR Sale: BC-610 modulation transformer, \$20. HT-7 frequency standard, \$15.00. RME-69, factory overhauled and speaker, \$75.00. James Buck, W0ZDS, 1224 Orchard Drive, Ames, Iowa.

SELL: WRL Globe Trotter. Meter, coils, xtals included. Best offer. W2UNU, Mexico, N. Y.

FOR Sale: Abbott 2-meter transceiver with tubes, \$30., with power supply, \$50. Like new. Herbert Paskin, 14 Marklaw Drive, West Brighton, Staten Island, N. Y.

SELL BC-242-N, in good operating condition, \$39. W6NXP, 1015 H. Wilson Street, Berkeley 2, Calif.

QSLs best quality gloss two color samples. I. McMillan, W5OIL, 2002 W. 10th, Texarkana, Texas.

BEAM control cable, new material. 2 #16; 6 #20 rubber insulated, coded, tinned conductors. Weatherproof rubber jacket. Heavy armor shield. 3/4" diameter. Price 10¢ a foot. F.o.b. Chicago. Trans-World Radio-Television Corp., 6639 S. Aberdeen St., Chicago 21, Illinois.

TRANSFORMERS: Can you beat this? Unconditionally guaranteed for full year. Filament transformers, ratings 2 1/2 @ 10A, \$3.00; 10V @ 5A, \$2.88; 5V @ 15A, \$3.60; Postpaid, write for list. Electrical Assemblies, Grand Haven, Mich.

HALLICRAFTERS HT-6 handwiring 45-watt input CW-Phone transmitter; 80-40-20 coils; ECO coils 80-40-20; like new; cost \$150. Take \$95 or up. Astatic T-3 xtal mike with stand; cost \$19.32. Sell \$14. Percy C. Noble, W1BVR, 37 Broad St., Westfield, Mass.

QSLs, SWLs, samples. Jaggi, W5FAY Press, 6118 Goliad, Dallas, Texas.

SELL ARR 5 (AAF version of SX-36) for \$60 and ARR (AAF version of SX-28A) for \$90. Both with 60CY power supply, \$160. Cover \$40. Kc to 144 Mc. Full manuals included. Like new, hardly used. Reason: Just given SX-42. Dwight Baum, 1308 E. California, Pasadena 5, Calif.

SX-28 less speaker, realigned A-1, \$110.00 W8MGP, 3066 Portsmouth, Cincinnati, Ohio.

QST superheterodyne, eight tubes, \$40. Overton, R.F.D. No. 1, Paterson, N. J.

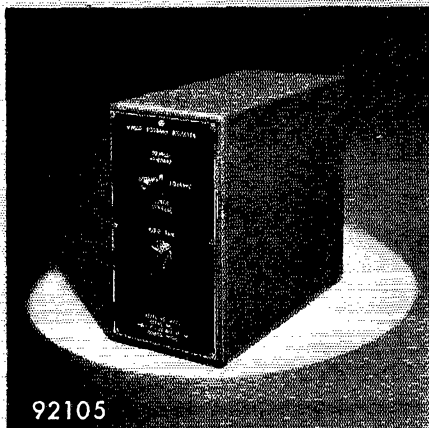
COMPLETE Mark II (40, 80, 11 1/4 meter) transmitter-receiver-phone/c.w. Paid \$75. Sell for \$50 postpaid. Aircoy's code practice set, \$20 postpaid. Lee Kingsley, W6AGO, 2627 Wyandotte, Denver 11, Colorado.

HAMFEST, June 6 has been chosen as date of Starved Rock Radio Club hamfest. For details, write W9MKS, Utica, Illinois. W9QLZ, G. E. Keith, jr. Box 22-A, Utica, Illinois.

Designed for



Application



92105

THE NO. 92105

SSSR

Single Sideband Selector

We announce the No. 92105 Single Sideband Selector, see April QST for technical details, which permits single sideband selection with your present receiver! Produced in co-operation and under exclusive U.S. patent license (2,364,863 and others) with the J.L.A. McLaughlin Research Laboratories.

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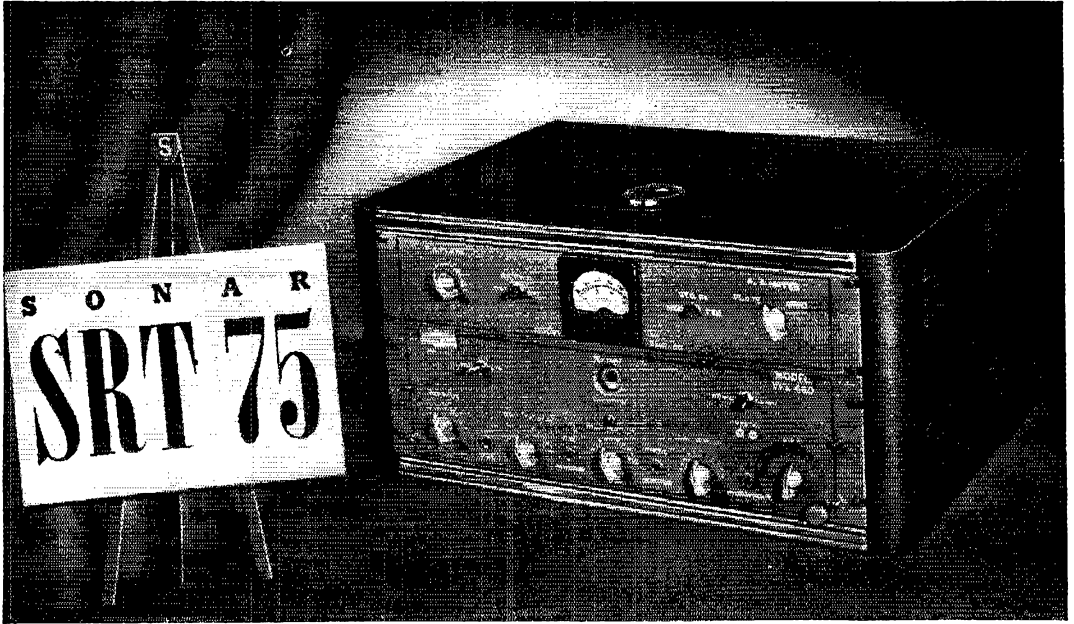
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HERE'S HOW — in keeping with our policy to keep prices as low as possible, with the highest possible quality — Sonar now offers the ham an opportunity to buy a complete 75 watt all-band transmitter, factory tested and assembled as a complete unit.—OR—to purchase the units separately and assemble them in a rack or cabinet of their own choice. These units are available individually. The SRT-75 comes complete with tubes and one set of coils for only . . . **\$203⁶⁷**

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The Collins 32V-1 Amateur Transmitter

This compact, band-switching ham transmitter is as satisfying a companion on your vacation as on your desk at home. It is complete, with power supply, in a cabinet 21-1/8" wide, 12-7/16" high and 13-7/8" deep, and weighs only 106 pounds. All it asks is a 115 volt a-c power source, and almost any random length of wire for an antenna. It is conservatively rated at 150 watts input on c-w, 120 watts on phone, and covers the 80, 40, 20, 15, 11 and 10 meter amateur bands.

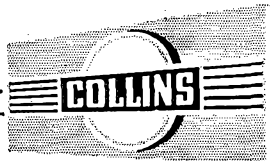
The heart of the 32V-1 is the Collins 70E-8A permeability tuned oscillator, which is used as the VFO. The dial calibration is very accurate, and the frequency stability compares favorably with most crystals used by amateurs.

The 32V-1 is a smart buy for any ham.

It is an outstanding performer at its rated power, and in case you decide to increase power at a later date, none of your investment need be sacrificed. The r-f output of the 32V-1 is sufficient to drive a kilowatt final amplifier using standard triodes, and its modulation transformer has a 500 ohm tap making available 60 watts of audio power to drive the modulators of the kilowatt final.

Order now from your Collins dealer. If you do not have the name of the dealer in your community who is carrying Collins equipment, we will be pleased to furnish his name and address promptly. The net price of the 32V-1 complete with tubes and instruction book, F.O.B. Cedar Rapids, Ia. exclusive of any state or local taxes..\$475.00

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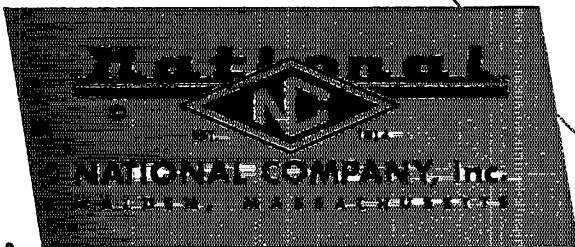
THE HRO-7C
LATEST model of
BIG WAVELENGTH
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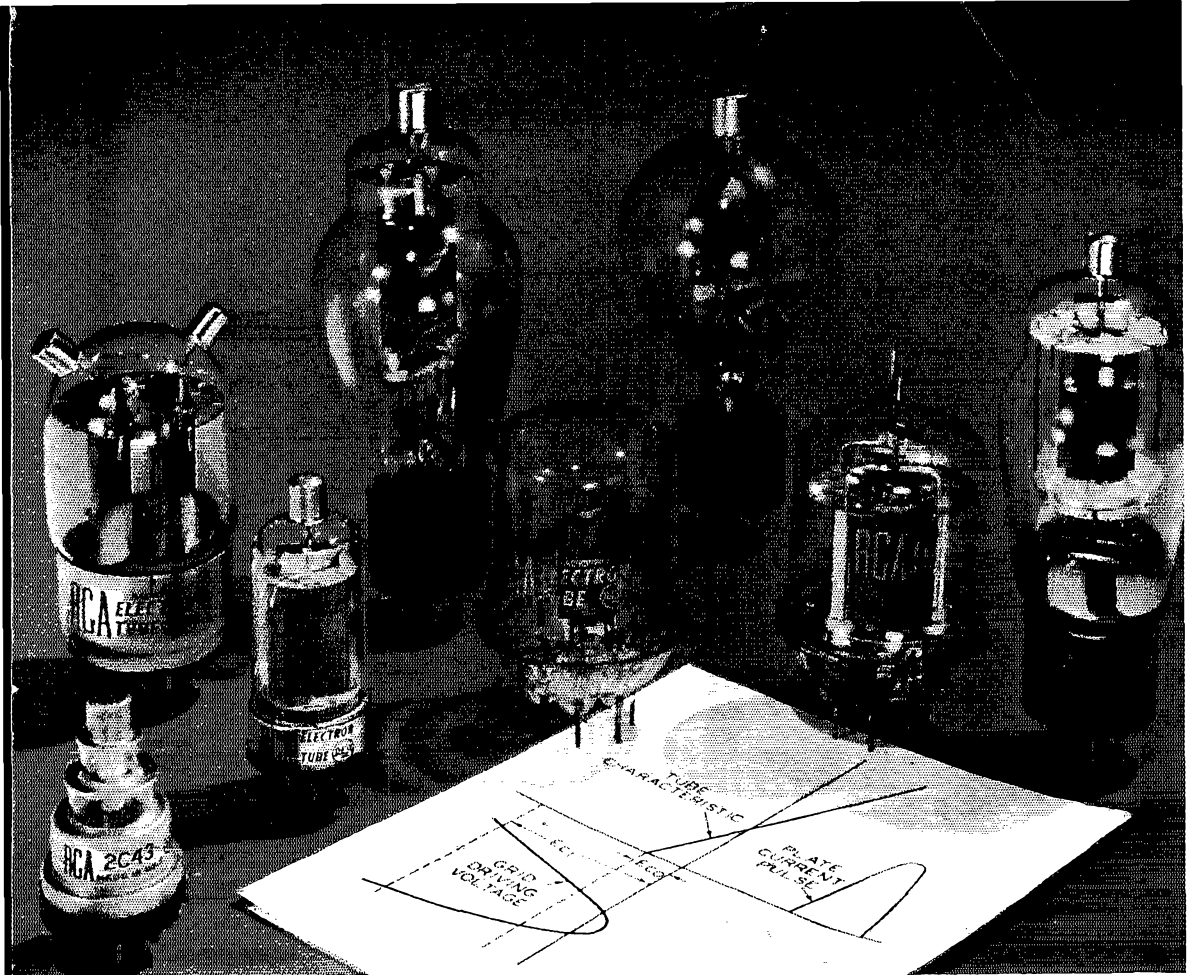


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Net weight 95 lbs.

- The incomparable HRO-7
- Power supply
- 10" speaker
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- All in one convenient unit

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**In doubler service emission counts . . .
 . . . and RCA power tubes have plenty of it**

YOUR CHOICE OF RCA TUBES FOR DOUBLER SERVICE			
Tube	Type	Heater (or Fil.) watts	Max. plate dissipation watts
2E26	beam	5.0	13.5*
2C43	triode	5.7	12
807	beam	5.7	30*
808	triode	30.0	75*
811	triode	25.2	55*
815	beam	10.8	25*
826	triode	30.0	75*
829-B	beam	14.2	45*

* Class C telegraphy (ICAS) rating

It takes a lot of cathode emission to back up those heavy peak plate current pulses when you're driving a frequency multiplier tube for optimum gain.

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