

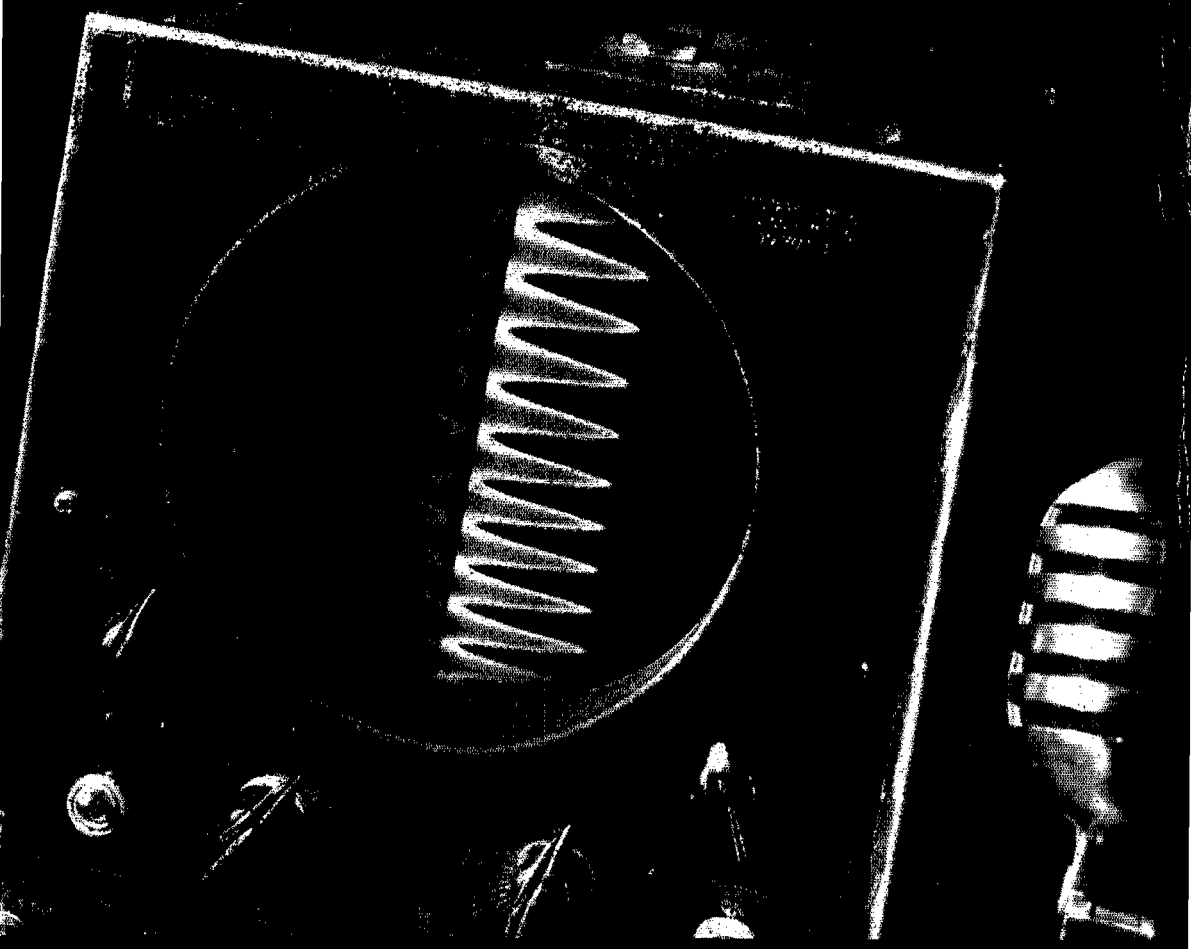
January, 1948

35 Cents

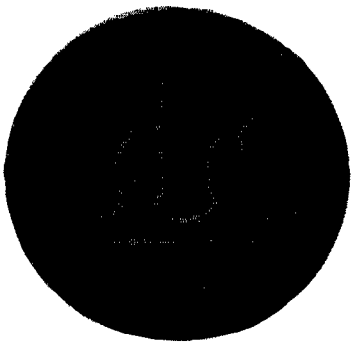
# QST

devoted entirely to

# amateur radio



The Issue - SINGLE-SIDEBAND TELEPHONE FOR AMATEURS

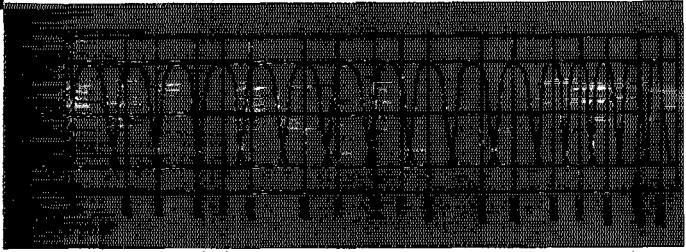


# FOR SPECIALTIES

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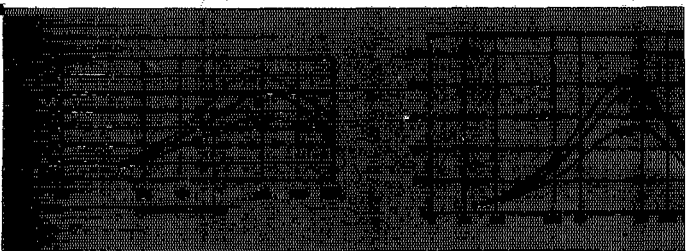
## AUDIO FILTERS

The curve illustrated shows a group of filters affording sixteen separate bands in the audio and supersonic region with 35 DB attenuation at the cross-over points. These have also been supplied spaced further apart (40 DB cross-over), with intermediate bands, permitting flat top band pass action for any selected range from 100 cycles to 200 KC.



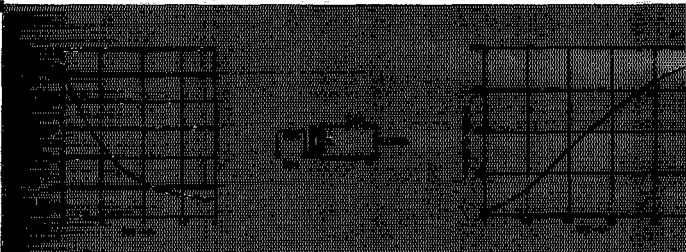
## TOROID DUST HIGH Q COILS

UTC type HQ coils have found wide application because of their high Q, stable inductance and dependability. The HQA and HQB types are catalogued. New types HQC and HQD are now available, effecting a Q of over 200 at 50 KC and 100 KC respectively.



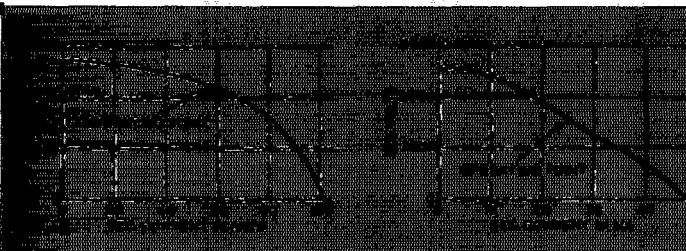
## SATURABLE REACTORS

Saturable reactors are used extensively for both power control and phase control. The left curve is that of a small (1" cube) sensitive unit indicating the variation of inductance with saturating DC. The right curve is that of a moderate size power control reactor indicating power to the load with saturating DC.



## CURRENT LIMITING TRANSFORMERS

This type of transformer is used extensively to extend the life of vacuum tubes by limiting the filament current when cold. The curve at the left is that of a typical transformer of this type for high power amplifier tubes in broadcast service. The curve on the right illustrates limiting action in a high voltage transformer for serial service.



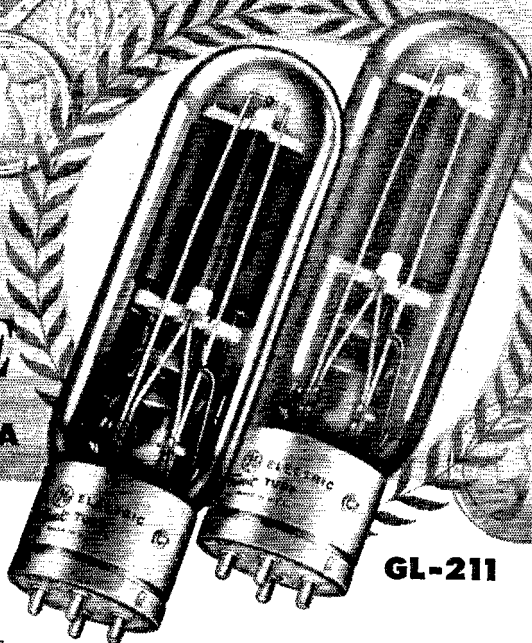
**May we design a unit for your application problem.**

*United Transformer Corp.*  
1000 BROADWAY, NEW YORK 10, N.Y.  
TELEPHONE: 677-1000



**VETERANS**  
with medals for  
**SOLID**  
**PERFORMANCE**

**GL-203-A**



**GL-211**

**FOR DEPENDABILITY**

You can't beat these two fine G-E "old-timers". They're doing a sterling job, day-in and day-out, in thousands on thousands of rigs.

Always—from the first post-spark years—the GL-203-A and GL-211 have been popular . . . and remain so today. They've been continuously improved and refined, of course, since it's G-E policy not only to originate, but to *stay ahead* in tube design and performance!

Versatility is a hallmark of these triodes. They are used widely as Class B a-f modulators, as Class C r-f amplifiers; also, the GL-211 (with a lower amplification factor, its only difference from the GL-203-A) finds frequent application in Class A a-f service.

Get the full story about these proved, popular ham types TODAY from your nearby G-E distributor! *Electronics Department, General Electric Company, Schenectady 5, New York.*

**AS USERS KNOW . . .** Two tubes of either type in Class B a-f service have an output of 260 w (at 1,250 v), which will voice-modulate a 1-kw final. Also, as noted elsewhere, the GL-211, due to its lower *mu* (12 against 25), serves exceptionally well in Class A a-f work.

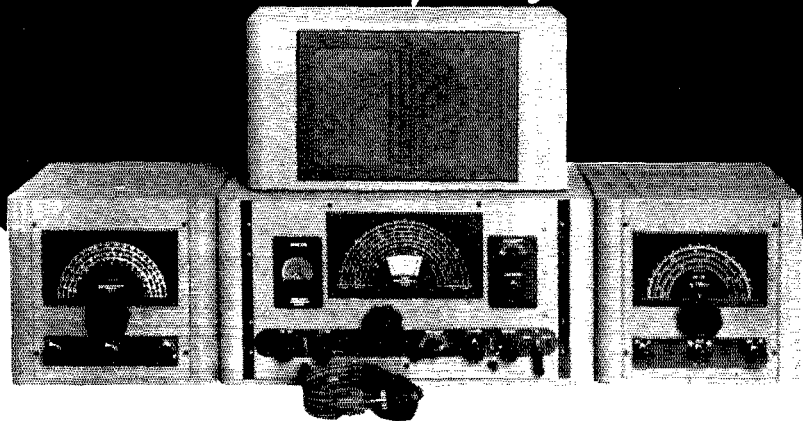
● Rig-builder's circuit guide . . . Don't miss this feature in Jan.-Feb. Ham News! It's G.E.'s newest, most scientific aid to ham-rig design and tube applications. See your G-E tube distributor. Ask him for your free copy.

ELECTRONIC TUBES OF ALL TYPES FOR THE RADIO AMATEUR

**GENERAL**  **ELECTRIC**

161-GA1-8850

matched in appearance...  
*Unmatched in performance!*



*Just Announced!*

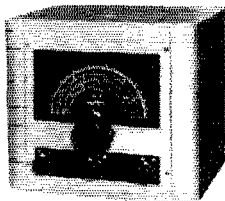


**The "Boomerang"  
 (MB-3)**

The new "BOOMERANG" is a break-in device, a signal monitor, a code practice unit, and a tone modulator for MCW. It will follow the fastest bug. Self-contained power supply. All you need is a receiver with a headphone jack. Improves your QSOs 100%.

**The HF 10-20  
 Converter**

It provides outstanding and imageless reception on 10, 11, 15 and 20 meters. Output (i. f. frequency) is 7 mc. Features include provision for separate antenna, band selector switch, self-contained power supply, planetary tuning and high gain. If your receiver tunes only to 18 mc, the HF 10-20 is necessary for reception on 10, 11 and 15 meters, and will provide improved reception on 20 meters.



From two meters to reception through the broadcast band, RME receiving equipment still provides the optimum in performance.

The new DB-22 Preselector, with self-contained power supply, has an overall gain of 30 db throughout its tuning range of .54 to 44 mc. The image ratio is 50 db down with a communications receiver such as the RME-45.

The RME-45 is a piece of equipment that stays modern. It's now available with the new NBF-4 ratio detector for narrow band FM. The NBF-4 can also be used with all previous models of RME-45s.

The VHF-152 Converter was quick to set many new DX records on 144 to 148 mc. Performance is also outstanding on 6 and 10 and 11 meters. It has generous bandspread, high gain, imageless reception and self-contained power supply.

Illustrated folders on request.

Canadian Representative:  
 Measurement Engineering, Ltd.  
 Anprior, Canada.



**RME**

FINE COMMUNICATIONS EQUIPMENT  
**RADIO MFG. ENGINEERS, INC.**  
 Provia 6, Illinois U. S. A.



JANUARY 1948

VOLUME XXXII • NUMBER 1

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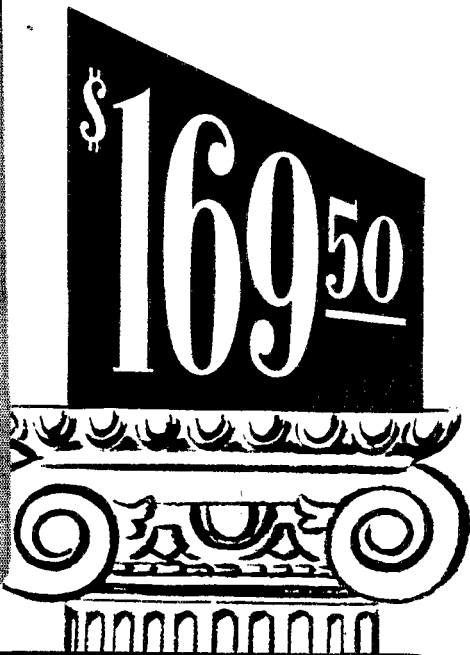
*Model*  
**SX-43**

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

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

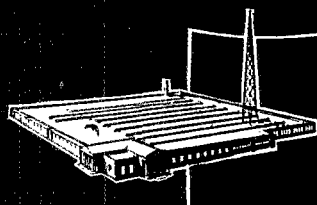
One stage of high gain tuned RF and a type 7F8 dual triode converter assure an exceptionally good signal-to-noise ratio. Image ratio on the AM channel on band 5 (44 to 55 Mc.) is excellent as the receiver is used as a double superheterodyne. The new Hallicrafters dual IF transformers provide a 455 kilocycle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

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



- ALL ESSENTIAL AMATEUR FREQUENCIES FROM 540 kc TO 108 MC
- AM - FM - CW RECEPTION
- IN BAND OF 44 TO 55 MC. WIDE BAND FM OR NARROW BAND AM . . . JUST RIGHT FOR NARROW BAND FM RECEPTION
- CRYSTAL FILTER AND EXPANDING IF CHANNEL PROVIDE 4 VARIATIONS OF SELECTIVITY ON LOWER BANDS
- TEMPERATURE COMPENSATION FOR FREEDOM FROM DRIFT

- SERIES TYPE NOISE LIMITER .
- PERMEABILITY ADJUSTED "MICROSET" INDUCTANCES IN THE RF CIRCUITS
- SEPARATE RF AND AF GAIN CONTROLS
- EXCEPTIONALLY GOOD SIGNAL-TO-NOISE RATIO
- SEPARATE ELECTRICAL BANDSPREAD CALIBRATED FOR THE AMATEUR 3.5, 7, 14, AND 28 Mc BANDS



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

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Rogers Majestic Limited, Toronto-Montreal

## Section Communications Managers of the ARRL Communications Department

**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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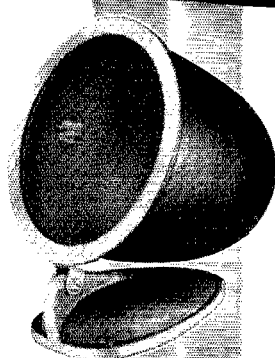
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**Jensen Speech Master** REPRODUCERS  
NOW WITH **ALNICO 5** PM DESIGN

JENSEN Speech Master Reproducers have long been widely used in moderate-level intercom, paging and P. A. systems. Now, in **ALNICO 5** design, they are once more available for all applications where clear, crisp, intelligible speech and good "talk-back" performance are required. Ideal for amateur, commercial, police and aviation phone communication as separate units or integral equipment. In amateur CW they aid selectivity, help signals override QRM and QRN. The husky voice coil withstands keying transients.

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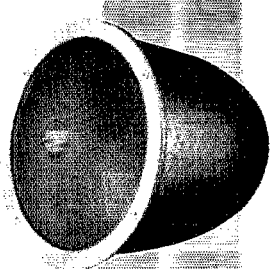
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**MODEL AP-10 SPEECH MASTER**  
(Desk Type)

**ALNICO 5** PM design. Complete with swivel base and tilt adjustment. Double dustproofed, fully enclosed and protected. Internal mounting bracket for 1/2 x 1/2" transformer. Power rating 5 watts. Height 8 1/4", depth 5 1/8", diameter 5". Attractive hammered gray finish with satin chrome trim. 36" RC cord. Shipping weight 5 1/4 lbs.

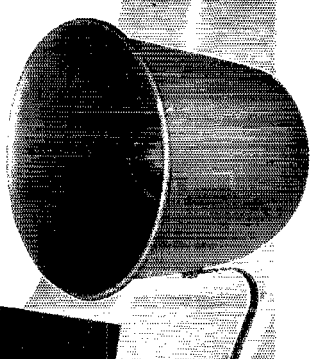
	<i>List Price</i>
AP-10 (ST-590) with 3-4 ohm voice coil . . . . .	\$13.90
AP-10 (ST-591) with 45-50 ohm voice coil . . . . .	14.50



**MODEL AP-11 SPEECH MASTER**  
(Panel Type)

Similar to AP-10 but without swivel base. Clearance eyelets for mounting screws. Mounts in 4-27/64" cutout. Depth from front panel 4 1/2". Power rating 5 watts. Screws and drilling template furnished. Shipping weight 3 1/4 lbs.

	<i>List Price</i>
AP-11 (ST-592) with 3-4 ohm voice coil . . . . .	\$11.30
AP-11 (ST-593) with 45-50 ohm voice coil . . . . .	11.90



**MODEL AR-10 REFLEX SPEECH MASTER REPRODUCER**

Specially designed reflex horn increases efficiency in mid-range, giving added effectiveness and punch to speech quality when used for paging, intercom and call systems operated at moderate levels. Reflex construction prevents direct access of snow or rain to speaker diaphragm. Power rating 6 watts. Space within case provided for mounting 1/2 x 1/2" transformer. Over-all diameter 10", depth 8". Complete with bracket for wall or post mounting.

	<i>List Price</i>
AR-10 (ST-643) with 3-4 ohm voice coil . . . . .	\$20.00
AR-10 (ST-644) with 45-50 ohm voice coil . . . . .	20.75

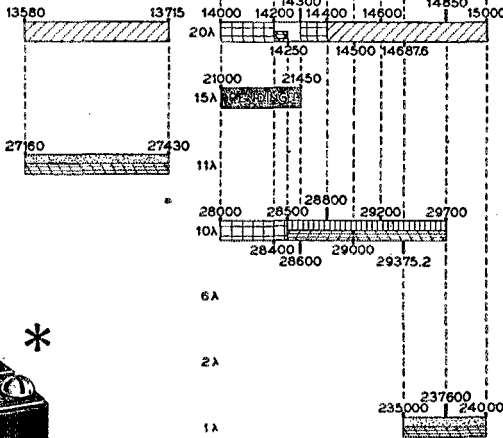
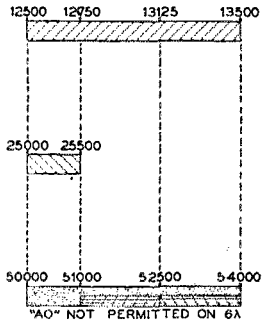
*Designers and Manufacturers of Fine Acoustic Equipment*

# "why plug in a promise?"

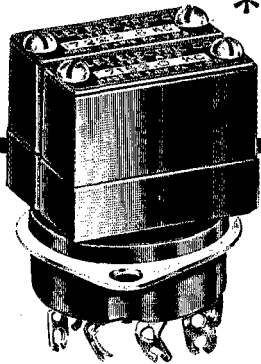
## AMATEUR FREQUENCY CHART

NOTE 1: AX2 CRYSTALS ARE AVAILABLE IN THIS RANGE FOR MULTIPLYING INTO HIGHER FREQUENCY AMATEUR BANDS.

NOTE 2: AX3 CRYSTALS, USED IN CONJUNCTION WITH THE BLILEY CCO MODEL 2A, ARE AVAILABLE IN THIS RANGE FOR MULTIPLYING INTO HIGHER FREQUENCY AMATEUR BANDS.



- UNRESTRICTED PHONE
- RESTRICTED PHONE
- FM
- NBFM CLASS "A" ONLY
- CW ONLY
- A<sub>0</sub> A<sub>1</sub> A<sub>2</sub> A<sub>3</sub> A<sub>4</sub>
- AX2 NOTE 1
- AX3 NOTE 2



## "plug in a BLILEY... TO BE SURE"

Crystal quality goes much deeper than the frequency on the nameplate. Here at Bliley we practice and preach quality control all the way from the raw quartz.

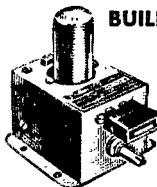
Extra care is taken to insure accuracy of calibration. Frequency stability is maintained by precise orientation of the quartz plate. Every crystal must meet a high standard of activity before acceptance. All crystals are plated to insure long term

dependability and trouble-free service.

By any comparison Bliley crystals are a "techniquality" product. For further details get a copy of Bulletin 35 from your distributor.

**\* 2 BLILEY TYPE AX2 CRYSTALS WILL FIT ANY OCTAL SOCKET**

# Bliley CRYSTALS

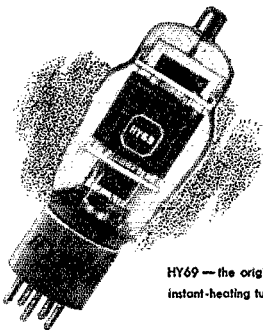


**BUILD YOUR TRANSMITTER AROUND A BLILEY CCO - 2A**

A completely packaged crystal controlled oscillator for the 2-6-10-11 meter bands. An ideal nucleus for new construction or conversion of existing equipment. See Bulletin 34.

# Over 90% OF NEW MOBILE TRANSMITTER DESIGNS USE HYTRON

## THE ORIGINAL INSTANT-HEATING TUBE

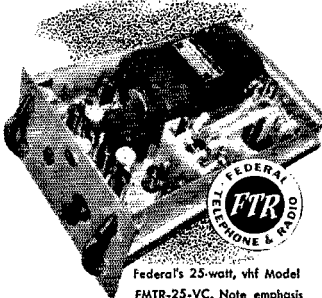


HY69 — the original instant-heating tube.

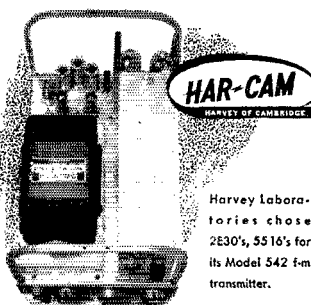
Because they fill a real need for conserving filament power, Hytron instant-heating tubes are in. Yes, the 2E25, 2E30, HY69, HY1269, and 5516 are in the new mobile transmitter designs of many famous friends—too many to thank in this small space. The 2E25 and 2E30 also appear on the Army-Navy Preferred List. Why so popular? With no standby current, battery drain can be cut to 4% of that with cathode types—attainable power output and range increase. Potentials of rugged filaments are centered for battery operation. Beam pentode versatility simplifies the spares problem—one type can power all stages. Join the leaders. If you build mobile equipment—for land, sea, air—put Hytron original instant-heating, easy-on-the-battery tubes on *your* preferred list.



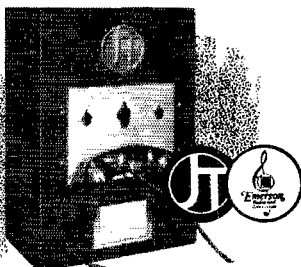
Bendix MRT-3A, 152-162 mc f-m taxicab transmitter uses 2E30's generously.



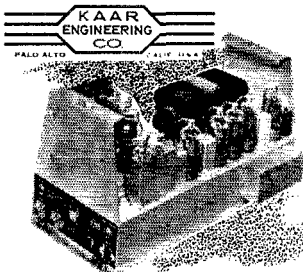
Federal's 25-watt, vhf Model FMTR-25-VC. Note emphasis on 2E30 and 5516.



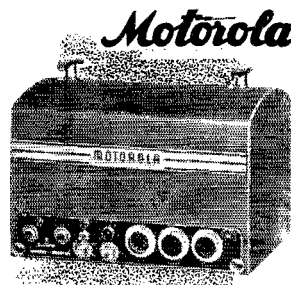
Harvey Laboratories chose 2E30's, 5516's for its Model 542 f-m transmitter.



Jefferson-Travis Model 351, 35-watt marine radio-telephone employs HY69's.



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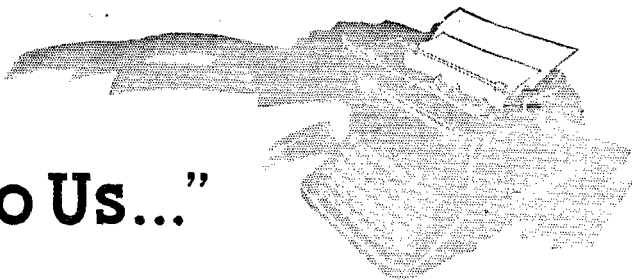
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# "It Seems to Us..."



## SINGLE-SIDEBAND

Several articles in this issue of our magazine point the way toward the most significant development that has ever occurred in amateur radiotelephony: carrierless single-sideband emission. After years of fearing that our receivers weren't stable enough to permit the use of s.s.s.c.—as we're calling it—the adventitious appearance on the air of an experimental station with this method of emission has shown that it isn't so difficult after all and that its merits are waiting for all of us. And so immense are these advantages that we are convinced that a speedy revolution in our equipment and our operating practices is imminent and certain.

When only a single sideband is radiated it is found to be fairly easy to reinsert the carrier at the receiver—even the ordinary b.f.o. works quite well. The communication bandwidth required is only about half of that necessary for the usual emission. Of vastly more importance is the fact that if we were all single-sideband, the reinserted carrier (except in the rare case where two signals were bang on the same frequency) would be properly related only to the desired signal, and all other near-by signals would remain a sort of nonspeech rumpus which the brain can rather readily ignore or reject. We are thus offered the possibility of maintaining better communication with 'phone stations moved closer together than we have ever thought possible—even closer than the channel-width. The increase in the effective width of the 'phone assignments, instead of being merely doubled, may prove to be several times that great. But even two ain't hay.

In the usual present-day snarl of 'phone interference, not only are we bothered by the fact that the conflicting signals are understandable as speech but we have the piercing shrieks of heterodynes. They come from the simple fact that in the usual method the carriers contain two-thirds of the power. Even if single-sideband did not practically confine recognizability to the desired signal, the utter absence of heterodyne beats would greatly simplify our communication problem.

The signals would all be just "voices" and could be read at will just by "listening" to the right one. There is an experience everybody has had that will serve as an example. You are, let us say, in a theater lobby at intermission, with everybody out for a smoke, or you're at a noisy cocktail party. Standing closely packed, everybody is talking at once but, by simply concentrating and using your "brain filter," you can listen-in on any one of a large number of near-by speakers. They are using carrierless single-sideband. To make a comparison with present-day radiotelephony you must now imagine each of these persons wearing around his neck a flask of compressed air equipped with a peanut whistle, all going at once and in all sorts of notes, most of them louder than any human voice. What chance would you then have of understanding each near-by speaker at will? About as much as you do on the 'phone bands today!

S.s.s.c. will have many other virtues in its catalogue. Except for the final amplifier and perhaps its driver, all the gear can be at receiving-tube level, saving the great expense of Class B modulators and their big transformers and power supplies— and the space they now occupy. The final, no longer two-thirds preoccupied with amplifying the carrier, can have its power capabilities much more effectively used. Of equal interest is what will happen to receivers. There will no longer be any excuse for the manufacturers not building into them the considerable increase in selectivity that they could put there now but don't, and there will be a definite impetus to build receivers that possess excellent stability. While s.s.s.c. can be received on our ordinary receivers, a selectivity curve designed to accept only one speech sideband—something that we will need for best results to chop off the chatter from undesired signals—will make a much more useful tool than we get today with a curve intended to straddle both sidebands, and music sidebands at that. Communication could be so very different!

It's interesting to think what s.s.s.c. can do for our operating practices, too. In addition to the reduction of interference and the

ability to accommodate a great many more stations, a major advantage is that duplex operating immediately becomes possible. The present wise prohibition of duplexing comes from the fact that we can't stand the interference of unmodulated carriers, but the prohibition simply disappears when there is no carrier at all. Amateur telephony could have the ease of landline telephony. But we'll probably have to revise our present ideas about the desirability of all parties to a QSO being on the same frequency, and admit that some separation is desirable for s.s.s.c. duplex. We'll have to standardize, too, on which sideband we'll radiate, so that the reinserted carrier at the receiver won't have to be flopped from one side to the other in different cases. Our regulations, incidentally, may require some revision, since our present 'phone assignments are to A3 emission and A3 is defined in terms of a modulated carrier. That, it may safely be assumed, is a mere technicality, since A3 is commonly held simply to mean a.m. as against f.m., and since there is never objection to new methods that economize in spectrum space.

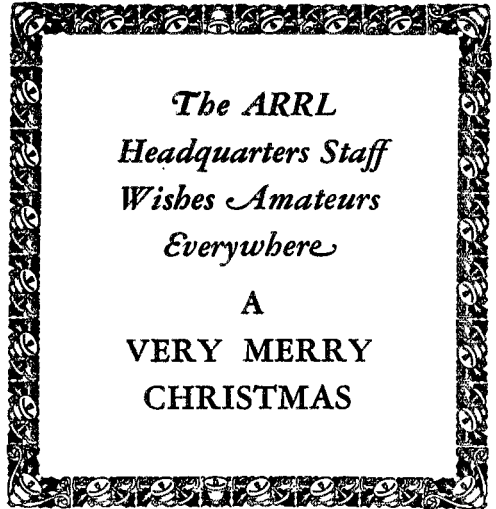
There are several amateur s.s.s.c. stations on the air now and more are coming along rapidly. You can listen for yourself. Brother, won't it be something when we are all carrierless and with only one set of speech frequencies? Everything points to s.s.s.c. becoming the accepted amateur method in the near future. Condition yourself to the thought, and we'll supply practical information as rapidly as possible.

*Adams*

### ARE YOU KIDDING?

If you fancy yourself an amateur psychologist—and who doesn't?—you can have yourself some fun by putting an ARRL Operating Aid No. 3 in front of you on the operating table. (For the uninitiated, the ARRL OpAid No. 3 is simply a small card with the RST system printed on it, available to one and all upon request.)

The psychology part comes in when you start to use the thing. Let's assume you call and raise a fellow with an average signal and a slight trace of ripple on his signal. When he comes back to you, he gives you "RST 579" and a half minute or so to think over your report to him. If you didn't have OpAid No. 3 in front of you, your report to him would be "RST 579" with no hesitation. But a quick glance at the card shows that, *by the definitions*, your report to him should be "RST 568," which means "Perfectly readable, good signals, good d.c. note with just a trace of ripple."



(If there is any QRM at all in the background, the R report *should* be 4, meaning "Readable with practically no difficulty.") His probable mental reaction will be, "That tin-eared so-and-so, why doesn't he get a good receiver? And what's wrong with my note—everyone gives me T9!" Over the air, he may venture an inquiry about how "rough" his signal is, as a result of the T8 report. You can then go on to explain that you have a copy of the RST system in front of you, and that the T8 report doesn't indicate he will be deluged by FCC tickets. He'll probably sign with you in a hurry, wondering what kind of misguided lid *you* are.

You know this isn't overdrawn at all. Give a fellow a report of S4 these days and he will wonder how you can possibly hear him at all. Give anyone T8 and he starts to tear the rig apart. And yet the RST system is only a shorthand device for getting information across to the other fellow in a hurry. A language where everyone has different definitions for the same words would be a pretty useless thing, and the general disregard for the *accurate* use of the RST system makes it seem silly to use it at all. We have to do it right or there's no sense in it. The fellow in some distant land who has no monitoring equipment depends upon the reports he gets for technical information— if you tell him he's T9 when he's T6, and T7 when he's T3, you haven't much right to squawk about "the bum signals that clutter up the band."

But forgetting the sermon, if you want some fun with psychology—both yours and the other fellow's—get an OpAid No. 3 and hang it on the front of your receiver. You'll be amazed!

—B. G.

# What Is Single-Sideband Telephony?

*A Few Facts About the New 'Phone Technique*

BY BYRON GOODMAN,\* WIDX

THE history-making single-sideband suppressed-carrier transmissions of W6YX and WØTQK have aroused considerable interest in the transmission and reception of these signals, and well they might, since it is not at all unlikely that most of us will be using the system within a few years. The name describes the thing of course, but it doesn't tell all. Neither does this article, but it should<sup>1</sup> give you a start toward understanding the stuff.

Everyone knows that a regular a.m. 'phone

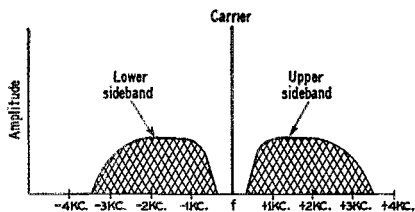


Fig. 1 — The normal a.m. signal consists of a carrier and a pair of sidebands. The crosshatched areas represent the frequency range of the sidebands.

signal takes up space frequency-wise that can be represented by the sketch in Fig. 1. The carrier frequency, designated by  $f$ , is a single frequency. The "sidebands" take up room on either side of this frequency, depending upon the audio frequencies present in the modulation. The cross-hatched areas in Fig. 1 represent the frequencies occupied by the sidebands.

At the receiver, the usual practice is to center the carrier in the passband of the receiver, and to use a receiver with a response curve capable of passing both sidebands. This is shown in Fig. 2, where the sketch of Fig. 1 has been superimposed on a typical selectivity curve of a receiver. However, it is not at all necessary to receive both sidebands, and this fact has been used by McLaughlin<sup>2</sup> to reduce heterodyne interference. A response curve of a receiver capable of receiving only one sideband is shown in Fig. 2 as a dotted line. Under such conditions, nothing is omitted from the original signal, since one sideband is all that is required. As WIDBM aptly puts it, "both sidebands are saying the same thing."<sup>3</sup>

\* Assistant Technical Editor, *QST*.

<sup>1</sup> McLaughlin, "Exit Heterodyne QRM," *QST*, Oct., 1947.

<sup>2</sup> Rand, "The Q5'er," *QST*, December, 1947.

<sup>3</sup> Crosby, "Exalted-Carrier Amplitude- and Phase-Modulation Reception," *Proc. I.R.E.*, Sept., 1945.

• The year 1947 will go down in amateur radio history as one of the big ones, since it was in October of that year that the first amateur 14-Mc. single-sideband suppressed-carrier transmissions were made. But most hams would rather make history than read about it, so this article is intended to give you a nodding acquaintance with the principles involved in s.s.s.c. transmission and reception.

However, while one sideband can be eliminated without impairing the quality one iota, the carrier cannot be eliminated, or even reduced appreciably, if the modulation percentage is high. If, for example, the single-sideband receiver curve of Fig. 2 (the dotted line) were such that it cut into the carrier, the carrier would be reduced in the receiver. This in turn would give a signal that, so far as the detector was concerned, would look like an *overmodulated* signal, since the proper carrier-to-sideband proportions would not have been preserved. On the other hand, the sideband (or sidebands) can be reduced, leaving the carrier the same, with no ill effects other than to reduce the effective modulation percentage that the detector sees. This is the principle of "exalted-carrier" reception.<sup>3</sup>

The point that the carrier must be present in

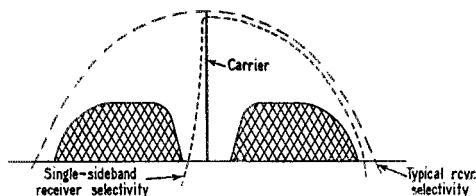


Fig. 2 — In normal reception, the a.m. signal is centered on the selectivity characteristic of the receiver. However, if the receiver has considerable selectivity, as shown by the dotted line, equally good reception is obtained by passing only one sideband through the receiver.

the receiver along with the sideband (or sidebands) before proper detection can take place is an important one to remember in this discussion.

## Carrier Suppression

There is really no need to transmit the carrier of a 'phone signal, provided the carrier is put back

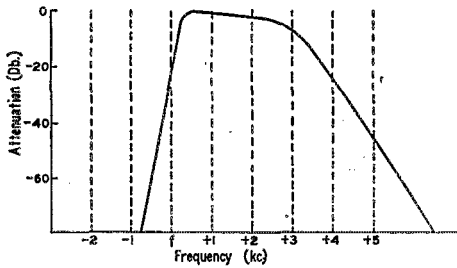


Fig. 3 — The filter required for sideband elimination requires very rapid attenuation in a range of about 1000 cycles. The characteristic shown above would be suitable for such work — the normal carrier frequency would be placed at  $f$ .

on the signal before audio detection takes place. Methods have been known for years for "suppressing" the carrier, and their effectiveness has been proven by a good record of commercial use. The two common types of modulators that suppress the carrier during modulation are the "balanced" modulator (using tubes) and the "ring" modulator (using diode rectifiers in a bridge or lattice arrangement). Both of these take the modulation frequencies and the carrier frequency and give an output that consists only of the sidebands (along with a few combinations of carrier harmonics that have to be filtered out). Of course the carrier suppression isn't perfect, but suppressions on the order of 40 to 60 db. are not difficult to obtain, and careful balancing has brought the figure up to 100 db.

But neither Johnny Q. Ham nor anyone else is going to get very far with a system that only suppresses the carrier. While it is easy to transmit, it is practically impossible to receive. The mathematics of the thing shows that the carrier has to be reinserted with the same phase relation to the sidebands that the original carrier had. This means, therefore, that it would have to have exactly the same frequency and phase relationship as the original carrier, and no frequency drift could be tolerated, since any at all would cause a phase change. So that's out the window.

However, the same mathematics shows that if one sideband is received, the carrier can be reinserted in any phase, and in practice the frequency can be off by 10 or 20 cycles without impairing the quality too much. That's more like it. While 10 or 20 cycles seems like incredible stability for a receiver, it isn't outside the realm of possibility at all and, in fact, receiver stability has been sneaking up on us over the years without our realizing it. But more of that later.

### Sideband Suppression

There are two classical methods of eliminating one sideband. One is a brute-force method that

<sup>4</sup> Honnell, "Single-Sideband Generator," *Electronics*, Nov., 1945.

consists simply of lopping off one sideband by using a very selective filter. This is the method used by the commercials. Another more delicate and subtle system requires an elaborate arrangement incorporating 90-degree phase shifts of carrier and audio signals. It has been used,<sup>4</sup> but it isn't easy.

You can't just dismiss that filter with a sentence or two. In the first place, it has to have a characteristic similar to that shown in Fig. 3, and filters like that aren't easy to come by. The frequency  $f$  represents the carrier frequency at which the filter is used, and the important thing about the filter is the slope of the curve between "+0.5 kc." and "-0.5 kc." Notice that within this 1-kc. range the attenuation goes from 0 to about 50 db. The slope on the other side of the filter is unimportant, just so long as it permits the sideband to pass without excess attenuation. Filters with a characteristic like that of Fig. 3 are not easy to obtain, and the filter is usually designed for a low frequency, since the selectivity in cycles decreases as the frequency  $f$  is increased. The filter characteristic shown in the McLaughlin article<sup>1</sup> would be satisfactory, and this was obtained at 50 kc. Fifty or 75 kc. probably represents the upper frequency limit for effective sideband filters, unless one resorts to crystal lattice-type filters, infinite-rejection circuits and other complex dodges.

### Frequency Changing

Our s.s.s.c. transmitter now begins to take shape. It will start off with a modulator that suppresses the carrier, and then we'll go through a filter that will lop off one sideband, after which we'll have to get the signal to the operating frequency and out on the air. Fig. 4 shows the signal as far as we've gone.

As mentioned earlier, this filtering of the sideband would be done at some low frequency, and we have the problem of getting to the operating frequency. We can't do it by frequency multiplication, any more than we can in conventional a.m. after modulation. So the next big point we run across is that you heterodyne the signal when you change frequency in s.s.s.c. work. This is old

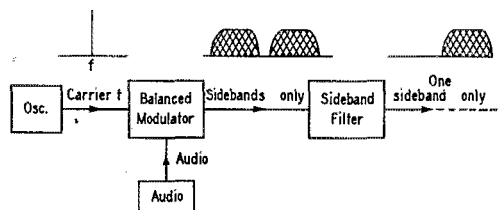


Fig. 4 — The basic system for obtaining an s.s.s.c. signal. The carrier and audio frequencies are fed into a balanced modulator, where the sidebands are generated minus the carrier. The signal is then passed through a filter that removes one sideband.



stuff, of course — we do it all the time in receivers and converters. So, if our output from the sideband filter is on 50 kc. and we are headed for 14,250 kc., we would feed the single sideband into a mixer with an oscillator running at, say, 600 kc. This would give beats of 550 and 650 kc. To use only one, we would run the output of the mixer through a 550-kc. filter (a stage of i.f. amplification). Then to get to 14,250, we would beat this signal against a 13,700-kc. oscillator and run the output through enough selective stages to wipe out the undesired 13,150-kc. signal. All this is shown in Fig. 5. To make the job of the filters a little easier, balanced modulators can be used for the mixers, so that the local-oscillator signal is eliminated in the output. In Fig. 5, the local-oscillator signal is shown in the output of each mixer, as would be the case in conventional mixer circuits.

It is also apparent from Fig. 5 that it is only necessary to change the frequency of the last local oscillator in order to change the output frequency. Thus a basic s.s.s.c. exciter and modulator would consist of the stages shown in Figs. 4 and 5. The frequencies wouldn't be the same, necessarily, but the principles involved would be. The entire unit would use receiving tubes and, for the most part, receiver components.

#### **Amplification**

It has been pointed out that frequency changing involves the use of heterodyning instead of multiplication in s.s.s.c. technique. We also have to forget about our cherished Class C amplifiers, because the s.s.s.c. must be amplified in a Class A or Class B stage; i.e., an amplifier that reproduces the input signal without distortion. But our receiver techniques are generally Class A, and Class B amplifiers are no strangers to the 'phone man who has been using one for a modulator for the past 14 years. We don't even have to worry about too-careful adjustment of these Class B amplifiers. They are more tolerant with no carrier, unlike the critical "linear" amplifiers everyone shies away from. And, unlike audio Class B amplifiers, they don't have to be push-pull.

So there you have the fundamentals at the transmitter end: carrier suppression in a balanced modulator, sideband rejection in a sharp filter, frequency changing by heterodyning, and amplification in Class A or Class B amplifiers.

#### **Reception**

The receiver end is a lead-pipe cinch. All you have to do is tune in the signal and put back the carrier in the right place! Fortunately, any communications receiver is set up to do this, although the technique seems a little strange at first. The first thing you do is turn off the a.v.c., although you can leave it on while you tune in the side-

band if you want. You tune in the sideband, as indicated by maximum strength in the 'speaker (or maximum swing of the S-meter, if the a.v.c. is on). With a.v.c. off, switch on the b.f.o. and adjust its control, *not* the main tuning control, until the signal clears up and begins to sound like something human. As you vary the b.f.o., you will get various types of inverted speech and deep and falsetto voices, but when you hit it right the speech will sound as natural as any other signal. It may be necessary to back off the manual gain quite a bit, particularly if you have a weak b.f.o. in the receiver. In any event, it's a good idea to run with reduced i.f. gain, because you have no a.v.c. to hold the gain down in the receiver, and you can't afford to have any stage in the receiver overloaded, since the linearity will be destroyed.

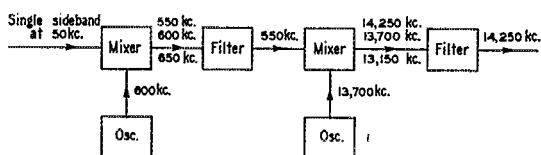


Fig. 5 — Frequency changing in an s.s.s.c. system is done by heterodyning the sideband to a new frequency and filtering out the undesired beat products. The diagram above shows how a single sideband might be taken from 50 kc. to an operating frequency of 14,250 kc.

#### **The Advantages of S.S.S.C.**

What does all this get you? Some of the benefits won't show up until a number of stations are using the system, but here are a few of the obvious advantages: Transmitting only one sideband, the receiver bandwidth has to be only half as great, for the same fidelity, as it does for double-sideband reception. This gives an immediate 3-db. improvement in signal-to-noise, since reducing the bandwidth by a factor of 2 decreases the noise by the same amount. The power required at the transmitter end for equivalent double- and single-sideband signals at the receiver is considerably less in the case of s.s.s.c. transmission. There is no carrier power to be supplied, and all of the power goes into the one signal-generating sideband. For example, a kilowatt 'phone using double sidebands and the usual carrier requires that a kilowatt of power be supplied to the r.f. amplifier plus the power consumed by the 500-watt modulator. The same signal is obtained at the receiver in the s.s.s.c. system by furnishing power to the final amplifier equal to what would be drawn by a Class B modulator capable of delivering 250 watts of audio. The saving in transmitter input is plenty! When you aren't talking you have no output signal, so there is no good reason why you can't carry on excellent duplex work right on your own frequency! With

(Continued on page 186)

# Single-Sideband Operating Tests

## *Some Results — and Suggestions for Improving Reception*

BY O. G. VILLARD, JR., \* W6QYT

**T**HE following notes are based on our own listening experience, plus reports received in over-the-air contacts. There is little that is quantitative in all this, but to the extent that the impressions of careful observers may be relied on, it should be of interest.

### *Relative Power*

For equivalent sideband power, single-sideband-suppressed-carrier apparently gives a louder-sounding signal than conventional double-sideband transmission. One would suspect this to be in part attributable to the increase in receiver sensitivity when the b.f.o. is switched on (caused by curvature of the second-detector characteristic — a well-known effect) but the significant thing is the fact that the “louder-sounding” signal gets through the QRM better. One possible explanation is that in many communications receivers sideband clipping begins at audio frequencies as low as 2000 cycles per second. Thus a conventional signal of average width would be somewhat clipped whereas the s.s.s.c. signal might not be clipped at all.

The double-sideband transmitter at W6YX has a 7000-cycle total radiated bandwidth, whereas the s.s.s.c. transmitter has a 2500-cycle total radiated bandwidth. Both rigs use sharp cut-off low-pass filters. The matter of bandwidth is one point which obscures the comparison at W6YX, of course, since the audio-frequency response of the s.s.s.c. rig is 300–2500 cycles whereas that of the double-sideband rig is 100–3500 cycles. Thus the speech sounds “crisper” on the s.s.s.c. rig. We hope to arrange matters so that both rigs have the same speech bandwidth, and will make further tests.

However, taking everything into account, the results with s.s.s.c. still are surprisingly good. Once the knack of tuning the signal in is learned, most amateurs prefer the single- to the double-sideband transmission.

### *Tricks in Demodulating the Signal*

Roughly one-fourth of the operators with whom we tried out s.s.s.c. reported themselves unable to receive it clearly at all. The most common complaint was that no matter *how* the local oscillator was tuned, the signal never did become clear and distortion-free. It is believed that a

• On the evening of September 21, 1947, the 75-meter 'phone band was the scene of a contact that well may have signaled the beginning of a revolution in amateur radiotelephony, for this was the first amateur work with single-sideband suppressed-carrier transmission. Since then the transmissions of W6YX have given many the opportunity to try out the technique of receiving single-sideband signals — signals that sound like nothing human when detected by ordinary methods.

This article summarizes the reactions of those operators who have contacted W6YX, offers explanations, and suggests improved methods for receiving s.s.s.c. transmissions. W6YX will continue to be on the 14-Mc. band as regularly as possible, so keep an ear out for the transmissions.

In s.s.s.c. lies the certainty of doubling the effective width of the 'phone bands — and the possibility that the actual improvement in utilization may be much more than 2 to 1. If you operate 'phone, better begin now to find out what single-sideband is all about.

certain percentage of receivers have local or beat oscillators which have appreciable frequency or amplitude modulation because of hum voltages. On such a receiver a c.w. signal simply doesn't sound p.d.c. This effect is often missed in practice, because a small amount of hum may go unnoticed in c.w. work. But any hum modulation on the reinserted carrier of an s.s.s.c. signal plays absolute hob with the speech quality. We have one receiver on the campus which has this defect, and s.s.s.c. heard on it sounds appalling. The hum completely garbles the voice, apparently because each individual speech-frequency component acquires the hum modulation.

It is very desirable to use the minimum r.f. gain setting when the b.f.o. is used for demodulation. This assures a strong reinserted carrier in relation to the signal. The a.v.c. should also be disabled, because in many receivers a change in a.v.c. voltage, such as might be caused by a burst of incoming speech, can shift the receiver local oscillator a few cycles, thus detuning the reinserted carrier from the correct frequency at a syllable rate.

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The most desirable arrangement is to use a separate signal-frequency oscillator. This allows the receiver to be tuned without upsetting the frequency of the reinserted carrier. It is then easy to adjust the receiver to accept the band occupied by the signal, with the aid of a variable-selectivity crystal filter. Maximizing the audio output, by varying the tuning alone, assures correct setting of the receiver passband. Selectivity may then be increased until sideband clipping is evident. Some of the oscillators that have been successfully used to demodulate the s.s.s.c. signal include the BC-221- or LM8-type frequency meter, several varieties of VFO, and even a regenerative preselector set into weak oscillation! The harmonics of a separate oscillator can of course be used.

The strength of the locally-injected carrier is not especially critical. Too little voltage causes the speech to sound distorted. Too much causes the receiver to block up or become microphonic. However, the receiver a.v.c. may be switched on when a separate oscillator is used, and this will prevent blocking although the available gain may thereby be reduced. For greatest flexibility, the oscillator injection should probably be adjustable. Incidentally, some receivers, particularly the HQ-120, seem not to have very much b.f.o. voltage injected into the i.f. amplifier. Greater coupling here might help.

#### **Stability Considerations**

Virtually all receivers will drift while warming up after being thrown from "stand-by" to "on." It is therefore desirable to leave the receiver on during transmission and reception, if the b.f.o. is used for demodulation. A continuously-operating separate oscillator renders this procedure unnecessary. Moreover, receivers without voltage regulation of the local oscillator will shift frequency enough, when the line voltage changes by a minute amount, to throw the reinserted carrier off frequency when the b.f.o. is used for demodulation. One amateur had to retune every time his wife switched a light on and off upstairs! Sets like the AR-88 and the new HRO do have voltage regulation of the local oscillator, and are noticeably more stable with respect to line-voltage changes.

We have found that unless the receiver or the external oscillator is phenomenally stable, it will be necessary to retune from time to time to keep the reinserted carrier on the "nose" anyway. (The Collins 75A receiver seems to get away from this problem very nicely.) Even with an ECO — unless it is voltage-regulated and very, very stable — there will be appreciable drift, requiring occasional retuning. However, tests with two crystals of the same frequency — one in a variable air-gap holder — have shown that it is possible to maintain absolute zero beat even on 10 meters with 80-meter crystals, for considerable periods of time.

Exact zero beat may be found by varying the capacitance across the crystal holder for a vernier effect — most variable gaps give too coarse an adjustment. A set-up like this is reminiscent of a loran receiver, in which the pips remain at the same place on the screen for minutes at a time. Thus if two hams wanted to work regular skeds, they could use two crystals on the same frequency — one at the transmitter, and a variable one for carrier reinsertion at the receiver.

#### **Suppression of Carrier**

At first it was thought that radiation of a pilot carrier would be desirable. However, unless you are going to pick up this carrier, amplify and reinsert it, it does more harm than good, because if a b.f.o. or separate oscillator is used for carrier reinsertion, it will be found that a strong beat is set up between the pilot carrier and this oscillator when the reinserted carrier is not quite at the correct frequency, but yet not far enough off to affect the intelligibility seriously were the pilot carrier absent. By far the best results are obtained when the "pilot carrier" is completely suppressed.

#### **Using Receiver B.F.O.**

It seems to be true that when the receiver b.f.o. is used for carrier reinsertion, using extra crystal selectivity complicates the tuning procedure. This, in all likelihood, is because the incoming s.s.s.c. signal often ends up somewhere outside the receiver passband, if the b.f.o. is not set correctly, and is hence chopped off when the bandwidth is narrowed. It is not easy (as is most desirable) to get the signal properly centered in the receiver passband, and then to set the b.f.o. to the correct frequency! The whole process is greatly simplified when a separate oscillator is used. However, our signals have been received successfully by means of the b.f.o. on virtually every type of receiver, including the BC-312-type surplus set.

#### **Appearance on Panadapter**

Several amateurs have looked at the s.s.s.c. signals on the Hallicrafters panoramic adapter, and have reported that the s.s.s.c. signals are about  $\frac{2}{3}$  as broad as our conventional signal, whereas they should be only about one-third as broad. This is probably attributable to the poor resolution of the panoramic adapter, although on this point we haven't much experience as we haven't tried an adapter ourselves. At any rate the panoramic adapter owners unanimously conceded that the s.s.s.c. was somewhat narrower!

#### **Performance with DX**

We have had only three real DX contacts, not having tried for these especially, but the performance on these was what one would expect. In all cases they got us O.K. Actually, the 20-

meter band QRM between here and the East Coast is probably a tougher test than a DX contact. We would like to try a contact with a European during which the characteristic flutter fade was bad, however; it might be instructive to see how s.s.s.c. compares with double-sideband under those conditions. The ZS we worked had a good receiver and had no difficulty copying us. There seems to be some evidence, however, that if the signal is marginal the receiving operator tends to lose contact entirely unless his locally-reinserted carrier is right on the nose. Under those conditions the loss in intelligibility which comes when the local carrier is slightly off tune cannot be tolerated. However, when signals are strong, slight detuning — plus or minus 10 or 20 cycles or so — does not hurt as it is still possible to understand what is being said.

In general, the presence of strong heterodyne QRM makes finding the correct frequency for the local carrier considerably more difficult. For example, there is an almost irresistible temptation to zero-beat the local oscillator with one of the interfering carriers, and not to set it at the correct frequency for demodulation of the s.s.s.c. signal. This is purely a habit pattern of long standing which has to be consciously broken! Again, use of a separate carrier oscillator aids in reading through QRM, because the receiver may be readily detuned slightly to one side of the s.s.s.c. signal to avoid interference. However, it is worth pointing out that the crystal rejection notch can be used equally well when either the b.f.o. or a separate oscillator is employed for demodulation.

#### Some Misleading Impressions

Some amateurs, on hearing s.s.s.c. for the first time, will report the signal to be exceptionally "sharp." There seems to be a tendency to confuse the exactness with which the local carrier must be reinserted, with the "sharpness" of the signal. Some report, for example, that the signal is "broad" with the b.f.o. turned off, but "extremely sharp" with the b.f.o. on. Fig. 1 may explain this effect to some extent. Without the b.f.o. the receiver output will be the envelope of the s.s.s.c. signal, reduced in strength because of the detuning, and with the relative amplitude of its frequency components somewhat altered. In general, the audio output will be in the range 300-2500 cycles. (Not exactly, of course, as the envelope of an s.s.s.c. signal does not contain the same frequency components as the signal itself. But for a complex wave such as speech, it sounds roughly the same.) Now with the b.f.o. on, and centered, say, at the middle of the passband, the output of the receiver second detector in the example in Fig. 1 will be a band of frequencies in the range 4000-6500 c.p.s. These frequencies will tend to be rejected if the receiver has poor audio fidelity, and in any case the ear is not as sensitive

to them. Consequently the receiver output sounds weaker by comparison, and one gains the impression that the selectivity has been increased, as far as the s.s.s.c. signal is concerned, when the b.f.o. is turned on. It should be emphasized that reports on the sharpness — i.e., bandwidth — of the signal are best made with the aid of the crystal filter which, in its sharpest position, effectively turns the receiver into a manually-operated spectrum analyzer.

#### Miscellaneous Data on S.S.S.C. Tests

The first QSO was with W6VQD, Winfield G. Wagener, September 21, 1947, at 9:30 p.m. PST on 3970 kc. Win reported the signal Q5 S8 through heavy 75-meter QRM on his BC-348-Q

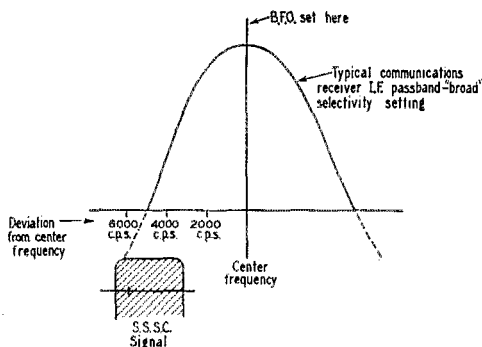


Fig. 1 — Why the detuned single-sideband signal sounds weaker with the b.f.o. on. Without the b.f.o., the rectified components of the detuned signal are more or less in the original audio range, but when the b.f.o. is switched on the signal components all beat with the b.f.o. to produce components of high audio frequency. These higher frequencies are amplified less in the audio system, and in addition do not seem as loud to the ear. The over-all effect is that the detuned signal tends to be suppressed.

receiver. He used the crystal filter and reported the quality good and the voice recognizable. The transmitter power was about 20 watts peak into a haywire antenna. W6ZTE is the campus station of the Stanford Radio Club; W6YX, the other transmitter, is located near the Ryan High Voltage Laboratory which is about one mile from the center of the campus. W6ZTE is located in the Electronics Research Building (part of Electrical Engineering Department) on the campus.

The higher-power rig was then built and was first tested over the air in a QSO with W0NWF on 20 meters on October 9, 1947. Peak envelope power output was gradually raised over a period of time to the present 400-watt (approximate) level. This is comparable to the 350 watts of peak sideband power provided by the regular W6YX transmitter running 1-kw. input, assuming an efficiency of 70 per cent. (Average sideband power

(Continued on page 126)

# A Single-Sideband Transmitter for Amateur Operation

*Circuit Details and Tuning Procedure for S.S.S.C. Transmission*

BY ARTHUR H. NICHOLS,\* WØTQK

• Here is a down-to-earth description of the equipment used to generate the 14-Mc. single-sideband suppressed-carrier signal at WØTQK. While a few of the circuits and components may be new to you, you will find that the only real requirement to getting started on amateur s.s.s.c. is rolling up your sleeves and diving into the thing. This rig was built in five evenings, from scratch and with no previous experience, and is a superb example of the really progressive amateur's spirit and ability!

THERE are five main considerations in the design and construction of a single-sideband suppressed-carrier transmitter. They are (1) as nearly complete suppression as possible of the carrier, (2) elimination of the unwanted sideband, (3) linear operation of the entire transmitter, (4) a minimum of spurious-frequency radiations, and (5) excellent frequency stability.

The first two objectives are obtained by using a balanced modulator and an adequate filter system. Linear operation is obtained by using Class A amplifiers wherever feasible. Spurious frequencies are minimized by using balanced modulators for all frequency conversions, with traps further to reduce the local-oscillator signal that might leak through. The use of crystal-controlled oscillators for the high-frequency signals, running continuously, results in excellent frequency stability. The low-frequency oscillator (9 kc.) is

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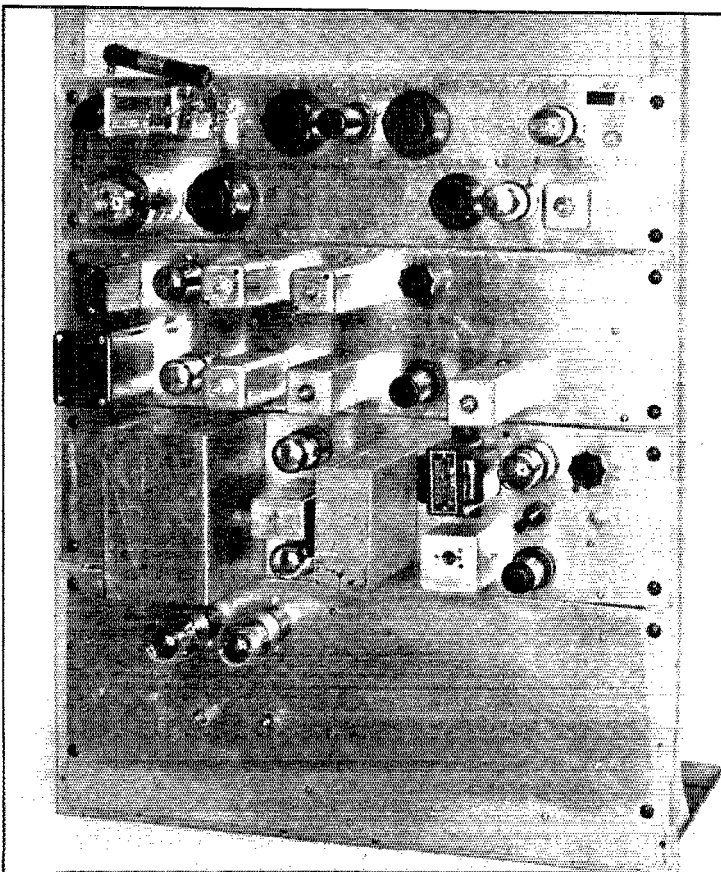
The s.s.s.c. exciter at WØTQK was built on four separate chassis. From the bottom up, they contain the power supply, the speech and first modulator, the second modulator, and the third modulator and output amplifier.

self-controlled, but its power is supplied by a regulated source and, in any event, it takes a large-percentage change to affect the output frequency appreciably.

The block diagram of Fig. 1 shows the various stages required to obtain 14-Mc. output from the original s.s.s.c. at 9 kc. The first modulator, with a carrier frequency of 9 kc., produces the upper and lower sidebands but cancels out the carrier in the output circuit. The first filter passes only the upper sideband. The second and third modulators and filters perform similar functions but on different frequencies.

## Circuit Details

If duplex operation is to be used in s.s.s.c. operation, the audio amplifier must have a low noise level, and the microphone must be insensitive to extraneous noise. Any noise or unwanted signal in the audio system will show up as modulation and hence as output, preventing full enjoyment of duplex operation. Further, poor response below 250 cycles in the audio end will make the job



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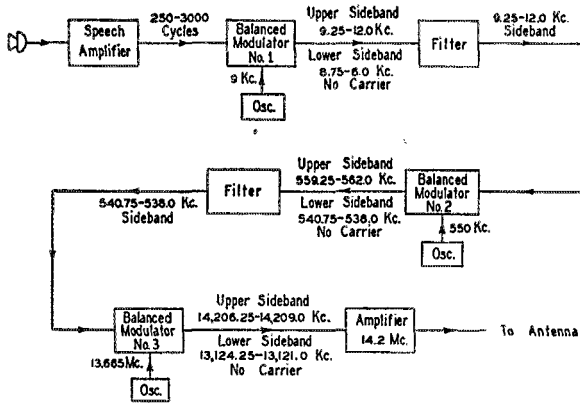


Fig. 1 — A block diagram of the W8TQK s.s.s.c. transmitter. Two frequency conversions are required after the original single sideband is obtained at 9 kc.

of the sideband-cutting filter easier. As shown in Fig. 2, a 6SL7 with the two sections in cascade was used in this rig, with a small coupling condenser to reduce the low-frequency response, and the amplifier has plenty of gain for working out of a crystal microphone. The 9-kc. oscillator coil was made by removing the iron from a p.p.-plates-to-voice-coil transformer and potting the windings in a small shield can filled with wax. Since transformers vary a great deal, the proper shunting capacitance to tune the circuit to 9 kc. must be found by trial. The 100- $\mu$ fd. variable condenser is used to set the oscillator frequency to the right point on the slope of the filter characteristic.

The "ring" modulator used in this first unit uses two 6SN7s connected as diodes. Both the carrier and modulating frequency are canceled out in the output of this arrangement, leaving

only the sideband products of modulation and some harmonics. The cancellation is theoretically perfect in an exactly-balanced system, but stock tubes worked satisfactorily in this instance.

Selected 1N34-type crystals might also be used in this application, or the Sylvania V-306 "varistor" unit, which is made up of four selected crystals, could be substituted.

The special balanced output transformer, T<sub>202</sub>, was wound specially (in the manner of the windings shown in Fig. 5) on a toroidal permalloy core. However, any high-grade transformer core should be satisfactory in this frequency range. In most cases a 1-to-1 turns ratio will be satisfactory.

The sideband filter is the one big headache in the production of single-sideband energy, and it is no small

problem. The one used in this equipment was a surplus item and is very difficult to locate. It has a characteristic as shown in Fig. 3. However, with the information given in Terman's *Engineering Handbook* and many other texts, an excellent filter can be constructed. When designing one, the steepest possible attenuation slope should be set on the oscillator side, while the other side merely serves to limit the higher-frequency sidebands. A cut-off frequency of about 3 kc. above the oscillator frequency seems desirable. If there is not enough attenuation above this point, the speech amplifier may be designed to furnish additional reduction. In any event, the sideband filter must have high attenuation at all frequencies above twice the oscillator frequency minus the highest audio frequency, to eliminate the lower sideband of the oscillator harmonic and all other higher-frequency signals. The frequency

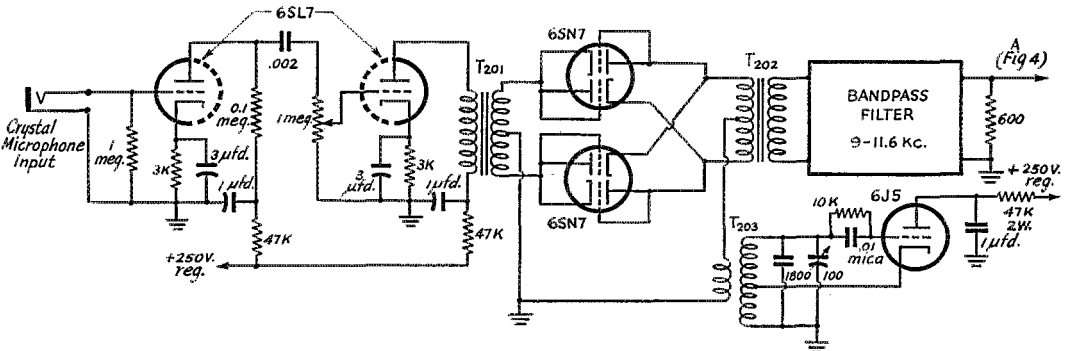


Fig. 2 — The speech amplifier, first balanced modulator, and sideband filter of the s.s.s.c. system of W8TQK. Resistors are 1-watt and capacitances in  $\mu$ fd. unless otherwise noted.

- T<sub>201</sub> — Single plate to 200-ohm line, center-tapped (Thordarson 55A15).
- T<sub>202</sub> — Balanced line-to-line, special (see text).
- T<sub>203</sub> — Push-pull plates to voice coil, with iron core removed.

The 1800- $\mu$ fd. shunting capacitor will vary with the winding used, and a capacitance necessary to tune the circuit to 9 kc. should be employed. The 100- $\mu$ fd. variable condenser gives a tuning range of about  $\pm$  125 cycles.

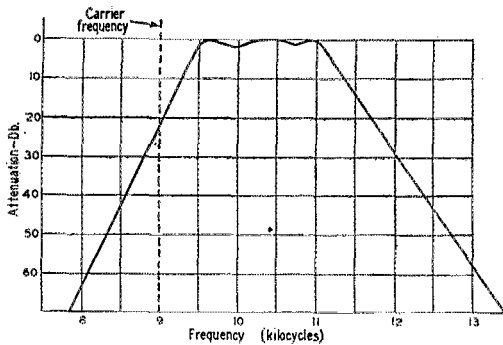


Fig. 3 — Transmission characteristic of the 9- to 11.6-kc. bandpass filter shown in Fig. 2. The rapid attenuation in the region between 9.5 and 8.5 kc. is the secret of the suppression of the lower sideband.

of this first filter is not at all critical and may be as high as 50 kc., but it must be remembered that we are after a steep slope in cycles and not in per cent. If too low a frequency is used, trouble will be encountered in the second filter when it tries to separate the upper and lower sidebands at that point. Since condensers are cheap and coils are hard to wind, a low design impedance of around 500 ohms makes construction easier. It goes without saying that high-Q coils are extremely desirable.

### Second Modulator

The second-modulator-and-filter unit operates on 540 kc. and is the simplest to build since, for the most part, conventional receiver i.f. technique is used. The wiring diagram is shown in

Fig. 4. Coils were obtained from junked i.f. transformers, with turns removed to permit them to resonate around 540 kc. It is desirable to have a tuning range in these transformers of a little more than twice the first-oscillator frequency (9 kc.) so that either sideband can be selected. A crystal oscillator was used in this section mainly because one was available in the junk box, but a good self-controlled oscillator, running continuously from a regulated power supply, should serve just as well. Injection voltage from this oscillator to the modulator was set at 2 volts, as was the case in the other two modulators, although this value is not very critical.

The output coil for the modulator gave a great deal of trouble in the original design stages, and the final design was hit upon only after filling the shack with what seemed like miles of No. 32 wire. This turned out to be a bifilar winding for the primary with a single scramble-wound secondary, as shown in Fig. 5, and it gives excellent balance. It is simple to construct, and is also used in the third-modulator grid circuit. Because of variations in construction, the necessary amount of shunting capacitance may have to be found by cut-and-try.

As in the first modulator, the selection of frequency for this section is not critical, but there are several factors to be considered. The frequency must be high enough so that the sidebands generated in the next modulator will be far enough apart to be readily separated by a filter. But the frequency of the oscillator in this second section must be low enough so that its following filter will not have to be too selective. Then, too, the procurement of components is always a

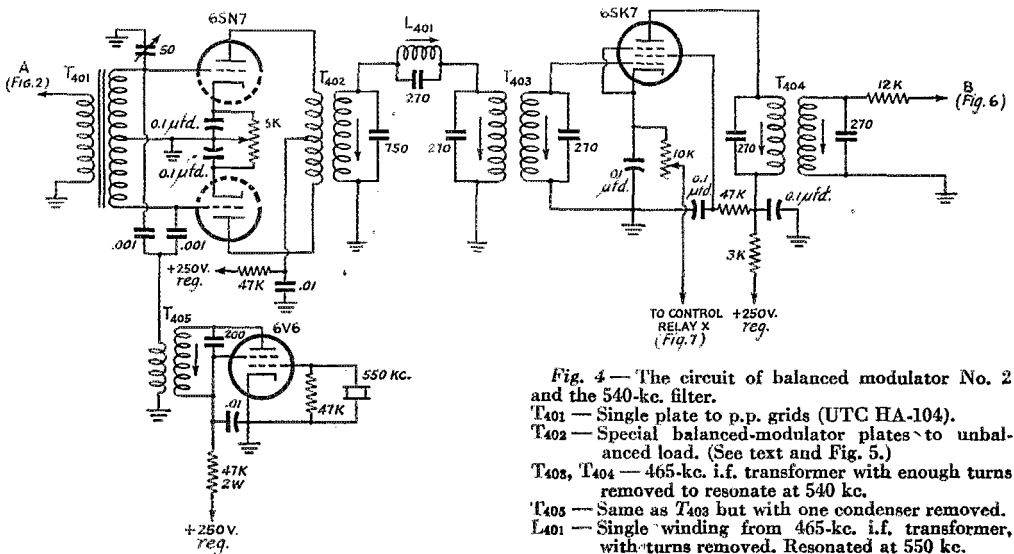


Fig. 4 — The circuit of balanced modulator No. 2 and the 540-kc. filter.

- T401 — Single plate to p.p. grids (UTC HA-104).
- T402 — Special balanced-modulator plates to unbalanced load. (See text and Fig. 5.)
- T403, T404 — 465-kc. i.f. transformer with enough turns removed to resonate at 540 kc.
- T405 — Same as T403 but with one condenser removed.
- L401 — Single winding from 465-kc. i.f. transformer, with turns removed. Resonated at 550 kc.

problem, particularly if they must be special, and so a frequency somewhere in the i.f. range of present-day receivers seems indicated. It is also a great help to be able to listen to the output of this stage in a receiver, and so the low-frequency end of the broadcast band seems to be a logical spot.

### Third Modulator

The frequency of the third section, and consequently the selection of components, depends entirely on which amateur band is to be used, and the preceding frequencies. Since only 14-Mc. operation was planned in this instance, an oscillator frequency around 13,600 kc. was needed, and a crystal ground for working in the 11-meter band filled the bill nicely. The wiring diagram of the third-modulator section and the following amplifiers is shown in Fig. 6. A 6SL7 in an oscillator-doubler combination gave the required 2-volt signal, and the coils in these stages were shielded to prevent any strays from getting into the output amplifiers and causing out-of-band radiations. The output of the third modulator is low, as in the other modulator stages, but a single 6SG7 operating Class A brought the signal up to about 15 volts, ample to drive an 807 as a second Class A amplifier. Since the over-all gain of these two stages is very high, it is essential to use complete shielding as well as parasitic suppressors in the 807 stage. If the stage driven by the 807 does not operate as a zero-bias Class B stage (and

hence load the 807 at all times), it is necessary to use a loading resistor across the 807 tank. In our case the 807 stage was loaded by a 4000-ohm resistor, since the 807 is used to drive a pair of 813s. The peak output power of the 807 stage appears to be about 10 watts, and it is ample to drive the 813s to 1-kilowatt peak input.

### Power Supply

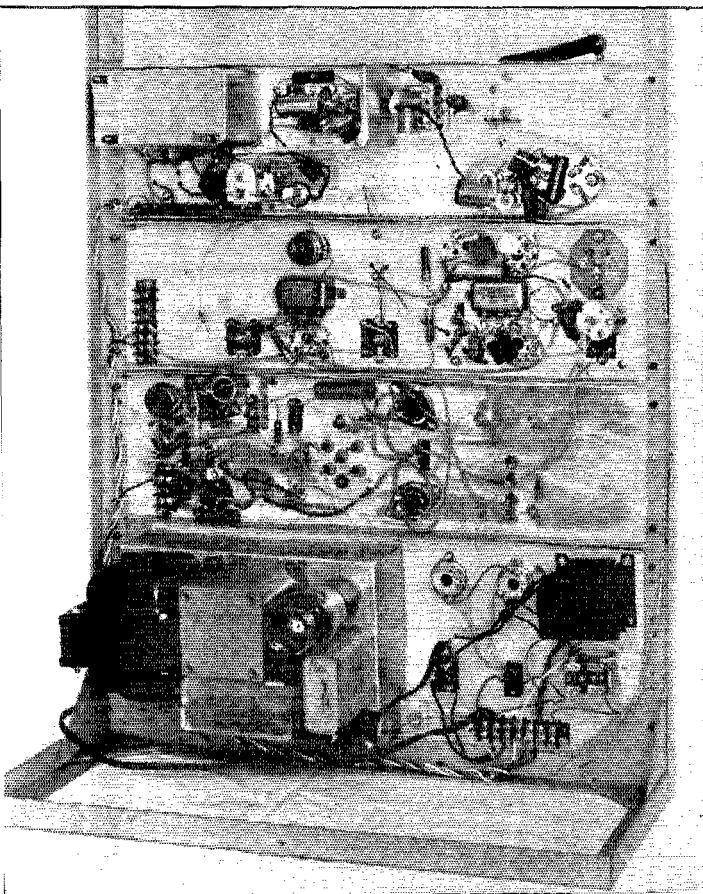
There is little to be said about the power supply, since it is conventional in every way. However, the wiring diagram is shown in Fig. 7, since the control circuits are also included in this unit. The control circuit is a d.p.s.t. relay that opens the cathode circuit of the 6SK7 540-kc. amplifier and the plate power to the 807 stage. The oscillators are allowed to run continuously, to minimize frequency drift.

### Construction

The entire exciter, including the power supply and control circuits, is mounted on a 30-inch relay rack. In the interest of economy and ease of construction, panels were made of 0.050-inch aluminum (bought in surplus) with the top and bottom edges turned back to strengthen the panel. In spite of the thin material there is ample strength to support the heaviest components, and a great deal of time and labor was saved by working in aluminum instead of steel. All tube sockets are mounted on these panels, which puts all of the tubes on the fronts of the panels, and the wiring becomes a simple matter. Although this type of construction does not conserve space, it is invaluable in testing and development. The author had never seen another single-sideband rig, and so all sorts of serious difficulties were anticipated. Fortunately, they weren't encountered.

The power supply, borrowed from another rig in the station, was bolted on the back of the lower panel.

Since three frequency conversions are used, and the signal is at



◆  
A rear view of the s.s.s.c. exciter shows the relatively simple lash-up required to get going. The entire unit was built from scratch in less than a week, with no attempt to make the thing beautiful. Most of the parts will be readily identified by comparison with the several wiring diagrams.



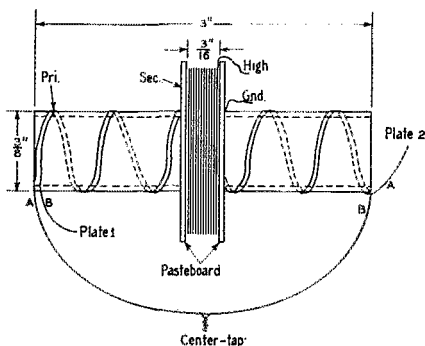


Fig. 5 — Winding details of the  $T_{402}$  of Fig. 4. The primary consists of two strands of No. 32 d.s.c., close-wound parallel for a winding length of 2 inches. The secondary is 50 turns of No. 32 d.s.c., scramble-wound between two pasteboard rings. Several layers of writing paper are wound over the primary before starting the secondary. The coil is tuned with a 1-inch powdered-iron slug.

a low level most of the time, shielding is not necessary on the first two modulator units, other than the usual shield cans around the i.f. coils. The third-modulator assembly deals with frequencies near the output frequency and signals of a higher level, and so shielding between stages is essential. The high-frequency oscillator and multiplier are completely enclosed, and the 807 has its plate circuit on the front of the panel, and obviously not for aesthetic reasons!

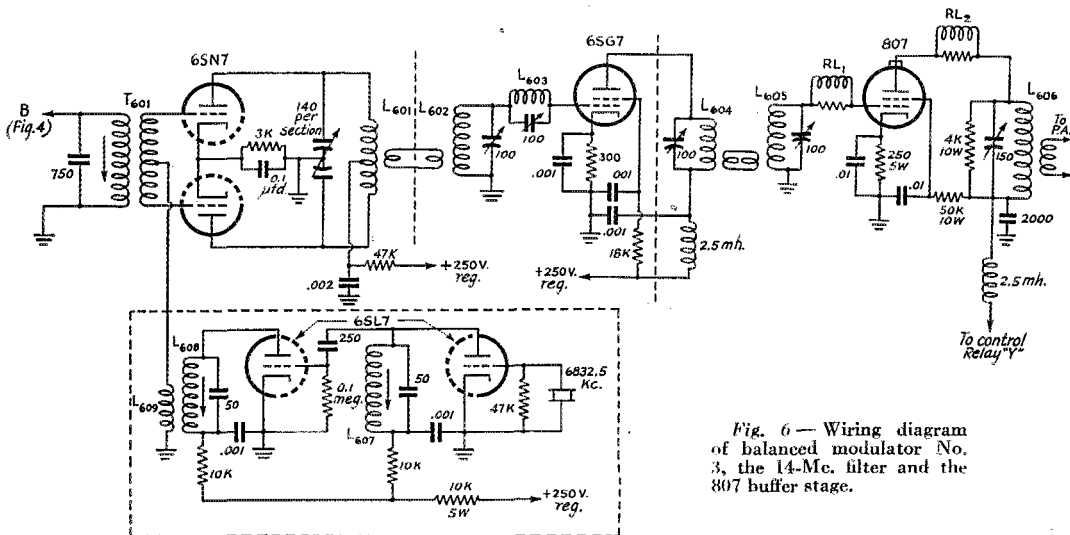


Fig. 6 — Wiring diagram of balanced modulator No. 3, the 14-Mc. filter and the 807 buffer stage.

- $L_{601}$  through  $L_{606}$  — 14 turns air-wound,  $\frac{3}{8}$ -inch diameter, 0.85 inch long (B & W Miniductors). Link windings are 2 turns at ground ends of coils.
- $L_{603}$  — Tuned to 13,665 kc. with mica compression trimmer.
- $L_{607}$  — 18 turns No. 18 s.c.e., close-wound on  $\frac{1}{2}$ -inch diam. tubing.

- $L_{608}$  — 9 turns No. 18 s.c.e., close-wound on  $\frac{1}{2}$ -inch diameter tubing.
- $L_{609}$  — 8 turns No. 18 s.c.e., close-wound on same tubing as  $L_{608}$ , spaced  $\frac{3}{8}$  inch.
- $RL_1, RL_2$  — 6 turns No. 18 wound over 100-ohm 2-watt resistor.
- $T_{601}$  — Same as  $T_{402}$ , Figs. 4 and 5.

### Additional Amplifiers

It is to be assumed that more than the 10 watts of s.s.s.c. energy furnished by this exciter will be wanted at the average station, although this exciter will compete very well with conventional rigs having about 10 times the output.

The mere mention of a Class B r.f. amplifier seems to put the damper on the enthusiasm of most amateurs, but it shouldn't be so. Very few hesitate to use a Class B audio amplifier as a modulator, and they seldom run into trouble. Any amplifier following this exciter should operate in the same manner as a Class B audio amplifier, since the carrier has been completely suppressed. Any tube that is suitable for r.f. applications will work well, provided it is properly neutralized and the operating voltages set as for Class B audio work. The ratio of peak to average power in speech being about 10 to 1 (depending upon the voice and microphone), quite high peak output can be obtained with low plate dissipation. Although the theoretical maximum efficiency of this type of amplifier is 78 per cent at full output, even the actual peak operating efficiency of 50 to 65 per cent will compare favorably with any Class C amplifier. As in all Class B amplifiers, the efficiency is proportional to the exciting grid voltage, within the range of linearity.

A pair of 811s or 805s would make an excellent final amplifier, although a single tube is just as satisfactory. The use of zero-bias tubes eliminates

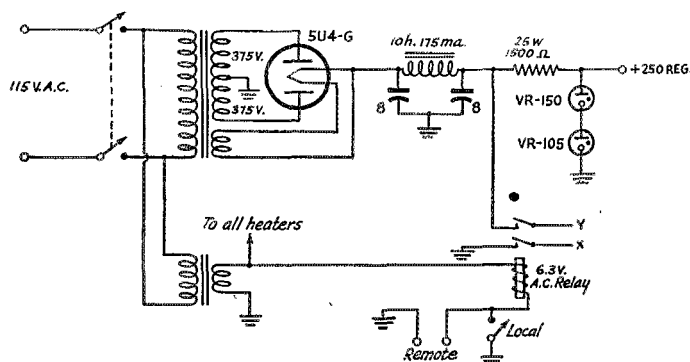


Fig. 7—The power supply and control circuit for the s.s.s.c. exciter.

the need for a fixed-bias supply and its rigid requirement of constant voltage (necessary if the amplifier is to remain linear throughout its range.)

The second rig in this station used a pair of 813s in a neutralized push-pull final, so all that was necessary was to run a link from the s.s.s.c. exciter over to their grids and to short out the resistor bias in the 813 amplifier. The tubes are run with 600 volts on the screens, 2000 volts on the plates, and the bias is adjusted to give a zero-signal plate current of 40 ma. With full signal the plate current rises to 470 ma. The tubes show no color during normal voice modulation. To attest to the completeness of the carrier suppression, when there is no audio signal a small 2.5-volt dial lamp can be coupled to the output tank of the 813s and it will show no sign of any r.f. But the experiment should be tried with the microphone circuit closed, because it doesn't take much to burn out the bulb in a hurry!

#### Transmitter Tuning Procedure

The tuning of an s.s.s.c. rig is very straightforward and, incidentally, quite interesting. The first thing to remember is that nothing can be done without an audio signal! After the frequency of the first oscillator (9 kc. approximately) has been set well down on the slope of the sideband filter, a tone signal of about 1000 cycles is fed into the speech amplifier. For this tone we use the c.w. beat-note obtained by tuning the station receiver to the 18th harmonic of a 100-kc. frequency standard. (The 1800-kc. signal is convenient; the receiver is stable at that frequency, and there is no QRM.)

A vacuum-tube voltmeter would be very handy for tuning, but there is none in our shack so a 1N34 crystal and a 20,000-ohms-per-volt meter do very well. If everything is correct, a reading should be obtained at the second-modulator plate coil,  $T_{402}$ , under modulation. This coil is tuned for maximum output on the desired sideband, as are all of the coils in the second stage ( $T_{403}$ ,  $T_{404}$ ). Of course the crystal-oscillator stage

must be checked first for operation, because an audio signal is used. The 1N34 voltmeter across the secondary of  $T_{405}$  will indicate output when the oscillator is working.

The third, or output, section is tuned in the same manner by peaking each circuit for maximum output. When all circuits have been tuned, with the exception of the traps,  $L_{401}$  and  $L_{603}$ , the second modulator (Fig. 4) must be balanced. The controls for doing this are the 5000-ohm potentiometer in the cathode

circuit of the 6SN7 modulator and the 50- $\mu$ fd. variable from one grid to ground. A receiver tuned to 550 kc. should be coupled to the output (point B) and the 5000-ohm potentiometer adjusted for minimum signal. The 50- $\mu$ fd. condenser is to compensate for capacitive unbalance in the secondary of  $T_{401}$ , and it may have to be increased in capacitance or connected to the other grid, depending upon the construction of the transformer. When minimum reading has been obtained with these two controls, the 550-kc. trap should be tuned to eliminate the last of the oscillator signal. The high-frequency trap in the grid circuit of the 6SG7 ( $L_{603}$ ) is tuned by listening to the 13.6-Mc. signal and tuning for minimum. As a final check on the carrier suppression, it should be possible to couple a flashlight bulb to the output tank and have no indication of r.f. when there is no audio signal.

#### Operation

Until such a time as this type of transmission is either in greater use on the amateur bands or more operators are aware of its existence, the problem of establishing contact will remain a large one, but with interest shown it is not insurmountable. Three systems have been tried at this station with varying degrees of success. The first is to contact the station with the main 1-kw. rig set on the same frequency and then, after informing the receiver station of the proper tuning procedure, to switch rigs. This has worked in almost all cases, but occasionally we will get the report that the *f.m.* is not working! The second method is to call CQ, or another station, on single sideband and hope for the best. Surprising as it may seem, many contacts have been secured this way. The third system, which incidentally places the transmitter in a queer mode of operation, is to feed a small amount of 9-kc. signal around the first modulator and filter unit and use this as a carrier. Plate dissipation on the final-stage runs high this way, and the allowable power output is cut down.

(Continued on page 88)

# Any DX Today?

*M.U.F. — The Time, Distance and Direction*

BY D. W. HEIGHTMAN,\* G6DH

WITH no more complicated apparatus than a sensitive general-coverage receiver for 25-60 Mc., plus a reasonable amount of common sense, much can be learned about the vagaries of that somewhat elusive medium on which we chiefly depend for our DX communication — the ionosphere. While most of us are probably interested in the *effect* rather than the cause, from a practical standpoint, we can also save much wasted time and watts by knowing roughly what frequency band to use, and when to use it, for any particular direction and distance. We can also, if we are so minded, take advantage of DX openings in the 5-, 6- and 10-meter bands which have, unfortunately, in the past been so frequently missed by many of the amateur fraternity.

The following is, then, an effort to indicate in simple terms the methods to follow in making these checks on "conditions," and also a record of past observations of the writer and others — which records always serve as a useful indication as to what may happen in the future. There are now many references in textbooks and other publications<sup>1</sup> to the subject of ionospheric propagation but, in order that we should have a fairly clear picture of what we are talking about, the main features will be summarized as we proceed.

## *Ionospheric Layers*

Primarily, of course, we rely on the fact that the upper atmosphere is ionized, chiefly by the sun's radiations, and for this reason the main factors in deciding conditions prevailing at any particular time over a given path are the position of that path on the earth in relation to the sun, and also the intensity and type of radiation received from the sun at that time. The relative importance of *corpuscular* as opposed to *ultraviolet-wave* ionization of the upper atmosphere is not at all clear at the present time.

The ionization is normally somewhat stratified in what we know as *E*, *F*, and *F*<sub>2</sub> layers with a *D* region below the *E*, and "sporadic *E*," clouds of very high ionization about the *E*-layer height. The maximum ionization in the *E* region occurs at a height of about 100 km. while the *F*<sub>1</sub> is concentrated around 200 km. and *F*<sub>2</sub> 350 km. At nighttime and in winter daytime *F*<sub>1</sub> and *F*<sub>2</sub>

\* Those of us who work on 50 Mc. have, in recent months, become acutely conscious of those magic letters, "m.u.f.," and we are inclined to think of the observation of maximum usable frequency as something quite new. The author of this article has, however, been studying v.h.f. DX propagation diligently for many years, keeping detailed daily records of maximum usable frequency for *F*<sub>2</sub> propagation over most of the world. His observations have carried through more than a complete 11-year sunspot cycle. What G6DH has to say regarding m.u.f. observation is of first importance to all who would make the most of time spent in work on the higher frequencies. The technique he outlines is concerned primarily with 50-Mc. DX at present, but the DX aspirant on any of the lower frequencies will find it useful, come a sunspot minimum.

combine to form a single *F* layer around 250 km. These heights are, of course, subject to day-to-day variation.

On frequencies over, say, 25 Mc., signals are reflected chiefly in the *F*<sub>2</sub> or *F* region, because the ionization density is greatest there, particularly in winter months. In the summer period however, from May to August in the northern hemisphere, the sporadic-*E* ionization is often of such intensity as to reflect signals of higher than 60 Mc., while the *F*<sub>2</sub> ionization is very much less than in winter. The accepted method of measurement of virtual height of the layers and, indirectly, of the ionization density, is to send short-wave pulses up vertically to the ionosphere and measure the elapsed time until the reflected waves are returned to the sending point. The time taken, go and return, is shown on a cathode-ray tube and hence the effective height of the layer can be ascertained. As the frequency is increased, we reach the "critical frequency" at which signals are barely returned, while any higher frequencies pass right through the ionized region and are not reflected, unless there is a layer above having a higher ionization density. Thus we refer to the critical frequency of a layer rather than its ionization density, and the critical frequency gives us an index to conditions prevailing overhead at any particular time.

\*234 Burrs Road, Clacton, Essex, England.

<sup>1</sup> Notably *CRPL Radio Propagation Handbook*, National Bureau of Standards, Washington, D. C.

For low-angle (horizontal) transmission the highest frequency returned to ground (some distance away) is obviously much higher than the critical frequency (for vertical transmission), since in this case the amount of bending required is much less. The highest frequency we can use for a given distance at any particular time is called the maximum usable frequency (m.u.f.). Obviously, the maximum distance we can cover in one hop will depend on the layer height and the effective height of the transmitter and receiver. The question of distance and m.u.f. is discussed in more detail later. When we refer to m.u.f., unless otherwise stated, we mean the m.u.f. for the most favorable distance (generally about 3000-4000 km. for the  $F_2$  layer). The m.u.f. for a shorter or longer distance would be less.

### Amateur M.U.F. Checks

While for obvious reasons the average amateur cannot measure the critical frequency he can, quite easily, obtain a reasonably accurate check on the m.u.f. by the simple expedient of tuning on his receiver upward from, say, 25 Mc., and continuously until no further signals are heard, noting the highest-frequency signals received.

Nowadays, there are so many transmitters, in various parts of the world, operating on the higher frequencies or producing harmonics in the 30-60 Mc. region that one can be practically certain of receiving some sort of signal almost up to the m.u.f. Many commercial telegraph stations oblige by sending their calls at frequent intervals preceded by "Vs" or "QRA de," which is, of course, a very useful feature. The fact that near the m.u.f. the attenuation of signals because of absorption and other effects, is least, is of assistance, in that the signals checked need not have high power.

Initially, it may be found a little tedious, identifying and locating the various signals heard (especially when they are high-speed commercials!) but with a little experience one soon gets to know the "regulars." The acquisition of a copy of the *Berne List*, which gives locations and frequencies of almost all stations throughout the world, is very helpful in this respect. It is also essential to learn to differentiate between comparatively local ground-wave or tropospheric signals and the DX ones.

A long-wire antenna, part vertical and the rest horizontal, has been found quite suitable for this general-coverage reception. Care should be taken, however, to see that the antenna used does not have dead spots in the frequency range to be observed.

It will generally be found best to locate check signals every two or three megacycles, from about 25 Mc. upward, and from directions roughly at each of the eight compass points. Once these signals are known it need only take a

few minutes to get a reasonably accurate check on prevailing conditions and possibilities.

The writer's records, discussed below, have been obtained using the above simple methods. Compared with measurement of critical frequencies this system of checking path m.u.f. has one distinct advantage, i.e., the critical-frequency measurement only tells us the state of the ionosphere immediately overhead (and not where our signal will meet it some 1200 miles distant) whereas the m.u.f. check is made under actual working conditions. Critical-frequency measurements therefore involve some prediction of path m.u.f. an hour or two ahead.

### Factors Influencing M.U.F.

As we already know, the m.u.f. will be dependent on time, location, distance and direction. It is convenient to go into rather more detail under these subheadings:

*Time:* In addition to minor, continuous and unpredictable variations in m.u.f., there are average long- and short-period changes which occur with some predictable regularity. First we have the solar-cycle variation, from maximum to minimum, of about five to six years. Fig. 1, from

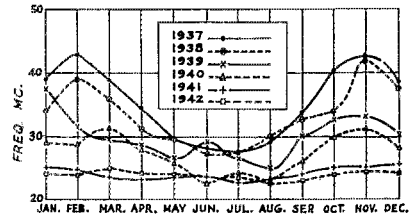


Fig. 1 — Average monthly daytime m.u.f. for years 1937-1942, for all directions, from records at G6DH. Peak days were 10 to 15 per cent above averages shown. Note small variation, winter to summer, for 1941-1942, a sunspot minimum, and high winter peaks of the 1937 maximum.

the records at G6DH, represents the average monthly  $F_2$  m.u.f. for all directions from the maximum in 1937 to the minimum in 1942. The considerable drop in m.u.f., particularly the winter m.u.f., from sunspot maximum to minimum is quite marked; so also, is the second seasonal change in m.u.f. already referred to above. Note the peak periods of February-March and October-November.

The fact that the  $F$  layer has a greater ionization density in the winter months is a somewhat unexpected result. One might expect, with the northern hemisphere coming more directly under the sun's radiation in summer, that ionization would be greater in summer.<sup>2</sup> Only the  $E$  layer

<sup>2</sup> The sun is actually closer to the northern hemisphere in winter than in summer. Its lesser heating effect is the result of the low angle at which it strikes the earth's surface. — Ed.

follows the expected trend, however. From mid-winter up to about February the average  $F_2$ -layer ionization increases; thereafter, coincident with the splitting of the  $F$  region in daytime into  $F_1$  and  $F_2$  layers, the  $F_2$  ionization drops, reaching a minimum in midsummer. By October–November it reaches another peak and then lessens somewhat toward midwinter.

This description of seasonal variation applies to the northern hemisphere. The situation in the southern hemisphere will be more or less opposite but does not yet appear to have been clarified and the observations of people working on similar lines "down south" would be welcome. It is also interesting to note from Fig. 1 that the variation in m.u.f. is far less marked from winter to summer in sunspot-minimum years; a bare 10 per cent instead of 60 per cent or more.

According to the writer's experience, sporadic- $E$  occurrence over 30 Mc. also peaks in sunspot-maximum years, although the *CRPL Propagation Handbook* mentions an "apparent increase in sporadic- $E$  occurrence with decreasing sunspot number." Generally speaking, it is apparent that further evidence is necessary in respect of sporadic  $E$ , before conclusions can be drawn. Comparing June and July 1937 with the same months in 1942, the number of days on which sporadic- $E$  reflections were observed by the writer on or over 50 Mc. was: 1937 — June, 7 days, July, 11 days; 1942 — June, 2 days, July, 1 day.

Another point is that if we acknowledge, to some extent, a 27-day cycle in  $E_s$  (sporadic- $E$ ) occurrence, then this must be attributed to sunspots. This being so,  $E_s$  would be expected to peak in sunspot-maximum years. As has already been mentioned, sporadic  $E$  peaks in the spring and summer months.

The third cyclic variation — generally not too reliable — is that caused by the sun's rotation, approximately 27.25 days. If there has been an abnormally high peak in m.u.f. on any particular day and path this will generally be caused by increased radiation from the sun occurring near a sunspot or spots. Hence, if there are no great changes on this particular part of the sun's surface on the next solar rotation, similar peak conditions may be expected. Unfortunately, since the sun's radiation varies between extremely wide limits over a comparatively short distance in the spot area, it may well happen that instead of a peak in conditions an ionosphere storm or other disturbance occurs with the next rotation. Also, because of this very variable radiation, peak conditions may occur over one part of the earth while, over another part, conditions may be subnormal. Matters will, obviously, also become complicated if there are several sunspots in fairly-close proximity.

This 27–28 day trend can be followed, to some extent, from Fig. 2, which shows variations in the

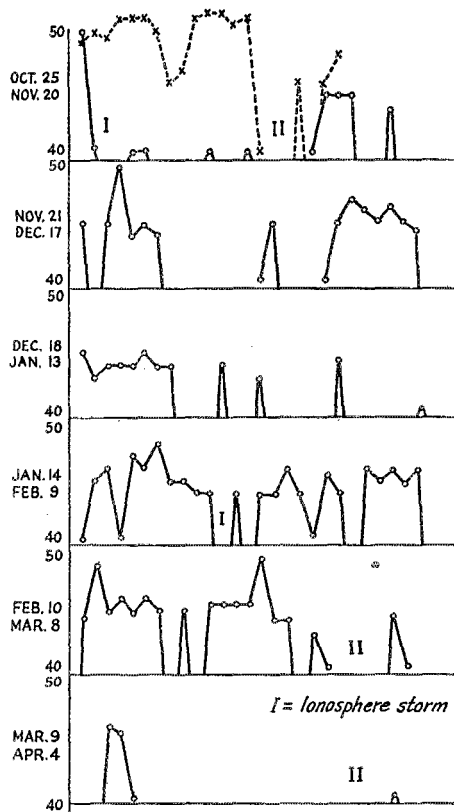


Fig. 2 — Daily  $F_2$  peak m.u.f. for winter of 1946–47 compared on a 27-day cycle basis. Figures are based on reception of east coast U.S.A. stations at G6DH. The broken line, top, gives m.u.f. peaks for the same days in October and November, 1947, for comparison.

$F_2$  m.u.f. to the U.S.A. during the winter of 1946–47; also from Fig. 3 showing the  $E_s$  openings of the summer of 1947. The 27–28 day cycle is considerably more apparent from B of Fig. 3 where times and daily durations are considered. Note particularly the similarity of the patterns of the June and July peak periods. Looking at A of Fig. 3, which only gives the daily peak frequencies, one can see little evidence of this cycle. At best, all we may say is that the 27-day cycle gives us a reasonably good guide as to when we may expect a repetition of conditions, good, bad or indifferent. This is particularly true if only one or two repetitions are taken into account and suitable revisions in predictions are made as each cycle occurs.

Fourthly, we have the diurnal or daily variations in m.u.f. Fig. 4 gives examples of the trend of the  $F_2$  m.u.f. through the day for different directions on various types of days, disturbed and otherwise, in England.

The rise in m.u.f. is often extremely rapid. In the early mornings particularly, for instance, within 10 to 20 minutes it will rise from 25 to over 40 Mc. On some days this steep gradient is continued up to near 50 Mc., remaining there for maybe 10 minutes and then dropping to the 40-45 limit again. On other days, there will be a steep increase to 40-42 Mc. after which the curve flattens to remain at this value. There may then be a later sharp peak from this frequency to 50 Mc. or thereabouts. Yet other days show several fluctuations between the 40- and 50-Mc. limits. Generally speaking, one of the best indications of a good day for 50-Mc. DX will be an early and sharp m.u.f. built up at dawn. It is found, also, that prolongation of the decline in evening m.u.f. to the west means that the following day will be good. This fall in m.u.f. can be so gradual that the 28-Mc. band remains open two hours or more after average closing time.

It frequently happens, under stable conditions, that on mornings when the m.u.f. is high to the east similar conditions are repeated in the afternoons to the west. In other words, stations on similar latitudes experience similar east-west m.u.f.s on any particular day though, of course, minor fluctuations take place. This fact can give a four-hour warning of high westerly m.u.f. If, for instance, we find in England high m.u.f. to Russia in the early morning, the same pattern can be expected to be followed to the U.S.A. direction in their early morning, which is early afternoon in England. A, of Fig. 4, is a good example of this. Under disturbed conditions, however, the opposite may be true — a complete blackout to the east with the western m. u. f. or vice versa.

Apart from a week or two at the equinoxes, it seldom occurs that the m.u.f. is high north and south of the equator simultaneously. This fact has often been made apparent from the daily re-

ports on the m.u.f. in South Africa at ZS1P (given on 28.3 Mc. at 1130 GCT). When he has reported, say, 47-Mc. m.u.f., often, in England, the m.u.f. has been found to be ten or more megacycles lower.

It is interesting to note that on ionospherically-disturbed days when the m.u.f. to the northeast and northwest directions is extremely low, sharp peaks occur in the m.u.f. to southerly directions, especially around midday. Examples of such days during 1947 were March 26th, 29th, and October 11th, 15th, when PA9UN, Eindhoven, Holland, was received in Capetown and South African signals were received in England. On the other hand, however, there have been one or two days, notably October 4th and 17th, when again South African stations were received in Europe, on which the northwest m.u.f. was fairly normal and no apparent ionospheric disturbance was taking place. We can only conclude therefore that while under disturbed conditions the north-south m.u.f. is likely to be high, such conditions are not necessarily essential for high north-south m.u.f. B, of Fig. 4, shows the sharp midday southerly peaks of a disturbed day with extremely-low morning and evening m.u.f., and low m.u.f. east and west.

Under disturbed conditions it appears, at times, that sporadic *E* is playing a considerable part in propagation because the received signals have the characteristics of those normally received by this form of reflection, i.e., very strong peaks but spasmodic in appearance. Presumably, part of the path is covered by  $F_2$  reflection and  $E_s$  fills in the gaps.

Considering  $E_s$  daily variations, Fig. 3-B depicts the times and directions of occurrences observed at G6DH during the summer of 1947. From this it will be obvious, as is well known to those who have worked on the 5- and 6-meter bands, that  $E_s$  follows no definite pattern and it

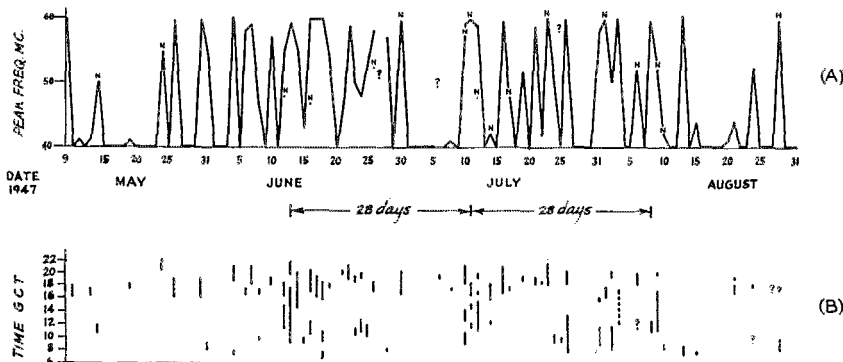


Fig. 3 — Sporadic-*E* openings observed at G6DH during the summer of 1947. A, peak m.u.f., over 40 Mc., B, duration and time of day of observed openings. The record is fairly complete, but occasional short periods were missed. Where the letter *N* appears, reflections were of the northerly, or auroral, type. Note similarity of June-July 27-28 day periods.

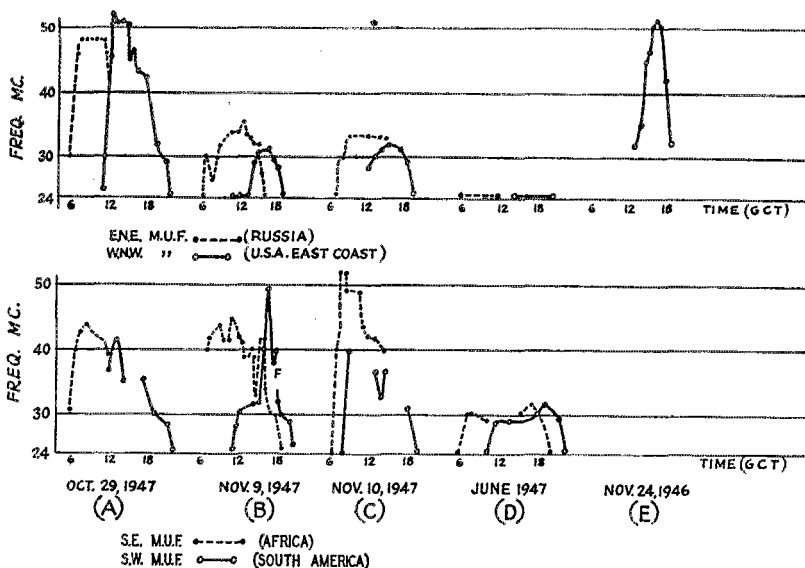


Fig. 4—Examples of daytime  $F_2$  m.u.f. variations for various directions. A is an example of a very good day for U.S.A.—Europe on 50 Mc. Note rapid build-up in early morning, the W.N.W. outline running parallel to the earlier E.N.E. one. The S.E. and S.W. m.u.f. are not very high. B and C are examples of days having northerly ionospheric disturbance. Note the very low E.N.E. and W.N.W. m.u.f., yet high peaks in southerly directions, first to S.W., then to S.E. E is the m.u.f. outline for Nov. 24, 1946, when the 50-Mc. signals of W1HDQ were first heard across the Atlantic. D is a normal day in June, 1947.

is not possible to give any accurate predictions of occurrence. The early evening from 1700 to 2000 generally, however, provides the majority of openings.

From the foregoing it will be gathered that it is not possible to forecast exactly at what time the m.u.f. peak will occur over any particular path on a particular day but it is normally possible to estimate this within an hour or two. While in the winter months the peak will occur when it is about midday, at a point midway over a given path, with the approach of summer there tends to be a drop at midday with peaks at morning and evening.

**Distances:** During the winter of 1946–47 it was found that the optimum distance for  $F_2$  transmission, over 45 Mc., was of the order of 2500 miles, being a minimum in midwinter and increasing toward the equinoxes, coincident with the increase in layer height. Signals observed were generally from directions between E.N.E. and S.E. from England. While the m.u.f. was probably similar in the opposite directions, unfortunately the optimum distance brought us to mid-Atlantic with no signals for checking purposes. The m.u.f. for distances over 2500 miles was almost always less.

The distance of 2500 miles (or 4000 km.) is generally accepted as the maximum distance for single-hop  $F^oF_2$ -layer transmission, based on the average layer height and the maximum distance covered by a signal leaving almost tangentially to the earth's surface. There would appear to be

no reason why double-hop  $F_2$  transmission<sup>3</sup> in the 45–50 Mc. region should not take place but, apart from north-south transequator transmission about the equinoxes, the distribution of sunlight is, normally, too irregular to allow this to take place; i.e., while the m.u.f. at one end may be high, at the other it is too low.

Any very-long-distance contacts that have taken place on 50 Mc. have all been of the transequator type (i.e., over 5000 miles). More recent tests with 50-Mc. South African stations have tended to show that prolongation of the distance covered may be brought about by combinations of  $F_2$ , sporadic  $E$ , and also tropospheric reflection.

The average sporadic- $E_s$  skip distance over 50 Mc. during the summer of 1947 was 750 miles while the maximum coverage was 1300 miles. There was almost no evidence of double-hop transmission.<sup>4</sup>

An additional and useful factor in checking the m.u.f. can be the observation of the skip distance

<sup>3</sup> The "control-point" theory, upon which propagation predictions are based, denies the existence of double-hop  $F_2$ -layer propagation. It assumes a control point 1200 miles from either end along the great-circle path between two stations in question. Regardless of distance, then,  $F_2$  propagation will take place if the m.u.f. at the two control points is up to the frequency in use. The minimum distance will be, as the author states, something in the vicinity of 2500 miles, but the maximum may be anything. Propagation beyond the control point is assumed to be analogous to that in a wave guide, and the signal may be heard at any point beyond twice the control-point distance. — Ed.

(i.e., minimum distance over which strong signals are received) on, say 28, Mc. In this respect the writer has found the following approximation to be sufficiently accurate:

$$F_2 = \frac{280}{d} + 15.5$$

where  $F_2 = 2500$  miles m.u.f. (i.e., the highest m.u.f.) and  $d =$  skip distance in hundreds of miles on 28 Mc. From this it will be seen that for 50-Mc. propagation to be possible over 2500 miles the skip on 28 Mc. should be down to 800 miles ( $F_2 = 280/8 + 15.5 = 50.5$ ). In using this check care should be taken not to confuse sporadic  $E$ , rebound, and other types of signals with true  $F_2$  ones. Also, the formula is only reasonably accurate for 28 Mc., there being a great deal of difference between skip at either end of the amateur 28-29.7 Mc. band.

*Location:* Generalizing from the NBS and other prediction charts, the highest m.u.f. occurs north and south of the equator in the 20° latitudes, with a progressive and gradual drop as the latitude becomes higher north or south. An unexpected and very considerable drop in m.u.f. frequently is shown to occur over the equatorial regions, with a very steep gradient from the equator to the 20° latitudes. On this basis, stations in the 20°-30° latitudes should (during sunspot-maximum years) be ideally situated for contacts on frequencies of the order of 50 Mc., especially over 2500-mile paths running parallel to the equator. Unfortunately, from this point of view, activity of stations in these parts of the world on frequencies over 30 Mc. has been very low in the past. However, it now seems that a good deal of interest is being shown and with consistent activity we may hope for some very interesting results, some already having been obtained, particularly by our friend, Major Ken Ellis, MD5KW, operating currently on 50 Mc. in the Suez Canal zone.

M.u.f. observations are always complicated by the irregular distribution of land over the globe and the lack of activity in certain parts. Hence the more regular activity we can get the sooner our knowledge of these matters will be supplemented. In this respect the short-wave listener could contribute much useful information — far more than in sending QSLs to 14-Mc. DX stations who don't need or want them!

Paths running near to the magnetic poles of the earth are subject to fairly frequent interruption because of ionosphere storms, and, except

under abnormal conditions, do not have high m.u.f.; hence contact with countries in northerly latitudes or over long distances, where the great-circle path passes higher than the 60° latitude, is unlikely over 40 Mc.

Recent 50-Mc. openings have shown that reception of distant stations can vary considerably at stations only 50 or 100 miles apart, so much so that at one station the signal may be inaudible and at the other S9! This is reminiscent of sporadic- $E$  summer conditions when, on 58.5 Mc., the writer has been able to hear other amateurs 60 to 70 miles away working stations 1000 miles distant which were quite inaudible at his station. As an example of the importance of location, it has been particularly interesting to compare the results obtained by G5BY at his excellent location on the southwest coast of England and those of the writer, G6DH, 230 miles E.N.E. of G5BY, on the southeast coast. G5BY's latitude is 50° 20' and that of G6DH 51° 50'. Referring to m.u.f. prediction charts one finds that between the 50° and 60° latitudes there is an average downward gradient in m.u.f. of 0.8 Mc. per degree; i.e., G5BY's m.u.f. to the United States should be approximately 1.6 Mc. higher than that of G6DH. Working with the m.u.f. limit a bare 50 Mc. this fact has often been amply borne out in practice! When at G6DH, W1HDQ (an ideally-situated station with excellent antenna array) is perhaps weakly received for a few minutes at a peak period, it will generally be found that G5BY has had a good opening to U.S.A. for maybe an hour or two! The fact that G5BY is also nearer to U.S.A. by 200-odd miles is also undoubtedly of importance since the optimum distance is of the 2500-mile order and from G6DH the nearest U.S.A. stations are 3250 miles. A somewhat similar example at the North American end of the trans-Atlantic path is the comparison between the signals of VE1QZ, Halifax, Nova Scotia, and the Wls. WE1QZ is usually heard first, and often loudest, during 50-Mc. openings, his distance from England being closer to the 2500-mile optimum than any of the Ws.

In the other direction G5BY also has scored. During the course of many 50-Mc. tests with MD5KW in the Suez Canal zone, on a number of occasions G5BY would report MD5KW S9 when the signal was absolutely inaudible at G6DH (even though the m.u.f. in that direction was at least 50 Mc.). In these instances it appears that G6DH is *too* close to MD5KW — distance 2100 miles. PA0UN has, also, on several occasions, *not* been able to receive MD5KW who is 1950 miles from him, when G5BY was actually receiving him O.K. G5BY is approximately 2300 miles from MD5KW. Up to Nov. 9, 1947, MD5KW had been received only twice at G6DH for short periods at fairly weak strength.

<sup>4</sup> Based on European-African observations, where distribution of activity may have prevented reception over greater distances. Sporadic- $E$  skip in the United States, where extensive activity on 50 Mc. permits observation over distances up to 2700 miles, provides some evidence of multiple-hop propagation, particularly in June and July, though here, as in the case of  $F_2$ , it may be possible to hear signals at any point beyond the *minimum* distance for the layer in question. — *Ed.*



On Nov. 10th, however (when MD5KW made his first 50-Mc. G two-way QSO with G6DH), the signals were S9-plus at G6DH. In this instance it appeared that  $E_s$  was assisting and reducing skip distance.

To U.S.A. the results of PAØUN (180 miles east of G6DH) compare similarly to those of G6DH, it possibly not quite so well at times, which is, of course, to be expected, because of the greater distances involved.

### General

During recent 50-Mc. openings, to U.S.A. particularly, the opportunity has been taken to check the spectrum from 30 to 50 Mc. with a view to obtaining indications for future openings. Generally it is found that up to about 42 Mc. many signals from all parts of the U.S.A. are "pounding" in. From 42 to 45 Mc. the number of strong signals thins out noticeably, then from 45 to 50 Mc. there may be only two or three not-very-strong signals. On some occasions, with 50-Mc. Ws coming in, there have been no other signals received over 45 Mc., although others (such as the f.m. broadcasters, etc.) were known to be operating. In other words, as we approach the m.u.f., reception becomes more and more selective as to distance and direction. This, no doubt, is attributable to the fact that only a "small patch" of the "sky" is reflecting the signal to which we are listening for all too short a period; often maybe for only 5 to 10 minutes.

In watching the m.u.f. build up from 6:30 A.M. EST it has been observed on several occasions, during checks with W1HDQ, that a 15.95-Mc. f.m. broadcast station (call not copied but presumably on northeast coast of U.S.A.) would come in for about 5 to 10 minutes, then go out, as if the m.u.f. were dropping again. After about 15-20 minutes of this occurring the m.u.f. would be found to have increased to 50 Mc. and W1HDQ could be received, still with the 46-Mc. f.m. inaudible! Presumably under these conditions the 46-Mc. signal is coming down at a shorter distance as the m.u.f. rises. On afternoons when the m.u.f. has *not* gone up to 50 this signal has remained in, often at very good strength! Hence m.u.f. build-up can be extremely deceptive!

On Oct. 17, 1947, both PAØUN and the writer were receiving South African 50-Mc. amateur signals for a short period around 1200 GCT but there were *no* other signals over 43 Mc. at this time. Had we, therefore, been making a normal m.u.f. check we would have not thought it possible to work as high as 50. On the other hand PAØUN reports that on Oct. 11th, during a 50-Mc. contact with ZS1P, there were several other commercial, etc. signals over 48 Mc. to indicate the opening which, he said, was reminding him of sporadic  $E$  because of the deep fading and strong peaks. At the time G6DH could find

nothing over 37-38 Mc., yet G5BY was receiving the South African O.K.

Another indication of the presence of high m.u.f. has been the reception by  $F_2$  "rebound"<sup>5</sup> of stations, within the skip zone, operating around 41-46 Mc. It is normally found that such signals can be received up to within 4-5 Mc. of the m.u.f. At G6DH, for instance, the Paris television on 42 and 46 Mc. (210 miles distant), Stockholm f.m. broadcast on 41.6 (850 miles), and Copenhagen f.m. broadcast 41.25 (550 miles) serve as useful indicators. If a bearing on the direction for maximum signal can be obtained, this will also indicate the zone where the m.u.f. is highest, as this is sometimes difficult to ascertain by other means.

### A 50-Mc. WAC?

It is interesting to speculate on the possibility of working all continents on 50 Mc. So far as European stations are concerned the writer considers that, with the possible exception of the Australasian contact, this *would have already been possible* with conditions prevailing on a few days from October to December, 1947, and should again be possible during the period January to March, 1948. Unfortunately, there has been little or no consistent activity in some of the most-favored countries. For European stations, activity for the Asian contact is most desirable in India or Iraq. There is no doubt that contact with VU could have been made on several occasions and even more so with Iraq and other countries in that direction.

Australia to Europe would present the biggest problem and a suitable path will probably only occur from Western Australia since this path passes nearer the high-m.u.f. equatorial zones than that from VK2, etc. This path should be most favorable on a few days in the February-March October-November periods.

Africa has already been contacted, leaving South America to be considered. Here again it is believed that on at least two occasions during early November, 1947, contact could have taken place from Europe to South America. For instance, on November 8, 1947, from 1410 to 1435 GCT, HKO5, Bogota, Colombia, harmonic on 48.2 Mc., was a good signal; on November 9th, from 1615 to 1645, ZXX2, 48 Mc. (Brazil), was quite consistent, and again on November 14th, HKO5, 48.2 Mc., was received from 1415 to 1435, with other southwest signals coming in around 47 Mc. until 1645. There was, on these days, every indication of a 50-Mc. opening to South America but no amateur signals were heard.

(Continued on page 150)

<sup>5</sup> "Ten-Meter Propagation by Rebound Scattering," Heightman, *CQ*, September, 1947.

# An Easily-Adjusted VFO

*Hints on Cleaning Up the ECO Signal*

BY HARRY G. BURNETT,\* W1LZ

**B**EFORE the tools were lined up to build this variable-frequency oscillator, time out was taken to dig back through past issues of *QST* and the handbooks. Some smart amateurs have done some heavy thinking on VFOs, and the articles listed in the bibliography at the end of this article proved very helpful. Most of us have a very natural desire to begin where the other fellow left off.

Since the VFO in the 1947 edition of the ARRL *Handbook* seemed a logical starting point, this one began originally with that circuit — and then grew like Topsy. VFOs with few exceptions seem to be really driver units. The idea of a simple crystal substitute consisting of an electron-coupled oscillator and two isolation stages looked better. After all, this was to be primarily a frequency-determining device.

A glance at the photographs and at the circuit diagram of Fig. 1 discloses that the power supply is external to the VFO, to minimize heat and vibration. All tubes are miniatures — a 6BA6 (miniature version of 6SG7GT) and two 6AK5s. (Type 6AR5 — miniature version of 6K6GT — may be used for the second isolation stage, if more output is required.) They are mounted so as to protrude horizontally through the rear of the cabinet to keep the heat, as much as possible, away from the oscillator tank circuit. The many variable controls appearing in the circuit diagram are innovations which make the unit easy to adjust.

First consideration of VFO design appears to be frequency stability. Coil  $L_1$  is designed for a high  $C/L$  ratio because of this. It should be space-wound and very thoroughly doped to avoid humidity effects. If you can find a suitable ceramic form, use it in preference to a phenolic form

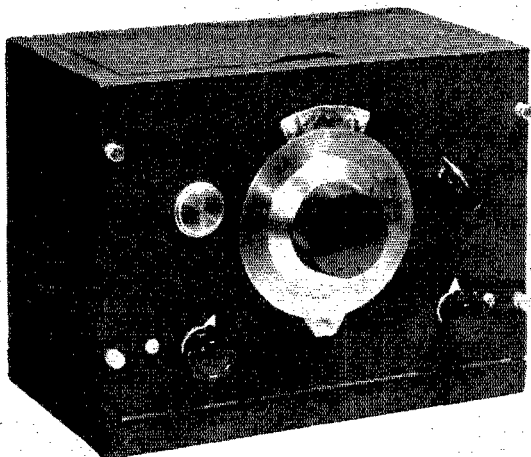
\* % Hytron Radio and Electronics Corp., 76 Lafayette St., Salem, Mass.

• One of the worst things about a VFO is the difficulty in spotting the source of trouble when the signal goes sour. So many factors, or combinations of factors, may have an effect upon the signal quality that one sometimes can spend days without coming even close to the solution. With this experience, W1LZ has come to the conclusion that it is easier to provide variable adjustments initially than to waste time later changing fixed values. With the arrangement he describes, it is easy to observe the effects of changes in electrode voltages over a wide range.

which usually has a poor coefficient of expansion and, because it is not white, does not reflect external heat so well.

The rugged, double-bearing main tuning condenser,  $C_1$ , is just large enough to cover the 80-meter band with a slight overlap at each end of the band. Condensers  $C_2$  and  $C_4$  are zero-temperature-coefficient padders which give the circuit a high  $Q$  and good frequency stability. Trimmer  $C_3$ , which sets the band on the dial, is adjusted for minimum possible capacitance by increasing the value of  $C_4$  to the maximum value which still permits use of the trimmer for hand-setting. This is done by building up the capacitance  $C_4$  with two or more paralleled zero-temperature-coefficient condensers. The trimmer  $C_3$  has sufficient capacitance to cover 3395–3800 kc. for multiplying to the 10- or 11-meter bands.

Condenser  $C_6$ , controlled from the front panel, is a two-plate variable. The stator plate is adjustable on threaded rods to the desired spacing. Normally, this trimmer is set at midscale. A flick of it to the stop at either minimum or maximum capacitance then quickly shifts the fre-



Front view of the easily-adjusted VFO. The vernier frequency shifter is to the right of the main tuning dial, while the band-setting condenser is behind the sliding button cover to the left where it may be adjusted with a screwdriver. The power switch is in the lower right-hand corner and the oscillator screen-voltage control is to the left.

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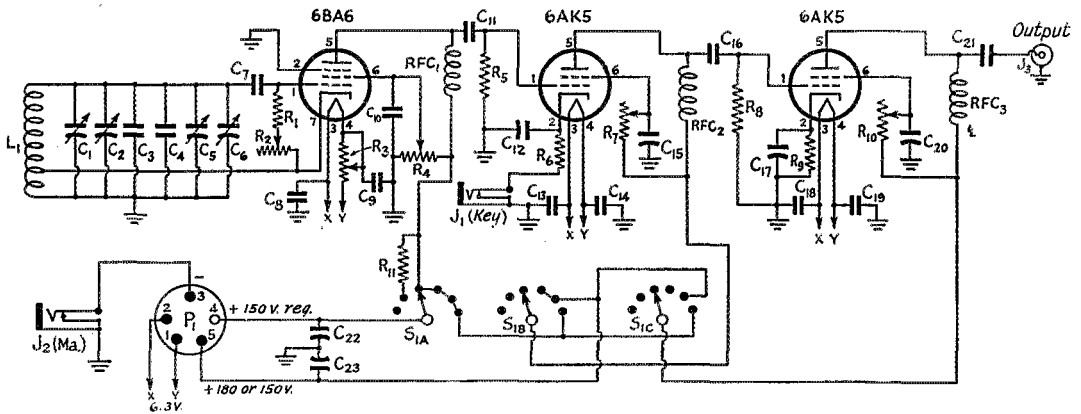


Fig. 1 — Circuit diagram of W1LZ's VFO.

- C<sub>1</sub> — 100- $\mu$ fd. variable (Bud CE-2004).
- C<sub>2</sub> — 75- $\mu$ fd. trimmer (Hammarlund APC-75).
- C<sub>3</sub> — 200- $\mu$ fd. zero-temp. padder (Eric Ceramicon).
- C<sub>4</sub> — 50- $\mu$ fd. zero-temp. padder (Eric Ceramicon).
- C<sub>5</sub> — 3-13- $\mu$ fd. neg.-temp. trimmer (Eric Ceramicon N300 TS2A).
- C<sub>6</sub> — 2-plate variable, rebuilt National SS-35 (see text).
- C<sub>7</sub>, C<sub>11</sub>, C<sub>16</sub> — 100- $\mu$ fd. mica.
- C<sub>8</sub>, C<sub>9</sub>, C<sub>10</sub> — 0.01- $\mu$ fd. mica.
- C<sub>12</sub>, C<sub>15</sub>, C<sub>17</sub>, C<sub>20</sub> — 0.01- $\mu$ fd. paper.
- C<sub>13</sub>, C<sub>14</sub>, C<sub>18</sub>, C<sub>19</sub> — 0.001  $\mu$ fd. (built into Cinch tube sockets).
- C<sub>21</sub> — 0.0022- $\mu$ fd. mica.
- C<sub>22</sub>, C<sub>23</sub> — 0.1- $\mu$ fd. paper.
- R<sub>1</sub>, R<sub>5</sub> — 47,000 ohms, 1 watt.

- R<sub>2</sub> — 4-megohm variable, 2 watts, carbon.
- R<sub>3</sub> — 10-ohm variable with slider, 10 watts.
- R<sub>4</sub> — 50,000-ohm variable, 2 watts, wire-wound.
- R<sub>6</sub>, R<sub>9</sub> — 200 ohms, 2 watts.
- R<sub>7</sub> — 0.5-megohm variable, 1 watt, carbon.
- R<sub>8</sub> — 0.1 megohm, 1 watt.
- R<sub>10</sub> — 50,000-ohm variable, 1 watt, carbon.
- R<sub>11</sub> — 22,000 ohms,  $\frac{1}{2}$  watt.
- L<sub>1</sub> — 17 turns No. 20 enam.,  $1\frac{1}{2}$  inches long, 1 inch diam., tapped at 4 turns from ground end.
- J<sub>1</sub>, J<sub>2</sub> — Closed-circuit jack.
- J<sub>3</sub> — Coaxial connector jack.
- P<sub>1</sub> — Five-prong plug for power supply.
- RFC<sub>1</sub>, RFC<sub>3</sub> — 2.5-mh. r.f. choke.
- RFC<sub>2</sub> — 175 turns No. 30 d.s.c.,  $\frac{1}{2}$ -inch diam.
- S<sub>1</sub> — Ganged ceramic, 6-position single-circuit switch.

quency to a predetermined one on either side of the main frequency. Of the straight-line-capacitance type and connected across an already heavily-padded circuit, the condenser gives approximately equal frequency change for each degree of rotation. This vernier is also a handy convenience for very fine adjustments in frequency.

#### Negative-Temperature-Coefficient Trimmer

Condenser C<sub>5</sub> offers a new slant on temperature compensation, because it is a *variable* negative-temperature-coefficient condenser. Ordinarily, the amateur is not sure of the exact amount of capacitance he requires for final negative temperature compensation, and he is inclined to skip this finishing touch. The variable trimmer shown can save him some tedious computation and experimentation.

Tolerance for the temperature coefficient of this Eric Ceramicon trimmer is  $\pm 100$  parts per million per degree C. or  $\pm 20$  per cent, whichever is greater; whereas, a fixed Ceramicon has a tolerance of  $\pm 30$  parts or  $\pm 15$  per cent, whichever is greater. It is apparent that for most amateur purposes, the performance of the trimmer approaches sufficiently that of the fixed condenser. If the slightly greater stability of the fixed condenser is desired, however, the needed capaci-

tance can be determined by first using the trimmer and adjusting it for proper compensation. The trimmer may then be removed from the circuit and measured on a capacitance bridge. Finally, a fixed condenser of the same capacitance and temperature coefficient may be soldered into the same position formerly occupied by the trimmer.

This condenser is mounted just over the oscillator coil, but perhaps a better location would be inside the coil, to avoid the effects of sudden drafts. It is wise to experiment with each particular layout to determine the most effective spot for temperature compensation. In general, this compensating condenser should be mounted as close as possible to the component causing most of the frequency drift — usually the coil — to assure that temperature changes of that component and the compensator will be fairly equal. Care should be taken not to mount the compensating capacitor on the chassis itself, because temperature variations of the chassis are likely to be different from those of the surrounding air.

A frequency meter offers the best means of determining the proper capacitance setting (which will probably vary with each installation) of the negative-coefficient-condenser, but if one is not available, the VFO can be tuned just outside the band and its signal beaten with that of a stable commercial signal picked up on a thoroughly-

warmed receiver. Proper adjustment of the trimmer can be determined by varying the temperature of the VFO unit over as wide a range as possible for each experimental setting of the condenser. Any means of raising or lowering temperature may be used, but care should be exercised not to force a draft of air into the VFO. If more negative compensation is needed, the 4-30  $\mu$ fd. Type N500 TS2A may be a better choice than the one shown.

Unless your receiver is really stable, you can, by using this trimmer and the other means of frequency stabilization recommended in this article, attain stability so good that the receiver "walks away" from the ECO. Some of you have probably concluded that this type of negative-coefficient trimmer would be helpful also in stabilizing a frequency meter or the h.f. oscillator of the receiver.

#### ECO Heater Voltage

Another unusual kink which contributes noticeably to frequency stability is the variable resistor  $R_3$  in series with one of the heater leads of the 6BA6. Reduced heater voltage has been used in telephone applications, for long life, and in high-gain audio stages for minimum hum. Provided — and this is important — the cathode current of the ECO is low, the same advantages of long life (desirable when the oscillator is to be calibrated) and low hum can be enjoyed with an ECO. More important, reduced heater voltage means less heat and consequent frequency drift.

To supply the required cathode current of 0.5 to 2 ma. at a plate voltage of 150, the lowest safe heater potential for the 6BA6 in this special application is considered to be 4.5 volts (at this potential, power dissipated by the heater is only 59 per cent of normal) with the key closed. Keeping in mind this limitation, adjust resistor  $R_3$  to give the lowest voltage consistent with stable operation. Bear in mind that if the heater voltage is made too low, instability may result from variations in cathode emission.

#### Cathode Tap

Much has been written about the criticalness of the cathode tap. In general, it should be as low on the coil as possible; try 3, 4 or 5 turns from the bottom. For each tap tried, snap the gang switch back and forth between Points 2 and 3 to cause a change in applied voltage. An increase in frequency when the plate voltage is dropped indicates the cathode tap is too high on the coil; a decrease in frequency, that the tap is too low. The thought of fussing with quarter-turns to locate the final critical point to tap was not pleasant, and an easier way was sought to make the final feed-back adjustment.

#### Variable Grid Leak

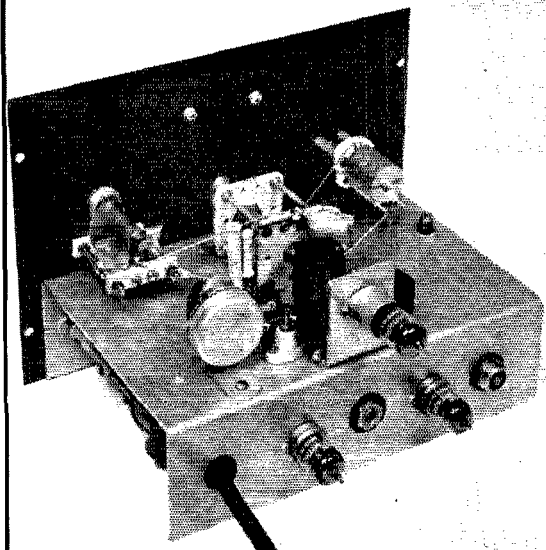
Rereading of Terman on oscillators confirmed the belief that the value of the grid leak had a pronounced interlocking effect on excitation. A variable high-resistance grid leak,  $R_2$ , seemed to be the answer. The 47,000-ohm fixed resistor,  $R_1$ , was connected in series with the variable 4-megohm resistor,  $R_2$ , to prevent accidental adjustment of the grid leak to zero, and to keep r.f. out of the wiring to the variable resistor. Much less fussy adjustment of the cathode tap is necessary with this arrangement because the variable grid leak permits fine adjustment of the feed-back in a less painful manner. Set this grid leak at as high a resistance as possible to increase the tube impedance, but be careful not to introduce too much grid resistance or you will block the oscillator and start a series of "birdie" oscillations all over the band.

#### Variable Screen Controls

Another much-discussed adjustment of the ECO is the proportioning of plate to screen voltage. A 50,000-ohm (a lower value would produce more heat and is considered unnecessary when using a well-regulated supply) variable control of the potentiometer type,  $R_4$ , is used. This permits quick, exact adjustment of the screen potential directly from the front panel. Note that the resistor  $R_{11}$  is inserted in series with both screen and plate potentials of the 6BA6 when  $S_1$  is in the second position. Since the resistor is out of the circuit when the switch is turned to the third position, it is easy to determine the effect on frequency of comparatively large variations in applied plate and screen potentials when the switch is snapped back and forth between these two taps.



Rear view of WILZ's VFO. The 6BA6 oscillator tube is mounted on a heavy bracket at the center with the isolating-amplifier tubes below. The oscillator variable grid resistor,  $R_2$ , is to the left of the oscillator coil.



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Frankly, it was found difficult to proportion the screen and plate potentials to achieve the sort of compensation originally recommended by Dow. For a comparatively narrow band of frequencies, compensation is possible; a 3:1 voltage ratio seems about right. A regulated power supply, however, makes exact proportioning of plate and screen voltages much less important. The screen control, nevertheless, is a very handy gadget for minimizing oscillator input closely to that required to give sufficient drive to the following stage.

Experience with the convenience of the oscillator screen control led to the installation of variable resistors  $R_7$  and  $R_{10}$  for the screens of both the isolation stages. The large resistor  $R_7$  in the screen of the first 6AK5 is necessary to avoid overexciting the grid of the next stage. To begin with, these controls can be set to give a screen potential of 120 or 140 volts (dependent on whether the plate potential is 180 or 150 volts). Then final precise adjustments may be made by watching a grid meter in the stage following the VFO. Be careful to avoid exceeding the absolute maximum screen dissipation (0.5 watt) of the second 6AK5.

#### *Power Switching and Metering*

It might be well to point out here the versatility of the three-gang switch,  $S_1$ . The six positions are: (1) all d.c. potentials removed, (2) oscillator d.c. potentials through a 22,000-ohm resistor (for varying applied voltage), (3) normal oscillator potentials connected, (4) d.c. potentials to oscillator and first isolation stage, (5) d.c. potentials to all three stages, (6) d.c. potentials to all three stages, but with the last two stages fed by the regulated pack normally used only for the oscillator, rather than by the power supply employed for normal keying of the transmitter. This last position permits tuning the complete VFO — with a strong signal in the receiver — without applying power to the remaining stages of the transmitter. A relay, powered when the regular transmit switch is thrown, can be used to open the negative lead to the oscillator during stand-by.

The meter jack,  $J_2$ , is wired in the negative lead to make easy the progressive metering of the additive cathode currents of the tubes as follows: oscillator alone, oscillator and first 6AK5, and all three stages. Do not ground the negative of the oscillator pack external to the VFO since this would short-circuit the metering jack. This also means that the VFO unit cannot be operated from a pack supplying the following stages. The gang switch and metering system really speed up initial testing and later adjustment of the unit.

#### *Keying*

Keying with a VFO is a problem. If the oscillator itself is keyed, it is virtually impossible to

avoid both clicks and chirps simultaneously. Yet the break-in operation possible with oscillator keying is mighty desirable. The only real solution is to let the oscillator run constantly — at reduced input — and key the remainder of the transmitter. Oscillator input can be made very low (0.5 to 2 ma. total cathode current at 150 volts plate) and still give sufficient output to drive the high-gain first 6AK5. Precautions must be taken, of course, to minimize oscillator-signal leakage. Shielding of the tank circuit, the tube, and around the coupling lead to the grid of the first isolation stage, the power cable, and the output coaxial cable helps materially in cutting down the signal in the receiver. Double shielding of the entire unit, such as is common with signal generators, is fine if constructional problems can be overcome.

Next in importance to shielding is the judicious use of by-pass condensers and grounds. That is why condensers  $C_{22}$  and  $C_{23}$  were added at the point where the "hot" power leads enter the VFO. (These condensers serve a dual purpose, in that they tend also to prevent r.f. feed-back into the VFO.) A condenser across the output terminals of the oscillator power supply also may be desirable when the ECO is powered by the receiver pack. If break-in operation of the transmitter is to be primarily on 80 meters, it would be wise to put the ECO on 160 or 320 meters.

At WILZ, plate cut-off primary keying (see *QST* for March, 1947) of all stages except the constantly running ECO works O.K. The keying is reported to be the same as when crystal control was being used. Oscillator-signal leakage into the receiver can be reduced to  $S_1$  to  $S_5$  dependent upon the effectiveness of the shielding and by-passing and upon the drive required for the following power stages. No trouble is experienced in working break-in with weak DX stations, particularly if full use is made of the i.f. selectivity of the receiver.

#### *Input & Output*

Although the cathode currents (key down) of all three tubes in the VFO total only 18 ma. (1 ma. for 6BA6, 6 ma. for first 6AK5, 11 ma. for second 6AK5), the output is sufficient to drive two 807 doublers (running at 300 and 500 plate volts respectively) hard enough to overexcite a 5514 with up to 175 watts input on 14 Mc. The low current drawn permits taking the voltage for the ECO from the same regulator tube which supplies the h.f. oscillator of a receiver, provided the sixth position of  $S_1$  connects to a similar voltage separate from the receiver. Or — if the cathode of the first 6AK5 is keyed, the entire VFO can be supplied from a single OD3/VR150. At WILZ, the same electronically-regulated pack used for the receiver gives really pure regulated d.c. for either the oscillator or the entire VFO. Incidentally, test the oscillator with a rather

poorly-filtered pack. If you can get a good d.c. note that way, your oscillator will perform beautifully when fed really p.d.c.

The load is coupled by means of 52-ohm coaxial cable. For simplicity, capacitive coupling is used. Because the coaxial cable by-passes the output voltage to ground, the line is kept as short as possible (not more than 5 feet), and a comparatively large coupling condenser,  $C_{21}$ , is used to obtain a better voltage distribution. Ordinarily, the transmitter end of the "hot" output lead is connected directly to the grid of the driver tube. If there is parasitic trouble in the first driver tube, it may be better to connect the "hot" lead of the VFO output to the driver grid through a 10- or 20- $\mu$ fd. mica condenser, as suggested by Hunter (cf., bibliography).

#### Parasitics and R.F. Feed-Back

With the VFO perking beautifully, it is quite likely that only half of the job is done. Hooking it up to the rest of the rig and keying it still remains a problem — particularly when there are many stages and high power. If you were born lucky, or if you have already done a thorough job of wiping out parasitics, r.f. feed-back, and improper neutralization, skip the next few paragraphs.

On the other hand, if you are still plagued with these troubles, here are some reminders and suggestions which may help. Read again what the *Handbook* and past articles in *QST* advise for eliminating parasitics. Make full use of shielding, v.h.f. chokes, suppressor resistors in grid, plate and screen. Avoid low-frequency oscillating circuits formed by similar grid and plate chokes, and by taps on grid or plate coils. Be sure that with no excitation, reduced fixed bias, and full plate voltage, the plate condenser of each stage can be tuned over the whole dial without any change in plate current, and without any grid current developing or r.f. showing when a neon bulb is touched to the plate coil. Remember also that some parasitics occur only when excitation is applied, and that parasitics can develop in any stage of the VFO itself. Make one change at a time as you strive to get rid of them. With the receiver and monitor, check for spurious a.c. signals either side of your main frequency.

Watch out for tunable hum from mercury-vapor rectifiers — particularly from a bridge rectifier. It can usually be eliminated by r.f. chokes in the plate leads and/or by 0.002- $\mu$ fd. buffer condensers connected between plates and cathodes. An adequate swinging choke and electrostatic shielding of the plate transformer also help to minimize this tunable hum.

R.f. feed-back headaches are usually worse with VFO than with crystal control, and a good monitor is invaluable in tracing their causes and eliminating them. Shield properly and keep the VFO out of strong r.f. fields. Notice that the plate-circuit components of this ECO are under the chassis shielded from the grid circuit. By-pass, choke (try chokes in negative leads), and ground to kill r.f. when it pops up in undesired spots in the transmitter.

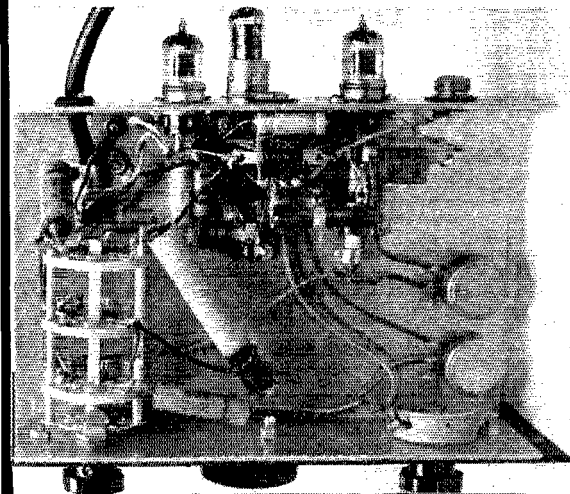
Large noninductive mica by-passes (0.01  $\mu$ fd.) with very short connections were employed for screen and heater of this ECO. Observe also the by-passing of the heaters of the 6AK5s with 0.001- $\mu$ fd. condensers built right into the novel Cinch sockets. The old-fashioned method of by-passing both sides of all heaters, and then grounding the center-tap of the common filament transformer, was more appealing than grounding one side of all heaters to the chassis. R.f. has a nasty habit of appearing unexpectedly on a "grounded" chassis.

An example of how a little stray r.f. can ruin the note occurred with this VFO. The note was unstable; at times T9, at others T8. After days of searching for the baffling cause, it was found that grounding the bracket supporting the oscillator tube directly to the back of the cabinet cleared up the note. This connection was needed, despite the fact that the chassis and cabinet were already bonded together through the front panel. Screwy? For a good note, also be sure you put real p.d.c. on both oscillator and final; filter on the pack feeding the other stages is not so important, if you run well into Class C.

Watch your neutralization, too, particularly on the higher frequencies. Use short leads and a split-stator circuit to avoid regeneration; space and orientate properly, and shield if necessary, the coils of the tuned circuits; connect grid and neutralizing condensers by separate leads to the grid terminal of the tube. If the circuit is single-ended, balance the plate-to-cathode capacitance of the tube with a similar capacitance between ground and the end of the plate coil connected to the neutralizing condenser.

Bottom view, showing the arrangement of parts. The two potentiometers to the right are for adjusting the isolating-amplifier screen voltages. Near the center is the broadly-resonant choke, RFC<sub>2</sub>. The power switch, S<sub>1</sub>, is to the left.

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An excellent neutralizing indicator and one not likely to upset the normal balance of the stage being neutralized is the grid meter of the following stage. With fixed bias removed from this following stage, its grid-to-cathode circuit will act as a diode to rectify any r.f. leakage current from the previous stage. Adjust the neutralizing condenser for zero current on this grid meter with the plate condenser at resonance. For the final stage, a lamp and loop coupled to the antenna coil will serve the same purpose in neutralizing that stage. As has been pointed out often in *QST*, neutralizing is frequently the only way to tame a high-power beam pentode.

### Construction

The cabinet is 10 inches long, 7 inches high, and 6 inches deep. The chassis is a simple "U" bent out of 1/8-inch aluminum stock 8 3/4 inches long and 2 1/2 inches high, with its depth made exactly right to give a snug fit against the rear of the cabinet. Notice the knurled 6-32 panel screws which make it possible to remove panel and chassis in a jiffy — without a paint-marring screwdriver. If extreme mechanical rigidity is required, two General Radio knurled 10-32 panel screws may be used to bond the rears of the cabinet and chassis together by insertion of the screws into tapped holes drilled through the backs of both cabinet and chassis.

The photographs show clearly the mounting of the parts. No attempt has been made to be fancy, but everything is securely tied down to avoid vibration. Mounting bracket for the 6BA6 oscillator tube is of 3/16-inch aluminum. The zero-temperature-coefficient condensers are soldered vertically into place at the rear left of the main tuning condenser. Note the negative-coefficient trimmer mounted just above the oscillator coil, the variable grid leak to the rear left of the oscillator coil, and the 6AK5 screen resistors mounted below the band-set trimmer at the rear right of the panel.

The special vernier,  $C_6$ , is to the rear left of the main tuning condenser. A small stand-off insulator rigidly supports the grid condenser and its associated wiring. The milliammeter jack is between the two 6AK5s. Note that a microphone-type connector (rear right of chassis) was used for the output cable connection to permit use of a shielded output cable. Tuning dials are largely a matter of taste, but the National Type N used has smooth, dependable action and a vernier scale which permits very fine calibration.

For maximum mechanical stability, it is suggested that a shield with a hold-down spring be used for the 6BA6. This spring should be lengthened to give good pressure on the top of the tube and, if it is found desirable, a couple of bits of paper match may be wedged down between the base of the shield and opposite sides of the tube to brace the 6BA6 securely.

To minimize vibration, you probably will want to set your VFO on a sponge rubber mat cut from a kneeling or typewriter pad. If you do, here's a tip. Use a sharp knife moistened with castor oil. You can then cut nice square edges; and the oil will not cause deterioration of the rubber. Keep your eyes open, too, for that new cellular rubber which has a little air bubble sealed up in each tiny cell. It should be ideal for this purpose.

Good luck to you in building or rebuilding your VFO. Let's hope this article offers you some usable ideas. Before you actually begin designing the VFO to obsolete all other VFOs, look up at least a few of the references given in the bibliography. You will find them very helpful.

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### HAMFEST CALENDAR

NORTH CAROLINA — The Key and Mike Club, Winston-Salem, will be host to the North Carolina Floating Club at a hamfest on January 18th. Plans are now being completed for an all-around good time. Other amateurs interested in attending may obtain further information from Lewis Kanoy, W4DCW, 114 Idlewilde Drive, Winston-Salem, N. C.

**SWITCH  
TO SAFETY!**



# ARRL Week and Member Party— Jan. 24th-25th

*Sixth Annual Contest with 'Phone and C.W. Call-Pin Awards  
in Each Section<sup>1</sup>*

BY F. E. HANDY, \* WIBDI

**P**RESIDENT BAILEY will address a special message to ARRL members from W1AW and all OBS appointees during the week of January 18th. The entire League field organization will climax the observance of this ARRL Week on January 24th and 25th by participating in an operating party that features a simple scoring plan and call-pin awards. Fixed scoring credits will be given for radio reception of this message<sup>2</sup> and/or qualification in the CP run of

tion that our fraternity is "of, by and for" the amateur, and the sum of our prestige as an organization is in reality dependent on *what we each make of our organization and ourselves as members of it.*

We might each try to do one thing a day along different lines, pointed toward organization and self-improvement. Broadening our fraternal relationships and activities may be the best thing for ARRL Week observance. Ideas! Shift to 80 c.w. if you have worked only 2 (or vice versa), give yourself a week of pleasure in handling traffic or measuring frequencies, and go after some neglected ARRL awards in any field you have been neglecting. January is a good month for adoption of some New Year's resolutions. An ARRL Week log might show items like the following:

Mon., 19th: Copied code-proficiency run (W1AW-W#CO). . . . Am now one of 10,000 amateurs to show FCC and others my CP ability and interest.

Tues., 20th: Got caught up on QSLs; copied the G.W.B. (W2KH) message from . . .

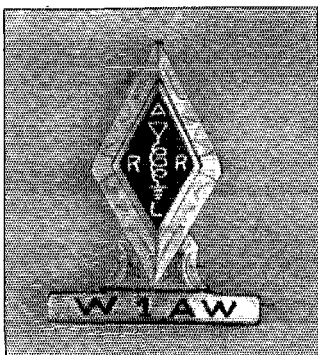
Wed., 21st: 'Phoned my EC, arranged to rejoin AEC, urged early test of 144- and 3.5-Mc. local plan. Visited W. . . . Had first taste of work on . . . . . kc.

Thurs., 22nd: Reported into section traffic net, originated first message in 6 months, and also sent one to Hq.

Fri., 23rd: Sent SCM a letter asking for OBS appointment and form for monthly report. Gave Director. . . . a note reporting our club discussions.

Sat., 24th: Fixed monitor and rechecked rigs for zero splatter and thumps. Got tuned up *right* for start in Jan. 24th Member Party shindig.

Sun., 25th: Party going big . . . lots of activity! Never in contact with so many good operators by radio in one week-end!



ARRL call pin to be awarded the highest-scoring c.w. and 'phone station in each section.

the 19th (or previous runs). These, with all contact points in the end-of-week party, multiplied by number of sections worked, constitute the participant's score.

### ARRL Week

The ARRL Week idea implements our notion that during this week every good member will participate in *some* activity dedicated to general betterment of his ARRL. This is in the realiza-

\* Communications Mgr., ARRL.

<sup>1</sup> See complete list of ARRL sections, page 6.

<sup>2</sup> W1AW will send the message from President Bailey ahead of any other official bulletins on 3555, 7210, 14,150, 23,080 and 52,000 kc., and 146 Mc. (c.w. simultaneously), at 8:00 and 11:30 P.M. EST, at 20 w.p.m.; then at 9 w.p.m. starting Sun., Jan. 18th, continuing through Fri., Jan. 23rd; also Sat., Jan. 24th at 11:30 P.M. EST and Sun., Jan. 25th at 8:00 P.M. Information will be repeated on voice on 3950, 14,280 and 29,150 kc. in turn directly after each such transmission. Over 500 OBS appointees throughout the country will also send the same message, as many times as feasible on different bands and frequencies, throughout the week.

### ARRL Party Rules

To put it simply, this is a family QSO party for all League members, held Saturday afternoon and Sunday. To get contacts, on 'phone simply call "ARRL, this is . . . , over," or on c.w., "ARRL de W. . . . K." Work members, wherever located. The member in each section submitting the leading tabulation will receive an ARRL call-pin award. Advance entry is not required. Use any amateur-assigned frequencies, and part c.w., part voice, or all *one* mode, as you please.

Two of these ARRL-membership-and-call-letter pins (gold border and lettering, with black-enamel background) will be awarded in each



section, with call of c.w. and 'phone winners appropriately engraved.

**Starting Time:** Saturday, January 24th, 3 P.M. PST, 4 P.M. MST, 5 P.M. CST, 6 P.M. EST, or the equivalent time at any point.

**Ending Time:** Monday, January 26th, 12:01 A.M. PST, 1:01 A.M. MST, 2:01 A.M. CST, 3:01 A.M. EST, or equivalent.

Operate *any* 20 hours of the 33-hour party. State contest hours you did *not* operate if your score is over 20,000.

### Contest Exchanges

In radiotelephone contacts the section, membership month and year (expiration date) will be exchanged. No special order is required. On c.w., members will abbreviate section names and use four numerals to show membership dates. "CONN 0348" will mean "Connecticut Section, my membership good through March, 1948," for example. Information to be exchanged in every case comes right off your own *League membership certificate or pocket card*. On logs show frequency bands, 'phone or c.w.

**Scoring:** One point for each complete set of information sent; 1 point for each set of data received and logged. No member can be worked to get more than one complete exchange for 2 points. A fixed credit of 50 points may be added before multiplier, for those *who give earlier date* of their ARRL Code Proficiency award . . . and for those members attaching Jan. 19th copy, if they qualify.

A fixed credit of 50 points may be added before multiplier, for *radio reception and copy* of President Bailey's ARRL Week message with the call, frequency and time of transmission of the station from which you received the text.

**Multiplier:** The multiplier is that number of field-organization sections in which *at least one* ARRL member is contacted. (Assume W5XXX has completed exchanges with 60 different stations, located in 30 different ARRL sections. His multiplier is 30.) The *sum* of contact points and either or both fixed credits, if earned, will be multiplied by the number of *different sections*. A convenient way to keep a record of new sections as you work them is to circle and number the name of the section in your list or mark the list in *QST*.

Participants report claimed scores with the information on exchanges. Attach a copy of President Bailey's message, if received. Attach CP copy or give date of earlier award for possible credit. Summarize and mail your score promptly. Log forms (not necessary) will be sent free on request to Hq., or rule your own, just three columns listing *calls, sections, dates*. It's a one-operator activity, although separate scores for each operator may be sent in. Fun and new contacts are assured! See how many members you can work on these dates. Try your luck!



FATHER TIME hardly could have closed his books for 1922 without taking special account of the numerous DX and traffic-handling records that were established at the year's end. As reported in *QST* for January, 1923, both the Atlantic and Pacific Ocean barriers were decisively toppled. Eighty American and Canadian amateur stations were heard in England alone during the warm-up Transatlantic Preliminaries in November, and latest confirmation is that during the first day of the December Transatlantic Finals two score stations, including the radiophone of 2ZK, were heard in England and France. Equally impressive are the lists of calls heard by the radio operators of the S.S. *China* and S.S. *Easterner* while making the north and south Pacific runs to China and Australia, respectively. Traffic-wise there is sensational news too: A new high of 50,000 messages was handled by our ARRL stations in November, a highlight of which was the 4-minute 10,000-mile Hartford-Sleepy Eye, Minn.-Hawaii-and-return relay staged by 1AW, 9AWM and 6ZAC.

The fallacy of evaluating antenna radiation through current reading alone is put in disrepute this issue by Assistant Editor Boyd Phelps' excellent article, "Antenna Resistance Measurement." The need for considering the radiation, ohmic, and dielectric-absorption resistances of an antenna is stressed. Another antenna article, "Loop Transmission," by Leon W. Bishop, 1XP, searchingly proposes the use of directional loops to reduce interference to near-by radiophone listeners. Further to meet the severe interference problems which are requiring many of our stations to observe quiet hours, the Editor sounds a call for data on practical power-supply filters to clean up the notes of our self-rectified c.w. rigs. A reprint of S. E. Anderson's Radio Club of America paper, "Vacuum Tube Amplification," discusses in comprehensive fashion the various circuits for coupling audio- and radio-frequency amplifier stages for receivers. Also along this line, Chief Engineer Wm. F. Dichl of Grebe describes his company's new single-stage r.f. amplifier.

The *Radio Society of Great Britain* is to be the new name of the Wireless Society of London, according to the latest word from abroad. There is international amateur DX on the Continent, too, the c.w. signals of British 2JZ being successfully copied by Leon Deloy of French 8AB.

Here at home amateurs have been in extremely favorable public light. The recent Colorado-Wyoming blizzard saw 7ZO, 9AMB, 9ANQ,

(Continued on page 150)

# • Technical Topics —

## The Lazy Man's Q5-er

**D**ON'T fool yourself for one minute — the trend is toward sharper and sharper i.f. amplifiers. McLaughlin<sup>1</sup> and Rand<sup>2</sup> have both described the advantages of high selectivity in the i.f. amplifier, but it was the surplus market that really came through with a cheap and clean answer. Well, not a complete answer, but at least something that will perk up that old broadband superhet of yours and make it cut through the QRM and pull out the desired signal like nothing you ever saw or heard.

You have probably seen those advertisements for the "ARC-5" or "274-N," complete or in parts. The part we're interested in right now is the receiver that tunes from 190 to 550 kc. Up to a few months ago it was up for sale mainly to the private airplane owners who might be interested

<sup>1</sup> McLaughlin, "Exit Heterodyne QRM," *QST*, October, 1947.

<sup>2</sup> Rand, "The Q5-er," *QST*, December, 1947.

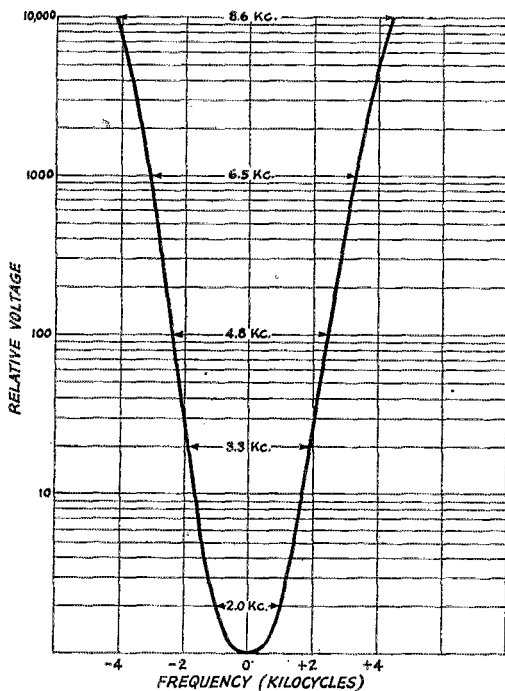


Fig. 1 — The over-all selectivity characteristic of a BC-453-A receiver with the i.f. transformers in the "sharp" position, measured at 455 kc. Compare this with the curves on page 21 of the December, 1947, *QST*.

in a beacon receiver, but the smart ex-GIs who had worked with the things remembered the specs and latched on to them for another reason. Independently, two different hams (W5KWI, W6OZB) tipped us off. The i.f. amplifier in this particular receiver (designated the BC-453-A by the Signal Corps) works on a frequency of 85 kc. The i.f. transformers have provision for two settings of coupling, the idea being that you align the amplifier with the transformers in the loosely-coupled condition and then increase the coupling to give a broader characteristic. But that *sharp* position is the one we're interested in! Fig. 1 shows the over-all characteristic of the BC-453-A measured at 455 kc., with all the i.f. transformers loosely coupled. As you can see, the characteristic is even better than that obtained with the "Q5-er," and it's a natural for amateur work.

Adding the BC-453-A to the tail end of your receiver is as painless an operation as you'll encounter in any surplus deal. All you need is 25 volts a.c. at 0.45 ampere, and 250 volts d.c. at about 40 ma. These voltages are fed to the three pins on the top rear of the receiver, where the generator was mounted. The connections are shown in Fig. 2. If you're lucky, you'll be able to scrounge up a small control panel (designated FT-260-A) that plugs in at the front of the receiver, but we've only seen one of these, and they seem to be hard to come by. However, lacking the control panel, all you have to do is to solder a few wires to the socket pins at the rear of the set, for leads to the audio output, gain control and b.f.o. switch. These connections are also shown in Fig. 2. You can mount the gain control and b.f.o. switch any place you want to, and if you want to keep the unit compact, you can make a small panel for the front, if you can't get an FT-260-A. The proper connections for this panel are also shown in Fig. 2.

The receiver has no a.v.c., but it wouldn't be too difficult to wire it in. However, we haven't found it necessary so far. The b.f.o. adjustment is a screwdriver one on the side of the set, and this is a little inconvenient for single-sideband suppressed-carrier reception, but otherwise the set is a little honey. The workmanship is a beautiful thing to behold. When you get the receiver, unscrew the caps from the i.f. transformers and pull out the fiber pins — they'll move about  $\frac{1}{4}$  inch — to loosen the coupling. The coupling will already be loose on the center i.f. transformer, but tight on the other two. The audio output is

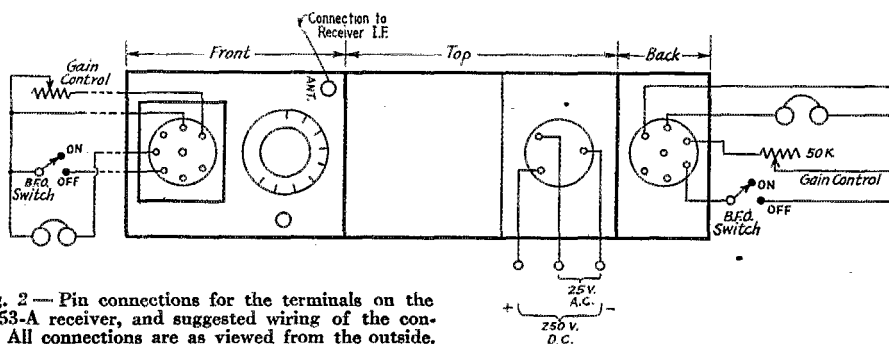


Fig. 2 — Pin connections for the terminals on the BC-453-A receiver, and suggested wiring of the controls. All connections are as viewed from the outside.

not too great, but it is certainly adequate to run a small 'speaker.

Now that you have the power and controls to the BC-453-A, all that is left is to tie it in to the receiver. Even this is painless. If your receiver i.f. amplifier uses double-ended tubes, you can wrap an insulated wire around the grid lead to the last i.f. tube, and run the wire out a louver of the receiver. If your receiver uses single-ended tubes, pull out the second-detector tube, wrap an insulated wire once or twice around the diode plate pin, and put the tube back in the socket. Run the wire out a louver. Place the BC-453-A on top or alongside your receiver, connect the wire from the i.f. amplifier to the BC-453-A antenna binding post, and turn on your receivers. Peak a signal on the regular receiver, as indicated by the S-meter, and then tune it in on the BC-453-A. You're all lined up and in business!

Yes, it's as easy as that. Then sit down and have yourself an evening of fun, just getting acquainted with selectivity. One trick is to have a 'speaker going on your regular receiver and one (or headphones) on the output of the 453. Turn off the a.v.c. on your receiver and tune slowly through a 'phone signal — a b.c. station serves nicely. Now tune slowly through the signal. You'll hear it come in on the regular receiver, then come in and go out on the 453, and then go out on the regular receiver! With the a.v.c. on, the effect isn't quite so striking, because the a.v.c. gives a false impression by increasing the signal to the 453 as you tune off resonance in the regular receiver. To use a.v.c. to its full advantage, the control voltage should be taken from the second detector in the 453. But even without making this modification, you'll gain in selectivity by using the 453 as is. The i.f. gain in the 453 should be run at a fairly low level, to avoid blocking in the output, and you can use very loose coupling between the 453 and the i.f. amplifier of the regular receiver.

On c.w. you can use the 453 in several ways. You have the choice of using the b.f.o. in the regular receiver or in the 453 — it doesn't seem to make too much difference. However, you can

leave the regular receiver on a.v.c. and use the b.f.o. in the 453, and get readings on c.w. from your regular receiver S-meter. By carefully aligning the tuning of the 453 with respect to your regular receiver's i.f. (with the crystal at its sharpest position), you can get single-signal reception like you have only dreamed of. There is *no* signal on the other side of zero beat, even with an S8 or S9 signal! By setting the rejection notch of the crystal to take out the last vestige of image signal (the other side of zero beat), you'll have the first perfect single-signal reception you've encountered. And the way you can sneak up to a loud signal and tune in a weak one is wonderful, since the *skirt* selectivity of the 453 backs up the crystal filter to a fare-thee-well.

We have used 453s made by Aircraft Radio and by Western Electric, and you may have guessed by now that we like them. They are certainly way ahead of your present 465-kc. i.f. amplifier.

— B. G.

## Strays

Professor Dan Noble reminded us the other day of a lovely definition which he recalled hearing Hiram Percy Maxim, W1AW, get off at a New England Division convention about 20 years ago:

"A radio amateur is a person who thinks that O. Henry is a coil possessing zero inductance."

— . . . . —

"While watching my XYL giving our little girl a home permanent, I found a cheap source of 2-inch open-wire feeder spreaders. The plastic curlers from a 'Toni' home permanent are ready-made spreaders and cost only about 2 cents each. In my case I drilled out the inner holes (which are spaced two inches) and threaded in my feeder wires. The outer forked tongue was used to hold the tie-wires. The XYL says that this ought to put a permanent curl in the standing waves on my feedline . . . ouch!" — W6MVX

# Happenings of the Month



## ELECTION RESULTS

In the six ARRL divisions in which balloting has just occurred for members of the League's Board of Directors, four new directors have been elected for the 1948-49 term and two incumbent directors have been returned to office. Here are the details:

In the Atlantic Division, Walter Bradley Martin, W3QV, the director from 1936 to 1945, was put back into office by a large plurality over four other contestants. The voting:

Commander Martin.....	1155 votes
J. Victor Brotherson, W3BHN.....	546 "
Edwin S. Van Deusen, W3ECP.....	440 "
Robert A. Blackburn, W3MPO.....	291 "
Harry B. Stein, W3CL.....	162 "

Commander Martin is on temporary active duty at the Naval Base at Philadelphia, associated with Naval Reserve training. He had many communication billets during the war, most of them in the Pacific, including serving as staff communications officer for the Commander South Pacific. In 1945 he was in charge of Naval communications in North China, his first post-war operating being resumed under the call XU1YV. He has been an active amateur since 1920 and prominent in the affairs of the Atlantic since 1934.

Henry W. Wickenhiser, jr., W3KWA, is the Atlantic's new alternate director, the voting having been:

Mr. Wickenhiser.....	1076 votes
C. Edward Keener, W3AJS.....	908 "
Don G. Harmer, W3MO.....	594 "

"Wick" served as a naval lieutenant during the war and is active as a brigade communications officer in the Naval Reserve now. Well-known ORS, he has been prominent in traffic work since 1933. He is an investment officer of the Fidelity Trust Company at Pittsburgh.

In the Dakota Division, Goodwin L. Dosland, W0TSN, former director of the Central Division, was elected to succeed Tom Davis, who was not a candidate. The voting:

Mr. Dosland.....	191 votes
E. Clyde Mohler, W0ADJ.....	138 "
John R. Lally, W0LVG.....	120 "
Harold B. Love, W0ZRT.....	57 "

Lieut. Commander Dosland, after five years on both fronts during World War II, now serves as CO of his Electronic Warfare Company, and is president of the Red River Valley Amateur Radio Club. Now engaged in the practice of law at Moorhead, Minn., he is also the county attorney for Clay County.

As previously reported, R. A. Kimber, W0BLK, has been elected alternate director of the Dakota without membership balloting.

The Delta Division voted a change in the office of director, Victor Canfield, W5BSR, succeeding Dr. George S. Acton, W5BMM, by 363 votes to 163. Mr. Canfield is the senior member of a firm of certified public accountants in Lake Charles, La., and is ORS, OPS and OBS. For alternate director the Delta chose James W. Watkins, W4FLS, over Harold E. Walchli, W4TWI, 391 votes to 135. Mr. Watkins, the present Tennessee SCM and president of the Chattanooga Radio Club, is an electrical engineer in the electrical laboratories of the Tennessee Valley Authority.

The Great Lakes Division maintained both the incumbent director and his alternate. Harold C. Bird, W8DPE, nosed out Robert L. Stewart, W8FF, for the directorship, 804 votes to 688. John H. Brabb, W8SPF, carries on as alternate by winning over Chester W. Bolg, W8JXY, 841 votes to 649.

In the Midwest Division, Chester A. Colvin, W0VHR, was defeated for reelection by R. Leonard Collett, W0DEA, the latter receiving 537 votes to Mr. Colvin's 464. Wells R. Chapin, W0DUD, although he withdrew his name after the ballots were printed, received 27 votes. Mr. Collett, active on both 'phone and c.w., is a CAA aircraft communicator, with operating watch duties at an airway communication station at Joplin, Mo. He enlisted in the Navy in 1942, was disabled and discharged in 1944. He operates Morse as well as Continental.

As previously reported, the new alternate for the Midwest is Alvin G. Keyes, W0KTTQ.

With Director Ladley carrying on in the Pacific Division as the only nominee, that division balloted only for alternate director. In that race, Kenneth E. Hughes, W6CIS, won over Ronald G. Martin, W6ZF, 585 votes to 322. Mr. Hughes, long active in the club life of San Francisco and Sacramento, and with five years service in the Navy during War II, is now an operator at KRG, the San Francisco control station for the eight-station fixed net of the California State Department of Agriculture.

William C. Shelton, W4ASR, continues in office as director of the Southeastern Division, having won handily over Francis A. Saxon, W4AAY, 348 votes to 238. As previously reported, William P. Sides, W4AUP, likewise continues as the Southeastern's alternate.

## WASHINGTON NOTES

Something like two dozen additional international radio conferences of various sorts are scheduled for the next two years. While some are only regional and many are of limited agenda, the United States must be represented at a great many of them. The problem is so pressing, with the requirements on time and personnel, that the Government recently called an industry-Government conference in Washington to begin plans; it will require almost a "production line." Fortunately for us amateurs, the only conference of early concern to us will be the Inter-American one to be held in Bogotá in late 1948. Since American proposals must be circulated well in advance, the preparatory work begins in Washington on January 2nd. Thus we are only out of one conference when we begin work on another!

FCC is looking into pseudo-broadcasting by amateurs under the guise of amateur communication. Watch your step! The authorized types of communication are fully set forth in the amateur regulations; you should be familiar with them and abide carefully by them.

If you hear any broadcasting going on in our 7-Mc. band by a broadcasting station in the *American Region*, please note particulars carefully and advise ARRL Hq.

FCC announces the appointment of Albert L. McIntosh, W3ZM, to succeed Paul D. Miles as chief of its engineering department's Frequency



ALBERT LEROY McINTOSH, W3ZM

Allocation & Treaty Division and as the FCC representative on IRAC. Captain Miles goes to Geneva as the U.S. designee to IFRB. Mr. McIntosh, who has been assistant chief, served with Captain Miles as a member of the U.S. delegation to the Atlantic City conference, where they were the U.S. spokesmen on frequency matters.

Thus FCC again selects a dyed-in-the-wool amateur for a key post which, by its very nature, requires the scrutiny and solution of problems on an impartial basis. Mac has been a licensed

ham since 1929, obtaining his WAC with a Type 210 on 14 Mc. in 1931 from W6CYR. As president of the Hollywood High School Radio Club he operated a 50-watter from W6IG in 1929-30. At present he works 14-Mc. c.w. from W3ZM. His ambition is to be one of the openers of the precious new 21-Mc. band.

He attended U.C.L.A. and has done special work in electrical engineering at George Washington University. He has been a member of several United States delegations to foreign conferences. From 1940 through 1945 he served as chief of the identification section of FCC's Radio Intelligence Division. As a Government witness he introduced the plots of d/f bearings and other technical evidence in the famous "AOR" trial which resulted in espionage convictions and sentences of up to 99 years for the members of a ring of German secret agents in New York. Mac has a five-year-old son who regularly wears the cans, to the XYL's horror, and a three-year-old daughter whose jealousy toward the OM's operating time compares favorably with that of the XYL.

### THAT 21-MC. BAND

A great many of us are looking forward with much impatience to the opening of the new 21-Mc. amateur band in 1949. The general feeling is that it ought to prove to be a very good amateur band, staying in much longer in the solar cycle and much longer each day than 28 Mc. does and offering considerably more convenient dimensions for rotary beams than 14 Mc. does.

You're all aware that the proposal of this band was laid before the Atlantic City conference by the U.S. Government and that, after considerable sparring with other delegations, particularly that of U.K., it was finally agreed upon with a width of 450 kc. We think you would be interested now in learning how the idea got its birth in the United States. Besides, we want to make bows in the proper direction to put the credit where it is due.

The father of the idea was William R. Foley, W5MQ. Serving in the frequency section of Naval communications for the three years 1943-1945, Lieut. Foley was the Navy's alternate representative on the Interdepartment Radio Advisory Committee, which plotted the Government's needs for frequencies as FCC did for the non-Government services in the joint postwar radio planning which occupied so many years and which finally culminated in the ACy conferences. It is well known that in time of war, when we are closed down for security reasons, our frequencies are taken over by the military services. The latter, therefore, have particular reason for protecting us and for seeing that any national planning makes adequate provision for the amateur service. In the course of his duties it occurred to Lieut. Foley that the Navy wartime harmonic

families of frequencies would be considerably improved if, in addition to 7 and 14 Mc., there were a third-harmonic assignment at 21 Mc. There just ought to be!

So he proposed it, and it was supported by the other services, and it was adopted, and it appeared in the first IRAC proposal for postwar allocation. Prominent among those who helped



BILL FOLEY, W5MQ

to carry the ball, both before and after, was Lieut. Comdr. A. L. Budlong, USCGR, WIBUD, then chief of the Coast Guard's frequency section and also serving on IRAC, now again senior assistant ARRL secretary. From that point on the idea gained in strength, was strongly supported by ARRL and was incorporated in the FCC thinking. It was approved by the FCC hearings and was recommended to the Department of State by both IRAC and FCC, and so became a formal part of the U.S. proposals to ACy. The rest of the story you know.

Lieut. Foley is now the engineer-in-charge at the FCC primary monitoring station at Kingsville, Texas. He is both an oldtime amateur and oldtime FCC man, having operated W3MQ at Allentown, Pa., and Norfolk, Va., W4FEC at Savannah, Ga., and K4FEC at San Juan, P. R. His previous FCC assignments were radio inspector at Norfolk and Savannah and inspector-in-charge at San Juan. He is also an oldtime Naval Reservist, having organized and commanded Unit 2 at Savannah before War II. He is now awaiting instructions to organize an Electronic Warfare Company at Kingsville. He is the author of several technical articles in *QST*.

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## TELEVISION ARGUMENT

Oral argument before FCC began on November 17th on the Commission's proposal to end the sharing of television channels by the fixed and mobile services and, instead, to reallocate Channel 1 to the latter services. The argument lasted a week and was participated in by about 200 persons representing about 40 agencies from the several services concerned. ARRL was represented by Technical Director Grammer, General Counsel Segal and Secretary Warner. As previewed in our November editorial, the League urged that Channel 2, rather than Channel 1, be assigned to fixed and mobile, believing that the Commission was overlooking the much more serious problem of harmonics — which, under the Commission's proposal, were likely to de-

prive TV of a total of two channels instead of one.

The question is now before the Commission for final decision but announcement is not expected in time for this issue. You should watch for it, because it will have an important bearing on the future of our 10- and 6-meter bands. Television is growing rapidly, with much public interest, and an unfortunate allocation decision which precipitates inescapable interference between services in close geographical proximity could cause us increasing headaches. We're sure that members of the League are interested in what ARRL had to say on this matter. We think it important that you be informed on the League's position. Following is the ARRL direct testimony, as presented by Mr. Grammer:

The interest of the American Radio Relay League in the present proceedings arises from the fact that the frequency range under consideration today contains one band allocated to the amateur service and that it also contains the second-harmonic shadow of another amateur band which is currently carrying a greater proportion of all amateur activity than is any other amateur band.

Three other services besides ours are concerned with this portion of the spectrum, namely, television, the fixed service and the land-mobile service. The problems here confronting the Commission are exceptionally difficult. Each of these four services has its legitimate claim to a portion of these frequencies but the available space is palpably inadequate to take care of the needs of all of them. The entire space under consideration is said to be insufficient for the needs of an adequate television service in this part of the spectrum, yet the stated needs of the fixed and mobile services, in extension of their lower frequencies, not only impelled the original decision to employ sharing but now result in the proposed reduction of the television allocation. Yet for television's purposes, this is a most unwholesome portion of the spectrum. It is vile with harmonics from industrial, scientific and medical apparatus, and from numerous services using lower frequencies; most of it is subject to relatively long-distance interference through the vagaries of sporadic-E transmission; and some of it is even subject at times to worldwide interference via the  $F_2$  layer. There are serious interference conflicts with the other services. The conclusion that we reach as general students of the art is that it is highly unfortunate that there is any television allocation in this portion of the spectrum, and that in a soundly-conceived allocation plan the magnificent talents of the television people would be being exerted on the development of the higher-frequency television assignments. It seems to us that there is small prospect for the successful working of the television allocation in this part of the spectrum or, indeed, for the realization of a satisfactory national television service unless and until television "goes upstairs" to its u.h.f. assignments.

However, if we are to assume that that particular die has been cast and that some such provision for television is to continue to exist for the indefinite future, we still think that the basic 1945 allocation decisions for the four services concerned in the range 40 to 88 Mc. are particularly unhappy ones. The sheer truth of the matter is that three of the four services are here in head-on conflict with the other one, television. These allocations were laid down during the war, when there was no opportunity to make practical tests and when the severity of some of the problems could not be properly appraised. The defects now disclose themselves as the result of practical experience. The severity of the adjacent-channel interference problem now shows that the several other services in this range should not have television for a bedfellow; and it seems now to be amply demonstrated that the fundamental 1945 scheme did not take adequate account of the peculiar susceptibility of television to co-

(Continued on page 132)

# Parallel Standing Waves

## Cleaning Up the Antenna System

BY JOHN W. PADDON,\* VE3BLZ

THE postwar tendency to abandon tuned feeders in favor of nonresonant lines is a change for the better. These "flat" lines are more convenient to handle and install. If proper termination is preserved the transfer of power is more efficient. This important question of transmission-line matching has been dealt with in exhaustive detail by a number of sources and will not be considered in this article.

The Micro-Match and its somewhat less precise baby brother, the "twin-lamp," are useful tools in the amateur's hands. They provide a convenient means of quick determination of standing-wave ratio in a line without the laborious and frequently inaccurate methods we previously used.

Vagaries in Micro-Match readings set us off on the study of "parallel standing waves." It came about this way: a number of antennas and their feeders were being measured for s.w.r. Many Micro-Match readings were taken. Tabulation showed them to be too far wide of the expected theoretical results to enable them to be looked upon as normal measurement errors. Further study showed that if the feeders were disconnected from the Micro-Match and then reconnected the other way around (i.e. the sense of the feeder connections was reversed) two different sets of s.w.r. readings were obtained under the same conditions. Here, obviously, was something decidedly ungood — for a feeder operating properly is symmetrical and the Micro-Match readings *should* be identical regardless of the way the feeders are connected.

The unbalanced s.w.r. readings pointed directly toward parallel or "antenna" currents on the feeders. Further study confirmed the suspicion. Parallel currents are ones that flow in the same direction on both wires of the feeder as opposed to the normal feeder currents that flow in *opposite* directions on the two feeder wires. Since the wires of the feeder are spaced but a minute fraction of a wavelength the *parallel* currents treat them as if they were a single conductor. Since these currents practically always have a standing-wave pattern, it is convenient and descriptive to refer to them as "parallel standing waves." What causes them? What harm do they do? How can they be effectively eliminated?

• Most of us visualize current flow on an antenna-feeder system in rather simple terms. Too often the system itself has entirely different ideas. This article points out several possible ways in which "stray" currents can be set up, tells why they cause trouble, and outlines methods for eliminating them. Attention to this almost completely neglected point will pay off in better antenna performance, lessened BCI, and reduction of harmonic radiation.

### How Parallel Standing Waves Are Generated

Fig. 1-A shows a simple dipole fed by a transmission line. This feeder leaves the dipole at right angles. The system is perfectly symmetrical and is *inductively* coupled to the r.f. power source. If the transmission line is correctly terminated the currents flowing in the feeder wires are equal and opposite and there is no unbalance current to produce radiation. The expression "r.f. power source" is used instead of "transmitter," to cover the case where an antenna tuner is used — and it is devoutly hoped that an antenna tuner *is* used. The ancient and sloppy method of cramming a few turns into the final tank coil is an invitation to BCI, TVI and parallel standing waves. In almost every case it will be found to be an inefficient and ill-matched method of transferring power from the final amplifier to the antenna via the feeder.

Fig. 1-B shows exactly the same antenna system working in a different mode. Here there is *capacitive* coupling between the end of the feeder and the r.f. power source. For clarity it is considered that no inductive coupling exists. The whole system is going as a flat-top Marconi antenna. The currents flowing through the stray capacitive coupling treat the two wires of the feeder as a single conductor. They rudely ignore our careful work in pruning the dipole to one-half wave and they treat the whole system — the dipole, feeder and even maybe the a.c. power wiring — as one hunk of radiator stuck up in space any old how. In this mode of operation the dimension that must be watched is the one from one end of the dipole, back to its center and then down the feeder to the transmitter or

\* Technical Department, ARRL.

antenna coupler. That dimension we can measure. We may also get caught by the more obscure electrical length of the a.c. wiring. These points will be examined in detail later.

What harm do these parallel standing waves do? Generating r.f. energy is an expensive business at best. We want to cram all the r.f. energy at our command up the feeders into the dipole and from there into space and out to the ends of the earth. Fig. 1-B shows how parallel currents flow. There is no cancellation and the feeder itself radiates — for after all in this mode it is just the down-lead part of an ancient “T” antenna. The feeder is vertical and the radiation must be vertically-polarized. The antenna, however, is horizontal and that portion radiates horizontally-polarized waves. Except on some of the u.h.f. bands it is the horizontally-polarized stuff that does business for us. The vertically-polarized stuff is subtracted from our total available r.f. energy. It is also the vertically-polarized field that smears the local BCIs and causes grandmother’s hearing aid to call CQ at her. On top of all that the capacitive-coupled energy is very likely to be rich in harmonics — which state of affairs is most interesting to the gentlemen of the FCC.

What causes parallel standing waves? In Fig. 1-A the sending end of the feeder is *inductively* coupled to the r.f. power source. The end of the feeder is connected to a small pick-up coil which sits in the field of the associated coil in the r.f. power source. It picks up energy by *magnetic* coupling and passes it on to the feeder. It is true that the pick-up coil is probably only a turn or two of wire — but don’t forget that the wire is metallic and has physical size. It is close to or wound over the coil to which it is coupled. This coil too is made of metal and has size. Mother Nature says that two conducting bodies adjacent to each other have between them a *capacitance* (Fig. 1-B) whether they be the two plates of a condenser or our two coils. The capacitance is, of course, quite small but it is

still capable of raising hob with our antenna system. We will tag it “stray capacitive coupling” and discuss what to do about it later in this article.

Fig. 1-C shows how we get snarled up. The currents shown are produced by superimposing the normal feeder currents of Fig. 1-B. The two sets of currents add or subtract from each other, as the case may be, and it can be seen that the presence of the parallel currents causes a large resultant unbalanced current.

Supposing you get out O.K. and have no BCI, you might wonder whether it was worth while doing anything about parallel standing waves. Let’s take two of the many ill effects introduced. Where unbalance occurs it is most probable that the performance of the dipole, considered separately from the feeders, is affected and even more probable that the field pattern of the thing will be distorted. In this article we talk about a dipole for the sake of simplicity. The phenomena apply equally to *any* antenna, beam or otherwise, which is fed with a transmission line. Another example of what we pay for parallel standing waves is common in many ham stations. Consider the ordinary change-over relay. If the line currents are balanced and there are no parallel ones present the field about the feeder is compact. Even the inevitable impedance “hump” caused by the difference in spacing between the two wires of the feeder and the relay contact arms will not have a large enough field about it to couple into surrounding objects. Where there are parallel currents there will be a field about the feeder and probably a strong one. Remember that in this mode the whole system is going like a flat-top Marconi against ground. The relay is right in the field. Its coil and associated wiring appear to the r.f. on the feeder as a short path back to ground — and there goes some more of our hard-earned r.f.!

#### How To Detect Parallel Standing Waves

How can the presence of parallel standing waves be determined? One method is to take a Micro-Match and, following the normal procedure, read the s.w.r. on the line. Leave everything set and switch off the transmitter. Disconnect the feeder from the Micro-Match and connect it back on but the other way around. Switch the transmitter on again and note the s.w.r. reading. Compare the second reading with the first. If there is a wide difference between the two there are parallel standing waves present on that feeder. If the two readings differ by only a small amount don’t take it for granted that things are O.K. Splice in an added length of feeder — about one-eighth wave — and repeat the test. It may be found that a quite different

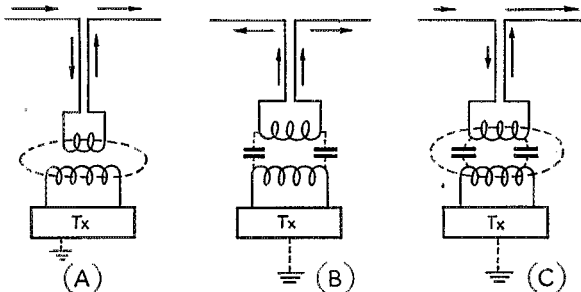


Fig. 1 — A — Current flow on a symmetrical dipole system, the feeder being inductively coupled to the transmitter. B — Parallel currents set up by stray capacitive coupling. In this mode the system goes as a Marconi flat-top antenna. C — Unbalance of feeder currents caused by superimposing capacitive-coupled strays upon normal feeder current.



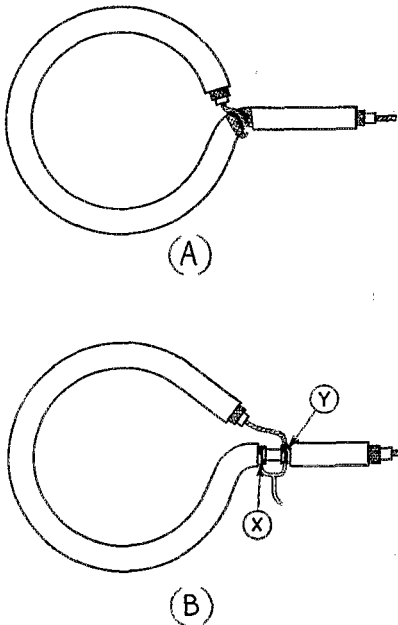


Fig. 2 — The shielded pick-up loop provides a cheap and effective form of Faraday screen, reducing stray capacitive coupling between transmitter and antenna system.

state of affairs will appear. This is a wise precautionary recheck since it is always possible that a single set of readings will present a unique condition in which the discrepancies cancel out.

This is a good place to note that many a perfectly-innocent Micro-Match has been sworn at for telling the truth. If you have used a Micro-Match and got a reading that seemed to you far off the mark, just repeat the test above. It will probably exonerate the instrument and at the same time bring to your attention the fact that all is not well on the feeders.

Where an antenna tuner is in circuit a second method may be employed. Leaving everything set up normally, put a good short-circuit across the end of the feeder and another across the entire antenna-coupling coil. By doing this all inductive coupling is washed out and only stray capacitive coupling remains. Having reduced transmitter power, switch on and then take a sensitive wavemeter and explore with it along the feeder. If there is r.f. present it can only be there by stray coupling, and parallel standing waves are in your hair. A suitable type of sensitive wavemeter is described on pages 397-399 in the 1947 ARRL Handbook.

#### Cures at the Transmitter End

There are two separate and distinct causes for parallel standing waves and they require separate investigation and cure. One lies in the method of

coupling from the transmitter to the sending end of the feeder and the other in the antenna system itself. Let's take the transmitter end first.

The best and surest cure is the use of a Faraday shield. The textbook type is an awkward thing to make and clumsy to install — especially in the push-pull case.

The next best thing is the shielded pick-up loop described in the September '47 issue of QST. Here we have a simple and inexpensive type of Faraday shield within easy reach of anyone. Fig. 2-A shows the construction of such a loop. Its Faraday-shield effect can be improved by using the more elaborate arrangement at 2-B. Before describing its construction it would be wise to emphasize the fact that the plastic insulation in coaxial cables has a low melting point. The soldering iron should be used with great care. If the surfaces to be soldered are perfectly clean and the soldering iron well tinned the job can be done with a minimum amount of heat.

Inspection of Fig. 2-B shows that at the base of the loop a gap is provided in the screen of the coaxial cable between X-Y. A single wire is connected at point X. A similar ground wire is connected at point Y on the opposite side of the gap. The inner conductor protruding from the end of the pick-up loop is connected at point Y also. The purpose of the gap is to make it unnecessary for current from the inner conductor at Y to flow back over the outside of the shield to the open end to complete the link circuit.

With either type a single turn only is drawn and wherever possible only a single turn should be used. More turns can be employed if absolutely necessary but should always be kept to the minimum number required for adequate coupling. The size of the coaxial cable is unimportant so long as it is sufficiently robust to carry the output power of the transmitter. This pick-up loop has a high degree of Faraday-shield effect when properly grounded. The ground should be short and direct and made with heavy-gauge copper wire or ribbon. The ground should be connected at the transmitter end only and carried to a point making perfect connection

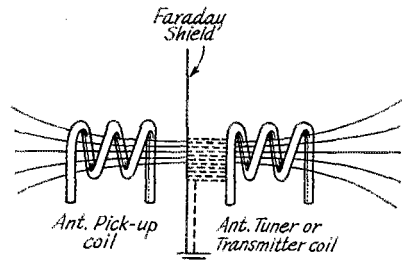


Fig. 3 — A Faraday screen blocks capacitive coupling without affecting magnetic coupling. The solid lines depict the magnetic lines of force coupling the two coils. The dotted lines show how the electric field is drained off to ground.

with the transmitter chassis. We get a bonus with the use of the pick-up loop since it also serves to throttle harmonic coupling. This type of coupling can well be used between stages in the transmitter for the same reason.

How does it work? A Faraday shield is a sort of strainer. It permits the *magnetic* field to pass without attenuation. It intercepts the *electric* field and drains it off to ground. Fig. 3 shows a

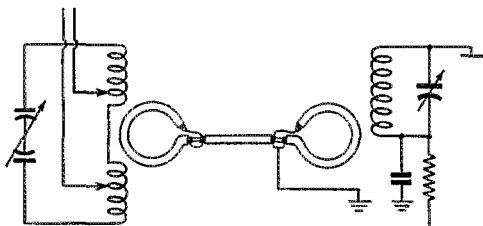


Fig. 4—Coaxial link with shielded pick-up loops between transmitter and antenna coupler.

simplified diagram of what happens in the case of a textbook Faraday shield. If we put one of these strainers between the transmitter and the antenna coupler we permit inductive coupling and chop off the stray capacitive coupling. But parallel standing waves are caused by capacitive coupling and not inductive coupling. Our strainer thus prevents the generation of parallel standing waves.

Fig. 4 shows the hook-up of the coaxial link between the transmitter and the antenna tuner. The length between the two pick-up loops can be any convenient one but it is good insurance to make sure that it is not a multiple of a quarter wave at the frequency used.

#### What To Do About the Antenna and Feeder Dimensions?

Our worry is the total length from one end of the dipole back to its center, where the feeder is connected, and down the feeder to its end in the shack. If this length is a half-wave — or a multiple of a half-wave — the impedance appearing at the shack between the end of the feeder and ground is high. Even a very small amount of stray capacitive coupling will transfer an alarming amount of r.f. to the feeders and set up parallel currents.

If, on the other hand, the length is an odd number of quarter waves the small stray capacitance will transfer little energy or none at all. At first glance that looks fine — but let's see what happens at harmonic frequencies. If the length is a quarter wave at the fundamental frequency it will be a half-wave, a number of half-waves or even full waves at a harmonic frequency. At these frequencies the end of the feeder will look like a high impedance and the stray capacitive coupling will do the rest — even

more than on the fundamental, since the harmonics are at a higher frequency and more energy will be transferred through a given amount of capacitance.

The answer is to compromise and cut the over-all length, from one end of the dipole through to the end of the feeder, so that it comes out at a dimension between a multiple of one-quarter and an odd multiple of one-eighth wave. Let us restate that this is a compromise and not a complete cure. It will, however, cool off the r.f. in the shack — by preventing a voltage loop (in the parallel mode) from appearing at the transmitter.

#### The Importance of Antenna Symmetry

As if things weren't complicated enough already, we must consider another cause of parallel currents. Fig. 5-A shows a dipole from which the feeder hangs at right angles. The dipole is horizontal and parallel to ground. We then have a system that is symmetrical both in itself and with respect to ground. By their position in space, both wires of the feeder are equally exposed to the fields of both halves of the dipole. Some of the radiated energy from each half of the dipole must be picked up by each feeder wire. Thus currents are induced — but these currents are equal and opposite in each feeder wire because the system is perfectly symmetrical. Since they are of equal magnitude and 180° out of phase they will cancel each other out.

In Fig. 5-B the feeder is shown coming away from the dipole at an acute angle. In this case the field from the right-hand end of the dipole will induce more current in the feeder wires than the field from the left-hand end. These induced currents will never completely cancel and there will be an unbalanced current, i.e. a parallel standing wave.

We must achieve symmetry at all costs, or at least as much symmetry as our particular set-up will permit. Even if it is necessary to increase the total length of the feeder proper it should be so arranged that it departs from the antenna at right angles for at least one-half wavelength at the fundamental frequency. Lengths shorter than a half-wave are an invitation to trouble.

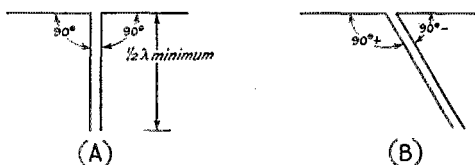


Fig. 5—A—The ideal position of the feeder in respect to the antenna. The farther the 90° portion can be extended the better. B—A feeder coming away from the dipole at a sharp angle is looking for trouble in the form of unbalance and parallel currents. To be avoided if at all possible.

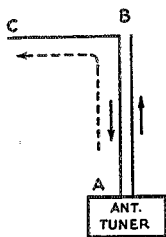


Fig. 6 — Showing lack of symmetry and imbalance in the Zeppelin type of antenna.

Let us now take careful aim and slowly squeeze the trigger in order to blast a commonly-held amateur superstition. It is widely believed that the existence of large standing waves on a feeder automatically means that the feeder is radiating. Regardless of the magnitude of the standing waves, as long as the currents are equal and opposite and there is no unbalance current present, there will be no appreciable radiation from the feeders. As an illustration, let's look at two types of commonly-used antennas fed with tuned lines.

One type is the center-fed dipole (commonly and incorrectly named a "center-fed Zepp"). Assume that we have satisfied the conditions of symmetry and the system looks like Fig. 5-A, except that the feeders are tuned. As has been detailed above, all currents induced on the feeder by the two halves of the dipole are equal and opposite. Unless there is some outside influence causing a parallel current and hence an unbalance in the system the currents cancel each other out and radiation from the feeder does not take place.

The old stand-by Zeppelin antenna, on the other hand, almost inescapably has a radiating feeder. It is true that by a rather complex technique the feeder currents can be balanced but since it can take place at only one frequency at one time it is not applicable to amateur uses and will not be considered.

Fig. 6 shows the Zeppelin antenna. The feeder currents put into the tuned line by the transmitter are equal and opposite as they flow on the feeder wires. The left-hand wire of the feeder pair is connected at its end (point B) to the end of the radiating dipole (B-C). There is, however, the length A-B-C which, aside from the feeder duty that part A-B does, is still a piece of wire and constitutes, by itself, an antenna. In the "antenna" A-B-C there is also a current flowing in the same fashion as if it were a simple "L" antenna. This current superimposed upon the normal feeder currents causes an unbalance current and the feeder radiates.

#### Maybe the Power Wiring Needs Treatment Too

So far we have looked into the antenna coupler and the antenna-plus-feeder system. That leaves the a.c. power wiring. It may be perfectly in-

nocent but it is better to check and make sure. Many amateur stations are in attics or on the upper floors of buildings. The power wiring has to get there from the house meter, which is usually located in the cellar. One side of the power wiring is often said to be "grounded" — but that doesn't necessarily mean an r.f. ground. Although we can't see it, there is all this power wiring hanging between the transmitter and ground. From an r.f. standpoint the transmitter is floating high in the air (so are the receiver and the station generally). It can happen that the power wiring either by itself or as part of a flat-top Marconi system, starting with the dipole, is of a resonant length and will absorb power and thus set up parallel currents. Whether this is going on can be checked by taking a sensitive wavemeter and exploring the power wiring all over the house and right down to the house meter. If there is r.f. present on the power wiring it will be detected by the sensitive wavemeter. By-pass condensers, from each side of the a.c. line where it enters the chassis, to a good ground point, may do a lot of good. If the condition is really severe a simple line trap as shown in Fig. 7 will help. The line trap is connected between a point close to the transmitter chassis and the a.c. power source. To adjust it, simply switch on the transmitter and place a sensitive wavemeter close to the lead from the line trap to the power source. If the meter shows a reading, tune the condenser in the line trap until a minimum reading is obtained and leave it set. Unfortunately this type of trap is effective on one band only, and its usefulness is thereby limited. It will, however, prevent r.f. from leaking back down the power system until it gets into somebody's a.c.-d.c. or TV set. More important, in those cases where the power wiring has associated itself with the antenna system to become a flat-top Marconi, the insertion of the line trap de-

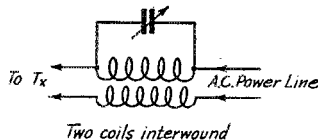


Fig. 7 — A.c. power-line filter. The condenser and coil to which it is connected should tune to the operating frequency. The second coil is identical with the first and the two windings are close coupled either by interwinding or by winding one over the other. The filter prevents good r.f. from being dissipated in the house wiring.

tunes the system and discourages the generation of parallel currents.

Obviously the line trap must be wound with wire of a heavy enough gauge to carry the current demanded by the transmitter. The kilowatt fraternity will have to put the line trap in the supply to the final-amplifier high-voltage transformer.

(Continued on page 148)

# 14th ARRL International DX Competition

*C.W.: Feb. 13th-15th and March 12th-14th;  
'Phone: Feb. 20th-22nd and March 19th-21st*

BY F. E. HANDY,\* WIBDI

**A**MATEURS all over the world are invited to take part in this contest, designed to bring out more DX for all DX workers. Operators outside the continental U. S. and Canada will try to work as many of our stations as possible to exchange serial numbers. Stations in all localities need only take part and report results to receive credit and to be eligible for the medalion awards. Individual competition in this activity is only with other operators in your section, so one does not compete, strictly speaking, with operators across the nation.

A quota plan for mainland United States and Canadian contestants of three stations per country applies only in the c.w. contest. You may enter one or both contests, since c.w. scores are independent of voice scores. All claimed points in the 'phone section of the contest must be made voice-to-voice. In the telegraph contest only c.w.-c.w. QSOs count. Contacts with operators who don't submit logs can count if proper exchanges are made. Refer to this announcement to explain the plan of operations.

Operators exchange two- or three-figure signal reports<sup>1</sup> combined with three self-assigned numbers. Each operator allots himself three figures to form the last portion of the serial number that he sends to stations contacted. Complete exchanges are recorded in the contest log, as shown in the example.

In 'phone exchanges two numerals will be given, the first the "readability" and the second the "strength." C.w. exchanges should also include accurate tone-scale reports. Thus telegraph entrants will send and receive six-figure groups, and 'phone entrants five-figure groups.

## Awards

Engraved medallions will be awarded c.w. and 'phone-operator winners for each country,<sup>2</sup> and leaders in each U. S. A. and Canadian ARRL section.<sup>3</sup> *Separate QST listings will credit the results of stations where more than one operator participated in any contest work.* Additionally, the collective scores reported by club secretaries and confirmed by receipt at ARRL of individual contest logs, will be considered for a club listing where at least three 'phone or three c.w. entries validate the minimum showing required to constitute a club entry. ARRL will present a gavel to the club submitting the greatest aggregate score.

## Rules & Conditions

1) Contest logs must be marked " 'phone" or "c.w." Separate entries may be made for c.w. and 'phone.

2) The ARRL Countries List (not prefixes) shall define remote localities and, in the mainland United States and Canada, the government licensing areas (such as W1, W2, VE8, etc.) similarly shall be used to determine the *multipliers* for the scores of the DX stations.

3) Scoring: Both the continental United States or Canadian station, and the station in the remote locality, receive *one* point when a serial number is acknowledged by the station in the remote locality. Each operator adds *two* points more when a serial number to U.S.A./Canada is acknowledged.

Quotas. There is no quota limit on the number of continental U. S. A. and Canadian stations that "outside" stations may work for credit. W/VEs: On c.w., the quota is three stations per country per band. (If one-way exchanges for *less*

\* Communications Manager, ARRL.

<sup>1</sup> For RST definitions of "readability, strength and tone," in that order, see 1948 ARRL *Handbook*, or *Operating an Amateur Radio Station*, page 15.

<sup>2</sup> Alaska, Hawaii, Philippine Islands, Cuba, Puerto Rico, Canal Zone, Newfoundland, and all localities outside the continental United States and Canada will receive QST mention and awards based on their work with W/VE stations.

<sup>3</sup> Page 6 of this issue carries a complete list of sections of the ARRL field organization.

<sup>4</sup> "Countries" for U.S.A.-Canada; "districts" or "licensing areas" for others. A progressive record of *new* countries (or licensing areas) is kept in these columns. The multiplier for "each band" is added to obtain the over-all multiplier. The Worked Record shows the progressively-increasing *new* countries (or licensing areas) in each band as the contest proceeds. The last number in each column added to similar numbers in the other columns gives the over-all multiplier. Counting the entries in the columns gives the different contacts on each band for the log heading.

<sup>5</sup> February 13th (and March 12th), one minute past midnight, Saturday morning, Greenwich, marks the start of c.w. contest periods. This is Friday night Feb. 12th (and Mar. 11th) 8:01 P.M. AST, 60th meridian time; 7:01 P.M. EST, 75th meridian time; 6:01 P.M. CST, 90th meridian time; 5:01 P.M. MST, 105th meridian time; 4:01 P.M. PST, 120th meridian time, etc. Time at other points should be computed from Greenwich.

The c.w. periods end one minute before midnight, Sunday night, Greenwich (7:59 P.M. AST, 6:59 P.M. EST, 5:59 P.M. CST, etc.) making each operating session two minutes short of 48 hours long.

The 'phone periods start Feb. 20th (and Mar. 19th), hours as above, ending also one minute before midnight of each following Sunday night.

# LOG, 14TH A.R.R.L. INTERNATIONAL DX COMPETITION

(Example: W6ZAA, Serial No. 543)

C.W. Entry                      Feb. 13th-15th                      (Logs from W or VE show, for each band)

Call.....

Name.....

Address.....

Transmitter Tubes.....

Plate Watts (input last stage).....

No. Hours Station Operation (17 h. 28 min.)

ARRL Section (for continental U.S. and Canada)

Bands	3.5 Mc.	7 Mc.	14 Mc.	27 Mc.	28 Mc.	Total	Different Stations & Countries
Nr. DX Stations QSOed		3	5		1	9	9
Nr. Countries QSOed		2	4		1	7	6

(Logs from remote points indicate, for each band, in this part of the log: "No. U.S.A.-Canada stations QSOed . . ." and "No. U.S.A.-Canada licensing areas worked . . .," in a similar tabulation.)

Date & Time	Station Worked	Country	Worked Record of New Countries <sup>4</sup> for Each Freq. Band					Serial Numbers		Points	
			3.5	7	14	27	28	50	Sent		Received
Feb. 13th 4:02 P.M. PST (or 0002 GT)	VP9E	Bermuda			1				568543	478001	3
Feb. 14th 8:15 P.M. PST	G2MI	England			2				579543	579287	2
9:40 P.M. PST	PA6AZ	Netherlands			3				488543	488111	3
Mar. 12th 9:38 P.M.	VK2TI	Aust.		1					579543	579287	3
10:50 P.M.	ZL1MR	N.Z.		2					487543	398657	3
11:50 P.M.	VP9X	Bermuda			3				349543	588984	3
Mar. 13th 12:05 A.M. PST	VK2RA	Aust.		2					588543	579000	3
4:10 P.M. PST	VK2TI	Aust.					1		499543		1
5:00 P.M. PST	PY2AC	Brazil			4				487543	489852	3
											24

Assisting person(s): name(s) or call(s)

$$\text{Multiplier} = 2 + 4 + 1$$

$$24 \times 7 \text{ (countries)} = 168$$

I certify, on my honor, that I have observed all competition rules as well as all regulations established for amateur radio in my country and that my report is correct and true to the best of my belief.

Operator's Signature

than the three points per station have been made, an additional station may be worked to give not more than nine points per country, per band.) On 'phone, there is no quota limit on the stations per country. The same station may be worked again in other bands.

**Multipliers:** The number of countries worked on one band plus those worked on a second band, etc., shall be used as a multiplier.

**All others:** The number of continental U.S.A. and Canadian licensing areas contacted (a possible eighteen) shall be used as a multiplier of the

sum of all claimed QSO points for the total score. This multiplier is increased further by working the same areas on *additional frequency bands*. (E.g.: Ten, eight, and five areas, indicated by call numeral, are worked on three bands. The sum, twenty-three licensing areas, is the multiplier.)

The final score equals the total "points" multiplied by the "multiplier."

4) Periods — C.w. — start Feb. 13th (and Mar. 12th) 0001 or 12:01 A.M. Greenwich.<sup>5</sup> End Feb. 14th (and Mar. 13th) 2359 or 11:59 P.M. Green-

wich. 'Phone — start Feb. 20th (and Mar. 19th) 0001 or 12:01 A.M. Greenwich. End Feb. 21st (and Mar. 20th) 2359 or 11:59 P.M. Greenwich.

All work in a designated mode must take place in the proper period.

5) Logs must include date, time of QSO, call of station worked, serial numbers exchanged, total time and other data as shown on sample log, with the claimed score.

6) Eligibility: Fixed amateur stations in any part of the world are eligible to participate. Only single-operator stations will compete for medalion awards. More-than-one-operator stations will be given special mention, in the order of their scores. No credit will be granted for exchanges with ship-expedition or aero- or maritime-mobile stations. All claims presented must relate to operation in one country or ARRL section. Crossband work may not be counted.

7) Declarations: Each entry must include the signed statement as shown with the log example and, in addition, the names or calls of persons who assisted in any manner, by spotting stations, keeping log, or by using key or microphone during the contest periods.

8) The entries will be passed upon by an ARRL award committee whose decision will be final in all cases. No correspondence can be entered into regarding Contest Committee decisions. All entrants agree to be bound by all provisions of this announcement and the regulations of their licensing authority.

9) Disqualifications: The award committee will void or adjust claims as their interpretation of these rules and the evidence available may require. Off-frequency operation (as confirmed by single FCC citation or advisory notice or two accredited official observer measurements) will disqualify. Written protests concerning alleged unethical contest operating practices may be submitted by participants. Such complaints when from independent sources and buttressed by specific and adequate evidence will be considered by the committee in determining disqualification of the offenders. Low tone reports in logs also will be disqualifying.

### Operating Tips

Much listening is recommended — you have to hear them before you can work them. Full break-in makes for highest operating efficiency.

U.S. and Canadian amateurs: Many remote stations will not answer VFO calls on their exact frequency. Avoid any use of CQ. If ten fellows were calling you, would you look for and answer someone calling CQ?

All others: Short CQs will bring you many calls. Sign often to get your call through QRM. You can make your own operating pleasant by not answering any U.S.-Canadian station who uses your exact frequency. Make North American hams spread out both in this activity and at all

times by refusing to answer if they use your exact frequency. Use the following signals after your CQ and reward those who do your bidding:

HM — Will start to listen at high-frequency end of band and tune toward middle of band.

MH — Will start to listen in the middle of the band and tune toward the high-frequency end.

LM — Will start to listen at low-frequency end of band and tune toward middle of band.

ML — Will start to listen in the middle of the band and tune toward the low-frequency end.

### Invitation

Follow the sample report and take part! No advance entry is required. Your own copy of our form will be accepted. However, for your convenience ARRL has made up a mimeographed contest form or work sheet for your use in the '48 Competition. A postal card or radiogram will bring you three forms by third-class mail at no cost to you. Send postage if you wish us to use first-class or air mail.

Here are two week-ends dedicated to radio-telephone DX and two for c.w. DXing. Plan to make the best of them and see what you can do in the contest periods. Even those who don't expect to win for their area can add some choice countries, and hams in other nations will get a crack at some of our hard-to-get states.

### Silent Keys

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

W2BTO, Arthur L. Kent, Binghamton, N. Y.

W2GIZ, Carl F. Mueller, Elizabeth, N. J.  
Mrs. Henry W. Yahnel (XYL of W2SN),  
Assistant Manager W2 QSL Bureau,  
Helmetta, N. J.

W6TZQ, Curtis L. Dunwoody, San Leandro, Calif.

W8DTS, Albert A. Gloor, North Canton, Ohio

W8OEY, Jesse P. Bracy, Bluffton, Ohio

K9AAF, Lee W. Elliott, Appleton, Wisc.

W9PRK, Wilbur F. Reed, Marshfield, Wisc.

W9WEU, Victor O. Christman, Gary, Indiana

W9YKJ, Wynne H. Davies, Chicago, Ill.

G6PM, Peter Modridge, Edgemoor, Middlesex

GM5YG, Jack Wyllie, Glasgow

GM5KQ, James Fraser, Crieff, Perthshire

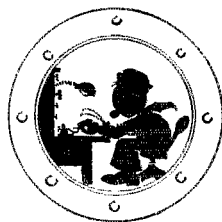
HC2HP, Dr. Herman B. Parker, Guayaquil

XZ2EM, Lt. Col. R. M. Hall, Rangoon

ZL1DD, Edward B. Foster, Auckland



# United States Naval Reserve



**I**LLUSTRATED this month is the new Naval Reserve Radio Station certificate which is being issued to amateurs who are members of the Reserve. The certificate assigns an official Naval Reserve call to be used on Naval frequencies during emergencies and radio drill periods. Reservists are also authorized to use the Reserve emblem on their personal amateur station QSL cards.

The following Naval Reserve amateur calls have been issued since publication of last month's list:

K1NRL	Lowell, Mass.	K6NRD	Santa Clara, Cal.
K2NAA	Brooklyn, N. Y.	K6NRM	Modesto, Cal.
K2NRV	Passaic, N. J.	K6NRX	Santa Rosa, Cal.
K4NAA	Covington, Ky.	K7USN	Portland, Oregon
K4NAB	Kingsport, Tenn.	K7NRO	Bremerton, Washington
K4NAC	Miami, Fla.	K8NAA	Hamilton, Ohio
K5NR	San Antonio, Tex.	K9USN	Chicago, Ill.
K5NRQ	Lafayette, La.	K9NAA	Joliet, Ill.
K5NRT	Jackson, Miss.	K9NAB	Olathe, Kans.
K5NRZ	Shawnee, Okla.	K9NAC	Emporia, Kans.
K6USN	San Francisco, Cal.	K9NRA	Lambert Field, St. Louis, Mo.
K6NAB	Oakland, Cal.		

During the biggest ham get-together of all time — the 10th Annual Boston Hamfest combined with the ARRL New England Division Convention — a Naval Reserve mobile radio station was set up in Mechanics Hall and numer-

ous stations worked using the amateur call K1USN/1. Admiral Deyo, commandant First Naval District, addressed the 4700 amateurs in attendance and congratulated them on their achievements. Reservists in charge of the USNR booth included W1s FGC, FI, LLQ, I.V, NK and QIE.

E. W. Officers Division 3-1, New York City, conducted its second meeting on 20 November. Several hundred Reserve electronics and communications officers heard Captain D. R. Hull, assistant chief of BuShips (Electronics), speak on "The Technical Phases of Electronic Warfare." Captain Hull is ex-1CBU.

E. W. Company 3-23 at the Grumman Aircraft plant, Bethpage, L. I., N. Y., dedicated its Naval Reserve radio station, N3CAW, on Navy Day. Admiral Grover C. Klein was the principal speaker, and an aerial exhibition by Grumman's latest plane, the Bearcat (F8F), was a highlight of the ceremonies.

### Marine Corps Electronic Warfare Plans Formulated

Approximately 500 radio amateurs served their country well in the U. S. Marine Corps during World War II, and with the inauguration of the new Reserve Electronic Warfare Program the Corps once again looks to the amateur fraternity as a source of much-needed electronics and communications specialists.

Organization of the Program calls for Electronic Warfare Units specializing in missile guidance, radar, pilotless aircraft, atomic weapons, TV, etc., each composed of one officer and nine enlisted men. Special Technical Units are also being formed, consisting of ten officers whose education and experience qualify them at the research, design and production engineering levels in the electronics field. A full training program has been evolved for Reservists, including access to the specialized courses of the Marine Corps Institute.

Amateurs desiring further information on the Program should contact the nearest Reserve activity, or write to Electronic Warfare, Division of Reserve, Marine Corps Headquarters, Washington 25, D. C.



New Naval Reserve Radio Station certificate, standard 8 x 10-inch size, which is issued to amateurs who are members of the Reserve.

# New England Amateurs Aid in Forest-Fire Emergency

*'Phone and C.W. Nets Exemplify Fine Organization*

NEW ENGLAND felt itself fortunate during September and early October. The weather was just what the late fall vacationers wanted. No appreciable rain had fallen since the first week in September, and here it was, the middle of October. True, some thoughtful persons were beginning to become alarmed about the overdry conditions in most of the wooded areas, but there seemed little need for concern, particularly when the unprecedented "run" of clear weather was bringing out a prodigal number of postseason vacationers who had money to spend in the resort areas of northern New England.

The first warning, during early October, of the trouble which was to come was the action by the Governor of Maine in declaring the wooded areas "out of bounds" to hunters and vacationers lest careless persons cause the starting of fires. This action was followed within a few days by similar proclamations by the Governors of the other New England states. It seemed that the forty days and nights of clear skies were not an unmixed blessing.

And then it began — at first only a number of small fires, but soon, as we know now, hundreds of acres of valuable timberland were to be devastated.

## *Maine*

Kennebunkport, a resort and fishing town on the Maine coast, about 30 miles south of Portland, was one of the first communities to be ravaged by a major blaze. On October 21st, W1OHY, Portland EC, received a request from Mr. Douglas K. Hammett, chairman of the Emergency Committee, Portland district, American Red Cross, for the establishment of communications between Portland and Kennebunkport, all wire lines between those cities having been burned out. Immediate contact was effected with W1KJJ in Kennebunk, some 7 miles west of Kennebunkport. W1KJJ reported that he had contact with Kennebunkport via landline at that time, but that the wires between Kennebunk and

Kennebunkport were expected to be burned out momentarily. W1LNI, Maine SEC, Portland, was pressed into service to handle the Portland end of the circuit to Kennebunk and W1OHY and W1LZI departed for Kennebunk with 144-Mc. equipment to cover the link to Kennebunkport when, and if, the line burned out. Vince Carr assisted in the operation of W1LNI during the night.

Early the following morning three more mobile units were dispatched into the fire area. Both 28-Mc. and 144-Mc. outfits were taken by W1FBJ, W1MBR and W1MXQ.

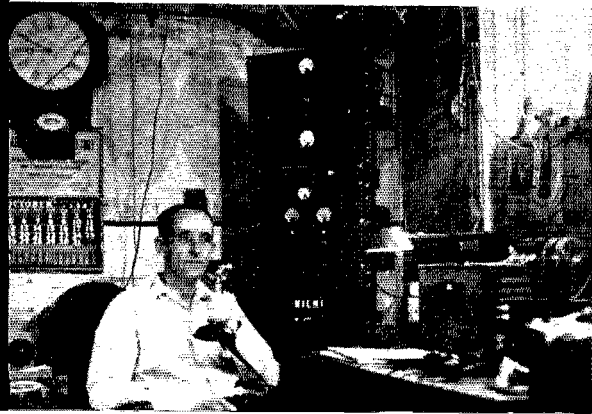
The State Police relay station having been burned out at Waterboro, one unit under W1MXQ filled in the link from W1LZI to W1OHY who was at the Central Fire Station in Kennebunk. Stations were set up in South Waterboro and Waterboro Center to facilitate communications between Chief Werrin and his deputies.

Fires at Bar Harbor had by this time reached serious proportions. W1LNI was requested by the Associated Press to get traffic out of that vicinity. Contact was made with W1DAS, Ellsworth, W1AUC, Trenton, and W1AI, Millbridge.

A mobile unit operated by W1PGZ and furnished by K1NRC, local Naval Reserve, was sent to Kezar Falls and then to Sanford. Many welfare messages were passed from one station to another, depending on the geographical locations involved.

Saturday morning, two mobile units under W1MBR and W1PYD were alerted to work with two airborne units manned by W1VY and W1EFR, who went up over the fire areas. Because of heavy smoke and high winds, accurate observations were impossible for fire spotting and the planes were at stand-by the rest of the day and Sunday.

On Saturday morning, W1FBJ, NC of the Sea Gull Net, moved his station to the Red Cross headquarters in Portland, and W1LNI assumed



Russell H. Lowd, W1LNI, Maine SEC, at the 300-watt transmitter where he acted as NCS of the Sea Gull Net for the duration of the Maine fire emergency.

**QST for**



control of the net for the duration. This move released W1FBJ for direct contact and processing of priority traffic to the Red Cross and other officials.

W1QHA, of the University of Maine Annex, Brunswick, Maine, operated by W1QIQ, W1NWJ, W1QMK, Clifford C. Little and Frederick B. Olsen, was sent to Hollis Center, a very hot spot. They remained there until midnight, Sunday; then packed and returned to school at Brunswick.

Through the courtesy of Lt. Cmdr. R. B. Coleman, director of Naval Reserve communications, First Naval District, and Lt. (jg) Frederick B. Olesen, CO of Naval Reserve Electronic Warfare, a TCS-14 was made available.

Localities served by this mobile unit were Clark's Mills and Richmond.

W1DEO was dispatched to Biddeford Red Cross headquarters to relieve the pressure at that point.

W1FBJ/1 was installed at Red Cross headquarters with the help of W1PYD, W1OIS, W1FBJ, W1OHY, Frank Skillin, Wayne Rietta, Irvin Cox, Ray Rollins, and Gerald Cole, a Red Cross official. The Lucas Tree Experts supplied a crew to hang the antenna. The station went on the air with W1FBJ and W1OHY as operators and Rietta and Rollins as traffic men. Other operators and assistants who helped maintain twenty-four-hour operation were W1LOA, W1EWN, W1CRU, W1MRB, W1ATO, W1EY, W1LRZ and W1PIX.

The control station, W1LNI, was also maintained on a continuous-watch basis with operators and assistants as follows: W1LNI, W1VV, W1FXA, W1FO, W1MBR, W1MFK, W1CRP, W1LHD, W1ODA, W1GVS and Vince Carr. W1LNI's XYL did a magnificent job in supplying all hands with hot food and drinks at unheard-of hours.

The light cruiser U.S.S. *Little Rock* sent two portable units out into the field where they were most needed. Unit NBVW/1 went into action at Clark's Mills, while NBVW/2 took station at Kezar Falls. NBVW/2 later moved to Norton Hill, West Brownfield. These units remained in operation, except for time out to charge batteries, until Wednesday noon at which time rain made

it unnecessary for further operations. NBVW and field stations worked on 3960 kc. with the Sea Gull Net, using power of three watts.

W1APQ, of Hampstead, N. H., and W1CCF moved to Kezar Falls where W1APQ set up and W1CCF went on to Hiram. These units remained in continuous operation for several days. Both operators managed to get some sleep during the quiet hours. W1DEO covered at Biddeford when W1PLB moved back to his home location at Saco. After W1PLB was in operation, W1DEO was sent to Limerick, and operated there until released at 10:00 P.M. Sunday.

Station W1FBJ continued twenty-four-hour operation until 11:30 P.M. on October 25th, at which time it was considered safe to shut down until the next morning. Conditions made it necessary to continue through to Wednesday, October 29th, at which time the station was taken off the air because of increasingly-favorable weather conditions. Beginning Wednesday morning, no further attempt was made to keep the circuit clear, as commercial lines were able to supply communications and the situation was well in hand. W1FBJ kept in close contact with the Red Cross during Thursday but no more operations were considered necessary and preparations were made to return the equipment to the home station.

At Boothbay, amateurs of the vicinity pooled equipment and stood by for possible assignment. One station, W1KMM, was the net contact. W1KRK set up his Mark II transmitter and receiver near the Red Cross and telephone connections. Batteries were loaned by a machine shop and a gas generator was made available. The following amateurs stood by until released: W1KMM, W1KRK, W1LUK, W1NIJ.

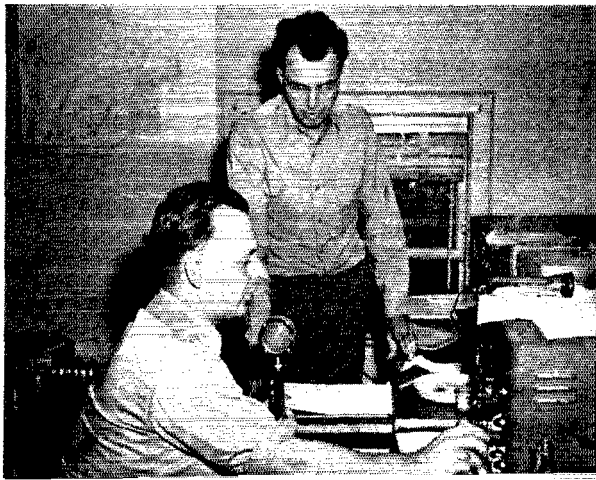
A group from W1YA, University of Maine, established communication between Somesville and various groups of fire fighters which were working out of that community in an attempt to prevent the devastation of the town by a number of fires which were blazing through the surrounding countryside. The group from W1YA included the following: W1s GKU, KNQ, KYO, MLB, MZK and OKU.

W1GMD, at Topsham, contacted the Univer-

♦

W1FBJ, Maine PAM (standing), and W1OHY, Portland EC, operating W1FBJ/1 at Portland Red Cross headquarters.

January 1948



sity of Maine, Bowdoin College, and the Red Cross, and assisted in many ways. W1PYD went to Portland to help W1FBJ.

In the Ellsworth-Trenton-Bar Harbor region W1AFT stood by for 46 hours and handled 12 messages. W1AI worked with men from WABI of Bangor and passed traffic for their use which was broadcast. Relays from NBVW/1 and /2 were made to W1LNI and W1FBJ. W1DAS stood a lone trick for a total of 90 hours operation with 40 messages handled. W1NVA filled in while DAS snatched a few hours sleep, handling some 10 messages. W1AMR was consistently on the Sea Gull Net, relaying traffic and covering for his teammates whenever called.

In the Saco area, W1PLB moved his rig to Biddeford and joined the Net. He was assisted by W1PYD, W1GKJ and W1NXX. After the Coast Guard and other units arrived, W1PLB was moved back to Saco and operated from there for the rest of the emergency.

An emergency c.w. net was set up and controlled for the duration of the Maine emergency by W1GVS, and included W1s AKR, AMR, AWQ, BPX, CPL, DAS, EFR, FO, GE, HSW, ICN, JAS, LBJ, LDC, LKP, LPS, LRQ, LWO, MQB, NXX, OAC, OHT, OHU, OTM, PVY and QGU. This net served to provide general message coverage into the Maine area for traffic coming from outside points, and helped to keep the 'phone net free for use as a Red Cross facility.

#### Massachusetts

The Fitchburg, Mass. Park Department called upon the Fitchburg Radio Club to provide communications assistance to the fire fighters who were battling a number of fires near that city. Both 144-Mc. voice stations and 3.5-Mc. c.w. stations were provided and manned by W1s ACP, CCK, EAX, EIR, JYA, LXT, MBL, MIM, MSV, MVF, OBU, OLD, OME, OOO, PQW, PTO, QCB, QEY and QKX.

In Pittsfield, Mass., the American Red Cross Disaster Relief Committee called upon the Pittsfield Radio Club to furnish communications in connection with a fire raging in that area. W1LUD, EC, called out the AEC group, and using 144 Mc., 3.5 Mc., and 3.85 Mc., the gang included W1s AZW, BKG, COI, EZN, EZT, HAZ, HNE, IZN, JGY, JLT, KZS, LKO, LPQ, MN, NFF, NGE, OBA, OMJ, OSA, QJZ, QNI and W0SRP/1.

The Merrimack Valley Amateur Radio Club, of Lawrence, Mass., including W1s BLO, CBY, CRW, GO, IGO, JDK, LBH, MCD, MQN, NNG, NON, NZS, PFA, QGH, QIT and QNC, operated a net which relayed fire reports from a plane spotting fires in the areas near Exeter, N. H., and Rockport, Mass.

The following amateurs outside the immediate emergency areas are among those known to have contributed to the success of the operations:

W1s AHP, ATS, AW, AWN, AWT, BUZ, CK, CMO, CZ, DAV, EFW, EUL, GDE, GMH, GPJ, HKP, ICO, IGW, INW, ISH, JCK, JRS, KKJ, KOB, KTT, KYG, LKF, MGP, MGR, MP, MVD, MXT, NNG, OCD, OE, OGU, OQL, PTL, PYM, QCU, QDO, QEU, SS, TE, TO, UP; and W2s AFX, PDP, QBS and SOU.

—A. H.

## 'Phone-Band Phunnies

### The "Ain't-I-the-One" Boy



This is the personality kid. He is simply oozing the stuff at every pore and practically knocks himself out every QSO being witty, humorous and wise all at the same time. He is really loaded with a collection of *Reader's Digest* bottom-of-the-page anecdotes, and he trots them out at the slightest provocation.

He insists on being "different," even in calling CQ, and he often calls in a foreign language to prove his erudition, or throws in little humorous "asides" while he is calling. Once in contact, he affects a fine scorn for the ordinary routine of giving signal reports, weather, etc.; he is likely to ask abruptly, "Can you tell me what is the price of hay in China? Over."

Another of his pet performances is to "invent" some Rube Goldberg type of thing and explain its working in great detail every time he has a QSO. Some form of "smellovision" is a musty favorite in this respect.

All of his transmissions are obviously made with his BCLs strongly in mind, and he waxes quite histrionic at times — so much so that it is a little difficult to tell which kind of a ham he is, whether the sock-and-buskin or the key-and-mike genus.

It is seldom indeed that you can tune any of the amateur bands without finding at least one splendid specimen of this poor man's Jack Benny.

—John T. Frye, W9EGV



# The World Above 50 Mc.



CONDUCTED BY E. P. TILTON,\* WIHDQ

CONSIDERING the nature of the reports at hand this month as the first sheet goes into the typewriter, this department might well start off with the familiar "How: What: Where:" of its neighbor a few pages away, for the news of the moment on 50 Mc. is certainly concerned primarily with the query, "How's DX?" In fact, we venture to say that, if it were possible to analyze all QSOs that took place on all amateur bands during the month of November, 1947, the 50-Mc. band would show the highest percentage of international DX QSOs of any of our slices of the spectrum! And a large portion of those contacts which were not international were at least transcontinental in character.

Such was the generosity of the ionospheric Santa Claus. How long it will continue is anybody's guess, but present indications are that there may be some 50-Mc. DX worked during the peak periods each month through the winter, with a resumption of north-south work, at least, in the February-March period, as in 1947. It is probable that the 50-Mc. enthusiast will have found an appreciable amount of DX in his Christmas stocking by the time this appears in print, as the holiday period last year showed several days of m.u.f. very close to 50 Mc., and this year has thus far run well above last, period for period.

Where DX was worked during November was principally a matter of the distribution of activity over the world and the alertness of the operators on the band, as DX contacts were made almost everywhere where there were sharp operators looking for it. Almost everywhere, too, the boys were counting countries, and a 50-Mc. WAC appeared to be within the realm of possibility. At least one American, W5VY, San Antonio, Texas,

\* V.H.F. Editor, QST.

had North and South America, Europe, and Oceania already in the bag! Various European stations, now hearing commercial harmonics in the 50-Mc. region from the Near East, India and South America, are certainly not very far behind.

It is utterly impossible to record in day-by-day form all the DX contacts made in November, but some highlights are in order. On the first day of the month, after a quiet morning (the first day when Europeans were not worked for more than a week), there was a terrific east-west opening. There had been brief sessions of transcontinental DX before this, but never anything like the furor of this afternoon. W1, 2, 3 and 4 worked W6, W7 and VE7 in a four-hour riot. A new prefix appeared on the scene, too, as KL7DY, Sitka, Alaska, had the gang in W2, 3, 4, 5, 8, 9 and 0 lined up waiting to work him. The W1s were waiting in line, too, but none of them made it — a significant fact, indicating that the great-circle path from W1 to KL7 was just over the northern edge of that elliptical area of high m.u.f. lying along Latitude 50. We worked along the high m.u.f. area (W1-W7, -VE7); we worked across it in criss-cross fashion (W1-W6; W4-W7, -VE7; W2-KL7, etc.); and we worked almost straight across it (W5-KL7); but we have no evidence that there was anything not visible on the predictions, such as a W4-XE, or a W1-KL7, though the latter might have happened if nobody else had been on the band, as W1s heard KL7DY, but weakly.

The following day was similar, except for a slight deterioration in the transcontinental characteristics and a reopening of the European path. This day was fair — W6OVK was able to make 52 contacts in eastern United States and Canada!

With this neat and powerful layout, using a pair of VT-127-As in the final, L. E. Mueller, W8RLT, Plymouth, Mich., has put a consistent 50-Mc. signal across to Europe.

January 1948



## RECORDS

### Two-Way Work

50 Mc.: CELAH — J9AAO  
10,500 Miles — October 17, 1947  
144 Mc.: W3GV — W0WGZ  
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 — W3HFW/3  
12.5 Miles — September 24, 1947  
2300 Mc.: W1JSM/1 — W1ILS/1  
66 Miles — October 5, 1947  
3300 Mc.: W6FFE/6 — W6ET/6  
150 Miles — October 5, 1947  
5250 Mc.: W2LGF/2 — W7FOF/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

Until Nov. 5th, conditions remained good for trans-Atlantic work, though most such contacts were crossband to 10 meters, many of the European stations listening on 50 and replying on 28. PA0UN and PA0GN were the principal European 50-Mc. signals — and then came the glad news: the Gs had received official authorization, good until Dec. 31st, for 50-Mc. work. Subject to certain time and frequency limitations (stations within the London area must not operate after 1500 GCT; and some frequencies, mostly unimportant since they are well up in the band, must be avoided) British stations having such permission could join the fun.

And how they joined it! Even that first morning several were ready to go, and the first official two-way 50-Mc. QSO between G and W took place at 8 A.M. EST, Nov. 5th, with G6DH calling your conductor on 10 to say "Look for me on 50 Mc.!" Within a few days scores of Gs were on the band, but they had to wait a bit for their best licks, as ionospheric disturbances washed out the high m.u.f. over the North Atlantic path until about Nov. 15th, though conditions were good to the south and southeast from England on several days.

The first two-way G contact with MD5KW was made on Nov. 10th, by G6DH, and PA0UN duplicated this on the 11th. MD5KW had a field day on Nov. 12th, working ZS6DO, ZS6HS, ZS6JB and VQ2PL in an opening that lasted from 1550 to 2145 GCT. VQ2PL is reported to have heard a W8 in Cincinnati, Ohio, on this date. SU1HF, Cairo, Egypt, worked his first DX on 6, ZS6JB, on the 13th, and on the 16th he worked nine Gs — and another 50-Mc. DX convert was made! Hal has been watching for W signals, but has heard none at this writing. MD5KW has

heard several W signals, but no two-way work has yet been done between North America and Africa.

During the latter half of November there was evidence that the area of high m.u.f. over the Atlantic Ocean was moving southward. W7FS/MIM, aboard the *Nathaniel Crosby* at a position 700 miles west of the Azores, worked W0JVE and W0KYF, in the St. Louis area, crossband, with W7FS/MM on 29 Mc., and for several days thereafter he was hearing various Gs and PA0UN, as he neared the U. S. coast, off Cape Hatteras.

The first G-W5 QSO was made on November 16th, when G5BY worked W5JLY, San Antonio, Texas, at 9:20 A.M. CST. G5BY also worked W4HVV and W4WMI, Raleigh, N. C., on this date. This was the first of a series of almost daily openings which continued through December 1st. W5s VY, FRD, LIV, FSC and AJG are among the W5s known to have worked European stations.

November 22nd saw the appearance of F8OL, the first French station to make two-way contact across the Atlantic on 50 Mc., as several of his countrymen received the official go-ahead, though crossband work had been done two weeks before by F8ZF, operating on 28 Mc. HB8VK, Zurich, Switzerland, the first to make it from his country, showed up the same day, his first contact being made with W1CGY, Enfield, Conn. W9ZHB, Zearing, Ill., was probably second. His list of contacts, Nov. 22nd and 23rd, was quite impressive, including many stations scattered over most of the eastern half of this country. HB8VD was doing well also.

Most European governments appear willing to grant their amateurs at least temporary authorization for 50-Mc. work, and quite a few more prefixes are expected momentarily, including OH, OZ, SM, I, OK and possibly others. The number of PA0s is increasing, and W contacts have been made by the following Netherlands stations: UN, GN, WL and PAX. Of these, PA0UN leads the pack. With 100 watts to a pair of 807s, and a four-element array, David is well out in front. He has all U. S. call areas worked except W6 and W7 and is close behind G5BY in states and stations contacted. The following French stations are known to have official permission for 50-Mc. operation: F8OL, F8ZF, F8GH, F9FT, F8NW, F3CA, F8SN, F3HL and F8QL. Even better news is that FA8BG and FA8IH also have official permission. Their geographical position is by far the best for W contacts of any stations in Africa thus far reported to be interested in 50-Mc. work.

The skip from Europe has been stretching out, and several Europeans are vying for the first W6 or W7 QSO as we write. W6UXN, Inglewood, Calif., heard G5W? (probably G5WP) on the 23rd, and on the 24th W6UXN was heard by G5BY at 9:16 A.M. PST, RST 569 on c.w., work-

ing W1CGY. G5BY has been reported heard by W7QLZ, Phoenix, Ariz., so the race for WACA from Europe may soon be won! G5BY has worked W0IFB, Solon, Iowa, as early as 8:17 A.M. CST, and contacts with W4, W5, W9 and W0 are becoming more common. G5BY is up to 24 states worked two-way on 50 Mc. since Nov. 6th. His first contact with W0ZJB came on Nov. 24th — the anniversary of the first trans-Atlantic cross-band contacts!

Not all the DX was between Europe and this country. On Nov. 5th, OA4BG, Lima, Peru, worked LU1CC, LU9AX, LU6DO and LU3BR; LU9AS, LU1DO, LU1CC, LU9AX, LU9MA and LU6DR were worked on the 10th. On the 15th, OA4BG and OA4AE heard W6JRM, La Mesa, and W6QG, Santa Ana, Calif., at a time when the band was open for transcontinental work from W6.

Some interesting "heard" reports come from ZS6GX, Germiston, Transvaal. On November 3rd, at about 1805 GCT, he heard a fading carrier on the low end of 6 which soon resolved itself into W7DF, Everett, Washington, in QSO with VE1AYL. On the 5th, at 1635 GCT, he heard W0QIN, Minneapolis, testing and calling CQ on 50 Mc. Though he called several times, and W0QIN and W5BSY/MM (then in mid-Atlantic) were heard intermittently until about 1700, he was unable to make any contacts. An interesting angle in connection with these reports is that on Nov. 3rd, W5BSY/MM made contacts with ZS6JB (a near neighbor of ZS6GX), W8SFG and W8RLT. He heard W9ZHL, W9AB, W8MVG and W8PUK, all on the 3rd. W5BSY/MM is currently on the way out across the Pacific, running in the vicinity of Latitude 30, en route to Shanghai. He will be checking 50 Mc. daily.

The set-up appeared to be right almost daily for work between the Mainland and the Hawaiian Islands. W7ACS/KH6, Honolulu, reports reception of numerous stations up to more than 48 Mc. in the old f.m. band, several of them from the East Coast, but only one contact, with W6BPT, at 9:26 A.M. HST, Nov. 8th, had been made at this writing. As the great-circle path from north-eastern U.S. and VE1 to KH6 is not greatly different from that between England and Texas, it is still hoped that Gene may yet be able to knock off some eastern contacts. He heard the automatic transmission of J9AAO on Okinawa on the 8th, at 1250 to 1300 HST.

### 50-Mc. Oddities

November 15th was apparently better for north-south work than most of us realized, we were so busy scouting DX along the east-west routes. XE2C, Monterrey, Mexico, believed to be the only XE2 on 50 Mc., worked W9HSB, Springfield, Ill., and we have already seen that W6s were getting into South America.

Something of what we face in the matter of

TVI may be seen from a report forwarded by W6GGM. He sent us a letter he received from a television-receiver owner in Roslyn Heights, N. Y., reporting reception of W6GGM "loud and clear," on Channel 1, during the excellent east-west opening the afternoon of Nov. 4th. Until further notice, this stands as the TVI DX record. It's beaten regularly in Europe, however, but it's the f.m. stations (U.S.) who are to blame, not amateurs. British viewers have been having a very bad time of it recently, with various high-powered U.S. f.m. stations operating close alongside their 45-Mc. video channel!

Working KL7DY was a big thrill for all the gang, but probably W3OR, Essington, Penna., got the biggest bang of all out of it. Those who were on 5 prewar may recall that Alan was the victim of a gag whereby some fellow with a distorted sense of humor got on 5 during a hot opening in



### Standings as of November 30th

W1CLS	44	W5VY	40	W9DWU	46
W3CIR/1	42	W5ML	38	W9PK	43
W1LLL	40	W5AJG	38	W9ZHL	42
W1HDQ	39	W5JLY	38	W9JMS	36
W1CGY	37	W5FSC	34	W9QKM	33
W1HMS	36			W9ALU	32
W1JLK	35	W6UXN	46	W9UIA	30
W1LSN	33	W6OVK	38	W9AB	22
W1CLH	32	W6ANN	35		
W1CJL	30	W6BPT	32	W0USI	45
W1AF	26	W6FPV	31	W0QIN	43
W1NF	25	W6WNN	24	W0ZJB	43
W1EIO	24	W6EUL	22	W0DZM	42
		W6HZ	13	W0TQK	42
		W6BWG	12	W0SV	42
W2BYM	38			W0BJV	42
W2AMJ	38	W7BQX	43	W0HXY	41
W2IDZ	37	W7ERA	43	W0INI	41
W2RLV	35	W7HEA	40	W0YUQ	39
		W7FDJ	36	W0JHS	38
W3OR	35	W7FFE	35	W0PKD	36
W1KMZ/3	33	W7KAD	35		
W3MKL	33	W7JPA	34	VE1QZ	24
W3RUE	31	W7QAP	30	VE1QY	24
		W7ACD	27	G5Y	24
W4GJO	46			VE3ANY	21
W4QN	40	W8RFW	25	VE2KH	17
W4GIY	40	W8TDJ	22	VE2GT	14
W4WMI	33	W8QQS	20	XE1KE	12
W4HVV	29				
W4FJ	26				
W4FNE	25				
W4JML	20				

Note: Only stations reporting their standings regularly are listed in this box. To get in send in a list of states worked, one call for each state, with the date the contact was made. Then report at least once every two months.

1941, working W3OR while signing the call K7GNN, and giving his location as that then assigned to K7GNN in the *Call Book*. Of course, our wise friend was one of those who was sure that such things were utterly impossible!

There have been some phenomenal low-power DX contacts made in recent weeks. On Nov. 29th, W1MUX, Wayland, Mass., raised G5BY with an input of 3 watts. He was reported R5 S6 on 'phone! Numerous W6s, with their converted MBKs running as low as 3.5 watts, have worked the East Coast, and some worked KH6 in October. But the miles-per-watt record is unquestionably held by W2RRG, Atlantic City, N. J., who raised W7ERA, Milwaukie, Ore., with an input of 0.3 watt! Signals are pretty good out there in the Pacific Northwest, however. W7ERA was wondering why everyone was coming in S5, S6 or so, during the big session of Nov. 23rd, yet they were giving him S9-plus reports. After about six or seven contacts he began to think that the noise level was suspiciously low — so he took a look at his converter, and yes, you've guessed it — no antenna. Just a length of 300-ohm line, going no place in particular!

The farthest-north 50-Mc. station? KL7CM, Fairbanks, Alaska, claims the title. He's heard signals from W6, 7, 8 and 3, but has made no contacts as yet. Oh yes, the frequency — 50.2 Mc. Should be O.K. — KL7DY was doing all right on 51.2, which is about one megacycle out of the band, in most fellows' estimation!

How high can you go and still work out, on this  $F_2$  business, anyway? The writer has made quite a few checks with G5BY, on various kinds of days. On one particularly good opening we shifted progressively higher at W1HDQ, in 500-ke. jumps. O.K. at 50.5 — just as good at 51 — dropping off at 51.5 (maybe receiver tracking, Hilton says) — still readable on c.w. (S3) at 52 — S2 at 52.5, but receiver working very poorly this high (and the antenna at W1HDQ wasn't doing too well, either) — no signal at 53 Mc. A return to 51 Mc. restored satisfactory contact, however. Another day, when only a few signals were heard at G5BY, we were S7 on the low edge. QSY to 50.2 dropped us down to S2, and a move to 50.3 put us out of the picture. A return to 50.1 and we were able to carry on solidly. It *can* be that sharp!

The east-west opening of Nov. 1st was obviously red-hot. Signals were heard as high as there was any occupancy, about 51.5 Mc.; but checks the next day at the height of the opening showed about 50.8 to be the top. One thing is certain: if signals are booming in S9-plus and holding in steadily at 50.1 or higher, there is little point in everybody piling up on 50.001! Working the edge is often necessary, especially as the band opens and closes, but almost all of us have crystals that will put us up in the band a ways — let's use them when we can!

"CQ Vermont!" With only Vermont and Mis-

## V.H.F. MARATHON

States Worked  
in 1947

Call	50 Mc.	144 Mc.	235 Mc.	Score	50 Mc.	144 Mc.	1
W1AF	188	22		2531	26		1
W1BCT		248	5	1141			8
W1CGY	173			3181	37		
W1CLS**	350			6251	43		
W1HDQ*	297	149		6629	39		9
W1HMS	148	10		2699	35		1
W1KLR		158		923			5
W1LLL	274			4766	40		
W1PEN		130		1177			8
W2AMJ	325			5221	37		
W2BYM	337			5028	39		
W2CBB		261		1226			8
W2COT	85	172		1029	11		5
W2DZA		238	14	1241			7
W2NLY		717		6646			10
W2QVH	250	275		3481	37		6
W2RLV	125			2451	35		
W2RSO		242		2278			8
W3GKP	47	149		2192	12		8
W3HWN		237		2605			10
W3MHV		208		1404			6
W3RUE	99	96		2255	31		4
W4FJ	72	66		2276	26		9
W4FNR	67	6		865	25		1
W4HVV	172	4		3212	29		2
W4WMI	261	5		4074	33		2
W5FSC	133	27		2522	34		1
W6BPT	113			3862	32		
W6BWG	149			1102	12		
W6HZ	128	365	1	2323	13		1
W6OVK	164	189	4	6166	38		1
W7ACS/ KH6	28			1181	3		
W7QAP	139			2482	26		
W8RFW	84			1084	26		
W8FDJ	63	1		928	22		1
W8UKS		165		4258			8
W8WJC		149		4830			8
W9AB	71	13		945	22		3
W9AGV		73		506			5
W9ALU	102	13		1140	32		2
W9JMS	250	10		3019	36		3
W9ZBL	348	8		5522	43		3
W9QIN	238			3444	43		

\* Not eligible for award.

\*\* Tenth-period winner: W1CLS, 2664 points, a new record!

issippi to go, W6UXN was practically to the point of making cash offers to owners of mobile rigs in W1, to finance a trip to this, the hardest of all states to get. There was at least one Vermont listener, however — W1QQ, Richford, Vt., heard a flock of W6s and W7s in various November openings. He is working on a rig, so there's yet hope. W1AZV and W1CGX, Brattleboro, Vt., are now on the band regularly. Their frequencies are 50.3 and 51 Mc. respectively. W1AD, Bellows Falls, Vt., is also on, sharing 52 Mc. with W1AW at present, though he is expected to move lower soon. Both towns are deep in the Connecticut River valley, but these boys are determined to supply those long-sought Vermont contacts.

How to tell when the band is open — without spending lots of time listening? The Fresno area

has a special early-warning system, according to W6PSQ. He and W6EJD, W6HXA and W6JPU have a man monitoring the old f.m. band, in the service department of a local radio store. When East Coast stations start to come in, he gets on the phone. The Fresno gang finds ways to do the rest!

### **The Polarization Question on 144 Mc.**

It must be that nothing phenomenal happened on 144 Mc. during November, as our 144-Mc. file is thin, indeed, this month. What correspondence we do have is devoted almost entirely to the matter of antenna polarization, and it appears that the horizontal forces are gaining ground, even in the predominantly-vertical East. The primary reason for sticking with vertical antennas, aside from the fact that we started that way, has been the protection of the interests of the mobile gang. It certainly is much easier for the mobile station to use a vertical antenna, and in work over flat or open terrain similar polarization at both ends will make a vast difference in the working range of the mobile station. In hilly country, where the mobile station is beyond line-of-sight a high percentage of the time, cross-polarization may not be too great a handicap, however. The question remains whether the disadvantage suffered by the mobile enthusiast is a sufficient reason for withholding the advantages of horizontal polarization from the rest of the gang. In this connection we invite comments from operators of mobile equipment who have had extensive experience in areas where horizontal arrays predominate.

One thing is sure: if we are to have extensions of the east-west DX record it will have to be with horizontal antenna systems, as practically all the better stations in the Middle West are now using horizontal arrays. W2CBB reports a definite trend in this direction, accelerated, no doubt, by reception of W9 signals in the metropolitan area in October. He has a 9-element affair and has abandoned the use of any vertical arrays, feeling that this will help the trend. W2AXC has a 5-element job, W2CCC has a 10-element flop-over, W2RH is checking a rhomboid, and others who either have horizontals or who are working on them include W2IH, W2SYW and W2FKI. W4FJ and others in the vicinity of Richmond, Va., are using horizontal arrays. Their presence at the southern end of Atlantic Seaboard openings should provide incentive for horizontals in W1 and W2.

The chances are that there may be few opportunities for record-breaking DX before next spring, but W3GV points out that the first Eastern stations using horizontals will have a considerable advantage in working the gang in the Great Lakes area, if for no other reason than the reduction of local QRM from literally hundreds of stations, still predominantly vertical. And there are hundreds — note that W2NLY is now up over the 700 mark in stations worked on 144 Mc. in 1947!

### **Emergency Nets on 144 Mc.**

The winter months provide us a good opportunity for mending our 144-Mc. fences. While there are good nights now and then, right through the winter, they don't happen so often, and there are many times when the band provides us with little more than line-of-sight range, unless we have high-gain antennas and the best of gear. In the rush to work DX, particularly during the warmer months, we often tend to lose sight of the fact that, after all, the 2-meter band is still essentially a local proposition. On probably no other band open to amateur use can we work so effectively over the short distances which are of such great importance in emergency operation. The winter period is a fine time to work out emergency plans. If you have a local net operating drop us a line, and we'll be glad to run the details in this department. If you don't have one, how about getting started?

### **Gs Prepare for Opening of 2-Meter Band**

Having never had the opportunity previously of working above 60 Mc., the British are looking forward with considerable anticipation to the opening of the 2-meter band in England. Since they have no great accumulation of modulated oscillators and superregenerative receivers, they have strong hopes that they will get off on the right foot when 144 Mc. is released for amateur use over there. The British Isles, with their great concentration of population within a small area, should be a fertile field for 144-Mc. activity. It would appear that any station anywhere in all of G-land should be able to work any other under good conditions, and they may well work several European countries, as well. And trans-Atlantic work? Let those who would be first to say that such a thing is impossible examine the record of all our lower-frequency assignments before being too sure!

### **420-Mc. News**

There is interest in 420 Mc.! At least our QST story on 420-Mc. gear got a good going over, it appears. Several fellows have written in saying, in effect, "You showed us a 16-element array on the October cover; how about some dimensions?" Well, here they are. The array was a duplicate, in miniature, of the 16-element job used on 144 Mc., except for the method of feeding. For the middle of the band radiators should be  $12\frac{3}{4}$  inches long, reflectors  $13\frac{3}{8}$  inches. The phasing wires (No. 16, spaced one inch) are also  $13\frac{3}{8}$  inches. The quarter-wave "Q" section is  $6\frac{3}{4}$  inches long, and is made of  $\frac{1}{4}$ -inch tubing, spaced one inch center-to-center. Radiator-to-reflector spacing is  $5\frac{3}{8}$  inches. The array is fed with 300-ohm line. The model shown in the cover picture was made in knockdown form, for portable work. The elements are of  $\frac{1}{4}$ -inch tubing, and connection to

them is made by spring-type grid clips soldered to the phasing wires. The array has a gain of approximately 15 db., and it works well in either a horizontal or vertical position.

Other readers have written in to let us know that we left off a dimension for the length of the line used in the 6J6 transmitter, described in the November issue. Referring to Fig. 2, page 14, the lines,  $L_{1a}$  and  $L_{1b}$  are  $1\frac{1}{2}$  inches long. Under the receiver diagram, Fig. 3, the caption should state that  $L_2$ , not  $L_1$ , is vane-tuned.

Who, in working on a new and higher-frequency band, has not called CQ occasionally, just on general principles, not expecting an answer? W2HNY/2, operating from a 450-foot elevation near Westfield, N. J., was working W2LYP at Iselin, N. J., on schedule, as they have been doing for some time. After the work-out was over Matty called a "CQ 420 Mc.," and lo and behold — an answer! And DX, too: W2AJT/2, Long Branch, N. J., some 35 miles away. W2HNY uses a Cardwell oscillator unit as a transceiver for his portable work, with a 16-element array, vertical or horizontal. W2AJT was testing a 20-element array, with a 703-A "doorknob" oscillator, running 10 watts input. That 703-A, incidentally, looks like a good bet for 420 Mc. and higher. You won't find much dope on it in the handbooks, but it's on the surplus market in some quantity.

W2HNY and W2LYP find that, in working between their respective home locations, an eight-mile path, they are unable to hear each other when they use their small transceivers for both sending and receiving. When they put on their oscillators, each of which uses an 8012 at about 20 watts, and use the transceivers for reception only, the circuit is solid. Both have 5-element horizontal arrays. When W2HNY goes to an elevated location the small rigs are quite O.K., though the distance is increased to 12 miles.

The polarization question is bothering them, too. W2HNY says it's an awful nuisance to have to listen to no signals with both types of polarization! What shall it be, fellows, horizontal or vertical? We suggest standardization on horizontal — now — unless someone has serious objections. The primary reason for retention of vertical antennas on 144 Mc. — to provide for the mobile enthusiast — is unimportant on 420 Mc., since practically all work will be with something more complex than a vertical quarter wave. If it's a beam, it might as well be horizontal as vertical.

There is more 420-Mc. activity in southern New Jersey. W2VX, Westville, and W2PEN, Runnemede, have rigs similar to the job described in November QST, and 24-element and 5-element arrays respectively. W2PAU, Westville, has a converter ahead of a broadband receiver, and a pair of 8025s for transmitting. W2EH, W2KHW, W3ISE and W3FGQ are also active. The first

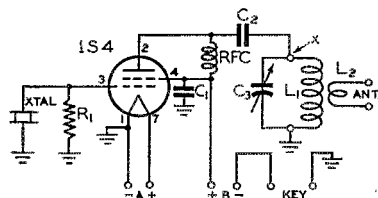
(Continued on page 148)

## A Bantam 1-Watter

ERNEST B. LINDSEY'S 6-oz. 12-cu.-inch 1-watt c.w. rig, pictured, should earn for him the warm approbation of the more-miles-per-milliwatt gang, that hardy breed who still successfully traffic the kilocycles, ofttimes to the utter disillusionment of self-respecting kilowatters.



In building this bantamweight transmitter, W4BIW used a surplus! Type BCR-746-A tuning unit as a foundation; however, midget components and a  $1\frac{1}{8} \times 1\frac{1}{8} \times 4$ -inch "U" chassis could be substituted. The 1S4 crystal oscillator is powered by a  $1\frac{1}{2}$ -volt "A" cell and 30 to 90 volts of "B," plate-and-screen current under load running 8 to 15 ma. The tank condenser,  $C_3$ , is screwdriver-adjusted. Connections to antenna, key and batteries are brought out to pin jacks in the fiber bottom plate. The schematic shows link coupling for connection antenna, but a single-wire feeder could be tapped in at X and worked against ground.



$C_1$ ,  $C_2$  — 0.0047- $\mu$ fd. mica;  $C_3$  — 140- $\mu$ fd. midget trimmer;  $R_1$  — 47,000 ohms;  $L_1$ ,  $L_2$  — depend on band and XTAL used (3.5 Mc.:  $L_1$  43 t.,  $L_2$  4 t., No. 30 d.s.c. on  $\frac{3}{4}$ -inch diam. plug-in form); RFC — 2.5 mh.

Performance? From Atlanta, W4BIW has blanketed Georgia and worked into Alabama with the rig. Here in Connecticut, using 80 meters and 0.8-watt input, 22 stations in 10 states were QSOed in 12 hours — without high-powered preliminaries.





# Hints and Kinks

## For the Experimenter



### CONVENIENT JUNCTION BOX

THE compact unit shown in Fig. 1 was patterned after a commercially-built unit, designed to provide a convenient a.c.-line outlet box for use in test set-ups requiring the application of power to several units at one time. It cuts down on the amount of "haywire" usually required in such cases, and eliminates the usual problem of "Where the heck am I gonna plug this in?"

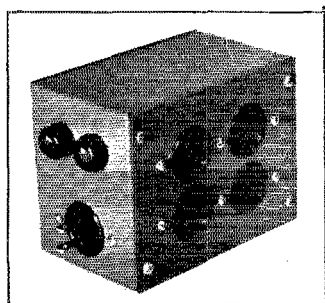


Fig. 1—Here's one way of solving the problem of having sufficient a.c. outlets on the test bench. Eight a.c. receptacles are mounted on a 3 × 4 × 5-inch utility box, along with line fuses and an input connector.

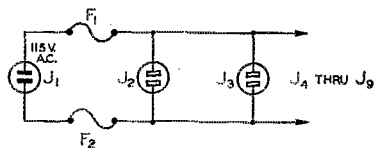


Fig. 2—The output receptacles are wired in parallel across the input jack.  $J_1$  is a standard male a.c. plug, while  $J_2$  through  $J_9$  are panel-mounting a.c. receptacles.

Eight standard a.c. receptacles are mounted on the sides of a 3 × 4 × 5-inch utility box. A male a.c. plug and two fuse-holders are mounted on one end of the box. The wiring arrangement is shown in Fig. 2. It is suggested that the fuses be rated a little below the rating of the fuse in the house-wiring circuit that is used to supply the box. In this way, if a fuse blows, it will be the one in the box before the one down in the cellar!

Variations on this scheme will suggest themselves, and if desired, toggle switches may be mounted near each receptacle to give control of the individual circuits within the box. — *W1JEQ*

### PROTECTIVE SYSTEM FOR 807 MODULATORS

THE system shown in Fig. 3 was worked out to give double protection to a pair of 807s used as modulators. The circuit prevents screen voltage

from being applied unless plate voltage is also on, and prevents the tubes from delivering output until the output transformer is loaded.

A high-resistance relay,  $Ry_1$ , is connected so that it is actuated by the 807 plate voltage. Thus,

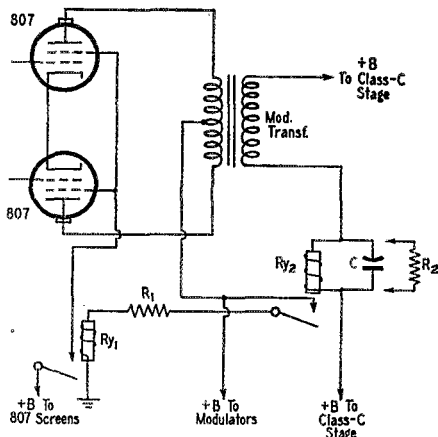


Fig. 3—Protective system for 807 modulators. Two relays are used to prevent application of screen voltage before plate voltage and to kill the entire modulator if the output transformer is unloaded.

$C$ —8- $\mu$ fd. 150-volt electrolytic.

$R_1$ —0.47 megohm, 1 watt.

$R_2$ —See text.

$Ry_1$ —High-resistance relay (10,000-ohm coil).

$Ry_2$ —Low-resistance relay (12- or 24-volt coil).

screen voltage cannot be applied until  $Ry_1$  closes after plate voltage is applied. The second relay is of the low-resistance type (12 or 24 volts), and is actuated by the d.c. flowing through the secondary of the modulation transformer. Thus if for some reason the plate supply to the Class C stage fails, it becomes impossible to apply power to the modulator, thus saving the modulation transformer which might break down if operated with an unloaded secondary.

If the voltage drop across  $Ry_2$  is too great, it can be shunted as shown in the diagram. Several values should be tried until the one that produces the lowest drop while still permitting the relay to close is found. — *Howard K. Van Jepmond, W9TJC*

## SWITCH TO SAFETY!





# How's DX?



CONDUCTED BY ROD NEWKIRK, \* W9BRD/1

## How:

We rushed into the shack just in time to observe Jeeves determinedly pounding his head against the wall. And as he backed up to drive home the next blow, we hauled him unceremoniously into the corner and plunked the portly gentleman into an easy chair. Gulping a sedative, he struggled to regain his usual decorum. We then noticed an unfinished VQ1 QSO in the log — in fact, it even looked unstarted.

He mumbled a tale of woe in his Laucashire drawl, something to the effect that after the VQ1 had replied with "QRZ? W9???/1 AGN PSE K" a veritable horde of W2, 3, 4, 6, 7, 8, 9 and VE chimers-in had burned a hole in the band, all a cycle or two apart. And sure enough, there was a little brown spot around 14,001 on the dial of our blooper!

"Where were the W1s and W5s on that play?" we asked, repairing the damage to the cellophane covering on KC4USA's card. We then placed a Band-Aid on Jeeves' palpitating pink pate, admonishing him to use another portion of the bulkhead during future tantrums. He was returning to his usual serene self and said that the 1s and 5s were giving an FP8 a going-over a few cycles lower.

Well, we promised to put him in for HADH (Heard All DX Hogs) to tack up beneath his HAD (Heard All Diathermies) certificate in the pantry, and then sent him into that cubbyhole to shake a cocktail.

So Jeeves is again as unruffled as ever but the funny business on twenty goes on and on. It appears that the number of DX Hogs that takes the pledge is well counterbalanced by new arrivals. Anyway, we must hope and work for the best. You DX stations — you can do a lot in helping to set the standard of our conduct over here. It's mostly up to you to straighten out the overeager beavers on this end. As soon as shady operating ceases to pay off things will become much more FB. It's not easy to continue being polite and square while a few nocturnal nitwits zero-beat and walk off with prize packages.

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The powers that be remind us all that there is a stack of QSL cards floating around these days having inadequate information on them; i.e., no dope indicating band used, whether 'phone or e.w., signal report, or even time and date. Even if you aren't rare DX your card may be needed by

someone trying to piece together a 10-meter WAS. (All right, Jeeves, so everyone doesn't work ten.) Granted, it's a lot of work for operators of rare DX stations, especially after a DX contest or any long session with a flock of Ws, but an incomplete card is almost worse than no card at all — it's painful.

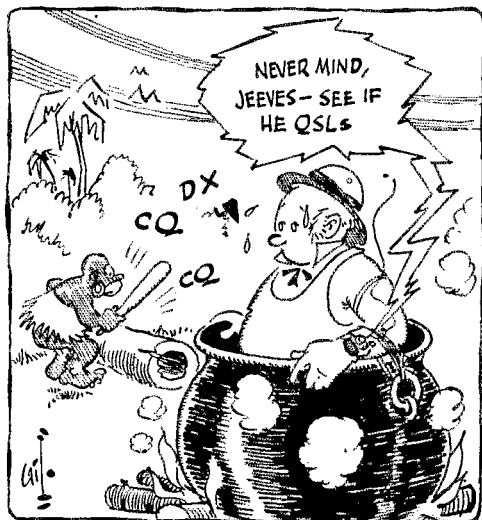
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Well, conditions from eighty down through six are pretty hot right now with no letup in sight. A lot of short skip on the DX bands has made the going pretty tough, according to some sources. Let's see what gives among the gang these days.

## What:

For reasons best explained by the technical department, eighty hasn't yet thoroughly shaken its mantle of summer QRN. That should account for the sparse reporting. Nevertheless, W1MEC's 30 watts accounted for G8JR and PAØNG. . . . . W3WJF also got those two and added FA8BG (3515) and OZ3HR (3530). . . . . W1FH worked some Europeans but couldn't locate any of his specialty, new countries, so he put back the coils with fewer turns. . . . . Via W3QV, we hear that ON4HC will be gunning for WAS on 3510.

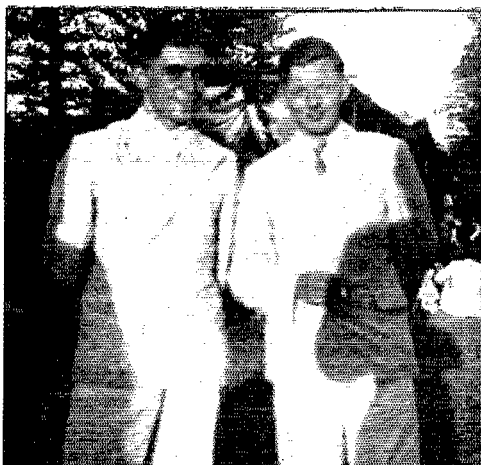
Forty has been a little better. VE3BBR shifted from twenty to test a new final for the SS and was surprised to work some Gs, F9FM, G13CFI, PA1XU, EI9J, CT1SX, and ZS1M (7110) while



\*DX Editor, QST.

using a 20-meter doublet. . . . . W2KIR unscrambled plenty of Cs, GD3UB, G16WG, GW3AUX, GM3BV, F9FQ, I1HOE, OK1FF and UA3BD/UC2, and heard VP7NK. . . . . The typewriter-case portable at W9BRD/1 even worked some Europeans while tied to a short piece of inside wire, so conditions *must* be good. . . . . W5LAK rounded up HR1AT and ZL1NF with his pair of 6L6s. . . . . For some of the boys who are getting out and may not know it, G3CDR sends us a list of calls heard while on shipboard in the vicinity of Malta: W1s MBB, O0Q; W2s EUV, NUU, POG, UZQ, VOI; W3HRZ; W0UKM; and VE10A and TH. . . . . HK5CR wants it known that he's snooping for New Mexico on 7103 from 2:30 to 4:30 A.M. MST daily.

Ten meters is evidently making some of the boys happy. Even W1FH raised an eyebrow at MD7RJ (28,210). That's Cyprus. . . . . W1EKU notes that he works VU best with the beam in the east and, in the morning, VK and PK peak a bit east of north. Vernon's best of late include OQ5AR, OQ5BL, ZB1AG, ZB1AB, ZB1S, ZB2A, MB9AM, MD5TS, VS9AB, VQ3EDD, ST2MP, ZS4AF, ZS4L, VQ4KPB, ZD2KC, PK2RK, LZ1AB, SUI1H, VU2BF, VU2TM, CT1QA, CR9AG, C1CS, W2W-MV/C9, XZ2DN, J8AAJ, J8AAM and a flock of other Js, ZSs, etc., all this being on the vocal. He's up to 81 countries with his T40s and 3-element beam. . . . . Also on voice, W2CYS gabbed with C1CH (28,380), C1JC (28,450), J2EUG (28,490), J2ROC (28,320), J9ABX (28,350), KG6AW/VK9 (28,490), VQ5DES (28,300), ZC6NF (28,550), FQ3AT (28,150), CP5EL (28,600), ST2JF (28,300), ZS4P (28,280), and ZS6OL, Bechuanaland (28,200). Vince then had code practice with UA9CF (28,050), UA9DP (28,110), UH8AA (28,080), CR4AX (28,150), ST2FT (28,050) and ET1IR (28,075). . . . . W2SHT's 807 shook the 'speakers of a mess of Europeans, VK2ANN, ZS6LB and KS4AC via c.w. . . . . A rare complaint from VE3AFY states that DX never seems to start tuning below 28,500 in order to work VE. Never daunted, however, he is now up to 56, reporting in with J2HYS, J2AHI, J2FOX, J2AAA, J5AAJ and J8AFK. . . . . W9MZW comes along for VP4TU, VP6JC, VP6ZI, CN8EH, CX1DB, and PZ1J (28,140), while hearing ZD4FB (28,200). Jack also worked CM9AA/mobile (28,490) so the mobile fever is spreading. . . . . Speaking of portable-mobile stuff, W6KPC climbed into his jalopy to jaw with VK2KZ, ZL2JD, ZL1FX, J2FOX and W4FOJ/MM. He crams 30 watts into an 832A with a whip on the rear bumper. . . . . G2PL says that FUSAA (28,008) claimed their contact was the first FUS-Europe QSO. Peter now has 181 postwar with 152 confirmed and moans about having a punk location! . . . . . From out west, W6ZZ recommends



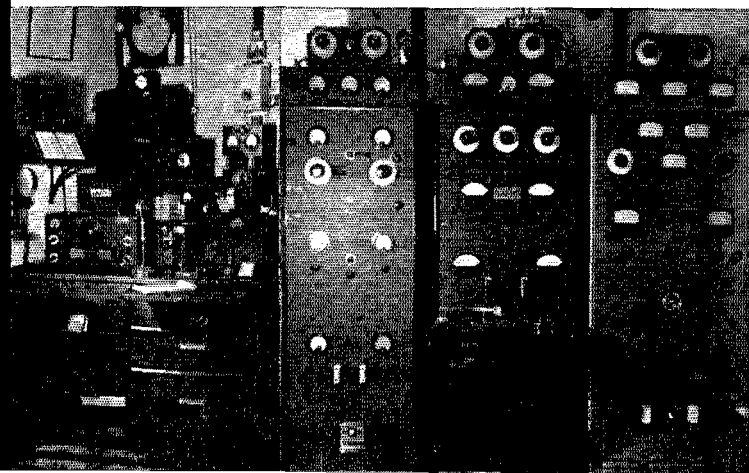
Here's a rare shot — VR5PL and VR5IP, respectively, representing the entire ham population of the Tonga Islands. Noel and Bert spent the war together in the RNZAF and are now with Civil Airways on Tonga. They plan on taking a trip to the States upon completion of their tour of island duty.

KG6AY, KG6BV, KH6DB/KG6, KW6AC, KG6BE, KA1VVS, VP4TZ, and scads of Js, all orally. Miles is getting awfully warm now with 91 postwar.

The brawl on twenty is hotter than ever, if anything. W6CIS crept up to 119 with such contributions as VU7BR, HI1AO, CT1JS, VR2AR, TI2AM, VQ5JTW, UH8AA, MD1D, J8AAS, VP5AD, VP3JM, HK1AM, EA7AV, TF3EA, ET1IR, CP1AT, ZD4AL, EP1AL, EK1AA, UB5BE, UG6AB, UG6WD and YU7KX. . . . . W1MRQ complains about a poor antenna and in passing mentions CR4AX, J2AHI, MB9AG, OE5ST, UA1AF, UA1BE, UQ2AB and PJ1PB/plane (!). . . . . W2LRC's vertical is still holding up to the tune of a lot of Europeans, including SM5WA, SM5WI, OH2NQ, F9CC, UA4MA, UA1AA. . . . . W6MX emerged with FQ3AT, I6ZJ, UQ2AB, ZS6NU (Bechuanaland), VU2BW, FA8IH, SUI1H, and MD5DA (Ismali). Walter relays info to the effect that W6ZCY has corralled 135 countries since March, some late mentionables being ZD3B (14,110), VQ4RAW (14,125), CT1A (14,125), CR6AI (14,150), HZ1AB (14,100), SV1RX (14,100) and FT4AB (14,110). . . . . W8DEN reports bad conditions and I1AHC/I6, J8AAW, W0SQS/Iwo, W2WMV/C9, FT4AN and CN8EE. . . . . We get a Guamish slant on things from W2LAT/KG6 who has 40 countries worked in three weeks on the island. Of particular interest are VS7NX, VS7AP, CR9AN, HS1SS, VS1CF, XZ2HP, PK6NG, PK7VK, PK6XA and UA6UE. . . . . Of all things, a good heavy rain is necessary before W7KWC can work into South America. Elmer hooked KA1ABT, W7ANN/C1,

KG6AD, UB5BD, UA9DP, CN8EG, YR5AH and KX6AF without benefit of precipitation . . . . . A 160-meter half-wave at W7LAN has accounted for EI4J, UA0KAA, UA1AF, UA1KAE, OH8NF, UC2AD, VS6AR and other niceties . . . . . A flock of stuff entered the log of W1NMP lately, accompanied by YA1A (14,000), XZ2DY (14,135), ZC3AK (14,150), VS6BA (14,070), GD2FRV (14,060), KM6AB (14,055), CR7BC (14,095), MD5SB (14,020), PK4KS (14,050), ZC1AL (14,030), J8AAI (14,110), J8AAS (14,093), J9ABL (14,095) and CT1IT. This brings Stan up to 135 . . . . . In the Ozarks, W5ASG collected such as MD5KW, VQ5JTW, J8ASC, UA0PA, UH8AF, UA9CH, UB5BC, UD6AG, RAEM/MM, ZP6AB, VP8AI and VS6AR, plus J8AAB and VQ5DES on 'phone . . . . . A total of 117 countries has now been accumulated at W0AIW. Late quotes are UC2CD, UD6BM, UQ2AB, UA9KCA, UA0OA, UB5BF, YO5J, LX1AS, OE7CP, GC4LI, CT1AC, CR9AN, ZD4AP, CR7AF, ZS3D, C9JW and PK4KS. Lee has a full gallon and a 3-element rotary to play with . . . . . W8JM represents West Virginia this month, bringing along UR2KAA, EK1AA and GD3BBS for 70 countries since February in a poor location and with low power. That's what the man said! . . . . . On voice, W9NDA specifies KH6MQ/J9, MB9-AB, LA2UA, VP1AP, HA4AB, ZM6AF, XZ2AG, TR1P, SV1WE and AR8AB. Then Heck uncorked some brass on I6USA, XZ2HP, UA0PA, VU2RS and ZD4AP. He reports receiving a card from the Cape Verde Islands — it unfortunately being the one he sent CR4HT some time ago. Too bad; scratch another one . . . . . Windsor's VE1EA collaborated with EP3D, HE1EO and MD5PC for 107 postwar . . . . . TA3SO, SM5-XR, HH3L, LA3GA and OZ7SS were snared by W3CVA recently . . . . . We note that W7BE gained MB9AM, MD5AA, XZ2PQ, PK5LK, UJ8AD, UI8AB, UA1KED (Franz Josef Land), GD2DF, VS7AC, VU2DS, VU2GH, I6AB, HA8PE, YR5PK, YR5VP, VQ2JC and ZB1AI, as well as others of quality. Chalk up 113 for Bill, all on twenty c.w. His brother is ex-KX6USN, now W6VOE, by the way . . . . . At W3RNQ we find CT1IT, KG6AL, EI4B, UA9CC, KV4AC, OE5LU, ZB1AH and ZE2JN, to get Al past the

century mark . . . . . Efforts by W8WU resulted in W0TKK/VK9, W2LAT/KG6, UD6AG, J2AAO, HK4AD (14,145) and UA3BD/UC2 (14,060) . . . . . W4MZ evolved a folded dipole from a chunk of No. 12 wire (no joints, no splices, he claims) and latched onto UA0KAA, KA6FA, CT1ILZ, UA0SL, UA0UA, PZ1WK, J2AAY and LU1ZA . . . . . The summer's best for W0MLM included HC2KJ, XU6GRL, KA1FH, KA1AK, KA1RP, KA7GC, HK3AW, W2JSB/KG6 and W6WCN/KG6 . . . . . A mere seven days brought W0NTA 14 new ones, or up to 126 postwar. Vince vows to give W0NUC and W0YXO plenty of competition from now on in . . . . . W5LAK is back again with OX1G, KV4AA, FA9ED, KP6AB, K6SBU/KG6, VP3JM and HK3CK . . . . . XT9F (14,100) provided a fancy contact for W6EFM while airborne in a transport in the vicinity of Canton, China. He gave the mail address as % C. A. T., Hungjao Air Field, Shanghai . . . . . The 450 watts at KP4KD has accounted for 101 countries in six months. Ev recently added PX1Z and ZD3B, making it 120 on the nose . . . . . W2QHH's 40 watts is still at it. We mean a 1-day WAC and contacts with XAFQ and KA6FA, to give Howy 102 postwar. Sensational QRP DX is nothing new for this guy — you'll remember him as prewar W8JIW with a 17-watt DXCC. Furthermore, he *doesn't* lean on a VFO! Not bad for an amateur. [Enough of that. — *Jeeves*] . . . . . The big boom from Bloomfield, W2CWE, accounts for ZM6AF (14,077), MD5DA (14,017), J9ABL (14,078), VP3TR (14,053), VS1BG (14,122), VS7ES (14,064) and a group of others already mentioned. Ed's score is 73 varied out of 119 and he's worried about his average. Some systems must be better than others, as W2QHH has varied 91 out of 102 worked. How about that, Howy — what's the secret? But if it involves sending a BC610E or something to each new one, skip it! . . . . . Between whipping up crepe suzettes and fancy frostings, W2DMJ sicked his 750 watts on a pile of stuff, along with VK9BI, UA3AF, UA4FA, CN8EH, LA3SA, OX3GE and G2XM/MM. Then Frank warmed up the Class-B in conjunction with D4ATG and OX3MC. The mast under his beam pretzelized under a recent breeze, so I guess we all have our troubles



◆  
 The rig at VK2AGU, Sydney, looks more like it belonged to a W than a VK: HRO and BC-348 receivers, separate transmitters on 10, 20 and 40, and rotary beams on 10 and 20. Harry has worked 95 countries on 'phone postwar. He never runs short of second operators — his two sons are VK2GD and VK2AI.  
 ◆

QST for

..... Poor W2HAZ isn't living right, or something. He would like to know if he can qualify for WAP (Worked All Phoneys). Guess not, Bill. They haven't all got on, yet. In spite of this circumstance, he did all right for a bunch of Russians and some Js..... Complaining of working nothing but run-of-the-mill stuff, W2TUD wangled UA3VX, OH8NF, OH3OR, OX3RD, C6HH, UB5KAA and VQ3HJP, plus about fifteen other notables—all in one six-hour session..... W6ZZ couldn't beat off J5AAN, CR7-BC, J2AVA, PK4TO and VS2CE with a baseball bat between OBS QSTs, needing just a few more to go over the mark.

**Where:**

Mailing points aren't quite so plentiful this time (hint, hint), but here are a few that should do someone some good:

- |           |  |
|-----------|--|
| C1MCC     | U.S. Army Advisory Group, Signals Section, APO 909, % Postmaster, San Francisco, Calif.                                |
| C1SL      | P.O. Box 409, Shanghai, China.   |
| C7AT      | P.O. Box 51, Tientsin, China.  |
| CN8EH     | Navy 214, % FPO, New York, N. Y.   |
| HZ2TG     | (via WØZWY)  |
| MB9AM     | (via RSGB)   |
| MD2C      | BOAC, Tripoli, North Africa.   |
| OE7CP     | Box 71, Graz, Austria.   |
| PK7VK     | Radio Section, Biak Island, Dutch New Guinea.  |
| VP5AS     | Milford C. Jossard, Vernam Field, Jamaica, B. W. I. (via W. I. A.)   |
| VK9BI     | P.O. Box 1013, Nanyuki, Kenya.   |
| VQ4RAW    | Box 155, Port Louis, Mauritius.  |
| VQ8AB     | Box 434, Singapore, Straits Settlements.   |
| VS1CF     | Ivan Bain, 1315 Petaling Hill, Kuala Lumpur, Malaya.   |
| VS2CB     | 109 Austin Road, Hong Kong.  |
| VS6BA     | (via RSGB)   |
| VS9ET     | Harry T. Phillips, Y1/c, USN, Service Schools Command Stenography School, Class 5-48, USNTO, San Diego 33, California. |
| WØTKK/VK9 | AP0 902, % PM, San Francisco, Calif.   |
| XZ2PQ     | 208 W/T Troop, Burma Command, Sig. Regt., Rangoon, Burma.  |

These, thanks to W1CLS, W1SU, W2DMJ, W4CCH, W6MX, W8WEA, W8WWU, WØAIW and VS9ET.

**Tidbits:**

A pile of 163 postwar has kept W2AGW quite busy. He also is wrestling with a new 50-foot steel tower which the local authorities are frowning upon..... CN8EG tickled W2HMJ pink with an unusual cartoon QSL. Grab that one for your collection, gang..... All who worked VQ4MNS after September 9, 1946, can roll up their sleeves and do it all over again. This advice from ex-VQ4MNS, now ZE2JO, who relinquished the call on that date and it has never been re-issued. Watch for ZE2JO on 7, 14 and 28 Mc..... J3AAD was the first postwar J to work 100 countries but J2AHI got his necessary DXCC cards first, according to the latter. He also swears being QSL manager had nothing to do with it!..... HB9CE brings glad tidings to the effect that I1AHC/16, W6VKV/16, and G3ZJ (now I6ZJ)



In climatic contrast to the picture on page 65, here is Coastguardman G. C. Bartoo, who gave the gang a lot of Greenland contacts while signing "Bart" at OX3BD from March through October, 1947. Nice and cozy, but can he get out of that thing?

were all in Asmara and in good standing. Frank states that ET1SS is also in Eritrea..... W1DX's letter from H. G. Baker, ex-AC3SS, informs us that he is now in VQ4 and awaiting a new call. He left AC3SS in the able hands of Bob Ford but here's the catch: Mr. Ford has gone back to England. Sob, no more AC3SS or GG. [Rats, you couldn't work him anyway. — Jeeves]..... KZ5AD is in dire need of Nevada, Idaho, Wyoming, Colorado, Rhode Island and Vermont for WAS and Sarge says QSL is always 100 per cent from his end..... ZB1AB donated the following info through W8CEI: As of November 10th, the following Malta calls had been issued: ZB1E, H, L, Q, S, AB, AC, AE, AF, AG, AI, AJ, AH and RL. Also, ZB1A, wherever he is, is not in Malta..... The prefix as in XPAØPN is evidently for portable use over there, as W4DCW recounts working this station (28,020) and receiving the location as Exhibition Island. QSL via PAØPN's QTH..... The Department of Military Science and Tactics at the University of Minnesota has WØDSF in operation in the rear of a classroom. The first week of use provided a flock of European QSOs. W6HJP, an instructor, is responsible for the works..... Ex-VU2JG, now G3CJG, has left for VQ3 and VQ4 complete with rig. Hope he drops into VQ1 for a while, too. Along this line, VQ3HJP slipped us an interesting sidelight on things in Dar-es-Salaam. He has an interesting story regarding the name of the place and you might get him to elucidate sometime should you catch him in an RCC mood without too many pursuers on the frequency. We are endeavoring to get a good shot of VQ3EDD's vertical double-diamond beam which keeps knocking our ears off

(Continued on page 148)

# First V.H.F. Sweepstakes

January 17th-18th — Certificate Awards to Section<sup>1</sup> Leaders — Gavel to Winning Club — All Work on 50 Mc. and Above

BY F. E. HANDY, \* WIBDI

ACTIVITY on v.h.f. is now at an all-time high, so it's time we scheduled an "SS" to see what over-all communication results can be rolled up in a week-end devoted exclusively to v.h.f. operating!

Accordingly, the First V.H.F. Sweepstakes will start at 2:00 P.M. your local time, Saturday, January 17th, ending at midnight Sunday. The aim of the contest will be to work as many v.h.f. stations as possible in one week-end. All points from such work will be multiplied by the number of different ARRL sections worked. New station records are invariably made in each regular SS and we expect the V.H.F. Sweepstakes to be no exception.

'Phone, m.c.w. or c.w. may be used. Since contact has to be fairly good to prove a QSO, customary SS exchanges (for the report sent Hq.) will be required. Exchanged information is in the form of a message preamble, with the ARRL section<sup>1</sup> substituted for the city and state, and the RST report for "check." Any station you work is good for *one* point in the score, if you get the other operator's acknowledgment, whether he is score-building or not. If an exchange of SS data is completed, *two* points may be claimed. This V.H.F. Sweepstakes will be operating fun as well as a means of providing an unexcelled test of possible station coverage in a January week-end.

Contest reporting forms will be sent gratis to anyone who requests them by radiogram or card, as has been mentioned in our advance announcements from W1AW. Use of these forms is not required nor is advance entry necessary. One can simply follow the log arrangement shown with this announcement, but it simplifies your work and ours if you ask for forms.

## Awards — Individual and Club

Distinctive certificates will go to V.H.F. Sweepstakes winners, one in each of the 71 ARRL sections.<sup>1</sup> By such section awards all operators compete under transmission conditions common to their vicinity.

When three or more individual club members or hams invited and reported by one club, compete and submit logs naming the club with which they are identified, an ARRL certificate will be issued through such club to the leading individual in the local competition. When less than three individual logs are received there will be no club award or club mention.

A gavel with engraved sterling-silver band is also offered to the club whose secretary submits the greatest aggregate score, which is the tabulation of all individual V.H.F. Sweepstakes score claims successfully confirmed by individual amateur reports which mention the club.

## The General Call

"CQ Sweepstakes, this is W . . . , over" will identify stations desiring to make contest exchanges. On c.w. this becomes simply "CQ SS de W . . . K." Use any authorized v.h.f. band, 50 Mc. or above. Every licensed amateur who can work on v.h.f. and who lives in any field-

\* Communications Mgr., ARRL.

<sup>1</sup> See list of sections in the ARRL field organization, page 6. Awards include Puerto Rico, Hawaii, Alaska, P.I. For section identification, give, e.g., Eastern Mass., R. I., W. N. Y., Neb., N. Y. C.-L. I.

<sup>2</sup> In 'phone RST exchanges only two numerals need be used. Say *Readability*, . . . *Strength*, . . . On c.w. contacts full 3-number RST reports should be logged.

## EXPLAINING CONTEST EXCHANGES

<i>Send Like Standard Msg. Preamble</i>	<i>NR</i>	<i>Call</i>	<i>GK</i>	<i>Place</i>	<i>Time</i>	<i>Date</i>
In the "SS" Exchanges	Contest information number sent consecutively, 1, 2, 3, etc., a new NR for each station worked.	Send your own call.	Send RST Readability . . . Strength . . . report <sup>2</sup> of station worked.	Your ARRL Section <sup>1</sup>	Send time of transmitting this NR.	Send date of QSO.
Purpose	The QSO NR tells how you are doing.	Identification	All stations exchange reports.	Section <sup>1</sup> vital contest data.	Time and date must fall in the contest period.	

## STATION W. . . — SUMMARY OF V.H.F. SWEEPSTAKES EXCHANGES

Freq. Band (Mc.)	SENT (1 point)				Time . . . ST	Date (Jan.)	RECEIVED (1 point)				Time	Date (Jan.)	Number of Each Different New Section as Worked	Points
	NR	Stn.	CK-RST	Section			NR	Stn.	CK-RST	Section				
50	1	W1AW	57	Conn.	4:15 P.M.	17	3	W1LJ	47	Conn.	4:18 P.M.	17	1	2
50	2		43		4:35 P.M.	17	7	W1HDQ	59	Conn.	4:40 P.M.	17	..	2
50	3		58		9:09 P.M.	17	8	W1MEP	359	Vt.	9:11 P.M.	17	..	2
144	4		49		9:30 P.M.	17	32	W9UQP/1	58	E. Mass.	9:38 P.M.	17	3	2
144	5		57		9:50 P.M.	17	15	W1JXP	58	Conn.	9:46 P.M.	17	..	2
50	6		54		11:30 P.M.	17	11	W2OHE	48	N. Y. C.-L. I.	11:32 P.M.	17	4	2
144	7		58		11:35 P.M.	17	30	W1LJ	57	Conn.	11:35 P.M.	17	..	2
144	8		57		11:45 P.M.	17	21	W3QCN	59	W. Pa.	11:56 P.M.	17	5	2
144	..	.....	...	...	.....	..	18	W2LKK <sup>3</sup>	59	E. N. Y.	12:34 A.M.	17	6	1
144	9	W1AW	34		8:50 A.M.	18	27	W1DQH	59	W. Mass.	8:47 A.M.	18	7	2
50	10		479		9:18 P.M.	18	12	W5BHO	379x	S. Tex.	8:20 P.M.	18	8	2
50	11		589		10:40 P.M.	18	20	VE1HLF	569	Maritime	11:35 P.M.	18	9	4

No. Bands Used: 2

9 Sec., 23 Pts.

Number and names of operators having a share in above work.....

Claimed score: 23 points X 9 sections = 207.

I Leary state that score and points set forth in the above summary are correct and true.

Equipment: .....

Signature.....

Tube line-up.....

Address.....

Number different stations worked.....

organization section is cordially invited to take part in the Sweepstakes.

### Rules

1) Contest exchanges must include all data shown in the example explaining contest exchanges.

2) All work must fall in the contest period. All work must be on authorized amateur frequencies, and modes, above 50 Mc.

3) All work to be submitted must be accomplished from points within a given ARRL section.

4) Fixed-station or portable or mobile operation under one call may be combined and submitted as one score.

5) A contestant is a single operator working with no help permitted by any other person during the contest. Scores claimed must be presented with names of all participating operators and only single-operator scores count toward section certificates.

6) No crossband work shall be counted for any points or sections in the contest.

<sup>3</sup> If but one point is made on a contact you can add a point by working this station again for exchange in the opposite direction later. Underline all such exchange entries in your contest log. Show parenthetically the call of the station you worked, leaving the right or left report column blank so that other pairs of exchanges completed in one contact are side by side in your report.

7) Scoring: Contacts count:

One point for each QSO completed.

Two points for each QSO when the required information is exchanged both ways.

For final score, multiply totaled points by the number of different ARRL sections<sup>1</sup> worked, that is, the number in which at least one SS point or exchange has been made.

8) Contest period: The contest shall start at 2:00 P.M. your local time, Saturday, January 17, 1948, and ends at midnight, Sunday, January 18th, your local time.

9) One contact per band may be counted for each different station worked. Example: W1XYZ works W3PDQ on 50, 144 and 235 Mc. for complete exchanges, two points each on each band. 2+2+2 equals 6 points but only one section multiplier.

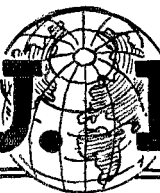
10) Sections are determined by obtaining at least one point by actual contact with a station operating in the section, and work in additional bands with stations in this section shall not increase the section multiplier.

11) Award Committee decisions shall be accepted as final.

12) Reports from all stations must be post-marked no later than February 2, 1948, to be considered for awards.

(Continued on page 150)

# I.A.R.U. News



## AUSTRALIA

The *Wireless Institute of Australia* advises that VK amateurs are permitted to employ frequency modulation on amateur bands above 50 Mc. and on 27.185 to 27.455 Mc. Pulse transmissions are allowed on the 166-Mc. and higher bands.

## QSL BUREAUS

Changes and additions; complete lists will be published as usual in the May and October issues of *QST*.

Canal Zone:	Canal Zone Amateur Radio Association, Box 407, Balboa.
Cook Islands:	Ray Holloway, P.O. Box 65, Rarotonga.
Dominica:	VP2DC, Roseau.
Greenland:	1385th AAF Base Unit, APO 858, % Postmaster, New York, N. Y.
Grenada:	VP2GE, St. George's.
Montserrat:	VP2MY, Plymouth, Montserrat.
Northern Rhodesia:	VQ2DH, Box 93, Livingstone.
Palestine:	(via ARRL.)
Philippine Islands:	Elpidio G. DeCastro, Radio Training Institute, Manila.
St. Vincent:	VP2SA, Kingstown, St. Vincent.
Trinidad:	Edgar H. Borde, 52 Mucurapo Rd., Port-of-Spain.

## COLOMBIA

The members of the *Liga Colombiana de Radio-Aficionados* recently elected the following amateurs to its Board of Directors:

President	Pompilio Sanchez, HK3BH
Vice-President	Josue Gomez P., HK3CV
Hon. Secretary	Aurelio Linero P., HK3CK
Hon. Treasurer	Carlos Fernandez, HK3BF
Auditor	Luis Caicedo R., HK3AO



## FRANCE

The *Reseau des Emetteurs Français* will sponsor a contact contest called "Trophee Pierre Louis" from 0600 to 2400 GCT on December 28, 1947. The competition is for members of REF who operate 'phone.

A verification group of five numerals, the first two of which indicate readability and strength and the last three being the numerical order of the contact in the contest, is to be exchanged in each QSO.

French contestants may exchange verification groups with foreign stations provided that the latter confirm the groups sent by letter to R.E.F. headquarters.

## CHILE

The *Radio Club de Chile* has recently elected a board of directors, to serve a two-year term ending October, 1949. The new officers are as follows:

President	Jose Lena L.	CE3AY
Vice-President	Ramon de Valle	CE3AM
Secretary	Luis M. Desmaras	CE3AG
Treasurer	Jorge Bernain	CE3DG
Directors	Alberto Stegmaier	CE3AS
	Antonio Chanes	CE3AE
	Rene Arangua	CE3AW
	Alfredo Quintana	CE3DZ
	Roberto Varela	CE3DS

## JAPAN

J2USA, the headquarters station of the *Far East Amateur Radio League*, is in full operation. The services of its station and its personnel have been offered to the United Nations in general in relaying pertinent information, as well as to occupation personnel in general in handling personal messages.

An emergency net in Japan is being planned. All J amateurs have been requested by F.E.A.R.L. to cooperate in the emergency program.



When F. J. North, G2CDI (now VP2-CDI), first came to Barbados, the event was celebrated by this gathering: Standing, usual order: Stewart, VP6ZI; Elliot, VP6MR; Murphy, VP6KM; Richardson, VP6JR. Sitting, left to right: Reece, VP6PR; Olton, VP6FO; North, VP2-CDI; and Croney, VP6JC.





# Correspondence From Members-

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

## ATLANTIC CITY, ETC.

P. O. Box 596, Indianapolis 6, Indiana

Editor, QST:

I followed with a great deal of interest the work done by the League in connection with maintaining frequency assignments to amateurs. Now that the results can be evaluated, I want to compliment the officers and men on the wonderful job they have done. Without the leadership and ability and long experience of the present officers of the League, it would have been impossible to have continued with the frequency assignments which the amateurs now enjoy. . . .

— D. J. Angus, W9CYQ

Norfolk, Virginia

Editor, QST:

Re: Atlantic City Conference and the gripes of W5FNA and WINXT. We lost 50 kc. and gained 450 kc. What are they griping about?

— Bus Etheridge, W4KYD

253 Albert St., Stratford, Ontario

Editor, QST:

I have just read, with deep distaste, letters on the above subject in November QST from two gentlemen who, from the fact that they possess call signs, we must assume to be hams. I should have thought that even an elementary knowledge of the problems of international telecommunications would have sufficed for them to realize that we amateurs have been fortunate to have emerged from this conference as well as we have. May I, as a visitor from another hemisphere, say that we, outside America, realize that this is largely due to the magnificent work done on behalf of amateurs by the ARRL, and the support given by your Government. Without this great effort we, in the "outer darkness," would have had a very tough time indeed and from talks I have had with fellow hams, during the last few months, over a fairly wide area of the globe, I can say that this is fully and warmly appreciated. One can only hope that remarks such as those in the two letters mentioned will never be uttered over the air and cause the authorities to regret and withdraw their support. . . .

— Stanley Woolmer, VS1AY

2901 Harris Place, Seattle 44, Washington

Editor, QST:

You know, it is really surprising what the attitudes of some of the fellows are. They've said, "The heck with the other 'punk' countries; we're bigger than they are, so just forget them." Well, if they'll look back about 8 years they will find that was just the same thing one Adolf Hitler thought. What the heck was the war for if it wasn't as much to protect the rights of the small guy as well as any other reason? . . .

— Ken Claar, W7LAR

2008 N. Cleveland St., Arlington, Va.

Editor, QST:

I note in the Correspondence Section of November QST that some of the brethren feel disgruntled about the manner in which ARRL fights for our frequencies. Particularly are they unhappy about Atlantic City.

If there is a more effective way to protect amateur rights than the methods used by ARRL, I, for one, wish these jokers would tell us. They are not helping by griping and criticizing

through general statements that say nothing. Let them give us a concrete proposal of what should be done and how!

Amateur radio has grown in the respect of other services simply because we have cooperated and exchanged ideas within our own ranks. This doesn't mean that we must follow the leader and agree with every move ARRL or any other amateur organization may make. We owe it to amateur radio to speak up if we know a better way of doing things. But it is a sound principle of acceptable human behavior to criticize only when you are prepared to suggest a definite remedy.

— Everett L. Battey, W4IA

[EDITOR'S NOTE: We acknowledge, with thanks, comment in similar vein from W2PUD, W7WJ, W7LHI, W5EGO, VE4FJ, W7HBO, W7KJE, and the Chicago Radio Traffic Assn.]

## TAKING STOCK

201 North Trenton St., Arlington, Virginia

Editor, QST:

. . . We cannot ignore the fact that a basic factor in the history of amateur radio has been the spirit of cooperation that existed within the group. Much of our strength was there.

That spirit appears to have been largely replaced by the same doctrine prevalent among Sunday drivers — lots of horn, lots of power, but no brake. Go into almost any radio club meeting; you will find, in the open or smoldering, the very same schisms that appear on the air. Instead of presenting a united front that will give us standing in our field of interest, we are bickering and quarreling like a group of juveniles.

Looking back more years than I like to admit, I can recall a discussion with a good friend of amateurs everywhere, A. A. Hebert, and in the course of it he remarked that the only thing amateurs seemed to agree on was the infallibility of all other amateurs — against outside attack. It is perhaps just as well that "A. A." did not live to see us as we are today.

I should like to suggest that all amateurs take stock, not only of their operating practices, but also of their general attitude toward the hobby. Is it one that would give us the stature we should have, if followed generally, or is it one that is mutually destructive? If cited as an argument in support of existing frequency allocations at the conference at Atlantic City, would it have been an asset or a liability?

Let's leave our rugged individualism outside our interest in radio communication. No one will lose contacts if we practise a little courtesy, a little consideration, and a lot of common sense. If we don't — and the handwriting is pretty clear on the wall around Washington — we stand a very good chance of finding that by failing to hang together we are all hanging separately.

— A. W. Smith, W2AFJ/4

## PUBLIC SERVICE

Shepherd, Tenn.

Editor, QST:

. . . My ham experience goes back to the days when amateur radio had a very insecure hold, and most hams felt that they had to justify themselves by a certain amount of public service.

The need is just as great today, but the latter-day hams don't know it. They come along and ham radio seems an established thing, safe and secure. They get their ticket and assume that they are free to follow it like any other hobby — like playing golf, for instance — and without any par-

(Continued on page 158)



# Operating News



F. E. HANDY, WIBDI, Communications Mgr.  
J. A. MOSKEY, WIJMY, Asst. Comm. Mgr.  
ALBERT HAYES, WIIIN, Natl. Emerg. Coördinator

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

**V.H.F. SS; ARRL Week and Member Party.** Want to find out what v.h.f. can do in a whole week-end of planned operating? The first *V.H.F. Sweepstakes* (January 17th-18th) mentioned last month is announced fully in this issue. Since work on our lower frequencies will not compete, we expect to meet a lot of the old familiar calls on these bands! All League appointees have arranged a joint operating program with the ARRL Member Party (annual event), January 24th-25th. The week between these two outstanding activities has been designated as "ARRL Week" and President Bailey has consented to give us a special message (by radio from all ARRL OBS appointees including W1AW) to be transmitted throughout the week. Fraternalism, experimentation, traffic and several other aspects of our many-sided hobby are, we think, worthy of individual attention during this special week. The first of the year is a good time to look over activities and investigate new fields in addition to doing right by our current responsibilities. All members who are on the air should find enjoyment and new contacts in the Member Party which climaxes the week. See you there!

**Emergency Note.** W5IGO, in her Oklahoma Traffic Net Bulletin (No. 5), comments on recent Gulf Coast hurricane emergency operations. "Much traffic moved well outside the protected frequencies . . . an orchid to the amateurs (cited) for a job well done. . . . One lesson learned in the hurricane was that to put into practice the *best* plan, one needs *advance* planning, organization and tests as stressed in last *QST*. The *emergency-powered* stations in the storm area should aim to work with relatively near-by stations having power, so that QRN and QRM are of no practical consequence. These outlying stations should connect with appropriate outlets which means, of course, traffic nets such as O LZ. . . ."

**Join the AEC.** In affiliating oneself with the ARRL Emergency Corps we are supporting the public-service value of the amateur . . . providing additional evidence that our individual licenses are in the public interest, convenience and necessity. Each operator, regardless of the frequency band normally used, is needed in the Emergency Corps and is most cordially invited to subscribe to its principles. Aim to participate

through organized amateur radio in the event of communications breakdown. Assure familiarity with AEC principles and a place in its practical plans through membership. *Full* membership in AEC will be granted every station that can be active. *Supporting* membership is gladly extended where you subscribe in principle but have only limited time for AEC activity.

**Qualifying Runs Expanded.** W0CO has kindly arranged to transmit a prepared tape with the same text and at the same time as W1AW on the monthly runs, to aid in individual amateur qualification for 15-, 20-, 25-, 30- and 35-w.p.m. ARRL Code Proficiency Certificates. A first run (announced by radio) for November 12th was most successful and brought W0CO some well-deserved fan mail. Every amateur deserves to get for himself the concrete proof of continuing proficiency — and interest in higher proficiency — as evidenced by one of these certificates! See full announcement of current Code Proficiency schedules elsewhere in this issue. There are "fixed credits" in the Member Party for successfully getting our ARRL president's message; also for successful copy on a CP run. Patronize W0CO or W1AW on January 19th and get all that's coming to you.

**Honest Reporting.** All amateurs are invited to send a radiogram or letter requesting a copy of Operating Aid No. 3, comprising the RST definitions, and to use this faithfully in signal reporting. This is the best answer to the following comment recently received: "In keeping an overseas sked, I have used the R and S reports to advantage. Both operators have a pretty fair idea of the value of the circuit, and we pace our sending accordingly. . . . There is a school of thought which claims that hams will always try to flatter the guy at the other end and never give accurate reports. I even recall one fellow who got up a printed QSL card showing RST 599! Too often, even a T7 or T8 report is cause for a W to shudder and visualize FCC tickets descending on him. It is stupid to allow our individual reports to develop into meaningless flattery when they can be such excellent tools. What good is a language if everyone has a different meaning for the same word?"

On the same subject, W6ZNP says, "What I find written on some cards today as an excuse for

a signal report bothers me. What does a report like QSA5 R7 mean?" Hybrid use of Q code and the popular RST system is definitely confusing. Let us use the recognized definitions. Start a message for one of our RST Operating Aids cards today.

**DX Control — by DX Stations.** Simple procedure can control DX situations. W2TXB, ever pushing his countries score closer to the 100 mark, suggests a campaign to get the DX gang to listen and work fellows off their frequency. Two pointed examples are given in his letter:

(1) "The other morning CR9AN called CQ with QLM<sup>1</sup> after his identification. What a difference there was not to have all that bedlam on his frequency. (There were one or two jerks still there.) But after such a call, when the guys dash down to the low end of the band, *they will not all be on the same frequency.* In setting ECOs and approaching the band edge with due caution, they automatically spread out properly so any one can be worked with best chances of a good QSO!

(2) "CR4AX called CQ and when he stood by I never heard such a bedlam on his frequency. An LU landed him but long before he was through it started all over again. CR4AX said he was running 15 watts, and after hearing the mess he apparently gave up the battle for I never heard him again. The same happens when CR6AI is on."

These examples speak for themselves. But CR4AX, CR6AI and others can control this calling situation almost at will. Wherever appropriate and courteous disposition to exercise patience and off-frequency calling sense is *not* apparent, we recommend the use of *instructions* after the calls of all DX stations.

Here are the ARRL-recommended abbreviations: These follow either a CQ or any call concluding a QSO, when those stations, remote from the North American continent, are not shutting down (can be indicated by CL of course), and when other stations are welcome to call them to establish contact. Tell W-VE operators from what part of the band you intend to start tuning your receiver! Note how greatly this improves the efficiency of conducting contacts for all! Use the following:

HM — Will start to listen at *high*-frequency end of band and tune toward *middle* of band.

MH — Will start to listen in the *middle* of the band and tune toward the *high*-frequency end.

LM — Will start to listen at *low*-frequency end of band and tune toward *middle* of band.

ML — Will start to listen in the *middle* of the band and tune toward the *low*-frequency end.

Example: If the procedure will be to tune from the middle of the band to the high end, a CQ call should include: by c.w. — CQ DE CR9AN MH K; by voice — simply use the words for which the abbreviation MH stands.

<sup>1</sup> ARRL some years ago recommended use of QLM, QMH, etc. After official adoption of Q Code for military and general international purposes conflicting with these meanings, ARRL revised its recommendations to drop the Q.

**Addressing Traffic Correctly.** WINBS, in reporting on the ARRL Simulated Emergency Test (October), advises that the technique of work with message texts deserves much more discussion and attention at AEC meetings. Rough drafting, editing for conciseness, reexamining for clarity, compressing thoughts and insuring that the choice of words will convey the exact meaning desired, while remaining as free from phonetic arrangements that produce garbles when relayed by



"ADDRESS TRAFFIC CORRECTLY"

voice or telephoned at destination, require study and practice of radio handling! *In emergencies, addressing traffic correctly and completely* is extremely important. At originating points individuals should secure exact and complete addresses and not accept for transmission traffic for Smiths and Joneses in New York, Chicago or Los Angeles!

**Operator "Sines" vs. Nicknames.** In the course of a recent rag-chew an amateur asked us what was the difference between our operator "sine" and nickname. He had heard both. Our sine is FH, our nickname Ed. The operator sine is probably as old as message-handling tradition itself. It is that identity of an operator which he places with the handling data on the bottom of a message blank or transmits over the circuit to show *responsibility* when receipting for messages. Every real operator should have such an official radio signature. Nicknames are often used in familiar fashion in operator chats. A nickname *may* be taken into use as a sine. But these are too often duplicated. We have several Eds and Als on our staff. Where several fellows operate in the same station, group or community, distinctive operator signatures become essential. The sign or private signature for use on your radio circuit is traditional. Frequent use of sines and nicknames is fraternal and commendable.

— F. E. H.

## AFFILIATED-CLUB HONOR ROLL

*The following clubs are additions to the "ARRL Affiliated-Club Honor Roll" which appeared in the June, 1947, issue of QST, on page 72:*

Albany Amateur Radio Club, Albany, Georgia  
Amateur Radio Transmitting Society, Louisville, Kentucky  
Capital City Radio Club, Helena, Montana  
Conneaut Radio Club, Conneaut, Ohio  
CQ Radio Club, Torrington, Connecticut  
Delgado Radio Club, New Orleans, Louisiana  
Frankford Radio Club, Philadelphia, Pennsylvania  
Helix Amateur Radio Club, La Mesa, California  
Honolulu Amateur Radio Club, Honolulu, T. H.  
Houston Amateur Radio Club, Houston, Texas  
Huntington Radio Club, Huntington, West Virginia  
Intercity Amateur Radio Club, Irvington, New Jersey  
Kaw Valley Radio Club, Topeka, Kansas  
Kingsport Amateur Radio Club, Kingsport, Tennessee  
Main Line Radio Club, Philadelphia, Pennsylvania  
Mid-South Amateur Radio Association, Memphis, Tennessee  
Midway Amateur Radio Club, Kearney, Nebraska  
Mount Shasta Amateur Radio Club, Mount Shasta, California  
Newington Amateur Radio League, Newington, Connecticut  
Niagara Radio Club, Inc., Niagara Falls, New York  
Order of Brass Pounders, Chapter 3, Kansas City, Missouri  
Parkway Radio Association, West Roxbury, Massachusetts  
Skyways Amateur Radio Club, LaGrange, Georgia  
South Lyme Beer, Chowder and Propagation Society, South Lyme, Connecticut  
Southeast Radio Club, South Gate, California  
Sunrise Radio Club, Laurelton, L. I., New York  
T-9 Society, Ocean Grove, New Jersey  
Valley Radio Club of Eugene, Eugene, Oregon  
Wichita Amateur Radio Club, Wichita, Kansas

## CODE PRACTICE ON 28 MC.

The following amateurs are transmitting code practice on 28 Mc. in the ARRL Code Practice Program:

W2MGB, Metropolitan Amateur Radio Society of Brooklyn, N. Y., Preston C. Yeomans, activities manager, 1156 East 40th St., Brooklyn, N. Y., 28,400 kc., Tuesdays, 9:00 to 10:00 P.M. EST (3 to 15 w.p.m.).

W6UNE, George N. Calhoun, jr., 3220 Pueblo Ave., Los Angeles, Calif., 27,400 kc., Monday, Wednesday and Friday, 8:00 to 8:45 P.M. PST.

W6ZIG, Donald M. Burrill, 606A Eagle Ave., Alameda, Calif., 29,016 kc., Wednesdays, 6:30 to 7:30 P.M. PST.

W8KQE, Marvin L. Sliker, R.D. 3, Bedford, Ohio, 28,792 kc., Monday and Tuesday, 11:30 to 12:00 noon, Thursday and Friday, midnight to 12:30 A.M. EST.

W9ASN, Charles J. Stevenson, 704 S. 20th St., Mt. Vernon, Illinois, 28,880 kc., Wednesday and Friday, 7:00 to 8:00 P.M. CST.

Additional volunteers are needed to send code

practice by radio. Schedules may be arranged to suit your convenience. Suggestions for conducting code lessons are available from the Communications Department. A combination of voice and code transmissions is most effective. If you are operating on 28 Mc. and would like to help in the ARRL Code Practice Program, drop us a postal indicating your interest and we'll send further details.

Those using the available practice are urged to correspond with the amateurs making the transmissions so that those who give this useful service may plan their lessons best to aid their listeners.

## W.A.V.E. CERTIFICATE AWARD

Back in 1939, the Canadian Amateur Radio Operators' Association (affiliated with ARRL) sponsored the W.A.V.E. award. Up to the time of The Great Silence, no one submitted proof of working all VE provinces according to the rules which state that *two* different stations in each province must be worked on *two* different bands! Three awards since have been won. Ex-W9VKF, now W1VG, was recipient of the Number 1 certificate while a resident of Peoria, Illinois. "Pete" is now hot after his next one from W1! Here are the rules:

- 1) The applicant shall submit proof of contact with two different stations in each province, contacts being made on two different bands. Yukon and Northwest Territories shall be considered a part of British Columbia.
- 2) All contacts must be made on or after January 1, 1939.
- 3) Applicants residing in territory designated by the prefix VE or W shall make all contacts from within one state or province.

A handsome certificate will be awarded for this accomplishment. Submit QSL cards as proof to C.A.R.O.A. Headquarters, 46 St. George Street, Toronto 5, Ontario.

## FLORIDA FLOOD EMERGENCY

The Tropical Radio Club, Miami, Fla., was on its toes during the floods which resulted from the two hurricanes that swept through the Miami area during the month of September. When the American Red Cross called for volunteer hams to man their equipment, 21 operators responded.

The Red Cross had an ART-13 transmitter at its main headquarters in downtown Miami with mobile units stationed in the flooded areas of Hialeah and Opa-Locka. The OMs and YLs of the Tropical Club operated on a 24-hour basis for a week and furnished the only communications available to the Red Cross for their vital emergency work in the Miami area. Those taking part included: W2HLI/4, W3LFM/4, W4s AI, ANY, BN, DUW, ECV, HBF, IEH, ITE, JAS, JDQ, KHI, KKD, KMM, KPT, LXZ, MEW, MKP and W0YTI/4.

## 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, 7210, 14,150, 28,060 and 52,000 kc. (voice — 3950, 14,280, 52,000 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 kc. 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 Monday, January 19th.

**General Operation:** W1AW engages in two-way work with amateurs, as follows:

*Monday through Friday, all times EST —*

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. ....	7210-kc. c.w.
7:30 P.M.—8:00 P.M.* .....	3555/7210-kc. c.w.
9:30 P.M.—10:00 P.M. ....	3555-kc. c.w.
12:15 A.M.—1:00 A.M. (Tues. through Sat.) ...	7210-kc. c.w.

*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. ....	7210-kc. c.w.
6:00 P.M.—7:00 P.M. ....	3850—4000-kc. voice
7:00 P.M.—8:00 P.M. ....	7210-kc. c.w.

The station staff:

R. H. Newkirk, W9BRD, "rod"

T. F. McMullen, jr., W5YCK, "fm"

W1AW is not open on national holidays.

\* Traffic schedules are kept during this period.

### BRIEF

The call W8PUN, Ohio PAM, was inadvertently omitted from the list of policing-observing stations who assisted in the clearing of frequencies during the September hurricane emergency as described in December 1947 *QST*

## 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 January 19th at 10:00 P.M. EST. Identical texts will be transmitted simultaneously from W1AW and W0CO of Wayzata, Minnesota. Frequencies of transmission from W0CO will be 7053 kc. and 3534 kc. W1AW will transmit on the same frequencies as those used for code practice. Either station may be copied. Send your copies of the qualifying run to ARRL for grading, indicating whether you copied W0CO 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 November <i>QST</i> :
Jan. 2nd:	<i>Four-Twenty Is Fun!</i> , p. 13
Jan. 5th:	<i>Audio Filters for the Speech Amplifier</i> , p. 17
Jan. 7th:	<i>Bamboo Poles for Beam Elements</i> , p. 24
Jan. 13th:	<i>A Projection-Type Beam Direction Indicator</i> , p. 27
Jan. 15th:	<i>Put That Beam Up To Stay</i> , p. 28
Jan. 19th:	Qualifying Run, 10:00 P.M. EST
Jan. 21st:	<i>Atlantic City Report</i> , p. 32
Jan. 23rd:	<i>Better N.F.M. Reception with A.M. Receivers</i> , p. 38
Jan. 27th:	<i>V.H.F. Crystal Oscillators</i> , p. 44
Jan. 29th:	"Listen, Oscar . . .", p. 47

## A.R.R.L. ACTIVITIES CALENDAR

Jan. 17th: V.H.F. Sweepstakes  
 Jan. 19th: CP Qualifying Run  
 Jan. 23rd: Frequency-Measuring Test  
 Jan. 24th—25th: ARRL-Member Party  
 Feb. 13th—16th: DX Competition (c.w.)  
 Feb. 19th: CP Qualifying Run  
 Feb. 20th—23rd: DX Competition ('phone)  
 Mar. 12th—15th: DX Competition (c.w.)  
 Mar. 17th: CP Qualifying Run  
 Mar. 19th—22nd: DX Competition ('phone)  
 Apr. 13th, May 14th: CP Qualifying Runs  
 April 24th—25th: CD QSO Party  
 June 12th—13th: ARRL Field Day

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.)

## BRASS POUNDERS LEAGUE

(October Traffic)

Call	Orig.	Del.	Rel.	Extra Del. Credit	Total
W6MLZ	21	9	1035	-	1065
W1AW	62	421	174	264	921
W2TYU	14	23	666	9	712
W6IOX*	2	28	584	26	640
W8SAY	54	481	43	31	609
W5MN	5	104	382	104	595
W6WNI	12	33	460	31	536
W2CGG*	12	58	392	55	517
W6IOX	2	8	493	8	511

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

W1INF, 330	W1FBJ, 147
W1NJM, 286	W1BDI, 138
W4PL, 159	W6CMN, 106

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."

\* September Traffic.

### TRAFFIC TOPICS

There has been some confusion with the signals QSV, "Send a series of Vs," and QRV, "I am ready." We might suggest that during lulls in net operation, it would be helpful to practise using the net QN signals and other Q signals that apply to net operation.

Trunk Line L is in operation on 3615 kc., Monday through Friday, at 10:00 P.M. EST. TLL will be a trancon, when filled with necessary stations, and now takes traffic for New York, Pennsylvania, Ohio, Indiana, Illinois and Missouri. The trunk manager is W2ITX.

The East Pa. Traffic Net is meeting at 6:30 P.M. EST, Monday through Friday, on 3785 kc. New stations are needed for greater coverage. Contact W3GMK, net manager.

The Veterans Administration hospitals in the Kentucky area have a fine traffic outlet through the Kentucky nets, KYN and KYP, according to information received from W4BAZ, RM for Kentucky.

W4VP and W7KAJ/6 are attempting to form a net of stations located in the veterans rehabilitation hospitals. Anyone in these hospitals who would like to participate should contact either of these men.

National Trunk Line is back on the air on 3670 kc. at 9:00 P.M. EST, Monday through Friday, with a second period at 11:00 P.M. EST. W1AW is net control station. The NTL connects all operating trunk lines for traffic exchange.

The Pine Tree Net up in the Maine country is operating on 3550 kc. at 7:00 P.M. EST, Monday through Friday. The PTN has connections into TLC, NEN, and VE1, 2, 3.

The Alberta Net is now in the organizational stage and is looking for members. All stations in that province, who might be interested, are requested to contact VE6LQ.

The Minnesota State Net (c.w.), MSN, is operating Monday through Saturday on 3795 kc. at 7:00 P.M. CST. The Minnesota State Net (phone), MSN, is operating on 3900 kc. at 6:15 P.M. CST, Monday through Saturday, and at 9:00 A.M. CST Sundays.

Trunk Line J has been in operation with a direct connection from Wisconsin to Florida. The trunk operates on 3780 kc. at 7:00 P.M. CST, Tuesday, Thursday, and Saturday, and will assume a full five-day schedule soon.

The North Texas Traffic Net is operating Monday, Wednesday and Friday on 3657.5 kc. at 8:00 P.M. CST. This net is a combined traffic and emergency group.

Iowa 75 Phone Net is operating at 12:30 P.M. CST, Monday through Saturday, on 3970 kc. The net has good coverage throughout the state and ties in with the Iowa National Guard during emergency.

The North Carolina Net is in full swing on 3605 kc. with W4CYB as NCS. The net meets at 7:30 P.M. EST, Monday through Friday. All North Carolina amateurs are cordially invited to join.

The Ontario Fone Net is operating nightly, Monday through Friday, at 7:00 P.M. EST, on 3850 kc.

### SUPPLEMENT TO DIRECTORY OF ACTIVE NETS

This listing is to be added to the directory as published in November 1947 *QST*. Supplements will be published at intervals to keep the directory up to date on all net listings and changes.

Beaver Net	3535	7:00 P.M. EST Mon.-Fri.
Buckeye Net (Ohio)*	3730	7:30 P.M. EST Mon.-Fri.
Cracker Emer. Net (Ga.)	3995	Wed. & Sun.
Delta Fone Net	3905	7:30 A.M. CST Sun.
East Pa. Traffic Net	3785	6:30, 7:30 P.M. EST Mon.-Fri.
Eastern Mass. Net	3745	7:00 P.M. EST Mon.-Fri.
Florida Emergency Net	3675	
ILN (Illinois)	3765	6:15 P.M. CST Mon.-Fri.
Indiana C.W. Net	3656	6:30 P.M. CST Mon.-Fri.
Indiana Fone Net	3905	6:30 P.M. CST Tues., Thurs.
Iowa 75 Phone Net	3970	12:30 P.M. CST Mon.-Sat.
Kansas Traffic Net	3610	6:45 P.M. CST Mon., Wed., Fri.
KYN (Kentucky)	3810	9:30 P.M. CST Mon., Wed., Fri.

KYP (Kentucky)	3955	7:00 A.M. CST Mon.-Fri.
Louisiana Section Net	3635	Mon.-Fri.
Minn. State C.W. Net	3795	7:00 P.M. CST Mon.-Fri.
Minn. State Phone Net	3900	6:15 P.M. CST Mon.-Sat.
Michigan Emergency Net	3540	9:00 A.M. EST Sun.
Missouri Traffic Net	3775	7:00 P.M. CST Mon.-Fri.
National Trunk Line <sup>1</sup>	3670	9:00 P.M. EST Mon.-Fri.
Nevada State Net	3660	
North Carolina Net	3605	7:30 P.M. EST Mon.-Fri.
North Texas Traffic Net	3657	8:00 P.M. CST Mon., Wed., Fri.
NTE-Net (North Central Texas)	3930	8:00 A.M. CST Sun.
NYC-LI Net	3710	7:00 P.M. EST Mon.-Fri.
NYS Traffic and Emergency Net	3720	7:00 P.M. EST Mon., Fri.
Ohio EC Net (c.w.)	3725	8:30 P.M. EST Mon.
Ohio Emergency Net	3860	6:30 P.M. EST Thurs.
Ohio River Net	3860	8:00 A.M. EST Sun.
Ontario Fone Net	3815	7:00 P.M. EST Mon.-Fri.
Pine Tree Net	3550	7:00 P.M. EST Mon.-Fri.
QIN (Indiana)	3656	6:30 P.M. CST Mon.-Fri.
QMW (Midwest Net)	3565	7:30 P.M. CST Mon.-Fri.
Rebel Net <sup>2</sup>	3635	7:30 P.M. CST Mon.-Fri.
Rhode Island Traffic Net	3540	7:00 P.M. EST Mon.-Fri.
Sea Gull Net (Maine)	3960	5:00 P.M. EST Mon.-Fri.
South Dakota Section Net	3720	8:00 P.M. CST Mon., Wed., Fri.
Southern California Net *	3765	8:00 P.M. PST Mon.-Fri.
Southern New Jersey Net *	3700	8:00 P.M. EST Mon., Wed., Fri.
Tall Corn Net (Iowa)	3660	6:45 P.M. CST Mon.-Fri.
Tri-State Emergency Net (Miss., La., Ark.)	3870	
Trunk Line "L" <sup>3</sup>	3615	10:00 P.M. EST Mon.-Fri.
West Pa. ORS Net	3750	6:30 P.M. EST Mon.-Fri.
Wisconsin State Net	3775	6:30 P.M. CST Mon.-Fri.

\* Change in listing.

<sup>1</sup> TLC, TLL, TLJ, Ohio, Mich., Rebel, TLAP, Wis., QMW.

<sup>2</sup> Tex., Ark., Miss., Okla., La., Fla., Tenn., Ga., Ala.

<sup>3</sup> N. Y., NTL, Ohio, Pa. Ill.

## OCTOBER CD QSO PARTY

The October CD QSO Party was one of the liveliest such activities on record. Observation during the shindig indicated that the gang was really going to town, but the number of high scores that turned up at Headquarters following the week-end of October 27th simply amazed us! Totals of more than 200,000 points were made by 41 participants. Favorable transmission conditions prevailing during the party helped considerably in making possible such high scores.

Top position was snagged again by W4KFC. Vic took just 2 hours and 14 minutes to make the first 100 contacts; his first hour of operation netted 47 QSOs and the second 45! Worthy of note is the average of 21.6 QSOs per hour he maintained during the entire 20 hours on the air. W8ROX, a consistent high scorer in the last few parties, took a well-deserved second place. W4IA, who needs no introduction to the CD gang after his many years of activity as WIUE and the League's ACM, went all out and took third honors.

The next CD get-together will run concurrently with the ARRL Member QSO Party, January 24th-25th, and the additional number of stations on the air should provide opportunity for many record-breaking scores. Don't miss it!

## CLAIMED SCORES (C.W.)

Station	Score	Contacts	Different Stations	Sections
W4KFC	662,055	431	251	52
W8ROX	470,340	345	221	47
W4IA	437,540	328	212	50
W2PWP	401,600	320	202	49
W2OXX	375,240	312	189	47
W0BQJ	373,500	300	197	52
W9RQM	370,090	305	193	45
W4TWI	364,620	303	190	46
W4RQR	363,440	302	189	47
W6WNI	355,122	218	132	49
W1EOB	354,000	289	192	48
W9WFS	350,370	300	185	44
W2AYJ	345,345	293	189	42
W1KQY	342,810	287	188	46
W1BFT	342,510	288	185	48
W1TS	336,540	278	190	47
W3FUF	327,365	281	185	48
W1OJM	307,470	271	177	45
W0VEE	303,480	275	173	43
W4BZE	300,775	259	183	44
W1IC	293,210	263	177	41
W1AFB	266,430	249	165	49
W2EWK	258,285	251	161	41
W8DAE	257,275	245	161	44
W1FTX	242,320	222	166	47
W3MTQ	241,390	239	160	42
W5LUY	239,400	222	165	45
W9FKI	225,680	242	143	39
W6BIP	225,266	148	114	49
VE7ABU	224,595	155	116	45
W8JM	224,070	225	153	41
W6MHF	222,750	150	116	49
W8YDR	221,325	227	154	41
W9BGC	219,420	207	169	43
W1NJM	210,790	208	154	43
VE3EF	206,635	215	146	41
W1LHE	205,660	220	148	34
W2ANG	205,440	214	153	39
W9NH	204,045	217	144	39
W3EIS	203,670	213	145	41
W3NF/2	200,625	209	145	42

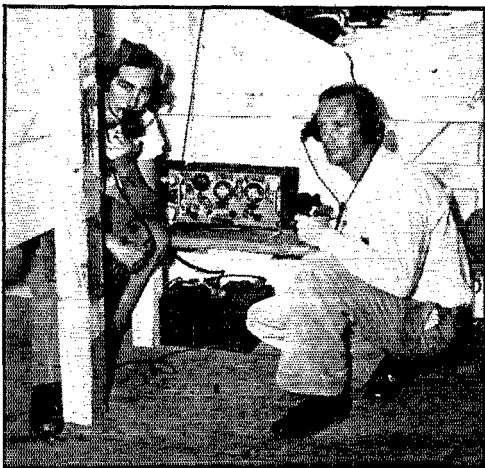
Others with scores over 150,000: W3FPQ 197,685, W1VG 192,035, W9SRN 188,940, W1AQE 185,400, W8EBJ 184,800, W9LFK 171,125, W1BIH 170,145, W2LFR 155,750, W2GVZ 154,800, W6CMN 153,549, W4KXE 151,690.



Here's the shack of George Sangrik, W8ROX, ORS and second-high in the October CD QSO Party. The transmitter consists of a Meissner Signal Shifter and p.p. 250THs running at 250 watts input. Receiver is an NC-200. George is hard at work on a p.p. 250TH amplifier for use in future CD Parties! W8ROX also holds WAS, WAC, 35-w.p.m. Code Proficiency Certificate and is a member of the AEC and RCC.

## A.E.C. ASSISTS AT BOAT RACES

The Boulder City Emergency Corps, under the leadership of W7OPP, EC of Boulder City, Nev., furnished communications for the Second Annual Lake Mead Sweepstakes, September 27th and 28th. The Sweepstakes, an annual power-boat race on Lake Mead, sponsored by the American Power Boat Association and the Boulder City Junior Chamber of Commerce, comprised 28 races this year, and, in the limited time allowed for the running of each event, amateur radio proved of great value to the officials.



Hanley, W7OOR (left), and Wilson, W7OPP, at the boat pit, operating portable on 235 Mc. during the Second Annual Lake Mead Sweepstakes.

Six portable transmitters were used on 235 Mc., three of which were installed in crash boats located along the race course, one in the judges' stand, and one at the boat pit. At the boat pit another rig on 3.5 Mc. was used to supply communication with Boulder City. The race officials found the convenience of radio communication a big help in smoothly running off the numerous events.

It appears that this event will provide a yearly workout for the Boulder City AEC group as it offers an opportunity to render a public service as well as a chance to test emergency equipment. The following amateurs took part in the activity: W7JU, W7HJZ, W7JLN, W7LGS, W7OOR, W7OPP, W7SXD and W7TKV.

## FREQUENCY-MEASURING TEST

January 23rd

W1AW will transmit signals for purposes of frequency measurement on 3.5, 7, 14 and 28 Mc. starting at 9:30 P.M. EST (6:30 P.M. PST), Friday evening, January 23rd. The signals will consist of dashes interspersed with station identification. They will follow a general message sent to enable

listeners to locate the signals before the measurement transmission starts. The approximate frequencies used will be 3760, 7085, 14,310 and 28,010 kc. About 4½ minutes will be allowed for measuring each frequency, with long dashes for measurement starting about 9:36 P.M. It is suggested that frequencies be measured in the order listed. Transmissions will be found within 5 or 10 kc. of the suggested frequencies.

At midnight EST (9:00 P.M. PST) W1AW will transmit a second series of signals for the Frequency Measuring Test. The identifying procedure and recommended order of measurement will be the same as for the first test. Approximate frequencies used will be 3640, 7140, 14,395 and 28,030 kc.

Individual reports on results will be sent ARRL members who take part. Copies of this report are sent SCMs so eligibility for OO appointments is known to the SCM. When the average accuracy reported shows errors less than 71.43 parts per million, or falling between limits of 71.43 and 357.15 parts per million, the participants will become eligible for appointment by SCMs as Class I or Class II Official Observers, respectively. It is only necessary that the individual amateurs have the interest and other qualifications for carrying forward in such League organization posts.

This ARRL Frequency Measuring Test will be used to aid qualification of Class I and Class II Observers. Observers not demonstrating the requisite average accuracy will lose their appointments until they demonstrate the above-stated minimum required accuracy for these classes of the appointment. It is required that all Class I and Class II OOs participate in at least two of the Frequency Measuring Tests to be announced during 1948.

## Awards

All League members (and only members) who take part and who are not connected with the Official Observing system, will compete for an electric-clock award by submitting their best measurements on the FMT. It will be presented to the member whose readings show the highest accuracy. A second electric-clock award will be presented to the leading Class I Official Observer. To be considered for the clock award it is necessary to attach a statement that you, alone, as operator, handled your equipment in making the readings submitted to the Communications Department of the League.

All participants may submit frequency measurements on one or all frequencies listed above, all awards depending on the over-all accuracy, as compared with readings submitted by an independent professional frequency-measuring organization. An award committee will examine results to insure fairness to all, and its decisions shall be final.



## DX CENTURY CLUB

Since the institution of the new DXCC listing many comments, pro and con, have been received. It is expected that a complete listing of all members, including scores, will be published periodically. The first complete list is tentatively scheduled for April *QST*. Send your additional cards for checking as soon as possible, so the list may be as complete as possible.

Applications for DXCC are rapidly increasing. At publication time, certificate Number 81 had been issued.

### DX CENTURY CLUB AWARDS

DXCC certificates based on postwar contacts with 100-or-more countries have been made 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.....	173	W2BXA.....	144
W8HGW.....	161	W1CH.....	141
W4BPD.....	155	W1TW.....	141
W3BES.....	147	W1AXA.....	140
WBRDZ.....	145	W2GWE.....	131

#### NEW MEMBERS

W6QJU.....	120	W3BXE.....	100
NY4CM.....	114	W3GHD.....	100
W3DRD.....	104	G8KP.....	100
W6KRI.....	104	W8CVU.....	100
W3RCQ.....	103	W9GKS.....	100
W4DKA.....	103	W6SN.....	100
W3TIF.....	102	W6TI.....	100
W6NTA.....	102	W8FGX.....	100
W9KOK.....	101	W9RRU.....	100
W8HRV.....	101		

#### ENDORSEMENTS

W1ADM.....	125	W3KT.....	116
W2GUM.....	121	W9RBI.....	112
W8ASG.....	121		

#### RADIOTELEPHONE

W1FH.....	128	W2ZW.....	102
W1HKK.....	110	W1JCX.....	100
W4CYU.....	109		

### TRAINING AIDS

*Code Lessons on Tape.* Responsive to demand, the code lessons which appear in the rear pages of the ARRL booklet *Learning the Radiotelegraph Code* have been put on paper tape suitable for use on any inked-tape type keyer, such as the TG-10. These tapes are available for use of affiliated clubs (with or without keyer) on a temporary loan basis. The code lessons are also available in mimeographed form if desired.

*Code Training Aids.* The list below includes all code-proficiency equipment and material which can be borrowed by affiliated clubs by appropriate application. Drop us a line for complete rules and application forms.

#### Code Records (78 r.p.m.):

*TA1.* Album I. 9 records, 18 sides. Introduction and practice in all letters and the numerals 4 and 5.

*TA2.* Album II. 8 records, 16 sides. Introduction of numerals and practice in all letters and numerals. Speed tests at 6, 8 and 10 w.p.m.

#### Recorders and Keyers:

*TA3.* Recorder, McElroy SR900 SL990. Audio tone input and tape puller are necessary auxiliaries. Records code signals on 3/4" white paper tape.

*TA4.* Tape puller, to accompany TA3 if required.

*TA5.* Keyer, TG-10. Produces keyed audio tone from inked paper tape. Speed dial calibrated in feet-per-minute and words-per-minute. W.p.m. calibration useful only when ARRL "calibrated" tapes are used (see "TP" items below).

*TA6.* Recorder, BC-1016. Records code signals on 3/4" white paper tape. No tape puller or audio tone required.

#### Tapes:

*TP1.* W1AW code practice, inked copy, calibrated.

*TP2.* Code groups, scrambled text, plain text with punctuation. Inked tape, calibrated.

*TP3.* Old W1AW qualifying run, inked copy, calibrated.

*TP4.* W1AW code practice, inked copy, recorded for slow speeds (below 9 w.p.m.) on TA5

*TP5.* Same as TP2, but recorded for speeds below 9 w.p.m. on TA5.

*TP6.* Kleinschmidt perforated tape, W1AW code practice. This tape cannot be used on TA5.

*TP7.* Code lessons 2 and 3 from *Learning the Radiotelegraph Code*. Recorded for slow speeds on TA5.

*TP8.* Same as TP7, Lessons 4 and 5.

*TP9.* Same as TP7, Lessons 6, 7, 8 and 9.

Complete mimeographed lists and rules can be had by writing or radioing to ARRL Training Aids. Our aids now include films, film strips, slides, records, recorders, keyers, tapes, reviews and sundry mimeographed and printed material.

Work is progressing on some original film strips and slide collections. New code tapes will be added as needed. Film reviews will be continued in the near future. We would like to hear from clubs with ideas.

### BRIEF

The Illinois Central Railroad has awarded gold medals to W5EWD, W5FCH and W5NRW for meritorious service during the September 1947 hurricane which struck Mississippi. These amateurs handled the entire volume of the railroad's train orders between I.C.R.R. division headquarters at McComb, Miss., New Orleans, and Baton Rouge, La. W5NRW is a train dispatcher for the I.C.R.R.

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With Code Proficiency copies arriving at Hq. each month following the qualifying run we usually receive several notes expressing thanks for the practice transmissions made from W1AW each weekday evening. One such note recently received points out what are perhaps two of the most important advantages of these transmissions. A former commercial op, brushing up on his code speed, writes, "After copying W1AW, I can say there is more real practice in ten minutes of c.w. on amateur frequencies than there is in hours of copying interference-free S9 commercial signals." The W1AW practice transmissions, or any other clean-out sending at suitable speeds in the amateur bands, provide excellent practice not merely in copying code, but in copying through varying degrees of interference and at various signal-strength levels — the best practical experience for any kind of radio operating.

• 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 — The York Road Radio Club held a very successful banquet at which there were many prizes for the lucky winners and plenty to eat. Rumor hath it that blood hounds will be standard equipment in the 144-Mc. transmitter hunts held by the YRRC. KT now is W3 QSL Manager and is being assisted in his work by members of the Frankford Radio Club. The FRC and the Coventry Amateur Radio Society have been holding over-the-air joint club meetings which are being received with great enthusiasm on both sides of the Atlantic. They believe that this is the first such venture. HBV nearly had to leave his happy home. It seems that he put his beam right through his roof for convenience in rotating from his shack in the attic and was not careful in making it water tight. The rains came and water ran down the pipe and on the top side of the ceiling of the room where HBV junior sleeps. The most convenient hole for the water to run out was the one where the electrical fixture was hung, the said fixture being of the inverted bowl type supported by three chains. These chains were designed to hold the bowl only, and no allowance was made for the couple of quarts of rain water. You probably have guessed the rest. The chain broke and at 3 o'clock in the morning spilled a lot of very chilly water into the face of HBV junior. Let it be a lesson. NNV now has his BC-610 perking on 28, 904 kc. The Schuylkill ARC will get the use of a recorder and tape machine from ARRL. GHD's beam atop his 60-foot mast is working super DX on 14 Mc. DZ had a time in the CD Party, his first. ELI is interested in frequency measuring and u.h.f. FPW has a new jr. operator. Congrats, OM. CAU reported three stations out of band this month. QEW says the E. Pa. Net is going full blast. Stations are needed in Allentown, York, and Harrisburg. Traffic: (Sept.) W3QP 13, BES 2, (Oct.) W3QEW 76, VMF 39, ELI 38, OML 17, QP 17, GHD 9, EU 8, HCT 6, FPW 5, DZ 4, NNV 3, CAU 2.

**MARYLAND-DELAWARE-DISTRICT OF COLUMBIA** — SCM, Eppa W. Darne, W3BWT — The Washington Area Emergency Corps, under the leadership of EIS, Area Coördinator, is to be congratulated on its splendid performance during the Simulated Emergency Test, Oct. 12. The Washington Radio Club's first October meeting was "Receiver Night." Four speakers, Messrs. McClenon, Emerson, Maiden, and Young gave good lectures and answered all the gang's questions. The second October meeting featured an equipment auction in which much apparatus changed hands, and the club treasury benefited to the "tune" of ten per cent on each transaction. MHW and FVD functioned as auctioneers. Plans were discussed for the club's sponsoring of an Atlantic Division Convention, which it is proposed be held in Washington next June. The Capitol Key and Mike Club of Washington recently received its Charter as an affiliated club from the League. The Baltimore Amateur Radio Communications Society has elected new officers for the coming season: JVI, pres.; VP, vice-pres.; LUE, treas.; MUU, secy. EQK heads the club's publicity committee, and VT has been appointed Emergency Coördinator for the Baltimore area. 8YCK/3, Washington Area Assistant Coördinator, has joined the League Staff at Hartford. We will miss KBX a lot when he moves to Pennsylvania in December. KHJ also is missed by the gang. He is located in Texas, and made WAS just before moving. EIS

and MTQ are newly-appointed ORS. 2NDL/3 is on 14-, 7-, and 3.5-Mc. c.w., and is very active in traffic work. MIB is on 3.85-Mc. 'phone, and also can work 14 Mc. AQV is on 3.85- and 14-Mc. 'phone. CDQ has a new Stancor 125-watt rig on the air. DRD has a new two-element rotary on 14 Mc., is DX Century Club No. 63, and has worked 149 countries. AKR is new ORS and is using VFO. EFZ will have WAC as soon as he gets Africa confirmation. MJQ worked 27 stations in one hour during recent CD Party. ECP has new 28-Mc. 'phone/c.w. rig, also new 144-Mc. receiver and transmitter ready to go. "What-a-man Van" leads the section in traffic this month. BKZ has 103 countries worked. ISF is busy with school work, but manages to be on Section Net. DQU now is 6UCK. MGD is mostly on 7 Mc., often 3.5 Mc., using 25 watts, and gets out nicely. IUC gets out swell with his four-element wide-spaced beam. NIH has new RME VHF-152 used with HQ-129X and has raised his power to 150 watts. JCS has his beam up again. EQK has worked 57 countries on 14-Mc. 'phone. PV fished a whole week at Atlantic City but caught none. Roland does better "fishing on the air" and catches plenty with that nice signal he puts out on 3.5-, 14-, and 28-Mc. 'phone. NL, PUC, KRN, and NDT, assisted by KBE, EWH, MDL, and 8FUE/3, spent week end of Oct. 4th at Shenandoah National Park, operating portable 28-Mc. gear. GM8CH and W7OT were among the many nice contacts made. MTQ schedules ZLBQ on 14 Mc. Traffic: W3ECP 217, W2NDL/3 173, AKB 136, KHJ 79, BWT 78, ISF 41, MJQ 29, PV 19, QL 16, EQK 13, BKZ 9, EFZ 8, JJD 8, AKR 7, MTQ 7, USN 7, DRD 4, KBX 4.

**SOUTHERN NEW JERSEY** — SCM, G. W. (Bill) Tunnell, W2OXX — Whis home from the hospital and will operate a bedside rig while recuperating. SAK has a war surplus rig for emergency work. CFB is back on the air. 3NF/2 is ORS in Phillipsburg and schedules his brother, 1NJM, weekly. SJRA had a record turnout to hear IOP and 3QV speak. VMX is going to school and will operate TRN. HAZ is working on new antenna. BAY gets out with his five-watter on 3.5 Mc. ZI has 46 countries toward his postwar DXCC. ORS is in a 7-Mc. net. SXX and RPH are assisting RG as Net Control Station. BEI is active in the 'phone net. UNT reports for the HTRA and says the October picnic was a success resulting in a mad scramble for SCR-522s by RLY, SVV, ASQ, QUE, VJI, GSP, UNT, and OYL. HCARA now is affiliated with ARRL. CYI was very active at the ITC Conference in Atlantic City. TKO is seeking radio and radar personnel for the National Guard. CD Party turnout was gratifying. New appointments are SUG, 3NF/2, SAI, PWP. Roses to SUG for the nice traffic total. AEW has moved to Audubon. Many appointments are overdue for endorsement. Don't forget to send yours in. If each one of you will mention just one event or activity in your locality on a post card each month I will not have to waste space with these appeals. Traffic: W2SUG 67, SXX 48, RG 35, 3NF/2 22, BEI 20, RPH 19, ORS 18, OXX 17, ZI 8, HAZ 2, RXL 2, BAY 1, CFB 1.

**WESTERN PENNSYLVANIA** — SCM, Ernest J. Hlinsky, W3KWL — This month's congrats go to NAV, Coke Center Radio Club, Connelville, for a job well done at the Pennsylvania Week Industrial Fair. 3.85-Mc. 'phone and 7-Mc. c.w. kept the boys busy for three days. For this noble support let's thank LDS, LFS, PFU, 9DPI, 8MEG, 9BKJ, and KPP. Down Altoona way the boys are going "hawg wild" on 144 Mc. Nine SCR-522s are active, with MYN, LJQ, MBB, RFM, and KQD starting the ball rolling. Altoona net frequency is 145.26 Mc. In Pittsburgh the ATA of Western Pennsylvania meets the first Friday of each month at Buhl Planetarium, North Side, Pittsburgh, at 8:30 p.m. An invitation is extended to anyone interested in ham radio. Officers of ATA are: NUG, pres.; SWX, AER, UST, and PY, vice-pres.; UHN, secy.; KYK, asst. secy.; UL, treas.; directors, KWA, BSO, OB, and KSP. Another radio club going great guns is the WESCO Amateur Radio Society of Greensburg with KQU, pres.; GRZ, 1st vice-pres.; LWD, 2nd vice-pres.; LEJ, secy.-treas. Amateurs from Greensburg, Irwin, Jeannette, Latrobe, Ligonier, Young-



(Number one hundred sixty-six of a series)

# Merry Christmas

AND

# Happy New Year

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John Stanley.....	W1LFF	Clyde Schryver.....	W0RPE

★ For many years it was our custom each year to buy National Tuberculosis Society Christmas Seals and have *QST* stick one on this page in each copy of the January issue. But this year, like the last couple of years, there seem to be more important jobs for girls to do than licking 97,000 stamps! We are making our contribution in the same amount as if we had bought the Christmas Seals, and the printed reproduction above is a symbol of the stamp we wish were there.



wood, and Manor have joined this bang-up club. An invitation also is extended to those interested in attending. YDJ sends in some juicy items. The 3.5-Mc. AEC registrants in Pittsburgh are organizing a practice net with Sunday morning drills. Polecat Net operation is on 3665 or 3650 kc. YDJ will act as NCS. MTT, KGR, and MGB are toying with 144 Mc. DGL and UHN are using Sonar mobile n.f.m. in cars on 28 Mc. MGB has Millen VHF exciter. LGM is VFO on 28 Mc. GEG and LJQ are new ORS. KEW is rebuilding to Tabletop kw. rlg. TKU is QRL in Michigan. CB is tickled with VR QSL. MLN and HFV made new 12 $\frac{1}{2}$  mile record on 1215 Mc. WAN has 813 final. QN reports emergency drills each Monday at 7 p.m. NCJ finally got those p.p. 813s going. VV and LOD are Bradford's 144 Mc. hounds. AER says his emergency 3.85-Mc. 'phone, 3.5-Mc. c.w. thirty-watt battery-operated rig works FB. Traffic: W3KWL 146, TOJ 115, YA 61, AER 38, MHE 36, LOD 22, LKWL 12, LJQ 10, NCJ 6, LWN 2, MOT 2, QN 2.

## CENTRAL DIVISION

**ILLINOIS** — SCM, Wesley E. Marriner, W9AND — From DJT we learn that the Western Illinois Club at Quincy elected TMI, pres.; AEX, vice-pres.; GQB, secy.; KDO, treas. A picnic was held at AEX's camp on Oct. 12th. HUX, of Beardstown, is back on the air looking for some of the old gang. His frequency is 7110 kc. Members of the Illinois Valley Radio Association are: OBB, HIK, LIQ, IQC, PSY, WOO, ZHB, OLM, WFFV, QKL, ACJ, YIF, IZY, DLO, OWT, JVC, DXY, PBY, BSG, and RRH. FNR is doing a little 14-Mc. narrow-band f.m., but mostly 14-Mc. c.w. DX. IVU has new HT-9 rig and u.h.f. 28-Mc. beam on the way. RUK is having power supply trouble. From Alton comes a card signed, "A Listener." He states there are two hams in Alton who have worked over 100 countries postwar. One has 149. Send in your total and call. MUX has moved to W5 Land. His call now is 5N1Y, Jasper, Tex. HQH is waiting for FMT results. TAL is setting up a SCR-522 on 144 Mc. The Illinois Valley Radio Assn. is affiliating with the ARRL. JVC ran into some trouble trying to convert a 459A into a transmitter. IQC is busy building a new rig. IZY has purchased a new rig. OBB is joining the ranks of the benedicts. YIF is busy with a YL now, and it seems radio has lost out on the deal. OLM still is rolling them in on his HRO. HAB, UWL, BJE, and EHL attended Mt. Vernon Hamfest. Most of the Centralians have 522 outfits ordered. QLJ has built a telescoping mast 30 to 60 ft. to be operated by motor from shack. ULA, Evansville, Ind., worked FJT's brother Pete on 50 Mc. His call is UWL. He is at WCIL, at Carbondale, and had a pair of VT-127s with 1 kw. on the QSO. FJI won the NC-173 receiver at the Peoria Hamfest. DLV has a 654 in his car with little dipole on top of car. EPD, who is moving to Owensboro, Ky., was given a farewell party by Centralians. The following amateurs of the Quad City area participated in the simulated emergency test, sponsored by the ARRL: AZT, EAP, WA, QWT, DVN, EWH, MVT, QYW, WWE, ATZ, and W6s FP, GOK, UIM, IGL, and AQJ. The tests were run off very smoothly on 28,800 kc. New calls: AAA, Rockford; AAH, Oregon. ACU has a homebrew dial-less converter on his BC-312 receiver. DXL will be active on 7 Mc. this winter. He also received QSL card for Azores QSO. FKI hears ZHB regularly on 144 Mc. and is listening for AND. KMN now has 1st class radiotelephone license. UPW obtained a file of back issues of QST, 1920-1940, and is busy reading them. DBO worked a KS4. BON has built a new 50-Mc. rig and is looking for contacts. EBX is willing to work a schedule four nights a week on 7 or 3.5 Mc. FIN won the local trophy given for WAS on c.w. SYZ is on Trunk Line "J" and Thursday NCS on ILL Net. JTX won fourth place in the recent YL QSO Party. The prize was a 7-Mc. crystal. LNI says he can hear the DX but can't snag 'em. BRX has been working on matching of coax. Outside work on the new house at SXL is at a standstill for the winter. The Kickapoo Radio Club had a weiner roast at Forest Park. The club is back in the YMCA for winter meetings. HJF, at Amboy, was 6HJF. ZHB has third tower with 144-Mc. gadget up in the air now. IVU has new RME-84, purchased from HGQ. LQP is working on a 28-Mc. mobile. EVJ is busy with traffic net organization. YTV, NIU, and FRP have reported in. ZEN is on 14 Mc. with 40 watts working nice DX like ZLZ, VY4, OX8, YR5, D4, CM6, and NY4, all on a folded dipole. DX: ERU 135, KOK 125, AND 107, FNR 91, KMN 70. 'Phone DX: HP 60 worked, 53 confirmed. Traffic: W9JTX 224, LQP 107, SYZ 83, EVJ 60.

FKI 45, FIN 12, FRP 8, ZEN 8, KMN 8, AND 5, DBO 5, YTV 5, SXL 4, HQH 3, EBX 2.

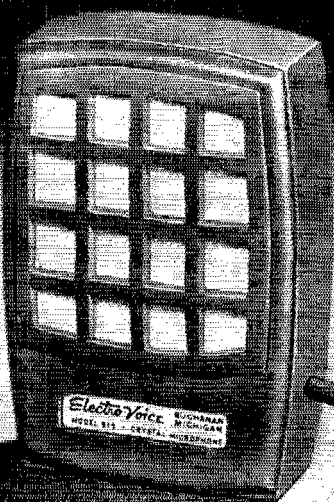
**INDIANA** — SCM, Ted K. Clifton, W9SWH — My term as SCM will end in April. Watch QST for the announcement and nominate a man from your club. QCY was the No. 2 station to work KL7GY on 50 Mc. from the States. KL7GY also was contacted by PRO. QCY and AB worked G5BY crossband on 50 Mc. Both winners of the DX Contest for Indiana were Fort Wayne stations, ANT in the c.w. section and UUN in the 'phone section. UCH has contacted seven states on 144-Mc. Fort Wayne Radio Club station, RJY, now is on the air. FMJ gave a talk at the Fort Wayne Club on Long Line Telephone Communications. LPQ, of Sullivan, is back with 400 watts to a pair of T55s on 3.85 Mc. WEU has joined the Silent Keys. The CQ Club has changed its name to the Lake County Amateur Radio Club. New officers are: HEL, pres.; DNA, vice-pres.; MVZ, RJU, SNF, CWO, WKN, and HPQ, advisory council. Their youngest operator is only 12 years old. BAX, GFO, and QLW have moved WEOA to the new studios. AI, representing the John Meek Industries, spoke at the October 29th meeting of the Michiana Amateur Radio Club. RZO and ABL participated in the show on WSBT. RDU has moved to Miami. UGH has emergency rig in his car. OSA and TBE are operators at WLBC. MFK is president of the Purdue Radio Club and is the new station trustee for YB. TG, Dr. Pichhardt of Franklin, says his call now stands for Tired Gent. BNX and BPB are the newest calls at Indianapolis. BNS says he can't read the newspaper now because he has to make every minute count for rag-cheers. OK, of Jasper, is new on the QLN. DGC, of Vincennes, is on 14-Mc. 'phone, MML, Vincennes, is working 28-Mc. 'phone. GZT is on 3.5-, 14-, and 28-Mc. 'phone at Montgomery. EOC has received his card from AC4YN in Tibet for his 14-Mc. c.w. contact. DAF and RNC, of Washington, are on 28 Mc. GQV is new at Portland. SNQ is new ORS. FJI has been busy with Cub Scout activities. In mailing reports please note your SCM's new address. Don't forget the Indiana Radio Club Council. Traffic: W9CBZ 222, DGA 44, HUV 36, ENB 22, SNQ 20 NH, 19, TT 19, IDZ 8, UKT 3, QLW 2.

**WISCONSIN** — SCM, Reno W. Goetsch, W9RQM — LFK is back on the air with 300 watts. 8TYE/9 is located at Oregon, Wis. The following participated in the National Emergency Test: VWQ, KZZ, OVZ, WWH, HFL, OME, PPH, PTN, BVG, HHM, LJF, SZL, JBF, GAA, VHA, FZC, HEE, RQM, and LED. CTD is working 28-Mc. 'phone with a three-element beam. EIZ is on 7-Mc. c.w. with 6L6-807. EZT and RYA are on 3.5-Mc. c.w. OLO has T55 on 7-Mc. c.w. ALB is active on 28-Mc. 'phone. APT, OES in Milwaukee, has changed to six-element 144-Mc. horizontal beam and works Chicago regularly with SCR-522. RUF is EC for Milwaukee area. AEY is active at Watertown. Point Radio Amateurs is a newly-organized club in Stevens Point. Officers are: BCC, pres.; HDJ, vice-pres.; BTZ, secy.; HJQ, treas. ARE worked several of the boys on 28-Mc. mobile. The Wausau Vocational School has an active club with the call NEF. CFT has accepted appointment of QSL Bureau for W9. HEE reported on Wausau activities. FEO was on 28 Mc. for the first time using n.f.m. FZC has EC Net on 28 Mc. at 9 p.m. each Wednesday. QLX has SCR-522 on 144 Mc. TED finally got out of the back yard on 28 Mc. RSR is using 100 watts with Meissner a.o. WSY is back on using 3.5 Mc. "V" beam. ECC is on 4-Mc. 'phone. HFL is working out with n.f.m. on 14 Mc. STO is sporting an FB tower and beam. RSX is running 240 watts to a new HY51A final on 3.5-Mc. c.w. RBI worked his 130th contact. LNM is ready for Century Club with No. 100. The Four Lakes Radio Club held a successful picnic on Blue Mounds. FTG and CJO, both using under 25 watts, tied for first place in Madison WAS Contest with 40 states in 3 months. ORY and EAE have new 28-Mc. beams. FHU still sticks to 28 Mc. Traffic: W9LFK 136, DKH 62, SZL 52, RQM 35, ESJ 30, CIH 21, W8TYE/9 18, W9SIZ 17, IQW 10, MUM 6, RBI 3, CJO 3.

## DAKOTA DIVISION

**NORTH DAKOTA** — SCM, Paul M. Bossoletti, W6GZD — New North Dakota stations are AZN, CTS, BCH, and BHF. Oldtimers back are GHQ and WYG. WFO is on 3.85 Mc. with n.f.m. and 70-ft tower for 28-Mc. rotary. LEB got new BC-348. VAZ raised beam another 20-ft. attempting to give RGT and GZD trouble with DX. HSR got new Bud VFO. KH6GF visited in Forx and Bismarck. CAQ schedules on 7 Mc. ZCM is new ORS and EC in Hebron. ILT is on 28-Mc. 'phone. The Fargo gang is getting SCR-522s in quantity. YSJ is pushing krg. on 50 Mc. CGM

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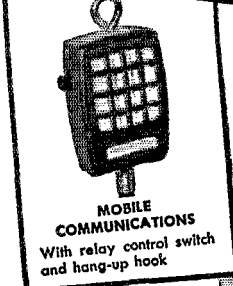
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has 24-element 144-Mc. beam. The Fargo Club sponsors Worked all Districts Contest. KL7IN visited the Bismarck bunch. GEH is showing 3.5-Mc. c.w. How about new members in North Dakota 3.85-Mc. 'phone and 3.5-Mc. c.w. nets? CDO is doing FB on 3.85 Mc. DM is rewiring ARC-5. 'TUF spills solder on ARC-5, too. GZD put up new self-supporting beam tower. Traffic: (Sept.) W6SSW 44. (Oct.) W6GZD 21, SSW 13.

**SOUTH DAKOTA** — SCM, P. H. Schultz, W9QVY — ORY is active in Naval Reserve radio set-up in Sioux Falls. QVY visited part of the Rapid City gang in person and part via 28 Mc. through courtesy of ADJ, SDE, GCP, HDO, and others put on an ARRL program over KMHK at Mitchell during National Radio Week. GCP is calling for more stations to get on South Dakota Net. DB is on 3.5, 7, 14, and 28 Mc. at Milbank. TI works 50 and 144 Mc. Fran reports that the gang is getting FB results using sixteen-element 144 Mc. antennas on 50 Mc. TI worked St. Paul crossband using 144 Mc. for transmitter and 50 Mc. for receiver. PRR, program director of the SFARC, arranges programs for each weekly meeting. Thus far DIY, RRR, NMA, and ZRA have given talks. The SFARC is preparing to install a 1500-watt emergency generator. The club is starting code and theory classes. RRR, with 12 watts on 7-Mc. c.w., has worked both coasts and 26 states. Traffic: W6BLK 16, GCP 5.

**MINNESOTA** — SCM, Walter G. Hasskamp, W9CWB — AQU is operating from 4TIS at Fort Benning, Ga. PNQ now is KL7MH on 14 and 7 Mc. looking for Minnesota contacts. SW has a new 28- and 14-Mc. beam atop a 60-ft. pole. BHY is building a frequency amplifier and an antenna coupler. BGY is operating from Cromwell and has joined MSN. BMX has changed his OBS schedule to 8:00 a.m. Mondays and Wednesdays. 6HJP/ø now is ØDSF. DNY is back on the air and MSN. FAH worked G5GK and ZL2NT on 7 Mc. RXL is new ham in Duluth with p.p. 250THs. AWL has a new Millen CCO unit to drive an 812 on 28 Mc. MOJ found that on 144 Mc. his vertical beam worked best when the director accidentally grounded to a downspout. DUS is keeping a weekly schedule with his brother, HQW. GKO is offering a prize to anyone on the Iron Range who can get through to Duluth on 144 Mc. from ground position — no airplanes! YUP has Meck transmitter at his hospital bedside. ZBQ says for trouble with Meck transmitters, put in a pair of 1614s in final. DEO is new station in Duluth. GKP had doped out a good noise-limiter circuit. KYE has an 811 on 7 Mc. ANU is building a new exciter. OMC is building a new VFO. RAJ has new final on 28 Mc. working lots of DX and handling foreign traffic. ORJ is experimenting with coax as antenna feeder. JIE is now SEC. Who will volunteer for appointment as PAM? Both nets are glad to have as many more stations as wish to report in. BEY, JIE, RPT, YBM, and CWB attended a meeting for organization of Emergency Corps at the home of JIE on Oct. 11. Stations wishing to act as ECs or as Corps members, contact JIE, St. Paul. Your cooperation with the Emergency Corps is urgently needed. RAJ is knocking off plenty of DX on 28 Mc. using his new final. He's handling a lot of foreign traffic to the States and recently relayed a message from the Admiralty Islands to Bemidji in ten minutes, completing it to Bemidji on the land line. Traffic: W9RPT 58, HEO 44, CWB 29, YBM 28, CLU 20, VJH 20, TPN 18, BBL 16, FAH 16, BMX 8, OMC 8, GKP 7, JIE 7, ZPH 5, BGY 4, EPJ 4, ORJ 3, RJF 2.

### DELTA DIVISION

**ARKANSAS** — SCM, Marshall Riggs, W5JIC — The State is making good progress in securing emergency equipment, with JAP having 2.5-kw. generator along with the other to go with it. EA has fully equipped BC-654A in operation. MRD has two complete BC-654As. DSW and BJH have the BC-654A in operation also. LUY is OBS on 7150 kc. Mondays, Wednesdays, and Fridays at 8 p.m. DSW is OBS on 3885 kc., Mondays, Wednesdays, and Fridays at 7:15 p.m. LRE is new PAM. FMF is new ORS on 3.5 Mc. LUY has new final p.p. 812s, 400 watts, on 14 and 7 Mc. MPI is back on 7 Mc. after trying 28-Mc. 'phone. NBT, NBR, and MPD are having a big time on 28 Mc. NLU is a brand-new call on 7 Mc. Let's have more new calls. The Arkansas c.w. net's new name is the Ozark Net. This net has 18 active stations. The Arkansas emergency net has 16 active stations. Attendance is good on both nets and interest is good, with much equipment for emergency use being accumulated. MRD and BJH are the official WX stations

for Arkansas nets. Let's have more reports, boys. Thanks. Traffic: W5EA 28, LU15, JIC 6.

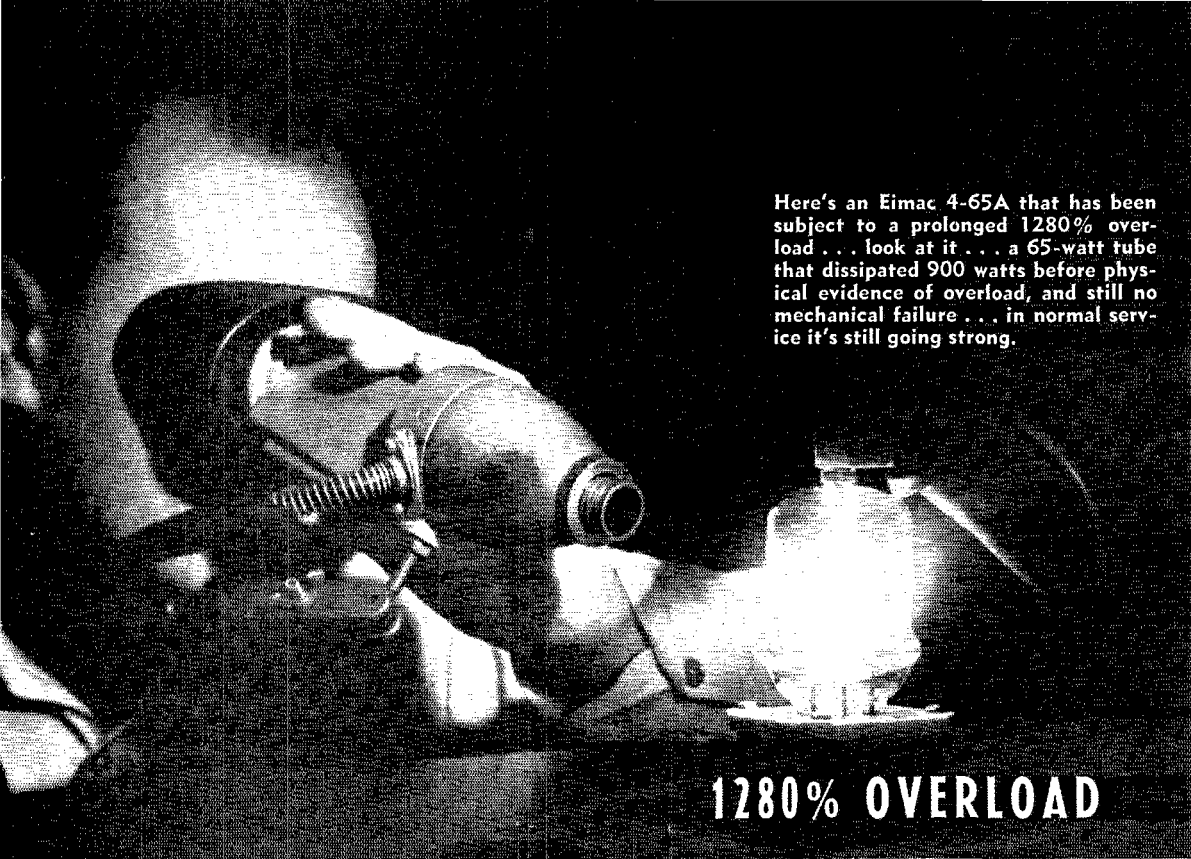
**LOUISIANA** — SCM, W. J. Wilkinson, jr., W5VT — CEW is PAM. KTE is SEC. HHT and JPY are Asst. SECs. We can use a good live-wire Route Manager, and also need ECs for Alexandria, Baton Rouge, and other points. 'TUF is operating portable from Rio Grande Valley. BLQ has 600 watts on 3.85 Mc. JPM, DHE, IUG, and GMR have FT-102 rigs. BSR is active on Delta 75 and Tri-State Emergency Nets. QH, CNG, CGC, IKJ, IUW, and others are active around Shreveport and Bossier. KRX is on 3550 kc. with a whale of a signal and will QSP. VT recently came up with an XYL but still manages to QSO and QSP quite a lot. Would like to hear from more of the gang each month. If you operate 'phone, an OPS appointment awaits you. If c.w., you should be ORS. If you like emergency operation, why not apply for EC. If your interests lie in experimenting, apply for OES appointment. There is an ARRL appointment for every active ham. You do not have to be Class A to hold these appointments. Get in touch with the SCM. MAD will have a new QTH somewhere in the Pacific area. His XYL, MAE, will go to Houston. Traffic: W5KTE 104, GHF 36, VT 19, CEW 7, KHC 6.

**MISSISSIPPI** — SCM, Harold Day, W5IGW — PAM: LN, RM; WZ. LN is our new PAM. WZ worked three VK stations in the WIA, and about 110 in the CD Contest. NNZ is a new Class A ham with a nice signal on 3.85-Mc. 'phone. IHP is working 50.6 Mc. with V-700 p.p. final. IHP and RY are the only known hams in the State working the 50-Mc. band. FCH is heard on 3.5 Mc. c.w. regularly. FSS is working 3.85-Mc. 'phone. GUU and IFR have a new three-element beam for 28 Mc. LAK has 51 countries now, and a new center-fed Zepp. The first combined drill of the Tri-State Emergency Net was held Nov. 5th. LN is NCS for Mississippi, EA is NCS for Arkansas, HHT is NCS for Louisiana. KUT has his rig working on 3.85-Mc. 'phone also since receiving his Class A ticket. An amateur radio club has been organized at Meridian. Thanks to DNS, KUT, LN, LAK, and WZ for the reports. Traffic: W5IGW 356, WZ 156, KUT 112, LAK 43, LN 17.

**TENNESSEE** — SCM, James W. Watkins, W4FLS — The NARC had a demonstration of the new mobile radio-telephone at the Oct. 23rd meeting. AFR is on 14-Mc. 'phone with a new rig consisting of an 813 final and 4-6L6s Class B. JSM has a new three-element rotary on 28 Mc. ILZ is converting a BC-348 for standby and monitor. KFK has a new rig on 28 Mc. GQQ is trying out a new antenna on 28 Mc. KH is using n.f.m. on 27 Mc. FHP is working 3.85 Mc. mostly. The Memphis Club has raised funds to start construction of a club-owned emergency unit. SW has a new rig using p.p. 304TLs in a grounded grid circuit. The Memphis Area AEC was alerted for hurricane traffic and handled quite a bit from the stricken area. CV is Memphis EC. IY built a 'phone rig after about 15 years on c.w. ERJ had two contacts in one week with KL7DY on 50 Mc. and also worked FWH crossband 50 to 3.85 Mc. for over two hours. LMQ now has 50 countries verified. The Kingsport Club now is an ARRL affiliate. MEA has 39 states on 7-Mc. c.w. JD operates a Collins 30K on all bands. Maryville hams announce the formation of the Smoky Mountain Amateur Radio Club with GQL, pres.; BXG, vice-pres.; MEU, secy.-treas. BXG has acquired his Class A license and is doing antenna work on 28 Mc. MEU works on 14-Mc. c.w. with about 12 watts. GQL is building 8005 final for 'phone-c.w. FUW is active on 7 Mc. FLS, IIB, and PL received their new Marine (surplus) transmitters. BTB is operating on 3.85 Mc. Traffic: W4PL 395, TWI 159, GHL 5.

### GREAT LAKES DIVISION

**KENTUCKY** — SCM, W. C. Alcock, W4CDA — Kentucky's two nets (KYN and KYP) are getting better all the time. New members are welcome. JDE addressed the Frankfort Rotary Club on ham radio. KWO works 'phone net with AVT-112. NDY's XYL worked a KH6 on 28 Mc. TXC and EDV are rebuilding. GPT replaced 802s with 807s and worked Mexico City. JHU finished his VFO. CIC transferred from Ft. Knox to Germany. QJU is a drummer. KLK schedules Germany on 28 Mc. PXX is new manager at WCIF. Ex-3NO now is 4NO and works at WCKY. FKM



Here's an Eimac 4-65A that has been subject to a prolonged 1280% overload . . . look at it . . . a 65-watt tube that dissipated 900 watts before physical evidence of overload, and still no mechanical failure . . . in normal service it's still going strong.

**1280% OVERLOAD**

## **PYROVAC . . . A NEW EIMAC PLATE MATERIAL**

The story's out . . . Pyrovac, a new Eimac plate material, the culmination of ten years research and millions of hours of life test data, is now in standard production—at no extra cost.

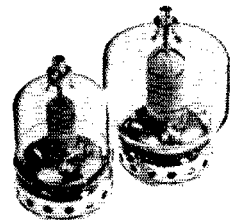
Pyrovac is truly as important a milestone of vacuum tube development as the thoriated tungsten filament. Pyrovac plates, like the thoriated tungsten filament, open a new vista for vacuum tube life performance.

This new material combines the advantages of tantalum to overloads, molybdenum's strength, weight and conductivity, and carbon's ability to dissipate heat . . . with none of the disadvantages of these materials. Tubes with Pyrovac plates are mechanically rugged, require no additional getters and they do not gas even under extreme overloads.

The life span of tubes with Pyrovac plates far exceeds that of tubes incorporating plates of conventional materials. For example, under conditions where a tube gave 3000 hours of service, the same tube type with a Pyrovac plate gave 15,000 hours of life, a 400 percent increase!

Pyrovac plates are capable of handling overloads in excess of 1000%. For instance, the 4-65A plate pictured above was radiating 900 watts of heat, a 1280% overload . . . without indication that the eventual life of the tube or its characteristics were affected. We don't suggest you dissipate 900 watts of heat in your Eimac 4-65A's (you could probably do it), but this example establishes proof that Pyrovac is a superior plate material destined to become the anode standard of the vacuum tube industry.

Pyrovac plates were first incorporated in the Eimac 4-250A in the early part of 1946 and followed in the 4-125A. As a result there has been universal acceptance of these tubes in all fields of electronic endeavor. . . . Further proof of the superiority of this new plate material. In the ensuing period of



Type 4-125A

Type 4-250A

time all Eimac internal anode type tubes have been converted to Pyrovac plates as rapidly as production facilities would allow.

For your assurance to obtain the most in performance and satisfaction for your vacuum-tube-dollar, insist on Eimac tubes . . . the criterion of good design in any electronic equipment.

**EITEL-McCULLOUGH, INC.**  
190 San Mateo Ave.  
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Follow the Leaders to

**Eimac**  
TUBES  
The Power for R-F

and MMY have Class A tickets. OGP and FBJ are operating on all bands. FR is building a kilowatt for 28 and 50 Mc. Newspapers to the contrary, BAZ is not married. FB and ODA are building p.p. 813 amplifiers. The CKAR Club visited Lexington Signal Depot, Kentucky University's ham club organized and is holding meetings. NEP worked Hawaii on 3.85 Mc. JXX now is in Audubon Park. CRI, JPV, and YCG are on 3.85-Mc. 'phone with ANA, LTQ, MPA, and IUP on 3.5-Mc. c.w. DNL, KBY, ITB, and JTZ are on 14-Mc. 'phone. KIV, KNX, JEB, KFE, OIC, NJY, MRF, OGY, and LBL are on 28 Mc. NJY also works on 144 Mc. IYV is attending Kentucky University. JYM is building 150-watt rig on 28-Mc. and is teaching at Western State where LQX is studying (?) and operating portable on 7 Mc. NGZ has new beam for 28 and 14 Mc. CMP is active mostly on Kentucky 'Phone Net, has new e.c.o. and 100-cc. frequency standard. Traffic: W4BAZ 149, CDA 30, FBJ 12, JTT 11, KWO 4.

MICHIGAN — SCM, Joseph R. Beljan, jr., W8SCW — SEC: SAY, RM: NOH, PVB, and UKV. PVB is new RM and is manager of the 7 p.m. QMN Net. BCX is new ORS. Grand Rapids Radio Club election: KBI, pres.; ZOH, vice-pres.; AQA, secy.-treas.; and NOH, activities manager. NCB has sixteen-element beam on 144 Mc. VQD has new four-element beam and is working nice DX. SAY worked GD3UB on 3.5 Mc. RLT is working choice DX on 50 Mc. TRN continues to schedule VE8NW with good success. Congrats to MBM and UFH on joining the married ranks. VOK will follow shortly. Congrats to WUT and WUU on the arrival of the jr. operator. TNO is doing a nice job as EC for the Pontiac area and reports increased activity on 144 Mc. ZHB did a nice job handling traffic for the deer hunters. YCL moved to Longview. EGI moved to new QTH and reports in QMN when not QRL. DNM moved to new location. GQF is back from Port Arthur and now sports a commercial ticket. ZUL is QRL servicing receivers. YLA does a nice job of reporting for the Neguinee area. TAW is out of the hospital after a minor operation. TUX is back on his feet after a three-year siege of illness and will be on 3.5 Mc. soon. UKV is pushing slow Trunk Line and continues to do a nice job on the 5 p.m. Net. SAY is first of the season to make BPL with a nice traffic total. Traffic: (Sept.) W5CYH 18, AQA 12. (Oct.) W8SAY 609, NOH 211, SCW 182, UKV 104, PVB 73, DNM 57, YBR 23, ZHB 27, TRN 26, YAO 26, AQA 25, G8J 25, FX 20, MGQ 19, BCX 11, RJC 11, YDR 9, VPE 8, UGR 6, EGI 5, TNO 4, OCC 2, UJE 1.

OHIO — SCM, William D. Montgomery, W8PNQ — RN's appointment as Route Manager has been renewed. Assistant Route Managers, as appointed by RN, are PMJ, EBJ, and ZAU. IVC has been appointed ORS, and DXB and APC have been appointed OBS. The Buckeye Net got off to a good start on Oct. 15th, with 22 stations reporting in (8730 kc. 7:30 p.m. Mon. through Fri.). Regular NCS for the net include IVC, EBJ, ZAU, LT, and SJF. Stations are checking in, in alphabetical order without the NCS coming in each time. Seems to work OK. PIH has a 9-lb. jr. operator born Oct. 19th. We hear that the Shaker Heights Amateur Radio Association has reorganized, and that they are proceeding with plans and training to get licenses for the members. Good luck, boys, we are for you! The Cleveland Area Council of Amateur Radio Clubs has elected the following officers: JNF, pres.; TNB, vice-pres.; OTT, secy.; QKF, treas. The council was formed early in 1947 and is composed of six member clubs in the Cleveland Area. In Dayton, TPP is conducting code and theory classes in the American Legion Hall; ORH is back in town and rarin' to go; CBI is fully recovered from his long illness; and TPC wishes the Cincinnati Television station would quadruple its power or antenna height so he could get a picture. WRN reports from Columbus that Oct. 13th was a good 144-Mc. night. UZ worked WJC at Everett, Ohio, and heard AKR, SFR, and an unidentified W2. RJD says 14 Mc. has been doing tricks — acting just like 3.85 Mc. with nice short-haul QSOs being held. JFC is teaching a code class in CAP, and is hoping that the boys will be able to swing a CAP station later on. The October Queen City Emergency Net 144-Mc. Hidden Transmitter Hunt was won by Bob Kamp, with Roy Dieselberg second, and 4KTV third. PNQ was the hider. BBA says he finally got on the air Oct. 12th with a BC-458. He is well satisfied with the results to date. DAE really goes for the CD Parties. He had 245 QSOs in 45 sections in the October one. AQ says his antenna pole broke at the "fur" end, so it is only 12 ft. off the ground now. He says that new poles seem to be hard to get. NDN had a "Y" field night on 14 Mc. not long ago, working YUIAN, Y8IJR, and Y8IAC,

not to mention OX3GE. WAB reports that YBF is holding daily schedule with a U. S. amateur station in Japan. UPB, our Ohio SEC, travelled to Columbus to address the boys there not long ago. He seems to be getting about the State quite often these days, and is doing a good job. Don't be surprised to see him drop in on YOUR club some night. LJ and ACE are at it hammer and dial for Dayton DX honors. ACE now has a beam to go with his kw., according to WXA. PUN reports that the Scioto Valley Radio Club now is fully organized, with CUO, pres.; PUN, vice-pres.; YKV, secy.-treas.; ZQB and 4OEE/8, directors. PUN also says there is a new radio club at Bellaire with HZJ as president. QBF wants a Russian to work him on 28 Mc. What say, Russians? In closing, let's see our traffic totals climb. Send in your totals, even if only one message is handled. Traffic: W8EJB 113, ROX 112, RN 103, UPB 78, QBF 60, PIH 41, PUN 39, CBI 37, PZA 35, YPS 28, WE 21, WXA 17, TKS 14, SJF 12, APC 10, BEW 10, PNQ 9, WAB 9, EFW 8, TMA 7, AYS 6, THH 6, AQ 4, EIU 4, NDN 4, ZAU 4, WSC 3, BUM 1, DAE 1.

## HUDSON DIVISION

EASTERN NEW YORK — SCM, Ernest E. George, W2HZL — ITX reports the NYS Net is going fine after summer layoff. The gang consists of GWY, ITX, LRW, NAI, NFB, QOM, TYC, SZ, 3IC, and PT/2. Traffic totals are mounting. EQD is active in AEC nets working BGO as net control station of group one of N. Y. C. and L. I. 3.5-Mc. c.w. AEC net. WDI reports the Naval Reserve Armory at New Rochelle now has fully equipped battery and line powered equipment. LRW will soon have kilowatt with a pair of 304THs in final, 'phone and c.w. Ex-6YDQ, now WGE in Catskill, soon will be on 3.5-, 7-, and 14-Mc. c.w. GYV reports the new receiver he won at Schenectady Hamfest is working fine. Incidentally, Jeff dashes home to knock off two or three W6s and W7s on 50 Mc. during lunch period. KLM now has antennas to all the telephone poles in the block. Hope he gets them all going before next spring. The Albany Radio Club has new headquarters at 134 Central Ave. It meets on the 2nd and 4th Fridays in the month and starts with code practice at 7:30. POO reports that this winter the following stations in Westchester are going to form a net on 420 Mc. using BC645s converted from February QST: RH, FOT, JL, PFM, and POO. Each one is a hot 144-Mc. man. Because experiments show horizontal polarization gets the best results, all are going to use it and hope other new-comers will do likewise. Traffic: W2EQD 185, ITX 138, LRW 102.

NEW YORK CITY & LONG ISLAND — SCM, Charles Ham, jr., W2KDC — The October high spot in AEC activity was the simulated emergency. After the smoke cleared the boys reported the following: In Brooklyn, remarkable results were achieved with a plane of the Floyd Bennett N.A.R. Amateur RC piloted by BVE, who operated on 144 and 3.5 Mc. K2NAR also actively participated on 3.5-Mc. c.w. Six fixed stations were kept very busy with messages from the airplane and two mobile units. DUS, HQT, ODS, and ALH handled the paper work. Co-operation is sought with Nassau and Suffolk re operating frequencies. The new Amateur VHF Institute has good results so far on 144-Mc. rhombics. NXT is working on a twelve and sixteen-element beam. SOX is thanked for dedicating the club station, WCR. KU is very active on 225 Mc. OHE worked many W4s and a VE1 on 144 Mc. during DX spree. Nassau's EC, FI, also planned and executed an excellent test with 22 stations active. A portable was located in Mineola at Red Cross, using emergency power. All stations forwarded messages to Headquarters via GG and KIT on 3.5 Mc. KDC received personal delivery service of messages from ORZ who valiantly overcame fuel-pump trouble to continue operating in true emergency fashion. RH and QXY visited Nassau during the drill and their mobiles participated. UBW moved from Brooklyn and joined AEC. JND again is active from Syosset. In Suffolk, initial confusion was overcome and a fairly satisfactory drill took place. It should be pointed out that Suffolk's AEC is so active and well integrated with other community services that their routine activity is very close to annual AEC simulated run. OQI requests much earlier notice on future drills and closer planning via 3600 kc. so all counties can work better together. NYC-LI Net is conducting a new member drive. As the program gets into high gear, OBU, newly-appointed RM, plans to visit clubs to talk it up. They are particularly short of ORS in Manhattan and Brooklyn. Contact OBU

(Continued on page 88)



# SPRAGUE TRADING POST

**FOR SALE** — Miles continuous tape recorder-reproducer in good condition, \$65. Delmont Schumann, 335 Nicollet Ave., Mankato, Minn.

**WILL TRADE** — National Radio School course. Want BC-654A transmitter and receiver or BC-348 receiver in good condition. Louis Hyman, 6757 Theodosia, St. Louis 12, Mo.

**FOR SALE** — Unmounted rock crystal for receivers, each one tested. Irwin C. Tilinski, 339 W. 11th Ave., Tarentum, Pa.

**FOR SALE OR TRADE** — Selsyn direction indicator with transmitter, mechanical beam rotator. \$15 or will trade for BC-659H FM transceiver in A-1 condition. A. E. Brown, 417 N. Orchard, Burbank, Calif.

**FOR SALE** — BC-645-A transmitter-receiver, new with 15 tubes, \$16.95 ea.; also walkie-talkies complete with tubes and crystal, \$49.50 ea. Harris Supply Co., 1336 W. Chase Ave., Chicago 26, Ill.

**WANTED** — Complete 100 watts or more phone transmitter for 10, 20, 80 meters plug-in coils or band switching, CC or ECO. A. J. Hesse, 260 Arlington Ave., Brooklyn, N. Y.

**FOR SALE** — Meissner 150-B transmitter, converted for 20 meters, coils, tubes, T-26 microphone, spare parts, \$275. C. Alvin Draper, 1272 Andrews Ave., Lakewood, Ohio.

**FOR SALE** — Hallicrafters S-20-R receiver, late model — like new, \$60. A. L. Oliver, 94 Potomska St., New Bedford, Mass.

**FOR SALE** — Triplett VOM 2400 in excellent condition, \$40. Michael Dudorics, Box 1608, Patterson, N. J.

**WANTED** — Converter, 10 meter mobile. Will trade or sell SX-23 Motorola FMAR13V fixed frequency mobile receiver, Hallicrafters S-20-R and National NTX-30 transmitter. E. F. Harris, 6748 N. Ashland Ave., Chicago 26, Ill.

**FOR SALE** — Supreme 571 signal generator, excellent condition, \$50. Raymond Nuss, Hometown Radio & Electric, Box 51, Doylestown, Ohio.

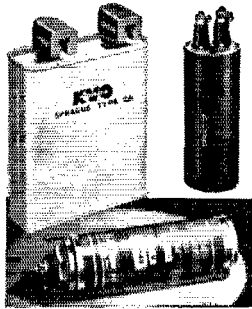
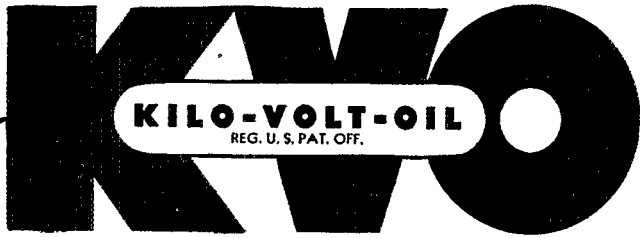
**SELL OR TRADE** — HT4 Heath aircraft transmitter, \$15; BC-1306 less hand generator, \$15. Ralph Franklin, Box 801, Detroit 81, Mich.

**FOR SALE** — Stancor 10P transmitter complete with tubes, coils, crystals and microphone, used less than 10 hours, \$45; also instructograph code machine with built-in oscillator and 10 tapes, \$15. Clair A. Rupert, R.D. No. 1, Sandy Lake, Pa.

**SELL OR TRADE** — S-38 in perfect condition. Want SX-25 in good condition with or without speaker. William H. Bauer, Ward 4, USVA Hospital, Outwood, Ky.

**FOR SALE** — 83 issues Radio Jan. 36 to Dec. 43; APA-10 pan-oscillo-receiver, new 110 volt, 60 cycle, \$90 or trade for 15 reel code practice tape kit for TG-10 automatic keyer. Ray Warner, W7JU, 530 Birch St., Boulder City, Nev.

**SELL OR TRADE** — QST magazines, 1924-1945, BC-375E transmitter, American code reader unit for recording telegraphic signals, teleplex, communications receiver. Write for list of ham gear. Want dynamic mike, audio amplifier, record changer or what have you? H. E. Leigh, Sr., 197 N. 14th St., San Jose 12, Calif.



KVO (Kilo-Volt-Oil) is an exclusive Sprague development that has made it possible to make smaller high-voltage transmitting capacitors which actually perform better and have greater durability than larger, old-style types. KVO has excellent dielectric efficiency. It maintains high insulation resistance and low power factor over a broad range of operating temperatures. In every respect, it is greatly superior to previous dielectrics.

Sprague Capacitors that are both filled and impregnated with KVO are available in three popular types: Type CR rectangular transmitting capacitors, 600 to 7500 volts; Type RC inverted round can capacitors, 600 to 1500 volts; and Type OT inexpensive round can units, 600 to 3000 volts. All types are supplied with famous Sprague Lifeguard protective terminal caps. Try Sprague KVO Capacitors in your rig — and note the difference!

**FOR SALE** — Driver transformer Stancor A-4712 and cathode modulation transformer Stancor A-3888, \$5 plus postage. Charles M. Palmer, 9567 Roslan, Overland 21, Mo.

**SELL OR TRADE** — Converted BC-348P \$60; unused TR-4; used DK-2 both with tubes, \$60; Excellent BC-221 with batteries, \$40; SCR-522, Speco STAP, Supreme 502, ADF receiver, etc. Want Panadaptor, Hiokok traceometer or what have you? E. S. Page, Box 239, Decatur, Ala.

**FOR SALE** — Meters, transformers and chokes, some for use in scope; tube sockets — rotary and toggle switches, coil forms and blank chassis; also special wound transformer used for electroplating. List on request. Electronic Service Laboratory, 34 Green St., Marblehead, Mass.

**FOR SALE** — Altec-Lansing high fidelity dual channel speaker in burr walnut cabinet, handles 25 watt output easily, \$175 F.O.B., S. E. Lessere, 28 Beekman Place, New York 22, N. Y.

**FOR SALE** — Handsets of every make and description, write your requirements. Dunn-Wright Electrical Co., 667 Sixth Ave., Brooklyn, N. Y.

**WILL TRADE** — 16mm Bell & Howell telephoto lens, 3" f4 telelate, perfect condition, uncoated. Want signal generator and other instruments. Jacob Goldfein, 65 Fort Washington Ave., New York 32, N. Y.

**FOR SALE** — Oscillator, \$10; Superior 670P test meter, \$20; bug, \$10; pair air-corp. headphones, \$1.50; all practically

new; also several small sets cheap. V Liotta, 722 W. 1st Ave., Cheyenne, Wyo

**WANTED** — Low frequency transmitters and receivers and Carrie current communication equipment. Tom Allen, 540 St. Johns Place, Brooklyn 16, N. Y.

**SELL OR TRADE** — National 1-10 receiver complete with coils, speaker and power supply. Latest type with dial on left. Trade for radio or photographic items. W. T. Golsen, Box 262, Baton Rouge, La.

**SELL OR TRADE** — Abbott TR-4A complete with tubes AC power supply and extra tubes. Want small intercommunication 5 station system, at least two subs with the master. Bob Westfall, The Pines, Woolwich, Me.

**WANTED** — Information for converting BC-223A transmitter to AC. Will pay cash or trade radio parts. All inquiries answered. E. Shafer W8MSG, 2889 East 116th St., Cleveland 20, Ohio.

**FOR SALE** — Hallicrafters 15 tube receiver, SX-28; 550KC-42MC including matching Hallicrafters Jensen bass-reflex cabinet with 12" speaker. Otto Pollei, Jr., 2122 Edgeland Ave., Louisville, Ky.

**WILL TRADE (in Canada)** — New 814; 150 mmf. 3000v variable; 1 — 40 mtr. and 2 — 10 mtr. xtals; dynamic mike; new Argus AF camera, for better Argus, preferably with coupled rangefinder, or other good 85mm make. J. P. Neil, VE3PN, 1127 Dufferin St., Toronto, Canada.


**WANTED** — HRO coils, also signs shifter, preferably Meissner. A. Freitag, W3HDZ, 1437 Patapsco St., Baltimore 30, Md.

**SPRAGUE PRODUCTS COMPANY, North Adams, Mass.**

(Jobbing distributing organization for products of the Sprague Electric Company)

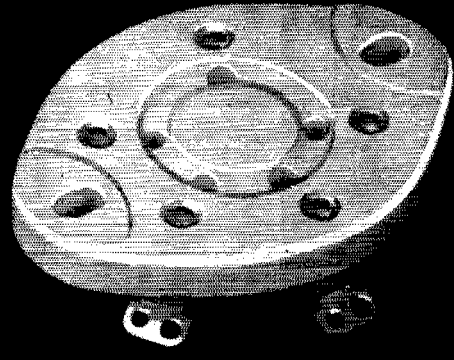
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# JOHNSON

## WAFER SOCKETS



*famous the world over*


Exactng users prefer JOHNSON wafer sockets because they are insulated with grade L4 steatite or better, top and sides are glazed, the underside is impregnated against moisture. Contacts are brass with steel springs, cadmium plated and are mounted against phenolic washers in molded recesses to prevent movement. Rivets are countersunk and mounting holes bossed to permit sub-panel mounting. Locating grooves facilitate tube insertion.

*Illustrated above is the 122-225, a 5-pin socket which can be used with such tubes as the 807.*

### Additional Types

- 122-224, 4-pin for tubes such as the 812 or T40
- 122-226, 6-pin for tubes such as the T21
- 122-227, 7-pin medium, for tubes such as the RK34
- 122-217, 7-pin small, for tubes such as the 6A7
- 122-228, octal, for tubes such as the 6L6 and 815

► Also available are Giant wafer sockets for transmitting tubes, of 5- or 7-pin bases, sockets incorporating a base shield, and Super Jumbo 4-pin base sockets.



# JOHNSON

*a famous name in Radio*

**E. F. JOHNSON CO. WASECA, MINN.**

and ask for a copy of *Net News*, a very informative organ, which this month has a biography of TYU. The Stuyvesant HSRC, operating CLE, has applied for ARRL affiliation and AEC membership, and operates on 14 and 7 Mc. BO is active on emergency work. Mac is working on a BC-454B and BC-696A for 3.5-Mc. work, a Signal Shifter using 4 watts being replaced. PZE/2 put up a 14-Mc. beam. HJ, on 14,040 kc. mostly, is being operated at City College. UOL's 50-footer was just about bent double at last report. DOG is back from a business trip to VE Land. FCH plans an ARC-5 to drive a 400-watter. ZV and 1PSQ/2 are new hams in Suffolk. ADW is working W4s on 144 Mc. OBW, at Holbrook, now has a 90-foot mast on 144 Mc. LYH is heading for that band. OQI is back on 28 Mc. with 90 watts. MZB is rebuilding for high power on low frequencies. TLE worked 5 Ws in a row and a VE on a Signal Shifter on his first night on the air. SKV manages some OO work. URX is working in very well as a new ORS. UZX has new 813 final. RQJ deserted traffic for ARC-5 during October. HXT is running the gamut of new antennas. KYV enjoyed his first CD Party. PRE is working lots of DX. LGK has a new method of making a 522 m.o.p.a. EC made TYU alternate on TLAP. BGO has new VFO on 3.5 and 7 Mc. and works Gs with 30 watts on 7 Mc. TUK subs for KTF as Asst. NCS of Group 2. TYV made BPL almost twice over but still has time for DX. RTZ definitely is making good as ORS. Traffic: W2TYU 712, TUK 143, OBU 135, BO 110, QYZ 107, RTZ 107, SJC 70, BGO 55, EC 38, UZX 26, LGK 14, PRE 12, OUT 10, ESO 5, KYV 3, HXT 2, RQJ 2.

NORTHERN NEW JERSEY — SCM, John J. Vitale, W2IIN — Thomas J. Lydon, 2ANW, is our new Assistant SCM. He is a member of the NNJ Net and is one of the NCS, ORS, OO, OBS, and EC. The NNJ Net is on 3630 kc. at 7 P.M., daily except Sundays, and the NJ Phone Emergency Net meets on 3900 kc. Sundays at 9 A.M., Wednesdays at 7 P.M., and invites membership to 'phone men in the northern half of the section. There are some OPS appointments open. NCY vacationed for three weeks in W9 towns and met many of his contacts. NDL/3 is becoming ORS/RM in Annapolis and is a regular member of the NNJ Net. BZJ is active in the USNR. ANG is revamping for break-in operation. The SCM visited the RVRC and spoke on emergency operation, Coördinators, and AEC. Here is one for Ripley: IIN was making some checks for BWI on 28-Mc. c.w. and while the key was down Joe's voice was heard, with no mike, modulator, etc. (voice-operated VFO-f.m.). He also worked BD that way, and Ross told us a W4 with an underground antenna was working a W2. The Irvington Boys are forming an EK (Electronic Key) Net on 3775 kc. QLF is f.m. VFO 5 watts because of burnt-out power transformer and expects to increase power. He claims that Irvington has 70 active amateurs. WK has horizontal doublets, coax fed, on 7, 14, and 28 Mc. working out fine. NNJRA meets the 2nd and 4th Monday nights at Hackensack YMCA. Officers are DIB, pres.; JT, vice-pres.; CCS, secy.; DZA, treas.; FKA, publicity; BBR, activities. NNJRA, BRC, LRC, and UCARA were alerted during the forest fires in the northern part of the State. LFR and ANW are possessors of A-I Operator Certificates. BLS is handling traffic from J-Land working it into the NNJ Net. DRA is back on the air on c.w. RVRC officers are IAT, pres.; BAI, vice-pres.; CBT, secy.; GPV, treas. The ORS-NNJ Net meets the first Wednesday of Feb., Apr., and June; the OPS-NJ 75 Emergency Net meets the first Wednesday of Jan., Mar., and May at Elizabeth YMCA at 8:30 P.M. ABG is on 7 Mc. using BC-455B and LSR 320E and folded dipole. OUS heard ZKIAM on 3.5 Mc. WAA, UUY, and UWN are on 7 Mc. VJM and TWO are on 28-Mc. 'phone, 100 watts. The Bloomfield Radio Club Net is on noon Sundays on 3745 kc. JC is net control. BZJ is EC for Freshhold. DRV, CWK, FBZ, and CBT are operating on 3.5 Mc. The RVRC station, QW, is emergency-powered for 3.5 and 144. FJQ and NTW are on 144 Mc. VQR is Monmouth County EC. BYK is on 144 Mc. with ARC-4, five-element beam. NZC has ARC-5 on 144 Mc. New officers of UCARA are PIX, pres.; PIY, vice-pres.; OSQ, secy.; IZC, treas.; URH, Asst. SEC; LTP, sgt. at arms. The club meets the 2nd and 4th Mondays at Elizabeth YMCA at 8:30. Traffic: (Sept.) W2CGG 517, NKD 113, NIY 48, CWK 43, LFR 41, ANG 29, GVV 26, CJX 24, IIN 16, LTP 14, APL 5, BRC 5, OXL 5, UZN 1. (Oct.) W2CGG 282, LFR 266, ANW 173, NKD 85, NQY 65, CWK 42, DRV 36, LTP 19, QEM 19, IIN 17, MTV 16, PPH 16, ANG 15, NIY 13, CQB 10, OOC 10, OXL 9, BZJ 8, GVV 3, QLF 3.

(Continued on page 90)

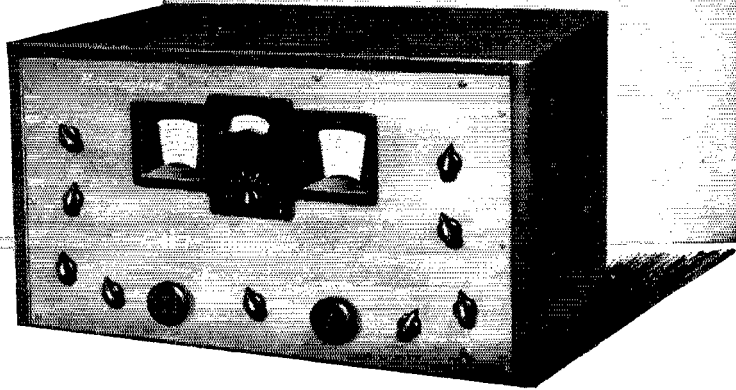


H

IGH SCORER

# HQ-129-X

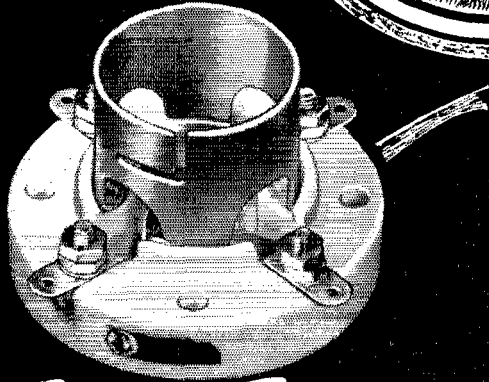
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## MIDWEST DIVISION

**IOWA** — SCM, William G. Davis, WØPP — The Council Bluffs Radio Operators Club held its first meeting Sept. 17 at Chieftan Hotel. JRY has new beam. FWL is building new 34-ft. self-supporting tower for his beam. PP visited SEE and found his new kw. rig nearly ready to go on 28 Mc. PGG is working for GFQ. UQJ is working v.h.f. for UP Railroad. QFZ and VEY are working 144 Mc. The Iowa City gang was in there pitching during the simulated emergency tests. Those taking part were RSI, TGQ, MTS, IFB, and TWX. Members of the Iowa 75 Net are going all out for the BC-654s for emergency operation. DIB has had 16 contacts on schedules with J2AAY with traffic on five of the schedules. FP is building up FB Emergency Corps in Quad City area. HMM is busy with organizational work in Tall Corn Net and Trunk Line "A." WMU renewed his EC appointment. WML gave a public demonstration of the value of ham radio for emergency communications. REV and QAQ are in San Francisco awaiting 6 calls. TWX calls his Iowa City Emergency Corps at 12:15 p.m. and the members are at their allotted places and all working at 1:20 p.m. AYC has new BC-654. OBS transmissions are made on 3560 kc. Monday through Friday by SEF. WQQ is working ZLs on 3.85 Mc. OK3ID visited Cedar Rapids. MKF is building 14-Mc. beam. PP has ORS certificate No. 245 signed by C. D. Tuska and Hiram Percy Maxim, and countersigned by A. A. Hebert. Traffic: WØHMM 167, AUL 152, FP 50, QVA 40, WML 36, PP 28, SEF 20, TIH 20, AYC 11, WMU 5.

**KANSAS** — SCM, Alvin B. Unruh, WØAWP — CXP, Ft. Scott, is new ORS-QKS netter. Eight Wichita emergency net members assisted police department on Halloween as an emergency test under actual conditions. 29.6 Mc. was used, with LFB/Ø as NCS. Results were excellent. In the CD Party BQJ had 300 QSOs for a score of 373,500. FBI NJS and AWP also ran. At Salina, OES PKD is active on 50.4, 144, and 420 Mc. Also active on 420 Mc. are MVG and INM. ACD and KH6GD/Ø are active on 28-Mc. 'phone with high power. ESL has 3.85-Mc. schedule with BCR. At Chanute, IFR, EC, works 3.9-Mc. 'phone and 3.5-Mc. c.w. LYF and TXY are active there at times. OZN worked a Mexican station on 3.85-Mc. 'phone and received word that several Mexican hams copy his official bulletins regularly. OOU is working 7 Mc. Field Kindley H. S. Radio Club (Coffeyville) officers are: BAC, pres.; YMT, vice-pres.; BAV, secy. The club transmitter is on 28-Mc. 'phone. OAQ and BQJ added more countries to their worked lists. MAE was selected as 3.85-Mc. OBS by the Heart of America Radio Club, Kansas City. KVRC, Topeka, held an emergency drill on Oct. 12th, using both fixed and mobile stations. New Calls: WIT and DRL. AGV is on 3.5 Mc. with BC-223. AGC has NC-173. SKW has BC-610 and Super Pro. IPI has HF-152 converter and HYQ-75 transmitter, with four-element beam. BXZ has HT-9 transmitter. Traffic: WØNJS 77, KSY 42, NCV 36, OAQ 32, OZN 32, KRZ 27, FER 19, AWP 19, IFR 7, LFB 7, MAE 5, AEY 2, ZMC 2.

**MISSOURI** — SCM, Mrs. Letha A. Dangerfield, WØUD — Reports indicate the expected increase in activity has arrived with the cooler WX. ARH has been building new 28-Mc. beam rotator and an 832 final for same band and is working over his 813 final. SKA labored hard to get gear ready for the emergency test and the batteries went down after he contacted the NCS. Then on Hallowe'en some goblin put his twin leads up a tree so he is going to waterproof it before putting it back where it belongs. KIK's new receiver is a big improvement. CMH rebuilt for the SS. ZIS reports increased activity on 144 Mc. He heard KL7DY on that band when he could not get on the air. CRM operated 122 hours and 11 minutes in October, and had 230 QSOs on 7 Mc. running 75 watts to pair of 807s. GCL has moved to St. James. VMO reports a good turnout for emergency test. ECE finally got the MON crystal. DEA worked 56 stations in 28 sections in the 3 hours and 20 minutes he had for last CD Party. GBJ is active on 14 Mc. MBE is the first YL to join AEC. BCD has applied for OBS appointment. QXO is running in circles keeping all his traffic schedules. ZZW is about the same with school work plus reporting in MON. ZVS is leaving as NCS of MON since he is taking job as operator on a river boat. OUD finds 3.5 Mc. very good in the morning. Traffic: WØQXO 147, ZVS 90, ECE 28, ARH 24, CRM 24, OUD 23, VMO 22, SKA 14, KIK 11, ZZW 10, DEA 9.

**NEBRASKA** — SCM, William T. Gemmer, WØRQK —  
(Continued on page 94)

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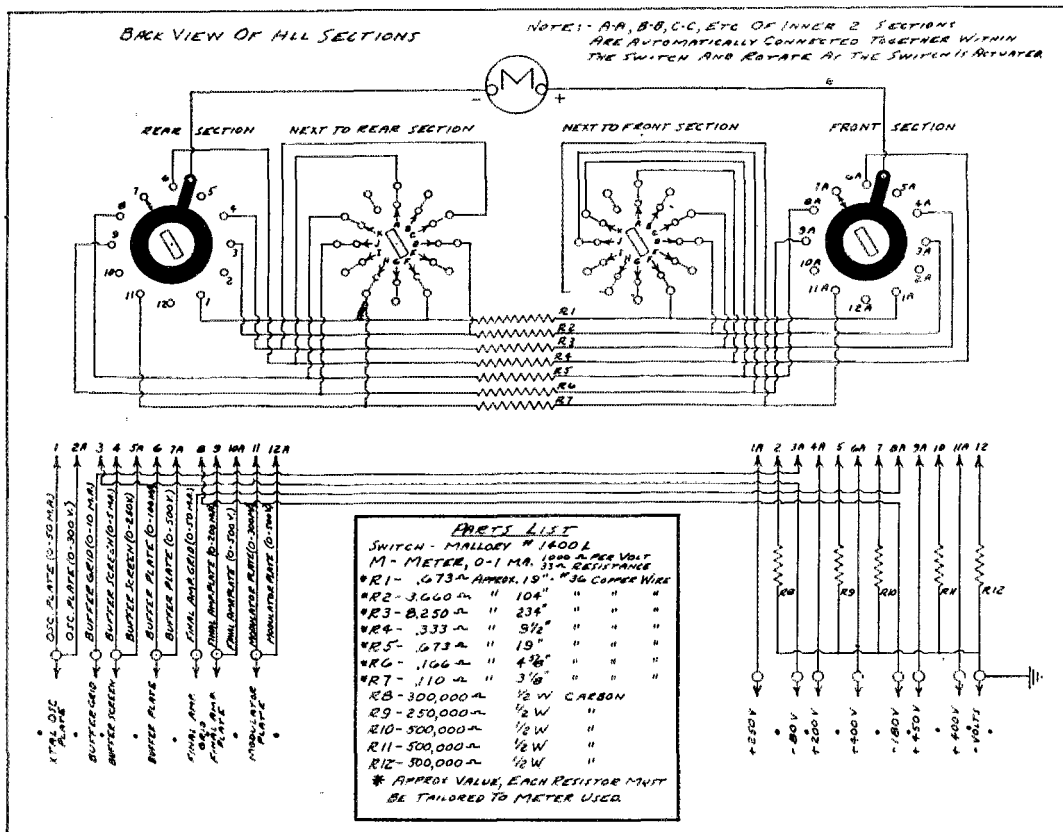
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## Meter Switching in DC Circuits

ALMOST every amateur designer at one time or another has been confronted with the task of making a single DC meter do multiple duty for measurement of voltages and currents in several electrically isolated circuits.

The most common and practical approach for accomplishing this task has been to employ a switch of some sort by which the meter may be moved electrically from circuit to circuit.

Unfortunately, however, not all conventional switching arrangements employed for this purpose have been completely free from limitations. For example, one such switching circuit commonly used permits measurement of either currents or voltages, but not both with the same meter. Another provides measurement of total current drawn by each in turn of several tubes but does not permit measurement of plates and screens separately. And with none of the popular switching



# MALLORY HAM BULLETIN

circuits is it possible to use the basic movement of the meter when both currents and voltages are to be measured.

Ideally a meter switching circuit should be so arranged that with its use a single meter may be inserted into or removed from each in turn of several isolated circuits. It should be possible to measure either voltages or currents as desired. Automatic insertion and removal of multiplier shunt or series resistors should be provided as required for expansion of the basic movement of the meter. Automatic observance of polarity should be provided so that either plate or grid currents may be measured. And it should be possible to use the basic movement of the meter when needed.

At first glance the design of a meter switching circuit incorporating each and every one of these ideal conditions would appear to be virtually an impossibility. Fortunately, however, this apparent impossibility easily becomes a practical possibility with use of a proper switch. Such a switch is available in the Mallory standard 1400L.

The 1400L has not been too widely known among Amateur designers. However, its features are ideal for this service, not only for meter switching in low power transmitters, but also in test equipment. It is so arranged that with its use a single DC meter may be inserted directly into or across any one of 12 isolated circuits for direct measurement of currents or voltages as desired. All this may be had without disturbing the electrical continuity of any of the other 11 circuits. In addition, as each circuit is selected for measurement, external shunt or series resistors may be thrown automatically into the circuit, thus increasing the basic voltage or current range of the meter.

The 1400L is a 12 position, 4 section switch. The outer 2 sections consist of 1 circuit 12 position wafers of the non-shorting type. The inner 2 sections consist of wafers with 12 positions but of a special construction to permit automatic shorting of all like positions between wafers with the exception of the position in use at any one time.

Your nearest Mallory distributor has catalog information about the 1400L and we have prepared a representative schematic with a description of how to use this switch in a low power transmitter. Circuit information is available for the asking. Just write us at Box 1558, Indianapolis 6, Indiana, and mention "Amateur Meter Switching".

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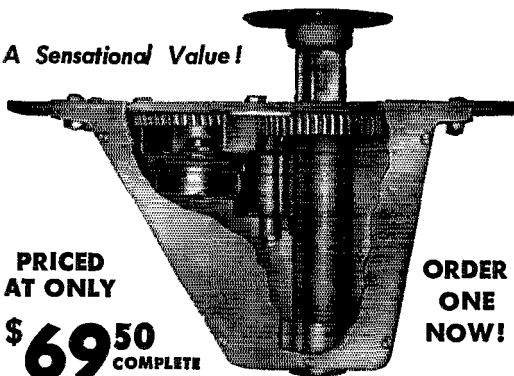
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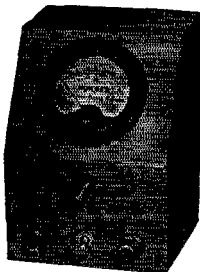
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(Continued from page 80)

DLX is back pounding brass on 3.55 Mc. ZBT is getting a c.w. rig fired up. FQB reports that EUT is active on 28 Mc. EKK is going back to 3.85-Mc. 'phone with 1 kw. WIP has BC-610 and put up 40-foot steel tower for 28-Mc. beam. RQS has wide-spaced three-element beam working FB. RUH hoisted three-element 28-Mc. beam to 34-foot pole. ZXB is now a D4. The Ak-Sar-Ben Radio Club changed meeting nights to the fourth Tuesday of each month. FQB is active week nights on 7- and 3.5-Mc. c.w. Thanks, FQB, for all the news. GDB is on 14 and 3.85 Mc. with 500 watts into a 4/250A modulated by two 4/125As, a Hammarlund 400 receiver. YOD is active on 28-Mc. 'phone. NXF, running 55 watts to an 807 final, has worked VK4, KZ5, KH6, KL7, VK3, and 45 states. He is using a new HQ-129X for copying them and has a 400-watt c.w. rig under construction. GPX is using a new three-element wide-spaced homemade beam and a VHF-152 on 28 Mc. ATB is running 300 watts on p.p. 35Ts into a 3 full-wave Johnson Q. EKP has BC-610 exciter unit for all bands. CMO is on 28-Mc. 'phone. The Nebraska Emergency 'Phone Net is active on 3983 kc. daily at 12:30 P.M. through the efforts of MLB. Pioneer Radio Club hams, NVE, VMP, and OED, took part in quarter-hour program over station KORN during Radio Week. NVE and VMP are active in 3.85-Mc. 'phone net handling traffic. AYO is on 7-Mc. c.w. and 28-Mc. 'phone. Traffic: WØEWO 3.

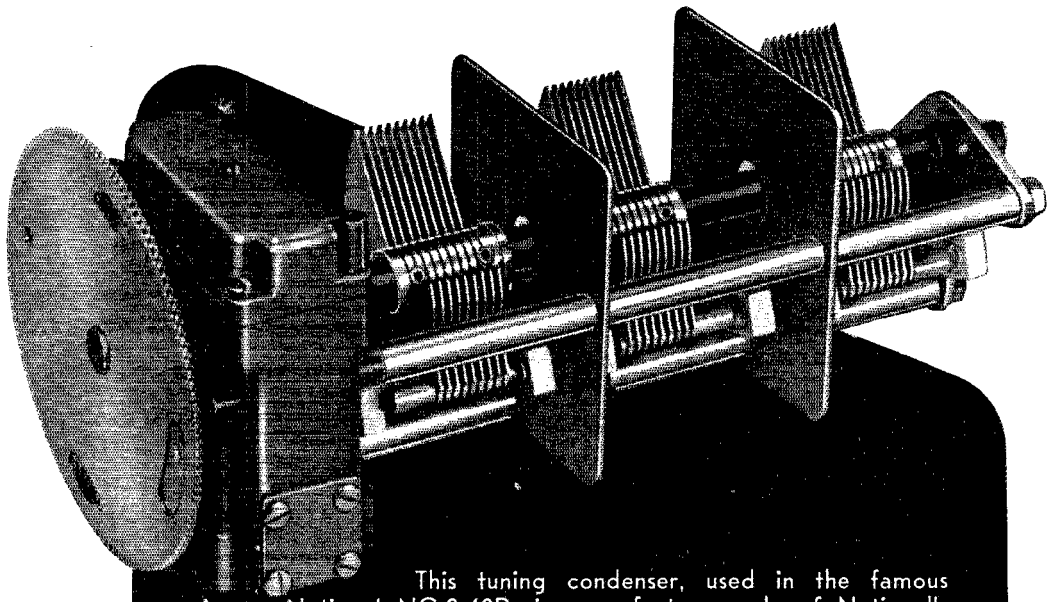
### NEW ENGLAND DIVISION

CONNECTICUT — SCM, Edmund R. Fraser, W1KQY — We sincerely regret the loss of KKS, who was killed in an accident. Club News: NARL: The club's new station call is QMF. NJM and DXT operated on 3.5 Mc. with FWH, OKY, AVN, and OHK on 144 Mc. during AEC drill. The club has purchased SCR-522 and 500-watt gas-driven generator. MRC: Newly-elected officials are: IYI, pres.; NMP, vice-pres.; DJC, secy.; EJT, treas. The club still is using 20-year-old engine driving a rewound Dodge generator, output 1 kw. for emergency power. BARA: APW is new club member. GVK has postwar WAC. Code classes are held Tuesdays at OPG and Fridays at club. NHARA: Newly-elected officials are: OKX, pres.; NGQ, vice-pres.; ATH, secy.; JQK, treas.; KQY, LTZ, and OCH, directors. AMM is conducting code and theory classes and QAK is chief operator. NWC has new exciter built by BQQ. CQRC: Newly-elected officials are: BIH, pres.; KXB, vice-pres.; OQM, secy. and treas. Nine licensed and six non-licensed hams meet the 1st and 3rd Thursdays of each month, at each other's QTH. PEN is active on 144 Mc. SARCO: OGQ reports Red Cross emergency tests still are being conducted. The radio room in Red Cross Building is equipped with SCR-522 and a 60-watt rig on 3.5 Mc. News in general: AW schedules 2BSP. IIN has new antenna ranch for QTH in South Coventry. INF is using p.p. 813s 450 watts to new antenna. DWP has new 14- and 28-Mc. beams. SZ is on 7 Mc. OBN now is CA in Farmington. APA has new three-element 14-Mc. beam. JAK and WR are gunning for WAS using 28-Mc. portable mobile rigs in their cars. AH has new Collins receiver and transmitter along with ART-13. JAK and KQY visited CH, who has swell 14- and 28-Mc. beam. EDL has new HT-9, IYI has new beam. NMP and DJC are working plenty of DX. ADW is building new rig with VFO. Doctor's orders make a layoff necessary so VB, of Newtown, is now Acting SCM. Traffic: W1AW 921, DAV, 443, INF 376, NJM 358, VB 302, EFW 252, KQY 173, BDI 154, LFE 109, ORP 86, JQD 42, TD 23, FSH 20, DXT 17, ADW 16, APA 14, HYF 6, MUW 3, IIN 2.

MAINE — SCM, F. Norman Davis, W1GKJ — SEC: LNI. PAM: FBJ. RM: NXX. Renewed ORS: FV. Renewed OPS: LNI. New OBS and EC: LDC. Congratulations to all who participated in the 'phone and c.w. nets handling traffic in the emergency caused by forest fires. The nets were carried on in a superb manner and a great deal of credit for this must go those who stood by on the frequencies, to be ready if needed or to reduce interference. Not to be forgotten was the splendid work done by stations, both in and out of the State, in monitoring the emergency frequencies and informing those who unintentionally caused interference. The Portland Amateur Wireless Association elected the following officers: CRP, pres.; JRS, vice-pres.; LZL, treas.; MFK, secy.; LNI, chief operator. VV has a fine radio amateur activities column in the *Portland Sunday Telegram* every week. NXX, net control for the P.T.N., reports activity increasing, but more stations are needed. If inter-

(Continued on page 88)



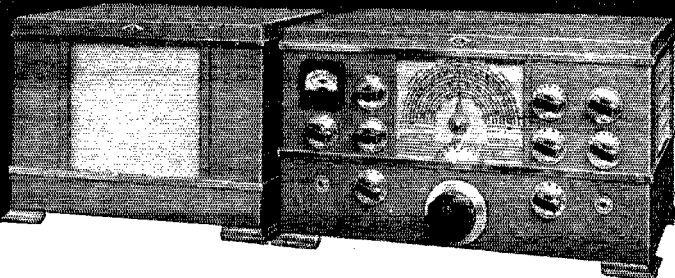


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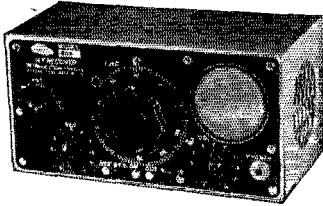
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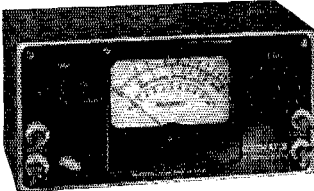


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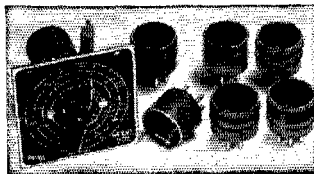


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ested, call in on 3550 kc. at 7 P.M. Monday through Friday. AMR has new VX-101 Jr. e.c.o. LNI is building a scope. AQL reports the Eastern Maine Amateur Radio Club handled about 100 messages through the club station, QDL, at the Bangor Trade Show. FZD has Collins ART-13. KTT is on 144 Mc. with 932 final. FV has put up a new half-wave doublet for 3.5-Mc. c.w. Traffic: W1FBJ 308, LNI 237, QDO 82, NXX 41, LKP 34, OHY 31, AUC 24, AFT 17, AI 9, KOB 8, FXA 6, AMR 5, GKJ 4.

EASTERN MASSACHUSETTS — SCM, Frank L. Baker, jr., W1ALP — New ECs: JYC for Sudbury, QNJ, for Wenham, BHD for Everett, and MP for Boston. LAO is new OBS. DHX is new OPS. The following renewed their appointments: ORS: MRQ, BB, LM, OJM, AAL, MEG, KTU, and EPE. OPS: BB and AAL. OES: JSM. EC: MBQ. How about some of you that are in towns where there is no EC coming forth and offering to help out? QMJ is a new ham in Norwell. QJY is on 3.5-Mc. c.w. DWO is a new ham in Millis. 11G and Chief Dispatcher Clem Corey, of the N. E. Electric System, gave talks at the Eastern Mass. Club. The Brockton Radio Club held an auction. AKY showed movies of his trip to Sweden at the South Shore Radio Club. The T-9 Radio Club held a meeting at ISX's QTH with movies and a talk on "High Efficiency Exciter Designs." HUV is going to Tucson, Ariz., until Apr. 1st. Glad to have seen so many of you at the Boston Hamfest. The Yankee Radio Club held an election of officers: AAT, pres.; OLC, vice-pres.; LQQ, secy.-treas.; directors, PZ, LAO, LN, GRV. They have a membership of 66. LMP is a radio operator with the merchant marine and is on his way to Italy. OMM has a new three-element beam for 28 Mc. New hams: QLB in Salem, QIE in Lynn. 8ZLH, ex-1LXB, went to the Boston Hamfest. KTU is new EC for Weymouth. JOB has an SCR-522. QHI has a new three-element beam for 28 Mc. which GAD and LAO helped to put up. NVB is building a new QTH in Peabody with a special shack and a four-element beam. FKS has an SCR-522 and he has his WAS Certificate. IQY has a new Johnson-Q with a pair of T55s on 14-Mc. 'phone, c.w.; he also has a .522. GNE is on 14-Mc. c.w. CCF helped out in Maine fire with messages into the Sea Gull net from Hiram, Maine; also JCK worked with GVS as NCS. MRQ is DX hunting on 14 Mc. LML has a three-element beam going up. HJ built a VFO. OA4AN visited BB and says to look for him on 28,200 kc. any afternoon or evening. NXY worked six new countries. MEG worked England and Holland on 3.5 Mc. GDY has new R-9er working FB on 28 Mc. and has J9s, C1s, and KA1s. OJM made 304,740 points in October CD Party. PZG has new HY5514 modulators. OBN now is a member of the RCC. ONZ says he is on 50 Mc. at Bedford Air Base with call PUJ and has worked PA8WN, G5BY, G5Y, and 7BXQ. EPIC was in Boston. QGJ is on with a new Collins 30K. LMB has beam up for 14 and 28 Mc. HLL is trying to get SCR-522 going and checking emergency portable rig each Sunday. ERH is sporting new 50-ft. high antenna. KWD climbed the tree. ILS, on Mt. Greylock, and JSM, on Mt. Wachusett, a distance of 66 miles, broke the record on 2350 Mc. on Oct. 5th. OK3ID attended the Boston Hamfest. AHP, NBS, and MCR were on during Red Cross simulated test. HP was ready during the bad fires with a TR-4. Traffic: (Sept.) W1CCF 124, TY 9. (Oct.) W1CCF 199, BDU 170, LML 124, EPE 98, MTQ 78, JCK 56, AAL 61, BB 45, TY 33, KKI 20, EMG 17, PZG 17, LAO 16, MDV 13, AGX 10, GDY 10, MGP 8, QHC 8, MDU 7, LM 6, OJM 6, KTU 4, HA 3, HJ 3, NXY 3, AHP 2, MCR 2, MRQ 2, PYM 2, A1P 1, MEG 1.

WESTERN MASSACHUSETTS — SCM, Prentiss M. Bailey, W1AZW — RM: BVR. PAM: JQ. SEC: UD. The October Emergency Test was a complete success in West. Mass. Many thanks to the SEC, ECs, and RM for their wonderful organization job. The real thing came to West. Mass. in the form of emergency communications during the forest fires which raged throughout this section. The Fitchburg and Pittsfield organizations were called out and functioned for several days. Disaster committees, Red Cross, and fire departments praised the operators no end. NLE, UD, and CCH have 522s. PDF and AVK have 12" television receivers. FQX has ¼ kw. on 28 Mc. LDE has ¼ kw. GYV has folded dipole working FB. The 144 Club still is functioning. MBL and MIM attended Manchester Hamfest. LTY got hitched. Our sincerest sympathy to MND and FJK. MND lost his mother and FJK lost his father during the month. Many Fitchburg hams attended Boston Hamfest. BVR attended Norwich, Conn., Radio Club, Man-

(Continued on page 100)

# It's Easy Now TO GET THAT NEW GEAR

All the latest ham gear . . . receivers, transmitters, test equipment, amplifiers, beam antennas, wire recorders, etc. . . . now offered by the RADIO SHACK on these new, far easier credit terms. You can start enjoying your new equipment RIGHT NOW. Just send us 10% of the total cost and take a full year to pay the rest.

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## SEE HOW EASY IT IS TO PLAY AS YOU PAY

Model No.	Equipment Code	Net Price	Down Payment	Per Mo. for 12 Months
<b>NATIONAL</b>				
NC-46	1	107.40	10.74	8.54
NC-57	1	89.50	8.95	7.12
NC-173	1	189.50	18.95	15.07
NC-240D	1	241.44	24.14	19.20
HRO-7	2	311.36	31.14	24.75
<b>HALLICRAFTERS</b>				
S-38	1	47.50	4.75	7.55*
S-40A	1	89.50	8.95	7.12
SX-42	4	275.00	27.50	21.86
SX-43	3	189.00	18.90	15.03
S-47	4	200.00	20.00	15.90
HT-9	5	350.00	35.00	27.83
Coils: 10M—\$10.50; 20M—\$15.50; 40M—\$11.75; 80M—\$10.85				
HT-17	5	69.50	6.95	5.53
Coils: 80M or 40M—\$3.50 per set; 20M or 10M—\$7.00 per set				
HT-18	6	110.00	11.00	8.75
<b>HAMMARLUND</b>				
HQ-129X	1	189.15	18.92	15.04
<b>R.M.E.</b>				
RME-84	1	98.70	9.87	7.85
RME-43	1	198.70	19.87	15.80
RME-152A	7	86.60	8.66	6.89 or 13.77*
RME-DB-22A	7	66.00	6.60	5.25
<b>MEISSNER</b>				
Signal Shifter	8	66.00	6.60	5.25
Coils: any band — \$4.00 per set				
Power supply — \$13.00				
<b>SONAR</b>				
VFX-680	9	87.45	8.75	6.95
Coils: any band — \$1.50 per set				
MB-611	10	72.45	7.25	5.76

### EQUIPMENT CODE

- 1 Tubes, speaker, built-in power supply
- 2 Tubes, speaker, and separate power supply
- 3 Tubes, built-in power supply, and R-44 bass-reflex speaker
- 4 Tubes and built-in power supply, less speaker
- 5 Tubes and power supply—less coils and crystals
- 6 Tubes and power supply—less crystal
- 7 Tubes and power supply
- 8 Tubes—less coils and power supply
- 9 Tubes and one set coils
- 10 Tubes — less crystal and power supply

\* 6 monthly payments

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# SURPLUS VALUES to fit your purse at the RADIO SHACK

## DYNAMOTOR SPECIALS — ALL BRAND NEW



PE-73 — 24-28 v. d-c input, 1000 v.  
350 mil d-c output .....\$10.00  
BD-77 — 14 v. d-c input, 1000 v.  
350 mil d-c output .....\$ 7.95  
PE-55 — 12/24 v. d-c input, 500 v.  
400 mil d-c output .....\$ 9.00

All outputs well filtered.

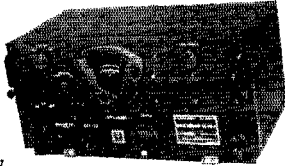
## BC-221 FREQUENCY STANDARD \$36.95

Fundamental ranges 125-250 and 2000-4000 kc; stability better than 0.003%; works on 110 vac. batteries, or vibrapak. Use it for a signal generator or to make a wonderful VFO. Complete with tubes, original crystal and calibration charts. Used but excellent working condition.



## BRAND NEW BC-348 COMMUNICATIONS RECEIVED

### \$69.50

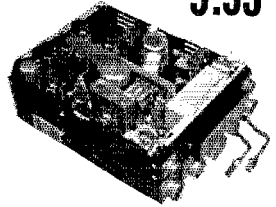


Guaranteed absolutely new and unused — in original, unopened, wood shipping cases. Complete with built-in dynamotor, crystal filter, full set of tubes, and detailed AAF technical manual. Shipping weight 61 lbs. Kit for conversion to 115-volt a-c operation, with full instructions .....\$6.50

## BRAND NEW G.E. BC-645A — ONLY

### \$9.95

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.



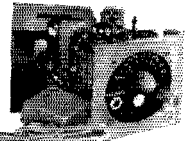
## Genuine "MAC" Key Model 200 69c

Here's a price-bustin' bargain — 3/16" silver contacts . . . circuit closer . . . tear-drop base with black wrinkle finish, heavily chromed parts. A professional model at a "give-away" price.

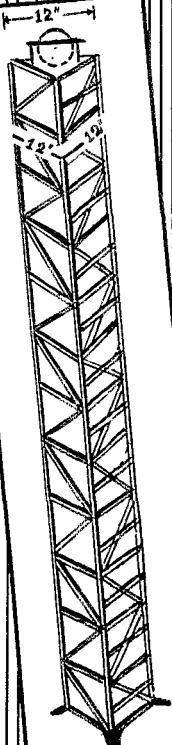


## BRAND NEW! RADIO RECEIVER BC-1206-A

### \$4.95 with tubes



Handy, all-round rcvr in metal case; tunes 200-400 KC; five tubes give pre-selector, converter, oscillator, 175 KC I.F., 2nd det., and A.F. Takes 900 mls at 28 vac. Filtered and shielded battery lead.



## TUBE PRICES REDUCED

Check these values!

Type	Net	Type	Net
2C34	\$0.45	836	1.00
2C40	.90	874	1.95
2D21	.60	VR105	.75
3B24	.75	VR150	.75
3BP1	3.00	931A	1.87
5BP4	2.25	954	.75
6AK5	.60	955	.75
211	.37	957	.75
6C21	13.50	958	.75
3E29	3.00	959	.75
2X2A	.60	1619	.15
801	.75	1625	.52
803	9.00	1624	.90
809	1.50	1626	.25
811	1.95	1629	.15
818	9.00	1651	.75
815	2.25	8005	3.15
(VT287)		9001	.52
826		9002	.60
(VT222)	2.25	9003	.52
882		9004	.86
(VT118)	2.25	9006	.67

Minimum tube order \$2.00

## TUBE SUPER SPECIALS

BRAND NEW Eimac  
304TH  
JAN-inspected  
\$3.95 ea.  
6 for \$23.20

BRAND NEW 807's  
90c ea.  
4 for \$3.10  
100 for \$75.00

3C24's 75c ea.  
6 for \$4.25

6C4 miniatures  
15c ea.  
Minimum order — 10  
866/866A 75c ea.  
6 for \$4.10

872/872A  
2 for \$2.50  
6 for \$7.00

ORDER NOW

## NEW 30-FOOT TRYLON TOWERS \$69.50

Ideal for beam antenna mounting. Made of copper bearing steel, hot dipped galvanized. Rigid, three-sided structure has horizontal cross braces forming convenient ladder for climbing. Complete with base plate, foot castings, screw anchors, steel guys, and all hardware. Shipped knocked down. Wt. 388 lbs.

BRAND NEW \$1.95  
ANH-B1 PHONES  
Complete with head-band, cushions, cord, extension cord, and plug.



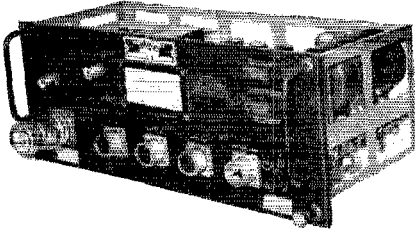
## "BUG" KEY Brand New J-36 Limited Quantity



### \$6.95

You'll be pleasantly surprised at this value . . . its counterpart has been sold by a well-known speed key manufacturer at more than double our bargain price. Made for the Signal Corps by Lionel Corp.; supplied complete with cord, wedge plug, and switch.

# NEW LOW PRICES on Popular Tubes - Parts and Surplus Specials



## FM ALTIMETER RCVR-XMTR RT-7/APN-1 \$9.95

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.

## SELENIUM FULL-WAVE RECTIFIER \$3.95

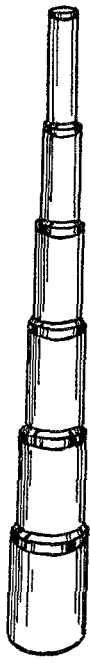
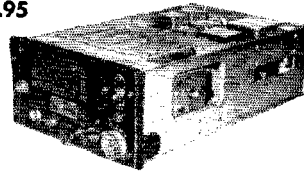
A-c input 35 volts; d-c output 28 volts, 3.5 amperes.

## BRAND NEW MOUNTED CRYSTALS

For 2-meter Band 95c ea. These are not surplus but were made for us by one of the leading manufacturers of crystals.

## RADIO COMPASS UNIT BC-433-G \$10.95

Use it as a spare for your radio compass or convert it to a triple superhet covering the broadcast band. Covers 200-410-850-1750 kc. Fifteen tubes: 6N7, 6L7, 6SC7, 6J5, 5Z4; two each 6F6, 6B8, and 2051; four 6K7; wired for 14 or 28 vdc operation. Used but in good condition. Price includes full set of tubes.



## NEW 50-FOOT TUBULAR MASTS \$17.50

Light-weight yet sturdy mast consists of 6 sections of tubular plywood telescoping together. Metal band at top of each section prevents splitting; wood ring near base of each section limits telescoping. Mast 6 1/2" O.D. at base, 4" O.D. at top. Kit includes ground spikes and two extra sections (10 ft. x 3 1/4" and 8 ft. x 2 1/2"). Wt. 170 lbs.

## GIBSON GIRL AUTO-XMTR ONLY \$9.95 complete

Hand - cranked auto - xmtr with 300-ft. antenna wire, collapsible box kite, two 4-ft. balloons, hydrogen generator, and inflating equipment. Hand generator makes fine emergency power supply: you can use the balloons for sky-hooks on your vertical antenna; and fly the box kite just for fun. Packed in waterproof case.

## MOBILE RCVRS \$5.95 XMTRS \$9.95



RCVRS Great for stand-by on 40-80 meters; phone or OW; ample band-spread; complete with 6 tubes.  
 BC-454-B 3- 6 MC \$5.95  
 BC-455-B 6-9.1 MC each  
 XMTRS Furnished with 4 tubes, including 1629 magic eye, 1626, and 2-1625's; also calibrating crystal.  
 BC-696-A 3- 4 MC \$9.95  
 BC-459-A 7-9.1 MC 9.95  
 Shipping Wt. — rcvr or xmtr — 15 lbs. ea.

## LAST-MINUTE SPECIALS

- Single-button hand mike T17B ..... .98
- Radiophone handset TS-13 .....\$2.95
- Time-delay relay — Dunco TD-649
- 110 v. 60 cycles; DPST 20-amp contacts .....\$4.95
- RG-8/U cable: 50-foot roll with PL259 connector each end .....\$1.95
- Two rolls for \$3.50
- Tuning units (used) for BC375E xmtr:
- TU-5-6-7-8-9-10 .....price each \$2.25

## BRAND NEW TEST SET TS-26/TSM

# \$1195

Volt-ohmmeter in wood case with battery compartment, removable hinged cover, and carrying strap. Ranges: 3-30-300-600 vdc at 1000 ohms per volt; 1000, 10,000, 100,000, and 1,000,000 ohms; to 10 megohms with 45 volt battery in use. Overall size 8 1/4 x 7 1/4 x 5 1/2 inches. Test leads and instructions included.

## BATTERY KIT FOR TS-26/TSM \$1.88

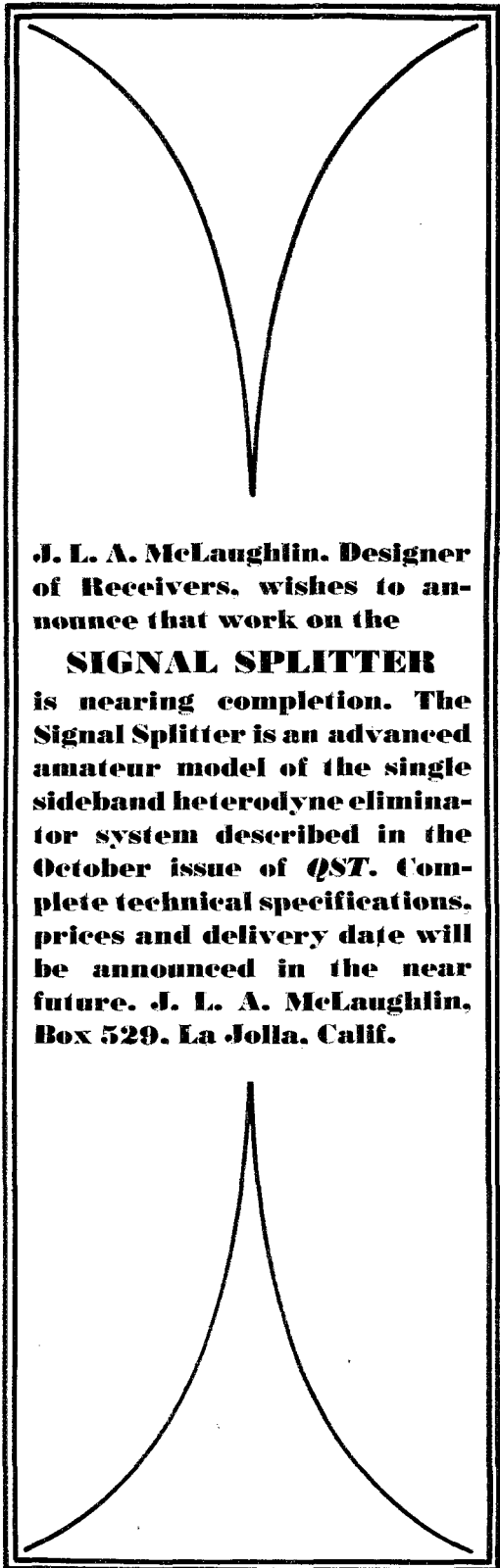
Consists of one 4 1/2-volt and one 45-volt battery.



Speed delivery and save C.O.D. charges — send full amount with order. 50% deposit required on all C.O.D. orders.

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**J. L. A. McLaughlin, Designer of Receivers, wishes to announce that work on the SIGNAL SPLITTER is nearing completion. The Signal Splitter is an advanced amateur model of the single sideband heterodyne eliminator system described in the October issue of QST. Complete technical specifications, prices and delivery date will be announced in the near future. J. L. A. McLaughlin, Box 529, La Jolla, Calif.**

(Continued from page 96)

chester, and Boston. COI is back on 28 Mc. AVU, OBA, and JXY have three-element beams. MJD is on 28 Mc. with pair of 4-125As. BIV, JXE, and AUN were on WHOB for a 15-minute program. EOB had best score ever in last CD Party. Vic operates KINRU, which reports into WMN. BDV is active on WMN. Our SEC, UD, visited the Worcester County Radio Assn. JGY gets on WMN. IBZ says three-element beam sure works. QGV is new ham in Leominster. MUN, IHI, and JE attended Boston Convention. LTA is working in White River Jct., Vt., but reports in WMN. COI and HNE attended Scotia, N. Y., Hamfest. BKG, KZS, TR, AZW, NGE, and OBA attended Boston Convention. JQ, our PAM, is organizing a 3.85-Mc. 'phone net in West. Mass. Get in touch with JQ if you are interested. Traffic: W1BVR 172, AZW 86, IHI 80; JE 32, BIV 29, MIM 21, LTA 14, BDV 11, JAH 6, EOB 4, LUA 4, JGY 3, KINRU 2.

**NEW HAMPSHIRE** — Acting SCM, Henry Izart, W1AUY — GDE is busy organizing a new emergency net. APQ did a fine job helping with fire traffic out of Maine. 2SIN/1 is on all bands from Exeter Academy. BT now is ORS. QJX and QJY are new YL operators on 3.5-Mc. c.w. The Minute Man Net meets each night on 3910 kc. Everyone is invited. 3LGV/1 is on from Dartmouth College with a 6L6 on 14 and 7 Mc. AUY has a kw. 'phone on 3.85 Mc. AWZ has taken on a new job with a Manchester radio wholesaler. APK flew over the fire area in Maine on official duty. All official appointees are reminded to watch the expiration dates on their certificates, and send them for endorsement when required.

## SECOND NEW HAMPSHIRE QSO PARTY

Feb. 7-8, 1948

Here is your chance to get NEW HAMPSHIRE for WAS!

Time: Saturday 6 P.M. EST to Sunday 6 P.M. EST. There will be no time limit and no power restrictions.

An engraved certificate will be issued to all stations who send in their report. Special certificates will be awarded for the highest all-'phone and all-c.w. scores in New Hampshire, as well as for the same high scores from outside the state.

Scoring: FOR STATIONS OUTSIDE OF N. H., 5 points per contact with each N. H. station, total points to be multiplied by the number of different N. H. counties worked (10 maximum). FOR STATIONS IN N. H., 5 points per contact with each N. H. station, 1 point per contact with stations outside N. H., total points to be multiplied by the number of N. H. counties worked.

Exchange of information required: Stations outside N. H. give RST (or RS on 'phone) report, plus their city or town and state. Stations in New Hampshire give RST report plus their county. Contest reports must list all information exchanged. The same station may be worked for additional credit on another band, 'phone or c.w. The general call will be "CQ NH" on c.w. and "CQ New Hampshire" on 'phone.

Scores must be received not later than February 28th. The decisions of the Committee will be final. Reports and scores should be mailed to Dorothy W. Evans, W1FTJ, Box 312, Concord, N. H. Committee members include W1AOQ, W1APK, W1FTJ.

This Second New Hampshire QSO Party is being sponsored by the Concord Brasspounders, W1OC, of Concord, N. H., who extend to all interested hams the invitation to join in the fun. New Hampshire Counties which can be worked are: Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham, Strafford, Sullivan.

**RHODE ISLAND** — SCM, Clayton C. Gordon, W1HRC — DW0 has moved to 60 Van Kleek Road, Millis, Mass., and Rhode Island loses one FB 00. QR works TL "C" Tuesdays and Fridays. The NAARO formed a new net on 29,080 kc. which meets the 1st and 3rd Fridays at 8:30 P.M. NCF

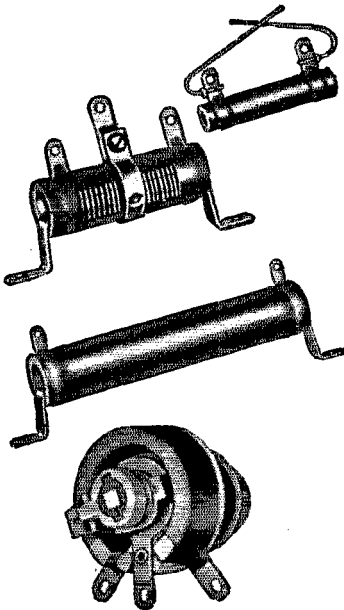
(Continued on page 102)

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**RELAYS**—provide convenient circuit control, protection, and greater operating efficiency . . . help reduce length of connecting leads. Amateur Relays available from stock: Antenna Change-Over, Antenna Grounding, Keying, Band Switching, RF Break-In, Safety, Overload, Underload, Latch-In, Remote Control, Sensitive, Time Delay. Also Industrial and General-Purpose Relays.

**RESISTORS**—exclusive features of VITROHM wire-wound resistors insure that *extra* performance needed in critical circuits. Fixed type in 8 stock sizes from 5 to 200 watts. Adjustable type in 7 stock sizes from 10 to 200 watts. Wide range of resistance values. Stripohm, Discohm, and Plaque types also available.

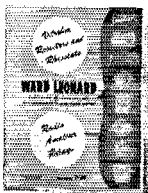
**RHEOSTATS**—for fixed or variable close control. Protected by tough, acid resistant, crazeless vitreous enamel. Sizes: 25, 50, 100, and 150 watts, in wide range of resistances.

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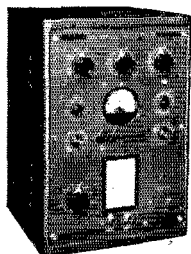
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Write for Catalog D-30. Gives complete information on stock resistors, rheostats and amateur relays. Includes helpful data and basic resistor formulas.

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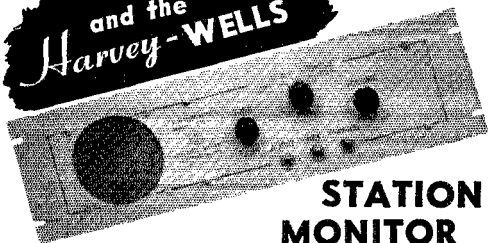


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TBS - 50  
TRANSMITTER

- ★ 50 WATTS
- ★ PHONE OR CW
- ★ NO PLUG-IN COILS
- ★ 8 BANDS WITH BAND SWITCH
- ★ CRYSTAL CONTROLLED ON ALL BANDS
- ★ OSCILLATOR OR MULTIPLIER TUNING
- ★ FOR FIXED STATION OR MOBILE OPERATION
- ★ TWO METERS TO 80 METERS
- ★ SIZE 8" x 13" x 9"

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STATION  
MONITOR

- ★ SIZE 19" x 5 1/4" x 5 1/2"
- ★ PROVIDES AUDIO NOTE FOR MONITORING ANY CW TRANSMITTER
- ★ NO TUNING OR BAND SWITCHING REQUIRED
- ★ PROVIDES PHONE MONITOR WITH 2 STAGE SPEECH AMPLIFIER
- ★ 4" PM SPEAKER AND PHONE JACK
- ★ BUILT-IN POWER SUPPLY

PRICE - incl. tubes \$34.75

Manufactured by  
**HARVEY-WELLS ELECTRONICS, INC.**  
SOUTHBRIDGE MASSACHUSETTS

raised 28-Mc. beam 15 ft., and is working DX on 28 Mc. AJQ is on 28 Mc. and is active in OO work on 14 Mc. LIFE worked traffic with ZS6FU also J2 and J9 on 28 Mc. with beam only 14 ft. off the ground. LWA has 813 all-band final. MJL had new rig for Sweepstakes. CJH is on 28- and 14-Mc. 'phone and 7- and 3.5-Mc. c.w. LDX is on 144 Mc. KLR is on 144 Mc. with SCR-522 and is new member of NAAO. OLR is on 144 Mc. NAAO now has 28 members. HRC, HEH, and TH have BC645 jobs. BOP and ARK have 522 transmitters running on 144 Mc. LPO has moved to Providence. OIK now is Class A. Traffic: W1QR 49, BTV 32, DWO 6, HRC 1.

VERMONT — SCM, Gerald Benedict, WINDL — PSD is the new RM. Give him all the aid that you can. GKA has resigned because of business pressure. QHL is a new ham in Burlington. QNM is located in Fletcher with the rig on 28 Mc. Rev. Allen, PJK, has moved to Indiana. AVP has new three-element beam on 14 Mc. FRT is on 28-Mc. c.w. QKQ is located at Northfield. EFW has new rig on 3.5-Mc. c.w. with p.p. 250TH final and has modulator with p.p. 810 completed. PSD reports into NYS and NE Nets. KP4FN is ex-W1BHR of Burlington. Traffic: W1PSD 12, AVP 11.

## NORTHWESTERN DIVISION

ALASKA — SCM, August G. Hiebert, K7CBF — After A disbanding for the summer months, the Arctic Amateur Radio Club of Fairbanks began winter meetings by electing EC, pres.; AC, vice-pres.; and DT, secy.-treas. First order of business was to organize code classes to be held Tuesdays and Thursdays at 8:00 p.m. by AO and AN. AC handled traffic through W3NMD for the Truman-Evans world flight. LL schedules his dad, W7EKT, on 28 Mc. CM, Fairbanks, has heard W3, W6, W7, and W8 stations on 50 Mc. AO and AN spend most of their time away from the job at C.A.A. working 28-Mc. 'phone. Activity on "The Rock" (Adak) includes W9AIG/KL7 and KB on 7- and 14-Mc. c.w. and 28-Mc. 'phone, with W2QDO and GU on 28-Mc. 'phone exclusively. DM has left Adak for a new Wright Field assignment. Others who have left the Williwaw country are W2QAJ/KL7 and HQ. Traffic: KL7BD 9, CM 7, LL 4, AC 2.

IDAHO — SCM, Alan K. Ross, W7IWU — American Falls: DMZ is net control station for the FARM Net, an intermountain traffic net which meets at 7:30 p.m. Monday through Friday on 3935 kc. Nampa: IYG is working DX with his mobile rig on 29,676 kc. Kuna: EMT worked a ZL1 on 3.5 Mc. with solid copy both ways. Boise: The Gem State Radio Club heard GTN discuss and demonstrate the oscilloscope as refers to amateur use. Meetings now are held the first Tuesday of each month. The following have converted SCR-522s on 144.25 Mc.: HPH, KJO, DOH, JMH, and IWU. Anyone else in the State on with these or other good rigs? It would be nice to try to work out of Boise for a little "DX." Reports were scarce this month. I am sure every one of you have something you would like to see in print, so drop me a card today. Traffic: W7EMT 53, IYG 20, IWU 9, BAA 7.

MONTANA — SCM, Albert Beck, W7EQM — SEC: BWH. Montana State College Radio Club at Bozeman has new charter. The Gallatin Amateur Radio Club was organized at Belgrade Oct. 10th. JDZ is secy.-treas. LOD is a new ham in Willow Creek; he is a shut-in. KUX, in Manhattan, is building a pair of 813s. HOZ is in forest service at Libbey. LEP and LEQ are new hams in Missoula. Both have Signal Shifters/807. CJB, EWD, BYZ, and HDM are with the CAA. JFT left for Greenland to join the Weather Bureau as operator and maintenance man. HDM is building antennas. KKT, with NWA, is remodeling his home. KDF and LZU are active on 28 Mc. BHB, BAR, FOA, CPY, and DXQ were visitors at the Fulton Ranch, the home of FLT and his XYL, HYD, in Eastern Montana. BHB and FLT are building new rigs. CPY is erecting a 28- and 14-Mc. three-element beam. AYG has new HRO. KKB, in Butte, worked a VE1 on 50 Mc. FIN is constructing these days. FTV is experimenting with his wire recorder. DYI has band-switched final. IVI moved to Denver. The Butte Amateur Radio Club met at BGG's home in Whitehall recently. 5IDO/7 is a new ham in Butte. EQM returned home from snow-bound Silver Gate.

OREGON — SCM, Raleigh A. Munkres, W7HAZ — We appreciate all the fine reports this month, gang! Keep them coming. Klamath Falls: The Klamath Amateur Radio Society was granted an ARRL Charter. KCI and his XYL, LKG, are running each other competition on 28 Mc. FJD

(Continued on page 104)





# SUPERSEDED

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## MODERN DESIGN IS COMPACT!

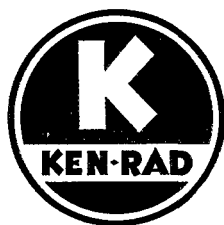
That's why Ken-Rad miniature tubes do an oversize job in your rig

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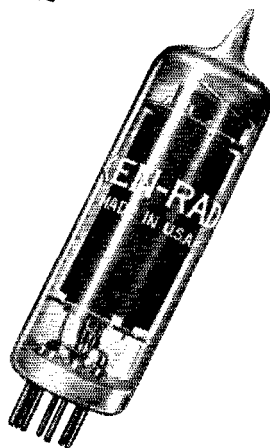
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Wherever the Circuit Says  $\Omega$

took a BC-654 on a hunting trip and returned with lots of contacts but no deer! JRU should have appointment as EC by this time. LaGrande: KVG has been named DX king of this vicinity. LPP is a new ham in town. HBO has new final but evidently isn't running KVG any competition. Portland: Portland Amateur Radio Club's new officers are: BQD, pres.; ICA, vice-pres.; IES, secy.; CUJ, act. mgr. The PARC now has twelve members in its 28-Mc. mobile net and is affiliated with the Red Cross. JMZ is doing an FB job on the traffic net. Eugene: KL reports he's getting lined up for winter with a new bandswitching job. FNZ is operating on traffic net with low power and doing a good job. Pendleton: The Pendleton Amateur Radio Club has a new club house with lots of antenna space. An emergency net soon will be formed. Medford: The 28-Mc. net was active during the search and subsequent location of an airplane crash that took the lives of Oregon's governor, secretary of state, and president of the Senate. Cutler City: RM APF still is tops in traffic! Don could use some more good traffic handlers on 3540 kc. Contact him there or write to Cutler City. EYP has a shop at DeLake. Traffic: W7APF 135, JMZ 97, FNZ 8, HBO 4, LBV 4.

WASHINGTON — Acting SCM, Clifford Cavanaugh, W7ACF — JFB took first place in YLRL QSO Party Sept. 27th and 28th and was appointed NCS for 80-meter YLRL net which meets Wednesdays at 7:30 p.m. on 3764 kc. FB, Miriam, keep up the good work. New ORS are JC, DRT, and JYQ. The following are new ECs: JRH, Sumner; EBJ, Puyallup; KNV, Olympia; JBH, Mt. Vernon. LIL reports an FB joint meeting of Tacoma and Olympia radio clubs. Mr. Budlong, of ARRL, presented the final dope on the Atlantic City Conference. BL reports working J stations on 14 Mc. with 100-watt 'phone and wonders if his new kw. rig will do as well. CZY listens to the gang on WSN from Aldercrest Sanatorium. Bet his fingers itch. DRT, at Ellensburg, has new jr. operator and finds it hard to clear WSN traffic and stir formula at same time. IG and DYH are going strong on their 9 p.m. Sunday schedule. BTV, Tacoma, received his OBS appointment and is oiling up the mike. FWD, Olympia, has added a wire recorder to the shack and will make recordings of fancy sending on WSN. EYS, Bellingham, is building high power for 50-Mc. work using a pair of 250TLs in the final. He also reports that both he and BQX heard J9AAO on 50 Mc. on October 31st. EKT, Spokane, is on regularly with official bulletins. FRU, our RM, has good Alaska outlet for PN Net and WSN. George has accepted a job as Trunk Line A manager. JPX says his 3.85-Mc. dipole blew down and he is having trouble getting it back on 55-foot mast. JYQ, Seattle, is busy building preselector when not on WSN as alternate NCS. AFS handles traffic in and out of Seattle for anyone. ETK, Tacoma, reports 91 countries, 37 zones, and a burnt-out beam motor. Is it any wonder, hi? KNV, Olympia, is busy getting the AEC gear in town lined up. KTT is on Naval Reserve cruise. HMJ is building a 28-Mc. mobile job. KWC, Bellingham, sends in a fine AEC activity report. He has nine stations in his net. GNR is new Asst. EC for Bellingham. DXZ is sending out lots of OO cards. The boys are grateful, Frank. The Puyallup Radio Club is laying plans for Field Day and the Valley Net. SVE will next be heard from in L.A. where he is attending school. CAM has been appointed EC for Yakima. DGN, Seattle, says he is too busy working on Boeing XB47s to pound brass. Traffic: W7FRU 227, JYQ 49, FWD 39, LEC 33, ACF 29, JPX 18, KWC 17, DRT 15, LIL 13, EYS 10, BL 6, JFB 4.

### PACIFIC DIVISION

NEVADA — SCM, N. Arthur Sowle, W7CX — Asst. SCM, Carroll Short, jr., 7BVZ. SEC: JU. ECs: OPP, TJY, KEV, QYK, JLV, JVW. RM: PST. PAM: KHU. KOH has stacked a six-element beam on 28 Mc. with good DX results. NCR is on 50 Mc. JVW is on 3.85 and 3.5 Mc. QYK is active in AEC work on 3680 kc. KTH is on 7225 kc., the 40-meter Nevada Net frequency. JPW is active on 3.5 and 14 Mc. JU, PZY, JXH, and BVZ have obtained Bendix TA-12 transmitters. JU and BVZ have 274Ns to be used with converters on 50 Mc. JUO has his three-element beam up again. WVZ reports good DX. FRE reports activity on all bands with 100 watts. BED is a new ORS. JLV is organizing AEC group. EEF has new three-element beam on 14 Mc. 6ZTM/7 is having good luck with n.f.m. on low power. GC is knocking out the DX on 14 Mc. KLK is building 50-Mc. equipment. Traffic: W7BED 407, KHU 173, WVZ 126, TJY 71, JU 53, BVZ 5, CX 5.

(Continued on page 108)

# Plasticon HiVolt Supplies

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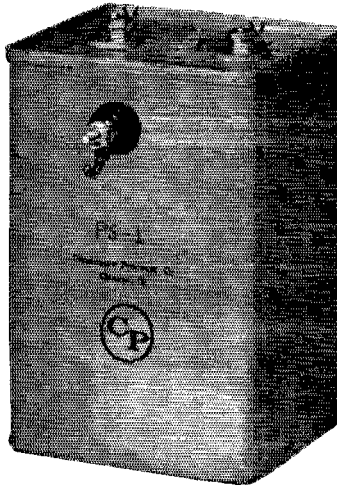
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## HiVolt PS-2

### SPECIFICATIONS:

Volts Input: 118 VAC, 60 cycles.  
Volts Output: 2400 VDC, maximum.  
Current Output: .005 Amps. DC, maximum.  
Max. Watts Input: 10 watts.  
Type of Filter: RC Filter: 50,000 ohms, 2x.1 mfd.  
Terminals: 8-32 screw and nut.  
Insulators: 118 VAC—2 bakelite washers; 2400 VDC—2 porcelain standoffs; container neutral.  
Container: Terne plate steel—gray lacquer finish.  
Size: 3 $\frac{3}{4}$ " x 3 $\frac{3}{16}$ " x 5 $\frac{1}{2}$ ".  
Weight: 2.5 lbs.



LIST PRICE **\$25.75** F.O.B. CHICAGO

Note: The PS-2 is similar in appearance to the PS-1 except that all four terminals are on the recessed top of the container.

## HiVolt PS-1

### SPECIFICATIONS:

Volts Input: 118 VAC, 60 cycles.  
Volts Output: 2400 VDC (capacitor load)  
Current Output: .006 Amps., half-wave DC.  
Max. Watts Input: 15 watts.  
Type of Filter: Not filtered.  
Terminals: 8-32 screw and nuts.  
Insulation: 118 VAC—2 bakelite washers; 2400 VDC—1 porcelain standoff; 2400 VDC—lug spotwelded to case.  
Container: Terne plate steel—gray lacquer finish.  
Size: 3 $\frac{3}{4}$ " x 3 $\frac{3}{16}$ " x 5 $\frac{1}{2}$ ".  
Weight: 2.2 lbs.

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Note: The PS-1 is designed to charge a parallel-wired bank of not more than 15 AOCOE22C3 Plasticon Energy Storage Capacitors (48 mfd.).

## Plasticon Photoflash Capacitor

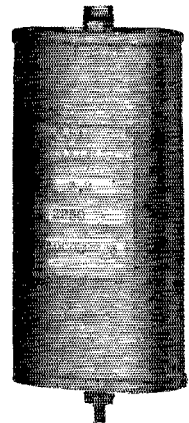
*Due to weight and size limitations, it is accepted practice to over-rate capacitors for intermittent photoflash use. This leads to frequent failures and costly replacements of large multi-section capacitors. Plasticons are made in individually cased units which cost no more, weigh less, and take up only 5-10% more volume than multi-section blocks.*

### SPECIFICATIONS:

Catalog No.: AOCOE22C3.  
Watt seconds: 7.6.  
Capacitance: 3.2 mfd.  
DC Operating Volts: 2250-2400V.  
Duty Cycle: Intermittent.  
Terminals: 8-32 screw and nut; one bakelite washer insulated; can grounded.  
Container: Terne-Plate Steel.  
Size: 2" x 1 $\frac{1}{4}$ " x 4".  
Weight:  $\frac{1}{2}$  lb.

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Note: Plasticon Photoflash Capacitors are made from 1600 to 5500 volts and up.



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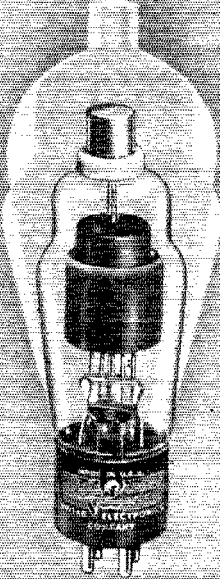
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Filament Rating 2.5 Volts—5 amps.  
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Supply Frequency up to 150 cycles  
Max. Peak Inverse Voltage 12,000  
Max. Peak Plate Current 1.0 amp.  
Average Plate Current 250 mils.  
Max. Overall Dimensions  
Height . . 5½" Width . . 1¾"

Time tested and field proven, the Z-225/866-A provides more power than the conventional type 866-A. It occupies less space, as illustrated above. This accomplishment by UNITED engineers is in keeping with the successful industry trend toward making tubes and equipment smaller—and at the same time, more efficient and powerful.

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NEWARK, 2

NEW JERSEY

SANTA CLARA VALLEY — SCM, Roy E. Pinkham, W6BPT — Asst. SCM, Geoffrey Almy, 6TBK. RM: CIS. PAM: QLP. WNI makes BPL with a good traffic total. He has returned to work for PAA so has to give up his schedule with 1AW. CIS still is working DX and added YU7KX and UD6AG, giving him a total of 122 countries postwar. YHL is active on 144 Mc. from Redwood City. TBK has heard the East Coast on 50 Mc. using a converted DM-36. USO has returned to the section and plans to go to San Jose State College. PBV has been selected as one of the operators for the Gatti-Hallicrafters Expedition to Africa. Bob reports YEZ now is in Saudi Arabia. RFF is on 14- and 28-Mc. 'phone using a pair of 807s as Class B modulators. ZZ now is using a separate HRO for 28 Mc. and an HRO-7 for the 14-Mc. band. WJM sends in a nice report of the traffic handled by the gang around Salinas. He will clear traffic going south and can be found on 3695 kc. Mondays through Fridays at 8 P.M. MFH has a broadband converter going on 50 Mc. and has heard the East Coast. IWS, OVK, GGM, CCJ, and BPT enjoyed the opening of 50 Mc. to the east and had many good contacts during the first week in November. KG is building crystal-control exciter for 144 Mc. CFK enjoyed a week's vacation in Southern California. Thanks, gang, for the FB report sent in this month. Traffic: W6WNI 536, WJM 84, NNX 37, WSH 16, DZE 11, ZZ 11, SYW 7, RFF 6, CIS 2.

EAST BAY — SCM, Horace R. Greer, W6TI — Asst. SCM, C. P. Henry, 6EJA. SEC: OBJ, EC: AKB, AHW, EHS, NNS, IT, IDY, QDE, WGN. Asst. EC u.h.f.: OJU. RM: ZM. On Nov. 7th the Richmond Radio Club was host to the Mt. Diablo Radio Club in the Richmond City Hall. On Oct. 23th the Oakland Radio Club was host club at a special meeting held for 1BUD, who gave an FB talk on ARRL, and RB, who gave a talk and demonstration on 144-Mc. equipment. On Oct. 9th the Northern California DX Club held its anniversary meeting. TT now has 148 postwar countries. TI was 2nd Northern California station to receive his postwar DXCC certificate. FDR has new antenna up and has new final with pair of HK354Cs. RMM has new beam direction indicator that works FB. EJA added six new countries to his list this month. QLH says it looks like his beam will stay up this time and is sure putting out an FB signal. YDI is active on Mission Trail Net. LMZ reports DX only fair. BIL is going after DX in a big way. MEK has new wave meter and added six new countries this month. BUY is worrying about antennas at his new QTH, 2.1 miles from Walnut Creek. PB reports new final with p.p. 250THs working FB. WP can now hear Europeans with his new NC-173 receiver. RM has new 65A tetrode driver. IKQ received his prewar 'phone DXCC Certificate. UPV is chasing 28-Mc. QSOs in his car. AED is using ART-13 as driver for his final. IDY has new final with p.p. 250THS. EE is getting the bug fast on 28-Mc. 'phone with all his new equipment. OBJ and AKB have been playing around on week ends in the field with emergency equipment. RVU is working lots of good DX. LDD, MHB, WJX, NZ, CTL, and W5LP/6 are looking for DX. FXX is getting some good QSOs with VKs on 3.85-Mc. 'phone. GEA likes his HQ-129 very much. EY says the top of his house now looks like an antenna farm, nothing but wires. BF is back on the air on 3.85-Mc. 'phone. ELW is putting out an FB 14-Mc. 'phone signal. The 50-Mc. gang have been having a field day of late working plenty of East Coast boys, one station working 18 in one evening. MLZ reports that during the Navy Day program REB, IOX, WNI, CMN, 7BED, and 7APR took the bulk of c.w. traffic. Most of the traffic came from YTL at Mare Island. MLZ, one of many outlets, was kept busy for two days. Traffic: (Aug.) W6RMM 8, (Oct.) W6MLZ 1065, ZM 61, FDR 47, KEK 16, YDI 13, TI 10, RMM 7, EJA 5, LMZ 2.

SAN FRANCISCO — SCM, Samuel C. Van Liew, W6NL — Phone JU 7-6457. FZG is working hard to complete 50-Mc. rig. QTH will be 500 feet from P.G.&E. sub-station. IRZ is getting all set with 807 rig on 7 Mc. GFW lost a pole in recent rain storm. DIX also lost a tall one due to an ambitious truck. VKT worked his ZL on 7 Mc. along with an LU on the same band. NLQ is on 3.85 Mc. with 16 watts and a new half-wave doublet for same. He also is pounding it out on 7-Mc. c.w. with the 200-watt rig. RSI and BDU are very active on 28-Mc. n.f.m. CWR, of Eureka, sends in the following from that area: ZZK is rebuilding and looking for high voltage transformer. CWR is planning new rig. NAO now is operating f.m. The Humboldt Amateur Radio Club is coming alone fine with a

(Continued on page 108)



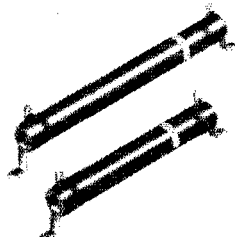
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## AMATEUR ITEMS

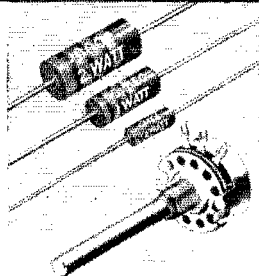
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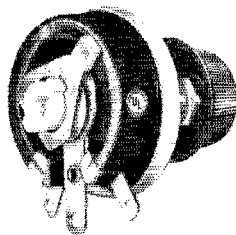


"Little Devil" resistors are individually marked. In 1/2, 1, and 2-watt,  $\pm 10\%$  tol. Also  $\pm 5\%$  in 1/4, 1-w sizes. RMA values, 10 ohms to 22 megohms. Type AB, 2-watt molded element potentiometer for industrial use. 50 ohms to 5 megohms in linear taper.

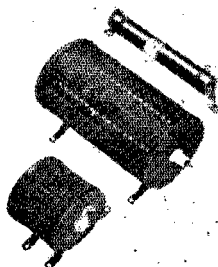
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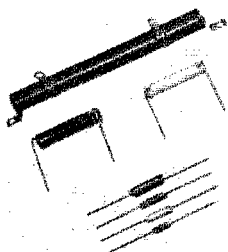


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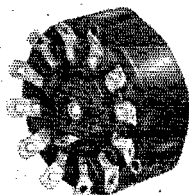
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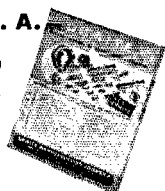


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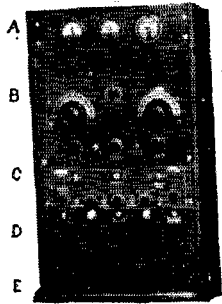
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A. The new Simpson illuminated meters read buffer grid current, buffer plate and final grid current, and final plate current.  
 B. R.F. section has symmetrical controls on front panel, which adjust final grid tank; band switch 10-11, 15, 20, 40 and 80 meters. Excitation control adjusts proper drive to 8005's when different bands are used. Illumination switch for meters. Buffer plate tuning. Send-receive switch transfers antenna, power and receiver in one operation. Center meter switch to read either buffer plate or final grid current.  
 C. Recommended Sonar VFX 680 NBFM exciter. (Any unit capable of delivering 1/2 watt on all bands is applicable.)  
 D. Heavy duty power supply delivers 1250V at 500 ma plus 700V tap at 100 ma. Kenyon T line transformers throughout. Swinging and smoothing chokes plus 3 mfd. of filter. Has high voltage relay which removes plate voltage from final when neutralizing. Power relay operated by send-receive switch or remote switch breaks input voltage to primary of plate transformer. Fused line input.  
 E. Standard streamlined Relay Rack 36 3/4" x 22" x 15" overall. Rear and top doors have safety interlock system.

### OTHER FEATURES

Separate filament transformers throughout. Built in bias supply enabling oscillator-keying as well as protection against excitation failure. Tube base clamps hold the tubes rigidly in place. Absolute symmetry of all r.f. wiring. Provisions for remote control switch. Top door on relay rack provides easy access to change 8005 plate coils.

Complete kit of parts includes all components, tubes, meters, coils, panels, chassis, wire, Power Supply components, instruction manual, schematics and drilling templates. Less Sonar VFX-680: 60c. per watt. **\$29950**  
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# SUN RADIO

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steady gain in membership. EYY is all set for the coming winter DX season, having revamped the shack and operating position. He had a personal visit from G5NW. He was very much impressed with ham doings. MHF is looking for schedules on 7- and 14-Mc. c.w. His DX total now is 118 postwar stations. HJP, now at the University of Minnesota, is operating a pair of Eimac 250TH tubes running a California kw. on 14-Mc. c.w. Art has been assigned the call DSF for the Department of Military Science and Tactics at the University of Minnesota. RBQ has a new 70-ft. steel tower with a 14-Mc. rotary beam on top which works out fine from all reports. Bill also has a new Collins receiver and between getting acquainted with it and the new rotary he is plenty busy. He is gunning for DX in earnest now and plans to give the gang plenty of competition. Now comes the DX season and most of the boys are busy getting the last drop out of their rigs and looking forward to the coming contests. The Marin Radio Club members have a net going now on 29-Mc. Join in the fun. The San Francisco Naval Shipyard Amateur Radio Club put on a fine exhibit Navy Day at the Hunters Point Navy Yard. An amateur station was installed with emergency equipment on both 144 and 7 Mc. Traffic was handled throughout the day between QXT/6 on location and NL on 7 Mc. and later relayed through the Pioneer Net on 3.5 Mc. to the various destinations. About 500 messages were handled. The Shasta Radio put on a swell hamfest the week end of Sept. 27. Many of the gang made the trip north and had a fine time and also brought home some swell prizes. The San Francisco Radio Club's meeting of Sept. 25th was honored by the presence of our ARRL president, George W. Bailey, who gave us a very interesting talk on the telecommunications conference. At the Oct. 27th meeting of the San Francisco Radio Club the Bay Area amateurs were again in for a treat, having with them A. L. Budlong, 1BUD, who gave added information on the telecommunications conference. Also present was J. L. Reinhartz, who gave us a fine demonstration on a unique exciter for 144-Mc. equipment using the new 2E-26 tubes. Thanks for the reports. Traffic: W6VPC 105, JWF 38, MHF 13, NL 11.

SACRAMENTO VALLEY — SCM, John R. Kinney, W6MGC — Asst. SCM, R. G. Martin, 6ZF, SEC: KME, RM: REB, OES: PIV. At the meeting of the SARC held Nov. 3rd, 1BUD reported on ARRL activities and Atlantic City. He was accompanied by EY, ARRL vice-president. 3IBS, ex-1QP, gave a very interesting lecture on simplified 144-Mc. control, which was sponsored by the SARC, the Army Signal Assn., the I.R.E., and the A.I. of E.E. on Oct. 30th in Sacramento. KME reports that the local chapter of the Red Cross has offered portable a.c. power supplies to Sacramento Emergency Net members for a very nominal sum. ZQD is activities manager of the Shasta Radio Club of Redding and is assembling an emergency net in his locality. CQK is now in Woodland and reports a very FB station with p.p. 304Ts and an HQ-120X. He also has acquired a 70-foot pole to mount his 28- and 14-Mc. beams. PIV reports that not much DX is heard on 50 Mc., that the traffic nets are very busy, and that 144-Mc. is very active with 90 per cent of it crystal-control. WTL reports that he is building a new exciter, that YTN is attending college at Davis, and that RMT is proud dad of a jr. operator. All of OJW's official bulletins are transmitted on 3.9 Mc. He now has 49 California counties worked and 45 verified in the California Counties Worked Contest of the SARC. AF now is Diesel engineer on Western Pacific passenger trains. A card was received from ZF, on vacation in sunny southland of Alabama. Traffic: W6REB 312, ZF 55, VDR 35, PIV 20, OJW 1.

SAN JOAQUIN VALLEY — SCM, James F. Wakefield, W6PSQ — Asst. SCM, Wilbur B. Osler, 6VPV, OYF has 522 on 144 Mc. MHD is on 3.85 Mc. with n.f.m. MDQ is on 28-Mc. mobile with KL7, J9, VE8, and KM6 to his credit. GQZ and EXH hold daily schedule on 144 Mc. as GQZ goes to and from work. ZYN has 6L8 on 7 Mc. SARC has 29,400 Club on the air every night at 1930, and has had an average of 12 stations a night since it started. WQR is Net Control. YGZ has 300 watts on 28-Mc. n.f.m. using a 24G in final. INP and PJJ have a family 28-Mc. mobile rig. Fresno's four 50-Mc. boys got in on the FZ opening the first of November. JPU, EJD, HXA, and PSQ had fine contacts with the 1st, 2nd, and 3rd call areas. It was better than 28 Mc. No QRM to speak of. JPU, EJD, and HXA have MBFs with 3 watts out and PSQ has converted MBF transmitter with 18 watts input. IFE broke the 3300-Mc.

(Continued on page 110)

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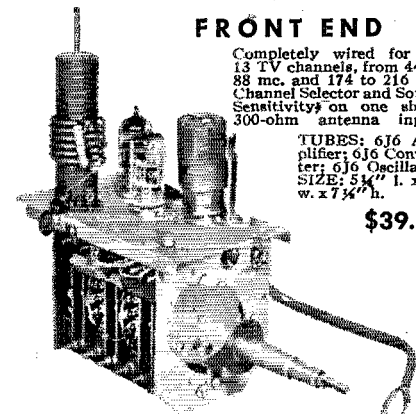
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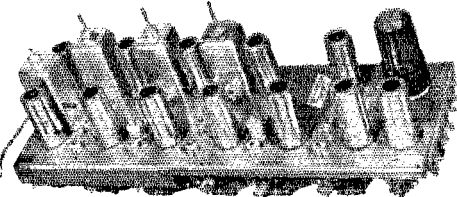
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record working from General Grant Park to Mt. Hamilton. YWQ has new beam on 28 Mc. as has JWK. ZKD a YL, is the youngest ham in Fresno. JWK has new rig using 5514s on 28 Mc. running 300 watts. The DX fight between KUT, PCS, and SRU continues, with PCS leading by a small margin. SRU has added another element trying to get the edge. MEY and GWM are local outlets for Mission Trail Net in Fresno. QFR has five 70-foot poles up for four Sterba Curtains and several long-wire antennas. He has a BC-810 on the air on all bands. WQR has 850 watts on 28- and 14-Mc. 'phone. Appointments are open.

**ROANOKE DIVISION**

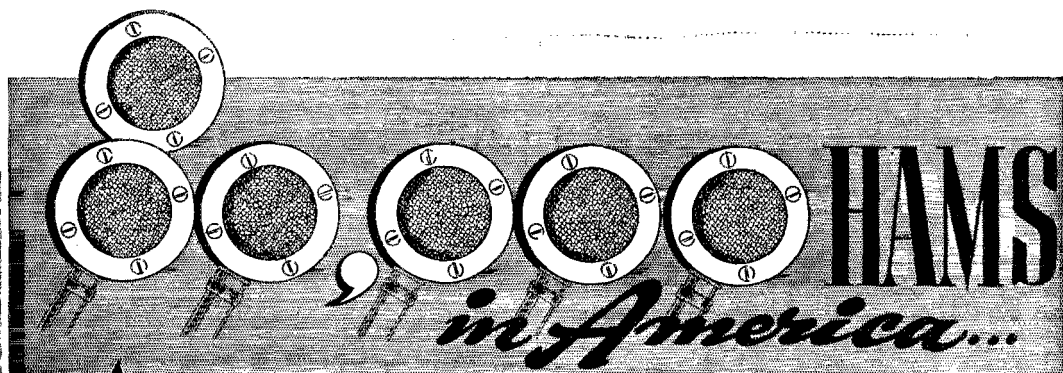
**NORTH CAROLINA** — SCM, W. J. Wortman, WACYB — #AHX now has call 4MOC and is located in Whiteville. FXU is proud possessor of a new HRO-7, but has been swarmed under with difficulties trying to get on at new QTH. BCS is sporting a new rig, and a new receiver won at the Charlotte Hamfest. BYA is busy with another 14-Mc. VFO, and works lots of Europeans on 28 Mc. NI has built a new high-fidelity amplifier. IZR has a rebuilt preselector going, but can't get quite enough excitation to his final for satisfactory operation. KDI has a new speech amplifier with compression. LPY, IDO, and IFS are busy on 28 Mc. HUL is running a good half gallon on 3.85-Mc. 'phone. Ex-2JEB now is 4MRE and is busy on 28 and 14 Mc. LAH is ogling n.f.m. after a crack with low power a.m. DCW held a hot dog roast for the Winston Key & Mike Club. Lots of fresh meat looking for new tickets as a result of the recent visit by the R.I. The EC gang in Charlotte held a drill in line with the National Emergency Corps test. Those taking part were EYF, CFL, DSY, DLX, GKG, HEI, HGC, JVL, LKI, LSU, EO, and FO. Test messages were handled from the mayor and other prominent citizens. There are now fourteen members in this Corps. How about some AEC activity from the clubs in other sections of the State. Traffic is picking up with the organization of the N.C. Net. Anyone interested in traffic, please contact CFL. Traffic: W4CFL 70, IMH 23, CYB 7, EYF 7, HUJ 1.

**SOUTH CAROLINA** — SCM, Ted Ferguson, W4BQE/ANG — Most of AZT's time is devoted to 14- and 3.85-Mc. 'phone. KMK, Greenville EC, reports that several of the Corps handled emergency traffic into Florida and Mississippi. MOP has a converted 50-Mc. receiver. HMG has a new three-element beam for 28 Mc. GKD is on 144 Mc. New officers of the Palmetto Amateur Club are BZX, pres.; GB, vice-pres.; MAQ, secy.-treas.; and HEV, trustee. DNR is on 7-, 14-, and 28-Mc. c.w. with p.p. 812 final. LTW has 120 watts to p.p. 1625s on 7-Mc. c.w. DFC works 7, 14, and 28 Mc. with 450 watts. ANK is building a new high power for 7-Mc. c.w. and 28-Mc. 'phone. IZD has 25 watts on 28-Mc. 'phone. MRJ works Florida to Canada on 3.5-Mc. c.w. with clothes line for antenna. HTR is on 28-Mc. 'phone; also 14-, 7-, and 3.5-Mc. c.w. CZA is working 7-Mc. c.w. MSN is on 3.5- and 7-Mc. c.w. FCK works 14-Mc. c.w. and 28-Mc. 'phone. BWV is on 28-Mc. 'phone. CE/4 is on 3.85- and 28-Mc. 'phone and 7-Mc. c.w. Those taking part in Charleston's 28-Mc. 'phone net are ANK, DFC, HTR, IZD, LMB, FCK, CE, DBK, BWV, and PG. GB is on 28-Mc. 'phone. BZX is president of the Columbia Club. CEL is on 3.85-Mc. 'phone. KYW is looking for 144 Mc. contacts.

**WEST VIRGINIA** — SCM, Donald R. Morris, W8JM — Wheeling amateurs are reorganizing their radio club which was quite active before the war. BTW worked a VK on 3.5-Mc. c.w. during the VK Contest. ZEW has moved to Minnesota because of his health. FQQ has added modulator to his 1-kw. 14-Mc. rig. Ex-AKZ now is 4KIX in Alabama and on 14-Mc. c.w. The MARA moved to spacious new quarters in the B. and E. Bldg., Fairmont, and has plenty of room for transmitters and aerials for all bands. The club meets the first Friday of each month at 7:30 p.m. Visiting amateurs are welcome. TDJ, MIP, GBF, and JM gave 15-minute program over WMMN on amateur radio and JM participated in 30-minute program over WPDX on emergency communications. GBF visited 3GEG and 3NCD. VAN won the DX 'Phone Contest in W. Va. VAB has new hilltop location with 75-ft. tower and 1-kw. 3.85-Mc. 'phone rig. USF attended State radio council meeting in Fairmont. Next meeting will be held in Charleston in February. Clubs and amateur groups are urged to be represented at this meeting. New ORS: FMU, West Va. Net meets on 3770 kc. Mon. through Fri. at 7:30 p.m. Outlets are needed in Parkersburg and Martinsburg. Traffic: W8GBF 102, JM 61, CSF 46, BTW 10, DFC 7, PQQ 7.

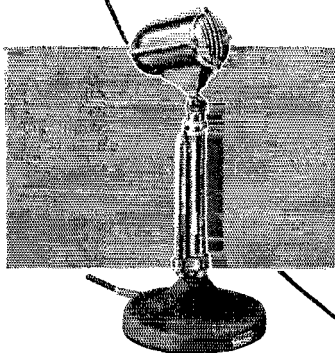
(Continued on page 118)





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### ROCKY MOUNTAIN DIVISION

**COLORADO** — SCM, Glen Bond, WØQYT — GIR, who lives in the Black Forest near Colorado Springs, is back on the air after a wait of 18 months with a 616 on 7-Mc. c.w. SGG will be glad to take traffic for relay to the South. Otto has a 55-watt rig on 7-Mc. c.w. LZ Y is handling more traffic now and will have more power soon. PGX, in La Junta, is on 3.85-Mc. 'phone every morning with the Coffee Club and each evening with the Brown Jug Club. APZ and OWP, in Brush, are conducting a class in theory and code. OWP can be heard almost every morning and evening in the Coffee Cup and Brown Jug Clubs. QDC is rebuilding, putting everything in a 6-foot rack. Here is some dope on the Bell Club: SAY is on 14-Mc. c.w. JRN is building a kw. rig. ACB is on 14-Mc. 'phone with a beam. WES has a new home and NPT is doing good within a ten-mile radius of Denver on 3.85-Mc. 'phone. ACA is having oscillator trouble and has burned out his keying relay. VIK is watching the 50-Mc. band and has made some good contacts. VGC has a new Sonar NFB exciter on 28 Mc. driving his T55. IXM worked Holland on his home rig but could not be heard on the mobile rig. Traffic: WØFPZ 42, QYT 41, LZ Y 19, OWP 10, PGX 5.

**UTAH-WYOMING** — SCM, Alvin M. Phillips, W7NPU — The USAC is conducting successful 144-Mc. hidden transmitter hunts. TAR is working 14-Mc. DX with his Signal Shifter and folded dipole. JZC has new 28- and 14-Mc. beam. Profs at USAC now include CKI, KIR, and 6PIA. New USAC officers are TAR, JQU, and KSC. GBB is moving traffic on Pioneer Net, FARM Net, and a trunk line and soon will have his new 500-watt final going. KIY, using an 807, is working traffic and also is gunning for a Rhode Island QSO for WAS. UTM will QX 3630 kc. at 7:30 nightly for Utah stations to help him out with his Utah traffic. Recent appointments are as follows: RM to GBB, ORS to UTM, SEC to JQU. Congratulations, fellows. Let's realize that the new Section Emergency Coördinator will need the cooperation of all. A. L. Budlong held meetings at Cheyenne and Salt Lake City to explain the workings of the frequency allocation machinery and its results. At the Shy-Wy meeting CIB won the BC-375 door prize, donated by BAH and ICZ. KEZ has transferred to San Francisco. JVU is enjoying his 120 watts and new four-element 14-Mc. rotary beam. LLH is lining up a net for Northern Utah. Traffic: W7KIY 90, GBB 87, UTM 38.

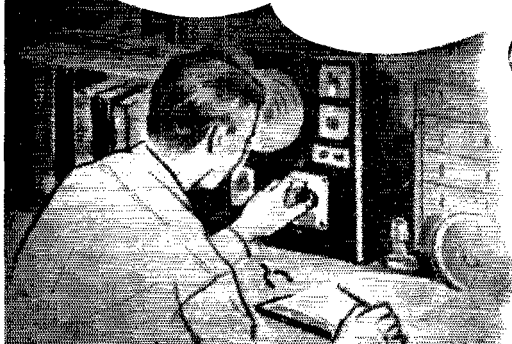
### SOUTHEASTERN DIVISION

**ALABAMA** — SCM, Arthur W. Woods, W4GJW — AUP attended Cracker Net meeting at Cochran, Ga., on Oct. 19th, and is building new portable rig. EPE is running 180 watts to a pair of 3C24s on 14 and 7 Mc. FMZ works 7 and 28 Mc. and submitted his OPS for endorsement. MHD is becoming interested in Emergency Corps work. DMV is working plenty of DX on 14 Mc. with 75 watts. ATF and HLJ attend Rebel Net meetings regularly. IKK has been heard on 'phone recently. ELX is finally going e.o.o. KUX visited Mobile and Pensacola. HCV is nearing completion of push button controlled all-band transmitter. RM is on 3.85 Mc. MKV is on 28 Mc. IAT is working good 14-Mc. DX. IMK is working 7 and 14 Mc. GJW visited MS while in Pensacola. BMM continues to operate on 3.85 Mc. HA is new OBS in Anniston. MLU is the call of the Vulcan Amateur Radio Club at the Army Reserve Air Base in Birmingham, and may be heard on 28, 7, and 3.5 Mc. GMH won a pair of HK24Gs at Vulcan Club Halloween Party. MSP and MAK are new calls in Birmingham. FIG is on all bands from 144 to 3.85 Mc. BLY is on 7 Mc. FKG is on 14-Mc. 'phone and c.w. FSW is on 144 Mc. GJC is on 28 Mc. Traffic: W4AUP 21, EPE 3.

**EASTERN FLORIDA** — SCM, John W. Hollister, W4FWZ — High water and wind damage: ASR, DQW, JQ, and IKI. Gadgets: The ETB mike holder. Thyatron controls by IVX. Beams: The JQ ZL-V beam donated by WS, QR, and FWZ. All Tony has to do is to get it up. LXA needs New Mexico, Utah, and Montana for WAS. BT made WAS after 17-year effort. DX who-dunnits: GHP, CFO, LXA, and EHU. Daytona Beach: ASR re-discovered his VFO and is going on c.w. again. ETB has good dope on simple VFO and 348 conversion, the VFO is made up from old BC-375 tuning unit. Ft. Lauderdale: In spite of high water, ZS did an outstanding job during the storm. FGU is back on KKe Net again. JAX: It's a ten-element 144-Mc. beam for EID, the lad who has been a demon on 50 Mc.

(Continued on page 114)

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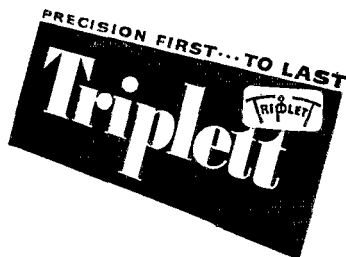
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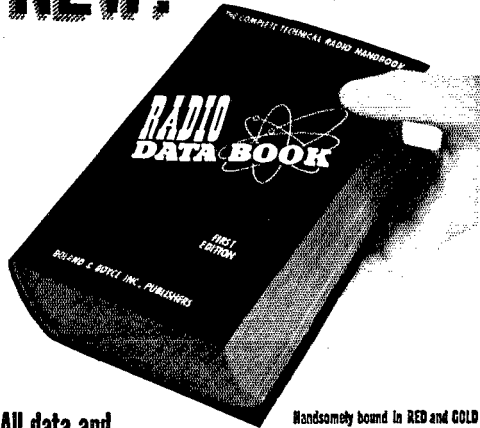
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HWA has gone mobile on 27 and 28 Mc. with Silver and Gon-Set gear for QSOs while traveling around the State. Miami: They dood it again! Now it's a 14-year-old YL ham, MKP. Brooksville: MNT, 13 years old, takes 20 w.p.m. and asks about traffic net. Orlando: CPG is the prime mover in the state-wide 144-Mc. roundup. Get in behind this, fellows, for greater activity on 144 Mc. Palatka: The ARRL b.c. radio script was presented over the KKO Net from QR. It was well presented, thanks to EVB, GCD and QR. Umatilla: AYW reports 141,930 points in the last CD Contest. Please, gang, let's have more activity in the CD and LO Contests. LCZ, on 3675-kc. c.w. net and rag-chew spots, has only battery-powered generator at his QTH. Tampa: LXX has been appointed ORS. KM has big 14-Mc. beam but it is not yet known whether it is for display or for use in DX. PB's rig emits a fine signal. The SCM hollers, send activity reports on the first of each month. Traffic: W4ZC 200, DQW 124, BT 81, IQV 71, AAR 63, JYG 18, FWZ 12, GHP 12, JQ 12, LXX 9, IKI 6, LCZ 5, MKP 2.

WESTERN FLORIDA—SCM, Luther M. Holt, W4DAO—RM: AXP. The Pensacola Emergency Corps made a broadcast of a simulated emergency over WBSR, the purpose of which was to acquaint the public with emergency work being done by local amateurs. MOB is newest Pensacola call. LRC is on 28-Mc. 'phone. 5FHF/4 is ex-4FII. 3NGS is in the Navy at Pensacola. DLO is new OO. AXP has new R-9er. GTJ has low power on 7 Mc. MS., EGN, DZX, and DAO work 14-Mc. 'phone. DXQ keeps 7 Mc. hot. GXN was transferred to another Naval base. MFY visits Pensacola almost weekly. Members of the Pensacola Emergency Corps include KFP, JV, EQR, DAO, 9ERT, LCY, HIZ, MOB, BCC, CNK, and others. MIEN is building new e.c.o. EQZ is building new three-element beam, also portable a.c. power plant. QK built butterfly tank condenser. JJZ moved into new home. FDL works 7 and 28 Mc. LRX is new OBS. ACB visited the Pensacola gang. Traffic: W4AXP 38.

WEST INDIES—Acting SCM, Everett Mayer, KP4KD—NY4CM has DX total up to 155. KP4AM, on 28 Mc., worked G and ZS6 with the ZS6 running 4 watts. On 27 Mc. Roger worked HC1KP for a new country. BE QSOed W6s with 12-watt 'phone. DV has 1 kw. for 7 and 14 Mc. c.w. and 500 watts for 14- and 28-Mc. 'phone. AC put 2 watts on 28 Mc. with indoor antenna and worked locals. Roberto has new HQ-129X. FN and AC got mixed up with 220-volt a.c. line while putting up antenna for FN. BJ worked ZC6 for new country. FP and FV are active on 28 Mc., FP with Meek and FV with Globe Trotter. AT now is KV4AT at St. Thomas, V.I. FI is active in Mayaguez. EW has new 28-Mc. rotary beam operating FB. W4LQG/KP4 is active on 28 Mc. while in P.R. AK finally got a UA card. KD has 121 countries, postwar. The Puerto Rico Amateur Radio Club board is quite active with KP4CL, new XYL prexy. Traffic: NY4CM 19, KP4KD 6, DV 4.

**SOUTHWESTERN DIVISION**

ARIZONA—SGM, Gladden C. Elliott, W7MLL—About 500 hams attended the Southwestern Division Convention in Phoenix and had a rip-roaring time. Nearly every city and town in the State was represented and there was a big turnout from California with the W6s taking home a lion's share of the prizes. MAE worked KP6AA on 3.85-Mc. 'phone, which is some sort of a record as Ken uses only 12 watts input. JVK has a new four-element rotary to go with his 400 watts. PBD worked MD5AF in the Suez area. NZS has a new Hammarlund rig on 3.85- and 14-Mc. 'phone. SMZ has a kw. on the air with a new TWT transmitter and is working a lot of DX. QNC and UPX have five-element rotaries on 28 Mc. in Safford. LOC has a new four-element rotary. ROD and KWW are on 50 Mc. OWX worked Newfoundland on 50 Mc. JFG worked all South America on 14-Mc. 'phone with an 8JK antenna. 9NEO/7 is on 3.85 Mc. and 7 Mc. in Tucson. PEY worked D4AXS, who was using 6 watts. PEY reports 82 countries and JIW 70. KRW gets good reports on n.f.m. with an 813 in the final running; 400 watts. New officers of the Old Pueblo Club are: LHD, pres.; LAD, vice-pres.; SMZ, secy.-treas. JEB had his 28-Mc. mobile rig stolen.

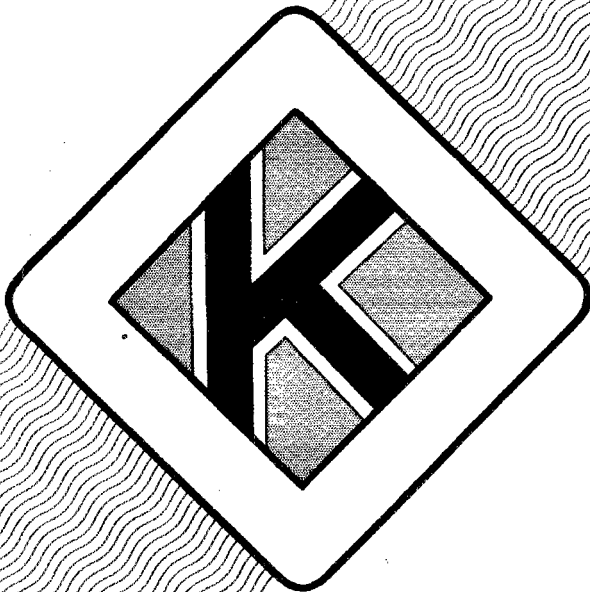
SAN DIEGO—SCM, Irvin L. Emig, W6GC—Asst. SCM and SEC, Gordon Brown, 6APG. The Arizona section certainly did a fine job in handling the Division Convention. DEY is working 50 Mc. with new converter but soon will be on 10,000 Mc. with QG, both using surplus gear. VJQ, LUJ,

(Continued on page 116)

# Sign of Transformer Reliability

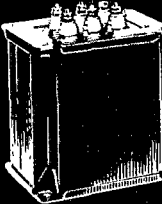
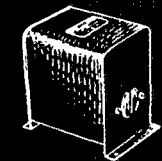
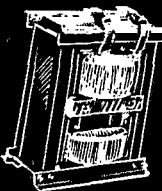
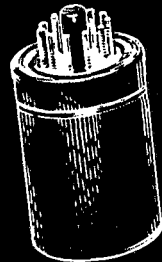
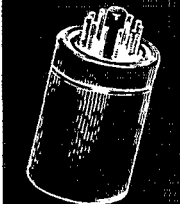
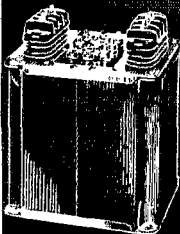
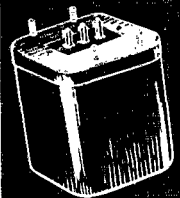
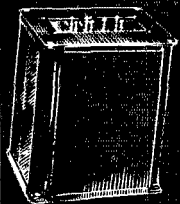
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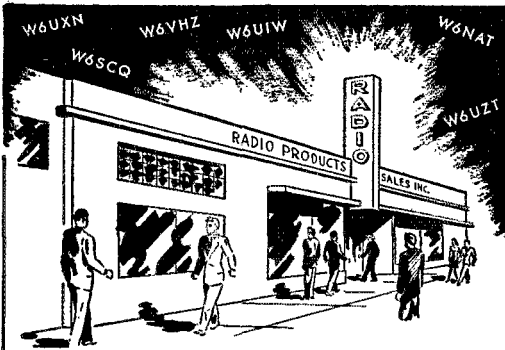
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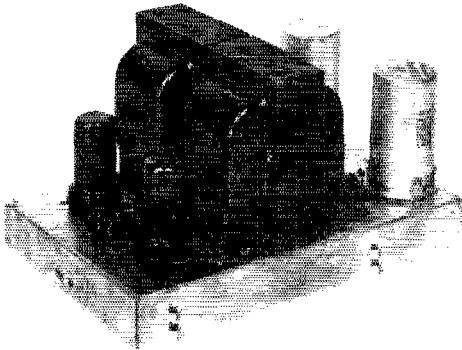


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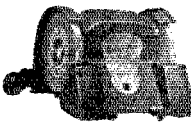


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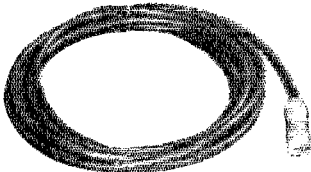
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and WZL schedule W6YOT/C6. Welcome to new XYL. AQL! The XYLs of VUK and WUW expect their licenses any day. CHV rebuilt final and erected a new 28-Mc. beam. netting three new countries! BGF is active on the Pioneer Net. BAM says DX is so good he has no time for traffic. CNQ sends nice card about doings in Calexico. DWA is moving to new QTH. RDI is working out fine with 9 watts on 28 Mc. ZUR and YXU are going on the air with ATC transmitters. LRU has new DM-36 and 200-kc. crystal. AHA is a new call. ROQ works 7 and 14 Mc. when not busy at KVOE. SPK and QG worked 7ACS/KH6 on 50 Mc. during recent opening. URU is building his 3.85-Mc. 'phone into a rack. NGN received a nice stack of DX QSLs. BAG is on 144 Mc. ZWY is working lots of DX on 28 Mc. with a pair of 35Ts. HWJ is active on 3.85 and 144 Mc. RWP has a new Taylor 900-A. PHJ, FCI, and ZWL are on 7 Mc. UAB, on Victory Ship QRD, expects to work 28 Mc. while en route to Japan. ADT is pounding brass on a banana boat to Mexico. The Palomar Club had a fine turnout of 70 amateurs and friends at their picnic. 1BUD, of ARRL, gave an interesting talk on the Atlantic City Conference at a joint meeting. The San Diego YLRL had a luncheon with Miss Diana Tuck, ZS6GH, as guest speaker. WUW raised power to 300 watts. PFQ worked PK6AA on 3.85-Mc. 'phone. WXW works three-way with VKs on 27 Mc. YWR is on 7 Mc. YYM is back from Guatemala. FVJ has a new rig. Traffic: W6CHV 40, WZL 40, BGF 35, VJQ 35, LUJ 33, LRU 12, DEY 7, CNQ 6, WUW 6, MI 4, YWR 2, OBD 2.

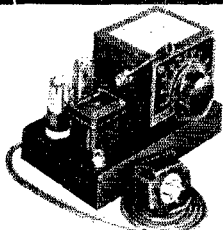
## WEST GULF DIVISION

**N**ORTHERN TEXAS — SCM, N. C. Settle, W5DAS/MNL — Asst. SCM, Joe Bonnett, 5III. SEC: QA. PAM: ECE. RM: CDU. LMF, LOI, JQY, and DAS have new Panadaptors. DMR and DAS are using H18 n.f.m. units. 144-Mc. activity continues with DXR, EVI, CZZ, ATX, and DAS. Reports indicate 50-Mc. interest is picking up around the State. The NTX Net complains of not enough traffic while the NTX one-man Trunk Line, LSN, keeps busy working Rebel Net and TLAP. Nice going, Spet. We are happy to see LO-Nite participation on the increase. Sunday morning EC drill activity continues on 3.9-Mc. 'phone band. DAA, formerly of Terrell, reports regularly into the North Texas Traffic Net from Kingsville. ARK and BBH work in 'phone and c.w. traffic nets serving Ft. Worth. ISD schedules New Mexico Net. GZU schedules Oklahoma Net. LVR, of McKinney, commutes to Dallas to attend school. FMZ, ILZ, and ASA are active on 3.5-Mc. c.w. GYW keeps Wichita Falls on the active list. HBE, of Dallas, is moving to new QTH. AAK was happy to get a replacement transformer for receiver after a long delay — two days later plate supply transformer went west. 6ZF and his XYL visited CDU. Contributions for this column are welcomed by your SCM. Please use station activity report cards. How about traffic reports from the net 'phone stations? Traffic: (Sept.) W5LSN 84, (Oct.) W5LSN 211, CDU 57, GZU 40, MXV 39, ISD 23, ILZ 20, ARK 16, ASA 13.

**OKLAHOMA** — SCM, Bert Weidner, W5HXI — Asst. SCM, George Bird, 5HGC. EC: AST. Each month the OLZ bulletin comes in with a lot of good comments and news. OLZ is really a traffic net and will welcome new members. OEPN is on each Sunday at 0830 on 3860 kc. and welcomes new members. This is one 'phone net that can follow procedure and handle traffic properly. YJ reports into OLZ each night with a different operator. New officers at Stillwater are: LTN, pres.; LJW, vice-pres.; MGY, secy.; NDO, treas. NCB is QSL Mgr. Each ham graduating from A. & M. College will be presented with a 7050-kc. crystal and the club will monitor the frequency at all times. NMM is on in Oklahoma City and now is a member of OLZ. IGO, on a trip to New Mexico, kept schedules with HXU and AHT. HXU left for CAA post in Alaska. A new club has been organized at Tinker Field with the call NEG, and is giving code lessons to a number of interested persons. EHC still hopes to get his 813 rig on the air. AI has developed a folded 14-Mc. beam that is only slightly larger than the 30 Mc. His results are equal to the conventional beam in every way. The simulated emergency was a great success wherever stations were on. HXC re-wound a plate transformer for EHC bringing him nearer to getting his rig on the air. Traffic: (Sept.) W5AHT 125, GVS 59, IGO 57, FMF 29, ADC 16, JKS 13, EHC 7, IOW 5, (Oct.) W5AHT 154, IGO 97, JKS 37, FMF 37, GVS 31, HTK 24, NMM 14, PA 9, ADC 8, FRB 7, EHC 7, HKH 5, IOW 4.

**SOUTHERN TEXAS** — SCM, Ted Chastain, W5HIP  
(Continued on page 118)

# If it's Radio... HARVEY has it!

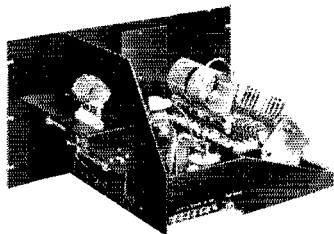
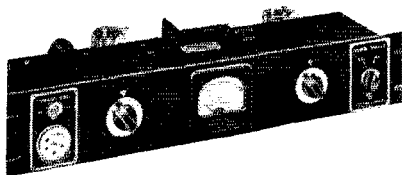


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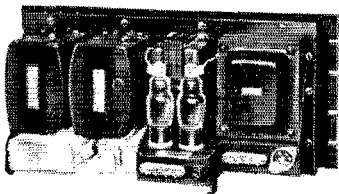
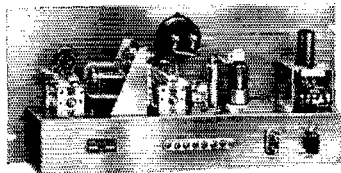
## Millen 90800 Exciter-Transmitter . . .

Based on an original Handbook design, this popular 50-watt Exciter-Transmitter is ideal for use as a low power transmitter or as an exciter for high power transmitter stages. It uses a 6L6 and 807. With coils for 10 meters, less tubes.....\$42.50



**Millen 90881 RF Power Amplifier . . .** This 500-watt amplifier may be used as the basis of a high power amateur transmitter or as a means for increasing the power of your present transmitter. Wired for use with two 812 type tubes, but may be used with TZ40's, 35T's, 812H's, HF100's, HK54's, etc. Plug-in coils are available for all bands 10 through 80. The Millen 90800 exciter is an ideal driver for this amplifier. Complete with one set of coils, less tubes.....\$89.50

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**Millen 90281 Power Supply . . .** This unit is rated 700 V. DC at 250 mls, completely filtered. Also supplies 6.3 volts AC at 4 amps. Unit is designed for use with transmitters such as the Millen 90800, 90810 or any other transmitter or laboratory purpose requiring this power. It uses two 816 rectifier tubes and has a 2-section pi filter with 10 henry GE chokes and a 2-2-10 mfd. bank of 1000-volt working GE Pyranol capacitors. Complete less tubes.....\$84.50

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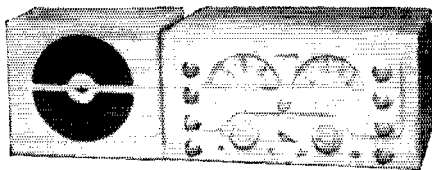
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W2D10 W2LJA  
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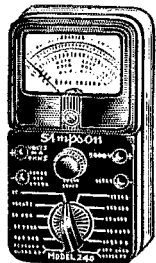
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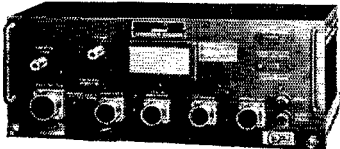
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--SEC: HQR. PAM: EYV. KZT has new VHF 152-A. BDI now is Class A. NKY, with 50 watts, is working nice DX. NMA is running 18 watts and has twin triplex 80 ft. in the air. LSO worked KH6LS on 3.9 Mc. IVU mixes ham radio with flying. EWZ has BC-348Q. LDU works c.w. in San Antonio. JPC is rebuilding. NIY gets out nicely with a vertical folded dipole. HZJ is using n.f.m. on 14 Mc. MKD has new 28-Mc. mobile rig. LGL has new Millen final. MTI is at A.&L. DAA is ORS and EC at Kingsville. The Kingsville Amateur Radio Club and the Corpus Christi Radio Club held a joint picnic at Kingsville. The highlight was a trip through FCC monitoring station. MN was pinch-hitter for 4PL during the latter's vacation. IC is OPS and EC. KSW is new ORS. LSE is rebuilding his rig. FKY is active on 144 Mc. and converting on 50 Mc. EAL is on 144- and 28-Mc. 'phone and c.w., and 7-Mc. c.w. JMI has new six-element beam and rotator to aid 60-watt 144-Mc. final. IMF's receiver, a 522, went up in smoke. GLS has installed 522 144-Mc. mobile equipment. BHO is 144-Mc. OBS in Houston. ADZ is active on 14- and 28-Mc. c.w. and 144-Mc. 'phone. IYF has mobile SCR-522 as well as a fixed 144-Mc. station. The San Antonio Radio Club held an election Sept. 19th, and the following officers were placed in office: GKI, pres.; UB, vice-pres.; HMJ, secy.; and MIQ, sgt. at arms. GEL is new secretary of the Corpus Christi Radio Club. Look for FZB on 3.85 Mc. from Midland soon. IZ, HSX, and CZF are public relations officers for Zones 3, 2, and 4 of the STEN. BGG has new Meissner Signal Shifter and HQ-129X receiver. San Antonio Technical High School is on 3.85 Mc. with the call GJD. MKL has been transferred to Memphis, Tenn. HQR has new transmitter: 812-Hs in final with 811s for modulators. All c.w. stations who are interested in joining the South Texas Emergency Net, please contact Dave Harrell, W5CVQ, NCS in Austin. You are needed! Traffic: W5MN 595, LWV 31, JPC 10, HIF 10.

NEW MEXICO — SCM, J. G. Hancock, W5HJF — SEC: ZM/ZU. MNN, club station at the Roswell AAF was operated at the Eastern New Mexico State Fair and handled 335 messages for fairgoers. MJA, CTP, CYI, MOJ, and #POM/5 took turns operating. DVJ won a prize at the recent ARRL convention at Phoenix. MYA and MYU are "retooling" to go on 28-Mc. 'phone. HPZ is installing sound systems for R.C.A. JYW has only two more to go for his WAS. DER has 22 states on 50 Mc. GXL worked a KH6 on 3.85-Mc. 'phone. NQP is new ham in Clovis. 7KAK and 7LBJ, father and son, are operating at Las Vegas. HJF is VFO on all bands. GXL and HJF have got a 'phone net going on 3950 kc. meeting at 3 P.M. Sundays. These present the first week were AOH, DVJ, GXL, HJF, 7KAK/5, and #VWU/3, with LAJ and ZM coming in the second week; Fellows, this is my last report. Lawrence R. Walsh, SMA, Box 1663, Los Alamos, was elected SCM, as his was the only nomination petition submitted. SMA is quite active in the Los Alamos Club and also is active on 28 and 14 Mc. n.f.m. Congratulations and best wishes, Larry, you have a swell bunch with which to work. Traffic: W5MNN 347, HJF 31, ZM 26, LAJ 12, MXF 3.

## CANADA

### MARITIME DIVISION

MARITIME — SCM, A. M. Crowell, VE1DQ — We believe that QZ made a "first" this month by working G on 50 Mc. DQ handled traffic via V06H and VE3ANP. LZ has a new final — and a blown test meter! AW was back on 14-Mc. 'phone. FN has new 55' steel tower. TA has complete mobile gear and uses n.f.m. EK reports a nice score of 87,780 in the SS Contest. DB is plugging away on 14-Mc. RP is adding to his list of countries with the VFO and 200 watts to p.p. 809s. ES now is on 14 Mc. ET is knocking off the ZLs with the beam up again. HD was heard recently in a good QSO with ZL on 28-Mc. 'phone. The LCARC net got going on Sept. 23rd with the following taking part: IE, EE, EW, FC, IW, IZ, JO, MW, RQ, and TY. FL, AYL, and AK are on 50 Mc. The LARC has a very swell bulletin edited by IW and FV. W9EJX in St. Charles, Ill., has QSOed so many VE1s that he has issued a little newsletter. Art had a nice three-way with our first n.f.m. mobile man, NT, while being guided into Halifax via 28-Mc. 'phone by DQ. NT, on 29,535 and TA, on 29,512 kc., are the only active n.f.m. stations we know of in this section. Look for W9EJX on 28,518 and 28,528 kc. and also on 27 Mc. Traffic: VE1EK 5, DB 3, DQ 2, RP 2, QZ 2.

(Continued on page 120)



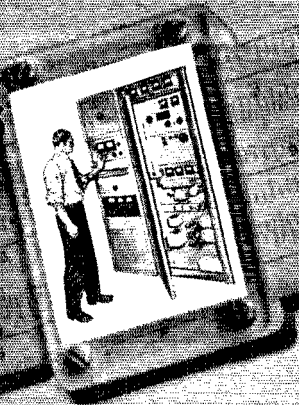
★ Here's How You Can Figure on

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**ONTARIO DIVISION**

**O**NTARIO — SCM, David S Hutchinson, VE3DU — The Beaver Net is in full swing and the Ontario 'Phone Net is going again with 22 stations. ATR is going strong on BN and schedules WINJM. AWJ is rebuilding. LA is new 3.5-Mc. man in Windsor. BHE, BOL, AVI, BQC, ADN, AHL, and BIW are active on 144 Mc. in the Windsor area. The Peterboro ARC is trying to arouse local interest in 144 Mc. BQL has Belleville-Trenton-Picton 50-Mc. net going and prospective Kingston hookup. GT is active on 7 and 14 Mc. KM is busy on 3.8-Mc. 'phone and 50 Mc. The Hamilton Club had an emergency test on Oct. 19th. VD is active on 7 and 14 Mc. BAJ finally got down and made first QSO on 3.5 Mc. BCP is new call at the Pagwa Radio Range. HP is back in the big city after a sojourn in Port Arthur. RX is on 14-Mc. 'phone. ATC, AVZ, BBG, and BDN are active on 7 Mc. RH, AME, AVJ, BDN, and BQR are working 14 Mc. AME, AVJ, and BAV, are getting out on 50 Mc. AVN and AWC have new all-band 'phone-c.w. rigs. BAX is on 144 Mc. BMI is working 3.5, 7, and 28 Mc. BQR has new 811 on 14-Mc. c.w. BOP is on 50 Mc. with 6AG7 oscillator, 6F6 into an 813. EF is on 3.5, 7 and 14 Mc. with new rig using 811 final and Mix VFO. The Kirkland Lake gang had an FB hamfest on Oct. 4 and 5. Feature speaker at the banquet was our genial CGM, 2BE. The London Radio Club had a large social evening Oct. 20th. AIB, of Toronto, is now AEC to VE3KM. QB is new OBS. Plans are under way for VE3 participation in Trans-Canada Trunk Line "1" with several BN boys ready to take their turn. All the Beaver Net boys soon will be ORS. Anybody wishing appointment as OBS, OPS, ORS, RM, or EC, send in applications to your SCM. Traffic: VE3ATR 81, BCS 64, XO 53, SF 54, DH 33, WX 31, HP 20, DU 14, BQL 13, KM 10, VD 10, BMG 7, GT 7, BCP 4, AWJ 2, BME 2.

**QUEBEC DIVISION**

**Q**UEBEC — SCM, Gordon A. Lynn, VE2GL — TH has new 28- and 14-Mc. rotary four-element beam on the roof. YG and UL are experimenting on 235 Mc. KG is adding 814 final. WY is working DX on 28 Mc. early mornings. YG has a pair of T40s 300 watts on 28-Mc. 'phone. KD is heard on 28-Mc. 'phone. BE is giving 28 Mc. a whirl. LO continues active on 7-Mc. c.w. PA is active on 3.8-Mc. 'phone. DR is heard on 14-Mc. c.w. IC has changed QTH to Roberval and is on 3.8 Mc. DY rebuilt modulator and now is using Class B. EC now is OPS and has emergency rig built and ready for use, portable or fixed. ZZ continues his effort to whip Emergency Corps into shape with assistance of QQ and TA. BG and BE schedule VK3HF daily. BG has new CSR-5 receiver. PI is working lots of DX on 14 Mc. on new antenna. YF, UJ, GK, and BG worked SUIJM on 14 Mc. CA reports good results on n.f.m. on 29 Mc. KT is active on 7 Mc. as is WR, who also tries 3.5 and 14 Mc. RJ is on 7 Mc. EQ is on 7 Mc. and has new NC-173 receiver. KH worked G5BY on 50 Mc., G5BY being on 28 Mc. TM is now unrestricted 'phone. GM has 616G on 3.5 Mc. VT is handling traffic on 7 and 3.5 Mc. NS and NU have new 200-watt job about completed. AW is modifying rig to include 28 Mc. and is quite active on 3.8 Mc. DU is active on c.w. OG has new four-element beam on 28 Mc. JJ has new three-element beam on 28 and 27 Mc. Traffic: VE2ZZ 36, GL 31, EC 29, BG 14, LO 4, CA 2, HH 1, TQ 1.

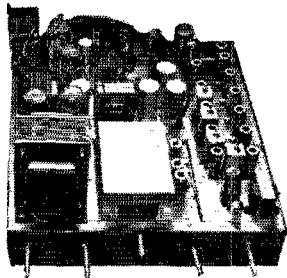
**VANALTA DIVISION**

**A**LBERTA — SCM, W. W. Butchart, VE6LQ — TA and KU, of Hussar, attend CARA meetings. CARA has C2 frequency meter for sale. The Calgary boys provided communication for the Calgary Air Show recently. BU gets out FB on 28 Mc. DF has application in for ORS. Nice to hear from the Alberta Net again! OD and 5CM handled radio chess game between Calgary and Regina. PP finally hooked up with EI3J and now works Mitchell regularly. EI3J wrote to Pere's mother and passed along news from Lac La Biche. HM returned from an extended visit to Eastern Canada and the States. While there he checked WWV for accuracy on time. Charley also visited WIAW and ARRL Headquarters. AL uses QRP rig on 'phone/c.w. now that he's living in more thickly populated area! LQ gets FB results out of three-element plumber's delight and 70-watt input to HK-24a. MF and MH bat out the c.w. on 14 and 28 Mc. these days. AH is new president of NARC; AT is vice-president. MJ finally got next to a beam-rotating motor. EH uses c.w. to schedule his brother, YN, at Provost.

(Continued on page 122)

# TERMINAL IS YOUR BEST BET for Everything in Television!

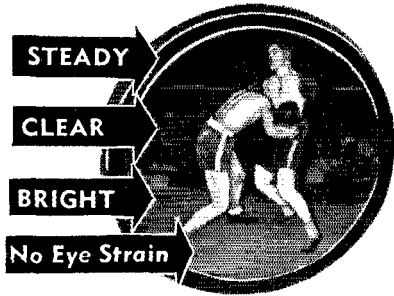
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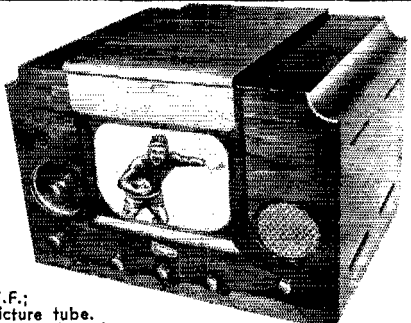
Model TA-10 — Complete assembly as described, with 10" flat surface CR tube (51 sq. inch picture). Packed for safe shipment anywhere.

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122

BW has new rig under way. LG says the free QSLs supplied by the Provincial Government should be out soon. How about some news from the Lethbridge gang?

**BRITISH COLUMBIA** — SCM, W. W. Storey, VE7WS — Many of the Collingwood Radio Club boys are starting to rebuild. UU blew up his HK-54 final, then not long after the power section of the new VFO went up in smoke. However, he worked his first VK from his QTH with his buffer. AME is starting his new call, rig, and antenna on 7 Mc. now. Look for a T9 signal around 7035 kc. That will be Doug. GP is on 7 Mc. KK is the most-heard call on 7-Mc. c.w. Jim gets through QRM FB with a single 6L6. LF is going to work the DX with lots of power. He is getting the rig together somewhere in the neighborhood of a kw. XT is putting out more RF; he is using a pair of 81s and melting the plates on them. MH has not been heard on 14-Mc. c.w. lately so he must be building up that 28-Mc. 'phone rig. 7-Mc. c.w. is getting its share of QRM from BE, who is building up new modulator. OJ has a fine new pole in his back yard. JPE's three-element rotary is down now, either for repairs or something new. YF has lots of room for antennas at new QTH. KW is on 28-Mc. 'phone now and likes it better than c.w. VD has another music box RME-69 and also Jone's bi-push exciter unit. NY is now on 14 Mc. with 25 watts. TC is working a lot of DX these days. EF has a BC-348Q receiver. UM is rebuilding his 3.85-Mc. transmitter. ME is going to put up a poled dipole. The Totem Radio Club had a fine turnout on Oct. 14th. US puts out official bulletins on 3850 kc. with 300 watts.

### PRAIRIE DIVISION

**MANITOBA** — SCM, A. W. Morley, VE4AM — Congrats to NT on the arrival of a jr. operator, and to NO's XYL, who received her ham ticket. 3.85-Mc. 'phone is very active with JN, at Waskada; XP, at Dauphin; AU, AP, and HD, at Brandon; GQ and JM, at Winnipeg. HS at Miami, is back on after harvesting and has built a converter for 28 Mc. QD, a new call at Brandon, was SWL prewar and will be heard soon with 813 final. KD, at Neepawa, got his 500-watter going, thanks to AD. TJ has new VFO, KK has new beam on 28 Mc. Flin Flon has EQ on 3.5 Mc. and YM on 7 Mc. FW has new receiver. AP and HD both run ATIs on 3.85 Mc. St. Vital has an antenna bee on with SS, FW, and AM all trying out short antennas for restricted space. Traffic is on the upgrade but no reports are reaching me. Trunk Line "I" is in operation again, as is the AFARS TCT. By the time this appears in print you may have a new SCM. Support him, whoever he is. For your cooperation in the past, many thanks. Traffic: VE4AM 9.

### New Books

**Elements of Acoustical Engineering**, by Harry F. Olson. Published by D. Van Nostrand Co., Inc., 250 Fourth Avenue, New York 3, N. Y., 1947. Second edition. 527 pages + 11 index pages. 6 X 9 inches. 342 illustrations. Price \$7.50.

This book presents an up-to-date exposition of the fundamental principles used in modern acoustics and a description of existing acoustical instruments and systems.

**Patent Notes for Engineers**, published by *RCA Review*. Radio Corporation of America, RCA Laboratories Division, Princeton, New Jersey, 1947. 146 pages + 15 index pages. 5½ X 9 inches.

These notes represent an effort to bridge the technical gap between engineers, research workers and inventors generally, and their patent attorneys. Practical suggestions are included for protecting inventions prior to the filing of applications and thereafter.

**Elements of Radio Servicing**, by William Marcus and Alex Levy. Published by the McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York City, 1947. 459 pages + 8 appendix pages + 9 index pages. 6 X 9 inches. Price \$3.60.

This book presents elementary principles and practices of radio servicing for vocational-school students, with emphasis on service theory and procedures.

(Continued on page 124)

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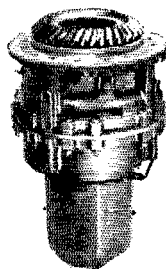
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Television Simplified, by Milton S. Kiver. Published by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York City, 1946. 365 pages + 4 glossary pages + 5 index pages. 8 x 5 $\frac{1}{2}$  inches. Price \$4.75.

Practical television is explained, covering the theory, mechanics, repair and servicing of television equipment.

F. M. Simplified, by Milton S. Kiver. Published by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York City, 1947. 342 pages + 5 index pages. Price \$6.00.

This book covers the construction and operation of f.m. transmitters and receivers and all the apparatus used in them, and explains the practical use of this knowledge in operation, installation and servicing of present-day f.m. equipment.

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Mc.	EST	Power Output (kw.)	Audio Freq. (cycles)
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5.0	7:00 P.M.-7:00 A.M.	10.0	440
5.0	7:00 A.M.-7:00 P.M.	10.0	400 and 4000
10.0	continuously	10.0	440 and 4000
15.0	continuously	10.0	440 and 4000
20.0	continuously	0.1	440 and 4000
25.0	continuously	0.1	440 and 4000
30.0	continuously	0.1	440
35.0	continuously	0.1	440

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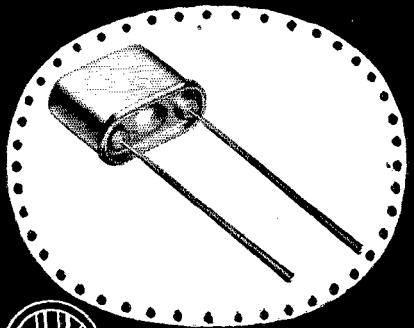
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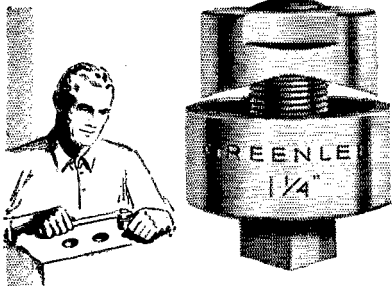
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The IF-17W is one of three new filter crystals, hermetically sealed, which permit operation from the Arctic to the Tropics. They are silver plated and wire mounted for higher Q, faster starting and elimination of sudden shift of peak frequency characteristics of the old air-gap type. Cut for low series resistance. Low shunt capacity approx. 1.8 mmfd., low series resistance approx. 4,000 ohms. Spurious responses are none  $\pm$  10 kc. Type IF-17 has pins .050" in dia. spaced  $\frac{1}{4}$ " centers, type IF-17L has pins .093" in dia. spaced  $\frac{1}{2}$ " centers and type IF-17W has the RMA standard wire lead pigtails.

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SANDWICH, ILLINOIS

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IN RADIO CHASSIS**



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**Single-Sideband 'Phone**

*(Continued from page 16)*

no heterodynes between carriers, there is no heterodyne interference, the big bugaboo of 'phone as practised today. This fact, coupled with the obvious one that your signal occupies only half the spectrum space it does with conventional a.m., will make room for many more 'phone signals in the same number of kilocycles. With selective receivers that pass only one sideband, the number of clear channels is exactly doubled, but there is still another advantage. Suppose the interfering station is only 500 cycles removed; i.e., the two carriers, if they were transmitted, would be separated by that amount. And suppose that the same relative sideband (upper and lower) had been suppressed in each case. The unwanted signal would ride through the receiver along with the desired one, but it would be completely unintelligible. It would only manifest itself as monkey chatter in the background, there would be no interfering heterodyne, and one signal could probably be copied through the other. You know what two equal-strength signals 500 cycles apart can do with conventional a.m. — now you can see why we're so enthusiastic about the possibilities of s.s.s.c.

With only a single sideband transmitted, you can expect less trouble with selective fading, the kind caused by the sidebands coming in with the wrong relative phase to each other and the carrier.

We promised to mention receiver stability. You will recall that the carrier has to be reinserted with an error of less than about 20 cycles for full naturalness, but the requirement is only about 50 cycles for intelligibility. For many years this seemed like an insurmountable obstacle in the way of amateur s.s.s.c., but it is no longer so. Our present receivers, after they are warmed up, are capable of such stability over the period of a transmission, as has been demonstrated by the satisfactory reception of W6YX and W0TQK by many stations. By using crystal-controlled high-frequency oscillators, we should have no trouble with s.s.s.c., even on 29 Mc. This improved stability of receivers has been sneaking up on us over the years, and it only took the transmissions of W6YX and W0TQK to show that amateur s.s.s.c. is here and practical!

**Single-Sideband Tests**

*(Continued from page 18)*

in the conventional W6YX transmitter is perhaps a little higher than in normal rigs because of the overmodulation splatter-suppressor circuit employed, which permits overmodulation during occasional peaks.<sup>1</sup>

Since October 9th, we have worked the following

*(Continued on page 128)*

<sup>1</sup> Villard, jr., O. G., "Overmodulation Splatter Suppression," June 1947 QST



# NEWARK'S SMASHING SURPLUS VALUES!



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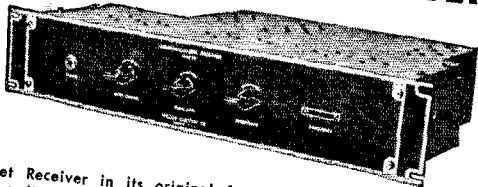
3C24/24G .49      866A/VT46A .75  
 6 for 2.55              6 for 4.10  
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HY69	\$1.65	807	\$1.35
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12A6	.11	815/VT287	2.25
2C40	.45	832A/832	2.25
2X2/879	1.50	837	1.50
3CP1	1.50	865	1.50
3BP1	1.50	874	1.75
3CP1	1.50	884/VT222	.85
3EP1	1.50	922	.68
3E29/829B	1.50	931A	1.88
3CP1	2.25	954	.23
5AP1	2.25	955	.23
5BP1	1.73	956/VT238	.75
5BP4	1.73	957/VT237	.30
5CP1A	6.00	958A	.38
5LP1	4.50	959	.38
6AG5	.81	1613	.38
6AK5	.60	1624/VT165	.45
6C4	.15	1625/VT136	.15
6D4	.45	1626/VT137	.23
6J6	.53	1629/VT138	.14
7BP7	1.50	1641	.45
9JP1	1.13	1665/2050	.90
10Y	.25	2051	.55
12DP7	1.38	7183	.15
12GP7	9.36	8005	3.15
0C3/VR105	.75	9001	.23
0D3/VR150	.75	9002/VT202	.30
21P1	.38	9003/VT203	.23
304TL	3.75	9004	.23
316A	.45	9006	.23
801A/801	.75	717A (6AK5 with micanol octal base)	.75
803	9.00		
805/VT143	3.75		

## CW-3 110V Superhet RECEIVER

Brand New!

**\$10<sup>95</sup>**

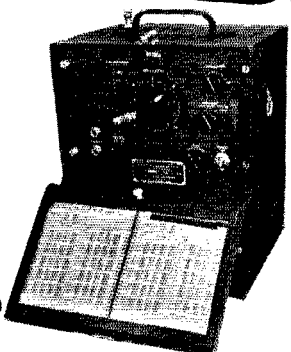


The CW-3 Superhet Receiver in its original form is a 7-tube fixed-tuned aircraft frequency unit. The circuit comprises RF Mixer-Oscillator, IF 2nd Detector, BFO, Audio Output, BFO Limiter and 110 V. Power Supply Stages. Available now, BRAND NEW, but less coils and crystal, unit offers many possibilities for conversion and re-use. Inserting home made 5 mc coils in front end will supply a fixed-tuned channel for "WWV" providing a stand-ard frequency with its many uses. Use it for IF and Output Channel in conjunction with 10 or 6 meter converter. Contains 2-6K7, 6K8, 2-6C8G, 80 and 6SN7 tubes. Many fine quality components to salvage if desired. 3 1/2 x 19 x 11 1/2. Grey wrinkle Finish. Elaborate instruction book included. Wgt. 32 lbs. with tubes, less coils and crystal. A Smashing Buy!

## Famous BC-221 Crystal Calibrated FREQUENCY METER

Use it as a Signal Generator and VFO. Crystal calibration in all ranges — 125-250 and 200-400 Kc. Not brand new, but in excellent condition — ready to operate. Complete with Tubes, Crystal and Original Calibration Book. Use it with 110VAC power pack, batteries, or vibrapack. A wonderful unit at a New Low Price!.....

**\$36<sup>95</sup>**



## 2 1/2 Mh RF CHOKE



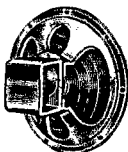
Super Value! Pie wound on ceramic form. Finest Quality. No. 9C S-600. Add postage..... Each

## H-16 U Army-Navy PHONES



Terrific Value! Brand New and Guaranteed. 8000 ohms, rubber-covered throughout. Ear plug type, with cushions. Cord and PL-54 plug. Adj. band-. While they last!..... **99¢**

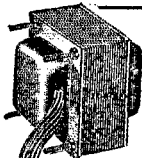
PLUS 12C POSTAGE



## Special Buy! 8" PM SPEAKER

Heavy duty, 6.8 oz. Alnico V Magnet. Sturdy speaker designed for PA and other high quality applications. Will handle up to 6 watts. Only a few left at this very low price!

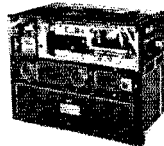
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## 6.3 V — 80 Ma. POWER TRANSFORMER

Excellent Buy! For use with 6X5 tube. Ideal for converting Surplus equip. (BC-348, etc.) Delivers 6.3 V @ 2 1/2 Amps. 660 VCT @ 80 Ma. No. S-589, 5 lbs..... **\$2<sup>39</sup>**

## SCR-522 TRANSCEIVER



A Terrific Buy! The finest 2-meter surplus rig available at an amazing price! Receiver — Xmitter, less power supply and control box. Most have crystals and tubes, some are missing. But basic unit is there — ready to operate and enjoy. Schematic included. Wgt. 75 lbs. They're going fast! "AS IS", Only..... **\$14<sup>95</sup>**

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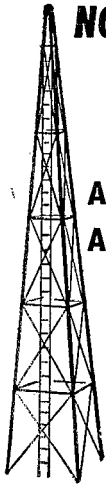
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- COMPLETE—Ready to Assemble
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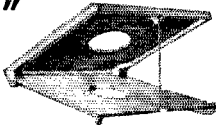
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- Any Rotary Head will fit it
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DX on s.s.s.c. (no special effort made at DX work):  
October 9th — VK4KS

Fragmentary contact. VK4KS in contest.

October 25th — KH6MQ/J9 Kwajalein, Marshall Islands. Got us distinctly through bad QRM.

ZS6GF

Pretoria, South Africa. Had 40-minute solid QSO. Reported s.s.s.c. easily readable but hard to tune. Had AR-88 receiver.

On November 3, 1947, worked WØTQK at 8:55 p.m. PST, for the first two-way single-sideband QSO. Our first contact with WØTQK was on October 21st, and he had built up his entire rig in the meantime! On November 8th, worked WØTQK for first duplex s.s.s.c. QSO; very nearly solid circuit for one-and-one-half hours.

Thanks are due the following members of the Stanford Radio Club for their assistance in connection with the single-sideband tests: Dave Thompson, W6VQB, Rob Beaudette, W7FXI, and Chet Carr, W6NVH.

## Single-Sideband Transmitter

(Continued from page 84)

In all cases where the receiving station has been able to tune in the s.s.s.c. signal correctly, the results have been very gratifying. The most apparent effect is the terrific reduction in QRM compared to double-sideband transmission.

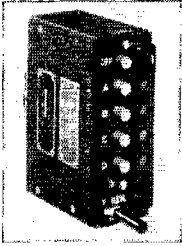
When one tunes in a single-sideband signal, it sounds like — and is! — a sideband that has lost its carrier. No amount of tuning will restore its readability. The essential thing to remember is that this very narrow band of frequencies being transmitted must be centered in the passband of the receiver i.f. amplifier. This is most easily done by using sharp i.f. selectivity, crystal in first or second position, and tuning for maximum signal. Once centered in the i.f. channel, the receiver is set up for c.w. reception, audio gain on full and r.f. gain reduced, and the b.f.o. set to the frequency of the missing carrier. In order to set the b.f.o. a very careful adjustment is required, since the exact frequency may be passed over during periods of no modulation. If the oscillator is set on the wrong side, the speech will appear inverted and unreadable. As most receivers will drift during stand-by, the high-frequency oscillator (main tuning) should be corrected since most of the drift is in this oscillator. Changing the b.f.o. will set the signal out of the i.f. passband. If sufficient selectivity is available in the i.f. amplifier, it can easily be seen that two stations can use the same carrier frequency with no interference. A recent test with a dual-conversion amateur receiver showed that no retuning was necessary over a period of more than half an hour. S.s.s.c. communication places a severe stability requirement

(Continued on page 180)

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- 832A Tubes, brand new.....\$2.15
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- ARC-5 Banana Plugs, silver plated. Per dozen.....10c
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**Wire Wound Potentiometer**

100,000 ohm, precision made. G.R. type, 2.5 watt, 6" diameter. Brand new....\$1.95



Shure Phono Pickups, 1 1/2 oz. Low Pressure, brand new, for.....\$1.95

- G.E. Relay, 200 Amps. Silver Plated Contacts, 24 Volt Coil.....39c
- Sigma Relay, Hermetically Sealed, Plug In Type; Fits 5-Prong Socket, 4 Ma. D.C., 2000 Ohm Coil.. 95c
- Crystal Diodes 1N23A; Swell for Field Strength Meter or Crystal Set. 35c ea. 3 for.....\$1.00
- 1-Inch Bull's Eye Pilot Assemblies, Candelabra Base; Red or Amber.....39c
- Heinemann Magnetic Type Circuit Breakers, 3-5-25-35 Amp Sizes.....95c
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Shure Crystal Bullet Microphone, with Stand and 7 feet of Cable. Regular \$16.50 List. For.....\$5.50

**I.T. and T. SELENIUM RECTIFIERS**

Full Wave Bridge Rectifier; 54 volts AC Input, 39 volts DC Output at 1.2 Amps. Signal Corps. Spec. 4DO238. Special at.....\$1.50

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- 3X0.2 Mfd., 4000VDC. Tobe.....98c
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- 2 Mfd., 1000VDC. Aero.....79c
- 1 Mfd., 5000VDC. Solar.....\$2.95

**Variable and Mica Condensers**

- APC-25 Trimmers, screw driver adjusted, 12 plates. 25 Mmfd silver plated variables, 15c ea. 10 for.....\$1.25
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**5-INCH CATHODE RAY TUBES, Type 5BP1. Green Screen, Brand New and in Original Cartons. All Scope owners will want a few at this ridiculously new low price of..... \$1.95 EACH**

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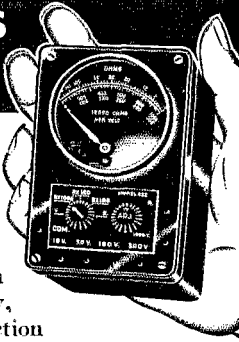


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on the receiver, but the present trend appears to be toward this end.

In spite of its apparent complexity of construction, only five evenings were consumed in building this equipment. The saving in large modulator and r.f. driver tubes and their power supplies more than overcomes the few additional receiving components needed, and it is hoped that adequate filters will soon be offered for less than the cost of a modulation transformer. This is the first stab at reducing QRM on the amateur 'phone bands since the modulated oscillator was outlawed. It's up to you!

## Any DX Today?

(Continued from page 31)

If 50-Mc. WAC is to be achieved it will call for consistent daily operation by all concerned, with good antennas and receivers, using the methods of m.u.f. observation outlined above.

In carrying out observations such as described in the foregoing many interesting problems needing explanation, with plenty of food for thought for those with inquiring minds, present themselves. What, for instance, causes an ionosphere storm and its associated auroral effects? Why are there no ionosphere storms in mid-December, when the North Pole is in darkness (possibly because this is an ultraviolet-light effect)? Why does the  $F_2$  m.u.f. drop so much in midsummer giving a general effect very similar to ionosphere-storm days in October-November or February-March? What causes the very high  $H'_{\nu}$  m.u.f. of winter days at sunspot maximum -- is it purely ultraviolet radiation, the angle at which it strikes the upper atmosphere being of importance, or is some other factor involved? What causes sporadic-E ionization in both this and the other regions? How important and interdependent are actual weather variations in the stratosphere and above? . . . And so on!

There is now a great deal of evidence -- it remains to be analyzed and interpreted!

## Conclusion

The examples of various records accompanying this article represent only a few of those made at G6DH over a number of years. Further details of these are available for anyone who has a genuine use for same.

## 25 Years Ago

(Continued from page 39)

9AUS, 9DTM and 9ZAF rendering splendid public service. . . . At the Seattle Radio Show the public was given a demonstration of the "Radio Hound" radio-controlled car built by 15-year-old Kenneth G. Field, 7QB. . . . For a second year the Department of Commerce gives recognition and encouragement to amateurs, with the announcement of a Hoover Cup for 1922.

Gracing the pages of the "Who's Who in Ama-

(Continued on page 132)

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Hammarlund SPC400X	398.25
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RME 45	198.70
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Collins 32V1	475.00
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Signal Shifter model EX	99.50
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Millen 90881	89.50
Millen 90810	69.75

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PM-2C fundamental	.500"	1 mc to 10 mc (outside ham bands)	±5kc 4.75 ±.01% 5.90
Special Price—Jan. '48	only	1 mc, 5 mc, or 10 mc.	±.005% 2.95
LF-2A dual freq.	.750"	100 & 1000 kc (exact)	8.75
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teur Radio" section are the countenances of our esteemed League treasurer, A. A. Hebert, and Pacific Division Manager J. Vance Wise, 6ZX. Announcement is made this month of the resignation of Pacific Division Director A. E. Bessey, 6ZK, who is entering commercial radio. Mr. Bessey's successor will be Mr. A. H. Babcock, 6ZAF.

Three prominent stations share the limelight in the station descriptions section this month: Dr. William D. Reynold's 9ZAF, Denver, Herbert L. Gordon's 8BAS, Antwerp, Ohio, and BY4, station of Hq. Co., 71st Infantry, New York National Guard, N. Y. C.

Strays announce two additions to the QST family — Director S. Kruse, 3ABI, ex-9LQ, has been named Technical Editor, and E. C. Adams, advertising manager, is the proud father of a bouncing baby daughter.

## Happenings

(Continued from page 44)

channel interference, particularly in the matter of harmonics. The way things are set up now these services are inescapably going to be in each other's hair and, as we appraise it, the situation is going to be almost intolerable for all of us. In the light of the practical experience now gained it could well be that a general reallocation of the entire range under 88 Mc. would permit a more comfortable arrangement of the four services in their mutual relationships.

The position of amateur radio in the present allocation is an intensely difficult one and, because of the great importance to us of our allocations in this vicinity, a matter of serious concern to us. Amateur stations of course are nearly altogether in residential areas, at short distances from television receivers. We have a band from 28 to 29.7 Mc. (a range which has never been assigned to any other service) the second harmonics of which fall in a television band. Because the operations of Ioran have denied us the return of our band 1750-2050 kc., the 28-Mc. band is the only amateur allocation below 50 Mc. which is open to telephony by Class B and Class C amateurs, in consequence of which it carries a heavier load of activity than any other amateur band. As we shall show, it is impossible to suppress its harmonics to the point of avoiding serious interference to television reception, at the distances involved. We have another band from 50 to 54 Mc. which has a television channel on each side of it, yet the nature of television receivers as presently constructed in the United States is such that there is no reasonable hope of escaping destructive adjacent-channel interference. Amateur activity in this band has increased greatly since the war and pioneering work of considerable scientific value is occurring there now in the investigation of propagation conditions. In recent weeks, by virtue of current ionospheric conditions, many amateurs have engaged in trans-Atlantic and trans-Pacific two-way communication on this band, and scores of amateurs have made transcontinental contacts. The amateur distance record on this band has been successively broken until it now stands at 10,500 miles. Careful records are kept and correlated with ionospheric predictions, in liaison with the Central Radio Propagation Laboratory. Similar work of scientific value is being done in connection with sporadic-E and extended-tropospheric transmission. In short, the two amateur bands in question are of great importance in the structure of amateur radio, yet the allocation established by the Commission in 1945, in its placement of television channels in their relationship to our amateur bands, is one which simply invites serious interference to the former service, precipitating a condition which, with the growth of interest in television, is practically certain to result in a public demand for restraint on our activities, through no fault of our own. Amateur radio is an old and honorable service, with a proved record of national usefulness, and we express strong objection to television allocations made in such manner that it is impossible

(Continued on page 134)

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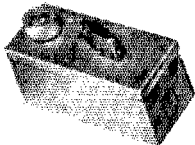


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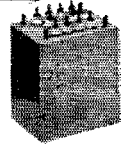
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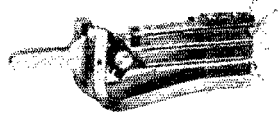
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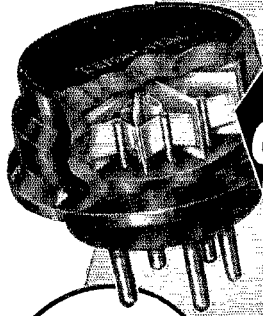
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for us to work without interference even when we observe the highest standards in the art. We submit that it is not reasonable to put us in this position. We submit that any allocation that does so is faulty engineering. We consider the present allocation in that category and assert that it is not proper to impose such an allocation upon us. We feel the need of asserting also that the rights of our service to exist in this frequency range are the equal of those of any other service, and that if the Commission maintains an allocation in which there is no reasonable hope of avoiding destructive interference, despite the best engineering practice in the operation of transmitters, it will not be the fault of the amateur and he should not be expected to make any concession to such an allocation. In short, we must resist any implication that television broadcasting is more in the public interest than the activities of the amateur service and must assert our equal right to make every reasonable use of our allocations, provided that we comply with good engineering practice and the extensive body of technical regulations that govern amateur operation.

We are, on the other hand, intensely conscious of our relationship to the general public and deeply concerned about the inescapable predicament in which the present allocations place us. We feel, as we have said, that there are many other reasons beside our own case that indicate that a satisfactory television service cannot be operated in this part of the spectrum. Short of that we believe, as we have also said, that a re-engineering of the allocations in this part of the spectrum could overcome many of the difficulties. Should the Commission feel, however, that it is bound to maintain the essentials of the present television channeling system in this spectrum range, there are still some improvements that can be made in the present basic allocation that would help both the amateur service and the other services concerned. These suggestions we should now like to outline and explain to you.

The Notice of Proposed Rule Making contains the following statement:

"4(D) — Possibilities of interference to television from such sources as harmonic radiation, television receiver response to stations on intermediate or image frequencies and television receiver oscillator radiations are engineering equipment problems which the Commission expects can more properly be solved by equipment development rather than further revisions of frequency allocations."

We agree with the general principle that frequency allocations should be independent of equipment deficiencies. It is nevertheless true that, for practical working, the existing technical state of the art has to be considered in making allocations. Transmitter frequency tolerances and receiver selectivity characteristics always have been determining factors. The latter, particularly, have had a profound influence on the assignment of channels for broadcasting.

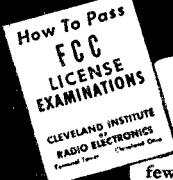
In the past it has not been necessary to take into account harmonic radiation from transmitters, for the excellent reason that the degree of harmonic control possible and the nature of the services to which interference was caused were such that harmonic difficulties could be resolved readily. V.h.f. broadcasting changes this situation completely. Broadcast assignments in the v.h.f. region not only are higher in frequency than the great majority of stations in the other services but the channels are so wide that harmonic interference is practically inescapable. The amateur service, with its greater number of stations than any other service, and with its transmitters frequently located a matter of yards or even feet from one or more broadcast receivers, is particularly likely to be the source of widespread interference to television reception unless this factor is taken into account in allocating.

At the informal engineering conference held by the Commission staff in June of this year, the League, through Robert M. Morris, presented data accumulated in an investigation of a number of cases of amateur interference to television. It was shown at that time that the principles of good engineering design as applied to amateur transmitters could be expected to give a fundamental-to-harmonic ratio of the order of 50 db. By carrying harmonic suppression methods to a degree that represented considerably more than ordinary engineering practice, the Commission's staff showed that it was possible to secure a ratio of the order of 70 db. To the best of our knowledge this figure has not been exceeded. More significant, however, than the attenuation ratio itself is the fact that the Commission's measurements

(Continued on page 138)

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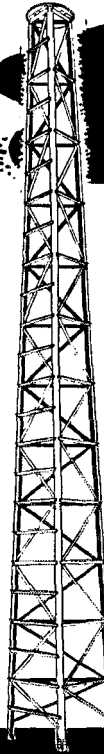
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showed a harmonic field strength of the order of a few hundred microvolts per meter at a distance of 100 feet, close to the ground.

It was the consensus of the engineering meeting that a ratio of about 40 db. between the desired television signal and an in-channel interfering signal is necessary for acceptable reproduction of a television picture. If a figure of 500 microvolts per meter is accepted as the lower limit of the field strength for satisfactory television reception, an in-channel interfering signal cannot exceed 5 microvolts per meter at the same point without causing interference. At the present time, many television receivers are operating with considerably less than a 500-microvolt-per-meter signal, and the owners expect nevertheless to receive interference-free pictures. In the amateur case, where a 28-Mc. transmitter may be located a matter of yards from the television receiver, we estimate that a fundamental-to-harmonic ratio of 110 to 120 db. must be achieved if there is to be no interference. In the present state of the art, such attenuation is some 40 to 50 db. higher than is known to be possible of attainment.

We submit that, in a situation such as this, there is no visible means by which this problem can be solved by equipment development, and that it is proper for the Commission to give it full consideration in setting up frequency allocations.

The League always has advocated assignment of amateur bands in harmonic relationship. Until the 1945 allocations revision, this harmonic relationship was preserved through the amateur assignments below 300 Mc. The 1945 allocations substituted the band 50-54 Mc. for the prewar band of 56-60 Mc. as part of a compromise plan by which it was expected that an extra television channel could be carved out of a spectrum which otherwise did not have enough room for it. The Notice of Proposed Rule Making now under consideration is evidence that other features of that allocation have since proved impracticable. To avoid interference, it is now proposed to take one channel from television broadcasting and assign it to the fixed and mobile services. No consideration is given to reduction of harmonic interference. We believe that it has been amply demonstrated that harmonics cannot be suppressed to the point where there will be no interference, but that, instead, the second harmonic of a transmitter operating at a power level of a few hundred watts can be expected to cause general interference to television reception over a radius of  $\frac{1}{4}$  to  $\frac{1}{2}$  mile. When the second harmonic falls in a television channel. When the number of amateur transmitters and their close spatial relationship to the general public is considered, we believe that there is here a co-channel problem that may well exceed the magnitude of that existing between the television and the fixed and mobile services.

This point deserves further discussion. Taking the proposed allocations as given in Appendix C of the Notice of Proposed Rule Making, we estimate that the total population in areas that will be served by Channel 2 is approximately 38,000,000, or about 30 per cent of the total population of the country as shown by the 1940 census. This is the total of the population within an approximate 30-mile radius of each of the cities in which Channel 2 is intended to be assigned. On the reasonable assumption that the density of amateur stations follows the population density, 30 per cent of all amateur transmitters will be located in those same areas. In other words, close to 25,000 amateur stations are potentially capable of causing interference to Channel 2 because of irreducible second harmonics from the amateur band 28-29.7 Mc. The great majority of amateur stations actually are equipped to work on this band, and surveys by our Communications Department show that 30 per cent of all amateur operating activity occurs there. This 28-Mc. band has become the scene of the local communication that formerly was concentrated in the band 1750 to 2050 kc., a band which has not been available to amateurs since the 1945 frequency allocations. We do not believe that the Commission intends to withdraw from amateurs the privilege of working in the present 28-Mc. band, yet as a practical matter that could be the effect of maintaining the harmonic relationship between that band and television broadcasting.

Now that the Commission is proposing the elimination of one television channel, the necessity for the compromise that resulted in the dislocation of our prewar 56-60 Mc. band no longer exists, since that relocation was done simply to make the extra television channel possible. Available statistics

(Continued on page 158)

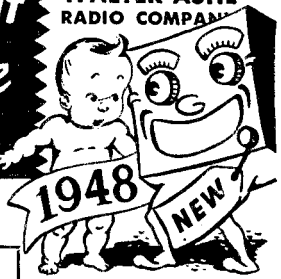


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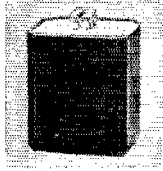


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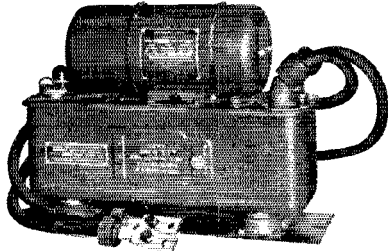
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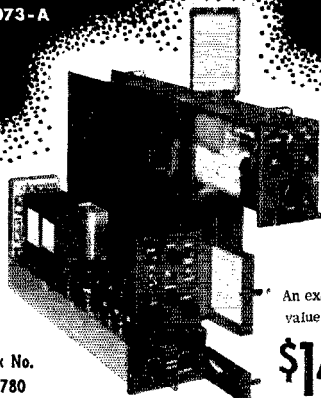
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show only about 100,000 television receivers now in use, and we believe that the seriousness of this harmonic problem should be recognized by the Commission before it is too late and that provision should be made to take care of it in the allocations before the number of television receivers is measured in millions rather than thousands. In our letter of September 12, 1947, responding to the Commission's Notice of Proposed Rule Making, we originally suggested that the allocation for Channel 2 be changed to 50-56 Mc. and that the amateur band be changed to 56-60 Mc., thus permitting harmonics from the amateur 28-Mc. band to fall within an amateur band. In making this proposal we were well aware that such a change not only would require retuning two television transmitters now operating on Channel 2 but would also necessitate readjusting receivers to respond to the new channel assignment. Equally important, under the new regulations of Atlantic City the Commission would not be free to assign 50-54 Mc. to any service except amateur unless there were unanimous agreement of the nations of the American Region to derogate in such respect. We felt, however, that even these difficulties were not insuperable and that, once the Commission realized how serious this harmonic-interference situation can become, it too would favor such a reallocation despite the difficulties.

Upon further consideration, however, we now wish to recommend for the Commission's consideration that it continue present Television Channel 1 and eliminate Channel 2 instead, assigning 54-60 Mc. to fixed and mobile. Under this recommendation it will be necessary to change the frequency of the two television transmitters now operating on Channel 2, but the really difficult problems would disappear; no changes in any receivers would be required; and, since the amateur band could be left at 50-54 Mc., no derogations or arrangements between nations in the Americas would be needed to make assignments not contemplated in the Atlantic City regulations. Our present proposal would have the additional very great advantage that second harmonics from industrial, scientific and medical equipment operating on the international assignment at 27 Mc. also would not fall in a television channel. Under both the existing allocation and the Commission's proposal these harmonics are as great a threat to television reception as amateur harmonics.

We realize that under our present recommendation, second harmonics from the amateur 28-Mc. band would fall in frequency regions assigned to the fixed and mobile services. However, our past experience shows that this situation will not present any serious problems. The fixed and mobile channel-widths are very small, and if interference did arise a small shift in the fundamental frequency of the amateur transmitter would clear the fixed or mobile channel in that vicinity. This is not possible with a television channel that occupies a space greater than the entire second-harmonic region of the 28-Mc. band. Also, there is on a statistical basis an extremely small chance of harmonic interference to fixed and mobile as compared to the probability of such interference with television reception.

It might be objected that the ARRL proposal does not provide a satisfactory answer to the problem of interference from fixed and mobile services operating on channels adjacent to a television channel. We understand that presently this is a most serious consideration. However, we firmly believe that the far more distressing problem is that of harmonics from other services that fall inside a television channel. Some 25,000 amateur stations and an unknown but undoubtedly huge number of ISM installations are potential sources of interference to Channel 2. While the number of fixed and mobile stations also undoubtedly will be large, it should be realized that each amateur station and ISM installation corresponds to a fixed or land station, in that it causes more or less regular interference over the same area. Mobile transmitters, on the other hand, are used only intermittently and the interference lasts but a short time; also, they are generally in motion and the interference is not concentrated in one locality. In other words, the mobile station operates on a "share the interference" basis, while a non-moving station of any type confines its interference to one group of listeners.

Another factor that should be given consideration in the question of adjacent-channel interference is the effect of receiver selectivity. It was brought out at the June engineering conference that it is technically feasible to increase the

(Continued on page 140)

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## CRYSTALS

In the greatest purchase of radio transmitting crystals every one made by a 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 MC harmonic ratings but Sun encloses directions for deriving the correct fundamental frequency in kilocycles.

### CRYSTALS WITH A MILLION USES

Fractions Omitted											
kc	kc	kc	kc	kc	kc	kc	kc	kc	kc	kc	kc
412	420	429	437	445	457	469	479	490	497	506	516
413	422	430	438	445	458	470	481	491	498	507	518
414	423	431	440	447	459	472	483	492	501	508	519
415	424	433	441	448	462	473	484	493	502	509	522
416	425	434	442	451	463	474	485	494	503	511	523
418	426	435	443	453	466	475	487	495	504	512	
419	427	436	444	468	477	488	496	505	515		

**49¢**  
each

I.F. Frequency Standards			Crystal Frequency Standards 98.356kc			For Crystal Controlled Signal Generators 525kc			
kc	kc	kc	kc	kc	kc	kc	kc	kc	
450	454.166	461.111	Easily altered for 100 kc Standard Mounted in low loss 3 prong holder.	526.388	531.944	536.111	527.777	533.333	537.588
451.388	455.556	464.815		529.166	534.722	538.588	530.555		
452.777	459.259	465.277							

**99¢ each**

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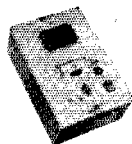
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ASSORTED MISCELLANEOUS CRYSTALS				FOR HAM AND GENERAL USE			
Fractions Omitted				Fractions Omitted			
370kc	376kc	381kc	384kc	390kc	395kc	402kc	405kc
372	377	383	386	391	396	403	406
374	379		388	392	397	404	407
375	380			393	398		411
				394	401		

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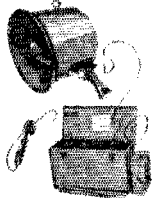
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priced at a fraction of the cost of their holders alone.  
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 Complete with bat's.



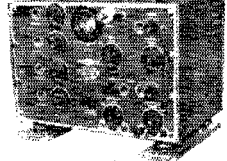
### DC MILLIAMMETER

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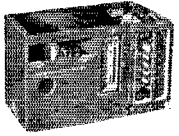
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These can be easily converted to 20-40-80 meters. Crystal required for 10 meters. Each electronic coupled oscillator dial has 3000 divisions enabling quick precision shifting. This transmitter was constructed of the highest quality of precision parts, with laboratory precision. Four separate output tanks; one 4-position selector channel switch having seven sections which changes the ECO, IFA and output tanks simultaneously. All the controls are mounted on the front panel. The housing is cast aluminum; shields and case are sheet aluminum. Dimensions 11 x 12 x 15 inches, weighing 35 1/2 lbs. Complete, simple instructions for conversion furnished. Uses three 807, four 12SK7 tubes; one 2-inch 5 amp. R.F. meter. A complete coverage transmitter, for the new or experienced amateur. A TRUE HAM VALUE — BRAND NEW, complete with tubes... **\$49.95**



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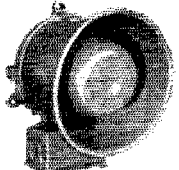
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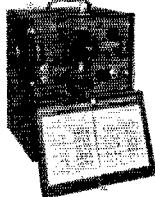


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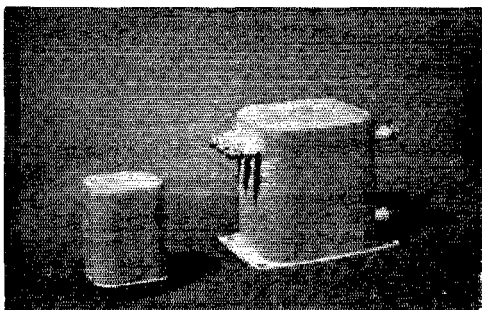


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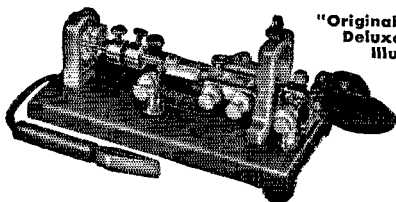
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adjacent-channel rejection of a television receiver. It was also quite clear at that conference that receiver manufacturers are unwilling to incorporate those features that would make for better performance in this respect because of the relatively small increase in cost involved. In asking for the lion's share of an exceedingly valuable portion of the radio spectrum, it is surely not unreasonable to expect that, in return, television receivers should be built to a standard that will make it unnecessary for other portions of the spectrum, not used by television, to be wasted. A worthwhile increase in receiver selectivity is acknowledged to be well within the present state of the art. If the same were true of harmonic suppression the League would have much less reason for appearing at this hearing.

But aside from these considerations, a closer study of the ARRL proposal will show that the situation with respect to adjacent-channel interference is not as bad as superficial examination might indicate. For purposes of identification, let us call those areas in which Channel 2 (under the Commission's present proposal) is to be assigned, "primary metropolitan areas"; those areas where Channel 3 is to be assigned, "secondary metropolitan areas"; and those areas where neither Channel 2 nor Channel 3 will be assigned, "all other areas." Under the ARRL proposal, the allocation plan as set up by the Commission in Appendix C would be modified only by substituting Channel 1 for Channel 2. To the copy of this statement which we shall file with the Commission there is attached a chart showing the probable assignments as they would be effectuated in the event the Commission adopts the ARRL proposal.

In "primary metropolitan areas" the allocation pattern would call for Channels 1 and 4 to be assigned. In these areas, fixed and mobile stations operating in the 54-60 Mc. band would be separated from Channel 1 by the 4-Mc. width of the amateur band, and separated from Channel 4 by the 6-Mc. width of unused Television Channel 3. Thus there would be ample guard bands on either side of our proposed fixed and mobile assignment to prevent adjacent-channel interference. In the "all-other" regions where Channels 1, 3 and 4 would not be assigned, there would be no adjacent-channel problem of any kind. The regions where Channel 3 will not be assigned under the Commission's plan aggregate 89 per cent of the nation's population and over 97 per cent of the land area, by our estimate.

In the "secondary metropolitan areas" — those where Channel 3 is assigned — there is a possibility of adjacent-channel interference from fixed and mobile stations working in the band 54-60 Mc. However, at least the lower 2 Mc. of this band would be useful, considering that a 4-Mc. guard band was considered sufficient in the 1944 deliberations. In any event, Channel 1 would not be assigned in these "secondary metropolitan areas" and there would consequently be no adjacent-channel problem at all for the stations working up to 44 Mc. The problem here is not of large dimensions, since the "secondary metropolitan areas" represent only about 11 per cent of the total population and less than 3 per cent of the land area.

It is surely evident from consideration of these figures that adequate provision can be made for the fixed and mobile services from the standpoint of adjacent-channel interference. The judicious assignment of frequencies to fixed and mobile, taking into account the pattern of television channel assignments and the geography of the situation, should reduce interference of this type to a satisfactory minimum.

From the foregoing, it seems to us that objection to the ARRL proposal on the grounds of adjacent-channel interference is not such as to warrant undue concern. There is one special case that may be an exception. In the New York area the needs of the fixed and mobile services may be of such proportions that stations will have to be assigned frequencies immediately adjacent to the low-frequency edge of Channel 1. It has been said that allocations plans, particularly in this part of the spectrum, are necessarily shaped by the needs of metropolitan New York, and that if that area's needs did not exist the solution of these allocations problems would be simple. We submit that if New York needs the ramified fixed and mobile services now being offered more than it does a television channel, then the elimination of Channel 1 in that area, in addition to the elimination of Channel 2, would completely solve the adjacent-channel problem in the section of the country where it is no doubt most acute. Furthermore, this would

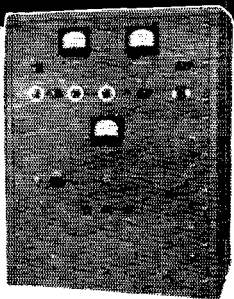
(Continued on page 148)

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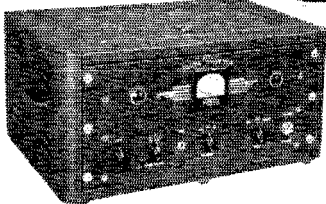
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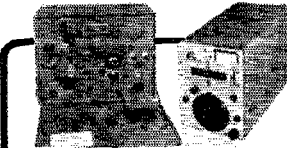


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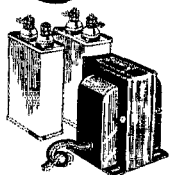
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open an additional 6-megacycle band for fixed and mobile in that area; in fact, it seems to us that the ARRL proposal opens the way to sharing of Channel 1, on a noninterfering basis, over a large part of the country. This can be done without raising the adjacent-channel problem that now exists under the present sharing arrangement, because Channel 1 is well removed from any other television channel under the ARRL proposal. Such a question is for the Commission to decide; we reiterate that the Commission's present proposal to eliminate Channel 1 and leave Channel 2 intact will, for all practical purposes, eliminate two television channels because Channel 2 will be rendered useless by harmonic interference — from other services as well as amateurs.

In summary: We appreciate the many difficulties that confront the Commission in attempting to arrive at an equitable solution to this problem within the existing framework. The elimination of at least one television channel seems a practical necessity if the other services to whom this part of the spectrum is vital are to exist. We respectfully submit that in proposing to eliminate Channel 1 the Commission, while giving relief to some of the services involved, has not given due consideration to the potential magnitude of the harmonic problem. We believe that the elimination of Channel 2 would not only achieve the desirable ends to be secured by the elimination of Channel 1, but would in addition solve the greater problem of second-harmonic interference from ISM, amateurs and other services now working in the 27 to 30 Mc. region. We so request the Commission.

## 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.

## EXAMINATION SCHEDULE

The Federal Communications Commission will give amateur examinations during the first half of 1948 on the following schedule. Remember this list when you need to know when and where examinations will occur. Where exact dates or places are not shown below, information may be obtained, as the date approaches, from the Engineer-in-Charge of the district. *Even stated dates are tentative and should be verified from the Engineer as the date approaches.* No examinations are given on legal holidays. All examinations begin promptly at 9 A.M. except as noted.

- Albuquerque: Mar. 25.
- Amarillo, Tex.: Apr. 2.
- Anchorage, Alaska, 39 U.S.P.O. and Courthouse: By appointment.
- Atlanta, 411 Federal Annex: Tuesday and Friday at 8:30 A.M.
- Bakersfield, Calif.: Some time in February.
- Baltimore, 508 Old Town Bank Bldg.: Monday through Friday. When code test required, 8:30 A.M.
- Bangor, Me.: Some time in April.
- Beaumont, Tex., 329 P. O. Bldg.: Thursday, and by appointment.
- Birmingham: Jan. 7, Apr. 7.
- Billings, Mont.: Apr. 26.
- Bismarck, N. D.: April 14.
- Boise: Some time in April.
- Boston, 1600 Customhouse: Monday through Friday.
- Buffalo, 328 Federal Bldg.: Thursday.
- Butte, Mont.: Apr. 23.
- Charleston, W. Va.: Some time in March and June.
- Chicago, 246 U. S. Courthouse: Friday.

(Continued on page 144)



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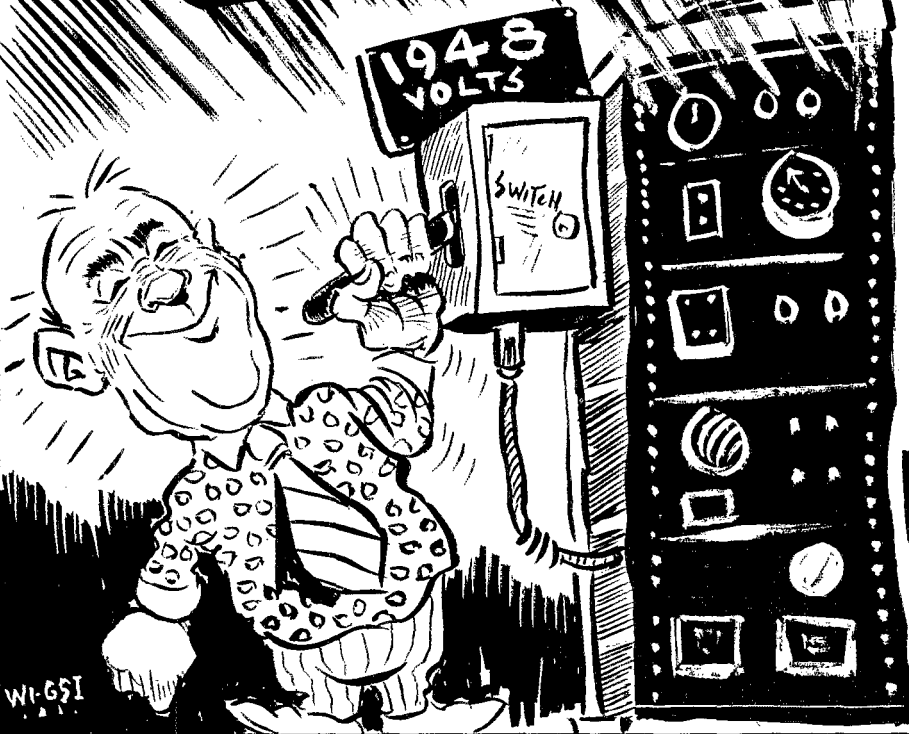
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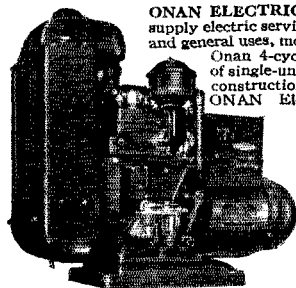
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**DELEHANTY SCHOOL OF  
RADIO • ELECTRONICS • TELEVISION**

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## ELECTRICITY

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ONAN ELECTRIC GENERATING PLANTS supply electric service for electronics applications and general uses, mobile or stationary. Driven by Onan 4-cycle gasoline engines, they are of single-unit, compact design and sturdy construction.

ONAN Electric Plants are available in many sizes and models. ALTERNATING CURRENT: 350 to 35,000 watts in all standard voltages and frequencies. DIRECT CURRENT: 600 to 10,000 watts, 115 and 230 volts. BATTERY CHARGES: 500 to 3,500 watts; 6, 12, 24 and 32 volts. Write for detailed literature or engineering assistance.

**D. W. ONAN & SONS** 4667 Royalston Ave.  
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SPEED UP YOUR RECEIVING  
with

**G-C Automatic Sender Type S**  
\$20.00 Postpaid

Housed in Aluminum Case, Black Instrument Finished. Small—Compact—Silent induction type motor, 110 Volts—60 Cycle A.C. Adjustable speed control, maintains constant speed at any Setting. Complete with ten rolls of double perforated tape. A wide variety of other practice tapes available at 50c per roll.



**GARDINER & COMPANY • Box 56**  
STRATFORD, NEW JERSEY

Cincinnati: Some time in February and May.  
Cleveland, 541 Federal Bldg.: First and third Fridays each month, also by appointment.  
Columbus, Ohio: Some time in January and April.  
Corpus Christi: Mar. 11, June 10.  
Cumberland, Md.: Apr. 8.  
Dallas, 500 U. S. Terminal Annex: Monday through Friday.  
Davenport: Some time in January and April.  
Denver, 521 New Customhouse: First and second Thursdays each month, also by appointment.  
Des Moines: Jan. 8, Apr. 8.  
Detroit, 1029 New Federal Bldg.: Wednesday and Friday.  
El Paso: Mar. 19.  
Ft. Wayne: Some time in February and May.  
Fresno: Mar. 17, June 16.  
Grand Rapids: Some time in January and April.  
Hartford, Conn.: Some time in March.  
Hilo, T. H.: Apr. 6.  
Honolulu, 609 Stangenwald Bldg.: Monday, also by appointment.  
Houston, 324 U. S. Appraisers Stores Bldg.: Tuesday and Friday.  
Indianapolis: Some time in February and May.  
Jacksonville: May 4.  
Juneau, Alaska, 6 Shattuck Bldg.: By appointment only.  
Kansas City, 838 U. S. Courthouse: Friday.  
Klamath Falls, Ore.: Some time in May.  
Knoxville, Tenn.: Mar. 10, June 9.  
Las Vegas, Nev.: Some time in April.  
Lihue, T. H.: Apr. 20.  
Little Rock: Jan. 14, Apr. 14.  
Los Angeles, 539 U. S. P. O. and Courthouse Bldg.: Wednesday at 9 A.M. and 1 P.M.  
Memphis: Mar. 10, June 9.  
Miami, 312 Federal Bldg.: Monday and Thursday.  
Milwaukee: Some time in January and April.  
Mobile: May 19.  
Nashville: Feb. 11, May 12.  
New Orleans, 400 Audubon Bldg.: Monday through Friday; when code test required, Monday, Tuesday, Wednesday at 8:30 A.M.  
New York, 748 Federal Bldg., 641 Washington St.: Monday through Friday.  
Norfolk, 402 Federal Bldg.: Monday through Friday; when code test required, Friday only.  
Oklahoma City: Jan. 22-23, Apr. 27-28.  
Omaha: Jan. 15, Apr. 15.  
Philadelphia, 1005 Customhouse: Monday through Friday, 9 A.M. and 1 P.M.  
Phoenix, Ariz.: Some time in April.  
Pittsburgh: Feb. 3-4-5, May 4-5-6.  
Portland, Me.: Some time in April.  
Portland, Ore., 406 Central Bldg.: Friday at 8:30 A.M.  
Reno: Apr. 21.  
Roanoke: Apr. 3.  
St. Louis: Feb. 5, May 13.  
St. Paul, 208 Uptown P. O. Bldg.: Friday.  
Salt Lake City: Mar. 20, June 19.  
San Antonio: Feb. 12, May 13.  
San Diego, 230 U. S. Customhouse: By appointment.  
San Francisco, 323-A Customhouse: Monday and Friday; Class A, Monday through Friday.  
San Juan, P. R., 323 Federal Bldg.: Thursday.  
Savannah, 214 P. O. Bldg.: By appointment.  
Schenectady: Mar. 10-11, June 9-10.  
Seattle, 801 Federal Office Bldg.: Friday.  
Sioux Falls, S. D.: Mar. 10, June 9.  
Spokane: Apr. 21.  
Syracuse, N. Y.: Jan. 7, Apr. 7.  
Tampa, 410 Main P. O. Bldg.: By appointment.  
Tucson, Ariz.: Some time in April.  
Tulsa: Jan. 28-29, Apr. 22-23.  
Washington, D. C., 2065 Temporary L Bldg.: Monday through Friday, 8:30 A.M. to 5 P.M.  
Wichita: Mar. 11.  
Williamsport, Pa.: Mar. 10, June 9.  
Wilmington, N. C.: June 5.  
Winston-Salem: Feb. 7, May 1.

### DELAYED MAIL

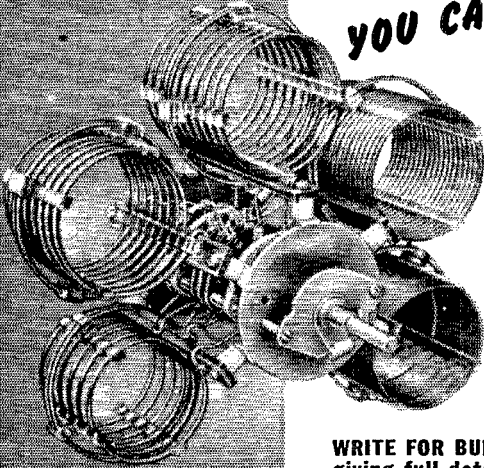
Mail service is quite poor these days. We've had numerous cases of delayed letter or ballot

(Continued on page 148)

# UP TO 150 WATTS

**YOU CAN HAVE TOP PERFORMANCE  
ON ALL BANDS!**

**WITH B & W TURRETS**



It takes an Air Inductor to give you top performance, and now, regardless of the power you're using, or plan to use, you can have it on all bands—with the proper B&W Turret Assembly. Through the years, the B&W Turret line has been improved and enlarged—and has consistently grown in popularity. So, if you're building a new rig, or revising your present one, start right by providing for the proper B&W Turret that offers all these advantages and more:

- Pre-assembled, pre-wired and tested at the factory. Quick to install and quicker to shift bands for you after installation.
- Select 80, 40, 20, 15, 11 or 10 meter band by the flip of a switch. (11 and 10 meter bands covered by 10 meter coil.)
- Switch design shorts unused coils—eliminating absorption effects.
- Complete assembly arranged for panel mounting through  $\frac{3}{8}$ " hole—provides panel control for quick, positive band switching.
- All B&W Turret types may be tuned on all bands by condensers having an effective capacity of 50 mmfd.

**WRITE FOR BULLETINS  
giving full details on:**

B&W "Baby" Turrets (up to 35 watts)  
B&W "Band Hoppers" (up to 75 watts)  
B&W 75-watt Turrets  
B&W 150-watt Turrets

**B&W**

**BARKER & WILLIAMSON, Inc.**  
237 FAIRFIELD AVENUE • UPPER DARBY, PENNA.

**SIMPSON MODEL 240**

**"HAMMETER"**

*... greatest instrument  
value on today's market—*

Here is today's version of the famous Simpson "Hammeter" — first self-contained pocket portable instrument built expressly to check high voltage and all component parts of transmitters and receivers. At today's price you cannot afford to be without it.

RANGES		
VOLTS A.C.	VOLTS D.C.	MILLIAMPERES D.C.
0-15	0-15	0-15
0-150	0-75	0-75
0-750	0-300	0-300
0-3,000	0-750	0-750
	0-3,000	

Ohms: 0-3,000 (center scale 30) 0-300,000 (center scale 3,000)

Size: 3" x 5 $\frac{7}{8}$ " x 2 $\frac{1}{2}$ ".

Price, complete with test leads. ....\$21.75

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**Simpson**



**\$21.75**

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# DRAKE RADIO SOLDERING IRONS



**600-10**—the Drake No. 600-10 is ideal for those all important connections when rewiring your rig. Get back on the air fast. Make good dependable connections with this 100 watt  $\frac{3}{8}$ " tip.



**400**—the Drake No. 400 is the perfect iron for work in small places. Only 9 inches long, it is especially designed for tight corners and delicate connections. 60 watt,  $\frac{1}{4}$ " tip.



Ask your nearest supplier or write for the name of the distributor nearest you . . . and give yourself the advantages of these superior irons.

**DRAKE ELECTRIC WORKS, INC.**  
3656 LINCOLN AVE. CHICAGO 13, ILL.

## ROTATORS SO-1 Radar Type

Plenty husky for any beam antenna a ham can dream up! Built to last a lifetime.

Powerful gear train and motor housed in rugged aluminum pedestal. Speed 2 r.p.m. Instantaneous reversing. Automatic lock-in prevents drift in strong winds.

SO-1 Rotator—brand new—complete with 110-volt, 60-cycle power supply . . . . . **\$89.00**

See our advertisement on page 122 in June issue of "QST"  
WRITE FOR DETAILS

**ELECTRONICRAFT, Inc.**  
5 Waverly Place Tuckahoe, N. Y.  
Tel. Tuckahoe 3-0044

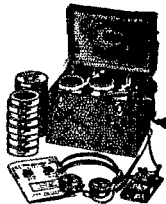


## EASY TO LEARN CODE

It is easy and pleasant to learn or increase speed the modern way — with an **Instructograph Code Teacher**. Excellent for the beginner or advanced student. A quick, practical and dependable method. Available tapes from beginner's alphabet to typical messages on all subjects. Speed range 5 to 40 WPM. Always ready, no QRM, beats having someone send to you.

**ENDORSED BY THOUSANDS!**

The **Instructograph Code Teacher** literally takes the place of an operator-instructor and enables anyone to learn and master code without further assistance. Thousands of successful operators have "acquired the code" with the **Instructograph System**. Write today for full particulars and convenient rental plans.



## INSTRUCTOGRAPH COMPANY

4769 SHERIDAN ROAD, CHICAGO 40, ILLINOIS

mail and many difficulties in the delivery of QST, with complaints of slowness or nonreceipt. By trying hard at HQ, we are generally succeeding in all of these matters in doing our part in the normal manner, and the fault lies with an overloaded mail service which is generally groaning throughout the country. If you will try to be patient and wait just a few days longer . . .

## Parallel Standing Waves

(Continued from page 48)

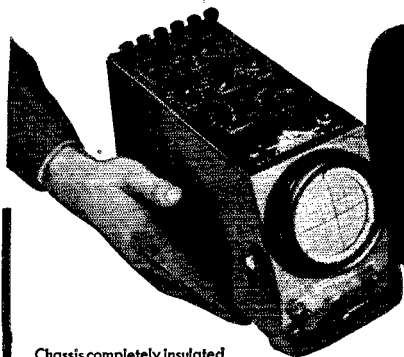
On lower powers the entire transmitter input can pass through the line trap. The load should be worked out or, if possible, an a.c. ammeter connected in the 115-volt a.c. line and a reading taken. Perhaps a good many hams will be surprised to find how much power is demanded. A little bit for this filament and a bit more for that C-bias pack add up!

The table below gives data for winding the tuned coil in the line trap with various sizes of wire (close-wound) for the several amateur bands. The untuned coil is simply wound over the tuned coil for its entire length. It would be wise to give the coils a good coat of coil dope or white shellac. It will be clear from the table that a single coil-and-condenser combination can be chosen to cover two adjacent bands.

Diameter	Length	Capacitance	Band
No. 8 d.c.c. wire; carrying capacity 30 amp.			
1 1/2"	1"	20	28 Mc.
"	"	80	14 Mc.
2"	2 1/4"	60	7 Mc.
"	"	240	3.5 Mc.
No. 12 d.c.c. wire; carrying capacity 13 amp.			
1"	7/8"	20	28 Mc.
"	"	80	14 Mc.
2"	1 1/4"	60	7 Mc.
"	"	240	3.5 Mc.
No. 14 d.c.c. wire; carrying capacity 8 amp.			
1"	5/8"	20	28 Mc.
"	"	80	14 Mc.
1 1/2"	1 1/4"	60	7 Mc.
"	"	240	3.5 Mc.

It would be extremely nice to be able to cite a few simple rules and write down a couple of elementary formulas, the application of which would solve all antenna problems. Unfortunately, every antenna, because of its surroundings, method of feeding, and so on, is a separate and distinct case. There is an engineering wisecrack containing some wry humor and a great deal of truth which says that antenna work is an equation having an infinite number of variables each one of which is infinitely variable. It's not quite that bad but there is no easy way out. On the other hand there is no black magic about it. Everything that happens happens for a good reason. If we make a methodical step-by-step search for the reason we will end up by finding it. After we have found it, some more step-by-step investigation will find a cure. It can be an infuriating business but it is always worth it — those DX stations will tell you so.

**FOR IMMEDIATE DELIVERY!**



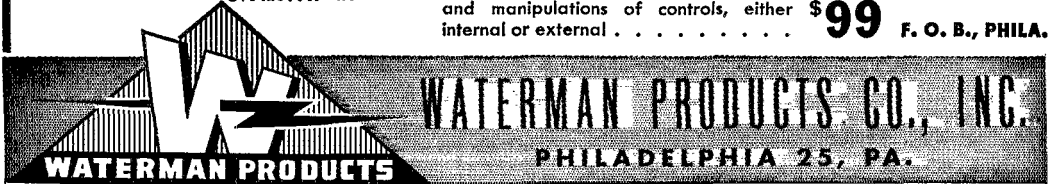
**INDUSTRIAL and TELEVISION**  
**POCKETSCOPE**  
**MODEL S-II-A**

by **WATERMAN!** — An OSCILLOSCOPE of UNUSUAL VER-SATILITY, UTILITY and PERFORMANCE  
**A 3 INCH OSCILLOSCOPE for MEASURING AC and DC!**

Chassis completely insulated from input circuits assures safety in industrial applications . . . Direct connections to deflecting plates and intensity grids from rear . . . Retractable light shield . . . Detachable graph screen . . . Handle . . . Functional layout of controls.

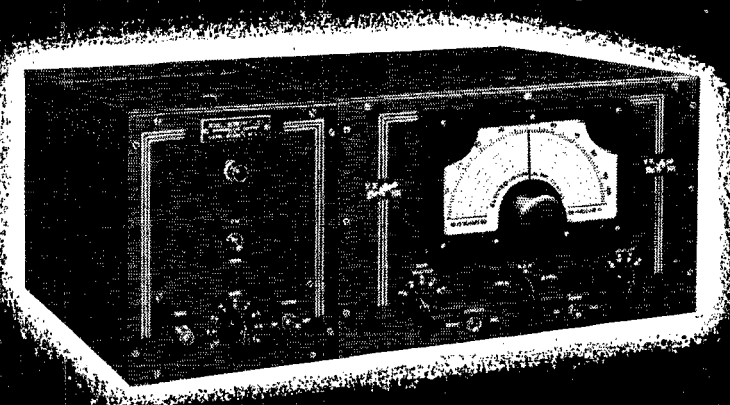
8 3/4 lbs. . 11" x 7" x 5 1/2"

AMPLIFIERS for vertical and horizontal deflection as well as intensity . . . Linear time sweep from 4-cycles to 50-kc with blanking of return trace . . . Sensitivity up to 100 mv/in . . . Fidelity up to 350-kc through amplifiers . . . Attenuators for AC and for DC . . . Push-pull amplifiers . . . Anti-astigmatic centering controls . . . Trace expansion for detail observations. Completely stable regarding line voltage fluctuations and manipulations of controls, either **\$99** internal or external . . . . . **F. O. B., PHILA.**



**TABLE-MATES**

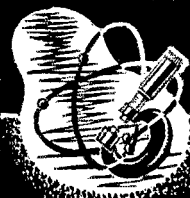
**EM-100**  
**MODULATOR**  
**\$58.00**  
**COMPLETE**



**VX-101**  
**DE-LUXE**  
**\$118.50**  
**COMPLETE**

**THE IDEAL COMPANIONS**

- 5 BANDS—VFO OR XTAL
- 20 WATTS—PHONE OR CW
- BAND SWITCHING
- HIGH-LEVEL PLATE MODULATION
- MODULATION TUBE LINE-UP 6SJ7, 6C5, 6N7, 6G6's PP, CLASS AB<sub>1</sub>, 5Y3



**ELECTRO-MECHANICAL MFG. CO.**  
 20-29 STEINWAY STREET, L. I. C. 5, N. Y.

*Write for* **BULLETIN 'M'**  
**DEC. QST AD**  
**FOR DETAILS OF VX 101**

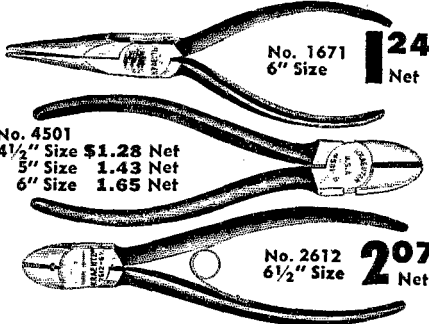
For those who want the best!

You'll Find it at Resco!

## KRAEUTER RADIO PLIERS

FOR SERVICEMEN AND AMATEURS

Designed for use in all fields of communications and electronics. Blue temper finished handles, polished heads.



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# Radio Electric

SERVICE CO. OF PENNA., INC.

7TH AND ARCH STREETS, PHILA. 6, PENNA.

Branches: 5133 Market St. & 3145 N. Broad St., Phila.

Also in Wilmington, Del., Easton, Pa., Allentown, Pa., Camden, N.J.



## RCA INSTITUTES, INC.

Offer thorough training courses in all technical phases of

RADIO and TELEVISION

WEEKLY RATES

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**VETERANS:** RCA Institutes is approved under G. I. Bill of Rights

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Checked Before Delivery

NEW RME UNITS

VHF 152A Converter — 2, 6, 10 and 11 M.	\$ 86.60
HF 10-20 Converter — 10, 11, 15 and 20 M.	\$ 77.00
DB22A Preselector — 54 to 44 Mc.	\$ 66.00
MB3 — Boomerang Break-In Monitor	\$ 22.50
NBF4 — Narrow Band FM Unit for 45	\$ 19.50
RME 84 — Communications Receiver	\$ 98.70
RME 45 — AM and Narrow Band FM Receiver and Speaker	\$218.20
J. K. Stabilized Crystals (in holder)	\$ 2.80
Exact frequency .05%	\$ 4.80
<b>Sonar Transmitter Units</b>	
Tempered Alum. — Beam tubing 3/8" to 1"	
12 ft. lengths 3/8"	\$ 1.44
3/4"	\$ 1.68
Clamps, each	\$ 0.22
Transmission Line — Reg. 300 ohm, 100 ft.	\$ 2.85
Heavy 300 ohm, per ft.	\$ .075
Surplus ARCS — 100-156 MC Trans.	\$ 14.45
Surplus Receivers, 3 to 6 and 7 to 9 M	
Surplus Transmitters, 4 to 5.1, 5.1 to 7, 7 to 9	

(New and Used)

**ART A. JOHNSON SALES**

Art A. Johnson, W9HGQ

1117 Charles Street

Rockford, Illinois

50 Mc.

(Continued from page 62)

QSO across the Delaware River was made by W2VX and W3FGQ. The boys have had a little trouble and a lot of fun finding the band and one another, but they are now getting signals nearly comparable with those obtained with similar equipment on 144 Mc.

### V.H.F. Sweepstakes, Jan. 17th-18th

"Sounds like a great idea, but why in January, when conditions are at their poorest?" Such was the comment heard when the date of our first V.H.F. Sweepstakes (see complete details elsewhere in this issue) was announced. Well, that was just the idea — to get some of the gang, who might not otherwise bother, to fire up and see what can be done when the v.h.f. bands aren't hot.

DX adds spice to our v.h.f. work, but unless we maintain consistent local activity, there will be few stations ready to go when DX conditions break. Let's help to keep our v.h.f. bands active by getting on and seeing how many stations we can work in the V.H.F. SS, whether conditions are good or bad. There'll be more contests next spring and summer.

### How's DX?

(Continued from page 67)

on 28 Mc. . . . . Back from Truk is W8WEA and he will answer all QSLs shipped to the given QTH in San Diego. Previously, it had taken an average time of three months for him to receive cards, all of which have been answered. So . . . save your hair, don't despair. . . . . Via W4CCH, VQ8AB remarks that he is in the Chagos Island Group, not Mauritius. The place isn't exactly on Times Square, either — he gets mail once every six months! . . . . . W9TKV's "vacation" from Harvard this summer turned into over 750 contacts with DX stations on 7 and 14 Mc. . . . . HZ2TG has come back home for a while and will QSL 100 per cent to those shipping cards to the listed location. . . . . The old thrill story again: W2UZN didn't think he could work DX with his little 807 until a G answered his CQ. Now you can't hold Jim down. . . . . An interesting epistle from VS9ET states that so far he can only pull W6s through out there. Gosh, there must be something to the California Kilowatt stuff. But Eddie also complains about the pile-up. His Vee keeps raising stuff in odd directions, furthermore, while being arrowed toward G. Ten or fifteen watts to an 807 gives him the push and he closes by informing that Y12JJ is now rebuilding on Bahrein Island. Guess the YI prefix wasn't juicy enough for him! . . . . . Out in Bellingham, W7EYS says he keeps rebuilding too much to raise an impressive country total. Must be out after an S9 DXCC! Bob is going down to 50 Mc. with a small pair of 304TLs driven by a VT-127A. . . . . Which is the quickest way to go bats, chase DX or work con-

(Continued on page 150)

# ATTENTION · ALL HAMS AND SWL'S

- ALL-ALUMINUM
- FULLY ADJUSTABLE
- PERMANENT
- STRONG AND RIGID

10-11 MTR.  
ROTARY

**\$2950**  
COMPLETE

10-11 MTR.  
ROTARY  
JR. MODEL

**\$1995**  
COMPLETE

2 ELEMENT  
20 AND 10  
ARRAY  
WITH 2 T  
MATCHES  
**\$6500**

IF YOUR DEALER CAN'T  
SUPPLY YOU . . .

"You can't work 'em if you can't hear 'em."  
With a HY-LITE ROTARY BEAM you will hear  
and work 'em.

Built of rigid aluminum castings and tubing  
the HY-LITE ROTARY BEAM is light weight and  
will stand strains many times greater than  
encountered in actual use.

Compare these specifications: The crossarm  
and center supporting frame is of heavy, high  
grade aluminum castings, with 1 inch aluminum  
tube connectors. The elements are 3/4 inch and  
3/4 inch telescopic aluminum tubes for the 6,  
10-11 meters and 7/8 inch and 1 inch telescopic  
aluminum tubes for 20 meters. The spacing be-  
tween the elements is .10 for the director and  
.15 for the reflector and adjustments are easily  
made with Allen set screws with the wrench  
supplied. Complete instructions are supplied  
with each HY-LITE ROTARY BEAM. Heavy rubber  
clamps on Steatite insulators rigidly support  
the elements. HY-LITE BEAMS are supplied with  
a 6 foot mast.

Stacked arrays can be had or easily added  
to your first HY-LITE BEAM. 20, 10-11, 6 meter  
beams are now available. HY-LITE ROTARY  
BEAMS are made right and priced right . . .

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*Write us...* **FOR OUR  
LOW PRICES AND CATALOG  
WITH VARIOUS COMBINATIONS**

## UNIVERSAL SCORES AGAIN!

Brand new, wanted items at unbelievable savings. Every item guaranteed exactly as advertised. Order with confidence from Universal.

### KENYON FILAMENT TRANSFORMERS

2 1/2 Volt, 10 Amps, 20,000 Volts  
insulation.

**\$4.00**

7 1/2 Volt, 12 Amps, 20,000 Volts  
insulation. Can be changed to 5  
Volts by removing a few turns.

**\$6.00**

7 1/2 Volt, 22 Amps, Open core type  
with 20,000 Volts insulation.

**\$3.25**

### KENYON

20 Henry 300-MA, 15,000 V Ins.,  
Filter choke, shielded case and  
standoffs, shipping weight 40 lbs.

**\$5.95**

### A Rare Buy!

Plate Transformer  
3200 Volt, center tapped.  
1600 Volts at 350 MILS output.

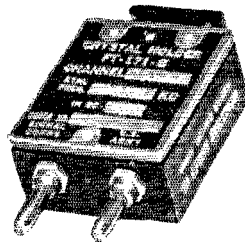
**\$10.00**

### Oilmite Condenser

Tobe, 1 MFD 600 Volt DC. Very  
special—

**49¢**

(20% DEPOSIT WITH C.O.D. ORDERS)



### Brand New CRYSTALS

Freq. 3500-4000 KC

Your Choice

Within 10 KC

**\$1.25**

5 for \$5.25 (Prepaid)

Universal has many other rare buys.  
Mail your "want list" today.

## UNIVERSAL RADIO SUPPLY CO., Inc.

715 South 7th St.

"Serving America's Hams"

Louisville 3, Ky.

## U.H.F. RESONATOR CO.

Pre-Tuned—Pre-Spaced—PreMatched

High-Power Beams Use  
Wide Maximized Spacing

### NO TUNING TO DO!

Beam clamps, 3 inch Dural tubing rotating masts, and bearings, available. Make up your own combination 10 Over 20, 6 Over 10, etc. Literature shows low-cost no-loss two inch open line flex. connection, all your RF power guaranteed out front.

Amateur net prices, 10-meter beams: 3 el. beam, length 12 ft., weight, 8½ lbs., \$35. 4 el. beam, length 20 ft., weight 13½ lbs., \$50. 5 el. beam, length 29 ft., weight 25 lbs., \$65. 3 el 20-meter beam, 23 ft. long, 39 lbs., \$100. For shipping prepaid anywhere in U.S.A. or Canada add \$10 deposit on strong wood box. Refund on return of box, less outgoing shipping charges.

50 to 100 ft., television ant. masts.

Beams for 50, 144, 235, 425, and parabolas, including 32 el. on 2 meters, 32 el. on 425 MC. Send for literature. Power gains over a folded dipole. 3 ele. 9.9; 4 ele. 11.5; 5 ele. 15.

MAIL ADDRESS GUION ROAD, RYE, N. Y.

ALL LETTERS ANSWERED PERSONALLY

## U. H. F. RESONATOR CO.

W. F. Hoisington, W2BAV

FACTORY AT PORTCHESTER, N. Y.

### • ALL-PURPOSE PORTABLE ELECTRIC POWER UNIT

#### 3 KVA

- Generator: 3KVA, 115, 120, or 125 volts, 3-phase, 60 cycles, 1200 r.p.m. (or 50 cycles at 1100 r.p.m.).
- Engine: Gasoline, 4-cylinder (Hercules Model ZXB) 9.5 h.p. at generator speed: 2¾" bore, 3" stroke, 64.9 cu. in. displ.
- Equipment: starting motor and generator for use with vehicle type 6-v. battery (battery not incl.). Oil filter, oil bath air cleaner; manual choke control; gas gauge on tank; gasoline strainer.
- Control Panel: main switch; circuit breaker and fuses; frequency meter; voltmeter and ammeter, charging ammeter, oil pressure gauge.
- Electrical Characteristics: Wiring, lights, small motors (either 3-phase or single-phase), and appliances served from these units can be used on most power company lines.

### W. S. GOFF & CO.

390 Main Street

Worcester 8, Mass.

## CLIPPER CHOKES and FILTERS

Triple speech power on carrier without over-modulation, as suggested in QST Nov. 1946, page 23.

**SHIELDED CHOKE**, 3.75 hy. 5%, hi-alloy laminations high efficiency. Model C-375 \$4.75

**COMPLETE FILTER ASSEMBLY**, including laboratory selected choke C-375, capacitors C3, C4, C5 and terminating resistor R5, sealed in 1¾" x 1¾" x 2¼" shield can.

Model LP-5000, cut-off freq. 5000 cy. \$5.95

Model LP-3500, cut-off freq. 3500 cy. \$5.95

IMMEDIATE DELIVERY, postpaid in U. S.

Preferably order through your jobber

### Kenneth Richardson Laboratories

254 Vincent Avenue, Lynbrook, L. I., N. Y.

tests? This query from W8YGR. Well, the coming DX Contest should do the trick. Perhaps it's still true — one doesn't have to be crazy in this game but it sometimes helps.

— . . . —

Well, we just read an interesting article concerning a switch that is pushed for 10 kw., so we're going right home to put one in the rig. Seems a little too simple, though. Probably has the usual catch to it, a bit of rewiring necessary or something. Still, we'll try anything to get a rise out of that CM2!

## V.H.F. Sweepstakes

(Continued from page 69)

### Proof of QSO

Before points or sections can be claimed, at least one exchange-and-acknowledgment must be completed between the two stations. As a courtesy, exchanges should be sent in the order of preamble (as shown) to make it easy for each operator to record the information. (It is not necessary for each station worked to be a contestant. Ask the operator to take your preamble, acknowledge it, and give you like information.

(Continued on page 152)

### Most States on V.H.F. in 1948

• V.h.f. amateurs may compete for *Most-States-Worked ARRL bronze-medallion awards* by reporting their QSOs representing different "states" to ARRL monthly by postal card or forms supplied upon request by ARRL. The record of states worked on 50, 144 Mc., or 235 Mc. and up will appear in *QST* monthly. To be considered for medallions, the top contestants may be required to supply written confirmations (proof of QSO for each state claimed) at the year-end.

1) Medallions will be inscribed with the call of the winner and number of states worked in '48: one for the operator working most states on 50-54 Mc., 144-148 Mc., and 235 Mc. and up.

2) Eligible: All licensed amateurs.

3) Period of work: Jan. 1-Dec. 31, 1948, inclusive.

4) All work credited must be from one location, i.e., from points of operation no two of which are more than 25 miles apart. The District of Columbia counts for Maryland.

5) Report new states worked by the 15th of the month following that in which the contacts were made. Hold confirmation cards and letters until the end of the year.

6) Duplicate awards will be made if warranted. In the absence of three entries the Committee may declare "no award." ARRL staff members are ineligible. Committee decisions are final.

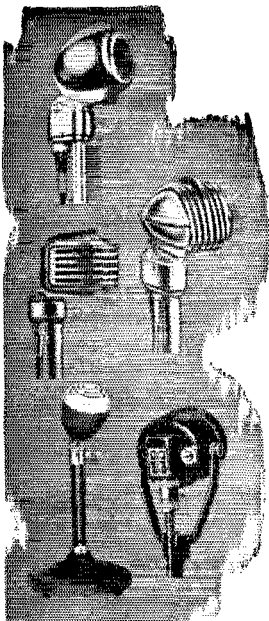
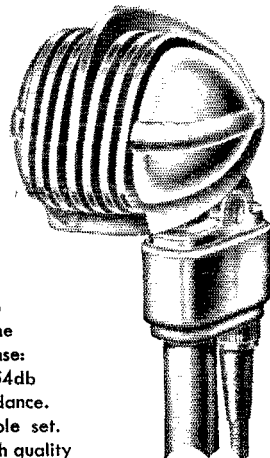
This competition is independent of the 50-Mc. WAS Contest previously announced.



# BEAUTY FOR DUTY

## Model 33D is Dynamic

The Turner Model 33D is designed with exceptionally smooth wide-range response and high effective output level. Ideal for critical applications where quality reproduction is desired. Excellent response to voice and music pickups. Engineered with Alnico magnets and Turner precision diaphragm. Entire circuit is well shielded to prevent extraneous pickup. Modern streamline design and rich satin chrome finish. Response:  $\pm 5$ db from 30 to 9000 c.p.s. Level: 54db below 1 volt/dyne/sq.cm. at high impedance. Complete with 20 ft. removable cable set. Also available as Model 33X with high quality crystal circuit.



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Microphones licensed under U. S. patents of the American Telephone and Telegraph Company, and Western Electric Company, Incorporated. Crystals licensed under patents of the Brush Development Company.

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NEW NC-57 - NATIONAL QUALITY-PLUS

LOW PRICE - 89.50 - MAKES THIS RE-

CEIVER - TODAY'S OUTSTANDING VALUE -

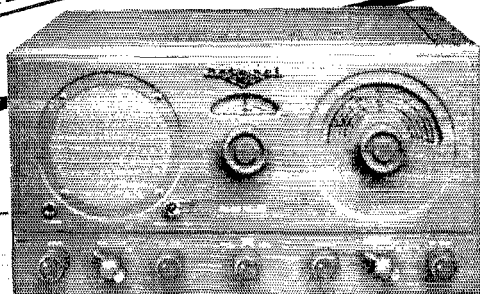
SEE IT OR WRITE FOR BULLETIN -

CONTAINING COMPLETE INFORMATION

**TYDINGS COMPANY**

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PITTSBURGH 19, PA.



NC-57

# MODULATION METER

MODEL G 232

Price \$47.00 Net (Including Test Leads)

Compact —  
5 1/4" x 3 1/2" x 2 5/16"

Welded Aluminum Alloy Case—Black Alumilite finish

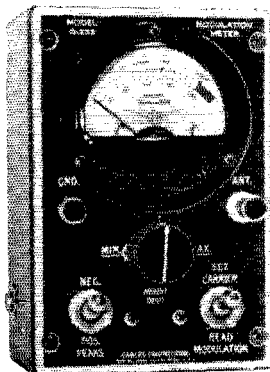
No Batteries used

Uses Crystal and Copper Oxide Rectifiers

Hermetically Sealed Meter

Monitoring Jack

Designed for use up to 300 Mc.



Monitors AM Modulation Percentage and Speech Quality • Indicates Carrier Shift and Shows Positive and Negative Peaks • Individual Accurate Calibration for both Voice and Sine Modulation.

Highest Quality Construction and Components

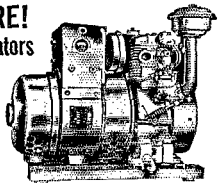
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Literature upon request. Veteran training

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VHF-152.....	\$86.60	Hammarlund	
Gon-s.t 10-11.	39.95	HQ 129X.....	\$177.30
Sonar MB 611..	72.45	RME-45.....	198.70
Sonar VFX680.	87.45	Hallcrafters	
		SX42.....	275.00
		National	
		NC-2-40-D...	240.00



**CONTINENTAL SALES COMPANY**

195-197 CENTRAL AVENUE, NEWARK 4, N. J.

All hams are requested to submit lists, even if they show only a small score, on a postal to help support claims from others. Awards will be based on individually-attained scores.

### Report Results

Report to ARRL, West Hartford, Conn., as soon as the contest is over. Use the log form in the example.

### Correspondence

(Continued from page 71)

ticular obligation to the general public. They assume that it's like life, liberty and the pursuit of happiness: guaranteed by the Constitution — or something. Naturally, regarding radio as purely a hobby they don't see any use in handling traffic, joining traffic nets or emergency corps, and holding drills.

Comes a national emergency and they are eager to help, but they are no more really qualified than a bystander is to play shortstop in a big league game, or for one of the audience to fill in for the ailing first violinist. . . .

— Benton White, W4PL

### OPERATING PRACTICES

Andrews, Texas

Editor, QST:

I think it is about time for a good pep talk to our fellow hams about needless QRM caused by fellows calling CQ once every minute and a half and never listening to any frequency except their own. This evening I called W7—three times on such a deal. He was about 20 kc. from my freq. and putting in an S9 signal here. When I turned the receiver off he was still calling CQ.

You know a lot of us are still "rockbound," and I think everyone should tune over the band following a CQ before calling CQ again. Tuning the whole band will certainly eliminate a lot of QRM and will add to the number of contacts.

— Roy Ayers, W5BTU

97 Belgrove Drive, Kearny, New Jersey

Editor, QST:

I may be what you call an old-timer but I still like clean-cut sending. I have been going over the forty-meter band since I got out of the Signal Corps and it seems to me that a lot of the boys have a habit of slurring letters, etc., together. In the old days we used to call it "a banana-boat swing"; in other words, you got part of it and filled in the rest and hoped for the best. We are now getting a bunch of new hams who are not quite up on chatter of our sort so why not give them a break?

— Vernon J. Reynolds, W8AGB

New York City

Editor, QST:

W4GZV's opinion is of particular interest to me because I discuss current events of national and international importance on the amateur bands. Of course I believe that "judicial prudence" should be observed in everything said on the air. But leave us not be left with the idea that there is an ever-listening ear, absorbing our conversations with the intention of slapping restrictions on those who do not conform, in policy, with the powers that be.

Such thinking will put a conscious or subconscious fear into the heart and mind of every thinking amateur. Many of us fought and worked in the recent war and we reaped the preservation of our ideals, one of which was freedom from such fear. The amateur fraternity, I sincerely believe, is a more-than-average-intelligence group, and I am confident that it never will mistake liberty for license. Exchange of views, whether on the street or via radio waves, is something to be encouraged in a democracy such as ours.

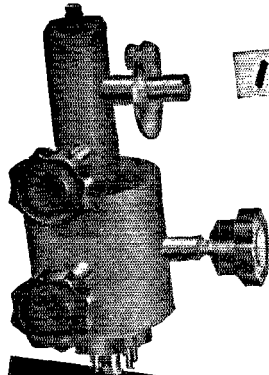
We must never forget that whether we are amateurs, veterans or part of any other group whatsoever, we are always citizens first and as such must exercise the powers and privileges granted us if we wish to preserve our way of living.

— Emanuel Berger, W3QVU

AMATEURS...

# A NEW BAND

*Decimeter Leads the Way*



**IT'S SIMPLE!**

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**IT'S FUN!**

To make a 13 cm. transmitter, plug a 2C40 tube into the DM-240-A oscillator, make filament, plate and antenna connections . . . you're ready to go!

To make a receiver, use the DM-240-A oscillator as a superregen detector in the separate-quench circuit. Or use it as the H. F. oscillator in a superhet!

New DX records are waiting to be made; new phenomena are to be discovered; new uses are to be found for these frequencies!

*Decimeter Leads the Way to Practical Receivers & Transmitters on 13CM. With the*

**DM-240-A  
OSCILLATOR**

**SEND FOR FREE FOLDER, 12-B.**

Look for these Decimeter products coming soon

- Precision Wavemeter for 13 cm. band.
- Oscillator for 25 cm. band.
- Precision Wavemeter for 25 cm. band.
- Reaction Wavemeter for 100 to 3000 Mc.

**DECIMETER**

1430 MARKET STREET

DENVER 2, COLORADO

# Trans-Atlantic..

(R-9 OR BETTER)

## on 6 METERS

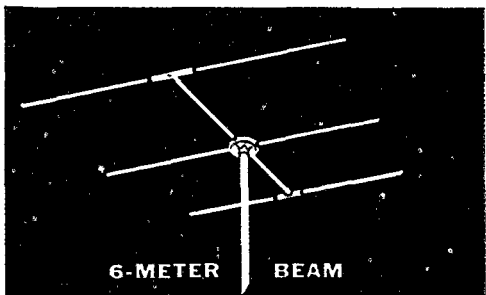
During a recent period when the MUF (maximum useful frequency) went up as high as 51 mc., station W1ATP in Holliston, Massachusetts, worked London and several California and Oregon stations with a signal strength of R-9 and better, using a Workshop 6-meter beam antenna. This is typical of the performance of Workshop antennas on all amateur bands.

Available through your regular dealer. Price \$9.00

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**6-METER BEAM**

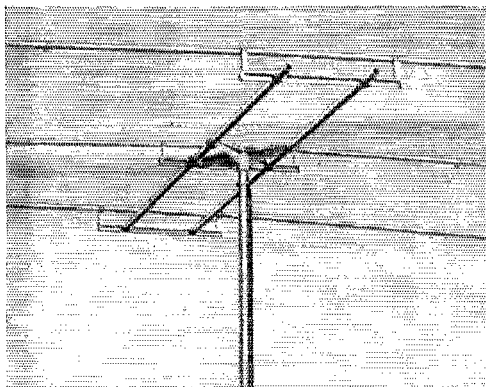
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2-Meter Beam Antenna #146AB	\$21.50
10-Meter Dipole Antenna #29AD	8.00
10-Meter 3-Element Beam Conversion Kit #29B	31.50
10-Meter Beam Antenna #29	39.50
20-Meter 3-Element Beam Antenna #14	120.00
Antenna Mast Kit #AM	8.25
Model #AM1	1.30
Rotating Accessory Kit #AM2	5.00
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## THE ARROW 6-10-11 MTR 3 ELEMENT BEAM



- ALL ALUMINUM 3/4" TUBING.
- ALL ALUMINUM CASTINGS.
- RIGID CONSTRUCTION.
- FED WITH 72 OHM COAX AVAILABLE FROM OUR SURPLUS STOCK AT LOWEST COST.
- SUPPLIED WITH 6" MAST OF STANDARD PIPE. EASILY ADDED TO.
- SEND \$5.00, BALANCE C.O.D. IMMEDIATE SHIPMENT.

COMPLETE WITH 50 FT. **\$29<sup>50</sup>**  
COAX AND INSTRUCTIONS

THIS BEAM IS MADE FOR AND ON SALE EXCLUSIVELY AT ARROW

**COMPLETE STOCKS**

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# ARROW ELECTRONICS, INC.

HAM DEPT., 82 CORTLANDT ST., N.Y. 7, N.Y.

## DISTRIBUTORS WANTED

### Antenna Position Indicator

*Remote Electrical Operation*

We can supply component transmitter and indicator units for use on 10 to 20 volt D.C. battery or rectified current. Distributors interested in quantity purchases will be considered for exclusive territory. Inquiries invited.



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An Accredited Technical Institute nationally recognized for high calibre training. Prepares high school graduates for technical careers. Classes start every Monday. Comprehensive courses in Radio-Electronics Engineering, Broadcast and Television Engineering, Broadcast and Television Servicing; 2,100 hours classroom and laboratory study.

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# HAM-ADS

- (1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in their pursuit of the art.
- (2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others.
- (3) The Ham-Ad rate is 30¢ per word, except as noted in paragraph (6) below.
- (4) Remittance in full must accompany copy. No cash or contract discount or agency commission will be allowed.
- (5) Closing date for Ham-Ads is the 25th of the second month preceding publication date.
- (6) A special rate of 7¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, if by a member of the American Radio Relay League takes the 7¢ rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising by him takes the 30¢ rate. Provisions of paragraphs (1), (2), (4) and (5), apply to all advertising in this column regardless of which rate may apply.
- (7) Because error is more easily avoided, it is requested signature and address be printed plainly.
- (8) No advertiser may use more than 75 words in any one issue.

*Having made no investigation of the advertisers in the classified columns, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.*

**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 in colors.** Stamp for samples, Glenn Griffith, W3FSW, 1042 Pine Heights Ave., Baltimore 29, Md.

**DEKA-XTAL.** New compact 10-crystal unit for standard 5-prong socket. Looks and operates like a dial-knob. Just plug it in and turn to any of 10 frequencies, your selection. Ask your dealer or write us. Also other low C ham crystals in 171 cases to fit octal sockets. 80 and 40 + 1 kc., \$2.65; 20 + 4 kc., \$3.50. Scientific Radio Products Co., 738 1/2 W. Broadway, Council Bluffs, Iowa.

**COMMERCIAL** radio operators examination, question-and-answers. One dollar per element. G. C. Waller, WSATV, 6540 E. Washington Blvd., Tulsa 15, Okla.

**AMATEUR** radio licenses. Complete code of theory preparations for passing amateur radio examinations. Home study and resident courses. American Radio Institute, 101 West 63rd Street, New York City.

**CUSTOM** building of ham equipment, your specifications. Medium power xmtrs, VFOs, etc. Inquire Chatel, W2KSC, ex-W1DIF, 235 Duane St., Brooklyn, N. Y.

**QSLs in plastic** — record cards, Ham Xmas cards. Stamp for samples. Reber Print, R.D. 1, Sewell, N. J.

**CRYSTALS:** Precision low drift units. Type 100A in 80, 40, and 20 meter bands. Two units plug in one socket. Plus or minus 5 kc. One dollar each. Exact frequency. \$1.95 ea. Rex Bassett, Inc., Rt. Lauderdale, Fla.

**QSLs,** Samples, Albertson, W4HUD, P.O. Box 322, High Point, N. C.

**TRANSMITTER** kits, 40 watts, \$69.50. Exciter kit, \$17.95. 275 watt Globe King. All makes and models new and reconditioned receivers. Trade ins accepted; low payment plan; terms financed by Leo, W0GFQ. Write for specials. World Radio Labs., Council Bluffs, Iowa.

**IN STOCK:** New and used Hallicrafters, National, Hammarlund, Collins, Millen, RME, Sonar, Meissner, Temco, Meck, Pierson, other receivers, transmitters, parts, etc. Lowest prices. World's Best terms. Reconditioned S38 \$35.00, S20R \$49.00, S40 \$59.00, RME84 \$69.00, RME243 \$70.00, ARR7 \$89.00, 1B250 \$29.00, Meck 760 \$99.00, NC40D \$169.00, HQ-120X \$199.00, SPC 400X \$199.00, SPC400X \$249.00, KP81 \$249.00, S22R, SX25, SX16, SX28A, SX42, HQ129X, NC173, HRO, HT9, Temco 75GA, and other receivers and transmitters. Shipped on approval. Write: Henry Radio, Butler, Mo.

**DON'S QSLs,** "Leaders in the Field." Samples, 2106 South 16th Avenue, Maywood, Illinois.

**ERECO** Beam Rotator: 110 VAC. Heavy duty, variable speed, selayn indicator weatherproofed. Complete indicator and rotator ready to operate — \$49.95. Satisfied users all over the country. Write for free literature. Erecro, 2912 Hewitt, Everett 6, Washington.

**DURALUMIN** tubing — 1 1/2" OD, 61st. — .049" wall — 2.8 oz. per foot. Shipped prepaid in twelve-foot lengths, 23 cents per foot, COD. Middletown, WICA, 23 River Glen, Farmington, Conn.

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**TREMENDOUS** stock of new guaranteed Government radio parts. Handle and Walkie Talkies for portable operation — Ground plane antennas \$12.50 — Transmitting tubes and condensers — Coaxial Cable and connectors — paramic antennas. See our display at Radio News, CO, Amateur Callbook, Electronics, Proceedings of I. R. E., Communications, American Aviation, Popular Mechanics, and Electrical World. Write for new illustrated Ham Catalog H200C. Wells Sales, Bob Whan, Pres. (W9BEQ), 320 N. La Salle St., Chicago 10, Illinois.

**TRANSMITTING** Keys: New, beautifully built, high quality Mac type 200 keys. Black crackle finish, heavy cast oval shape base, the type that doesn't require fastening down. It won't slip. Switch lever for closing circuit. All parts chromium plated. Adjustable bearings, heavy 3/16" silver contacts. A real buy, \$1.00. Shipping wt., 1 lb. Please include postage. Ed. Doherr W3CIR/1, 96 Highland St., Hyde Park, Boston, Mass.

**WANTED:** National "NSM" modulator. Thorpe, W8JDG, 698 St. Clair Ave., Detroit 14, Mich.

**FIRST \$500** takes my KW/CW rig. Hallicrafters receiver, bug, tape machine and many duplicate miscellaneous parts, coils, meters, etc. High grade parts only. Bargain. Moving because of illness. E. Elier, W3TXS, 407 E. Washington Blvd., Grove City, Pa.

**METERS** repaired. Springfield Testing Laboratory, 815 North 12th St., Springfield, Ill.

**EXCEPTIONALLY** well-built 300-watt fone or c.w. xmtr. In sturdy, varnished, wooden relay rack. For 10-meter operation, convert to plug-in coils if desired. Write W7LKI, 226 North First East, Cedar City, Utah, for details. All letters answered immediately.

**FOR Sale:** 150-B converted for 20 and crystal mike. Price complete with tubes less crystal mike, \$250. Packed in original carton, W9NGM, 509 Idaho, Huron, S. Dak.

**WANTED:** FB-7 rcvr including 10 meter coils. R. O. Loken, W7HPQ 4314 Meridian Ave., Seattle 3, Wash.

**SELL** new NC-240 D and SX-28-A used 3 months. In brand new condition with speakers. Doug Berry, 407 Ann, West Reading, Pa.

**HAMMARLUND** Super-Pro, army model in metal cabinet, 100-400 Mc, 2.5-20 Mc, as is, \$125. John Weber, 402 East Walnut, Kokomo, Ind.

**SELL** or swap: NC-46 and speaker, Gon-set 10-11 mtr converter, excellent condition. W2QQY, 1806 Sterling Place, Brooklyn, N. Y.

**SELL:** Collins Model 30J transmitter, 300 watts. Now on the air on ten. \$400. Dr. Paul Kincaid, 912 Rhode Island, Lawrence, Kans.

**SELL:** Collins model 150 transmitter fone and CW complete with tubes and coils for 10 meters. Price \$200 f.o.b. Durham, N. C., W4CEN, Box 58, Charlotte, N. C.

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**SELL** Echophone 1A receiver, good condition. \$35. John Forrester, 230 West 7th St., New York City.

**FOR Sale:** 150-watt all-band p.p. 807 c.w. amplifier, power supply meters, in black cabinet with grey panel. Also brand-new post-war Meissner Signal Shifter. Complete, \$195. W6WOS, 1450 Valane Drive, Glendale 8, Calif.

**HAMMARLUND** Super-Pro, like new, Army rack model, complete, less speaker. A steal at \$125. W20XR, 71 Crosshill St., Staten Island, New York.

**HALLICRAFTERS** Super Skyriter SX-28 and new R-42 speaker for sale. Clayton, 2674 W. 25th St., Cleveland, O.

**COMPLETE** 60W CW rig, 7 Mc, BC-312 AC rcvr, both \$60, f.o.b. W6UVP, R 1 Mentone, Calif.

**FOR Sale:** best offer takes new BC-610-E and Collins ART-13. W6CIF, 4721 Willowbrook Ave., Hollywood 27, Calif.

**FOR Sale:** 150 B xmtr, 250 watts, converted for 10 meters, \$225. Meissner 14 tube Traffic Master, \$40. W9FAK, Mt. Carmel, Ill.

**TELEVISION** set for sale, 7". First \$200 check takes it. W2NRM, Tenafla, N. J.

**SUPREME** AF-100 xmtr, new, list \$550. Sell for \$450, with tubes, coils, and mike. F.o.b. or deliver in New York area. 3 ch. wide spaced beam in original box with rotator, indicator, cable, \$100. HQ-129X, \$150. BC-221 freq. meter, with AC supply, \$40. W2VAA, 112 E. Union Ave., Bound Brook, N. J., Tel. 0067-W.

**SELL:** Hallicrafters S20R prewar, \$40 and S4IG, \$25. W2DZY.

**HALLICRAFTERS** SX-28A with speaker, 2 yrs old, \$120, express charges extra. Theodore J. Everett, Box 314, Niantic, Conn.

**HAMMARLUND** HQ-129-X receiver for sale. Excellent condition. \$125 or best offer. All inquiries answered. W2TFH, 28 Beach St., Floral Park, L. I., N. Y.

**WANTED:** Raytheon type UX8718B, surplus plate and filament transformer. Write Milan Leggett, W5LRI, 2518 Jeffries, Dallas 10, Texas.

**CODE** practice Wheatstone (perforated) tape wanted. W. S. Erwin 875 Seward, Detroit 2, Michigan.

**SELL** Meissner 150B Exciter unit, \$45, Abbott TR-4 with Vibrapak, \$40. Wanted: BC coils for HRO. W8JBI, 598 Wilson Ave., Columbus, Ohio.

**SELLING** out: K.W. phone, \$700; 2 1/2 K.W. modulation transformer, \$40; Kenyon 5 V.C.T. filament transformer, \$4.90; 805's, \$5, new, not surplus; H D V L 80 new, \$4. Misc. W8RHP, 2710 Lakeview Road, Rocky River, Ohio.

**METERS:** Send them insured p.p. We will repair, calibrate and return C.o.d. Complete instrument repair and calibrating facilities. Allen Precision Testing Laboratory, 12223 S. 73rd Ave., Palos Heights, Ill.

**SELL** power supply, comp. 2000 volts @ 300 mills. Also modulator stage, complete 811s, 300 watts. Name brand parts. Best offer. W2HYF, 248 Herzl St., Brooklyn, N. Y.

**FOR Sale:** precision series 954 set tester and leads. Used less than one hour. Perfect condition. Price \$70 or best offer. Also Precision series E 200-C signal generator and cables. Used less than 5 hours. Perfect condition. Price, \$40 or best offer. Either of above will be sent in original carton. Mr. Vassallo, 1969 Pacific St., Brooklyn 33, N. Y.

SWAP Conn saxophone, perfect condition, just completely overhauled and Cundy-Betony Silva-Bet clarinet, good condition, no radio equipment. Make offer. Long, 320 Ozark Ave., Fayetteville, Ark.

SELL BC-342D, modified to increase sensitivity, S-meter and noise limiter added, \$50. W4LAM, Thornton Hall, University of Va., Charlottesville.

BEST offer, S-38, new condition, FB7A with 5887 pack and 3 sets coils. C. A. Lanham, W9JLK, 404 West Union, Bloomington, Ill.

QSLs, SWLs, large variety of designs and colors. Also specialize in your own design. Guaranteed quality, good delivery time on standard samples. Stamp for samples. Frazer, W2DEE, Maple Shade, N. J.

NEW or used: all popular brands in stock. Hallcrafters, National, Hammarlund, RME, Gon-set, Millen, Meissner, others. Send deposit for new gear or write for list of used or surplus. Van Sickle Radio Supply, Indianapolis 6, Ind.

WANTED: Bendix Dynamotor power unit, 3206 or 3206-24. Henry Griffiths, 39-82 65 Place, Woodside, L. I., N. Y.

BEAM control cable, new material: 2 #16; 6 #20 rubber insulated, coded, tinned conductors. Weatherproof rubber jacket. Heavy overall braided shield. 1/4" diameter. Value 30¢ ft. Real buy 11¢ foot. F.o.b. Chicago. Associated Industries, 6639 Aberdeen Street, Chicago 21, Ill.

GET a converted BC454 nine-tube superhet for each band, 10 to 80 meters. Bandspeed, tuned r.f., two if, two g, two g limiters, 110 vac. \$25. Specify band. Electron-Machine Co., 2 East End Ave., New York.

FOR Sale: 40 ft. steel mast including rotating bearing and 4-element 10 M and 3 element 20 M nested copper beams. Mast is all-welded 12 ft. 1 3/4" square sections. Best offer over \$150. F.o.b. Alexandria, Penna. S. Swigar, W3NLR.

THORDARSON 129P58 new Dual Secondary 2400 volt/200 Ma, 1800 volt/150 Ma, \$12.50. W6TRV, 4535 17th St. NE, Seattle, Wash.

SELL 2 metal cabinets, 1 Par-Metal grey, 1 Corbin black. Both same size. 6" high, 22" wide, 14 3/4" deep. Hinge door at rear. Good condition, \$25 ea., plus shipping. MU 2514. Leonard Long, 4317 Chalmers Ave., Detroit, Mich.

CHANGING Frequency? Fine commercial crystals for Police, Aircraft, Marine, Geophysical and other services. Commercial re-grinding; many crystals can be economically re-ground to new frequencies. Inquire. Over twelve years of satisfaction and fast service! Try us first. Wanted: Laboratory signal generator. Eidson Electronic Co., Temple, Texas.

CRYSTALS: Acid-etched, BT cut. Frequencies 4100 to 9000 Kc. minimum activity. 4 milliamperes. Mounted in octal (FT243) or 5 pin holders (1/4" pins spacing). Your frequency within 10 Kc. \$1.00; 5 Kc, \$1.25. Calibrated within 1 Kc. of marked frequency. Exact frequency, \$1.75. Holders 20¢. AT-BT Xtal, Box 41, Park Ridge, Ill.

TRADE or sell Astatic FP pick-up, General Industries dual speed motor and turntable. A. T. C. 110 v. DC to 110 v. AC inverter. All are almost new and in perfect condition. Want practice code machine with or without osc. John Graham, Wurtzboro, N. Y.

MODULATOR for 1/2 Kw rig complete with 13 tubes and separate speech amp. \$70. Abbott TR4 with bat. pwr supply, \$30. W8GH, 1112 Norwood, Toledo, Ohio.

FOR Sale: 250-watt transmitter in 3 ft. Par-Metal cabinet; 140¢ Hf TZ40s, Af. Complete with mike and ECO. Price, \$250.00. Tero Kreckman, W2LLR, 11517, 237 St., Elmont, L. I., N. Y.

SELL Meissner analyst, instruments, like new, \$80. W7KUM, Uln, Mont.

SALE: Meissner Shifter 9-1090. Used 2 months. Good condition. Best offer over \$90 takes it. W0DEA, Joplin, Mo.

QSLs with your photo. Latest designs. Lowest prices. Free samples. Ken Stark, W4LNC, 307 Depot, Hilton Village, Va.

ONE new Model 905 "Sparx" signal tracer used less than two weeks. Cost \$40, sell for \$30. Gowen Radio Service, Westbrook, Minn.

CRYSTALS for sale. Guaranteed perfect, small type holders. \$1 each: 3622, 3582, 3608, 3590, 3615, 3642, 7020, 7010, 7020, 7015, 7060, 7050, 7159, 1893, 7048, 7054, 7066, 6815, 3708, 7146. Kca. Biley A-32 perfect cond., \$2 ea.: 7129, 7197, 7356, 7066.3, 7032A, 7142A, 3770.6. Kca. Valgey GM5, perfect cond., \$2 ea.: 7071, 7276 Kca. "PR" Peterson Radio, perfect, \$2 ea.: 7013, 7022 Kca. Write George M. Clark, Jr., W2JBL, 222 Hicks, Brooklyn 2, N. Y.

SELL National NC-100-ASD revr. Complete. Extras. J. M. Zabolzki, 3357 Fenton Ave., Bronx 67, N. Y.

24-28 VOL-T xfrmr, 115 V, 200 watts, fully shielded, porcelain terminals, \$8.95. J. Reidel, W2CRB, 1523 41st St., Brooklyn 18, N. Y.

DC arc horns: sell G-E motor generator used few hours only, 110V DC input. Output 1200V DC 450 Ma. 110V AC 500, 175VA, 75V AC 63, 100 VA. W8EF, 801 Lakeshore, Grosse Pointe, Mich.

BC-455B easily converted to 10-meter receiver, swell for mobile. Complete instructions, \$1.00. Brown, 3327 Geromino, Tucson, Ariz.

QSLs, SWLs. Designs that get results. Samples? Write Dossett, W9BHV, QSL Factory, 857 Burlington, Frankfort, Ind.

BARGAINS: BC348R converted, realigned, \$65. Fisher 30 watts phone 2-8 Mc. EC-etal, \$40 complete, EC-454 revr., \$45. \$3.25. New BC696 3-4 Mc, \$5.50. Others, M-A-M Radio, 114 Fauns, Houston, Texas.

HIGHEST offer over \$100.00 takes prewar HRO, recently realigned at factory, pwr supp, spkr, four sets coils. W4KTZ, Eupedon Farm, Clarksville, Tenn.

INSTRUCOGRAPH with 11 tapes and oscillator. Like new, \$22. D. Morehead, 4119 Lincoln pl. dr., Des Moines 12, Iowa.

FOR Sale: Stancor (20 F) less cabinet, xtal, mike with tubes, coils 40. Mike Morrissey, W4LXA, City Trailer Park, DeLand, Fla.

PAIR BC222 walkie-talkies, handsets, antennas, etc., \$35; xtal filter, RF, LF pwr xfrmr for Super-Pro, untested; Measurements Corp. Model 780 signal generator 15-27, 120-235 Mc. \$30; BC454A revr. 6-9 Mc. new \$4; Weston Model 564 voltohmmeter \$20; 130 ft. beaded copper coax; write for details. W2SI, 490 Fairfield Ave., Ridgewood, N. J.

QSLs, quality cards. Priced right. Samples, Ferris, W9UTL, RR 3, Box 560, Indianapolis, Ind.

COLORTONE QSLs! SMART! New! Different! For those who want the better kind! Samples! Serviced Colorstone Press, Tupelo, Miss.

QSTs: Sell or trade for good equipment. May 1931 thru Dec. 1946. Octobers 1931-1940, 1943 missing. Double issues October, November 1932. Best offer takes. W90FU, 307 E. Market, Taylorville, Ill.

QSLs, colored and plain. Samples free. Austin Ross, W1PBB, 50 Shore Road, Stratford, Conn.

HRO Sale or trade: National SW-3 drum dial; two matched condensers 95  $\mu$ id with 20-40-80-160 bandspeed coils. Also QST complete 1930 thru 1939. All for \$35. or what have you? Clarence R. Marchbank, W8HUG, Box 26, Galena, Mo.

HALLCRAFTERS DD-1 Dual Diversity 25-tube revr. Truly the DeLuxe of all receivers. Complete and guaranteed perfect condition. Cost new \$627 in 1941. Yours for \$327.00 f.o.b. no more, no less, no trades. W2RTM, RD #1, Ballston Lake, N. Y.

VT-127A filament sockets. \$1 with order, postpaid, Fox Valley Instrument Co., Box 603, Ingleside, Ill.

QSLs?? SWLs?? ONE-day service! "America's finest!" Samples, 10¢. QSL printers, Sakers, W8DED, Holland, Michigan (Veteran) DB225, HR-1207, W7H15, 522 QSL, CO subscriptions appreciated.

FOR Sale: BC610E, HRO STAI, Workshop Assoc. 20 meter beam mike, etc. \$900. complete f.o.b. R. I. Farrell, 95 Tremont, Central Falls, R. I.

BEAM rotators, propeller pitch motors, geared one R.P.M., reversible 25 volts, AC, described p. 54 July '47 QST, \$10.50. C.o.d. W5FJE, 214 North Pine, Albuquerque, N. Mex.

QUARTZ crystals. Beginning our fifteenth year manufacturing fine quartz crystals for amateur, marine, police, aircraft, geophysical and other purposes. Send your requirements or request descriptive folder. R. E. Nebel Laboratory, 1104 Lincoln Place, Brooklyn 13, N. Y.

SELL QSTs 1941-47 30¢ each, IREs, 1942-1947, 30¢ each. W5AQC, c/o KPRO, Longview, Texas.

SELLING out complete collection radio parts, accumulated over many years, all to be sold in one lot. List sent. Also, rack mounting power supplies which powered 500 watt (output) transmitter. Box 85, Newark, N. J.

TRADE for receiver, new Girard-Perregaux (Swiss) watch, gold, 21-jewels, 2-year guarantee, retails \$102.75; and German Voigtlander camera, 14.5, 120, case set of Omag filters, value, \$89.75. Want HQ-129X, Super-Pro, HRO, or similar; cash for difference. Will pay shipping costs. Also want \$25 revr. Cash. William Valentine, WALDW, Route One, Dry Ridge, Ky.

FOR Sale: Hallcrafters Sky Challenger, 550 Kc to 38 Mc. Very good condition. \$70. C. Williams, W0OMN.

BEST offer over \$27.50 buys Sky Rider, Jr. S-41G, excellent condition. Lloyd Walker, Lincoln, Kansas.

HARRISON'S QSLs, SWLs for 3¢ stamp. 8001 Piney Branch Road. Silver Spring, Md.

TWO Hallcrafters Sky Champion S-20-Rs, \$55 ea; two Abbott TR-4s, one with 6v, or 110v. pwr supply, total \$60. Local buyer preferred. WINEN, WINUF, Dedham, Mass.

BEAM elements: Dural 1/4" and 1/2" dia. Telescoping, 10-11 meter adjustable, 3 for \$9; 15-meter adjustable, 3 for \$12; 20-meter adjustable, 3 for \$18; 10-11, 15-piece element cut to freq. Set of 3, \$6. 6-12" lengths, \$10" dia. \$5 f.o.b. W2SYG, 375 Oak Place, Mineola, L. I., N. Y.

SELL pair of \$10s, \$6, \$15, \$3; ECO, complete for 10-80, \$55. All the above are new, never used. Also 50-watt transmitter absolutely complete, \$75 and S-40, \$65. W2VIV, Fulton, N. Y.

QSLs for discriminating hams. Distinctive! Colorful! New! Satisfaction guaranteed! Stamps for samples. Firman, W7JXP, 3739 SW, 98th St., Seattle, Washington.

HALLCRAFTERS SX-28 recently tuned and aligned, missing a few parts on case, \$125. Also HQ-129X, rather Navy version called BC. Real condition, \$90. Gene Wanamaker, 620 Grandview, Topeka, Kansas.

FOR Sale: have extra bound volumes QST 1932 through 1943. Best offer takes them. W8UPB, Box 82, Cincinnati 15, Ohio.

BACK issues QST from April 1935 to date. Best offer. W8PKS, Postoria, Ohio.

GIANT maps USA with portions Canada and Mexico. Size 50" x 38". Five colors, excellent detail. Calibrated degrees. Finest paper. Also World Edition same size. Satisfaction guaranteed. 75 cents each. W2PLH, 68 Loyal Rd., Clifton, N. J.

QSLs, SWLs. Meade, W6KXL, 1507 Central Ave., Kansas City, Kansas.

SALE: MK II transmitter receiver with 110 V. pwr. supply. Cost \$110 new. Used only a few hours. \$49 or best offer. Richard Bruce, 1171 Union St., Manchester, N. H.

SELL QSTs: complete from Jan. 1933 through Sept. 1938, \$17.50. Also 10th, 12th, 13th Editions HBEK, \$1.00 each. W9VXF, 3839 South 14th, Milwaukee, Wisc.

QSLs, different, inexpensive, finest quality, samples free! Camasa, W1ESN, 13 Hawthay St., Boston, Mass.

CRYSTAL kit: includes 4 low drift, highly active crystals, 2 holders, abrasive, instructions, treatise. State band preferences from 3500 to 8500 kilocycles. \$1.00 complete. Mounted crystals, your specified frequency, \$1 each. Breon Laboratories, Williamsport, Penna.

SELL Meissner 150-B transmitter. Good condition. Best offer takes it. W1CFM, Pascago, R. I.

QST back issues, 1931 to 1937 inclusive. Complete with indices. Best offer. W2CEB.

WANTED: Jefferson-Travis 350A surplus radios, also Temco 250GSC transmitters, spare parts for Bendix IA3-B, and Kohler generators. Write, wire Higley 224 Edgar Road, Linden, N. J.

METERS repaired. Springfield Testing Laboratory, 815 North 12th St., Springfield, Ill.

MUST Sell: complete 45-watt Concord public address system, A-1 condition. Write: Harry Zink, 444 E. Market St., Marietta, Penna.

SOLVE your problems with a straightedge. Write to Nomographs, Inc., Lawrenceville, N. J.

NATIONAL 1-10 with pwr supply, \$55. Postpaid. W2UHM, Henry Kudian, 510 West 190 St., New York City.

RME-45, excellent condition. Best offer over \$120. W9NKZ.

SURPLUS Bargains: tuning knob for command set covrs. 696. Alvarado, 903 So. Alvarado, Los Angeles 6, Calif.

PLATE power transformers constructed for your requirements; reasonable prices. Write for quote. W6FRX, Biggs, 1703 Chalcedony, San Diego 9, Calif.

QSLs. Kromkote cards at fair price. Dauphinee, W1KMP, Box 219, Cambridge 39, Mass.

QSLs, quality cards. Priced right. Samples. Ferris, W9UTL, 1768 Fruitdale Ave., Indianapolis, Ind.

RBL-3 long-wave receiver, perfect, \$32.50. W9BTS, 2405 East State St., Rockford, Ill.

HT-9, all coils, mike, \$325.00, f.o.b. W2LB, 68 Halbert, Buffalo, N. Y.

SELL: SX-11 Sky Rider, good operating condition, best offer. William Franz, 4166 Allendale Drive, Cincinnati, Ohio.

WANTED: Antenna mount-rotator or Two-phase drive motor and Bendix type V Selsyn used with RC148/RC350 IFF equipments. W9BRX, Squires, 319 E. Jefferson, Wheaton, Ill.

TELEGRAPH sounders, \$1.00. Boehme keying head. Usable with ARRL tapes. W9BDM, Joplin, Mo.

PERSONALIZE your ham receiver and testing equipment dials. Accurate drawings from your calibrations by artist with radio illustration experience. Special price for No. 522 receiver dials. Write for complete details. James P. Cox, 481 Manheim Ave., Bridgeton, N. J.

SYLVANIA modulation meter, Model X-7018. Original carton-brand new. Best offer takes it. W9CVU, 1949 First Ave. East, Cedar Rapids, Iowa.

BC-221 frequency meters (without modulation) used, but each instrument tested and guaranteed working order. While they last: \$28.50 f.o.b. Memphis, Tenn. W. Betterworth, W4IIV, Box 4245

FOR Sale: HRO-VW complete with 5 sets coils, including Type F Used about 1 year, \$150. W1ADC, Kittery Point, Maine.

DYNAMOTORS brand new Stromberg-Carlson, 12 VDC input 680 VDC, 210 MA output, 73 percent efficiency — 6 volts in gives 315 volts 18 MA. Weight 8 lbs. Price: \$11.50. Bill Farrington, W1OAW, 6 South Ave., Ithaca, N. Y.

DUMONT 3<sup>rd</sup> scope, model 164E. Used, but in good condition. \$45.00. R. Macauluso, 41 Birchwood Dr., No. Arlington, N. J.

FOR Sale: ARRS military model S-36 receiver, 27 to 144 Mcs, BFO, FM and AM detectors, crystal filter, perfect condx, asking \$110.00. W2OXR, 282 Franklin Ave., Staten Island, N. Y.

YOUR call on handsome lapel-pin or bar-pin for YL's. \$1.20. G. Wheeler, 39 Beaconsfield, Brookline, Mass.

SELL Hallcrafters SX-42 with Jensen speaker, \$240.00. Millen 300-watt smttr with 10-20 coils. Costs \$550. Sell for \$350. f.o.b. Both \$550.00. Ray Aikin, 255 Washington St., Lockport, N. Y.

QSLs, SWLS, High quality Economical! Samples. Cushing, W1HJI, Box 32, Manchester, N. H.

BARGAINS in good surplus test equipment: RCA-155A, W.E. oscilloscopes, Weston, Precision, Electronic V.O.M. Cabinet racks, others. Send for list. Brown, (W2IBK), National Instrument Co., Far Rockaway, N. Y.

IN Stock: new and used Hallcrafters, National, Hammarlund, RME, Collins, Millen, Meissner, other receivers, transmitters, etc. Lowest prices. World's best terms. Reconditioned S-38, \$35; S-20R, \$49; S-40 \$59; SX-42, \$199; HQ-129X, \$139; Super-Pro, \$79; HRO \$149; NC-240D, \$159; SX-25, SX-28, SX-16, RME-84, RME-45, DB-20, W4HF12A, NC-173, SX-45, NC101X, NC-100X, HT9 other receivers and transmitters, etc. Shipped on approval. Guns traded for. Write: Henry Radio, Butler, Mo.

C. FRITZ, 1213 Briargate, Joliet, Illinois: The QSL printer sends his Season's Greetings to hams everywhere.

ALL Contacts made by W2SLW/KL7 at Adak, Alaska, between September 1946 and October 1947 will be acknowledged now from home. WTH W2SLW, Box 121, Dumont, N. J.

MUST sell BC-312. Converted for 110 AC Noise limiter, and Hi-gain audio stage added. Add your power pack and P.M. speaker. With old and revised schematic, \$45. George E. Lingaelter, 281 Lexington Ave., Mansfield, Ohio.

WANTED: Any or all copies of QST prior to 1921. Will pay your price or trade NC-2-40D or SX-28-A or Koto-Beam, or most anything you want. Mark Potter, 233 East Avenue, Park Ridge, Ill.

SURPLUS transmitters and receivers and misc. equipment for sale. C. R. Funk, 220 Tennyson, Detroit 3, Mich.

HALLCRAFTERS HT-9 transmitter. 150 watts CW. 1000 watts phone. Coils for 10 and 20. Complete with crystals and mike. Perfect condition. Also Hallcrafters HT-18 VFO with FM. Brand new. It's a dandy. The combination of the two make a perfect ham rig. Both for \$380. W3KON, 522 South 46th, Philadelphia.

SELL or trade for ham gear: APN-4 Loran scope and receiver, ART-13 transmitter, can use 1500-2000 volt plate supply. W0LJY, Ellsworth C. Miller, 617 E. Mo. Ave., St. Joseph, Mo.

SELL: Hallcrafters S-39 for \$50. Melvin A. Diehl, Grundy Center, Iowa, W9WXX.

SEDLING out list. W6KNM, Box 4, Malibu, Calif.

WANTED: High grade volt-ohm-millammeter, perfect operating condition. Describe with price. W1RWM, 84 Westminster Road, Newton Centre 59, Mass.

BUY: Meissner Deluxe signal shifter, must have 20, 40 coils. State price and condition. J2AAV, 139 AACs, APO 704, c/o PM, San Francisco, Calif.

HALLCRAFTERS for sale: Sky Rider, Diversity DD-1. Excellent condition. Original cost over \$700. Will sacrifice. S. Cantor, 303J West 23rd St., Brooklyn 24, N. Y. ESplanada 2-4399.

SELL: Mark II trans-receiver, 40-80 meter, 235 M.C., 12 volt dynamotor, 110 volt A.C. pwr supply, complete: \$125. Irving H. Lipkowitz, 1540 Charlotte St., Bronx 60, N. Y.

SIGNAL shifter, plug-in coils for all bands including 15 meters. Prepaid for cash. \$4.00 per set. Rodgers & Harris Labs, Mt. Carmel, Ill.

SELL AF-100 Supreme transmitter. Rated 100 watts fone and c.w. Used very little. Like new. \$450.00. Bill Fountain, W5JYB, Box 1729, Meridian, Miss.

FOR Sale: Super Pro SPR-210-LX with power supply, newly reconditioned, \$150. Four dual section (2mf and 1000v. 6 and 800 v) converters, all for \$5 or \$1.50 each. New Broad band ten-meter converter, \$22.50. Check or money order, W5MOT, 4010 Maryland, Shreveport, La.

PORTABLE recording and public address system, almost new. Portecol 2-speed turntable with crystal pick-up, overhead feed, technocraft 110 line per-inch cutter, 14-watt Brentwood dual channel amplifier; 12" Jensen P.M. speaker. Entire outfit complete with cables, mike, etc., in two portable leatherette covered cases, \$150. W2PFA, Mike Rosenberg, 625 W. 53th St., New York 19, N. Y. Circle 6-4775.

BARGAINS: HQ-129-X, \$145; SX-25, \$85; 40-watt fone/cw rig, 65; Motorola 10-meter mobile rig, \$60. All A-1. W4ILP, 417 S. Fairview, Spartanburg, S. C.

ALL types of new and used ham equipment in stock. Cameras, firearms, radio equipment taken in trade. Farmers & Traders Exchange, Chittenango, N. Y.

QSLs in plastic covers: woodgrain, metallized and velour stocks. Fast service, cuts, specials, stamp for samples. Reber Print, R. D. No. 1, Sewell, N. J.

W2HBV selling out. Subraco-75T transmitter (advertised September CQ, Radio News); Millen 90700 ECO; NC-100A-X. Make offer, one or all. 217 Parker Avenue, Woodlyne, N. J.

W9PVA selling all radio apparatus. Local amateurs only. Luxem, 729 E. Kilbourn Ave., Skokie, Ill. DB2-A, \$58; VLF-152A, \$75. Slightly used. W8BV, c/o Box 218, Holland, Michigan.

HALLCRAFTERS SX-28 recently tuned and aligned, missing a few parts on case, \$125. Also HQ-120, rather Navy version called RBG; fair condition, \$90. Gene Wanamaker, 620 Grandview, Topeka, Kansas.

FOR Sale: RME-69 and DB-20 combination. Overhauled, voltage regulated, and in good operating condition. Complete, \$90. Postal money order only. W9KOK, Rt. No. 1, Winnebago, Illinois.

FOR Sale: One Thordarson multi-band xmttr, 100 watts fone and c.w., 80-40, 20-10 meters; in good condition and in use at present time, \$150. All letters will be answered. Joseph J. Hoff, W9TEA, R.F.D. No. 1, Rocheport, Mo.

FOR Sale or trade: FB7A and National pack also Hallcrafters S-38. C. A. Lanham, W9JLK, 404 Union, Bloomington, Ill.

TRADE: Sylvania modmeter, new. Aristocrat prismatic binoculars. 12 x 40. Consider \$125.00 used. Consider HQ-129X, VFO, pre-selector, W2BIV.

GENUINE bargains for hams, mail auction, finest test equipment, 2 receivers, 1 transmitter, many parts for sale at bargain prices by individual who set up shop and then changed his mind. Send self-addressed stamped envelope for list and details. B. L. Bobroff, P. O. Box 208, Racine, Wisconsin.

NEW GE pyranol capacitors, 2 mfd, 2000 WVDC 75¢; 25 mfd 1000 WVDC, \$1.25; Raytheon swing choke 2-12 henries, 1000-100 MA, new, cased, 7/8 x 1 1/2 x 5/8, \$7.50; Raytheon filament transformer, 2.5 volts, 11 amps, 3000 volts insulation, new, cased with stand-offs \$2.50, SKL Laboratory, Box 188, Lexington 73, Mass.

HAVE National SW-3 Universal model receiver with tubes, 40-80 meter coils, less power supply; want to trade for BC-221. Make offer. Cammen, W2PIU, 129 Eritchard Ave., Corning, N. Y.

FOR Sale: 2000-watt phone and c.w. xmttr factory built, Type HRT-100. Covers 10, 11, 20-40-80-160 meters. In two matching black crackle units. Cost \$900. Sacrifice at \$490. W2DWR, V. Padula, RFD 5, New Brunswick, N. J.

ABBOTT TR-4 on 2 meters with tubes, \$25. Complete modulator with Thordarson 300 watt Multi-match, fila. and input xfrms, meter, and 203Z tubes on National panel-chassis. \$35. W2LNC.

SURPLUS specials: Scope BC-1266, \$49.50; Indicator 1-221A, \$24.50; BC-603, BC-604, BC-191, \$14.95; Cathode ray tubes: SB24 or SBP1, \$4.95; 12DP7 or 12GP7, \$6.95; Mine detectors: SCR-625, \$49.95; AN/PRS-1, \$14.95; Premar antenna 24' extended, \$4.95, with base, \$8.90; spark plug suppressors, 50 for \$22.50; 6V lantern batteries, box of 30, \$2.75; 45V Heavy duty "B" batteries, 4 for \$1.98; Safety belt w/strap, \$5.75. Send for flyers. Abell Distributing Co., Box No. 2, 5 E. Biddle St., Baltimore 2, Md.

FOR Sale: Hallcrafters, S-20R receiver, like new. \$49. W. G. Kamrath, W9BDU, R. 4, Beaver Dam, Wis.

FIRST \$150 cash gets new type RME-45 and speaker both in original cartons. James Bolin, 725 Traffic St., Bossier City, La.

FOR Sale: Riders manuals X1 thru XV; RCA signal generator, Model 107B. Best offer takes them. W9VOY, Tracy, Minn.

FOCUS beam antenna. All aluminum. Improved intermediate spacing. Choice of matching systems. Housekeeper, 956 Paulding St., Peekskill, N. Y.

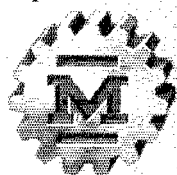
GIBSON radio rule, for designing circuit diagrams. Accurate, quick, uniform. 75¢ postpaid. Gibson Radio Rule, P. O. Box 307 Seattle 11, Wash.

SELL: Hammarlund, SPC-400-X, Super-Pro .54-30 Mc., excellent condition. Six months old. Best offer takes it. Alvin Hall, 717 Alton Ave., Columbia, Mo.

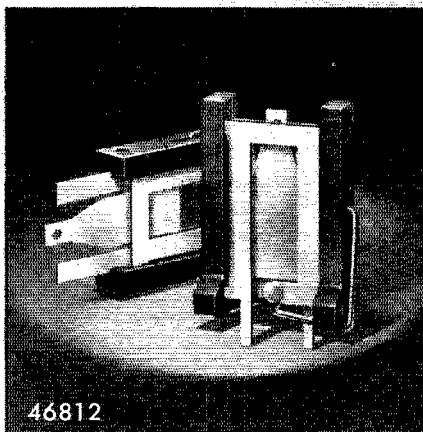
INSTRUMENTS, test equipment, repaired and calibrated. Laughner, R. D. No. 2, Jeannette, Penna.

WANTED: AN/APR-4 receiver, complete with tuning units, in good condition. Write, giving full details and price. R. Berler, W2EPC, 39 West 85th St., New York 24, N. Y.

# Designed for



# Application



46812

## Nos. 46811-46812 GUILLOTINE TUNERS

Developed by General Electric for high frequency circuits (Millen Nos. 46811 for oscillator and 46812 for RF stage) in receivers and converters. See August 1947 issue G.E. Ham News for details of application. The high-efficiency tunable circuit complete in one compact sturdy unit. The ideal answer to the 2, 6 and 10 meter ham band receiver tuned circuit problem.

## JAMES MILLEN MFG. CO., INC.

MAIN OFFICE AND FACTORY  
MALDEN  
MASSACHUSETTS



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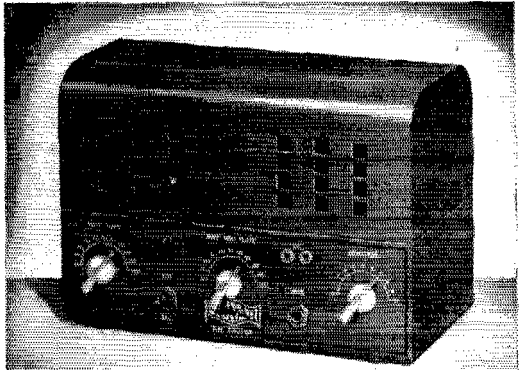


# ORIGINATORS OF NBFM EQUIPMENT FOR THE HAM

## SONAR DESIGNERS OF FINE COMMUNICATIONS EQUIPMENT

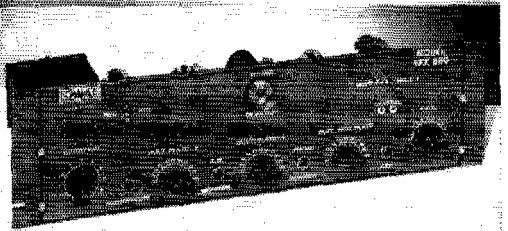
**THE XE-10**, first of the SONAR products, was designed to give the Ham a modulation unit for his complete AM rig. The XE-10 will convert any CW rig (regardless of power) to NBFM. Your VFO can be used to regulate the frequency input to the XE-10 or the xtal can be inserted directly into the XE-10.

**XE-10** AMATEUR NET **\$39.45** Complete Less Xtal



**THE VFX 680** was designed to meet the demands for a stable VFO-xtal exciter and also incorporates the exclusive SONAR NBFM circuit\* giving a complete 4 to 6 watt all band exciter, with NBFM phone and/or straight CW. The VFX 680 also has VFX (rubrizes any cut xtal) giving xtal stability with a variable signal. An ideal "pre-stage" for that new rig.

**VFX-680** AMATEUR NET **\$87.45** Complete Less Xtal



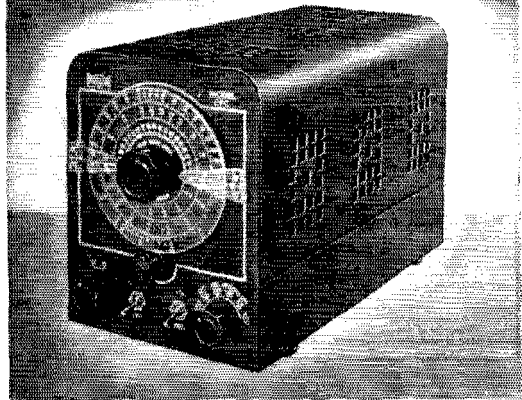
**THE MB-611** is another SONAR product incorporating NBFM, designed for mobile or fixed operation, on 6 to 11 mtrs—40 watts input with a pi-network to match any antenna. Further details on this xmitter and other new SONAR developments will be found in future advertisements. The engineering staff at SONAR has many new designs including low, medium, and high power xmitters.

**MB-611** AMATEUR NET **\$72.45** Less Pny. Sup. and Xtal



**THE C.F.C.** Sonar's new Calibrated Frequency Control has a Direct All-Band, calibrated VFO; a finger-tip controlled 5" dial plainly marked for all bands 80, 40, 20, 15, 11, 10; a built-in 1000 kc frequency standard; calibrated against WWV; CW keying and built-in CW monitor with 5 watt output; provisions for remote control, the C.F.C. can be linked to any type xmitter. The C.F.C. is furnished complete with tubes, regulated power supply and a 1000 kc crystal.

**\$59.75**

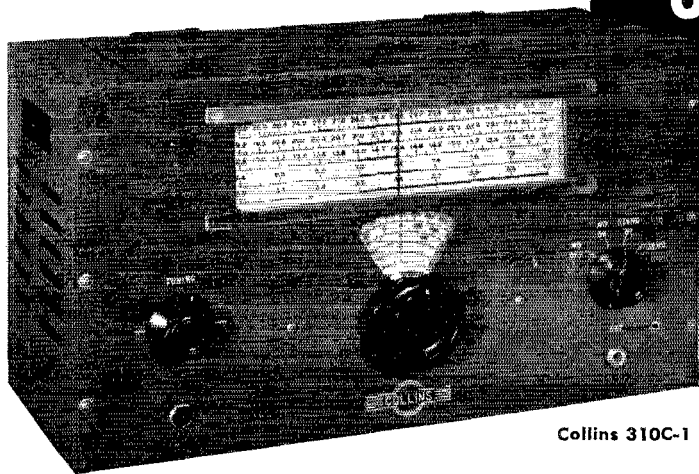


**RADIO CORPORATION**

General Offices & Factory: 59 MYRTLE AVE., B'KLYN 1, N.Y. . . . Sales Office: 600 S. MICH. AVE., CHI. 5, ILL.

*You know where you are with a . . .*

## Collins 310C Exciter



Collins 310C-1 and 310C-2 Exciters

The new Collins 310C-1 and 310C-2 exciters are designed around the highly stable, accurately calibrated 70E-8 permeability tuned oscillator. In operation, the slide rule dial indicates roughly your operating frequency, while the vernier dial gives you the frequency in kilocycles. You know where you are! You learn at once to use the exciter with perfect confidence.

The 310C-2 has a built-in power supply operating from a 115 volt, 50/60 cycle source. The power requirement for the 310C-1 is 6.3 volts a-c at 1.0 amp; 300 volts d-c at 40 ma. Otherwise these exciters are identical. Following the 70E-8 is a 6AG7 multiplier with an r-f output of approximately 80 volts rms across 40,000 ohms. This output is sufficient to furnish ample excitation to either the crystal stage or the 6L6 or 807 buffer stage of your pres-

ent rig. The output frequency range is 3.2 to 4.0 mc. For the higher frequency bands, merely employ the multiplier stages which normally follow the crystal oscillator in your transmitter.

### Tube line-up

1-6SJ7	Oscillator
1-6AG7	Multiplier
1-6X5	Rectifier (310C-2 only)
1-VR105	Regulator
1-VR150	Regulator

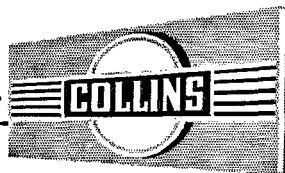
Net prices, complete with tubes and instruction book, F.O.B. Cedar Rapids, Iowa:

310C-1, without power supply.. \$ 85.00

310C-2, with power supply..... 100.00

Terms: 20% with order. Balance, plus 5% carrying charge, payable in twelve equal monthly installments.

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



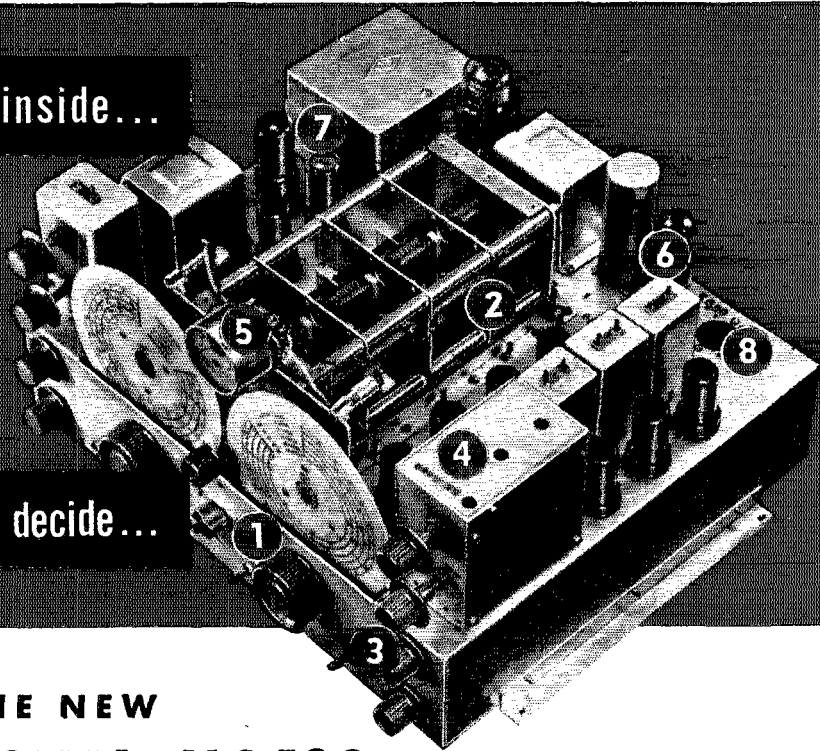
**COLLINS RADIO COMPANY, Cedar Rapids, Iowa**

11 West 42nd Street, New York 18, New York

458 South Spring Street, Los Angeles 13, California

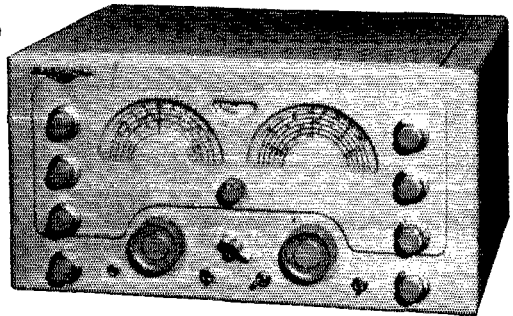
see inside...

then decide...



## ON THE NEW NATIONAL NC-183

- 1 Calibrated amateur bandspread for 6, 10-11, 20, 40 and 80 meter bands. Gear drive tuning dials.
- 2 Two RF stages on all bands! Image rejection 40 db at 28 mc!
- 3 New "double-diode" noise limiter, effective on both phone and CW!
- 4 New crystal filter provides 6 steps of selectivity!
- 5 S-meter with adjustable sensitivity for both phone and CW!
- 6 Temperature compensation and voltage regulator provide outstanding stability!
- 7 High-fidelity push-pull audio output! Ideal for phonograph attachment. Tone control.
- 8 Accessory socket for NFM adaptor!



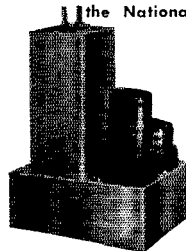
● RANGE: 0.54 to 31 mc. plus 48-56 mc.

● TUBE COMPLEMENT: 14 plus rectifier and voltage regulator.

● AUDIO OUTPUT: 8-watts undistorted

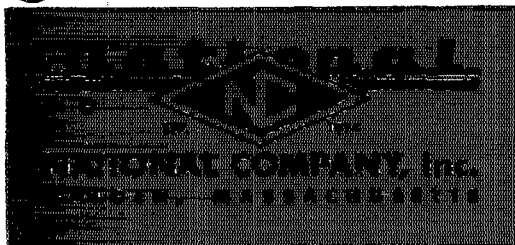
The brilliant new National NC-183 incorporates the latest in circuit design. Check its 8 outstanding performance features. Note the rugged, heavy-duty quality of the National-designed, National-built components at your dealer's today. When you see inside, you'll decide on the National NC-183.

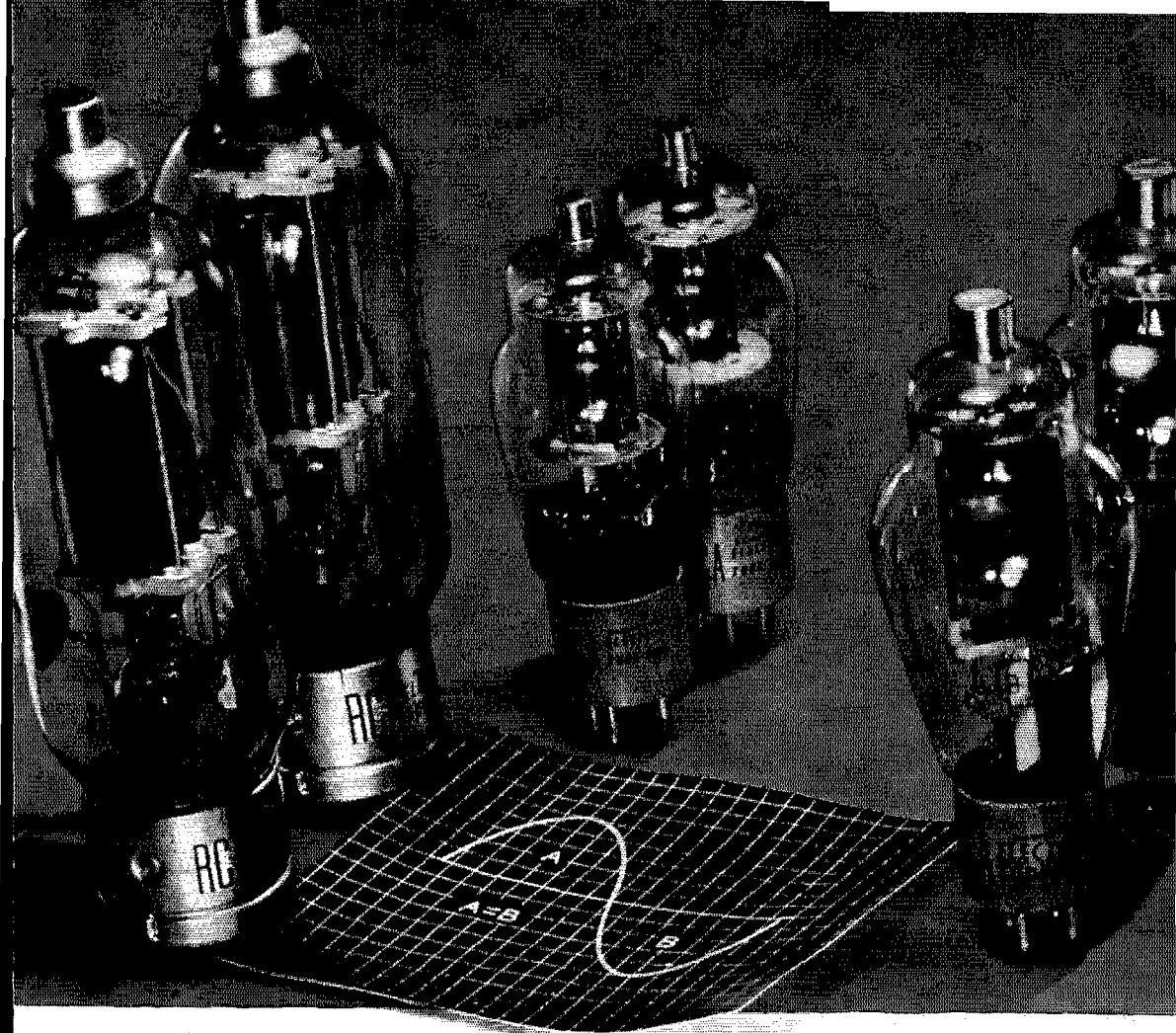
**\$269** (with 10" speaker)



NFM-83 adaptor makes the NC-183 a top-notch NFM receiver. Instant selection of AM or NFM from front panel.

**\$16.95**





**In modulator service, uniformity counts . . .  
 . . . and you can count on RCA tubes to have it**



To make A equal B...to keep a-f distortion low and power output high, the plate currents of a push-pull modulator must be alike. In short, tubes must have dependable uniformity.

RCA power tubes have that uniformity, because they're built to exacting tolerances . . . and held there by modern production methods and thorough quality control.

Your local RCA tube distributor can supply you with modulator tubes...uniform tubes...for every transmitter power. For information, see him or write RCA, Commercial Engineering, Section AM.54, Harrison, N. J.

Get a copy of Oct.-Dec. HAM TIPS from your local RCA Tube Distributor for hot articles on a Speech Amplifier and a Modulator Bias Supply.

Tube	max. d-c plate volts	max. signal		Amateur net price per tube
		driving watts	output watts	
2 RCA-807's	750	5.5	120	\$2.30
2 RCA-810's	2750	13	725	12.50
2 RCA-811's	1500	3	220	3.50

Note: Values shown are for ICAS operation.



**TUBE DEPARTMENT**

**RADIO CORPORATION of AMERICA**

**HARRISON, N. J.**

The Fountainhead of Modern Tube Development is RCA