QST

june, 1937
25 cents

devoted entirely to

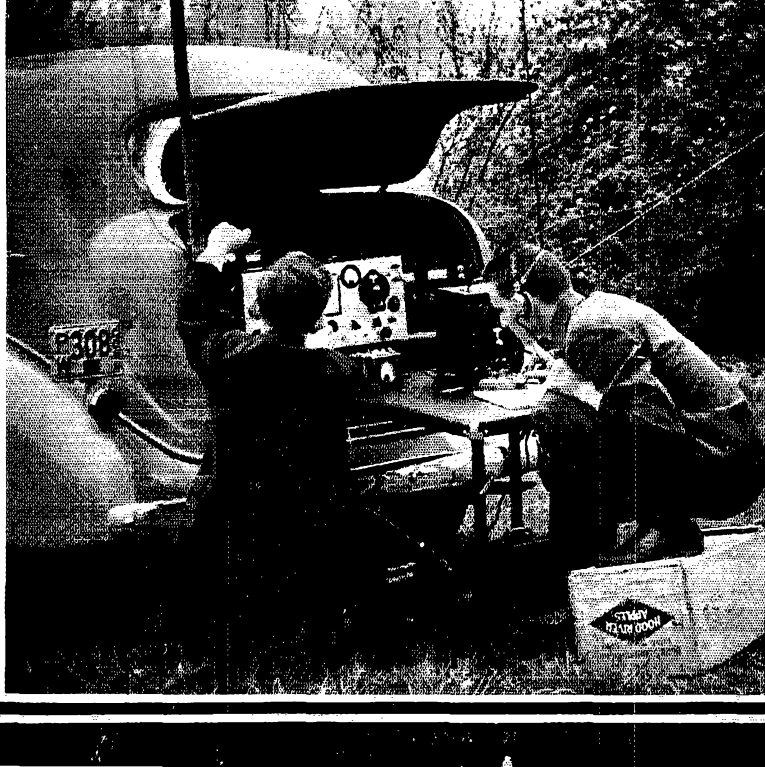
amateur radio

In this issue—

New Portable-Equipment

Full-Range Selectivity

The Board Meeting Reported

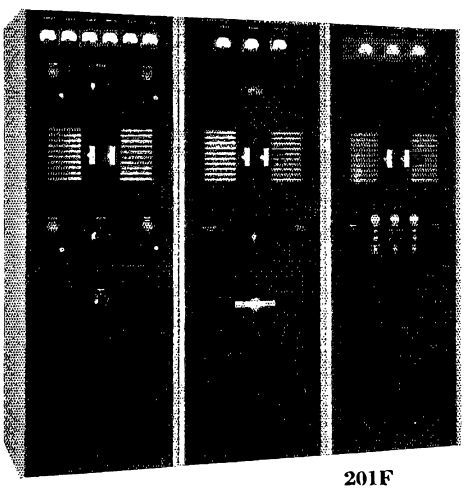


Collins Radio Company is first to present a series of high frequency transmitters of correlated design in powers from 300 watts to 2000 watts. One of the outstanding achievements in these "200 Series" Transmitters is the provision for efficient operation on any desired group of frequencies.

The Type 202BA-10 Transmitter is an example of the application of the Collins Autotune* System to the 200 Series design. The Autotune device automatically tunes the transmitter to any of ten desired frequencies within an interval of five seconds.

*Patent Pending

COLLINS



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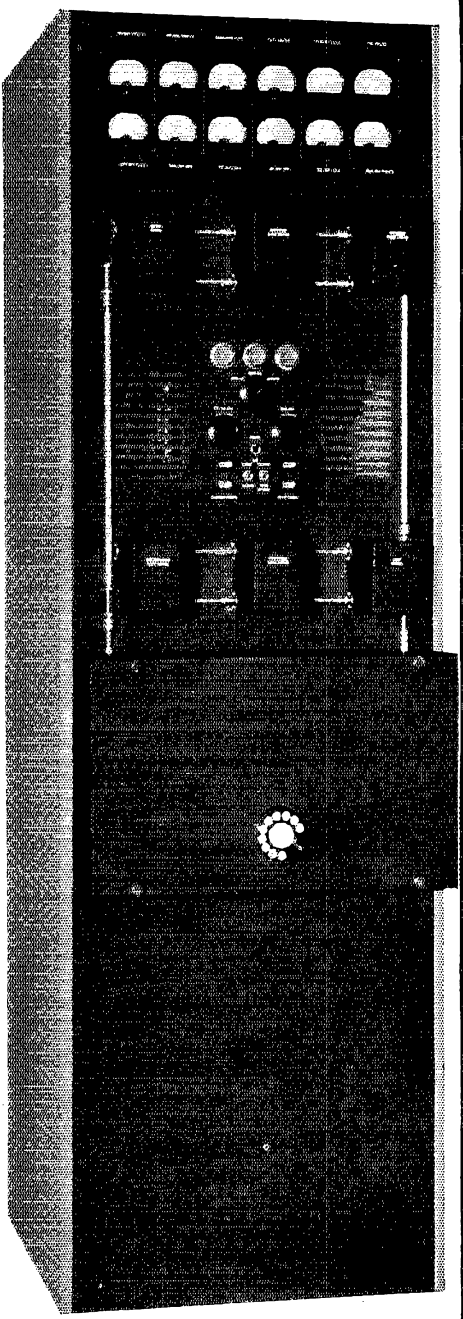


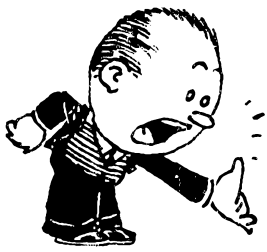
202BA-10

COLLINS RADIO COMPANY

CEDAR RAPIDS, IOWA

QST *devoted entirely to* AMATEUR RADIO

PUBLISHED, MONTHLY, AS ITS OFFICIAL ORGAN, BY THE AMERICAN RADIO RELAY LEAGUE, INC., AT WEST HARTFORD, CONN., U. S. A.; OFFICIAL ORGAN OF THE INTERNATIONAL AMATEUR RADIO UNION



JUNE
1937

Volume XXI
Number 6

★

Kenneth B. Warner (Secretary, A.R.R.L.), *Editor-in-Chief and Business Manager;* Ross A. Hull, *Associate Editor;* James J. Lamb, *Technical Editor;* George Grammer, *Assistant Technical Editor;* Clark C. Rodimon, *Managing Editor;* David H. Houghton, *Circulation Manager;* F. Cheyney Beekley, *Advertising Manager;* Charles Brunelle, *Assistant Advertising Manager.*

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38 La Salle Road
West Hartford, Connecticut

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Additional second-class entries to cover sectional editions authorized March 20, 1935.

The Contents

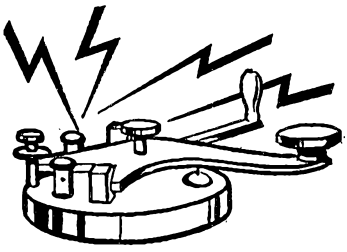
RME Owners Take 1937 W/VE International

Congratulations

W2UK RALPH E. THOMAS

Montauk Highway, Quogue, Long Island, New York

With an attested score of 123,216 Ralph E. Thomas is announced by *QST* as the highest scoring W/VE in the 1937 annual International DX telegraph contest with his RME-69—and C. W. Rogers, with a score of 105,223 takes FOURTH (also with an RME-69).



"Performance Speaks Much Louder Than Words"—

RME — 69

First and Fourth In DX Telegraph Contest

Congratulations W2AIW

C. W. ROGERS
155 Main St.,
Monasquau,
New Jersey

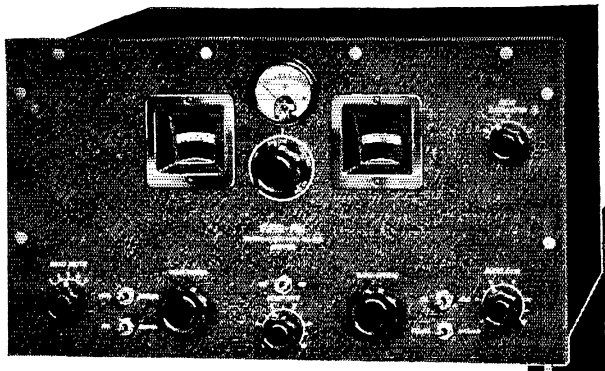
We are quite content to let the above facts about the RME-69 and the International DX telegraph contest prove what can be done.

Thousands of other "DX-ers" also know and attest the performance of RME-69—"it's on the air from everywhere"—and the best reasons we can give you for choosing RME-69 for your equipment are the things present owners broadcast. Correctly designed—capably engineered—properly constructed, these efficient communication sets are "out in front" in the opinion of the short-wave fraternity. We invite your correspondence—Bulletin 69 will be sent anywhere on request—and our mail is world-around, for fans everywhere are wanting to know more about RME equipment.

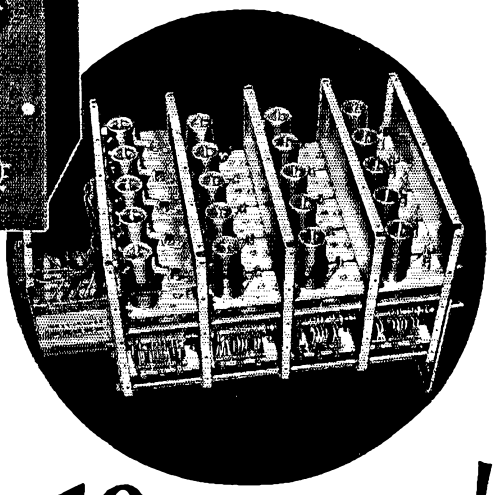
RADIO MFG. ENGINEERS, INC.

PEORIA **ILLINOIS**

RME - 69



☆ *At Left* — NEW "SUPER-PRO" IN METAL CABINET. *Below* — RUGGED NEW "SUPER-PRO" TUNING UNIT.



THE *Perfect* RECEIVER FOR 10 METERS!

EXHAUSTIVE field and laboratory tests made by countless critical amateurs, engineers, and professional operators now using the new "Super-Pro" continue to conclusively prove that "Super-Pro" performance on 10 meters is truly outstanding!

One of the features responsible for this high efficiency is the two stage R.F. amplification system used on the 20–40 mc. band, as well as the other four bands in the receiver. This affords a sensitivity of 0.8 micro-volt (30% modulated) with a signal to noise ratio of 6 to 1 at 28 megacycles! This system also affords an image rejection ratio so high as to provide complete freedom from "two-spot" tuning except in exceedingly rare instances, viz. — at 28 mc. the ratio is 150 to 1; at 14 mc. — 1900 to 1; at 7 mc. — 10,000 to 1, etc.

The AVC action of the new "Super-Pro" has been developed to an unusually high degree of efficiency — a change of 33,000 to 1 in signal input causing a change of only 2 to 1 in the output! The "Super-Pro" electrical band spread system provides a spread of over 90 divisions on the 28 to 30 mc. band. Other popular bands are similarly spread for easy tuning.

All "Super-Pro" receivers employ direct tuning with calibrations held to within a tolerance of plus or minus ½%. The tuning range of the 10 meter model is from 1.25 to 40 mc. in five bands. A model for the .54 to 20 mc. range, with identical features, is also available.

There are a host of other outstanding features in the new "Super-Pro" models such as — calibrated band width, beat oscillator, audio and sensitivity controls; stand-by switch; relay terminal strip; 8 metal and 8 glass tubes; separate humless power supply, trouble-free cam switch, etc. Crystal or standard models are available for table mounting or rack mounting.

Further data with interesting curves and illustrations appear in a special bulletin. Mail coupon below for your copy.

☆ *SEND FOR THIS BULLETIN!*

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HAMMARLUND MFG. CO., INC.
424–438 W. 33rd St., N. Y. City

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All appointments in the League's field organization are made by the proper S.C.M., elected by members in each Section listed. Mail your S.C.M. (on the 16th of each month) a postal covering your radio activities for the previous 30 days. Tell him your DX, plans for experimenting, results in 'phone and traffic. He is interested, whether you are an A.R.R.L. member or get your *QST* at the newsstands; he wants a report from every active ham. If interested and qualified for O.R.S., O.P.S. or other appointments he can tell you about them, too.

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

"Of, by and for the amateur," it numbers within its ranks practically every worth-while amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite. Correspondence should be addressed to the Secretary.

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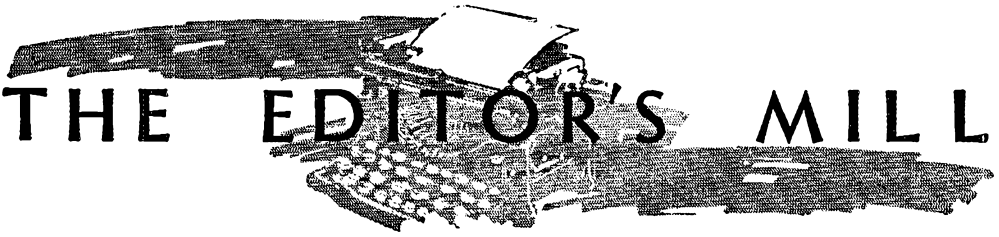


A CONSIDERABLE contribution to amateur progress and operating pleasure would result if more honesty were employed in signal reporting. We hail the man who is completely candid in his reports. Some of us are scrupulous in this respect but most of us are pretty easy-going about it and some of us are downright dishonest.

The c.w. signal report, done in the RST manner, occupies but a moment of the QSO, yet it is an important moment. Most of us log the reports given us. To many an experimenter they constitute valuable information on the results produced by changes in the apparatus. To all of us they can be a warning when things are going awry. 'Phone stations are interested not only in the goodness of contact but also in the quality of modulation. We think there is more candor amongst 'phone men, by and large, than in the brass-pounding branch; we've heard some good intelligent criticisms of the other fellow's signal, coupled with willingness to spot the difficulty and help correct it. However, 'phone gets no clean bill of health on this subject from us, for we've heard plenty of inaccurate reports there too.

As to the RST system, it is admittedly difficult to apply it intelligently without having the scales constantly before oneself for reference. They are printed in the A.R.R.L. log and of course in the Handbook, and our C.D. has them on a useful sheet of data and abbreviations. It is helpful to have this dope handy at the front of the log or posted on the desk for ready reference.

The looseness prevailing to-day comes, we suppose, either from flattery or carelessness. An experimenter can't tell anything of the progress of his tests if his reports are inflated by carelessness or a mistaken attempt to flatter him. And wouldn't you think that if the quality or the note or the keying goes sour during transmission, any ham is entitled to know it from his correspondent and not be told "599" regardless?

The chief ingredient that wants to be taken out of signal reporting is flattery. Voices that rattle and splatter certainly aren't "fine business," and neither are telegraph signals that go "Chowpy-chowpy, chow chow cha chow." During the recent DX contest we listened to two amateurs in a shack we were visiting. A European signal was coming in. It was, in all truth, a miserable splutter, about like you'd get by rattling two tube bases in a cigar box. "What'll I tell him, George, T2?", asked the operator. "Gee, no," said George; "he's T2 all right but don't ever tell anybody he's worse than T5. It might make him sore and he'd not give you back a good report."

Now, for the luvva Microfarad, we ask you! Is that to be our answer to this problem? If that's the price of good reports, we don't want some. If our note goes T2 during a transmission (of course we always monitor *our* transmissions—hi!) we want to know it. Besides, telling us T5 or even T7 wouldn't make us feel any better.

Surely we all feel the same way about this. We want honest, candid reports. Out with flattery! Don't soft-soap us. We want to *know* what our signal's like. And if it's T4 or S2 or some scale-value that doesn't stay automatically in mind, we want to be able to look it up in the table and know that that is exactly what our correspondent meant. So out with carelessness too! Keep 'em honest, OM.

WE WANT to speak a word about logs too. Aside from the fact that federal regulations require the logging of certain data, a log is an invaluable record and a most interesting document to scan in later years. We've just been pawing through ours. Despite the fact that we never seem to have sufficient time for enough operating, we're on Book No. 14 now. A nice juicy record they make. How we wish we'd *always* kept a log and had a record of those precious days before the war! How pleasing a possession would be our own written record of our personal participation in the changing pageant of amateur radio from spark-coil days through rotaries and high power and the Transcons and the beginnings of tube transmission and the dawn of DX!

We recently got an A.R.R.L. map mounted on wallboard and started shoving in colored pins in the countries worked. Hadn't we worked Petruvia? Or had we? No Petruvian QSL card greeted us from the pile. So through the logs we went, all fourteen volumes, compiling a list. And there it was, back in 1927, dear old Petruvia! Proudly we shoved in one more pin. And a couple of others we'd forgotten.

Those logs were a revelation. We never knew we could be so stupid as some of those entries show. And many a smile comes as we examine marginal sketches and circuits and notes on the gear used in by-gone years. Yes, we think anybody

will have to agree that logs can be a precious record of personal participation in a grand game. Our advice is to keep as comprehensive a record as you can find the time to keep up. We mustn't bog ourselves down with bookkeeping, and of course tastes will vary, but the more data we can log the more interesting it will be in retrospect and the more helpful in checking up on this and that.

Our recent experience with the colored tacks has led us to start a little side record of DX. With space provided for each country, we list all the DX worked; calls, date, frequency band, and city (the latter because calls get transferred in time). Now, have we worked Petruvia or not? A flip of the book and there's the dope, without wading through fourteen volumes of log. And watch out, Bahrein Island! We have a blank page in our book reserved for VS8 and you're on our beam. Some day, OM!

WHAT, no editorial comment this month on matters at the Board meeting? Nope, this page gets written considerably before the meeting, although we're holding some other pages for the minutes and a last-moment account of highlights, just before the presses roll. Next month!

K. B. W.

WWV Services Again Expanded

Standard Time Interval, Musical Pitch and Ionosphere Bulletins Added

BEGINNING June 1, 1937, the National Bureau of Standards will make some changes and extensions in the services broadcast by its radio station WWV, at Beltsville, Md., near Washington, D. C. The services will include: (1) standard radio frequencies, (2) standard audio frequency, (3) standard time intervals in the form of pulses accurately spaced one second apart, (4) the standard of musical pitch 440 cycles per second, and (5) bulletins of information on the ionosphere and radio transmission conditions.

1. Standard radio frequencies. This service makes generally available the national standard of frequency, which is of value in scientific or other measurements requiring an accurate frequency, and is useful to radio transmitting stations for adjusting their transmitters to exact frequency, and to the public generally for calibrating frequency standards. This service will be given every Tuesday and Friday (except nationally legal holidays), as heretofore, but the times, character, and frequencies of the emissions will be somewhat changed. The emissions each Tuesday and Friday will be continuous unmodulated, unkeyed waves (c.w.) except for a short pulse each second as described under 3 below.

The service will be given successively on three radio carrier frequencies, as follows:

10:00 to 11:30 A.M. EST, 5000 kc.
Noon to 1:30 P.M. EST, 10,000 kc.
2:00 to 3:30 P.M. EST, 20,000 kc.

The power of the transmitter used is approximately 20 kilowatts. The emissions on 5000 kc. are particularly useful at distances within a few hundred miles from Washington, those on 10,000 kc. are useful for most of the rest of the United States, and those on 20,000 kc. are useful in the western part of the United States and in other parts of the world.

From any single frequency, using harmonic methods, any frequency may be checked.

During the first four and the last four minutes of the 90-minute emission on each carrier frequency, announcements will be given; they will be made by telegraphic keying and by voice, and will include the station call letters (WWV) and a statement of the frequency and the accuracy. The accuracy of the frequencies is at all times better than a part in five million.

2. Standard audio frequency. On each Wednesday (except nationally legal holidays), a frequency of 1000 cycles per second will be transmitted as a modulation on the same radio carrier frequencies and at the same times of day as listed above. The radiated power will be approximately 20 kilowatts, with 30% modulation.

Except during announcements, the emissions will consist of the uninterrupted 1000-cycle frequency superposed on the carrier frequency. During the first four and the last four minutes of the 90-minute emission on each carrier frequency, announcements will be given; they will be made by telegraphic keying and by voice, and will include the station call letters (WWV) and a statement of the radio carrier frequency and the audio modulation frequency and the accuracy.

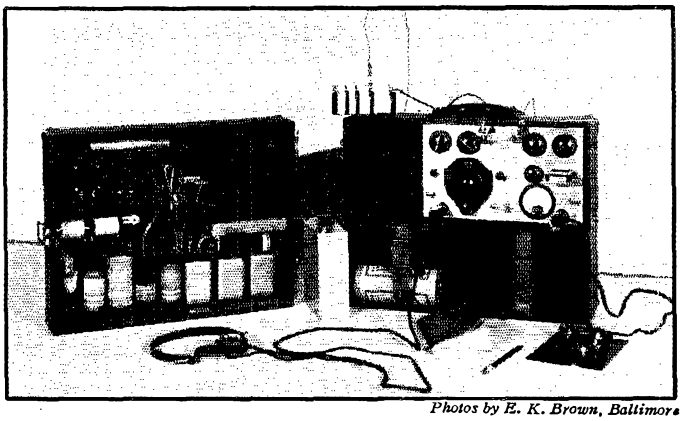
The accuracy of the frequencies (both carrier and modulation) as sent out from the transmitting station is at all times better than a part in five million. Transmission effects in the medium (Doppler effect, etc.) may result in slight fluctuations in the frequency as received at a particular place. As far as the carrier radio frequencies are concerned, such fluctuations practically never exceed a part in five million; furthermore, the presence of the audio modulation frequency does not reduce the accuracy of the carrier radio frequency. Under occasional extreme conditions, momentary fluctuations as great as 1 cycle per

(Continued on page 82)

A Complete Dry-Battery Portable Station with Crystal-Controlled Transmitter

By E. S. Van Deusen,* W3ECP

ALMOST every radio operator has had a desire or an actual need, at some time or other, for some kind of transmitting and receiving equipment which can be put into operation in a hurry, to meet unexpected conditions, when the normal power supply fails or when portable field operation away from power lines would be necessary. The recent flood emergency along the Ohio and Mississippi Rivers has emphasized the usefulness of such apparatus. A little preparation is recognized as the best possible insurance against an inability to perform when called upon, so it was decided to follow the advice of George Washington, who said, "In time of peace, prepare for war." This led to the development of a complete station, using dry-battery power and arranged to be contained in a small, easily-portable case. This particular equipment is built into the salvaged case from a defunct portable phonograph, contains everything necessary for establishing a station for c.w. telegraph independent of any external source of power, and when packed for carrying weighs only about 32 pounds. The assembly includes a surprisingly good simple receiver with a 19 tube as a regenerative detector and a stage of audio amplification, the crystal-controlled transmitter which will be briefly described below, a midget monitor, headphones, key, antenna and insulators, a ground rod, a spare tube, the coils not in use in the set, a few essential tools, and the dry batteries which supply the necessary power.



Photos by E. K. Brown, Baltimore

COMPLETE STATION SET UP FOR ACTION

The cover holds spare coils as well as miscellaneous small tools.

The original model of this station was described in a previous issue of *QST*.[1] That set used a transmitter consisting of a 19 tube working in a modified Hartley circuit, with an average power input of about one watt. Despite this very low power input, the set was used successfully on various occasions for consistent communication over moderate distances. For a period of several months during the winter of 1935–1936, when the writer was unfortunate enough to be a patient at Walter Reed Hospital, Washington, D. C., and closely confined to his bed, the little set served exceedingly well in providing both a welcome diversion from the monotony of hospital routine and a means of contact with friends and relatives. The most successful operation with the first model was accomplished during the summer of 1936, when the equipment was taken along on a vacation trip to Otsego Lake, in central New York State, and consistently maintained schedules with stations in central New Jersey during the period of peak summer QRN.

The principal difficulty experienced with the original model, except for the very limited power capabilities, was a lack of perfect frequency stability, arising from the type of circuit and the effects of swinging antennas. This led to the conversion of the set to the present improved design, during the fall of 1936, after rather extensive experiments to determine the constants and best arrangement of the various circuit components. The same type of tube, a 19 is used, but the transmitter functions as a crystal-controlled m.o.p.a., and the changes have resulted in a very noticeable improvement in both the frequency stability and the signal strength. The power input to the amplifier section averages about 2 watts. Of course, the little rig cannot compete with the QRM usually present on the amateur bands

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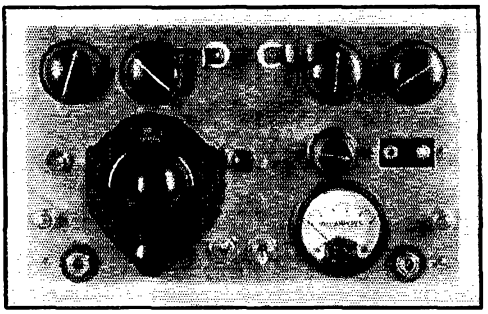
[1] Van Deusen, "A Complete Battery-Operated Portable Station," *QST*, July, 1935.

during the evening traffic hours, but for emergency or auxiliary purposes it has a really respectable "sock" and the signal is read very easily through normal interference, due largely



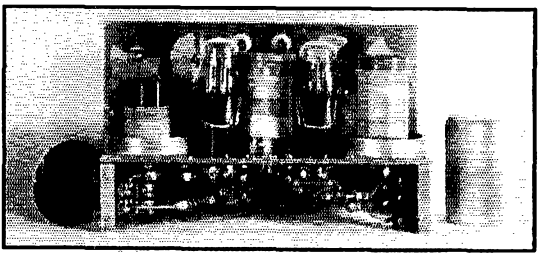
FRONT VIEW OF THE RIG

to the perfectly clean note resulting from the use of battery power. Consistent communication on the 80-meter band has been accomplished during the past winter with stations in all W districts east of the Mississippi River, and with all states in those districts except Wisconsin, Mississippi, Alabama and Florida, both from the home station location in Baltimore, Md., and from various field operating positions. On 40 meters, contact has been established with stations in mid-west W9 and in W5 districts.

The home station antenna is a 45-foot wire, loaded to operate as a Marconi radiator, while the field antenna usually is a 66-foot piece of bell wire drawn up on any convenient tree limb or pole. An alternate antenna which has been used successfully is a split Hertz arrangement with two 33-foot sections, center-fed, but the best results obtained to date have been with the Marconi type of antenna. Although fitted for operation on any of the amateur bands down to and including 20 meters, the experiments have been limited in general to work on the 80- and 40-meter bands. Local tests carried out on the 160- and 20-meter bands, however, indicate great possibilities, especially on 20 meters.

The circuit of the complete station is shown in Fig. 1, and is straightforward, without any trick connections. The receiver is basically the same as that used in the original model, but is changed slightly in the manner of connecting the audio section and also in the filament connections. The latter change provides some bias, and the changes have resulted in materially better volume and some increased selectivity over that of the original set. Change-over between the receiver and the transmitter is accomplished by a four-pole, double-throw jack type switch. The midget monitor is conventional except for its compact dimensions, and is used ordinarily only in getting the station on the air properly and for occasional checking purposes.

The transmitter circuit will be recognized as a normal triode crystal oscillator, capacity coupled to a neutralized triode amplifier or regenerative doubler. The neutralizing condenser is a midget padding condenser of 3 to 30 $\mu\mu$fd., modified by having a portion of the movable plate removed, but may be a short section of twisted pair adjusted by trial to secure the desired results. The adjustable condenser has been used in this set primarily because of the ease with which values could be changed during the process of determining coil constants. A switch is provided to cut off the amplifier plate supply when neutralizing adjustment is to be made. There is still some doubt in the writer's mind as to whether the operation is truly as a neutralized amplifier or as a locked oscillator, when the output is on the crystal frequency, but it works, and is remarkably stable, so this technical detail has been eliminated as non-essential. When the amplifier is operated as a doubler, an unexpectedly strong signal output is secured, and the circuit acts in an entirely normal manner. When doubling, it has been found desirable under certain conditions to use somewhat higher values of grid leaks in both oscillator and amplifier positions, and these biasing resistors are mounted on clips for ease in making changes.



THE REAR VIEW GIVES SOME IDEA OF THE COMPACTNESS OF THE LAYOUT
Coil shields have been removed.

The only details which require care in the construction, adjustment, and operation of the transmitter are the arrangement of components to limit any undesirable interactions or feedback, the choice of the crystal used, and the neutralization of the amplifier section of the tube. If space is available, shielding of the final tank coil, as well as the oscillator and receiver coils, can be provided and is recommended, because it will remedy some trouble experienced with excessive feedback during the development of this assembly. Space limitations dictated the omission of shielding for the final tank coil in the set described. The new National Type PB-10 plug-in bases and shields are excellent for this purpose and would have been used in this set except for the fact that the available space fell short of that

necessary for their use by only a fraction of an inch. The values of coupling to the antenna are a little critical under some conditions, especially with hastily placed field antennas, and the performance might be improved by provision of adjustable antenna coupling, but here also, space and a desire for simplicity indicated the use of a compromise arrangement and fixed coupling. The tip of one plate of the antenna tuning condenser is bent so as to short the condenser when set at maximum capacity. This permits link coupled output and the use of the set as an emergency exciter unit if necessary.

On one or two occasions, when the regular home station exciter went wrong in the middle of a QSO, this little transmitter has proven its ability to drive a pair of 46's sufficiently to enable continuance of contact at least well enough to explain about the trouble. Due to the low plate voltage used, 135 volts, care must be exercised in the selection of the crystal to be used in this transmitter. An active crystal, and one which keys readily, is required. Keying is accomplished in the common plate supply to both sections of the 19.

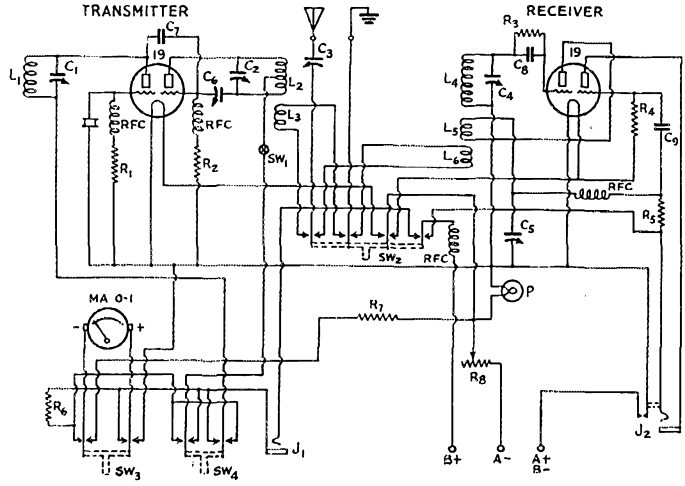


FIG. 1—CIRCUIT DIAGRAM OF THE BATTERY-OPERATED PORTABLE TRANSMITTER AND RECEIVER

C1, C2—100 μμfd. (Hammarlund Star midget.)
C3, C5—140 μμfd. (Hammarlund Star midget.)
C4—25 μμfd. (Hammarlund Star midget.)
C6—Neutralizing condenser, see text. (Hammarlund MEX.)
C7, C8—0.0001 μfd. mica midget, receiving type.
C9—0.0004 μfd. mica midget, receiving type.
R1—1000-ohm, 1-watt, metallized.
R2—1250-ohm, 1-watt, metallized.
R3—2-megohm, 1-watt, metallized.
R4—250,000-ohm, 1-watt, metallized.
R5—50,000-ohm 1-watt, metallized.
R6—Meter shunt resistor. (Value depends on particular meter used, and its internal resistance.)
R7—5000-ohm, 1-watt, metallized.
R8—6 to 10-ohm rheostat. (Yaxley Type C.)
Sw1—Single-pole, single-throw toggle switch.
Sw2—Four-pole, double-throw jack-type switch.
Sw3, Sw4—Double-pole, double-throw toggle switch.
J1—Key jack. (Yaxley No. 701.)
J2—'Phone jack. (Yaxley No. 703.)
P—Pilot light. (Yaxley No. 301R.) Note: Use special low-drain 2-volt bulb.
MA—Milliammeter.
RFC—R.f. choke. (National R-100 Hammarlund CHX.)
L1, L2, L3, L4, L5 and L6—See coil table.

The photographs are self-explanatory. On the panel, the receiver controls are at the left, and those of the transmitter on the right. The top row of knobs, from left to right, are: receiver regeneration condenser, antenna tuning condenser, transmitter amplifier tank condenser, and the oscillator tank condenser. Below the latter are the jacks for the crystal holder, with the filament rheostat to their left. The change-over switch is in the center of the panel, and to the left of the receiver tuning condenser dial are the pilot light and the headphone jack. The meter switches, directly under the change-over switch, are arranged to provide readings of either the filament voltage, or the plate current drawn by the oscillator or by the amplifier section of the transmitter, at will. The key jack is at the lower right corner of the panel. Filaments are controlled by insertion of the 'phone plug into its jack.

The general arrangement of the case and its contents is unchanged from that of the original model. Panel units are interchangeable, and a 5-meter transceiver, also designed to be inter-

(Continued on page 86)

COIL TABLE

Band	Number of Turns					
	L_1	L_2	L_3	L_4	L_5	L_6
160 meters...	45	72	8	80	15	12
80 meters...	26	36	6	45	14	9
40 meters...	10	18	5	22	10	8
20 meters...	..	10	5	10	6	6

NOTE.—Coils are wound on receiving type, plug-in forms. All oscillator coils, L_1, are wound with No. 22 d.c.c. wire. Amplifier tank coils, L_2 and L_3, on the same form, are wound with No. 22 d.c.c. wire, except the one for the 160-meter band, which uses No. 31 d.c.c. wire. L_2 is center-tapped, with L_3 interwound at its center.

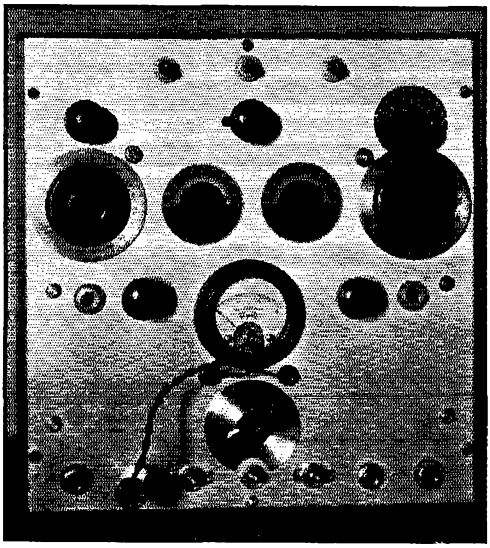
Receiver coils L_4, L_5 and L_6 on the same form, are wound with No. 22 d.c.c. wire, except the one for the 160-meter band, which uses No. 31 d.c.c. wire. Spacing of the winding may be advantageous to secure band spread on the higher frequencies. Antenna loading coils are described in the text. Monitor coils follow the specifications of the A.R.R.L. *Handbook* "cracker-tin" monitor, and are wound on tube bases.

A Battery-Operated Emergency Rig of Proved Performance

Description of an Outfit That Saw Service During the Floods

By William H. Jacobs,* W4CVQ

SINCE there has been so much said and written about the work amateurs did during the recent flood of the Ohio river, it seems that it would be a good plan for every amateur to take stock to see what he has that could be put to use if a flood or hurricane came down his alley and put the light company, telegraph and telephone systems out of business.



PANEL VIEW OF THE COMPLETE STATION

Most of us can dig enough out of the junk box to put something together on short notice; but things put together on short notice usually have bad habits. On the other hand, if one designs a portable rig around a few parts, then dumps the junk box on the floor, gathers together all the needed odds and ends available and, after very carefully planning the layout for efficiency, starts building, the results will not only be more certain but also well worth the time spent.

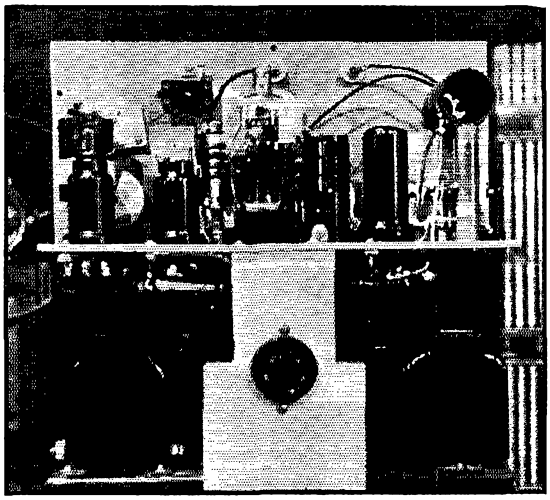
About four months of planning and ten dollars in cash went into the portable described in this article. It was first built up using a 59 c.c. oscillator and 46 r.f. amplifier, 53 speech amplifier and a 53 Class-B modulator. Coils were wound for 80-, 40- and 20- and the rig tested on all three bands. When put on the air on 20-meter c.w., to our surprise a W7 answered the first CQ. All districts of the U.S. and Canada were worked over one week-end on this band with about 15 watts input.

The big laugh came one Sunday morning while working W1SZ with it on 20-meter 'phone. He said QRM was so bad on Sunday that one could not possibly get through with less than three- or four-hundred watts. Yet he reported our signal solid S8. I believe Rod still thinks I was kidding him.

Then it was decided that a portable receiver should be built. So the whole works were dismantled and put in the junk box and a new start taken.

This time it was decided to use 6-volt tubes so it could be run from a storage battery. A close study of the tubes available was made and the lineup shown in the diagram decided on. The filaments consume three amps at 6 volts so it is not so hard on a storage battery.

The combined plate, screen, suppressor and bleeder drain of the r.f. section is 48 ma. at 225 volts when loaded, 18 ma. being drawn by the 89 and 30 ma. by the 6F6. The speech amplifier-



REAR VIEW SHOWS R.F. PORTION ABOVE AS INDICATED IN FIG. 1

* Fort Bragg, N. C.

modulator draws 25 ma. at 225 volts. At 225 volts the battery drain is no more than that of one of the old broadcast receivers which operated on B batteries. And the batteries to-day are better and cheaper.

When a.c. is available and a 350-volt power supply is used, the total plate drain is about 130 ma. maximum; the 89 takes 25 ma; 6F6, 60 ma, the two 6N7's 40 to 50 ma.

The receiver is a simple 6J7 in a conventional layout with cathode regeneration and a single stage of resistance-coupled audio. Even after using a superhet for several years, one will be surprised at the performance of so simple a gadget. The receiver tunes from about 2700 kc. to 6000 kc. and works smoothly on any voltage from 90 to 350. It is desirable to use a separate antenna for the receiver.

The transmitter tunes from 2700 to 4600 kc. and operates equally well (on both 'phone and c.w.) on a 22½-volt power supply. This doesn't sound reasonable but it is true.

The entire rig is bolted to the ⅛-inch aluminum front panel. It stands 10¾ inches high, 10 inches wide and 4⅛ inches deep and weighs 11 pounds without power supply. Starting from scratch the entire cost would be less than thirty dollars, including a power supply.

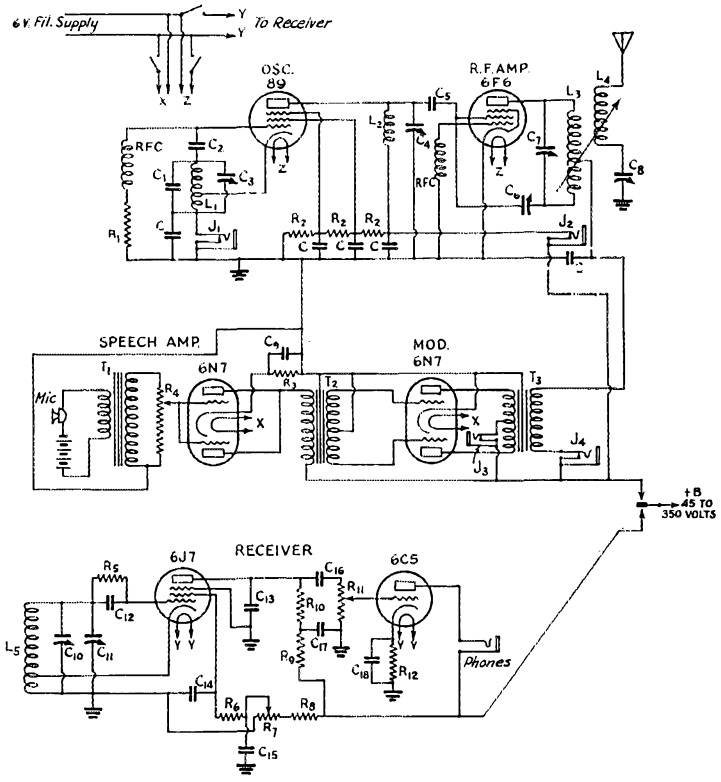


FIG. 1—TRANSMITTER AND RECEIVER CIRCUITS OF THE BATTERY-OPERATED EMERGENCY RIG

L_1—60 turns, No. 24 enameled on 1-inch diameter form; cathode tap at 20th turn from ground end.
L_2—40 turns, No. 24 enameled on 1-inch form.
L_3—45 turns, No. 22 d.s.c. on 1¼-inch form.
L_4—20 turns, No. 20 d.c.c. on 1-inch form to slide inside L_3.
L_5—40 turns, No. 26 d.c.c. on 1¼-inch form; cathode tap 1 to 2 turns from ground end.
C—0.01-μfd. tubular.
C_1—50 μμfd. mica.
C_2—0.001 mica.
C_3—140 μμfd. midget (Hammarlund "Star").
C_4—100 μμfd. midget (Hammarlund "Star").
C_5—40 μμfd. mica.
C_6—10 μμfd. (35 μμfd. cut down).
C_7—100 μμfd. Hammarlund.
C_8—140 μμfd. midget (Hammarlund).
C_9—10 μμfd. electrolytic.
C_{10}—100 μμfd. midget.
C_{11}—100 μμfd. midget.
C_{12}, C_{13}—100 μμfd. mica.
C_{14}—0.01 μfd. paper.
C_{15}—0.1 μfd. paper.
C_{16}—0.02 μfd. paper.
C_{17}, C_{18}—0.5 μfd. paper.
R_1—40,000-ohm grid leak.
R_2—Each 10,000 ohms.
R_3—1000 ohms.
R_4—500,000-ohm volume control.
R_5—4-megohm grid leak.
R_6—100,000 ohms.
R_7—50,000-ohm variable.
R_8, R_9—25,000-ohm.
R_{10}—150,000 ohms.
R_{11}—500,000-ohm volume control.
R_{12}—10,000 ohms.
T_1—Single-button microphone transformer.
T_2—Class-B input transformer for 53 (Thordarson).
T_3—Class-B output transformer 53 (Thordarson).

The "station" was completed in January and put on the air in the 80-meter c.w. band for two evenings. In all there were 16 contacts, all reports being 55 or better with 12 T9X's and 4 T9's.

It was operated on the 75-meter 'phone band one Sunday morning and four contacts were made, all reports being 56 or better and the quality reports all that could be desired. These contacts were all over 100 miles.

The writer was sent to the flood area the 27th of January with a communication detail and was in control of a radio net in the Memphis district. After a few days operation, one of the commercial transmitters furnishing communication at Wilson, Arkansas, went haywire. A radio store in Memphis was visited and about $12 of Uncle Sam's money spent for a pock full of gadgets which were assembled into the same circuit as the one shown in this article (r.f. only). This rig was placed on the air in Wilson at 4:20 P.M. February 8th and reported to the net control station at twenty minutes after each hour for the next ten days, during which the filaments were never turned off!

And Now We Have Full-Range Superhet Selectivity

Electro-Mechanical I.F. Circuits for Continuously Variable Band-Width from Below 100 Cycles to Over 10 Kc.

By James J. Lamb*

THE full range of receiver selectivity ideally desirable in amateur communication would embrace, as we have pointed out previously, band-widths from the minimum required for c.w. telegraph signals to the maximum required for high-fidelity 'phone. In practice, this might mean a total effective band-width range of from less than 100 cycles to over 20 kc. Furthermore, in order to cope with the wide variety of interference conditions encountered with the different types of signals, the selectivity should be continuously variable throughout this 200-to-1 range and should also include the additional feature of ability to reject a particular interfering signal even within the band-width range for which the receiver may be adjusted, especially in c.w. telegraph reception.

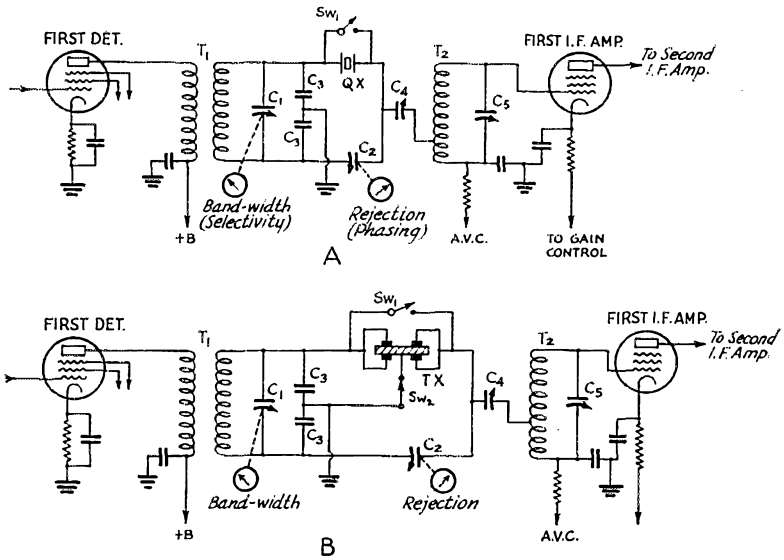


FIG. 1 — QUARTZ CRYSTAL FILTER AND ROCHELLE SALT "TRANSFILTER" CIRCUITS FOR CONTINUOUSLY VARIABLE SELECTIVITY BY TUNED IMPEDANCE CONTROL

C_1—50-μμfd. variable midget (Bandwidth control).
C_2—15-μμfd. variable with low-capacitance crystal mountings such as National CHR and Bliley BC3; 25-μμfd. for higher-capacitance mountings such as Bliley CF1 (Rejection or phasing control).
C_3—Each 75-μμfd. or 100-μμfd. fixed mica.
C_4—50-μμfd. trimmer type (Output coupling capacitance).
C_5—75-μμfd. variable (Output transformer tuning).
T_1—Input transformer, 5.5-mh. primary closely coupled to 1.2-mh. tuned secondary.
T_2—Output transformer, 1.2-mh. winding tapped approximately 1/4 turns from inside (ground) end.
T1 and T2 are shielded from each other.
QX—465-kc. filter crystal.
TX—465-kc. Transfilter (Brush Type A).
SW_1—S.p.s.t. filter switch.
SW_2—S.p.s.t. switch to open ground connection of Transfilter with SW_1 closed.

Unquestionably this is a large order and might appear practically beyond attainment to one who had not followed the recent evolution of selectivity in the development of our amateur superheterodyne receivers. Actually, full-range variable selectivity meeting these ideal specifications is now within our reach. In this article we shall attempt to show one method of approach by practical circuit arrangements and graphical performance data. There is nothing especially revolutionary involved, unless it be the results obtained, since the essential circuits are of types already familiar to us and are based on previous developments which have been described in *QST* and the A.R.R.L. *Handbook*.

The full range encompassed may be covered by the same i.f. amplifier in three steps, each capable

* Technical Editor *QST*.

of giving continuously variable band-width between its minimum and maximum limits. These are from 100 cycles or less to approximately 3.5 kc., from 3.5. to approximately 9 kc., and from 9 kc. to over 20 kc. These are total band-width figures at 10 per cent maximum response; or, to put it differently, total band-width at ten times resonance input.[1] For the highest selectivity range, the familiar variable-selectivity quartz crystal filter is used; for the medium range, a Transfilter unit [2] in the same variable-selectivity circuit carries on in place of the quartz crystal; and for the broadest range, variable-selectivity interstage transformer coupling fulfills the job with the filter circuit switched out. Since the band-width requirements of c.w. telegraph and 'phone reception have been found to be satisfied by the two higher-order ranges of selectivity, using the crystal filter and Transfilter respectively, only these two ranges will be treated in detail in the present article, the "straight" transformer-coupled i.f. selectivity being shown in each case simply for comparison.

THE EXPERIMENTAL SET-UP

The i.f. amplifier used in the experimental investigation included two stages of intermediate-frequency amplification with two 465-kc. air-tuned air-core transformers in addition to the filter unit, a diode second detector, and a "flat" two-stage audio amplifier with 6L6 output. The two i.f. transformers of this unit were adjusted for a relatively broad frequency characteristic to provide a fair amount of tolerance near resonance to accommodate minor deviations in frequency of the several quartz crystals and Transfilters used. A Rawson Type 501 milliammeter was connected in the second-detector circuit to indicate the rectified d.c. and a General Radio Type 583A power output meter was connected to the 6L6 stage for audio output measurements. The first i.f. stage was preceded by the filter circuit and this, in turn, was preceded by a 6L7 first detector. For i.f. selectivity, sensitivity and noise-ratio measurements, the grid circuit of the first detector was connected to the output of a G.R. Type 605A standard signal generator. An auxiliary i.f. amplifier, second detector and audio unit was used for aural monitoring throughout the tests, its i.f. input being taken off in parallel with the input to the grid of the first i.f. amplifier following the filter unit. Use of this auxiliary unit for monitoring avoided disturbance of the output measuring circuit of the test setup which would occur if 'phones or speaker were connected in the measuring circuit.

[1] J. J. Lamb, "Receiver Selectivity Characteristics," *QST*, May, 1935; *The Radio Amateur's Handbook*, 14th Edition (1937), p. 88.

[2] J. J. Lamb, "A New I.F. Coupling System," *QST*, April, 1937.

In making the selectivity tests, the second detector of the main unit was used as a vacuum-tube voltmeter to indicate i.f. amplifier output. This is an advisable procedure in running characteristics on high-selectivity circuits where it is not

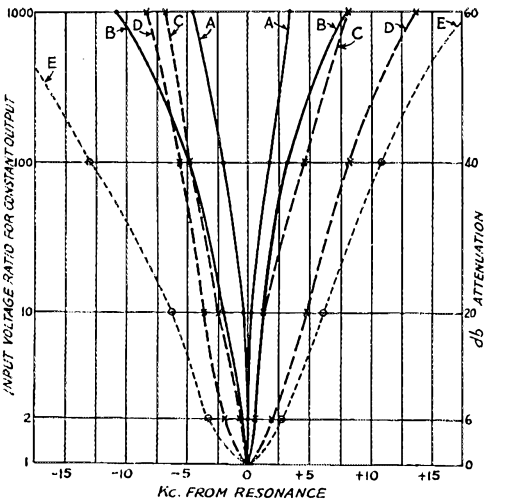


FIG. 2—SELECTIVITY CURVES FOR THE VARIABLE-BAND-WIDTH CIRCUITS OF FIG. 1

A, crystal filter maximum selectivity; B, crystal filter minimum selectivity; C, Transfilter maximum selectivity; D, Transfilter minimum selectivity; E, straight superhet without either filter.

feasible to use a modulated signal and where it is inconvenient to adjust for the same beat-note output frequency on each measurement. This method of output indication also prevents the frequency characteristic of the audio amplifier from affecting the measured selectivity.

The standard procedure for making selectivity tests was followed in all other respects, throughout the hundreds of readings which were taken in obtaining the data presented here and in checking and rechecking those of a critical nature.

The input signal throughout the measurements was in the intermediate-frequency range, of course, the first detector serving simply as the input coupling amplifier. The results obtained fully represent actual superhet receiver performance, however, as was checked thoroughly by using the first tube as the mixer in a converter circuit both with signal generator input and in the reception of communication and broadcast signals.

Since many of the measurements were made at extremely high filter selectivity, careful adjustment of the signal-generator tuning and measurement of the frequency deviation from resonance were necessary. In these measurements, the frequency reading from the magnified tuning scale of the signal generator was checked by

measurement of frequency increment in audio beat-note output of the auxiliary monitoring receiver unit. The stability of the 605A signal generator, which is of the oscillator-amplifier type, is exceptionally good. Repeated tests showed that it had no appreciable frequency drift during a run and that the re-set accuracy was entirely adequate, even from day to day.

The general procedure in making selectivity measurements for each of the various i.f. circuit combinations was as follows:

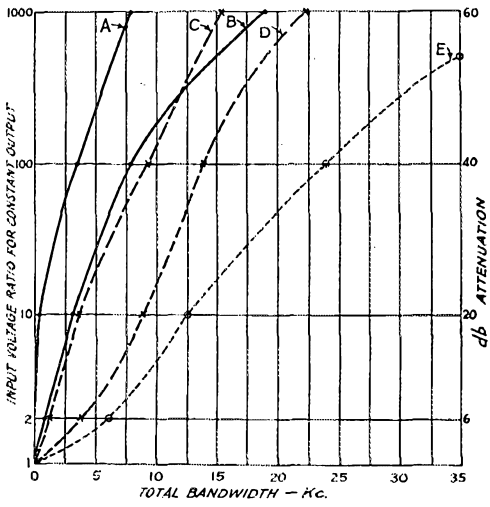


FIG. 3—TOTAL BAND-WIDTH CURVES, CORRESPONDING TO THE SELECTIVITY CURVES OF FIG. 2, TO SHOW MORE CLEARLY THE FULL RANGE COVERAGE OF THE CRYSTAL AND TRANSFILTER CIRCUITS OF FIG. 1

The i.f. gain and signal input level were adjusted to give second-detector current corresponding to that obtained with what would be considered a "normal" signal delivering output well above the background noise level. This reference current was 40 microamperes through the diode load resistor of 100,000 ohms, the signal input on i.f. resonance ranging between 10 and 40 microvolts. For most of the curves the signal generator's attenuator was then set for 2, 10, 100 and 1000 times this resonance input, and the signal-generator tuning adjusted to give the same reference output for each input level, first on one side of resonance and then on the other side. In certain special cases where there were irregularities in the selectivity curve, additional readings were taken for the particular frequencies at which these occurred. Before starting each run a preliminary test was made to insure that overloading would not occur at any stage in the lineup for the maximum input level which would be used in the run. Furthermore, each run was made at least twice to check for possible erroneous readings in frequency settings or input microvolts.

The tuning of the i.f. coupling transformers was also checked for each filter combination to make sure that the "straight" selectivity characteristic was not off resonance for the particular circuit in use.

FILTER CIRCUITS

Previous experience with variable-selectivity filter circuits using quartz crystals gave preference to the arrangement of Fig. 1A which provides both variable band-width control and variable rejection. The operation of this circuit has been treated previously [3] and need not be repeated in detail here. Band-width is varied by adjustment of the parallel-tuned impedance as indicated in the diagram, maximum band-width (minimum selectivity) occurring with this circuit tuned to crystal resonance and decreasing band-width (increasing selectivity) occurring as the parallel-tuned circuit becomes reactive (either side of resonance). With the impedance matching which this circuit provides, the over-all c.w. gain of the receiver is practically the same with the input circuit adjusted for "optimum" (medium-high) selectivity as it is with the crystal shorted out and the input circuit adjusted for maximum "straight" superhet gain. Either side of this point the over-all gain decreases slightly, both toward maximum band-width and toward extreme minimum band-width.

Preliminary tests with Transfilter circuits showed that the simple choke-condenser input and resistance output coupling given in April *QST* [2] was considerably less satisfactory than a coupling circuit giving more favorable impedance matching. The Transfilter unit is of fairly low impedance and accordingly cuts the gain of the input amplifier or first detector when fed directly from its plate. The same circuit used for the crystal filter was found to overcome these advantages and to give nearly the same over-all gain with the Transfilter as with the crystal, even though the Transfilter unit has a ground connection which might be expected to impair the operation of the balanced circuit. A preferred Transfilter arrangement is shown in Fig. 1B. In practice, it has been found satisfactory to use the Transfilter interchangeably with a crystal of the same frequency (465 Kc.) in this circuit.

With the Transfilter, selectivity is varied by the same method as with the crystal filter; that is, by variation of the parallel-tuned impedance which constitutes the input to the divided circuit. Although the selectivity-control condenser settings are not exactly the same as for a quartz

[3] J. J. Lamb, "Developments in Crystal Filters," *QST*, Nov., 1933; "Interference and Noise Reduction in Communication Receivers," *Proc. Radio Club of America*, Nov., 1936; U. S. Patent No. 2,054,757; *The Radio Amateur's Handbook*, 14th Edition (1937), pp. 104–106.

crystal of corresponding frequency, minimum selectivity occurs with the input circuit resonant to the Transfilter frequency and increasing selectivity occurs as the input circuit is tuned either side of resonance. The resonance setting (maximum band-width) comes at lower tuning capacitance with the Transfilter than with the crystal because the Transfilter capacitance to ground is apparently greater by 10 $\mu\mu$fd. or so. The adjustment is still well within the range of the condenser, however.

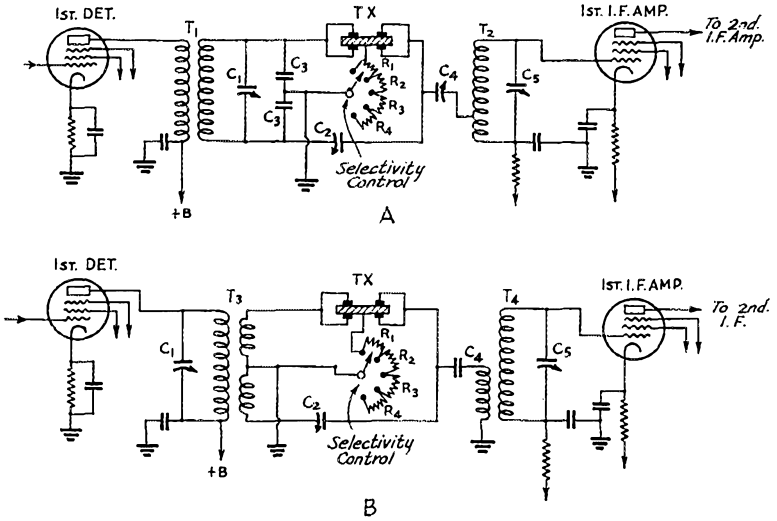


FIG. 4.—IMPEDANCE-MATCHING TRANSFILTER CIRCUITS WITH VARIABLE RESISTANCE CONTROL OF SELECTIVITY

The resistance in the common lead is varied in approximately logarithmic steps. Fixed resistor units of good r.f. characteristics should be used. The total resistance is 10,000 ohms, which is sufficient.

R_1—*1000-ohm ½-watt* R_3—*2500-ohm ½-watt*
R_2—*1500-ohm ½-watt* R_4—*5000-ohm ½-watt*

Other circuit values in A are the same as in Fig. 1. The input and output transformers of B are Hammarlund crystal-filter type.

MEASURED PERFORMANCE

The range of selectivity obtainable with these two circuits is shown in Fig. 2. Curve A is for the crystal filter at maximum selectivity, Curve B for the crystal adjusted for minimum selectivity, Curve C for the Transfilter circuit with the maximum selectivity adjustment and Curve D is for the Transfilter with the minimum selectivity adjustment. Curve E is the transformer-coupled selectivity characteristic of the i.f. amplifier without either filter ("straight" superhet). It is especially interesting to note that the selectivity range with the Transfilter practically continues on from where the crystal range reaches its broadest. This is illustrated even more clearly by the total band-width curves of Fig. 3 which are plotted from the same data. The principal difference between the selectivity of the crystal filter at its broadest and of the Transfilter at its sharpest is that the Transfilter selectivity characteristic is somewhat broader near resonance, giving a slightly greater effective bandwidth.

Actual reception tests demonstrate that this continuous range of selectivity, from the crystal filter at its sharpest to the Transfilter at its broadest, embraces every degree needed for c.w. telegraph and 'phone communication. The crystal filter provides selectivity from the highest that may be used for c.w. telegraph signals with slow-speed keying to a band-width sufficient for reception of 'phone signals under adverse interference conditions. Throughout this range the crystal filter also provides adjustable rejection or control of symmetry of the response characteristic for elimination of a particular interfering carrier even within the normal band-width range. The Transfilter selectivity range carries on from this point to a band-width sufficiently great for speech reception with entirely adequate fidelity. In fact, the Transfilter selectivity at its broadest is generally useful for broadcast program reception, providing fidelity fully as good as that customary with the average broadcast receiver.

This range is especially adapted to short-wave broadcast reception where it is desirable to constrict the frequency band of the receiver anyway because of the noise and adjacent-channel interference which is aggravated by the fading so characteristic of these frequencies. True high-fidelity reception is practically never feasible on the high-frequency bands, and considerable high-frequency attenuation is inevitably necessary. This is accomplished by the i.f. band-width control with the Transfilter in much more satisfactory fashion than it can be obtained by an audio-frequency tone control with ordinary i.f. selectivity. The i.f. band-width control accomplishes the same effect of reducing the noise but does so without introducing the amplitude distortion which may occur with audio-frequency tone control. Furthermore, it does the job prior to the second detector and removes noise and adjacent-channel sideband components before they have a chance to intermodulate with the desired signal in the second detector to produce

low-frequency audio components which cannot be removed by audio-frequency filtering subsequent to detection.

In running the selectivity characteristics of

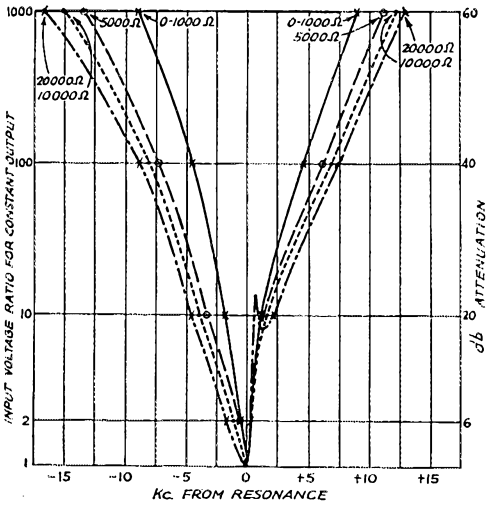


FIG. 5—SELECTIVITY CURVES FOR RESISTANCE VARIATION OF BAND-WIDTH OBTAINED WITH THE CIRCUIT OF FIG. 4A, C_1 SET FOR MAXIMUM SELECTIVITY WITH ZERO RESISTANCE

Zero- and 2500-ohm resistance curves practically coincide with the 1000-ohm curve and are not shown. Note the sharper "nose" and wider broadening in the skirts as compared with the impedance variation curves of Fig. 2.

Figs. 2 and 3 with the crystal filter, the bandwidth control C_1 of Fig. 1 was set at slightly less than half capacitance for maximum selectivity and at approximately ½ capacitance for minimum selectivity. The minimum selectivity setting is, of course, that at which the balanced input circuit is resonant to the crystal frequency, while the maximum selectivity setting is that at which the input circuit is inductively reactive for the crystal frequency. The rejection or phasing control C_2 was set to make the selectivity characteristic approximately symmetrical at 100 times resonance input; that is, so that the frequency deviations above resonance and below resonance were approximately equal for constant output with 100 times resonance input. The crystal-filter selectivity characteristic can be steepened on either side, of course, by other adjustments of the rejection control.[3]

In obtaining the Transfilter curves, the 50-$\mu\mu$fd. bandwidth condenser C_1 was set at approximately ⅓ capacitance for minimum selectivity and at approximately ½ capacitance for maximum selectivity; that is, the input circuit was *capacitively* reactive at maximum selectivity. The phasing control C_2 was set near minimum capacitance. The phasing control has but slight effect on the symmetry of the resonance curve with the Transfilter, the rejection action being noticeable only at frequencies far removed from resonance in contrast to effective rejection action up to within a few hundred cycles of resonance with the crystal filter. The phasing condenser is effective in neutralizing stray capacitance coupling across the Transfilter, however, and improves the steepness of the skirts of the resonance characteristic.

OVER-ALL GAIN AND NOISE RATIO

A matter of some importance in judging the relative merits of selective i.f. circuits, in addition

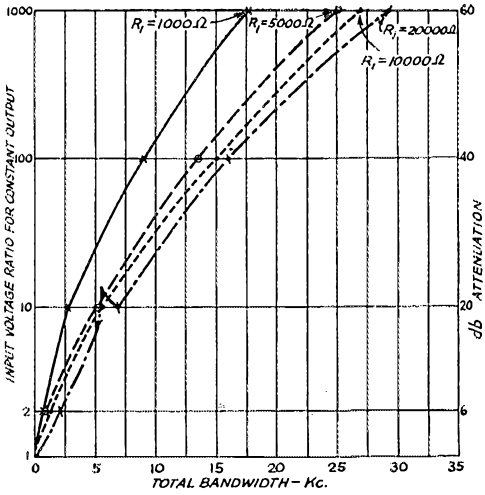


FIG. 6—TOTAL BAND-WIDTH CURVES FOR RESISTANCE VARIATION

TABLE I—RELATIVE C.W. GAIN AND SENSITIVITY

I.F. Circuit	I.F. Input For Const. Output	Relative Voltage Gain		I.F. Noise Equiv.	Relative Effective Sensitivity
		%	db		
Straight Super	17 μv.	100	0	2.0 μv.	0 db
Transfilter Broad	22 μv.	87	−2	1.32 μv.	+ 3.5 db
Transfilter Sharp	25 μv.	70	−3.5	0.80 μv.	+ 8.0 db
Quartz Xtal Filter Broad	35 μv.	50	−6	0.60 μv.	+10.5 db
Quartz Xtal Filter Opt.	20 μv.	85	−1.5	0.35 μv.	+15.0 db
Quartz Xtal Filter Sharp	23 μv.	74	−2.5	0.30 μv.	+16.5 db

to their contribution of selectivity, is their effect on the over-all gain and effective sensitivity. In connection with crystal filters, for instance, there is considerable divergence of opinion as to whether this or that particular arrangement is the better in point of how little it reduces the gain of the receiver. In our experience, the impedance-matching crystal filter circuit of Fig. 1A has practically negligible effect on the c.w. gain of the receiver as compared to the gain with the crystal shorted out and the circuit tuned to i.f. resonance for "straight" superhet operation. This refers particularly to the c.w. gain with the crystal filter circuit adjusted for optimum selectivity, at which adjustment the second-detector input (and the c.w. beat-note output) is maximum. The gain is actually reduced at minimum selectivity (maximum bandwidth) although the listener might get the opposite impression because the interference and background noise increase when the selectivity is reduced so that the gross sound output becomes greater. However, the net c.w. signal output is less, as is also the effective sensitivity of the receiver.

In the circuit arrangement of Fig. 1B, using the Transfilter, the gain is also negligibly affected as compared to the straight superhet gain. In practice, differences of a few decibels in over-all gain are readily compensated by adjustment of the receiver's gain control—provided, of course, the receiver has a proper margin of surplus amplification to start with. This should be true with any good receiver having a two-stage intermediate amplifier.

Of more importance than gain is the effective sensitivity of the receiver. This effective sensitivity is by no means a simple matter of how much amplification the receiver has. It is, rather, a matter of signal-noise ratio. It is best expressed in terms of the receiver's noise equivalent. As shown in the A.R.R.L. *Handbook*,[4] the noise equivalent is the signal input required to give signal power output equal to the noise power output. The noise concerned is the receiver "hiss" noise, which would be the lowest possible noise background under ideal receiving conditions. The noise equivalent will be determined primarily by the signal-noise ratio at the input of the receiver but will be affected by the subsequent selectivity because the noise power output is generally reduced in proportion to the reduction in effective bandwidth of the receiver.

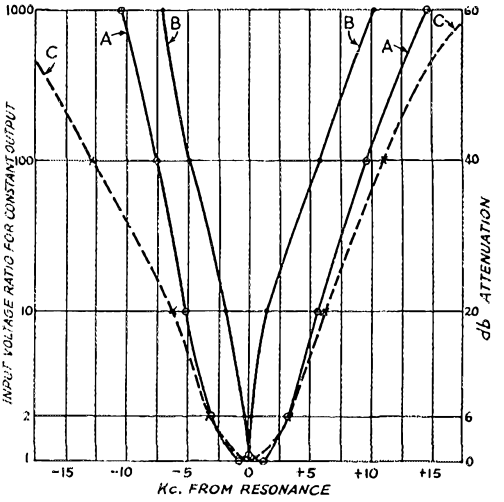


FIG. 8—MAXIMUM AND MINIMUM SELECTIVITY CURVES OBTAINED WITH THE BAND-PASS CIRCUIT OF FIG. 7

The mid-frequency of Curve A is approximately 1.2 kc. lower than the resonance frequency of Curve B. Curve C is the straight superhet selectivity without the filter.

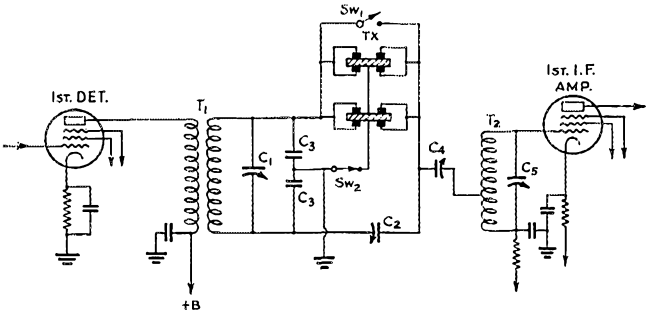


FIG. 7—VARIABLE-SELECTIVITY BAND-PASS CIRCUIT USING TWO TRANSFILTER UNITS IN PARALLEL, CIRCUIT VALUES BEING THE SAME AS IN FIG. 1B

The resonance frequencies of the two units differ approximately 200 cycles.

Table I gives typical quantitative comparisons of the over-all gain and effective sensitivity of the i.f. amplifier for the various orders of selectivity obtained with the circuit of Figs. 1A and 1B. In making these measurements, the receiver gain control was left fixed. The unmodulated c.w. signal input was adjusted to give 500-milliwatt beat-note output with each circuit combination in making the gain measurements, the input frequency being tuned to i.f. resonance. The noise-equivalent measurements were made in a similar manner, the c.w. beat oscillator being "on" for both the signal output and noise output measurements. It should be emphasized that receiver noise output should always be measured (or judged) with a carrier present in the second detector. The noise output with no carrier has little significance, since the

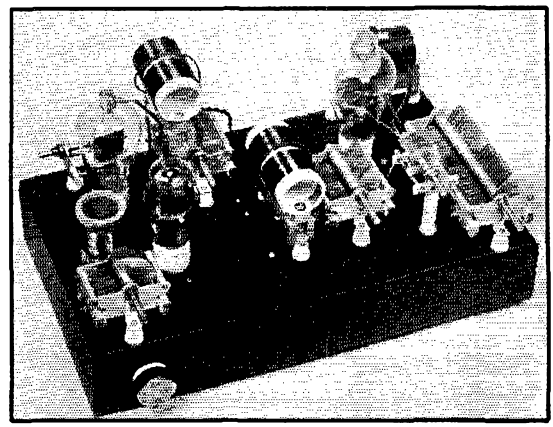
[4] 14th Edition (1937), p. 89.

(*Continued on page 122*)

A Three-Stage Transmitter Unit for 1.75- to 30-Mc. Output

By Earl I. Anderson,* W8UD

BY FAR the greatest problem in the design of an all-band amateur transmitter is that of maintaining suitable *L-C* ratios in the final stage. Insufficient capacity results in high harmonic content and poor linearity if modulated. Too much capacity results in poor efficiency. Because most transmitting condensers have a capacity ratio of about 4-to-1, a maximum of 3 adjacent bands may be covered with proper ratios. Operation on any other bands will leave a great deal to be desired. The transmitter to be described approaches the ideal condition over the full range from 1.75 to 30 Mc. Actually, the *L-C* ratio on 30 Mc. is slightly lower than the optimum value but the performance should be entirely satisfactory. On 1.75 Mc. the *L-C* ratio is slightly higher than is desirable for 'phone operation but is adequate for reasonable harmonic suppression.

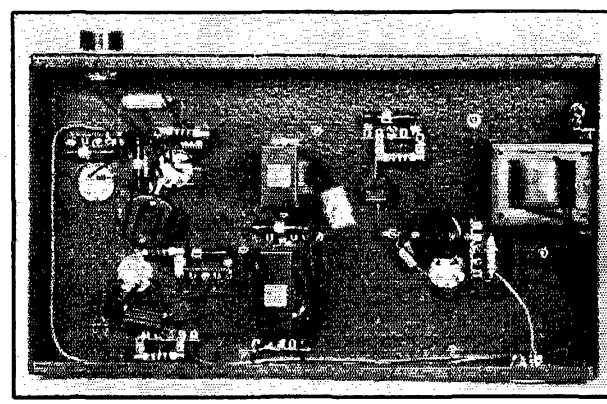


THE THREE-STAGE TRANSMITTER SET FOR ACTION
For clarity's sake knobs and dials have been removed.

Only 3 stages are used, a 6L6G or 42, a T-20 and a T-55. Using a 20- or 40-meter crystal more than enough excitation to the final may be obtained on 30 Mc. and on the lower frequencies the T-20 loafs along delivering only about ¼ of full output when exciting the T-55.

In order to obtain the necessary high capacity ratio, grid neutralization, permitting an unbalanced output circuit, is used in the final stage. The plate tuning condenser is a Cardwell MT-100-GD selected because of its high maximum to minimum capacity ratio (100 $\mu\mu$fd. maximum, 13 $\mu\mu$fd. minimum per section). By using only one section or both sections in parallel, the ratio is 15.4 to 1. The final stage voltage and current were then selected to fit the *L-C* ratios available and the condenser spacing. The T-55 should be operated at 1000 volts and at 150 volts ma. or less. Operation over so wide a range cannot be achieved without some compromises. One section of the condenser is used on 28 and 14 Mc. and both in parallel on 7, 3.5 and 1.75 megacycles.

In one respect grid neutralization is rather a bad actor at the higher frequencies. The grid of the tube puts a resistive load across half of the input coil which results in the opposite end of the coil being other than 180° out of phase, the condition necessary for neutralization, if the coupling is less than unity. Unity coupling is never realized in actual practice but satisfactory results are obtained if the coil is made as short as possible with the minimum spacing between turns. The best cure, that of putting a resistor across the neutralizing half of the coil equal to the grid of the tube, wastes too much driver power on 10



BOTTOM VIEW SHOWING PLACEMENT OF PARTS OUT OF R.F. FIELD

* Asso. Eng., Taylor Tube Co., Chicago.

meters but could be used on the lower frequencies if desired. The 10- and 20-meter grid coils should be wound as shown with the turns as close together as possible. If this is done no difficulty will be experienced. The neutralization will hold from 20 to 160 meters and only a slight readjustment need be made for 10 meters. The neutralization seems to be better with the center of the coil grounded as shown than with the condenser rotor grounded.

The oscillator circuit is of the grid-plate crystal type[1] using a 6L6G for either fundamental or second harmonic output. When working straight through with a 20- or 40-meter crystal the crystal current may be too high for safety with this tube, and the 6L6G should be replaced with a 42 for this type of operation. The 6L6G used as a 6-prong ceramic base and may be replaced with a 42 without any changes. An 80-meter crystal may be used doubling for 40-meter operation, and a 40-meter crystal for 20- and 10-meter operation

(Continued on page 88)

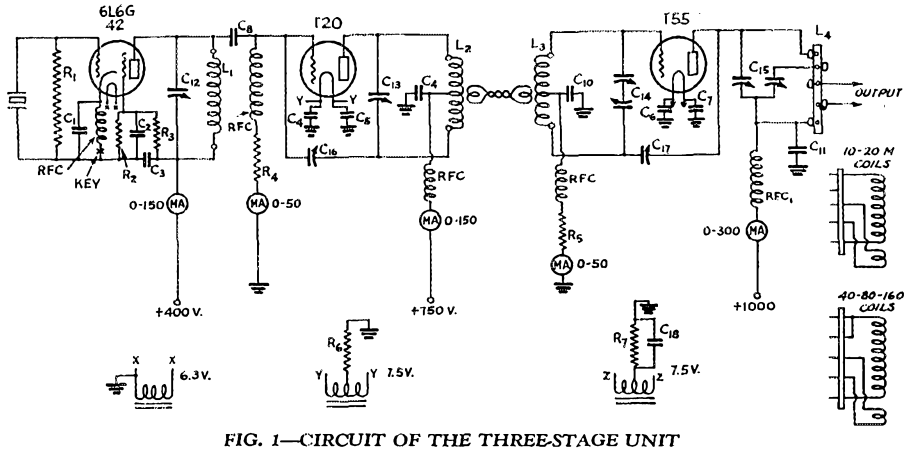
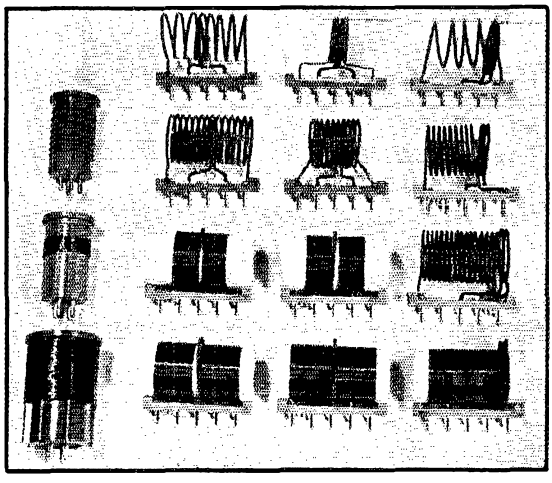


FIG. 1—CIRCUIT OF THE THREE-STAGE UNIT

C_1—150-μμfd.
C_2—0.01-μfd. 600-volt paper.
C_3—0.05-μμfd. 600-volt paper.
C_4, C_5, C_6, C_7—0.006-μfd. mica.
C_8—100-μμfd. 2500-v. mica.
C_9—0.002-μfd., 2500-v. mica.
C_{10}—0.002-μfd. mica.
C_{11}—0.002-μfd. 5000-v. mica.
C_{12}—105-μμfd. (Cardwell MR-105-BS).
C_{13}—100-μμfd. (Cardwell MT-100-GS).
C_{14}—100-μμfd. (Cardwell MR-100-BD).
C_{15}—100-μμfd. (Cardwell MT-100-GD).
C_{16}—8-μμfd. max. 1 stator plate removed (Bud 564).
C_{17}—8-μμfd. max. 2 outside stator plates removed (Bud 564).
C_{18}—8-μfd. 200-v. electrolytic (for 'phone).
RFC—125 ma. r.f. choke.
RFC_1—250-ma. r.f. choke.



COMPLETE SET OF COILS USED IN THE ALL-BAND TRANSMITTER

[1] J. J. Lamb, "A Practical Survey of Crystal Oscillator", *QST*, April, 1937, circuit shown in Fig. 5, page 34.—EDITOR.

COIL DATA

Band	L_1	L_2	L_3	L_4
1.75 Mc.	45 t. No. 18 2¼" dia. closewound	72 t. No. 20 1¾" dia. closewound	78 t. No. 20 1¾" dia. closewound	46 t. No. 16 1¾" dia. closewound
3.5 Mc.	26 t. No. 18 1½" dia. closewound	36 t. No. 14 1¾" dia. closewound	44 t. No. 16 1¾" dia. closewound	19 t. No. 14 1¾" dia. closewound
7 Mc.	12 t. No. 18 1½" dia. closewound	22 t. No. 14 1¾" dia. closewound	24 t. No. 14 1¾" dia. closewound	16 t. No. 10 1¾" dia. 2½" long
14 Mc.	8 t. No. 18 1½" dia. 1¾" long	14 t. No. 10 1¾" dia. 2¾" long	10 t. No. 10 1¾" dia. short as possible	10 t. No. 10 1¾" dia. 1⅞" long
28 Mc.		8 t. No. 10 1¾" dia. Approx. 3" long	6 t. No. 14 1¾" dia. short as possible	5 t. No. 10 3¾" dia. 2¾" long

The 100-Foot Lattice Tower at W9DNP

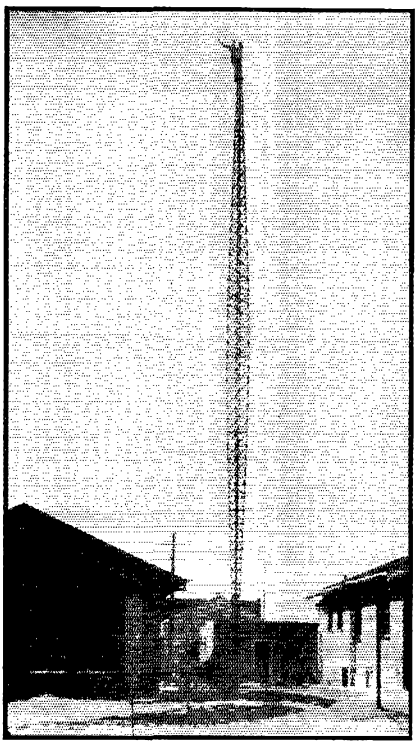
By Mel Williams,* W9DNP

ONE thing that always catches the eye of any radio amateur is a high, well-designed, sturdy sky hook. In some circles of society they make the statement that "clothes make the man." In amateur radio the same idea could be expressed in the statement, "a good antenna is the secret of success." That is my true sentiment after years of "wasted kilowatts," as a result of inefficient radiators, myriads of guy wires and any one of a dozen other things that might be brought up for discussion —or, should we say, cussing.

The sky-hook about to be described is not new or original in any sense of the word; but from the standpoint of performance, beauty, simplicity and low cost of construction, I have not been able to find any type that I like better. Of course there will always be some objection to most any type of tower whether it be expense of construction, the use of guy wires, the amount of space required to erect it, or any one of many others. The general objection to this one would probably be the fact that it has four guy wires. However, these four guy wires are placed at a point less than half way to the top of the mast, which still leaves 52 feet of un-guyed tower.

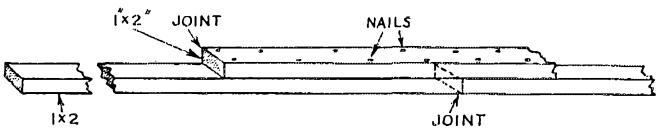
This tower was designed by W8KAZ, an engineer for the American Bridge Company, and much credit is due to him for his untiring efforts in the construction. The actual construction work was done under the most adverse weather conditions, in January, 1935. Regardless of these conditions the tower was built, oiled and raised in one week. The tower stood at its original location in Colorado Springs, Colorado, until March 1936, at which time it was taken down, placed on a pair of wheels and hauled to Denver, 75 miles from the Springs. The tower is now in use by W9DNP-W9FYY and its primary purpose is to snag DX. It seems to fill that purpose perfectly; for example, all continents were worked the night of April 5, 1936, in just one hour and twenty-eight minutes, with less than 300 watts in the antenna.

The total height of this mast is 100 feet and is strong enough to allow a man to climb to the top of it with safety. The greatest width is 26 inches at a point 48 feet above the ground. From this widest point it tapers to a width of 4 inches at the top and 6 inches at the base. The tower originally rested on a smooth block of stone two feet square and six inches thick. Later on, a recess 1 inch deep and 6 inches square was chiseled in the center of the block for the base. The total weight is about 400 pounds. This weight could probably have been reduced considerably by using cedar lath instead of pine, but the tougher qualities of the pine made it preferable in our case. The best lath obtainable was used and each individual one was inspected carefully for flaws. If any flaws were found the lath was discarded to be returned for credit. About 100 lath out of 900 purchased were found to be defective. Most lumber companies will give full credit for all such lath returned, as they are still OK for their regular purpose.



PROOF THAT W9DNP'S 100-FOOTER CAN BE CLIMBED TO THE TOP

The four upright corner pieces are made of 1-by-2 stock, each individual piece being 16 feet long before being cut for joining. Spruce was selected for the corner pieces

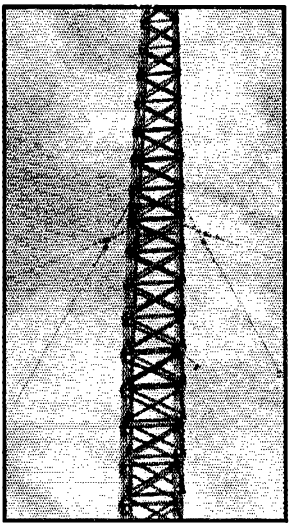


SPLICING OF UPRIGHT CORNER PIECES

FIG. 1—SPLICING OF UPRIGHT CORNER PIECES

* Box 677, Durango, Colo.

because of its toughness and because of its ability to stand many nails without splitting. This last item is a big one, as there are around 5000 small cement-coated nails in the structure. These pieces are then cut and nailed together so that they form a single 2-by-2, 100 feet long. Four of these 100-foot pieces are required. In making these corner pieces, the individual sections were cut and nailed together in such a way that no joint in any of the four corner members was at the same distance from the base. To accomplish this, four pieces of 1-by-2, 16 feet long, were laid side by side on the ground and marked "A," "B," "C," "D." The four pieces were then cut to the following lengths: "A," 7 feet; "B," 10 feet; "C," 13 feet; and "D" remained the full 16 feet. Another piece of 1-by-2 was then cut to a length of 4 feet. This piece was nailed on to the piece marked "A," making the start of the 2-by-2 corner piece. A full-length piece was then nailed on to the remaining 3 feet of the piece marked "A," thus making it a 2-by-2 and leaving a piece



ONLY ONE SET OF GUYS IS USED, AS SHOWN IN THIS VIEW OF THE MID-SECTION

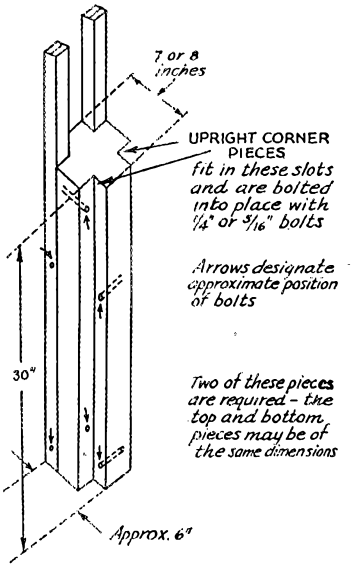


FIG. 2—SLOTTED TOP AND BOTTOM PIECES

13 feet long to be covered by another full length piece; and so on, until the full-length 100-foot 2-by-2 is completed. The pieces to be nailed to "B," "C," and "D" are 8½ feet, 11½ feet and 14 feet, respectively. These figures are not critical, however, and most any combination will work out OK. The idea is to "stagger" the joints to prevent weakness which could be caused by joints at the same distance from the base of the mast. The nails used on the corner pieces were long enough to go completely through the two 1-by-2's with a little left to clinch. They were placed every 6 inches for the whole length.

For the base and top we obtained two pieces of fir timbering 8 by 8 by 30 inches long. These pieces were then dressed down so that there was an even taper on all sides from about 7 inches to 5 inches. These dimensions are not too critical. A 2-by-2 inch slot was then cut in each corner the entire length of the piece for the corner pieces to fit into. The corner pieces were then cut to exactly the same length and bolted into place by ¼-inch bolts, 8 inches long. It is advisable to figure out the best way to arrange the bolts for maximum strength when you are ready to use them, as the grain of the wood or the arrangement of the corner pieces may necessitate some variations.

ASSEMBLY BEGINS

Now the fun really begins. After the top and bottom pieces have been firmly bolted to the corner members, get the thing straightened out on as level a piece of ground as you can find. You may have to block it up in places with pieces of scrap 2-by-2, or what-have-you. Above all don't get discouraged; it will probably look like a hump-backed snake and act like a piece of heavy rope. Now drive a small nail into the exact center of each end; then take a chalkline or heavy cord and stretch it tight from end to end. This is the center line and all measurements are made from it. The shaping of the tower is next in order. Two sides are formed at the same time, which simplifies things considerably. At the 50-foot mark, the middle of the tower, the corner members are spread apart until the outside of each one is exactly 13 inches from the chalkline. A cross piece is then nailed on temporarily to keep them in place. The correct taper is then determined and pieces of sharpened 2-by-2 are driven into the ground about every 15 feet for the entire length. The corner members are then pulled into position and temporarily nailed to the 2-by-2's driven in the ground. The lath, nails, saws, hammers and whatnots are then brought into action along with the glue pail. Every joint in the tower should be brushed with a coating of water-proof aeroplane

glue before being nailed together. A strong center cross piece is then put into permanent position. There are four of these pieces all together, two of them being 26 inches long by 3 inches wide by 1 inch thick, and the other two are of the same stock but 28 inches long. The shorter cross pieces are

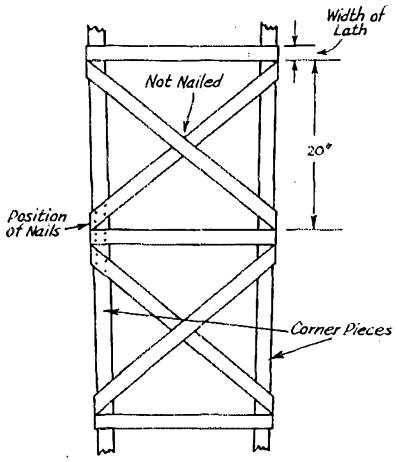


FIG. 3—ILLUSTRATING THE LATH PLACEMENT AND NAILING OF THE SIDES

used first, one on the front and one on the back (or top and bottom, if you want to refer to it that way). These cross pieces are all nailed, bolts not being necessary.

The next thing in order is to measure and mark the position of each of the horizontal cross pieces. These cross pieces are placed on centers 20 inches apart and should all be marked before any of them are nailed into permanent position. A steel tape should be used to mark these centers to prevent the slight errors which might add up to a considerable amount by the time 25 measurements have been made. It might be well, after the positions for these cross pieces have been marked, to nail several of them into permanent position along the entire length of the structure. In our case these pieces were placed 80 inches apart. Needless to say, we worked from the center toward each end so that the shape would be symmetrical. Careful measurements cannot be stressed too highly; the success of the whole project largely depends on accurate measurements. It might be well at this time to mention that for about 25 feet from the center toward each end, all lath used in the horizontal and diagonal cross pieces are doubled.

With these several cross pieces in permanent position, the rest of the cross pieces can be nailed and glued down tight. Four small cement-covered nails are used in each joint. The nails used to hold a single-thickness lath to the corner pieces are nearly two inches long and have thick shanks and large heads, while 2½-inch box nails are used on the double-thickness lath. Careful selection of the kind and style of all nails used is very important. It would probably be wise to get a flock of samples and try them out before making the final choice. It must be remembered that there are four nails at the end of each cross piece in a space 2 inches square. In the thousands of small nails driven into our tower, not a single split was caused by a nail. This speaks well for the pine lath which was very brittle, due to the dry Colorado climate.

The diagonal cross pieces are next nailed into place to form an "X" in each of the spaces between the horizontal cross pieces. The hard work is now finished, and the structure is turned completely over and the cross pieces are nailed into place on that side. After this side is completed it will be necessary to stand the two completed sides on edge and spread them apart in the middle. The two remaining 28-inch center cross pieces are then nailed into permanent position. These two pieces are made 28 inches long so they will cover the ends of the other two cross pieces which are only 26 inches long. A lot of temporary cross pieces are then nailed in place to start forming the tower. Measurements conforming with the already completed sides are then transferred to the side being worked on and the same procedure fol-

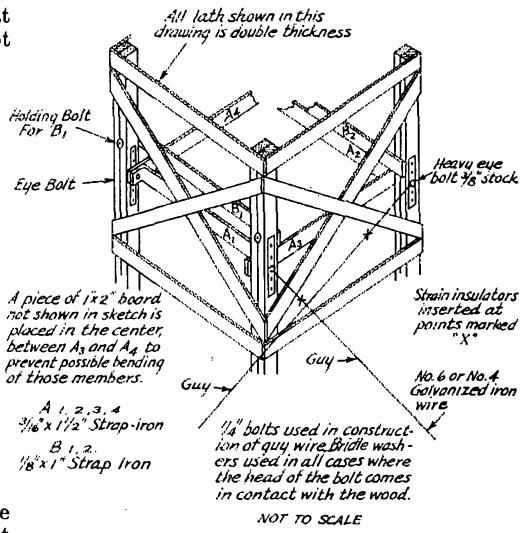


FIG. 4—INTERNAL BRACING OF THE MID-SECTION AND ATTACHMENT OF GUYS

lowed as in the first side. Upon completion of this side the tower is again turned over and the last side completed in the same manner as the second side. A few internal braces running diagonally from corner to corner are placed about twelve feet apart throughout the length (or height) of the tower.

The tower is now ready for the finishing touches. A bridle arrangement is built on the inside of the structure, 48 feet from the base, to connect the heavy guy wires. This bridle is constructed of 1¼-by 3/16-inch strap iron and fastened to the corner pieces with ¼-inch bolts 3 inches long. It is arranged so that the pull exerted by the guys is distributed by the bridle. This relieves strain on the tower which might be caused by high winds, or heavy snow or sleet.

The guy wires in use at present are No. 6 gauge galvanized iron, each wire being broken in two places by heavy strain insulators of the interlocking "egg" type. All splices and connections of the heavy wire are made by using small cable clamps. The use of these clamps removes the danger of crystallization of the wire which could be caused by bending or improper serving. Two clamps were found to be more than sufficient to hold any splice securely. For guy posts we used four 12-foot street car rails set in 4 feet of concrete. The holes for these rails were dug with a 6-inch posthole digger and less than one sack of cement was required to fill all four holes. The wires were fastened to the rails about 7 feet above the ground. The holes were already drilled in the rails so that simplified matters. These rails were placed at an angle of 90 degrees to, and 40 feet from the tower foundation. The height of the posts not only prevents broken necks but increases the effective

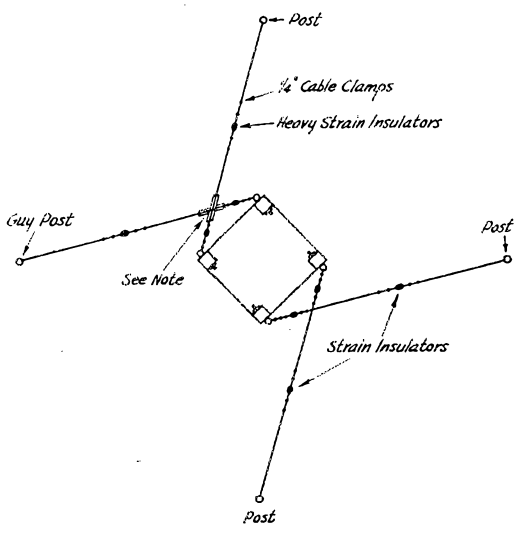
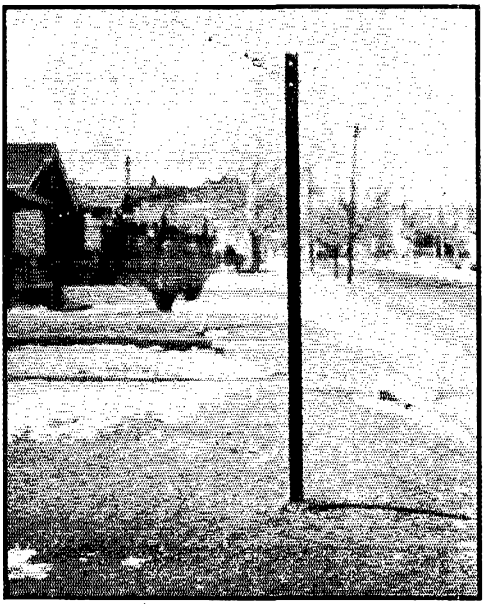


FIG. 5—TOP PLAN SHOWING THE ARRANGEMENT OF GUYS

Note: Receiver noise from guys rubbing together is prevented by insulation of the wires with a piece of hose slid over each wire at the point where they cross.

length of the guy wires themselves, thus assuring a great safety factor. The wires themselves are arranged in a criss-cross manner, as shown in a sketch, so that there would be less twisting or



ANCHOR POSTS FOR GUYS AS DESCRIBED IN THE TEXT

shaking of the tower by wind. A small block and tackle was used to pull them tight. If you cannot obtain a clamp designed for this purpose, a pair of cable clamps and a piece of scrap guy wire can be made to serve the purpose. In the original erection of the tower the guy wires were not placed on the structure until after it had been raised, heavy ropes being used temporarily in place of them. Two sets of weather-proofed halyards were first installed but were removed when we found that the mast was strong enough to climb. To weather-proof the tower it was "soaked" with six gallons of boiled linseed oil.

UP SHE GOES

The stone block for the foundation was made solid and the tower was ready to raise. All the rope we could get hold of was on hand, along with a block and tackle carrying ¾-inch rope. Four ⅜-inch ropes were tied on at the half-way point. These ropes were used to guide the tower on its way up and then to hold it in place until the permanent guys were in place. In tying the rope on to the mast care must be exercised in the way it is placed around the structure or crushing and breaking of the lath may result. It is a good plan to tie the rope around the tower at a point where there is an internal support. The stay rope for the block set should be tied around the mast at a point about sixty feet from the base. The other end of the tackle should be made fast to a pole or some other solid object about seventy feet away from the

(Continued on page 59)

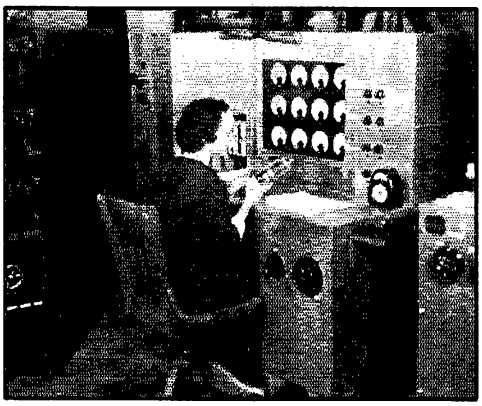
Frank Talk About This Business of Transmitting Tube Ratings

Some of the Why's and Some of the Wherefore's

By E. C. Hughes, Jr.,* W3EHJ

We all know there are so many transmitting tubes that we can't remember their numbers. What a lot of us would like to know is why two tubes that look to be about the same size carry widely different ratings—and, incidentally, how far above the manufacturer's "conservative" rating it's safe to go. Here's one tube builder's answer to these questions.—EDITOR.

THIS article is a discussion of the problems involved in rating transmitting tubes. Therefore, let's be frank in beginning by saying that it may sound to some like an advertisement of one company's method or its engineering staff. However, it is the writer's intention not to preach or advertise, but only to present the facts as he knows them. It is also, at the start, desirable that the author identify himself so that the reader may know his background. Furthermore, he believes that the tube manufacturer, as the one who shares the grief when things go wrong, should speak frankly and at some length regarding the problems of transmitting tube ratings.



MEDIUM-POWER TUBES, SUCH AS THE 803 IN THE YOUNG LADY'S HAND, ARE TESTED IN THIS RACK AT THE RCA TRANSMITTING TUBE PLANT

When yours truly gave up his spark coil in 1921 he had no connection with a tube manufacturer nor did he even suspect that some day he might. As a result he bought four of the then "last-gasp" 202's, tied them in parallel, poured on the coal in the form of raw a.c. and cussed the manufacturer who couldn't build tubes that would stand four times the voltage he said they would. 5AFS, in those days, could often work several stations between tube failures. Since that time a lot of water has gone under the bridge, and I find myself in the position of making tubes rather than ruining them.

Some years back, it looked as though Johnny Q. Amateur was on the way to giving the manufacturer the benefit of the doubt and, out of courtesy to his imbecilic ravings, taking tube ratings seriously. Recently, however, there has been another epidemic of tube-icide. You see, some optimists have been telling us how we could slip a kilowatt into a '99 and still look like sissies to those who really knew how to operate tubes. All of which has inspired me to attempt this piece, thus sticking my neck out for the rest of the fraternity to take cracks at it. Well, here goes:

HEAT

Heat is probably the greatest limiting factor in transmitting tube ratings. Heat is the result of losses in the tube. First, we have a hot filament or cathode giving off heat which can only be dissipated by the exterior surface of the tube. Then we have heat developed by other power losses in the tube. We all know that we can put so much power into a given tube and take so much out, but that we never can take as much power out as we put in. What we can't take out is lost power and this lost power shows up in the form of heat.

If you could refrigerate to a low temperature every part of a given tube except the electron emitter, it is safe to say that this tube's ratings could be doubled, trebled, or even quadrupled, just so long as there is enough electron emission to furnish the extra power you are pulling out. Unfortunately, it isn't practical to refrigerate a tube. As a result, as the power is increased the added losses which show up in heat mean higher temperatures, and these mean all sorts of difficulties. Let's look at a few.

While one doesn't usually think of the struc-

* Manager, Amateur Radio Section, RCA Manufacturing Company, Inc., Camden, N. J.

tural materials used in tubes as possible emitters of electrons, every metal, as well as the glass, in a tube is a potential source of electrons should the material be raised to a sufficiently high temperature. Accordingly, excess heat is dangerous in that it raises the temperature of such parts as grids, supporting structure, and plates to very high temperatures, which may result in primary emission. Emission from anything but the cathode is usually bad business, since tubes have a habit of resenting the assumption by certain parts of functions which rightly belong to others.

Materials inside the tube also have the annoying habit of releasing gas should the temperatures become excessive. No amount of pumping, bombarding, or getter will prevent gas evolution under overload conditions. Gas can be evolved from the bulb, plate, insulating spacers or other structural parts inside the tube.

Another cute trick occurs when positive ions are released by overload conditions from some tube part. These are attracted to the filament like flies to molasses. Unfortunately, the ions arrive at higher speeds than any fly ever achieved and under certain conditions literally dislodge hunks of the emitting surface from the filament or cathode. This treatment isn't conducive to long tube life.

Now don't get the idea that all tubes are alike. Some tubes use materials and have design features which permit them to run at very high temperatures without damage. Other tube types will not stand such temperatures, but that doesn't necessarily mean that the latter tubes are not as useful for their jobs as the others are for their particular applications. Design features, cost, operating characteristics, and the like, are what determine a tube's real worth. But, in general, remember to be a bit shy of operating conditions which cause your tubes to develop quite a fever. Be especially shy of high temperatures when you are trying to prove that the manufacturer doesn't know what his tubes will do. He may have discovered something about that type which you haven't, but shortly will—unless you were born under a lucky star.

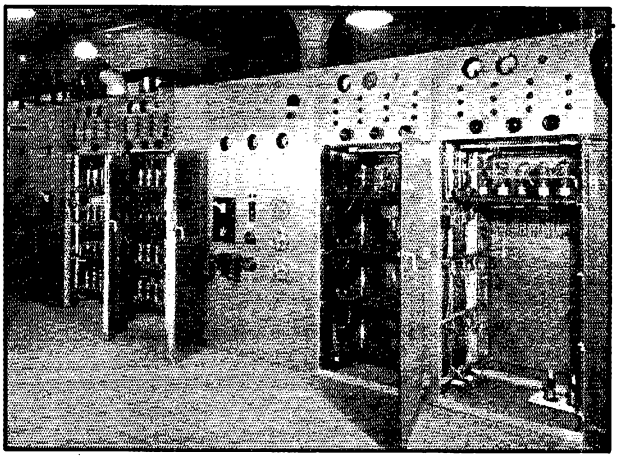
VOLTAGE

I should call plate voltage the next limiting factor in transmitting tube ratings. Excessive plate voltages bring a triple curse.

In the first place, excessive plate voltages usually mean excessive power input, therefore more losses (even though the efficiency may be considerably higher), more heat, and more trouble.

In the second place, excessive plate voltages are likely to break down the insulation between the plate and other electrodes. The results are well known and we need not dwell thereon.

In the third place, excessive voltages may cause excessive electronic bombardment of the bulb, resulting in gas evolution or, as often happens, bulb "suck-ins." This latter effect is particularly prevalent when high-frequency dielectric loss is also present.



PERIODIC CHECKS OF SAMPLES OF ALL TUBE TYPES ARE MADE IN THESE LIFE-TEST RACKS

CURRENT

Plate current, or more properly, total cathode current, is probably the next limiting factor. Like excessive voltage, excessive plate current usually means excessive inputs and excessive losses which, as we have already seen, are detrimental to a tube's disposition. These excessive losses may result in loss of emission from the cathode. Reactivation may or may not restore the lost emission.

OTHER LIMITING FACTORS

While heat, voltage, and current are not the only factors which limit the ratings for a tube, they are for the purposes of this story the most important. Other factors, such as the frequency at which the tube is to be operated, may influence the rating but the troubles they engender usually show up in the form of our regular nemesis—heat.

WHAT RATINGS ARE SUPPOSED TO MEAN

When a reputable manufacturer puts a rating on a tube it means that he has gone to considerable expense in determining that rating in order that you may know how to operate that particular tube at high power and still obtain long, reliable and economical operation. Ratings established with that intent are a protection both to you and to the manufacturer. Ratings which

(Continued on page 104)

How Would You Do It?

Solutions to the Problem of Protection Against Injury from Transmitter High-Voltage Supplies—Announcing the Sixth Contest

JUDGING from the splendid response to Problem No. 4, a good number of the amateur fraternity is alive to the grave dangers lurking behind the innocent-looking transmitter panel. It is admitted that none of the measures suggested will protect the ham who insists on working on the transmitter with the high voltage turned on. Any protective circuit of which we know may be short-circuited or propped open if one is foolish enough to do so. There should be no necessity for working on a transmitter with high voltage applied and, since no one in his right mind would do so, forgetfulness or absentmindedness is responsible for most accidents. It is for this reason that we believe we are justified in eliminating those systems designed for protection which depend solely upon warning signal lights. Signal lights may serve as a reminder for a few days or several weeks but eventually they become a part of the general atmosphere about the transmitter and become practically worthless as a protective device. Several of us have learned this from sad personal experience.

Solutions fell into four or five distinct groups. Some of the contestants may notice that principles presented are identical with their own. In these cases, it should be explained, selection was made of the most complete and best written manuscript. It is interesting to note that the system suggested by the first prize winner is not only the most foolproof but also the simplest. The whole idea is based on the use of push-button type switches which prevent the high voltage from coming on unless the operator not only pushes the button but keeps pushing.

—···—

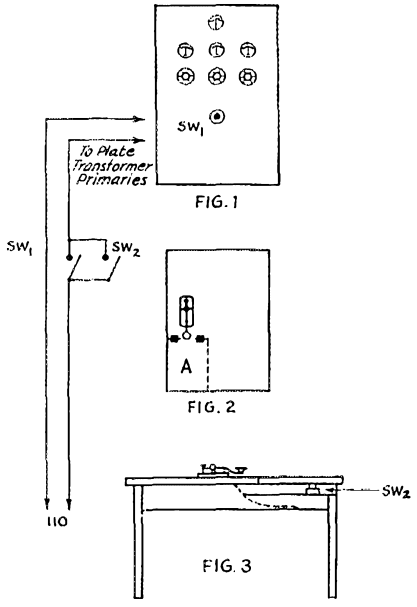
First Prize Solution

By Jennings Chestnut W9LYW[1]

HERE is my solution to problem No. 4. I find that with the use of two switches, I can avoid the danger of being electrocuted when making adjustments on a transmitter.

Fig. 1 shows a transmitter mounted in a relay rack with tuning controls in front. A push-button type of switch is mounted on the front of the transmitter. This switch is connected in series with the primary of the plate transformer. Therefore to tune the transmitter, the push-button must be held closed all the time. But the instant the hand is removed from the button, the plate voltage is cut off. When an adjustment is made behind the panel, the operator knows that the plate voltage is off. After the adjustment is completed, he can walk around to the front of the transmitter, and read the meters which are in full view.

Fig. 2 shows the operating table on which the key is mounted. The section marked A is hinged as shown in Fig. 3 in the cut away view. A second



A SIMPLE SYSTEM WHICH REQUIRES THE OPERATOR TO BE IN A SAFE POSITION BEFORE HIGH VOLTAGE CAN BE APPLIED

push-button switch is mounted under section A. This switch is connected in series with the primary of the plate transformer, and in parallel with the switch on the front of the transmitter. When the operator is ready to transmit, the weight of the arm closes the switch and connects the plate transformer.

Of course, with 'phone a push-to-talk switch on the microphone or a foot-operated switch can be connected instead of the desk switch, and serve the same purpose.

This also makes break-in operation easy, which is very desirable.

[1] Bernstadt, Kentucky.

Second Prize Solution

By Clement Van Velsor, W2HNX[2]

OUR hero need no longer fear that the high voltage may be on, for with the "step-on-it" switch, he cannot get juice even with the main switch closed, so long as he stands near his rig to adjust it.

The sketches of Figs. 4 and 5 show the idea which incorporates small platforms placed close enough to the transmitter, so that the operator must stand upon one of them to get near enough to work. The upper board is about 12 inches wide and of a length equal to that of the side of the transmitter, or the width across the back if that is exposed too. It is ¾ inch thick to adequately support the weight of our hero. The lower board is ¼ inch thick, of the same length as the first one, and about an inch narrower.

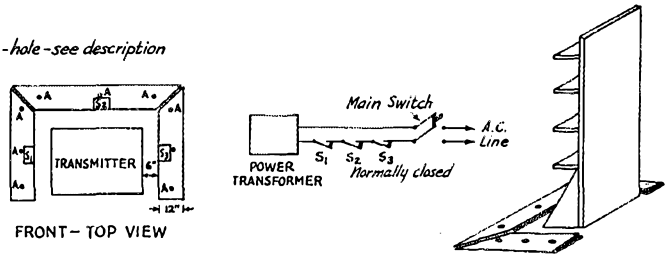


FIG. 4—GENERAL PLAN OF THE "FOOT SWITCH" BARRIER

A brass strip ¾ inch wide and 1/16 inch thick, the length of the boards, is mounted along one edge of the lower board on a number of bushings about ¼-inch high. The edges of the bushings come about ⅛ inch from the edge of the lower board. The brass strip extends over the edge of the board. Soldering lugs are fastened under the bushings, the number and location depending upon where wire connections are made. One is enough if only one switch is used, but if more, then two lugs are necessary.

Heavy compression type springs about ¾ inch long and about the same in diameter are used to keep the switch closed. Two or three per board is enough, depending upon length. Shallow cups like those shown are made in the upper and lower boards so the springs will not slip.

Now two or three strap hinges depending on length of the board are obtained, each about six inches total length. The two boards are fastened together with them as indicated. Holes for fastening the switch to the floor are drilled through both boards when closed, and the upper board holes made larger for the screwdriver to get through.

The springs are placed in position and the boards held closed while the bent brass contact strip (1/16 inch thick, and about six inches long) is fastened to the edge of the upper board as shown, so that when the boards are released, the springs will cause the contact strips to make contact with the bottoms of the brass strips. One or two lugs for soldering are fastened under the brass piece depending on where the wires are run to.

It is advisable to make connections before the switch is fastened to the floor to allow more room to work in. Then, with the whole assembly placed about six inches from the transmitter and parallel to it, it is screwed to the floor, putting the screwdriver through the upper board holes. The two boards cannot be spread apart when the brass pieces are assembled.

If more than one board is used, then all connections are in series, so that stepping on any one will break the contact.

By placing the boards six inches from the transmitter, our hero can stand just about near enough to adjust the rig. Standing within six inches is mighty uncomfortable. Switches are only necessary in front of exposed sides. As the front panel should be "dead," no switch is needed.

The springs should be heavy enough to make good contact in the switch, but not so heavy our hero's weight will not readily press the board down and break the circuit. So as long as he is on the switch, voltage cannot be applied to the transmitters since the switch is in series with the main switch or line.

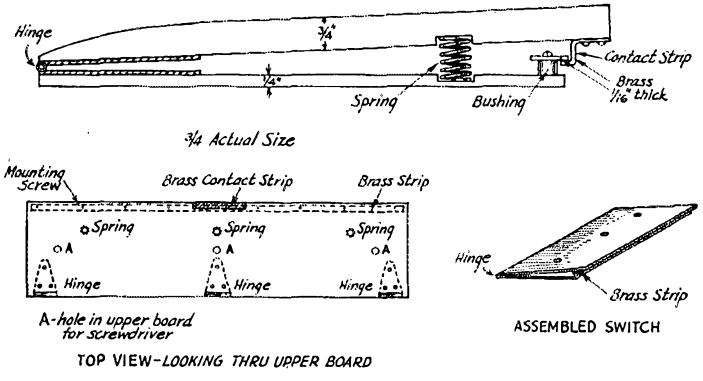


FIG. 5—CONSTRUCTIONAL DETAILS OF THE PLATFORM SWITCHES

[2] 1033 Sanford Ave., Irvington, N. J.

The main advantage of the switch is that it is out of the way, and not cluttering up useful space. It is easily moved and positive in action.

—•••—

Another simple system is suggested by H. E. Rice, Jr., W9YZH. The essentials are shown in Fig. 6. A rope barrier surrounds the transmitter. Any pressure applied against the rope automatically opens the primary circuit of the high voltage transformers. The pulleys are mounted on posts set in the floor on either side of the transmitter

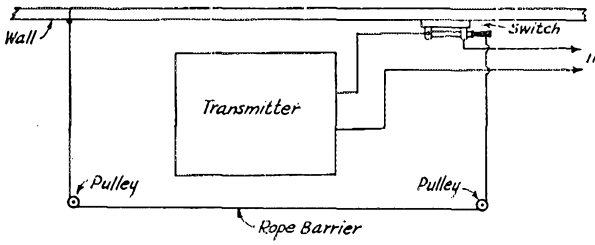


FIG. 6—THE ROPE OR LAMP CORD BARRIER

panel. In his application of this system, Mr. Rice uses a permanent brass rail for the front portion of the barrier. Two flexible electric cords in the line to the plate transformers form the two side sections. Plugs and receptacles are fitted to each end of each of these sections of cord so that the plugs are pulled out by a pressure against the cords.

—•••—

Problem No. 6

NOW that the transmitter is almost finished, our hero is planning a new antenna system. He will require, amongst other things, a new 50-foot mast in the back yard. The mast simply must be a clean and neat-looking affair with an absolute minimum of guy wires, but it must also be capable of taking a beating from the occasional violent winds. Our friend cannot help thinking that, with all the thousands of masts that have been put up by hams during the last twenty years, someone, somewhere, must have come pretty close to the ideal design and be willing to offer the details. The mast must be reasonably inexpensive to build and it must be so arranged that a whole army is not required to erect it. It is not essential that the design submitted has actually been erected but, naturally, special consideration will be given to descriptions of existing masts which have shown their ability to stay put.

Complete drawings with constructional details and dimensions are required.

Several contestants submitted various forms of the "door interlock" protective system in which the transmitter is entirely enclosed in a cabinet. Access to the inside of the transmitter is gained only through doors in the side or rear of the cabinet. Each door is equipped with a switch which opens the plate transformer primary circuit or a relay circuit whenever one of the doors is opened. An example of the correct method of installing such a system is described by Hammond Mathews, W9JRM. The circuit is shown in Fig. 7. The opening of any door of the enclosure will automatically open not only the primary circuit of the high voltage transformer but also the circuit including the holding coil of the magnetic switch so that it will not be possible to close the primary circuit again until all doors have been closed and the operator has returned to the operating position and pushed the starting switch.

We should like to mention in addition the very complete papers by J. B. Carter on a capacitative relay system, by G. P. Stout, W3FVF on a photoelectric relay system and by Mr. L. C. Waller on methods of protection by high voltage isolation and insulation. While these systems are most interesting and novel, we believe them to be somewhat too complicated for general amateur acceptance at the present time. We hope to be able to include these papers in a future presentation.

We should also like to thank the following for their interest in submitting various ideas, many of which were excellent:

(Continued on page 78)

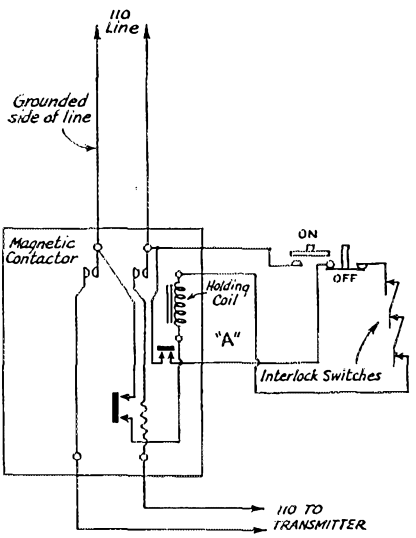


FIG. 7—THE CIRCUIT FOR A TRUE INTERLOCKING PROTECTIVE SYSTEM

What the League Is Doing

League Activities, Washington Notes, Board Actions—For Your Information

The Board Meets

The Federal Communications Commission was requested to change the 'phone portion of the 10-meter band to read 28,500-30,000 kc.; no changes were asked in 4-Mc. and 14-Mc. 'phone. A non-political group to study allocations within the amateur structure on an engineering basis, and a better planned use of bands, was created. A detailed plan for the recognition and coördination of amateur communication in times of emergency was forwarded to the F.C.C. Warner and Segal were ordered to the Cairo conference, with instructions to pursue as aggressive a position as possible without endangering present frequencies. They are also to attend the regional conference at Habana in November, with some interesting matters at issue. The headquarters office was continued at West Hartford; erection of the new memorial station, W1AW, will now proceed apace. Important new regulations tightening the requirements for eligibility to the Board and to the office of S.C.M. were adopted. Membership referenda were voted down. A national convention for 1938 was authorized.

These were the highlights in the fifteen-hour 1937 annual meeting of the A.R.R.L. Board of Directors at Hartford in early May. Every division of the League was represented. Keeping its nose strictly at its work, the Board waded through five busy sessions in two days, recessing only to have its meals in an adjoining room. By the time it had finished, every problem of the League that any director could think of was taken up and dissected, new orders issued.

Under the able chairmanship of Dr. Woodruff, the fourteen divisional directors, the Canadian General Manager and the Vice-President assembled, together with the other officers of the League, the General Counsel, Assistant Secretary, and an expert technical adviser. The Board received reports from its officers and committees, examined the work of the Executive Committee and its own informal actions in the past year, then heard detailed reports from every director, and thus spread before itself a foundation of detailed information on which to base its subsequent examination of a large number of League matters.

OPERATING MATTERS

The recurrent question of 'phone allocations was again before the Board but it was decided to leave these allocations in the 4-Mc. and 14-Mc. bands in their present status. However, everyone has known that something ought to be done about the 28-Mc. band, and by a unanimous vote the Board requested the F.C.C. to enlarge and to shift that 'phone allocation to the upper three-quarters of the band, retaining 28-28.5 Mc. exclusively for c.w.

The Board suggested to the Commission the desirability of rearranging its licensing structure to provide that 'phone may not be operated on frequencies below 56 Mc. until after a year of c.w. experience. That is what the Board would like to see but it is a complex subject, involving fundamentals of Commission policy and either a rather thoroughgoing rearrangement of all of its classes of amateur licenses or the addition of a fourth class and a new examination for it. Rather than a firm recommendation for a specified change in regulations, then, the matter goes to the Commission as a general suggestion. It is felt that such an expression of fundamental policy on the Board's part can aid the Commission in formulating its basic attitudes and possibly lead to simplifying the distinctions between classes of licenses.

We all are aware of the need to do something to consolidate our position as the chief handlers of emergency communications. Recent emergencies have shown the need for better coördination. A plan drafted by the Communications Manager was endorsed in its entirety by the Board and transmitted to the Commission with a request for enactment. Briefly, it calls for the selection of amateur coördinators, for the coöperation of F.C.C. in confining restricting orders to major emergencies and then only to the areas necessary, as determined in consultation with the League; for the creation of emergency calling and listening sub-bands of 25 kc. on the edges of certain low-frequency bands, with five minutes of each hour specified for mandatory listening for weak isolated stations. A complete structure for amateur emergency work is included, which it is believed fits in with the Commission's general plans for coördinating emergency communication, and which will be presented in detail in *QST* as soon as possible.

In recognition of the great possibilities that lie in planning the use of our bands and arranging our sub-allocations on an engineering basis, the Communications Manager was directed to centralize a study on this subject and report to the Board next year, having as his collaborators skilled amateurs drawn from different parts of

the country and representative of different types of amateur work, chosen with the advice of the division directors—and with the results digested with the aid of *QST*'s technical editors. Great hopes are held for the possibilities of such a study conducted in an engineering atmosphere.

INTERNATIONAL MATTERS

The Secretary and General Counsel were selected to represent the League at the Cairo conference to review the radio regulations. Their instructions are to pursue as aggressive an attitude on amateur frequencies as is possible without endangering our present assignment. The Board of course opposes all of the proposals to restrict us, notably wishing the power of amateur stations to be set by each administration as at present. While the League is concerned primarily with W/VE amateurs, its representatives will lend every possible aid to the interests of European amateurs whose low-frequency assignments are in a special table for the European region. Warner and Segal may be absent from the country five months on this mission.

The same two men are to represent us at Habana in November where a Pan-American regional conference is to be held. The general question of all the amateur frequencies in the Americas is at issue there. There is also a proposal by the Latin-American countries to permit amateur 'phone between 7 and 7.1 Mc. Our Board is opposed to any 'phone in this band but feels that, if the countries to the south of us insist upon some such 'phone, it is much better to concentrate it in a limited portion of the band than to permit it to be spread at will through the band as is now unfortunately the practice. The Board also hopes that agreement may be had at Habana to permit amateurs of all the countries in the Americas to interchange third-party messages of the type that would not normally go by a paid service, and the government of the United States has been requested to propose this.

ADMINISTRATIVE MATTERS

Candidates for S.C.M. hereafter will have to have been licensed amateurs at least two years and League members at least one year before nomination. Candidates for director will have had to be both licensed amateurs and League members for at least four years before nomination. Moreover, by an amendment to by-laws, the Board specified in much greater detail than heretofore the requirements for eligibility, making plain its intention to exclude from eligibility to the Board any candidate whose business connections are of such nature that he could gain financially through improper actions or through the exploitation of his office. This is no change in principle but it will have the practical effect of a considerable tightening of the requirements.

Names on ballots for S.C.M. and director hereafter will be listed alphabetically, rather than in order of the number of nominating petitions received, and some of the folderol is eliminated. When a director is being elected to fill a vacancy, if the remaining term is less than a year in length, the election will be both for that remainder and for the next regular term of two years.

The Board accepted the recommendation of its committee on the location of headquarters, ordering that the headquarters remain at West Hartford. Many plans that have been held in abeyance for this decision will now go forward. Work will start at once on the Maxim Memorial station, W1AW, which is to have 1 kw. transmitters on three bands. The Board instructed that, to the extent feasible, the new station be equipped with directive antennas, to lay down the maximum signal to the west. The Secretary was authorized to conclude a lease on the present headquarters building which will give the League a great increase in space, occupying the entire building. New facilities for the editorial department will shortly be provided, notably providing greatly increased space for workshop and laboratory. Some interesting shop and experimental programs have had to be held up for lack of room but will now shortly be under way.

The Board authorized a national convention for 1938, its regular 1938 meeting to be held at the same time and place. A proposal for membership referenda on problems before the Board was voted down. Cordial thanks were expressed to the Standard Frequency Stations and to the QSL Managers for their labors. The QSL Managers are to be supplied with cards to send to amateurs for whom QSL's are on hand, presumably nonmembers, in extension of this A.R.R.L. service to amateurs. Hereafter when members pay their dues they may obtain a membership card instead of a membership certificate, if they so prefer and specify. (Not both, however, and not for those who already have certificates—not until their dues are again payable. Announcement will be made when the cards are available.)

The Board decided that every licensed amateur ought to be a member of the League, and the directors themselves propose to sponsor this increase in membership. To this end, a committee of their own number is being appointed to study ways and means to make membership more attractive, to point out its advantages, and to increase fraternalism. Several ideas were referred to this committee for study. It is an important step.

South Carolina was transferred from the Southeastern to the Roanoke Division and is made a separate section, with an election for S.C.M. now announced. This will bring the number of S.C.M.'s to seventy.

Considerable study was given the subject of b.c.l. interference. Recognizing inadequate receiver design as the chief cause of complaints, the

Board endorsed a resolution originally drafted at a division convention, bringing this matter to the attention of the Radio Manufacturers Association and asking their coöperation. A *QST* article was asked, showing amateurs how a shift in frequency will frequently escape the interference caused by these inadequate receivers by overcoming the bum geometry of their i.f. stages. *QST* articles were also asked in analysis of the present amateur bands and how they came to be; and on an idea for the international subdivision amongst amateurs of the 7-Mc. band, now under study in the I.A.R.U. *QST* departments for A.A.R.S. and N.C.R. news were offered.

The Board appropriated money for its own meeting and for the division administrative expenses of directors the next year and a half, likewise for the international conferences that have to be attended and for several minor purposes. Total appropriations aggregated over $18,000. In two years the Board has appropriated $35,000 for numerous special projects, an index to the scope and variety of the work which A.R.R.L. is carrying on for its members.

We have had only a brief time to prepare this account, while the presses wait to carry it to you in June *QST*. Obviously we have hit only the high places. *QST* in months to come will uncover many of the details. Meanwhile here are the minutes themselves, well worth your careful reading.

Minutes of 1937 Annual Meeting of Board of Directors, American Radio Relay League

May 7–8, 1937

IN compliance with the Constitution and responsive to due notice, the Board of Directors of the American Radio Relay League, Inc., convened in regular annual meeting at The Hartford Club, Hartford, Conn., on May 7, 1937. The meeting was called to order by Dr. Eugene C. Woodruff, president, at 10:05 A.M., d.s.t. The roll was called, showing the following directors present:

Eugene C. Woodruff, President
George W. Bailey, Vice-President
Alex Reid, Canadian General Manager
Bennett R. Adams, Jr., Southeastern Division
E. Ray Arledge, Delta Division
Charles E. Blalack, Southwestern Division
Hugh L. Caveness, Roanoke Division
J. L. McCargar, alternate for S. G. Culver, Pacific Division
Ralph J. Gibbons, Northwestern Division
Wayland M. Groves, West Gulf Division
Kenneth T. Hill, Hudson Division
Carl L. Jabs, Dakota Division
W. Bradley Martin, Atlantic Division
R. H. G. Mathews, Central Division
Percy C. Noble, New England Division
Floyd E. Norwine, Midwest Division
Edward C. Stockman, Rocky Mountain Division

Thus all divisions were represented. There were also present Secretary K. B. Warner, Treasurer A. A. Hebert, Communications Manager F. E. Handy, General Counsel Paul M. Segal, Assistant Secretary A. L. Budlong and, as technical adviser to the Board, George Grammer, Assistant Technical Editor of *QST*.

On motion of Mr. Gibbons, after discussion, the minutes of the 1936 annual meeting of the Board of Directors were approved in the form in which they were issued by the Secretary.

On motion of Mr. Hill, unanimously VOTED that the annual reports of the officers to the Board of Directors are accepted and the same placed on file.

On motion of Mr. Arledge, unanimously VOTED that all acts performed and all things done by the Executive Committee since the last meeting of the Board, and by it reported to the Board, are ratified and confirmed by the Board as the actions of the Board. Mr. Martin requested to be recorded as objecting to the manner in which the Executive Committee picked the A.R.R.L. nominee for the Paley Award.

On motion of Mr. Blalack, unanimously VOTED that the Board, having considered its mail vote in which it rejected the supplementary report of its Cairo Committee dated July 7, 1936, in favor of filing a minority report in the United States preparatory committees preparing for the Cairo conference, pressing the endeavor to secure more frequencies, and having examined the same, now ratifies the vote taken and decides to take this action as of August 6, 1936. And on the further motion of Mr. Blalack, unanimously VOTED that the Board, having considered its mail vote on the question of withdrawing its 1936 request to the Federal Communications Commission for an expansion of the 4-Mc. 'phone allocation to read 3850–4000 kc. and refraining from appearing at the hearing thereon ordered for October 20, 1936, and having examined the same, now ratifies the vote taken and decides to take this action as of August 7, 1936.

Mr. Reid presented his report as Canadian General Manager. In turn, every division director rendered a report on conditions in his division, Mr. McCargar presenting the report of Mr. Culver.

On motion of Mr. Bailey, unanimously VOTED that the sum of three thousand dollars ($3,000.00) is hereby appropriated from the surplus of the League, as of this date, for the purpose of defraying the expenses of holding this meeting of the Board of Directors, any unexpended remainder of this sum to be restored to surplus.

On motion of Mr. Blalack, unanimously VOTED that the sum of one hundred eleven dollars and sixty-eight cents ($111.68) is hereby appropriated from the surplus of the League, as of this date, for the defraying of the expenses of the Cairo Committee of the A.R.R.L. Board in excess of the amount heretofore appropriated.

On the question of deficiency appropriations for directors who had contracted expenses in excess of their appropriations for administrative expenses, after discussion, moved, by Mr. Norwine, that the Midwest Division Director be required to refund the amount expended in excess of his appropriation. But there was no second, so the motion was lost. After further discussion, on motion of Mr. Mathews, unanimously VOTED that there is hereby appropriated from the surplus of the League, as of this date, the sum of twenty-three dollars and forty-three cents ($23.43) on account of the director of the Midwest Division, and the sum of seventeen dollars and thirty-nine cents ($17.39) on account of the director of the Southwestern Division, and the sum of nine dollars and fifty-one cents ($9.51) on account of the director of the Rocky Mountain Division, for the defraying of division administrative expenses in the preceding year in excess of the amounts heretofore appropriated for their respective uses. At the suggestion of Mr. Blalack, without dissent, it was decided to make future appropriations for the administrative expenses of directors on the basis of the calendar year.

On the question of matters concerning the American regional conference to be held at Habana in November, 1937: On motion of Mr. Jabs, unanimously VOTED that the Secretary is instructed to be present at the said conference, in representation of the interests of amateurs, and that there is hereby appropriated from the surplus of the League, as of this date, the sum of five hundred dollars ($500.00) for the purpose of defraying his expenses, any unexpended remainder of the same to be restored to surplus. On the

question of policy towards the Cuban proposal on the agenda of this conference that the frequencies 7000–7100 kc. be opened to 'phone operation in the Latin-American countries, moved, by Mr. Norwine, that the Board opposes this proposal. But, after discussion, with unanimous consent, Mr. Norwine withdrew the motion. After further discussion, on motion of Mr. Norwine, unanimously RESOLVED that, while the Board is opposed to any telephone operation in the range 7–7.3 Mc., it recognizes the right of Latin-American countries to permit their amateur licensees to use telephone and therefore suggests that if such telephone operation must be permitted in the Latin-American countries, it be confined to a range of 100 kilocycles. Digressing to a discussion of the desirability of a better appreciation by amateurs of the reasons behind their frequency assignments, on motion of Mr. Mathews, after discussion, unanimously VOTED that the Editor of *QST* is instructed to prepare an article to be included in a future issue of *QST*, giving the history of amateur frequency allotments and the reasons behind them, together with details on the coming Cairo conference and our connection with it, the attitude of foreign countries toward amateur frequencies, the importance of their votes, etc., for the purpose of creating a better understanding and better feeling of confidence among both members and non-members of the League; draft of the said article to be submitted to the Board of Directors for approval before publication. On motion of Mr. McCargar, unanimously VOTED that the League requests the Department of State to propose the addition to the Habana agenda of the question of a uniform special arrangement in the Americas permitting the international handling of third-party traffic by amateurs.

On motion of Mr. Bailey, VOTED that the question of selecting and instructing representatives to the Cairo conference is made a special order for the first item of business the following day; that the proposal of a continuing advisory technical council for allocation studies and a planned use of bands is to be examined before questions of 'phone allocation are considered by the Board; that the Board now proceeds to an examination of the Secretary's proposal to carry the *QST* goodwill item on the books of the League at a nominal $1, and that the Board then recesses for luncheon.

Officers' Reports Available to Members

In April of each year the officers of the League make comprehensive written reports to the Board of Directors. The Board of Directors has made these reports available to the membership of the League. Interested members may obtain copies postpaid at the estimated cost price of 50 cents per copy. Address the Secretary at West Hartford.

On motion of Mr. Blalack, unanimously VOTED that the Secretary is authorized to carry the item of goodwill and copyrights of the *QST* magazine, on the books of the League, in the amount of one dollar ($1).

The Board recessed for luncheon at 12:39 P.M., reconvening at 2:17 P.M. with all directors and other persons hereinbefore mentioned in attendance.

On the question of the desirability of establishing a continuing advisory technical council for allocation studies and a planned use of bands, after discussion, moved, by Mr. Blalack, that Mr. Bailey be appointed chairman and Mr. Handy one member of such a council, they in turn to secure names of two additional potential members, one from the midwest and one from the far west, and submit the same to the Board for voting. After further discussion, with unanimous consent, Mr. Blalack withdrew the motion. On motion of Mr. Mathews, unanimously VOTED that the Chairman is requested to appoint a committee representing opposing opinions on the subject to present to the Board to-morrow morning a plan on the composition of such a council, said committee to contain the Secretary as one of its members. The Chairman thereupon appointed Directors Reid, Martin and Blalack and Communications Manager Handy and Secretary Warner as the members of the said committee.

On the question of 'phone allocation matters:

On motion of Mr. Blalack, after extended discussion, unanimously VOTED that the Board requests the Federal Communications Commission to amend the regulations governing the 28,000–30,000 kc. band in such manner that 28,000–28,500 kc. will be assigned exclusively to c.w. operation and 28,500–30,000 kc. will be assigned jointly to 'phone and c.w. operation.

Moved, by Mr. Martin, that the Board make no request at this time of the Federal Communications Commission for increasing the 3900–4000 kc. 'phone assignment. In the course of an extended and spirited discussion, moved, by Mr. Arledge, that the motion be amended to add the words "as a temporary policy, until the advisory technical council studies and reports on the question." But, after further discussion, the said motion for amendment was rejected. The question being on the adoption of the original motion, the yeas and nays were ordered at the request of Mr. Gibbons and the said question was decided in the affirmative: whole number of votes cast, 15; necessary for adoption, 8; yeas, 11, nays, 4. Those who voted in the affirmative are Messrs. Adams, Arledge, Blalack, Caveness, McCargar, Martin, Mathews, Noble, Norwine, Stockman and Bailey; those who voted opposed are Messrs. Gibbons, Groves, Hill and Jabs; abstentions, Mr. Reid. So it was decided to make no request of the Commission concerning this band.

Moved, by Mr. Martin, that the Board make no request of the Federal Communications Commission at this time concerning expanding the 14-Mc. 'phone allocation. After discussion, the yeas and nays again being ordered at the request of Mr. Groves, the said question was decided in the affirmative: whole number of votes cast, 15; necessary for adoption, 8; yeas, 13; nays, 2. Those who voted in the affirmative are Messrs. Adams, Arledge, Blalack, Caveness, McCargar, Hill, Jabs, Martin, Mathews, Noble, Norwine, Stockman and Bailey; those who voted opposed are Messrs. Gibbons and Groves; abstentions, Mr. Reid. So it was decided to make no request of the F.C.C. concerning this band.

On the question of the desirability of providing for membership referenda, moved, by Mr. Mathews, that By-Law 43 be amended by adding thereto the following wording:

> "If, and only if, after the taking of a regular vote by the Board of Directors, it is found that eight of the Board have voted as a minority, then those eight by their unanimous vote may have the right of causing the subject of such original vote to be submitted as a general membership referendum. The results of such a referendum shall be segregated by Divisions and if the majority of the votes in any Division are contrary to the original vote of the director on the submitted subject, then his vote shall be changed, and a new vote of the directors on such subject recorded accordingly."

After extended discussion, the yeas and nays being ordered, the said subject was decided in the negative: whole number of votes cast, 16; necessary for adoption, 11; yeas, 7; nays, 9. Those who voted in the affirmative are Messrs. Adams, Arledge, McCargar, Jabs, Mathews, Noble and Stockman; those who voted opposed are Messrs. Blalack, Caveness, Gibbons, Groves, Hill, Martin, Norwine, Reid and Bailey. So the motion was rejected.

On motion of Mr. Arledge, unanimously VOTED that the report of the committee on the location of the headquarters is accepted and placed on file. Proceeding to a consideration thereof, moved, by Mr. Bailey, that the headquarters remain at West Hartford, Conn. After extended discussion, the yeas and nays being ordered at the request of Mr. Blalack, the said question was decided in the affirmative: whole number of votes cast, 16; necessary for adoption, 9; yeas, 13;

nays, 3. Those who voted in the affirmative are Messrs. Adams, Arledge, Caveness, Gibbons, Groves, Hill, Martin, Mathews, Noble, Norwine, Reid, Stockman, Bailey; those who voted opposed are Messrs. Blalack, McCargar and Jabs. So the motion was adopted. On motion of Mr. Martin, unanimously VOTED that the Board expresses its thanks to the members of the Committee for their work.

On the desirability of amending the by-laws governing the filling of vacancies on the Board of Directors, moved, by Mr. Groves, that By-Laws 21 and 31 be amended by the addition to each of the following sentences:

"If the unexpired remainder of the term to be filled is one year or more, the election shall be for the remainder of the term. But if the unexpired remainder of the term to be filled is less than one year, then the election shall be for such remainder plus the next regular term of two years."

The yeas and nays being ordered, the said question was decided in the affirmative: whole number of votes cast, 16; necessary for adoption, 11; yeas, 16; nays, 0. Every director voted in the affirmative. So the by-laws were amended as proposed.

On motion of Mr. Gibbons, the Board, by unanimous vote, extended a cordial expression of its thanks and appreciation to the QSL Managers and to the Standard Frequency Stations for their splendid services to amateur radio.

On the desirability of making appropriations for the administrative expenses of territorial directors on the basis of calendar years, on motion of Mr. Bailey, unanimously VOTED that there is hereby allocated to each division director of the League and to the Canadian General Manager the sums appearing opposite their respective names, for legitimate A.R.R.L. administrative expenses in their respective areas during the periods stated:

	Remainder of 1937	*Calendar Year 1938*
Canadian Gen'l Manager	$ 200.00	$ 250.00
Atlantic Div'n Director	100.00	200.00
Central Div'n Director	200.00	300.00
Dakota Div'n Director	125.00	200.00
Delta Div'n Director	125.00	200.00
Hudson Div'n Director	150.00	200.00
Midwest Div'n Director	150.00	225.00
New England Div'n Director	150.00	200.00
Northwestern Div'n Director	150.00	250.00
Pacific Div'n Director	125.00	250.00
Roanoke Div'n Director	125.00	200.00
Rocky Mountain Div'n Director	125.00	200.00
Southeastern Div'n Director	100.00	200.00
Southwestern Div'n Director	150.00	250.00
West Gulf Div'n Director	175.00	250.00
	$2150.00	$3375.00

and that there is hereby appropriated from the surplus of the League, as of this date, the sum of two thousand one hundred fifty dollars ($2,150.00) for the purpose of defraying these expenses during the remainder of the calendar year 1937, any unexpended remainders of these funds at the end of the year 1937 to be restored to surplus; and that there is hereby appropriated from the surplus of the League, as of January 1, 1938, the sum of three thousand three hundred seventy-five dollars ($3,375.00) for the purpose of defraying the disbursements authorized for the calendar year 1938, any unexpended remainders of these funds at the end of the year 1938 to be restored to surplus.

The Board recessed for dinner at 6:38 p.m., reconvening at 8:29 p.m. with all directors and other persons hereinbefore mentioned in attendance.

On motion of Mr. Caveness, after discussion, VOTED that the Secretary is authorized to execute a lease in the name of the League with the owners of the property at 38 LaSalle Road, West Hartford, Conn., providing for the use of the entire premises as the headquarters of the League for a period of five years at an annual rental of $4,200, heat included; the arrangement to provide that the owners of the building are to lay suitable flooring on the ground floor, install necessary additional doors and windows and overhead lights, repair the roof and north walls of the building, install a second pump in the cellar, enter into a contract with a reliable heating expert for the maintenance of the heating system, grant the League the right to sublet space if desired, and keep the premises in reasonable repair, including repainting; partitioning of the ground floor into offices to be done at the League's expense. Mr. Gibbons asked to be recorded as voting opposed.

On motion of Mr. Caveness, the Board adjourned at 8:56 p.m., under order to reconvene at the same place at 10:00 a.m. on the morrow. The Board reassembled at the same place on May 8, 1937, and was called to order by Chairman Woodruff at 10:10 a.m. with all directors and other persons hereinbefore mentioned in attendance.

Pursuant to special order, the Board addressed itself to matters concerning the Cairo conference. Moved, by Mr. Caveness, that Secretary Warner and General Counsel Segal be the League's representatives to the Cairo conference. After discussion, on motion of Mr. Bailey, further discussion of the matter was postponed until 11:00 o'clock.

Mr. Reid, on behalf of the committee appointed the preceding day, made the following report:

"Your committee, after consideration, decides to recommend against the formation at this time of a continuing advisory technical committee, but recommends that, as an initial test of the potentialities of the idea, the Communications Manager be requested to co-ordinate a study of this general nature and to incorporate the results of the same in his next annual report to the Board. To this end we recommend that the Board request the Communications Manager to form a group of collaborators chosen jointly by himself and the division directors of the League, such as skilled individual amateurs of diverse amateur interests or the affiliated clubs, or both, explaining to them the desirability of planning the future use of our bands along engineering lines as discussed in the conversations at this year's Board meeting and soliciting their suggestions, the Communications Manager then digesting the available ideas with the aid of the technical editors of *QST;* and endeavoring to find the common points of agreement and in general pursuing the study to the point where it becomes evident whether the idea has large future value or not. At the same time, and as a further test of the amateur reaction to ideas of this nature, the committee recommends that the Secretary be requested to publish in *QST* the proposal for the international subdivision of the 7-Mc. band currently being voted upon in the I.A.R.U. at the motion of the French amateur society."

After discussion, on motion of Mr. Gibbons, voted that the Board accepts and adopts the foregoing report.

Eleven o'clock having arrived, the Board resumed consideration of Cairo representation and policies. In response to an inquiry as to the basis on which his services might be available to the League at Cairo, Mr. Segal stated that he was not keen to go but would if the Board insisted upon it, on the same basis as his Madrid representation of the League, namely, $40 per day but not to exceed a maximum of $3,000. After discussion, the question being on the adoption of Mr. Caveness' motion that Secretary Warner and General Counsel Segal be the League's representatives at Cairo, the yeas and nays were ordered at the request of Mr. Reid, resulting in the adoption of the said motion: whole number of votes cast, 13; necessary for adoption, 7; yeas, 7; nays, 6. Those who voted in the affirmative are Messrs. Arledge, Caveness, Groves, Hill, Martin, Reid and Bailey; those who voted opposed are Messrs. Adams, Blalack, McCargar, Gibbons, Jabs and Noble; abstentions, Messrs. Mathews, Norwine and Stockman. After further discussion, on motion of Mr. Caveness, unanimously VOTED that, inasmuch as Mr. Segal has requested that he be considered only as a last resort and has requested discussions of others first, the subject be now reconsidered to permit those discussions.

Moved, by Mr. Caveness, that Secretary Warner be one of the League's representatives to the Cairo conference. The yeas and nays being ordered at the request of Mr. McCargar, the said question was decided in the affirmative: whole number of votes cast, 16; necessary for adoption, 9; yeas, 15; nays, 1. Those who voted in the affirmative are Messrs. Adams, Arledge, Blalack, Caveness, Gibbons, Groves, Hill, Jabs, Martin, Mathews, Noble, Norwine, Reid, Stockman

and Bailey; Mr. McCargar voted opposed. So Secretary Warner was named as one of the representatives.

After further discussion of other representatives, moved, by Mr. Caveness, that the choice of the second representative be left to the Executive Committee. But there was no second, so the motion was lost. Moved, by Mr. Reid, that Vice-President George W. Bailey be named as the second representative. But Mr. Bailey regretted his unavailability, there was no second, and the motion was lost. Moved, by Mr. Blalack, that the Executive Committee be requested to select a list of candidates for the second member of the League's representation, submitting their qualifications to the directors for a choice by mail. But the said motion was rejected. After further discussion, on motion of Mr. Gibbons, VOTED that General Counsel Segal is selected as a member of the A.R.R.L. delegation to the Cairo conference. Messrs. Jabs, Mathews and Noble requested to be recorded as voting opposed to this motion. Moved, by Mr. Gibbons, that the League delegation to the Cairo conference consist of three members. But the said motion was rejected, 6 votes in favor to 8 opposed. So the League representation to the Cairo conference consists of Secretary Warner and General Counsel Segal.

The Board being advised that General Counsel Segal intended to attend the Habana conference in November at his own initiative, on motion of Mr. Mathews, VOTED that General Counsel Segal is appointed one of the representatives of the League to this conference, to assist Secretary Warner, at no expense to the League. On motion of Mr. Blalack, unanimously VOTED that the Board expresses its appreciation to Mr. Segal for his kind willingness to assist.

On motion of Mr. Caveness, unanimously VOTED that the sum of nine thousand dollars ($9,000.00) is hereby appropriated from the surplus of the League, as of this date, for the purpose of defraying the expenses of the representation of the League at the conference in Cairo in 1938, any unexpended remainder of this sum to be restored to surplus.

On motion of Mr. Martin, VOTED that the Board instructs its representatives to the Cairo conference to assume as aggressive an attitude for the acquiring of additional frequencies as possible under circumstances without endangering the present frequencies and regulations. Mr. Gibbons requested to be recorded as voting opposed. It was further agreed to be the policy of the Board to uphold the right of each administration to fix the power limitations of its amateur stations, to seek the continued admittance of the I.A.R.U. in the meetings of the C.C.I.R., and to give at Cairo such assistance as is possible in the matter of the lower-frequency assignments of European amateurs who operate under a special arrangement for the European region.

On the question of the desirability of making certain recommendations to the Federal Communications Commission concerning emergency work by amateurs, the Board entered upon an extensive discussion. Mr. Martin read and filed a letter on the subject from the Washington Radio Club. The Board recessed for luncheon at 12:54 p.m., reconvening at 2:22 p.m. with all directors in attendance and all other persons hereinbefore mentioned except General Counsel Segal. After further discussion, on motion of Mr. Mathews, unanimously VOTED that the Board concurs in the recommendations made in Communications Manager Handy's annual report to the Board and that the appropriate officers of the League are instructed to transmit to and pursue these matters before the Federal Communications Commission.

As to amending the Constitution & By-Laws concerning the eligibility of candidates for Director and Section Communications Manager:

Moved, by Mr. Hill, that a new by-law be adopted, to follow By-Law 9 and to be known temporarily as By-Law 9a, as follows:

"9a. Any candidate for the office of Section Communications Manager shall have been both a member of the League for a continuous term of at least one year and a licensed radio amateur operator for at least two years preceding receipt of his petition of nomination."

The yeas and nays being ordered, the said question was decided in the affirmative: whole number of votes cast, 16; necessary for adoption, 11; yeas, 15; nays, 1. Those who voted in the affirmative are Messrs. Adams, Arledge, Blalack, Caveness, McCargar, Gibbons, Groves, Hill, Martin, Mathews, Noble, Norwine, Reid, Stockman and Bailey; Mr. Jabs voted opposed. So the new by-law was adopted. Mr. Segal here joined the meeting at 2:30 p.m.

Moved, by Mr. Hill, that Section 2 of Article IV of the Constitution be amended to read as follows:

"2. No person who is commercially engaged in the manufacture, selling or renting of radio apparatus normally capable of being used in amateur radio communication or experimentation shall be eligible to membership on the Board of Directors; nor shall any person who is commercially engaged in the publication of radio literature intended, in whole or in part, for consumption by licensed radio amateurs. The Board of Directors shall from time to time stipulate in the by-laws annexed to this constitution such regulations as they deem desirable for determining the eligibility or ineligibility of candidates for director. Directors shall serve without compensation from the League for services in any capacity."

On motion of Mr. Norwine, unanimously VOTED to amend the proposed text by striking out the word "amateur" where it appears as the twenty-second word thereof. The question then being on the adoption of the amended motion, the yeas and nays were ordered, and the said question was decided in the affirmative: whole number of votes cast, 16; necessary for adoption, 12; yeas, 16; nays, 0. Every director voted in the affirmative. So the amended text was adopted.

Moved, by Mr. Hill, that a new by-law be adopted, to be inserted immediately under the sub-head "Directors" and to be known temporarily as By-Law 10a, reading as follows:

"10a. Any candidate for the office of director shall have been both a member of the League and a licensed radio amateur operator for a continuous term of at least four years preceding the receipt by the Secretary of his petition of nomination, as hereinafter provided. It is further declared to be the policy of the League to exclude from eligibility to the Board of Directors any candidate whose business connections are of such nature that he could gain financially through the shaping of the affairs of the League by the Board of Directors or by the improper exploitation of his office for the furtherance of his own aims. The primary test of a candidate's eligibility shall be his freedom from commercial connections of such nature that his selfish influence in the affairs of the League could result in his pecuniary benefit. The following types of candidates are hereby declared, amongst others, to be ineligible:

(a) Any person commercially engaged in the manufacture, sale or rental of radio apparatus reasonably capable of being employed in radio communication or experimentation or television or facsimile operation, whether such person is engaged as owner, principal or employee.

(b) Any person commercially engaged, whether as owner, principal or employee, in the publication of radio literature, whether periodicals or text books, entered into for profit and intended, either wholly or in part, for consumption by radio amateurs.

(c) Any commercial user of *QST* advertising space.

(d) Any person commercially engaged, whether as owner, principal or employee, in the manufacture or selling to radio amateurs of station supplies such as log books, QSL cards, message blanks, maps and reproductions of calls.

(e) Any person commercially engaged as an owner or a principal of a broadcasting station or a group of such stations, or associated as a principal with an enterprise controlling a broadcasting station.

(f) Any person employed in radio work in any capacity wherein he participates in shaping the radio affairs of his enterprise, by a public-service communications company or by any other agency making use of radio frequencies which is, or is reasonably capable of becoming, a competitor with amateur radio for the allocation or use of radio frequencies.

The following types of persons are, amongst others, declared to be eligible:

(a') Operators and engineers of broadcasting stations who have no stock interest therein.

(b') Radio operators and other employees of commercial public-service communications enterprises and of other radio operating agencies whose business connection with such activities is of such nature that they have no participation in shaping the radio policies thereof.

(c') Persons owning not over five per cent of the capital stock of an enterprise commercially engaged in the manufacture or sale of radio apparatus, or commercially engaged in public-service communication by radio, or commercially engaged in radio broadcasting; provided that such person has no other connection with the management of such enterprise than his possession of minority stock interest therein.

No person serving on the Board of Directors is to be deemed in violation of these by-laws if, subsequent to his election, he engages in the publication of a divisional A.R.R.L. paper or magazine not organized for profit and no portion of the net income of which inures to his benefit."

At this point Messrs. Gibbons and Segal retired from the meeting. The yeas and nays being ordered, the said question was decided in the affirmative: whole number of votes cast, 14; necessary for adoption, 10; yeas, 14; nays, 0. Those who voted in the affirmative are Messrs. Arledge, Blalack, Caveness, McCargar, Groves, Hill, Jabs, Martin, Mathews, Noble, Norwine, Reid, Stockman and Bailey; abstentions, Mr. Adams; absent, Mr. Gibbons. So the new by-law was adopted.

Moved, by Mr. Hill, that the second sentence of By-Law 18 be amended to read:

"The remaining names shall be listed on a ballot, in alphabetical order."

The yeas and nays being ordered, the said question was decided in the affirmative: whole number of votes cast, 15; necessary for adoption, 10; yeas, 15; nays, 0. Every director present voted in the affirmative. So By-Law 18 was amended.

Moved, by Mr. Hill, that the sixth sentence of By-Law 9 be amended to read as follows:

"The candidates' names shall appear on the ballots in alphabetical order."

The yeas and nays being ordered, the said question was decided in the affirmative: whole number of votes cast, 15; necessary for adoption, 12; yeas, 15; nays, 0. Every director present voted in the affirmative. So By-Law 9 was amended.

Moved, by Mr. Adams, that By-Law 5 (a) be amended to delete the words "South Carolina" under the tabulation of territory in the Southeastern Division and to add the words "South Carolina" under the tabulation of territory constituting the Roanoke Division. The yeas and nays being ordered, the said question was decided in the affirmative: whole number of votes cast, 15; necessary for adoption, 12; yeas, 15; nays, 0. Every director present voted in the affirmative. So By-Law 5 (a) was amended.

On motion of Mr. Mathews, unanimously VOTED that the group being formed by Communications Manager Handy for studies of allocation and a planned use of bands is requested to examine the desirability of requesting the Federal Communications Commission to amend its amateur regulations to require that amateur 'phone transmitters shall not have an emission band in excess of four kilocycles width.

On motion of Mr. Mathews, after extended discussion, VOTED without dissent that the Board makes the suggestion to the Federal Communications Commission that a change be made in the requirements for new licenses for amateur operation, requiring that prior to approval of 'phone license applications on frequencies below 56 Mc., the applicant be required to have held for at least one year a license for the operation of a c.w. transmitter. Messrs. Adams and Reid requested to be recorded as not voting on the foregoing.

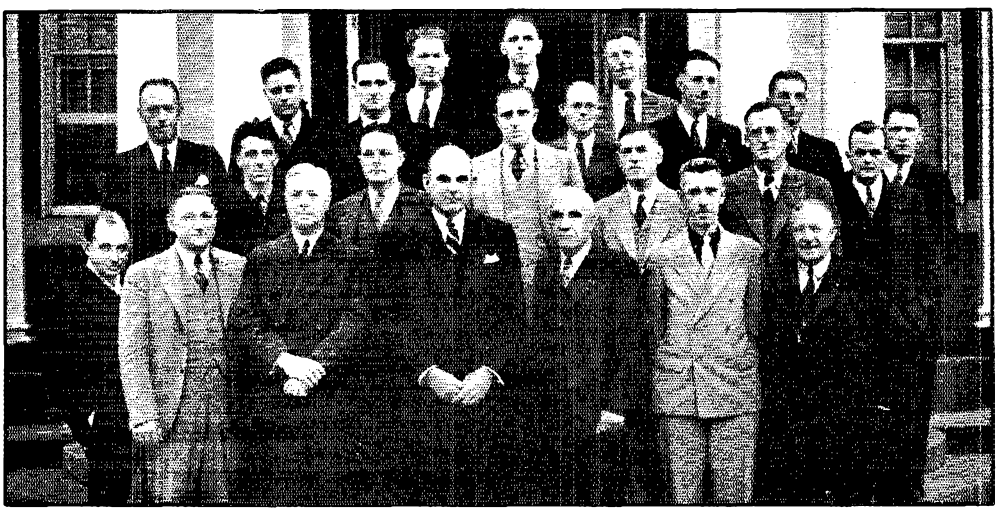
On motion of Mr. Mathews, VOTED that a national convention of the American Radio Relay League shall be held at a suitably designated spot during 1938.

On motion of Mr. Martin, after discussion, unanimously VOTED that, in view of the fact that many directors have expressed a feeling that it would be highly desirable to increase the membership of the League, such endeavor shall be sponsored by the Board of Directors.

On motion of Mr. McCargar, after discussion, unanimously VOTED that the Board endorses as its viewpoint the following resolution adopted at the 1936 annual Pacific Division convention and transmits the same to the Radio Manufacturers Association:

"TO THE RADIO MANUFACTURERS ASSOCIATION:

"WHEREAS the amateur fraternity is receiving the brunt of the adverse criticism in connection with broadcast interference complaints to the Federal Communications Commission, and



THE DIRECTORS AND OFFICERS OF THE LEAGUE
At the annual meeting at the Hartford Club in Hartford, May seventh

"WHEREAS most of the complaints received are from broadcast listeners using small midget superheterodyne receivers which have flooded the market in the past few years, and

"WHEREAS the present state of the radio art is such that present design practice being employed by manufacturers of small sets is wholly indefensible,

"THEREFORE be it resolved that we, the members of the American Radio Relay League, here in convention assembled, petition the Radio Manufacturers Association to establish a higher standard of requirements in the design of midget broadcast receivers which will preclude the pick-up of radio interference from other services which are operating in compliance with good engineering practices."

Moved, by Mr. McCargar, that all headquarters' expenses and salaries be submitted to the Board of Directors in budget form for approval at the annual meeting. But, after discussion, the said motion was rejected.

Moved, by Mr. McCargar, that the annual reports of the officers to the directors be made available to the Section Communications Managers and to the members before the Board meeting in order to allow members to make known to their director before the meeting their ideas and wishes regarding these reports. But, after discussion, the said motion was rejected.

Moved, by Mr. McCargar, that Secretary Warner's salary be reduced to $7,500 per annum and that the sum of $4,500 be applied to further representation at Washington. But the said motion was rejected.

Moved, by Mr. McCargar, that Secretary Warner's duties be limited to that of Editor of *QST* and that someone else take over all duties that have to deal with representation, the work of secretary, and League general managership. But the said motion was rejected.

Moved, by Mr. McCargar, that a periodical in draft form be sent to directors, S.C.M.'s and affiliated club secretaries containing information about the League doings and that on request of two hundred League members any subject must be presented for discussion therein. But the said motion was rejected.

Moved, by Mr. McCargar, that the American Radio Relay League adopt as fundamental that the operation of transmitters by private citizens, under reasonable regulation, is a constitutional right; and further that the General Counsel be requested to draw up a resolution embodying this idea for action by this Board, and that copies of the resolution be forwarded to the Federal Communications Commission. But there was no second, so the motion was lost.

Moved, by Mr. McCargar, that the membership of the American Radio Relay League be organized into local chapters and that a committee be appointed from among the present Board to work out details of such organization. But the said motion was rejected.

On motion of Mr. Norwine, and by unanimous vote, affiliation was granted the following societies:

Colorado University Radio Club.....Boulder, Colo.
Wheeling Radio Club.....Wheeling, W. Va.
Palomar Radio Club. Northern San Diego County, Calif.

On motion of Mr. Norwine, unanimously VOTED that the affiliation of the following clubs is regretfully terminated for non-compliance with the regulations of the League, the League being willing to reinstate them if and when they comply with these regulations:

Seminole Radio Club.....Jacksonville, Fla.
Virginia Polytechnic Institute Short Wave Club
Blacksburg, Va.
Montachusetts Radio Research Communications Ass'n
Fitchburg, Mass.
Butte Radio Club.....Butte, Montana
N.T.A.C. Radio Club.....Arlington, Texas
Fall River Amateur Radio Club.....Fall River, Mass.
San Isabel Radio Club.....Pueblo, Colorado

On motion of Mr. Norwine, unanimously VOTED that the President is requested to appoint a committee to consider ways and means of making membership more desirable, both from the standpoint of advantages and fraternalism.

On motion of Mr. Norwine, unanimously VOTED that membership cards, in lieu of membership certificates, are made available to members upon request at the time of paying their dues.

Moved, by Mr. Bailey, that the Board request the Federal Communications Commission to extend into the range 56–56.3 Mc. the regulatory restrictions as to stability and quality of signal now provided for in the range 28–30 Mc. After discussion, and in view of the recommendation of the technical adviser, unanimous consent being given, Mr. Bailey withdrew the motion.

On motion of Mr. Jabs, unanimously VOTED that the Editor of *QST* is requested to present in *QST* an article on broadcast receiver design, explaining the processes of reception and calling the attention of amateurs to the manner in which b.c.l. interference with local broadcast stations arises, and means for eliminating it.

On motion of Mr. Blalack, VOTED that the 1938 annual meeting of the Board of Directors shall be held at the same time and place as the national convention.

On motion of Mr. Noble, after extended discussion, VOTED that the Editor of *QST* is directed to make available at least one page of each issue of *QST* for Army-Amateur Radio System activities and that one page be made available for the Naval Communications Reserve, details to be arranged by headquarters.

On motion of Mr. Arledge, after discussion, unanimously VOTED that the sum of one hundred dollars ($100.00) is hereby appropriated from the surplus of the League, as of this date, to provide printed postal cards for the use of the QSL Managers in notifying amateurs of cards held on hand for them.

In response to inquiries, the President stated that work on the new headquarters station would now go forward at once.

On motion of Mr. Arledge, after discussion, VOTED that the committee to be appointed by the President to consider ways and means of making League membership more desirable, is requested to examine the desirability of the League paying the expenses for an annual meeting of Section Communications Managers in their respective divisions at any point they may select, preferably at the division conventions.

On motion of Mr. Jabs, unanimously VOTED that the Board requests the installation, to the extent feasible, of directional antennas at the headquarters station, in order to provide better coverage to the western portion of the country.

On motion of Mr. Caveness, the Board adjourned, sine die, at 6:52 p.m.

(In the course of its deliberations the Board also discussed, without formal action, classifications of amateur licenses, television, beginners' literature, the design of broadcast receivers from the interference standpoint, American Morse code, Army and Navy liaisons. Total time in session, 14 hours, 36 minutes. Total appropriations, $18,287.01.)

K. B. Warner

Secretary

A 500-Watt 14- and 28-Mc. Amplifier

Novel Constructional Methods for Accessibility and Performance

By James Millen,* W1HRX

IN MOST descriptions of r.f. amplifiers that have appeared in the past, it has generally been customary to stress primarily the circuit details and then, possibly to some extent, trick layouts making possible short leads. Mechanical and structural design both of the piece of gear as a whole, as well as of such minor details as brackets, coil and condenser mountings, etc., have largely been ignored. Feeling that it really takes no more time to do a good mechanical job in the first place than the more usual rag-time one, it is the particular intent herewith to illustrate and comment upon the mechanical rather than the electrical design features of a moderate-power r.f. final amplifier recently designed for use with a companion exciter unit[1] to form a complete one-half kilowatt 'phone transmitter. Consequently, we will use more than the customary number of photographic illustrations and devote less space to circuit comments and description. Particularly interesting should be the views taken prior to wiring and panel mounting.

In Fig. 1 is shown the front view of the complete transmitter. The entire r.f. section is contained in the two upper panels, the lower of which is the exciter unit already described. The top panel is the combination buffer-final stage unit to be the subject of this paper. The other units in sequence are: the 838 Class-B modulator stage; the Collins "7-C" speech amplifier; the 1000-volt power supply, using two 866 rectifiers, for the Class-B modulator, and, finally, the 3000-volt power supply, using four 866's in a bridge circuit, for the final r.f. stage. Inasmuch as these units are, with the exception of the Class-B modulator and the 3000-volt power supply, standard commercial units re-mounted on rack panels, and as the Class-B modulator and the high-voltage power supply are quite conventional in both mechanical and electrical design, they will not be further commented upon.

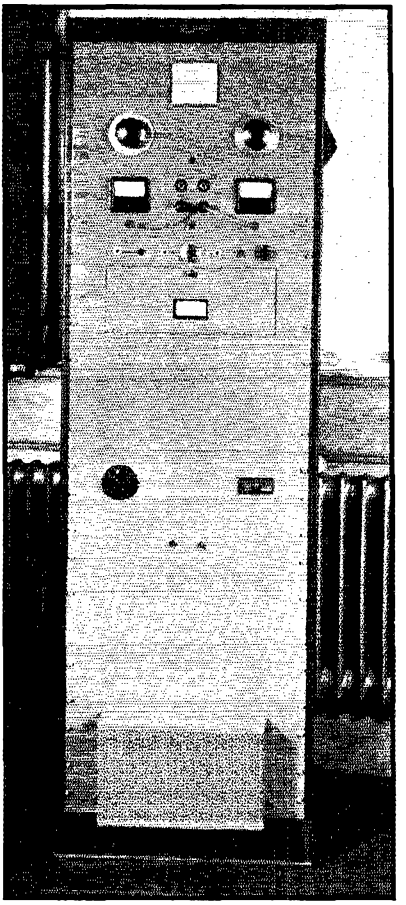


FIG. 1—PANEL VIEW OF THE COMPLETE 500-WATT TRANSMITTER

The final amplifier and its driver occupy the top panel of the rack.

THE CIRCUIT

The output from the exciter is ample to drive a high-μ triode of the 35T, 808, or RK-37 variety, consequently one of these triodes (RK-37) is used for the buffer stage. In addition to the small size of the tube itself, it has the added advantage of requiring a relatively low value of neutralizing capacity (3.5 $\mu\mu$fd.), making possible the use of the compact NC-800 type condenser, shown in the illustrations. The buffer stage in turn drives the final amplifier, employing a pair of RK-38 high-μ triodes in push-pull.

Coupling between the exciter unit and this amplifier unit is by means of a low-impedance link circuit with a pre-tuned plug-in tank circuit, mounted adjacent to the buffer tube on the amplifier chassis.

BAND SHIFTING

In shifting from one band to another, it is merely necessary to plug in the proper pre-tuned input tank circuit unit for the particular band desired (assuming, of course, that the exciter output has been shifted to the proper band, as previously described) and the input and output plug-in coils of the final stage. The coils shown in the transmitter in the illustrations are for the 28-

* Middleton, Mass.

[1] James Millen, "A Universal Exciter with Variable Frequency Crystal Control," May, 1937, *QST*.

Mc. 'phone band, upon which band this particular transmitter has been primarily operated this past winter.

DESIGN AND CONSTRUCTION NOTES

The three main points kept in mind in arriving at the mechanical design were:

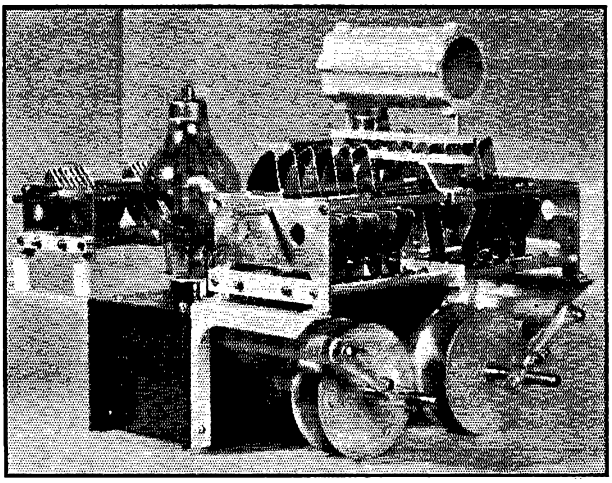


FIG. 2—SIDE VIEW OF THE CHASSIS BEFORE WIRING
Accessibility of all parts is a feature of this type of construction.

1. Efficient electrical layout (short leads, symmetrical arrangement of push-pull circuit components, etc.).
2. Compactness.
3. Economical use of component parts.
4. Freedom from likelihood of mechanical or electrical failure.

Structurally, the transmitter is built around the central steel chassis or U-frame, under which is mounted the filament transformer and the RK-38 sockets, and to the sides of which are attached the aluminum brackets carrying the relatively lightweight r.f. components, such as the two variable condensers, the neutralizing condensers, input tank circuit, and the buffer tube socket. This chassis unit is illustrated in Figs. 2 and 3, without wiring and without mounting of the front panel, in order to illustrate the simplicity and neatness of this type of construction.

Perhaps at this time it may be well to point out some of the constructional details that contribute much to the neat final appearance of the complete unit. Most prominent in this connection are, of course, the aluminum brackets carrying the variable condensers; actually, it takes very little, if any, more labor on the part of the constructor to form-up the type of brackets shown from sheet aluminum in an ordinary vise, than it does to bend up strip stock in the more normal manner. The round holes cut in the two rear brackets add much to the appearance and little to the labor, as holes of this size are very easily cut in aluminum with an ordinary trepanning tool or fly-cutter. Just to illustrate another type of bracket construction that is quite easily made and equally neat in appearance, we used for the front condenser mounting a slightly different form of bracket, made from sheet aluminum and shown very clearly in Fig. 2.

In order to bring the control shafts of the two condensers in line with symmetrical panel arrangement of the dials and without having the bracket extend above the main chassis level, four GS-1 standoff insulators were used minus their regular bases, for mounting the inter-stage tuning condenser. This also permitted the frame of that particular condenser to be operated above ground electrically, which is considered quite safe practice in this instance inasmuch as the plate voltage used on the RK-37 is only 1000, and not the 3000 of the final, and especially inasmuch as the metal shell of the type "O" National dial, used for tuning this condenser, is unusually well insulated from the shaft by means of a large bakelite bushing molded as an integral part of the knob. The only precaution necessary is to have ample clearance in the hole provided in the front panel for passage of the condenser shaft.

By mounting the filament transformer in the manner shown, not only is its relatively heavy

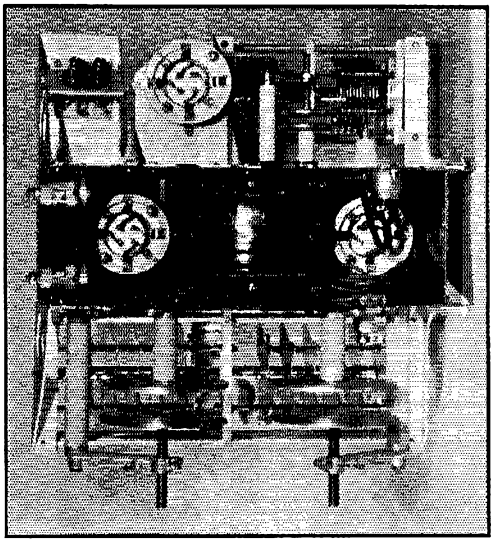


FIG. 3—THE FILAMENT TRANSFORMER IS MOUNTED UNDER THE CENTRAL CHASSIS
A bottom view of the driver-amplifier unit.

weight supported by the strongest part of the chassis, but extremely short leads also result. The a.c. input to this transformer is through the special receptacle recessed in the side of the chassis. Such an arrangement makes it possible to remove the entire amplifier from the relay rack at any time merely by pulling a few plugs, inasmuch as the r.f. input circuit is also fed through the G.R. plug-type terminals.

In addition to the symmetry of layout of the push-pull stage, which is so desirable for easy neutralization, the neutralizing condensers have also been mounted with a view to ease of access of adjustment for facilitating the original tuning of the transmitter. As can be seen from the photographs, the adjusting screws on all neutralizing condensers are readily accessible from the side of the transmitter. They are also placed so as to eliminate the necessity for mounting brackets.

Fig. 3 also shows an interesting and highly practical use of standard stand-off insulators as high frequency bushings by mounting them behind rather than on front of metal panels. The two at the back of the chassis are for the high voltage power-supply connections to the two stages, while the ones on the side are for the high voltage leads to the tank coils.

The two RK-38 sockets on the main chassis are mounted underneath, with just part of their shells protruding, so as to eliminate the necessity for bushings and holes through the chassis in order to make connections to the socket terminals.

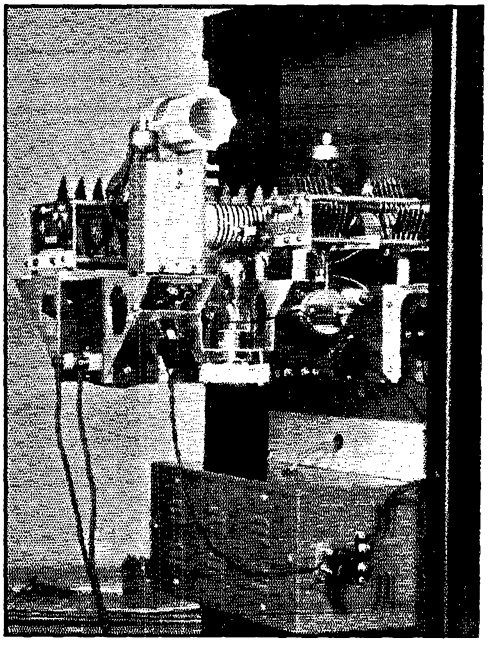


FIG. 5—COMPLETELY WIRED AND MOUNTED IN PLACE IN THE TRANSMITTER

The coils shown are for 28-Mc. work. Terminals are easy to reach.

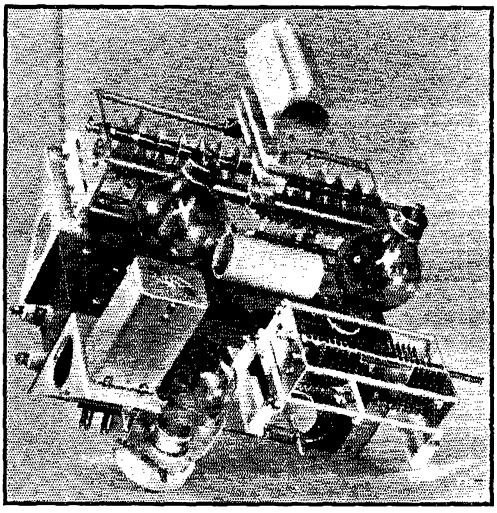


FIG. 4—A VIEW FROM THE OTHER SIDE, SHOWING COIL FORMS IN PLACE

Note the mounting for the driver tube.

The final r.f. tank coil is mounted by means of standard, commercially available, brackets designed especially for the purpose, upon the frame of the final tank tuning condenser. Such an arrangement, again is neat in appearance, requires no special effort on the part of the constructor, provides a symmetrical push-pull circuit arrangement, and results in short leads.

The terminal strip, located alongside the a.c. filament transformer input socket, is for easy connection to the relay or switches used for controlling the transmitter. When building any piece of equipment necessitating the use of switches, we have found it extremely convenient to incorporate, in the original design, terminals of this type across all panel switches, or in series with the primaries of all power transformers. If not required, they need not be used; when it is desired,

COIL DATA

L_1—28 Mc., 2 turns; 14 Mc., 3 turns; both No. 24 d.s.c. wire.
L_2—28 Mc., 5 turns; 14 Mc., 10 turns; No. 20 enameled, spaced 20 turns per inch.
L_4—28 Mc., 6 turns No. 16, 2½ turns per inch, c.t.
14 Mc., 16 turns No. 14 enameled, 6 turns per inch, c.t.
L_5—28 Mc., 5 turns No. 16, interwound with L_4.
14 Mc., 13 turns No. 14, 5 turns per inch.
L_8—28 Mc., 4 turns No. 10 enameled, 4 turns per inch.
14 Mc., 12 turns No. 10 enameled, 7 turns per inch.

Note: L_1 and L_2 wound on 1-inch diameter forms (in FXTB unit).
L_4 and L_5—wound on 1¾-inch diameter Isolantite forms (National UR-13 unit).
L_8 wound on ceramic form 2½ inches in diameter (National UR-10A unit).

however, to control any piece of equipment from other than the panel switch, it is of inestimable convenience to be able to run a pair of leads directly to such a terminal, rather than to dismantle half the transmitter in order to get at the leads of a switch or the primary connections on a "buried" filament or power transformer.

For reasons of economy, only two meters are employed; one is a grid milliammeter and the other is a plate milliammeter. By means of jacks and plugs, they may be used in either stage. Jacks are mounted on a bakelite sub-panel set well behind the main front panel so as to eliminate danger of anyone's coming accidentally in contact with the mounting bushings which, of course, in the case of the plate jacks, are at high voltage. The usual type round-shell 'phone plugs are amply long for easy insertion in jacks mounted some distance behind the panel in this manner.

The chassis unit just described is mounted directly to the aluminum front panel. Aluminum, rather than Masonite or other such composition, is used for the front panel because of the strength required for carrying a relatively heavy unsupported chassis without warpage, as well as for its electro-static shielding value.

The panels of all the units of this particular transmitter have been finished in the new light-gray lacquer now being so much used for commercial communication equipment. This new finish has a decided advantage over the older black finishes in that it reflects considerable light and makes much easier the wiring and working in what might otherwise be rather dark corners. The standard black relay rack sets off the gray panels in very attractive fashion.

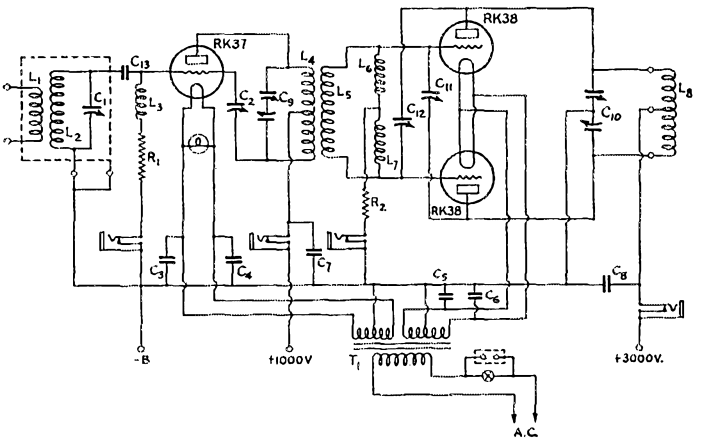
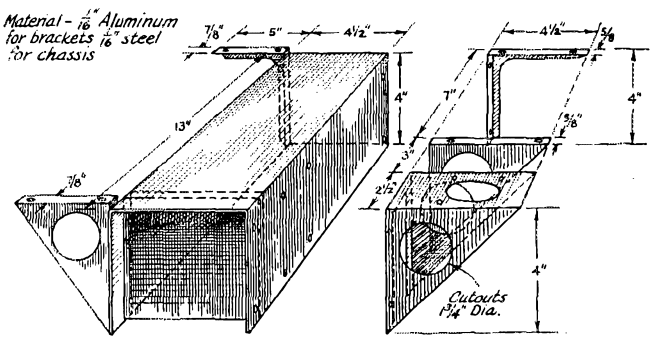


FIG. 6—CIRCUIT DIAGRAM OF THE 20-10-METER DRIVER-AMPLIFIER

C_1—50-μμfd. variable (National FXTB, units connected in parallel).
C_2—Neutralizing condenser (National NC-800).
C_3, C_4, C_5, C_6—0.01-μfd. mica (Aerovox).
C_9—Split-stator, 100 μμfd. per section, 0.077-inch airgap (National TMC-100D).
C_{10}—Split-stator, 40 μμfd. per section, 0.359-inch airgap (National TMA-40DC).
C_{11}, C_{12}—Neutralizing condensers (National NC-150).
R_1—20,000 ohms, 2 watts.
R_2—12,000 ohms, 10 watts.
T_1—Filament transformer, 5 volts, 16 amps., and 7.5 volts, 3.25 amps.
L_3, L_6, L_7—Short-wave chokes (National R-100).



CHASSIS—VIEWED FROM BACK

FIG. 7—DETAILS OF THE CHASSIS AND MOUNTING BRACKETS

Strays

More support for that cartoon on page 84 of January, 1936, *QST:* W1IXB sends in a clipping from a Boston paper reporting a two-way contact between 7.5-meter police stations in Hull, Mass., and Beverly Hills, Cal. This is probably the first instance of an actual DX QSO between two police stations on such a short wave length.

Some Practical Receiver Kinks for the Man Who Builds His Own

By Yardley Beers* W3AWH

DESPITE the wide-spread use of manufactured receivers, there are still a great many amateurs who like to do their own constructing. For this reason, the following modifications, made to two of the most popular of home-built receiver designs, should be of interest.

COMBINED AUTODYNE RECEIVER AND PRE-SELECTOR

In the past *QST* has carried a number of articles dealing with converting an autodyne receiver into a pre-selector for a superheterodyne. Unfortunately, to convert back to a receiver requires the complete reverse process, which involves considerable work with a soldering iron in the vital parts of the apparatus. This state of affairs does not permit one to use the apparatus for a portable or emergency work or as an auxiliary receiver at such times as N.C.R. drills, when it is convenient to have two receivers to guard two frequencies simultaneously—except by submission to the above-mentioned inconvenience.

In Fig. 1 is shown a circuit which will enable one to change from one use to the other with about as little trouble as is ordinarily undergone in changing coils. This circuit is an adaptation of the popular *QST* two-tube receiver described on page 119 of the *Handbook* (1937 edition), but the same method can be applied to any receiver employing a screen-grid or r.f. pentode detector.

In addition to the originally specified components, there are needed two more fixed condensers (C_9 and C_{10}), a 300-ohm resistor (R_7), a second r.f. choke (National Type 100), and a second six-prong tube socket. R_7 and C_{10} serve as a fixed bias circuit for the pre-selector. Parallel feed is to be preferred for the plate of the pre-selector, for there is a possibility of shorting the "B" supply in making improper connections to the binding posts of the output circuit, if series feed is used. All other symbols and components are the same as given in the *Handbook*.

For use as an autodyne receiver, a 57, 58, 6C6 or 6D6 tube is placed in the V_1 socket, and the circuit behaves in normal fashion. For use as a pre-selector, the tube is removed from the V_1 socket and placed in the V_2 socket. The grid leak R_1 should then be short-circuited, which can be done in a number of ways. Probably the most convenient is to mount a midget knife switch directly on the condenser and grid leak. However, the reader is warned that there is apt to be leakage across the insulation usually furnished with these switches. If the grid leak is of the type which slips into clips mounted on the condenser, an odd pigtail resistor can be obtained from the junk box and, with the pigtails soldered together, can be slipped into the clips in place of the grid leak. Of course the job also can be done with a piece of bare wire.

While the apparatus is being used as a pre-selector, the audio tube is obviously not in use

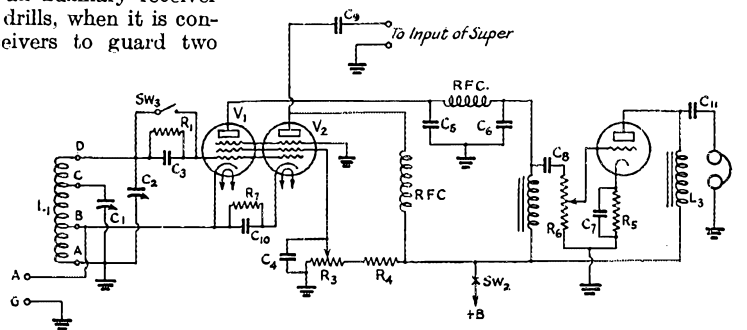


FIG. 1—COMBINED AUTODYNE RECEIVER AND PRE-SELECTOR

C_9—100 μμfd. or larger.
C_{10}—250 μμfd.
C_{11}—1 μfd.
R_6—500,000-ohm potentiometer.
R_7—300 ohms.
L_3—A.f. choke, at least 30 henrys.
SW_3—See text.
All other components same as in Fig. 707, p. 119, The Radio Amateur's Handbook, 1937 Edition.

and can be removed from its socket. From experience, I have found that the 58 or 6D6 is much superior to the 57 or 6C6 as a pre-selector tube, while the 57 or 6C6 is somewhat to be preferred as detector. (NOTE.—there are never tubes in both the V_1 and V_2 sockets at the same time.)

The pre-selector shown in the diagram is regenerative, which gives a considerable improvement in amplification and selectivity over a non-regenerative one. However, if a non-regenerative pre-selector is desired, it can be had by

* 900 West State St., Trenton, N. J.

connecting the V_2 cathode terminal to ground through R_7 and C_{10}, and by supplying the screen-grid voltage through a suitable fixed tap on a separate voltage divider.

It should be remarked in passing that the author has also made two slight alterations in the a.f. stage from the original *QST* circuit. First, an a.f. volume control R_6, which has proved to be a great convenience, has been installed. Secondly, it has been the general policy at this station to equip all a.f. output circuits with parallel feed, not only to prevent shock to the operator and damage to the headphones by the large d.c. currents, but also, since one side of the 'phones is grounded, to simplify the switching from one receiver to another. The output coupling circuit in this case consists of the choke L_8 and condenser C_{11}.

In spite of the number of extra parts, it was found possible with a little planning to get everything into the same type of cabinet as specified in the original *QST* article (National C-SRR, but not factory-drilled) without undue crowding.

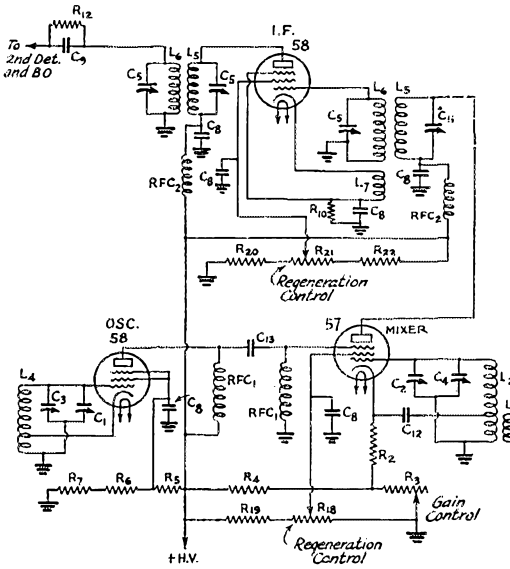


FIG. 2—MODIFIED REGENERATIVE S.S. SUPER DIAGRAM

C_{12}—0.002 μfd.
C_{13}—0.006 μfd.
R_{18}—50,000-ohm potentiometer.
R_{19}—30,000-ohm, 2-watt.
R_{20}—20,000-ohm, 2-watt.
R_{21}—25,000-ohm potentiometer.
R_{22}—20,000-ohm, 2-watt.
All other components same as in Fig. 2, p. 10, April, 1933, QST.

IMPROVING REGENERATIVE I.F. STABILITY

While the regenerative i.f. superheterodyne is not quite the equal of the crystal-filter type in selectivity, it remains popular among those who build their own because of its simplicity and economy. During the last couple of years I have used such a receiver and obtained results which compare favorably with those obtained by other local amateurs using commercially-built crystal-filter receivers.

Unfortunately, however, at first I met with considerable difficulty with instability in the regenerative i.f. stage. Changing weather conditions demanded a readjustment of the tickler with most inconvenient frequency. Furthermore, the control was far from smooth with the method originally suggested in *QST* (tickler shunted by variable resistor). The problem was then to find a method of regeneration control which would have a larger range—though not as large as with an autodyne detector—and which would be smooth in action.

The obvious solution seemed to be the well-known method of varying the screen-grid voltage. This voltage is supplied through the divider, R_{20}, R_{21}, R_{22} with a variable tap shown in the diagram, Fig. 2. Under requirements of the range of control mentioned above, the resistance of the potentiometer is smaller in proportion to the fixed section of the divider than with regenerative autodyne detectors, which permits greater ease of adjustment.

This obvious modification proved to be an adequate solution to the problem. I find now that it is necessary to make a slight readjustment of the tickler only once in six months, usually in the spring or fall with the change from cold weather to hot or the reverse. Now the regeneration in the i.f. is a most effective weapon against QRM.

The receiver, a portion of whose circuit is shown in the diagram, is a modification of the original *QST* circuit (Lamb, April, 1933, *QST*, page 8), and unless otherwise noted the symbols are the same.

REGENERATIVE MIXER

Regeneration in the mixer is an effective way of reducing image interference without the use of a pre-selector.[1] Many claim, however, that it is undesirable in a receiver that already has a regenerative i.f. stage because of the danger of interlocking of the gain control and the two regeneration controls. Nevertheless I was tempted to try regeneration in the mixer of my receiver, and I was delighted with the result. This modification is also included in the circuit shown in Fig. 2. The modification consists of first supplying the screen voltage from a variable tap on the voltage divider (R_{18}, R_{19}) and secondly removing the condenser which bypasses the cathode to ground, and instead connecting the cathode

(Continued on page 130)

[1] "Building a Simplified High-Performance Superhet," April, 1936, *QST* or 1937 A.R.R.L. *Handbook*.

The VK-ZL 1936 DX Contest Results

G. B. Ragless,* VK5GR

AS WAS the case with the two previous contests, the last event during October again proved an outstanding success. The contest was organized by the South Australian Division of the Wireless Institute of Australia in conjunction with the New Zealand Association of Radio Transmitters and under the patronage of W.I.A. Federal Headquarters. Many were the expressions of appreciation made by entrants and general satisfaction was shown with the new scoring methods. It will be remembered that a sliding scale of points was arranged for the first 12 contacts with a particular zone or country and that only one contact on the same band with the same station during the whole contest (except 28 Mc.) could be counted. The last rule had the desired affect of making listening important and encouraged the low-power station where weaker signals were eagerly sought after. The 28-Mc. band again proved very good particularly for VK2, 3, 4 who made many contacts with DX stations.

The Committee desires to thank all the overseas societies for giving the contest so much publicity and the competitors for their keenness during the contest. The outstanding performance during the contest was the wonderful work of VK3EG who easily won the Australian section. He worked 70 countries for his score of 235,970 points, and his log reads more like a list of the countries of the world. The New Zealand top scorer was ZL1DV for 95,964 points and 44 countries. Other high scores were VK2AE, 55 countries; VK4BB, 54 countries; VK2HF-VK4YL, 47 countries; VK3MR, 45 countries; VK3KX, 41 countries and ZL1FT, 40 countries. With 28 Mc. proving so good between VK-ZL and North America it was not unexpected that U.S.A. stations would lead the overseas contingent. The first station was W5EHM, 8850; followed by W6HX, 8460; W9TB, 8390; W6FZL, 8300; W9AEH, 7550; W3BES, 7290; and W6CJ, 6970.

The VK Handicap section proved a close contest between VK2HV and VK3HK who worked 27 and 26 countries respectively. Considering the opposition from higher-powered stations the performance of these stations were really outstanding. In VK-ZL the receiving section was almost unsupported, but excellent scores were registered by VK3ERS and ZL166. The receiving section was well supported overseas particularly by German and British listeners, who registered some very good scores. The top score was made by G2CAR 7780; followed by BRS 1535, 7710; BRS 1173, 7470; BERS 311, 7270; DE2415H, 7230; DE1729U, 7180.

COMPETITORS COMMENTS

D4BUF sent a complete report showing the German participation. G2ZQ who was on during part of the contest but was too busy to send in a report, made a score of over 6000.

G2TH, G6LJ and G5VQ had only 10 watts and G6ZO 11 watts. ZS5U was very active on 7 Mc. and found conditions good. The only 28-Mc. contacts of OE1ER was VK4BB; EI5F-VK6AA; SM6WL-VK2LZ and OK2RM-VK4EI. K5AY and XE1AY were very solid on 28-Mc. band, the latter making 51 contacts on that band. VE3AU after waiting 6 months for his first VK7 worked two within ten minutes during the contest. K5AC called VK4UR 5 times without luck. ZS1H made all his contacts on 28 Mc., and ZT6Y had four. G6CJ sent a very complete description of all his gear and of observations made during the contest on all bands. LA2Q sent his log in time to make sure we would have it. VU2LJ had no intention of entering and did not trouble until the last two week-ends, when VK-ZL was calling him hotly. G2LB, G6RB, HB9AT and many others expressed their appreciation of the contest.

OK2OP used 28 Mc. and heard many VK-ZL stations there. G6YG was operated by G6ZX and, in sending in a very complete report, said he worked 67% of stations called! W8CXR was on four 8 hours and called 30 stations for 7 contacts. W9VVR says 5 week-ends gave a chance of one good one. W1JPE found VK6-7, ZL4 very scarce. He used several antenna systems for various times. W8BXC says VK2HF loudest but VK3MR and VK6FO very good, while W8FGA found VK2NY, VK6FO and VK7JB best. Many stations found ZL-VK stations coming the long way and East Coast U.S.A. had many good contacts. W1SZ was only on during the last two week-ends! W3BES worked 47 and W9AEH 41 VK-ZL's during first A.M. W6GVM says he is going to win the contest next year. The best score outside VK-ZL W5EHM. He used 1 kw. with Johnson Q antenna on 7 Mc.; 1 kw. with V beam on 14 Mc. and 800 watts with V beam on 28 Mc. He and W6FZL made nearly 70 contacts on the 28-Mc. band. W6HX used 1 kw. and made 51 28-Mc. contacts.

LATE RETURNS

The following stations sent in reports which arrived too late: VE1EA, VE5HR, W3DBD, W3GHB, W3BWA, W4OG, W4AJY, W4DCZ, W6KJK, W8DAE, W8BYM, W9IJ and W9RCQ.

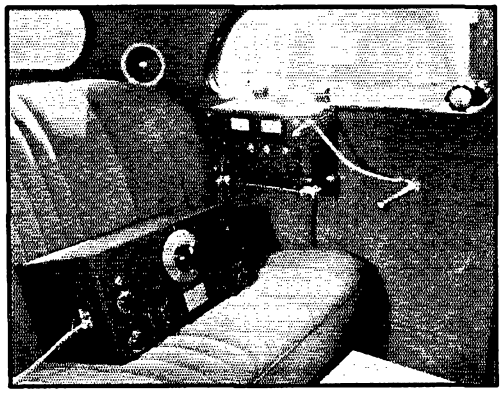
(*Continued on page 98*)

* Contest Manager, St. Marys, South Australia.

A 28-Mc. Mobile Installation

By Willard S. Wilson,* W3DQ

IT IS quite surprising that numerous amateurs seem to be unaware of the fact that the 28-Mc. band is available for mobile operation, both on c.w. and 'phone in accordance with F.C.C. Rules 376, 381 and 382. Greater activity with portable-mobile apparatus has been shown during the past few years on the 56-Mc. band, but there is no reason to pass up the opportunity of 28-Mc. mobile work, as surprising results await those who "get in" on the fun. This band offers not only local but also real DX contacts. The author's mobile installation has worked



THE REAR OF THE CAR IS THE OPERATING POSITION

The transmitter is mounted on brackets dropped from window casing. A ground lead is found on the window lever.

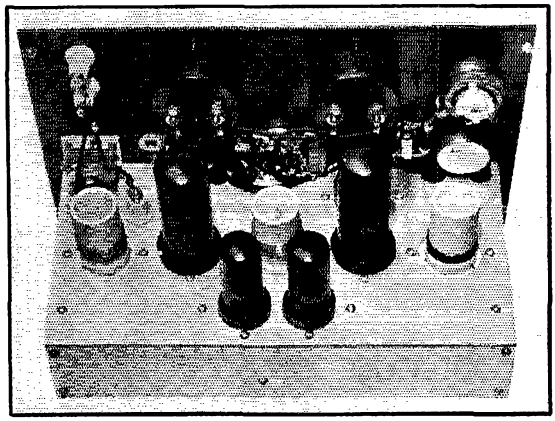
many local stations ranging in distances from 2 to 20 miles by ground wave coverage, and also 1000- to 2000-mile QSO's on the skip.

The transmitter (Harvey UHX-10) contains but four tubes, two of which are in the r.f. section and two in the audio side. The Tri-tet oscillator is crystal controlled, using a 7-Mc. crystal in the grid circuit and quadrupling to 28-Mc. in the plate to excite the second 6L6 Class-C r.f. amplifier. Excitation is adjusted by varying the plate voltage to the oscillator through the 5000-ohm resistor R, 4 to 5 ma. grid current being sufficient for the Class-C stage. The oscillator grid-cathode tuning condenser and oscillator plate condenser also govern grid current, and these should be varied until maximum grid current is obtained. The Class-C plate condenser C_5 is adjusted to resonance, and loaded to approximately 75 ma. with antenna connected. The antenna coil L_4 is series tuned by condenser C_6 mounted on the front panel. The series connection is necessary when working into a low impedance coaxial cable, twisted pair feed line, or a single-wire quarter-wave antenna against ground.

For 'phone operation the emission switch is turned to *PH* and the plate meter toggle switch to *M*. As the 6N7 audio tubes heat, the meter reading will rise to about 50 ma., which is the combined modulator and driver plate current. With a single button microphone plugged into the mike jack, and the gain control R_8 advanced, normal speech causes a rise in modulator plate current of about 25 to 30 ma., or meter readings to about 75 to 80 ma. peaks. For modulated c.w. and straight c.w. operation, the emission switch is turned to position desired, and key plugged into key jack.

A quarter-wave vertical antenna was found to give the best results. As shown in the photograph, it is mounted on the side of the car at the rear side window, close to the transmitter. The window is opened to the "no draft" position, which allows the Masonite strips to be inserted which hold the base of the fish pole telescoping antenna. This is raised to a height of approximately 7 feet, with about a 1-foot lead-in to the antenna post of the transmitter. In this position the top of the antenna is below trolley wires, etc., but care should be taken when driving through garage doors, underpasses and under trees with low-hanging branches. With the antenna in this position its radiating field is more above the auto than with the antenna fastened to the rear bumper. The antenna current is about 1¼ amperes at the binding post connection.

Control relays are operated from the driver's position by toggle switches mounted on a small



THE TRANSMITTER WITH HOUSING REMOVED

*405 Delaware Ave., Wilmington, Del.

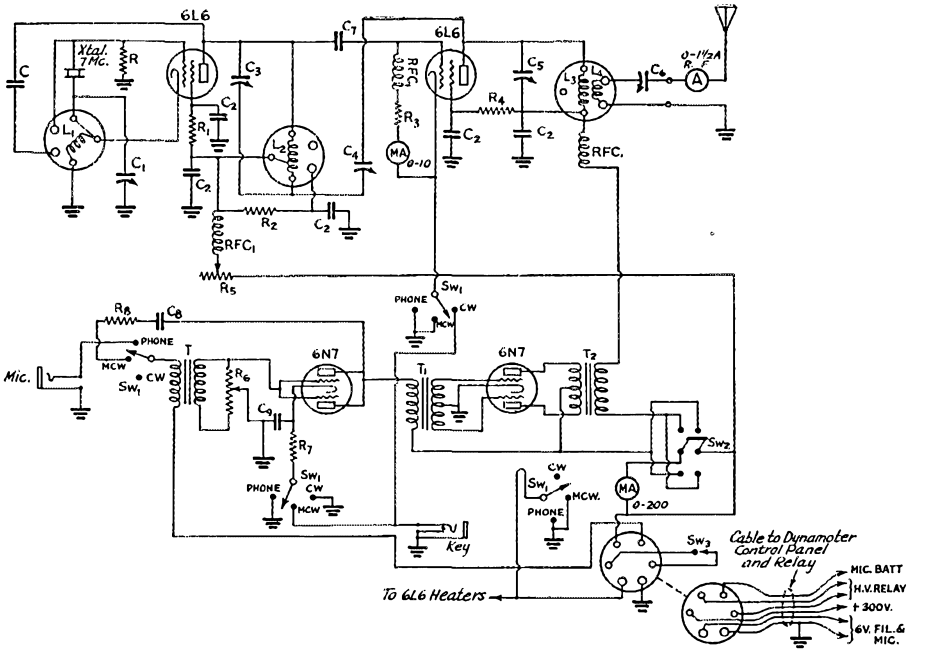


FIG. 1—COMPLETE TRANSMITTER DIAGRAM OF UHX-10

L_1—*Cathode coil, 8 t. No. 20 wire on 1½" diam. isolantite coil form.*
L_2—*28-Mc. 4½ t. No. 18 on 1⅛" form, ⅛-inch spacing. Tap 1½ t. from lower end.*
L_3—*28-Mc. plate coil, 3½ t. No. 18, ⅛" spacing.*
L_4—*Antenna coil, 3 t. No. 18, ⅛" from plate winding.*
C—*2 μfd. Hammarlund "Mex" trimmer.*
C_1—*Cardwell ZU-140-AS.*
C_2—*0.002-μfd. 600-volt, mica.*
C_3, C_5, C_6—*Cardwell ZR-50-AS.*
C_4—*Cardwell ZR-10-AS, using one stator plate.*
C_7—*50-μμfd., 600-volt, mica.*
C_8—*0.1-μfd., 600-volt tubular.*
C_9—*10 μfd., 25-volt.*
R—*50,000-ohm 1-watt, carbon.*
R_1—*25,000-ohm, 1-watt, carbon.*
R_2, R_3, R_4—*10,000-ohm 1-watt, carbon.*
R_5—*5000-ohm, 25-watt Ohmite "H".*
R_6—*500,000-ohm potentiometer.*
R_7—*1000-ohm 1-watt, carbon.*
R_8—*5000-ohm ½-watt, carbon.*
T—*UTC "UMG" mike input transformer.*
T_1—*Kenyon plate to P.P. grids.*
T_2—*Kenyon KR53M mod. transformer.*
CH—*National R-100 choke.*
Sw_1—*4-pole, 3-throw rotary switch.*
Sw_2—*D.p.d.t. toggle.*
Sw_3—*S.p.s.t. toggle.*

panel fastened to the instrument board as shown in the photograph. The microphone is also plugged into the jack located near the relay switches on this panel.

The transmitter is easily removed from the car and may be operated at a fixed portable location, by plugging it into the a.c. power unit shown in Fig. 2.

A good receiver is necessary, and the HRO Jr. was selected in this respect, as it operated exceedingly well from the vibrator B supply, and the six-volt heater type tubes in the set. The antenna for the receiver is also a quarter wave vertical mounted on the rear bumper of the auto. A large 23-plate 6-volt storage battery in the car furnishes filament current to receiver and transmitter, and also to the receiver B supply and high voltage dynamotor for the transmitter. This dynamotor has an output rating of 300 volts at 150 ma. Filter unit is incorporated in base of dynamotor. The power output of the transmitter is rated at 10 watts.

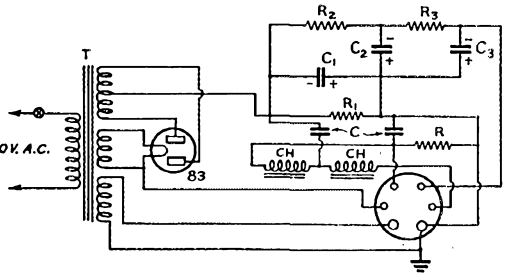


FIG. 2—A.C. POWER SUPPLY

C—*8-8 μfd.*
C_1, C_2—*25-μfd. 25-volt tubular.*
C_3—*50-μfd. 25-volt tubular.*
R—*25,000-ohm 25-watt bleeder*
R_1—*75-ohm 120-watt.*
R_2, R_3—*200-ohm ½-watt carbon.*
T—*Power transformer (UTC UH5).*
CH—*30-henry 150-ma. filter chokes.*

Upon completion of the installation, the first contacts were local. With the car ignition system

(*Continued on page 80*)

A Simple and Inexpensive Rotary Beam Antenna for 28 Megacycles

Constructional Details of the Rotating Antenna at W5BZR

WE NEED not enlarge upon the well-known advantages of directional antennas. It is sometimes not realized, however, that even the simpler types are worthwhile, because even though the power gain cannot be compared to that obtainable from large arrays using several hundred feet of wire, still a small gain is of considerable help, especially when signals are weak. And the advantages of directivity in reducing noise and QRM from unwanted directions are of decided benefit in receiving.

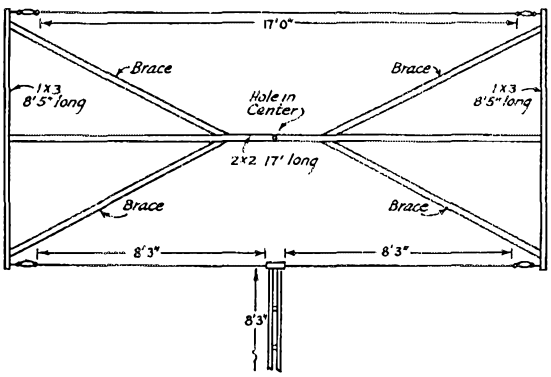


FIG. 1—"SCHEMATIC" OF THE 28-MC. ROTARY ANTENNA-REFLECTOR AT W5BZR

A wooden framework supports the two wires. The cross braces are 1 by 3 wood.

The drawings of Figs. 1 and 2 show the essential details of a rotatable antenna system which has been used very successfully by William Fritz, W5BZR, of Minden, La., for 28-Mc. work. It is not hard to build, mechanically, and is simple electrically, consisting of a half-wave antenna, center-fed through "Q" bars, with a parasitic reflector spaced a quarter-wave from the antenna. The antenna and reflector are strung on a light wooden framework which is fastened to a short length of pipe acting as a support and fitted at its lower end into an ordinary pipe coupling which serves as a bearing.

The following excerpts from a letter from W5BZR explain how to build it: "Get a good hard piece of 2" by 2" wood, 17 feet long (two hams can go in together and buy a 2" by 4" piece and have it split down the middle to reduce cost), and bore a hole approximately 11/16th inches in diameter in the exact center. This hole wants to be just right to pass a ¾-inch pipe. Go to a blacksmith's shop and get a piece of ¼" by 2" iron, 14 inches long, and have drilled in the exact center a similar hole to pass ¾-inch pipe. Also have a 5/16th-inch hole drilled in each end of the iron piece about an inch in from each end. These holes are to pass ¼-inch bolts which hold the iron strip to the wooden crosspiece, thus strengthening the crosspiece at the center. Now get a 27-inch length of ¾-inch pipe and fit it into the center hole in the iron piece so that three inches of the threaded end projects through, then have it brazed or welded to the iron. A jam nut can be obtained by sawing off one end of an old ¾-inch valve, running a tap through to enlarge the threads. While you are still in the blacksmith's shop, have a ¼" by 2" by 5¼" iron piece bent square 1¼ inches from one end, then have a 1-inch pipe coupling welded on the short side. Two 5/16th-inch holes should be drilled in the other side so the piece can be bolted to the pole. This piece supports the antenna assembly. The ¾-inch pipe slips down in the 1-inch pipe coupling and turns very easily in it. A galvanized-iron strap, 2 inches wide, shaped to fit closely around the pipe and the top of

(Continued on page 96)

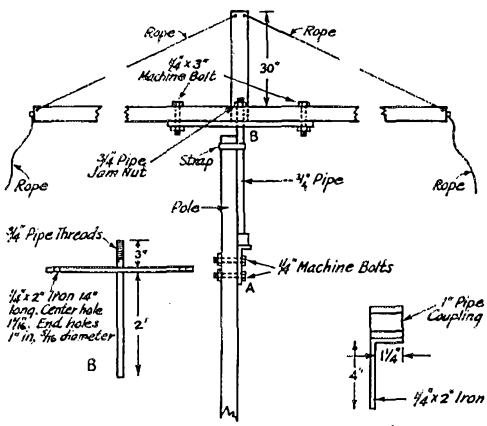


FIG. 2—MOUNTING DETAILS

Two special pieces, A and B, are required. These should be obtainable at little cost from a blacksmith, being made up from ordinary ¼-inch iron and pipe fittings.

Notes on High-Power Electron-Coupled Oscillators

A Practical Colpitts Arrangement With Parallel-Coil Band Changing

By Christoph Schmelzer,* D4BIU

A TRANSMITTING circuit which has attained considerable popularity with German amateurs is the Colpitts version of the electron-coupled circuit oscillator which may use a fairly high-power tube such as the Valvo-Philips QB2/75, which is the equivalent of the 860. Before describing this circuit in some detail, however, it would be well first to point out some features of the electron-coupled oscillators which are not generally appreciated.

In the first place, it is not correct to consider that the E.C.O. is only an oscillator and buffer in one tube, for the following reasons:

(1) Strictly speaking, a buffer amplifier is one which works without requiring any driving power (that is, without grid current rectification), so that any change in the plate circuit does not affect its grid circuit and hence has no influence on the driver.

(2) There is actually reactive coupling between the plate load circuit and the generating portion of the E.C.O. in the cathode-ground element which is common to both the input and output circuit.

(3) The electron-coupled oscillator's special feature of constancy of frequency with voltage fluctuation is not available in the ordinary oscillator-buffer combination using separate tubes unless the oscillator tube is a tetrode. This self-correcting feature is characteristic of any oscillator circuit employing a tetrode, incidentally, and is not especially peculiar to the electron-coupled oscillator as such.

Accordingly, we may more appropriately describe the electron-coupled oscillator as the combination of a triode oscillator and a tetrode amplifier having a common control-grid element, with electrostatic screening between the control and output elements, and possessing the general tetrode ability to compensate the influence of voltage fluctuation on the frequency generated by the oscillator—provided the ratio of plate to screen voltage is correct.

In the case of the Hartley arrangement of the E.C.O., there is one other consideration which has not been frequently emphasized. In this circuit, the cathode is tapped to the tank inductance to form an inductive r.f. voltage divider to give excitation of the proper phase and amplitude. However, the inevitable capacitance of the cathode to ground across one portion of this divider affects the phase. This capacitance may be relatively small with tubes having indirectly heated cathodes (such as the RK23, 802 etc.) but becomes appreciable with filament-type tubes when a separate filament transformer is used [1] as shown in Fig. 1. The primary of the transformer is, of course, at ground potential and there exists an appreciable capacitance between

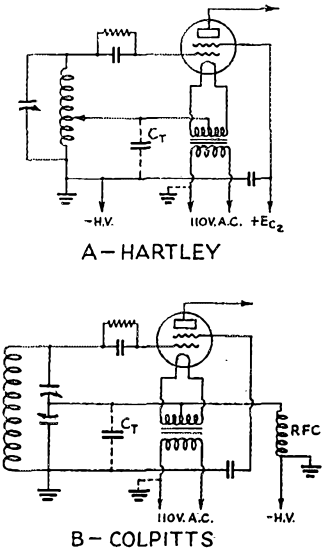


FIG. 1—SIMPLIFIED HARTLEY AND COLPITTS ARRANGEMENTS SHOWING THE FILAMENT-GROUND CAPACITANCE SHUNTING A PORTION OF THE TANK CIRCUIT

the secondary and primary winding. Where the filament is supplied through a double-conductor winding for this portion of the tank circuits [2] this effect would not be so serious, of course. However, this method is less adaptable than a separate transformer with a simple coil. This shunting capacitance effect proves to be espe-

* Present address, 57 Waterman St., Providence, R. I.

[1] "A Power Type Electron-Coupled Exciter Unit," by C. J. Houldson, *QST*, March, 1933.

[2] "Electron-Coupled Oscillator Circuits," by J. B. Dow, *QST*, Jan., 1932.

cially undesirable for frequencies of five megacycles and higher in actual practice.

To avoid this trouble, we should use a circuit employing a capacitive instead of an inductive voltage divider to obtain the feedback, in which case the transformer capacitance C_T is simply in parallel with another capacitance element in the tank circuit and hence does not contribute any undesirable phase shifting. This means that a Colpitts rather than a Hartley oscillator arrangement should be used. As indicated in Fig. 1B, C_T is in parallel with the cathode-ground capacitance element of the familiar Colpitts tank circuit.

I have used this type of oscillator for some time and it works very well. There is nothing especially original as compared to the circuit described by

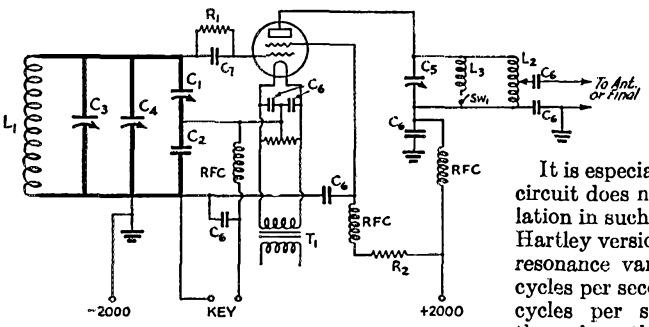


FIG. 2—THE CIRCUIT USED AT D4BIU

L1—12 turns, 1½-inch diameter, extra heavy mounted.
L2—25 turns, 2-inch diameter.
L3—10 turns, 2-inch diameter.
C1—500-μμfd. receiving condenser.
C2—500-μμfd., fixed.
C3—100-μμfd., variable.
C4—300-μμfd., variable.
C5—75-μμfd., variable.
C6—0.002-μfd., fixed.
C7—250-μμfd., fixed.
R1—50,000-ohm 100-watt.
R2—100,000-ohm 100-watt.
RFC—2-mh. 200-ma. r.f. choke.
T1—Separate filament transformer, preferably core type. Heavy-line connections have to be made vibration-proof, preferably from copper tubing. No additional shielding required if L1 is at right angle to L2 and L3, which may be side-by-side.
The tube is an 860 type (Valvo-Philips QB2/75).

J. B. Dow[2] except that he used chokes in the filament circuit. Unless these chokes have a capacitive reactance for the generated frequency, which would require rather large windings, the phase would be affected somewhat as in the Hartley circuit. A practical example of the application of these principles is shown in Fig. 2. This particular arrangement is one which I used for the last month I was on the air before coming to this ham paradise (the U. S. A.), and which brought me all T8X and T9X reports on 3.5 and 7 Mc.

Attention is called especially to the heavy-duty grid leak, which assists a lot in avoiding "creeping" of frequency. Another feature is the band-switching arrangement employing two coils in parallel for second-harmonic (7-Mc.) output. This system has been used at D4AAR-D4BIU for several years in crystal-controlled oscillators and gives no noticeable loss in efficiency. A particular advantage is that the taps for the output link need not be shifted from one coil to the other. In the layout at D4BIU these coils were side-by-side but can be arranged at other angles, although different arrangement will affect the mutual coupling and the value of inductance for the respective coils.

For the 860 type tube the value of C_1 is approximately 150 μμfd. This capacitance should be adjusted experimentally for best constancy of frequency as well as best power output. An outstanding feature of this oscillator is its excellent over-all frequency stability with changes in supply voltage. It is keyed in the cathode lead and gives a clean "crystal" note, even without any bleeder across the high-voltage power supply.

It is especially notable that tuning of the plate circuit does not influence the frequency of oscillation in such a critical way as in the case of the Hartley version. Tuning of the plate tank around resonance varies the frequency only about 300 cycles per second when doubling and about 2000 cycles per second when amplifying straight through on the fundamental. This is without additional shielding between the input and output circuit. The plate tuning is not especially critical and the input circuit may be adjusted for a QSY of 10 kc. on 3.5 Mc. without appreciably affecting the power output or quality of the signal (with a fixed setting of the plate tank).

With 2000 volts on the plate, the no-load plate current is approximately 20 ma. with the output circuit tuned to the fundamental and approximately 40 ma. tuning to the second harmonic (doubling). With a resistive load coupled, 120-ma. plate input can be drawn without appreciable change of frequency or quality of the signal, and loading up to the maximum recommended value of the 150 ma. is possible.

Naturally this oscillator is more sensitive to reaction from a subsequent amplifier stage, as compared to a crystal-controlled oscillator, but this should not be blamed on the oscillator since it is evidence of some fault in the other stages which was not taken care of by the designer.

This suggests one unfortunate aspect of crystal control. Frequently the ham thinks his transmitter is perfect when he hears the crystal oscillator's T9X signal in his monitor (if he uses a monitor); but he wonders why he has such bad key clicks when the transmitter is on the air. Then he tries all the key-click filter systems he can find in the A.R.R.L. *Handbook* and his file of *QST*'s without

(Continued on page 94)

HINTS and KINKS for the Experimenter

A Midget Transceiver

By E. Harbidge, W6LSJ

WHILE many commercial types of transceivers now on the market boast of compactness, ruggedness, and—most important—light weight, I have found that even the best of these is too heavy to carry on a twenty-mile hike, especially at high altitudes. So it was with this important fact in mind that a new and lighter transceiver was designed in the shack.

Instead of using the usual two tubes, the circuit is designed for one, a Type 19. One of the triodes is used as a detector and oscillator, while the other is used as an audio amplifier and speech modulator. As a further convenience, the circuit has no tricky dual-primary transformer; but instead uses a simple mike transformer and a choke. The transformer is used to couple the mike to the grid of the modulator while the circuit is transmitting, and as a grid coupling impedance while receiving. Heising modulation is used while transmitting, and the modulation reactor becomes a plate impedance on the receiving side. The headphones are condenser-coupled and grounded through a double-throw switch.

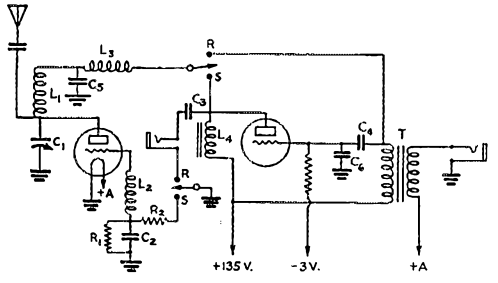


FIG. 1—CIRCUIT OF THE MIDGET TRANSCEIVER

C_1—35-μμfd. midget condenser (Hammarlund).
C_2—100-μμfd. mica.
C_3, C_4—0.1-μfd. paper.
C_5, C_6—100-μμfd. mica.
R_1—500,000-ohm, ½-watt.
R_2—7000-ohm, 1-watt.
R_3—50,000-ohm, ½-watt.
T—Single-button microphone transformer.
L_1, L_2, L_3—See text.
L_4—B.c. type audio choke.
The tube is a Type 19, the two triode sections being shown separately for convenience in drawing.

The radio-frequency by-pass condensers are the "postage stamp" type, and the audio coupling condensers are of the tubular type. The plate tank inductance, L_1, has 5 turns of No. 14 enameled wire wound on half-inch diameter form, the form being removed. The grid coil, L_2, has 7 turns of No. 16 enameled wire on a ⅜-inch form. L_3, the radio-frequency choke, has 20 turns of No. 20 enameled wire close wound. L_2 is spaced 1/16-inch between turns; the plate coil is pulled apart until it hits and covers the band.

Three 45-volt "B" batteries have been found sufficient to give the desired output, or approximately 0.1 watt. The "C" bias is three volts, while the mike current is obtained from the two filament batteries. The small Burgess 5308 portable "B" batteries are very well suited for this transceiver and will last an unusually long time. The filament supply may be large flashlight cells or any other type of 1½ volt battery. The Burgess Ribbon battery makes an ideal plate supply for portable work, as it can be rolled up like a blanket or wrapped around the operator as a jacket. The total plate current consumption as a transmitter is 18 milliamperes, while as a receiver it is 8 ma.

The antenna is coupled by means of a postage stamp condenser of 100-μμfd. capacity. The antenna may be a quarter-wave vertical rod, running directly from the antenna jack on the cabinet. For short distances an eighth-wave rod may be used, but for more efficient operation, the quarter-wave rod is recommended.

In actual operation this rig has worked over ten miles airline (this test was made from Berkeley to San Francisco) with an S9 signal.

As actually built, the transceiver is very compact, being mounted in a 3½- by 3- by 4-inch cabinet almost pocket size. The container is made of No. 20 gauge iron, held together by self-tapping screws. The usual precautions as to short leads in the r.f. circuit, as well as keeping the r.f. coils clear of other parts, should be observed.

The batteries may be carried in a specially designed knapsack or box. The filament rheostat is connected directly on one of the battery terminals. The variable resistance should be ten ohms.

—•••—

Beam Crystal Oscillator with Transformerless Power Supply

THE circuit of Fig. 2, used by William R. Percival, W2GCV, is suitable not only as a crystal driver for a regular transmitter, but also as a compact and light-weight portable rig, since it works directly from the 110-volt line without a

power transformer. W2GCV writes: "Having spent many hours in experimental work with the type 6L6G tube as a crystal oscillator, doubler and buffer amplifier, I have come to the conclu-

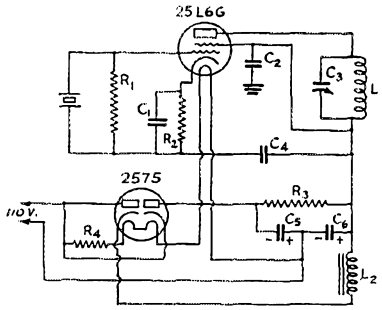


FIG. 2—LINE-POWERED BEAM CRYSTAL OSCILLATOR

C_1—0.001-μfd., 250-volt.
C_2—0.002-μfd., 250-volt.
C_3—100-μμfd. midget variable.
C_4—0.002-μfd., 250-volt.
C_5, C_6—8-μfd. electrolytic.
R_1—10,000-ohm, 1-watt.
R_2—300-ohm, 5-watt.
R_3—25,000-ohm, 50-watt.
R_4—200-ohm, 50-watt (for 110-volt line).
L_1—Inductance to resonate with C_3 at crystal frequency.
L_2—30-henry, 75-ma. filter choke.

sion that although this tube is an excellent oscillator, it appears to have greater power output than is necessary for many amateur applications. I have therefore been experimenting with the layout of Fig. 2. A Type 25L6G tube is used as a crystal oscillator, this tube being of the beam power type, but with lower ratings than the 6L6G, and intended for use in a.c.d.c. receivers. As a rectifier I use a Type 25Z5 in a voltage-doubling circuit; the power supply delivers approximately 150 volts at 70 milliamperes. The output is more than enough to drive one or two 6L6G's as doublers or buffers. The layout has the advantage of being well adapted to a small space, since I had room to spare when the entire set-up was mounted on a 12- by 4-inch baseboard.

"The only disadvantage from the standpoint of overall efficiency is the fact that some 21 watts are lost in the filament dropping resistor, R_4. However, if other 0.3-amp heater tubes are used in the transmitter, their filaments may be placed in series with those now in the circuit, thus putting the loss to work."

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Three-Band "Automatic" Antenna

FIG. 3 is a sketch of a novel antenna system which has been working out satisfactorily for Frederick Weyerhaeuser, W9YPQ. As most amateurs know, a center-fed antenna with twisted feeders is good for operation only in the band for which the antenna is cut. W9YPQ gets around this situation by using three antennas, one for each band, but all fed through a common low-impedance feeder. Only the desired antenna will take power because the others are the wrong length for resonance. The shorter antennas are suspended from the longer by means of glass-rod spreaders so that the spacing between wires is 4½ inches.

W9YPQ writes: "The fact that different center spacings are required for proper impedance matching of a twisted pair to a 40-, 20- or 10-meter antenna suggested combining all three of them to a single feeder. Local field-strength measurements and DX results are comparable to separate half-waves of the same type. The feeders at present are No. 18 stranded rubber-covered wire, and it is hoped that even better results will be had with more efficient feeders. The theoretical value for center spacing was used only on 40 meters.

"The tuning characteristics on each band are identical with those of separate antennas, and a neon bulb indicates the presence of r.f. in the desired section only."

One point about such an antenna system is that it does not possess the ordinary twisted-pair feeder's harmonic-discrimination. Therefore harmonics must be eliminated before they get to the feeder.

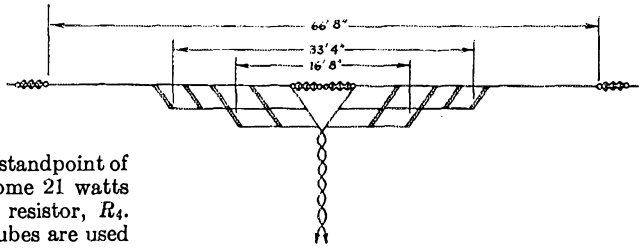

FIG. 3—A THREE-BAND ANTENNA WITH TWISTED-PAIR FEEDERS

Three separate antennas are used with the same feeder. The feeder is fanned at the upper end so that the spacing on the 40-meter antenna is 12 inches.

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A Cheap and Easily Constructed Unguyed Mast for Vertical Antennas

THE 38-foot mast whose essential details are outlined in Fig. 4 has been giving Charles W. Clemens, W3DZR, good service for nearly a year. It has been used to support a 5-meter vertical antenna, but there is no reason why it could not do the same for a 10- or 20-meter vertical. For the height specified it requires no guys, weighs only about 25 pounds, and was constructed by two men in about two hours—at a cost of only $1.50!

The bottom section consists of four sides with corner pieces of 1 by 2 spruce, each 20 feet long, formed into a square pyramid about 5½ feet wide at the bottom, tapering at the top to fit around the 2 by 4 top section. The lattice work is

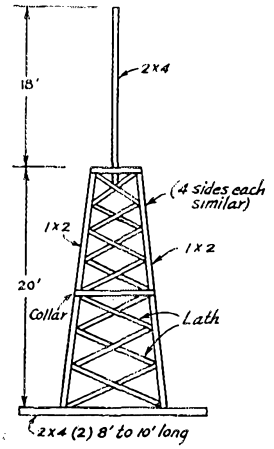


FIG. 4—AN INEXPENSIVE SELF-SUPPORTING MAST FOR VERTICAL ANTENNAS

Materials needed: 2—2 by 4's, each 8 to 10 feet long; 4—1 by 2's, 20 feet long; 1—2 by 4, 20 feet long; 2 bundles plaster lath.

made with plaster lath nailed to the 1 by 2's. The bottom of the pyramid is fastened to two pieces of 2 by 4 about eight or ten feet long, which act as runners to prevent rocking. Four pieces, one to a side, could be used to prevent rocking in both directions. The 2" by 4" top section is set about two feet down in the top of the pyramid. The purpose of the collar around the lattice section is to hold rope guys in case they are used, although no guys have been found necessary on the 38-foot height. Taller masts would require some guying.

The mast is kept upright by means of ballast on the runners. The ballast may consist of any collection of "junk" having enough weight to keep the mast from "walking." Despite the fact that the mast can be lifted by one man, W3DZR has climbed up the lattice section to give it a coat of paint. It has stood up under all kinds of wind, and only once fell over—in a 60-mile gale. The damage in that case was one broken lath, and the mast was put right up again.

Flood Notes

J. R. EAKIN, Superintendent of the Great Smoky Mountains National Park of the National Park Service at Gatlinburg, Tenn., writes informing us that the "U. S. Forest Service portables" used on boats on the Mississippi during the January-February flood emergency were the property of the National Park Service and were installed by technicians attached to the park. Operating personnel was provided by both the N.C.R. and the Park Service.

J. B. Wathen, III, W9BAZ, writes correcting the reference in the flood account to the Kentucky Net as an outgrowth of the A.A.R.S. The net was organized in 1931 under the auspices of the A.R.R.L., S.C.M. and R.M. of that time (W9OX and W9BAZ, respectively), with a spot frequency chosen at 3810 kc. A year or two later the A.A.R.S. adopted the same frequency for their drills, presumably because they were all members of the KYN as well.

C. L. Wilkins, W9KSH, wired on April 23rd from Cairo as follows: "This to inform you I came here. A pair of 46's is not much but satisfactorily effective for me as A. T. & T. kept me busy during flood with receiver at office to check river stages so feel I participated. Correction is indicated."

DIXIE JONES' OWL JUICE

ALL of you all who have long noted and marvelled at the sweet signal and beautiful splatterbugging emanating from W4IR will be shocked to learn that this here xmitter is now possessed of a devil. It does it on two freeks at once and more louder on the wrong one. Everything looks the same. All the nertz is screwed up and the durn little wires all disappear around the same corner they always did, and the meter needles wham over as of yore, but sumpn's funny. I git more RSTs and QSA5s and R9s off of where I don't think I'm at than where I do think I'm at. That bein' so it follows in logical sequence that the proper caper would be to haul off and tune the basic signal out entirely and then key the harmonic. What I wanto no is how to do that.

—W4IR of the "Dixie Squinch Owl"

Atlantic Division Convention

June 25th and 26th at Erie, Pa.

A CORDIAL invitation is extended to all amateurs to attend the 1937 Atlantic Division Convention by the Erie Amateur Radio Club, to be held at the Hotel Lawrence, Erie, Pa., June 25th and 26th.

The committee in charge has prepared a program replete with interesting events, and so arranged as to please everybody. Talks, trips, stunts, etc. We are assured of prominent speakers and A.R.R.L. has promised to send C. C. Rodimon, W1SZ, as the official representative.

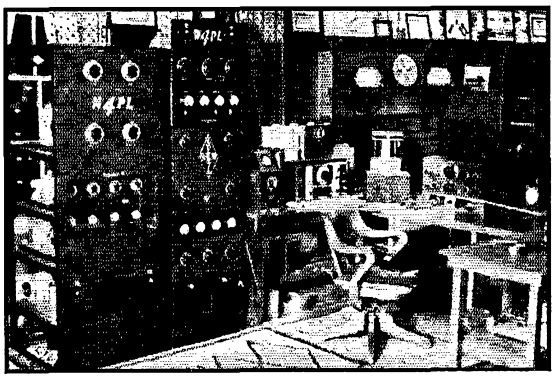
For further information write to J. V. Brotherson, chairman, 1722 West 11th St., Erie, Pa.

Amateur Radio STATIONS

W4PL, Shepherd, Tenn.

OPERATING convenience is one of the features of W4PL, owned by Benton White, of Shepherd, Tenn. The three tables arranged in a square "U" give plenty of operating surface, all within easy reach of the man at the key.

Starting at the near end, the frame-mounted transmitter at the left is a four-band job working from 10 to 80 meters, changing crystals for the higher bands. A 47 crystal oscillator works into a 46, then to a 10 and finally a pair of 50T's. Three power supplies used with this rig also are built into the frame. Primary keying is used with this transmitter. Input runs from 200 watts, with operation usually on 80 meters during the cool weather and on 20 and 10 during the summer.



W4PL

On the relay rack next in line are two transmitters. That at the top, on bakelite panels, is an early Collins transmitter using a 47 crystal oscillator, 46 buffer and 10 final. Two supplies furnish power for this rig, which operates with an input of about 50 watts. It is usually on 80 meters, although it can also be used on 40 and 20.

At the bottom of the rack is a straight-through transmitter (no doublers) using a 53 crystal oscillator, 10 amplifier, and push-pull 50T's in the final. By changing crystals and coils it can work on several bands, but usually is kept on 40 meters. Three power supplies are used with this set, which also has primary keying. The input to the final is about 200 watts. Pi-section antenna couplers are used with all three transmitters.

On the operating table itself, at the extreme left, is a Peak preselector (not in use at present) and on top of this unit is the plate meter for the final stage of the first transmitter, placed here so it can be seen conveniently. Next is an NC100X receiver, and above it an old all-wave super converted for amateur-band use but now used only as a monitor.

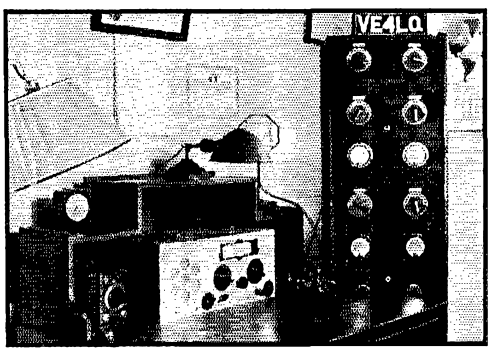
Beneath the desk lamp is the station control box, containing the jacks and switches necessary to control the three transmitters, two receivers and three receiving antennas. To the right of the control box is an NC101X receiver, used for all ham work except for handling traffic on a net in which stations are on different frequencies, when the smaller band-spread of the NC100X permits jumping from one frequency to another more rapidly.

VE4LQ, Edmonton, Alta.

VE4LQ, on the air since December, 1935, was built in its entirety by the owner-operator, W. W. Butchart, became an ORS in November 1936, and is the Edmonton outlet for the Alberta Net.

The station layout is shown in the photograph. To the left on the desk is the message file, freqmeter-monitor, receiver, keying oscillator, Vibroplex and straight key and, to the right, the transmitter.

(Continued on page 80)



VE4LQ

Fifth Annual A.R.R.L. June Field Day Contest

Combine Portable/Emergency Set Tests and Outing, June 19th–20th

TO BE PREPARED for emergencies requires that equipment be at hand, and the operator know what to do when power goes off, how to work without commercial power, how to send a message (proper order of parts) and show receipt for same, how to tune up workable antennas in "new" locations, how to make the most of low power, and many other things. The Annual Field Day is open to all W/VE amateurs [1] and dedicated to the testing in actual operation of sending and receiving equipment that will function self-powered for the occasion.

The F.D. combines an outing with the opening of the season for outdoor radio activities. Operating time for the F.D. shown in logs must be between Saturday, June 19th (4 P.M. local time) and Sunday, June 20th (7 P.M. local time), for all points that count.

Only portable stations actually operated in the field (away from the "home" address) are eligible to submit field-day scores. Any or all amateur frequency bands may be used, voice or c.w. telegraph likewise. Advance entry is not required. The general call: (c.w.) CQ FD or ('phone) CQ FIELD DAY. The object is for each field-portable to work as many other amateur stations as possible in the time allotted.

Scoring: Each different station worked counts *one point* toward the score (but one contact per station allowed). Working other stations in the field, portable-to-portable at *both* ends of a QSO will count *two points* instead of one only. "Manufactured" contacts between stations of the same field group in the contest are *out*, however. All stations used by a single group must operate under the same call signal and portable designation and in the same "F.C.C.-notified" locality.[1] An extra credit of 10 points (before multiplier) may be claimed for originating not more than one message addressed to A.R.R.L. Hq., reporting the number of operators, the location, conditions and power (informative data on situations always needed at Hq. in actual emergency, too!). These extra points will count *only* if the message copy is submitted showing complete handling data, and word count (CK) must be correct as well as preamble complete in the right order.

The multiplier: Scores may be multiplied by 2 if *either* the receiver or transmitter is independent of mains or commercial power source, by 3 if *both* transmitter and receiver are supplied from an independent local source. The following additional score multiplier is determined by the power input to the final stage (plate voltage times plate current—E × I).

(a) Up to and including 20 watts—multiply score by 3.
(b) Over 20, and up to 60 watts—multiply score by 2.
(c) Over 60 watts—multiply score by 1.

The log of operation, claimed score, and data on power, frequency band and time of each contact should be listed, with the claimed total, and sent in promptly at the end of the tests. Be sure to note the source(s) of plate and filament power, along with the "watts input."

Clubs are all invited to encourage their members to build portables, and to arrange special Field Day activities. Club contests for emergency set-building of members should be instituted, as well as planning for higher power centrally located amateur-emergency stations where possible. Every amateur is invited to take part, whether or not able to participate in club plans. Your portable transmitter can be a source of great pleasure for the whole summer season. Get it working now. Take a couple of hams with you. Test it in the Field Day. One field contact—and you win over the ham not taking part! All amateurs are requested to ask for application forms for registering their equipment and availability in A.R.R.L.'s Emergency Corps, if not already on record as a member of this organization.

Keep an operative portable at hand all the year. Use "six-volt" tubes in exciters (and receivers, too) so they can be easily converted in emergency. Better yet plan gas-driven units for ample power, but don't deny yourself the ability and pleasure to set up in any location when supplementary links to important agencies may be required. Surprisingly efficient and useful equipment may be operated from vibrator-type, genemotor and battery power supplies. Use them at the mountains and seashore this summer. See some of the set descriptions elsewhere in this issue and plan to get in on this interesting, constructive side of amateur radio fun. We'll be looking for your report on the F.D.

—*F. E. H.*

[1] To comply with F.C.C. regulations for portable station operation, licensees in the U.S.A. have only to observe the instructions of par. 387–384 as respects advance notification of the location in which the portable will be operated, to the Inspector-in-Charge of the district, and as regards proper station identification (BT-1-2-etc.). Only on the 28 Mc., 56 Mc. and higher frequency amateur bands is portable work permitted without such notification. In Canada, except for the inclusion of authorization to portables in the regulations for these u.h.f. bands, it is necessary to ask special permission of the Department of the Marine for the work a VE-amateur has in mind for frequencies below 28 Mc.

• I. A. R. U. NEWS •

Devoted to the interests and activities of the

INTERNATIONAL AMATEUR RADIO UNION

Headquarters Society: THE AMERICAN RADIO RELAY LEAGUE, West Hartford, Conn.

MEMBER SOCIETIES

American Radio Relay League
Associazione Radiotecnica Italiana
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Norsk Radio Relæ Liga
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Suomen Radioamatöörilitto r.y.
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Unión de Radioemisores Españoles
Union Schweiz Kurzwellen Amateure
Wireless Institute of Australia

Conducted by Byron Goodman

Contests:

Apparently the "Contest Calendar," suggested by the D.A.S.D. and reported in the December, 1936, I.A.R.U. Calendar and the February, 1937, edition of this column, has been overlooked by several of the member-societies. Three DX contests were scheduled for May by member-societies, and no doubt there will be several more conflicts during the year. While such conflicts work no great hardship on DX-minded amateurs in the outside countries, it is not quite fair to the country holding the contest to have to share its time with several other countries conducting similar affairs. The December I.A.R.U. Calendar carried a list of the contemplated contests for 1937 and an invitation for other member-societies to make known their contest dates and thus establish priority for that period. We heartily recommend that all societies planning tests during the next twelve or fifteen months advise I.A.R.U. headquarters as soon as possible, to avoid future conflict.

Although it is probably none of our business, we would like to suggest that smaller countries conducting DX contests plan to reduce the length of the tests. For example, a country with less than 25 active amateurs should be able to conduct a satisfactory contest over a period of a week, which includes the two weekends and their peak activity, instead of the four weekends some of them now ask. In this way, we believe foreign contestants will not have time to lose interest and a much better contest will result.

HANS BÜCHLER, HB9AA, WELL-KNOWN SWISS SPORT-AIRMAN AND NEW PRESIDENT OF THE U.S.K.A.

Mr. Büchler is shown with his small portable transmitter just before starting an aeroplane test.

Power:

Because this column treats with the doings of our member-societies, and because we felt that many of our United States readers would be interested in it, we are going to list the requirements for a "high-power" permit in Great Britain. The freedom and limit (1 kilowatt) in the United States is often the envy of amateurs in other countries, and the following, taken from the R.S.G.B.'s "T & R Bulletin," will show why:

"In submitting applications for an increase in power in excess of 25 watts, members are required to note the following information:

"1. The application must be based on sound technical grounds.

"2. Details should be given of past and projected experiments, with an explanation as to the reason why the present power is insufficient for the experiments.

"3. Applicants must give an assurance that crystal control or some other recognized form of frequency stabilising will be used for high-power tests.

"4. Applications must be addressed to the Secretary, R.S.G.B., and forwarded via a member's D.R., who is required to comment upon the application.

"5. Members, after being recommended by the Council, must hold themselves in readiness for a G.P.O. inspection of their station.

"The inspecting officer will, in particular, require to examine the station log and crystal certificate, and will seek evidence of past experiments and enquire for particulars of projected work. A log containing only a record of transmissions made, is not evidence of their experimental value.

"6. The requisitioned higher power may not be used until a definite authorisation in writing has been received from the G.P.O.

"7. The charges for high-power permits are given on page 414 of the March, 1937, *T & R Bulletin.*

"Members are reminded that their applications, or a copy thereof, are submitted by the Council to the G.P.O., therefore they should be written in official style and submitted as a separate communication to any other correspondence forwarded to their D.R."

Is that all?

General:

The R.S.G.B., through their secretary Mr. Clarricoats, would like to advise all amateurs that the R.S.G.B.'s National Field Day will take place from 1800 GT, Saturday, June 5th, to 1800 GT, Sunday, June 6th. During that time their portable stations will use the suffix "P" after their calls, as for example, "G6CLP." Last year their stations lost valuable minutes explaining that the letter P indicated that the stations were portable .. .. .. Most liberal of the larger nations from the standpoint of licensing foreigners is Germany, which offers to license the nationals of any other nation which in turn grants amateur licenses to German citizens .. .. .. W2GMN advises us that William P. Schweitzer, W2JKQ, rifle enthusiast and well-known 14-Mc. 'phone man, travels to England the last week in June with the American rifle team to take part in the International matches. He will be stationed first at Bisney, near London, and later at the Hotel Rafael in Paris. During the latter part of July he will be at Helsingfors, Finland. He is anxious to make contacts with European amateurs, and to keep in touch through them with his friends at home .. .. .. Newly-elected officers of the L.C.R.A. (Dominican Republic) are: president, Major Enrique Valverde, HI1C; vice-president, Dr. Leonica Ramos, HI3L; secretary, Dr. Enrique de Marchena, HI6O; and treasurer, Francisco Garcia Moya, HI2K.

SWL QSL:

H. S. Bradley, 66 Main Street, Hamilton, N. Y., has kindly offered to forward, through the various SWL organizations, all of the SWL acknowledgments coming into the United States. He is willing to forward all acknowledgment cards from amateurs outside the United States to SWL's in the U. S., and his services will take a burden off the shoulders of the already overworked QSL Managers in this country. Remember though, all *worked* cards for this country still go through the A.R.R.L. QSL-Manager system, and all listener reports for amateurs in this country should go direct to the Call Book address of the amateur.

The 100-Foot Lattice Tower at W9DNP

(Continued from page 27)

foundation block. The bottom of the tower should then be anchored with chains or heavy ropes so that it cannot move out of position while being raised. It does not have to be resting on the foundation while being raised as it can be moved on to the block after it is standing upright provided that the guy wires or ropes are not pulled too tight.

All that is needed now is a crew of about twelve husky fellows to do the hard work. A little refreshment provides a lot of inducement for the gang to get together and you can nearly always recruit rope holders from the crowd of "kibitzers" that gathers around to watch and give advice. A pair of 2-by-4's about 24 feet long, joined together with a single bolt placed about eight feet or so from one end to form a "scissors" or push-pole, is a great help in raising the tower for the first 30 degrees. The only further advice that I can offer is to take it easy and be careful. It may take two or three hours to get the ropes and tackle tied into position, but it is much better to be sure than to have a lot of kindling wood scattered over a whole block. It should only take about a half-hour for the raising if care has been taken and everything given proper preliminary consideration.

The two years' service that this tower has already rendered has, in my estimation, exceeded by many times the original cost of its construction. The total cost of all materials used was less than $40 and that is plenty cheap for a hundred-footer. Of course labor was not taken into consideration, as most hams do their own construction work. The cost would probably be prohibitive if a professional contractor or carpenter undertook the job; but such is the case with equipment of commercial manufacture.

All kinds of radiators have been tried on this tower and the results have been more than gratifying. For those who feel that the guy wires are

(Continued on page 88)

U.H.F.

THE second part of Ross Hull's article on ultra-high-frequency propagation is scheduled for the July issue.

OPERATING NEWS

Conducted by the Communications Department

F. E. Handy, Communications Manager **E. L. Battey, Asst. Communications Manager**

ADVANCE INDICATIONS POINT to greater interest in the annual A.R.R.L. Field Day (scheduled for June 19th–20th) than ever before. This is as it should be for the F.D. combines the idea of an outing with the testing of portables and emergency equipment. It brings out the best in operators, and next to traffic work, calls for the highest degree of coöperation and work with a group of one's fellow amateurs to plan the station, food and transportation arrangements and to put over a real communication performance, usually with a modest-powered rig.

The Field Days mean even more to us than opportunities to test self-powered equipment, however. Whether groups of three or four individuals work together, or clubs promote plans, the F.D. develops the highest in human fellowship and relationships. The F.D. is dedicated to *preparedness*, with the aim to promote building and testing equipment, and operator training; it exposes our construction and operating theories to the cold light of practice afield; it brings out weak points in equipment and operating to permit improvements. Also our album of amateur radio events is filled with snaps that fill us with happy recollections of the set-ups and experiences of several previous A.R.R.L. Field Days shared with others. New places and a changing assortment of equipment, and good times combined with the radio station as the central attraction and reason for the plans, give the F.D. a world of meaning to all its followers.

Certain clarifications and amendments to the F.D. rules have been made in this year's announcement which appears elsewhere in this issue, but the fundamentals of Field Day operating are the same as in our previous successful affairs. Any member's file of *QST's* will disclose numerous suggestions for Field Day equipment by the way of equipment articles and the suggestions made with previous announcements. This issue alone contains information enough from which to build a suitable set for this year's tests. Excellent low-power manufactured transmitters are also available.

We recently completed a new transmitter-exciter using all six-volt tubes, especially for portable work, but suitable for use in our fixed amateur station too. Work in the latter keeps it in trim, ready for any outside work, but giving us regular returns from its use. A convenient plug-in receptacle in the trunk of the car and another in the station permits operation at home from station power mains (a.c.) or at any point the car takes it from storage batteries (d.c.) using vibrator-type or genemotor h.v. sources, easily transportable. Plug-in coils give excellent all-band capability, with e.c.o. for flexibility within the bands, as well as ability to break-in on some continuously monitored government frequency to which the emergency set has been previously calibrated in the event of a justifying great need. Tests of such new low-power stations give a thrill of pride in satisfactory accomplishment that is something above and beyond the usual records so easily possible with plenty of power and all modern station aids. If you don't agree with the writer, we ask you at least to stick a simple job together and try it afield on June 19th before you tell us so!

Since more rigs will work as frequency multipliers and double or quadruple—and there will be more e.c.o.'s in the field this year—we may well outline a few precautions for all and sundry. Design of course may permit either crystal control or electron-coupled oscillator control of frequency or both in the same transmitter. While the crystal is well worth having as frequency insurance, the emergency significance of the construction will in the future make change-over to a "rubber crystal" (by which we mean the electron-coupled oscillator) an important feature in these intermediate power sets. Of course the e.c.o. must be ligthly loaded and operated below its rated plate voltage rather than otherwise, and provided with an amply large dial (for accurate resettings) and should be used and calibrated only over the high-C end of the tuning condenser scale (to permit keying comparable to crystal-keyed characteristics).

Other precautions are very important when operating e.c.o. or crystal multiplying, else off-frequency operation and consequent F.C.C. citations are likely! (1) *Be sure* the *correct* coils are plugged in for the particular bands and calibration anticipated. Unless you check, it is easy to get the wrong coil combination installed if there are several coils. This may make the set inoperative, but is more likely to invite an off-frequency adjustment or direct radiation of a harmonic or

parasitic. (2) Provide a small, simple, rugged, absorption type frequency meter or wavemeter (just a coil-condenser and indicator) of known characteristics to positively identify frequency and distinguish harmonics from fundamentals. Check with both this and the receiver. It is well to use our sets at the home QTH as a preliminary and make sure they are "right" before we set forth, but in any event, observe precautions. (3) If and whenever working "c.c.o." keep away from the band edges. Allow *liberal* factors of safety . . . always. It pays dividends. Even with crystals, the exact value of plate tank tuning, oscillator circuit and holder capacities and temperature may vary our frequency control considerably, not to mention the possibility of finding crystals with more than one frequency or other faults.

The choice of bands and exact type of equipment is left to participants. The gasoline-driven high-powered rig has our admiration and is most useful for clubs to develop as community-center dependable stations for possible emergency. Its ability to communicate makes it subject to a just handicap in an operating competition of this type. Most of us cannot afford such elaborate and extensive preparation, but intermediate power stations have proved highly useful and successful, where well built and operated by skilled operators. Our "little" station fills us with enthusiasm for its performance. The Field Day appropriately encourages the more widespread availability of the excellent lower-powered station which is not only good for the establishment of secondary stations if and wherever needed in communication emergencies of the general type, but is equally a pleasure to take to the mountains or the seashore during the summer season. Here's success to all in the Field Day this June. See you there.

—*F. E. H.*

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New South Carolina Section Created

Following action by the Board of Directors transferring South Carolina, on petition of members, from the Southeastern to the Roanoke Division, Director Caveness, W4DW, and your Communications Manager have taken the necessary joint action to make South Carolina a new independent A.R.R.L. Section, the League's 70th field organization Section, as of the date of election of South Carolina S.C.M. by South Carolina League members.

The election notice appearing elsewhere in these pages specifies the closing date for receipt of nominations for South Carolina Section Communications Manager as June 15, 1937, in soliciting nominations for the office.

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South Dakota Emergency

A SEVERE sleet storm visited South Dakota on the night of March 23rd, turning into a blinding blizzard. When it receded on the evening of the 24th it had left behind from 13 to 20 inches of wet snow. Practically the entire section of the state was without wire communication service of any kind for a period of three or four days. Highways were blocked for nearly two days. Amateur radio quickly sprang into service, handling important dispatches for telephone and power companies, railroads, W.U., news associations, and others. Several operators manned their stations continuously for 48 hours.

A letter from Mr. E. K. Albert, Electrical Superintendent, Northwestern Public Service Company, impressively tells of the great service rendered by amateur radio in emergencies of this type. Mr. Albert writes: "Due to the wholehearted coöperation of radio amateurs in our territory we were able to establish communication between our strategic points. This was a great help to us in restoring service to the towns in the area affected by the storm. Many of our towns had service restored hours sooner than would have been possible without the help of these amateur stations. In the affected area we operate about 900 miles of high and low voltage lines serving about 80 towns. Roads were blocked with snow. You can readily appreciate the problem of restoring service under such conditions without communication facilities. Our men who were engaged in this work are most enthusiastic about the help they received from the amateur stations. The following is a list of the stations that worked with us: W9VOP, W9RKI, W9FLO, W9WFL, W9LDU, W9JBT, W9DZA."

Rapid City: W9YKY, W9YQR, W9TOP and W9YOB handled train orders for the C. & N. W. railroad through W9FJR, Fort Pierre, using W9YOB in the daytime and W9TOP at night. This set-up also handled W.U. traffic. W9YQR handled repair crews in Pierre, Phillip, Chamberlain and Wall via W9YOB/W9TOP to W9FJR and W9VQN. W9SWV handled traffic into Nebraska on 1.75-Mc. 'phone. W9UAV and other members of the Black Hills Amateur Radio Club at Rapid City assisted in keeping transmitters going and in phoning local traffic. W9ADJ at Rapid Canyon, on the outskirts of Rapid City, had a circuit working into Rapid City for a grain company in Sioux Falls through W9OXC, Pierre; W9DIY handled the Sioux Falls end; this was on 3.9-Mc. 'phone.

Mitchell: W9DZA of this city remained on the air continuously for 48 hours, with W9UXC and W9KMD assisting, handling traffic for the power company, telephone company, W.U., railroads and schools, as well as press from W9DIY, Sioux Falls.

Wall: W9VQN, after erecting a temporary antenna (the storm had brought down his regular skywire), handled traffic with W9TOP and W9YOB, Rapid City, for the telephone company and the railroad 3.5 Mc. c.w. was used.

Sioux Falls: W9AZR and W9DIY did the bulk of the work in Sioux Falls, both handling important telephone and W.U. traffic. W9DIY also dispatched AP news via 3.9-Mc. 'phone. W9AZR, A.A.R.S. State Control Station, handled traffic with W9BNT, Omaha, Nebraska, W9BNT standing guard on 3717-kc. continuously until the emergency was over. W9AZR handled one death message from W9OED, Miller.

Huron: The public utilities, W.U., etc., were served here by W9RKI and W9VQP. Brookings: W9ORY and W9PPE played important parts in Brookings, handling emergency traffic. Watertown: W9BJV, 3.9-Mc. 'phone, was the important link here. Redfield: W9FOQ did a fine job, although his antenna was down in the snow.

Aberdeen: About 100 messages were handled by Aberdeen stations for the N.W. Bell Telephone Company, the N.W. Public Service Company, the railroad, the A.P. and local Aberdeen *American-News*, the local broadcasting station KABR, and the State and County Highway Departments. Assistance was also rendered in locating one missing person. W9RSE, W9IK, W9WFL, W9YDT and W9DKY were important stations at this point. Aberdeen hams received a letter of appreciation from Mr. L. S. Siekmeier, Chief Engineer of the Dakota Central Telephone Company, which is here quoted in part: "The management of the Dakota Central Telephone Company wishes to express its thanks and appreciation for the services rendered it with your amateur short wave stations during the period immediately following the sleet storm of March 23 and 24, 1937. . . . All long distance circuits were out of service at Aberdeen, Huron, Mitchell, Watertown and Pierre, resulting in the complete isolation of the points insofar as telephone communication was concerned. . . . The fine coöperation of . . . radio operators expedited the problem of quickly securing information regarding the extent of the storm, and the dispatching of crews and material from other states. As it was, you helped us handle our work more efficiently and restore our lines at an earlier date." W9PQW at Fargo, North Da-

kota was outstanding in keeping constant contact with W9RSE, Aberdeen, with the exception of one afternoon when W9OEL, Hope, North Dakota, handled the circuit.

Pierre: W9OXC (3.9-Mc. 'phone) and W9SEB (3.5-Mc. c.w.) were important stations in Pierre. W9OXC acted as relay station for many 'phones, dispatching traffic for the railroads and telephone company and gathering reports on highway conditions for line service crews coming into the state from Nebraska, Iowa and Minnesota. W9SEB spent most of the time handling W.U. traffic, although some messages were handled for the telephone company. All W.U. traffic between Phillip and Huron was handled through Pierre to Omaha, via W9SEB-W9BNT. 72 W.U. messages were handled via this route. W9BNT was tuned to W9SEB for a 24 hour continuous period.

A summary of the stations participating in the emergency, submitted by SCM W9SEB, lists the following: In South Dakota: W9DIY UAV AZR ALO BJV ADJ YKY YQR TOP YOB SWV OXC SEB DZA UXC KMD RKI VQP BDF FLO DKY LDU OED FOQ ORY PPE JBT GLK DID RSE IK WFL VOP YDT DKJ VQN VOD FJR. Outside stations: W9BNT WBU DKL PRJ PQW DHQ KZL NZG OEL WWV YLC AVX.

PRIZES FOR BEST ARTICLES

The article by Mr. Martin Oberg, W9UGU, wins the C.D. article contest prize this month. Each month we print the most interesting and valuable article received marked "for the C.D. contest." Contributions may be on any phase of amateur operating or communication activity (DX, 'phone, traffic, rag-chewing, clubs, fraternalism, etc.) which adds constructively to amateur organization work. Prize winners may select a 1937 bound *Handbook*, QST Binder and League Emblem, six logs, eight pads radiogram blanks, DX Map and three pads, or any other combination of A.R.R.L. supplies of equivalent value. Try your luck. Send your contribution to-day!

Why Lie About It?

By Martin Oberg, W9UGU*

IN AMATEUR radio, the greatest thrill, second only to working some ultra-mundane DX, is that of bragging to your friends about it. After the club meeting has adjourned and the select circle has gathered around the favorite table in the local tavern, the question most often heard is, "How's DX?" Then each of the boys goes on to relate the calls they have heard and worked and the reports received. It is usually the last one that says, "You guys know that ZD2 I been laying for? Well last night, 'bout a quarter to one, I hear him pounding in like a ton of bricks and give him a call. And what do ya think? He comes back and gives me 589." He looks around the group, searching for an approving glance. All are decidedly reprehensive and bring forth comments such as, "With your power"; "Show me the card"; "I believe yew" (said in a very sarcastic tone).

This all brings to mind the basis of this tragic tale. It happens that in amateur radio, as in every field of endeavor, there are a few that cannot gain the recognition that their inferior ego demands legitimately, so they resort to the insertion of a line in their log, and when the proper occasion arrives they either tell about it or bring out their log and showing it say, "You are running a lot more power than I am but look what *I* worked."

It happens that in my local sphere of acquaintances there is one of this type. Let me tell you about him. When I first met him he had a little rig running about thirty watts input and it's still the same haywire today except there's a new tube in the final and the power has been boosted a little.

The first time I was up to his shack he showed me a lot of entries in his log and a few DX cards on the wall. There were a few minor discrepancies in the cards such as: they were all written in the same handwriting, same color ink, same width pen, and they had all arrived in envelopes that had since been destroyed. I was dubious. In fact I didn't believe him.

After that, whenever I met him he had some new tale to tell. "I got S7 from J2—, I got S8 from SU1—, I got S9 from XE1—," he would say as we were shaking hands.

After a time this became rather boring and then downright distasteful. We, that is the boys, never had a chance to brag up our own DX. When we come out with working a new country that was our pride and joy he would retaliate with, "Oh, I worked that country with five watts input to an '01A on eighty the week after I got my ticket." Only a very just respect of the law saved him more than once.

Something had to be done, so yours truly had a brainstorm. I knew that 9NCQ had a blank K6 card that he had received in a personal QSO and was not filled in. I talked him into giving it to me and filled it out very nicely. Inserting it in an envelope, I addressed it to the "Great DX'er" as he had come to be called. First, however, I had taken the precaution of writing an eight-letter code group on the inside of the envelope. Then I put this in another envelope which I addressed to the postmaster at Hawaii and requested him to remail for philatelic purposes. Then I sat down and adopted what is known as a period of watchful waiting.

After about a month and a half I met him again.

"Got any new DX cards, old man?" I asked.

"Why yes," came the reply. "Just the day before yesterday I got a card from K6—. That was sure a swell QSO, let me tell you. Talked to the guy for about an hour. Yep, me an' Oliver are great pals. Made a sked with him and kept it every third night since then."

"Yeah," says I.

"Yeah," says he. "One thing I always do when I have a swell QSO like that is write the guy a nice long letter and ship it with the card. Always get a neat reply. Come over and I'll let you read Oliver's letter."

My eyes opened and I thought maybe he had really received a card and letter and then I decided that he was only enlarging on the fact that somebody had made a mistake, or so he must have thought.

"Well, I'm kind of busy right now but I will someday soon. Incidently, when you get home look inside the envelope the card came in and see if you can find an eight-letter code word reading MNOPQRST." I tell him.

He looks at me kind of funny, but seeing the innocent look on my face laughs, "Yeah, yeah, sure. Got to have your joke. Ha ha."

We part and I forget about it. About eleven-thirty that night when I am having a swell rag-chew with CK2—oops, there I go too. Well, anyway, the 'phone rings. It's the "Great DX'er."

"Hello, Marty," he says. "I want to ask you something."

"Shoot," I says.

"What did you say that code group was?"

I repeat and then he says, "Marty, how many guys know about that?"

"All of them," I tell him.

A moment of silence, then, "Well I'll tell you how it happened. That night I was sitting up and I hears this K6 rolling in. He was calling CQ and when he signs I give him a call. He comes back, 'QRZ W9???.' I calls him again and he comes back, 'r r sorri ob but missed call pse rept ar.' I gave him my call about five times, but every time he missed it, so finally he calls it a day and tells me that he'll look for me sometime when conditions were more favorable. I agree and sign, so that's how come I was thinking that he sent me that card."

"But OM," I says. "If he didn't get your call how could he ship you a card?"

That got him but he says, "Oh, I sent him one first."

"Mind if I write to Oliver and ask him?"

"Well—if you won't take my word and want to go to all that trouble."

"And how about all the dope on how great friends you were, and the skeds and the letter?" I ask.

"Well, maybe I did stretch the point a little," he admits.

*3435 Sunnyside Avenue, Chicago, Ill.

"You needn't tell any more of the boys than you can help about that, though, will you?"

"Of course not, ol' pal, ol' pal," I tell him, and after he hangs up I spend an hour on the 'phone telling the boys it.

Needless to say, the next time the select circle gathered he was rather quiet and hadn't worked any DX to speak of. All the gang knew about it, but not one of them would mention it. Some things are better unsaid, but many a sleeve was wet with tears of laughter.

So, little children, let me warn you. Never write all your DX cards in the same handwriting. Take a few friends in on the secret and get them to write some of the cards for you and you do the same for them. Also be sure and not to use the same color ink more than four times. And lastly let me warn you. *Never brag about a card that you didn't send yourself.* Even your best friend won't tell you.

Oh, yes, the "Great DX'er's" call. Anyone wishing further information kindly write to me enclosing a self-addressed postcard. I'll have a rubber stamp of his call made.

Re: DX Contest Disqualifications

W1HP was erroneously listed in the DX Contest "Disqualified List" printed in May *QST*. This was a typographical error; the call should have been W1HPV. W7DXZ will be glad to have it known that his was one of those cases in which "he notified ARRL first" on receiving an FCC citation.

Susquehanna Emergency Net

AN AMATEUR radio emergency communication system has been organized throughout the Susquehanna River watershed, to provide the hydro-electric plants with information on river stages at various points. Stations were chosen that were known to be reliable and beyond the reach of flood waters. In some cases stations have installed or have available emergency powered transmitters. Three stations have made arrangements to operate from State Institutions having private power supply systems.

To cope with the possibility that the river guages would be inaccessible during floods, prominent buildings whose elevations could be determined were photographed to scale and will be marked so that the operator or the observer may estimate the elevation within ½ foot from the photograph. At other points, city maps were obtained and elevations marked thereon in addition to the photographs. With this data, the hydrographic department will be able to determine the river stages at these points fairly accurately. With the information furnished by the observers from the various points along the river, the hydrographic department of the power company will be able to forecast the stage of the river accurately eight hours in advance, this information to be radioed back to the stations, giving them a service not available before.

The 3500-kc. band is used because it is the only one that will give consistent service over the distances involved 24 hours of the day. C.W. men operate on 3890 kc. and the 'phone men on 3910 kc., only 20 kc. apart; in this way station calls are reduced and traffic speeded up. During periods of the year that the Susquehanna River is subject to flood, members of the Susquehanna Net will be alert in case of normal communication failure. Stations will be called by radio to prepare for emergency communication and will confirm reporting on the net officially by telegraph collect.

Another net operating in the Atlantic Division is being formed by W8AOM of Buffalo, N. Y. When this net is completed, it is understood that the two nets will coöperate and fill any gaps existing in one net from the other net.

The Susquehanna Emergency Communication Net will be able to move important traffic to points where it can be handled by land lines or forwarded to the press. All traffic directed to the American Red Cross, Salvation Army and other relief organizations for food, clothing and medical supplies will pass through the net control station. This traffic will then be cleared to its destination through another radio circuit, by wired wireless, private lines or land lines that are available to the Net Control Station. Messages to the Coast Guard Station at Philadelphia and Baltimore will be handled in a similar way. The Net Control Station will have sufficient help from the Alternate Station and other amateurs to cope with the traffic for relief, power boats, medical supplies and will reduce confusion of relief messages that usually occurs during an emergency as a result of over ambitious stations picking up messages and starting them to a destination without authority. A supplementary net will be built up to take personal traffic from the emergency net at such times when the emergency traffic will permit.

The Key Stations located along the Susquehanna River will explain the function of the Net to their local authorities and relief agencies. The Susquehanna Emergency Communications Net holds tests at intervals, eliminations and additions being made as necessary. Should an emergency arise along the Susquehanna River Watershed, the net will be called to order either by radio or telegraph and scheduled.

Stations already affiliated with the Susquehanna net include W8MAH AVK EA VI BKT AYG RH BYK MFD CNA KQ DEC CEX DHG CHU W3UA AVX WX.

—*W3UA*

BRASS POUNDERS' LEAGUE

(March 16th–April 15th)

Call	*Orig.*	*Del.*	*Rel.*	*Extra Del. Credit*	*Total*
W8JTT	714	3	1188	2	1907
K6OGD	246	278	1156	200	1880
W1IST	536	192	930	—	1658
W3FTK	68	94	1442	23	1627
W1IOR	419	308	504	42	1273
W1HSX	235	96	708	27	1066
W7DUE	89	32	868	23	1012
W1INW	40	51	868	—	959
W9ESA	51	109	706	70	936
W1JXP	116	147	640	16	919
W6MTP	5	49	737	46	837
W6DH	42	122	536	122	822
W1IP	7	42	718	20	787
W1IHI	58	60	610	5	733
W38N	131	146	443	—	720
W3EOP	73	11	608	—	692
W9EBX	5	5	5	616	631
W1AKS	105	127	392	—	624
W4IR	30	67	488	39	624
W1GTN	148	38	426	—	612
W5CEZ	71	102	406	26	605
W7DRD	6	75	513	—	594
W3QP	129	230	—	230	589
W9RMN	8	20	21	534	583
W6IOX	61	139	244	138	582
W7EBQ	10	29	532	10	581
W6JTV	92	154	197	136	579
W8LSF	22	43	429	79	573
W1IWC	22	23	516	4	565
W8QAN	39	69	382	65	555
W2GGE	15	63	444	27	549
W1INU	377	106	61	1	545
W2EGF	26	39	459	15	539
W1INA	47	83	400	5	535
W8CSE	12	79	391	41	523
W6BMC	2	13	497	6	518
W6ITH	84	201	80	150	515
W8OEO	20	45	424	24	513
W8MOT*	21	4	483	4	512
W1IOT	47	426	33	1	507
W3BWT	36	48	384	34	502

MORE-THAN-ONE-OPERATOR STATIONS

Call	*Orig.*	*Del.*	*Rel.*	*Extra Del. Credit*	*Total*
KA1HR	1012	724	572	709	3017
W1GOJ	43	215	538	—	796

These stations "make" the B.P.L. with *total* of 500 or over. One hundred deliveries + Ex. Del. Credits also rate B.P.L. standing. The following one-operator stations make the B.P.L. on deliveries. Deliveries count!

W1UE, 217 — W6RF, 140 — W3GTS, 112
W6IMI, 196 — W3CIZ, 134 — W1FSV, 105
W8FLA, 196 — W5ZM, 119 — W9GMT, 104
W1FRO, 167 — W8JQE, 115 — W8CEU, 103
W3BKZ, 163 — W3FXZ, 113 — More-than-one-opr.
W8MQX, 158 — W5AAJ, 113 — W3ECA111
W2PF, 140 — W6GVU, 113

A.A.R.S.

Call	*Orig.*	*Del.*	*Rel.*	*Extra Del. Credit*	*Total*
WLVH (W6BMC)	10	11	750	3	774
WLMA (W8YA)	17	2	587	—	606

WLGK (W1IEG) made the B.P.L. *on 100 message deliveries.*

MORE-THAN-ONE-OPERATOR STATIONS

Call	*Orig.*	*Del.*	*Rel.*	*Extra Del. Credit*	*Total*
WLM (W3CXL)	383	338	2014	—	2735

A total of 500 or more, or 100 *deliveries* Ex. D. Cr. will put *you* in line for a place in the B.P.L.

* Feb.–Mar.

How's DX?

How:

No doubt it's a little unfair to inflict a gentle peeve on this column's faithful readers, but there's no time like the present, since our subject is a timely one. But, with all due respect to the *other* branches of amateur radio, we have always sort of looked up to the DX contingent as the last gasp in amateur radio with respect to technical things. They seem to be the ones that pick up the latest developments first, utilizing every new gadget to improve their operating range. Usually they haven't failed us, what with new antennas, higher efficiency finals, better receivers, and the like. And along these lines, they should be the most careful observers of cosmic phenomena, because a knowledge of the vagaries of the ionosphere is helpful in determining operating times and frequencies. Some of the DX men do a swell job on this, as for example, the "DX Calendar" arrived at by W6CUH, and some of the very complete logs kept by a number of the foreign amateurs. But why leave it to just a few to struggle along when we have a legion of observers throughout the country, admirably situated to notice unusual conditions? On April 25th there were two or more complete "fade-outs," when the bands were almost completely devoid of signals for periods of 20 minutes or so. Being Sunday, there were a great number of stations on the air, caught in this demonstration of cosmic whimsy, and all with a perfect chance to collect and forward data on it to us so we could send it to Dr. Dellinger, who really studies the thing. Oh, sure, we received reports on the fade-outs—about six! Six of our ranks interpreted the fade-out for what it was, and 4996 thought their receivers were dead or that no one was on the air. A fine example of something or other.

Where:

Among the more favorite pastimes during dull moments is looking through the Call Book for VE5 stations above the Arctic Circle and VK4 stations in Papua. Passing swiftly past the VE5 subject, we are pleased to report that at last a VK4 in Papua has been found—and not only found but worked! Yes, W8KKG down in West Virginia, who does plenty in a DX as well as a traffic way, worked VK4KC the other day for the Papuan station's first W contact, and W8LEC also reports a QSO with him. .. .. .. W6GPB is on the happy side again. He received a QSL card from CR9AB in Macau, establishing the authenticity of the station previously suspected of being a phoney. Joe says that the note and fist of the CR9 were probably responsible for a mix-up on the call, since he heard several W6's calling the station, each calling him something different .. .. .. There is an addition to the HS1PJ-HS1RJ combine; the call is HS1BJ .. .. .. CN1CR, reported a few months back, confines his work to 7 Mc. so far. He sent us a card to forward to B3BNB, but the call stops us. Any suggestions? .. .. .. According to W8LEC, FK7KW was not a phoney, but is an unlicensed station in Honduras. He used to sign HR1TC, also unlicensed .. .. .. Pan American Airways deserves a plug at this point. In pioneering trans-Pacific air travel they have set up a sweet communications system covering the Pacific, and a number of their operators are hams or ex-hams. As a result, information is made available that might not otherwise be known. Take W6BVL, for example. He was stationed at Wake Island for a while, and although he had very little time for hamming, did manage to get in a few licks on the 7-Mc. band. With limited time and a 53 oscillator doubling to 40, he worked all of Asia and as far east as W4, and got a heard card from England. On 20, at any time of the day or night he could hear Europe, Africa, and South America. George says, "I'm willing to wager there isn't a better location in the world. It would be a paradise if we could spend a few hours a day on the air with a '10 or so." Incidentally, the PAA transmitters operate on five frequencies between 2.9 and 16 Mc., and any of the frequencies is immediately available by simply manipulating a telephone dial.

When:

The recent severe magnetic storms, plus the natural letdown after the DX contest, have put a crimp in DX activity. But the dyed-in-the-wool DX-er doesn't let things like that stop him, so we have a few items to report .. .. .. It will soon be possible to make WAC on 56 Mc., if activity in the various continents is any key. Latest addition to the list of regular experimenters on that band is LU7AZ, whose 56,300 kc. signal will be on every Monday, Friday, and Saturday at 5 to 5:30 P.M., EST, from now until September, according to W1JIL. The power used is 300 watts .. .. .. W2BHW reports a QSO with XU8SM (14,020 kc.) at 7 A.M. .. .. .. W2GTZ, whose country total comes to 99, admits DX is spotty, and to prove it lists as worked MX2B, XU6AZ, PK4KO, PK3LC, PK3WI, U9MI, U9ML, U9MF, U9MJ, U9AV, U9AF, U9AW, U6SE, K6OJG, and OX3M. Heard were XU8HW, XU6SW, XU8JR, VS8AA, VS7RA, VS7MB, and VP8B. Yeah, it sure is spotty! .. .. .. In the early yawning between 6 and 7 A.M., W6MCQ hears

JOHN BUTCHER, G5XG, HAS A LOW-POWER RECORD THAT SHOULD END ALL LOW-POWER RECORDS

The British station has been doing some remarkable work with a 20-watt grid-modulated 'phone on 14 Mc., having made WAC and WBE five times since last May, but the topper was during a QSO with W4DAY of Rome, Ga. Trying several reductions of power, he got down to 2½ watts input (75 mils antenna current) and was still S4. DAY told him to go ahead again, and this time the English station announced that his plate input and antenna current were both zero, but he was still S3–4! As far as he can determine, his final was perfectly neutralized, so there was no controlled-carrier or other effect. W9YGC was also listening to the test and will confirm it. The result is an all-time QRP record, a real "no power" achievement. You can tie it but you can't beat it!

(Remember, this column reports these things as they are told to us, so don't take issue with us. We're still receiving applications for our DX expedition!)

VS1AD (14,330 kc., T9) and VU2DY (14,340 kc., T8). The VU is in Burma, you know, which counts as a separate country from India, and a tip on VS1AD is that he tunes from the high-frequency edge .. .. .. Iowa is well represented this month by W9LEZ, who peeped up above the tall corn long enough to let us know about U1AD (14,440 kc.),

SP1GZ (14,050 kc.), 1IIV (13,390 kc.), TG1AM (14,030 kc.), U5AE (14,450 kc.), U9MF (14,450 kc.), PZ1AL (14,460 kc.), PZ1PA (14,415), VQ8AA (14,300 kc.), and PK3BM (14,350 kc.) .. .. .. W6GPB reports VP9Q (7100 kc., T8), good DX for the West Coast. The 14-Mc. Africans come through around 1600 GMT out there.

What:

With the feeling that there are a great number of technical hints that will help out in the working of bigger and better DX, and with the hope that our readers will see fit to contribute such material as they feel will be useful, a new section is ushered in this month. Under this heading we plan to pass on those little tricks that have helped some stations become more successful than others. We'll appreciate any brainstorms you may have .. .. .. One of the simplest and most effective things to try is that of tuning the receiving antenna. W6JMR recently changed over to it, and is now wildly enthusiastic, saying that it brought the weak ones up several points. A still better idea is to use the transmitting antenna for receiving, installing a switch or relay to make the change .. .. .. W6MX gets away with two stages of air-tuned iron-core I.F. stages in his super-het by tapping the grids and plates only one-third of the way up on the coils. In other words, the air trimmer tunes across the whole coil, but the plates and grids are tapped down two-thirds of the way. There is no tendency towards instability, and the resultant selectivity is something to get worked up about. Walt says his preference in coupling between high-frequency oscillator and mixer is the inductive method used in Jim Lamb's original version of the s.s. super. A 6J7 is the mixer tube.

Who:

We were afraid it would happen, and so weren't terribly surprised. But it would have been nice if the score had come in soon enough to include in last month's write-up of the DX Contest. Yep, the highest score turned in for the c.w. portion is that of W2UK, whose claimed 123,216 points look awfully, awfully good. 272 contacts in 72 different countries did it .. .. .. An English station that always seems to be in on things is G2PL. The first to make a 5BTOC (with VE1EA), he has swung the trick again, this time with W1BB, which makes the Massachusetts station the first W to work it. They set up some sort of a speed record, too, accomplishing the feat of a QSO on 160, 80, 40, 20, and 10, all between 0000 and 2340 EST on April 10th. Solid 100 per cent QSO's were had on each band, with a full exchange of reports and plans for the subsequent schedules .. .. .. W2GTZ, who has a sked with him, advises that VK6SA is on the lookout for contacts with South Dakota and Nevada. Reeve has kept the sked for some time now, and finds it more enjoyable all the while .. .. .. ZS1AH wants to work a station in Wyoming for his WAS, advises W9TWT, and W8OPB pleads for G6GH (14,320 kc.), who needs New Mexico, Arizona, Montana, Nevada, Utah, Nebraska, Wyoming, and Iowa .. .. .. If any of the active 14- or 28-Mc. men in Nevada, Wyoming, and the other rare states will let us know that they're on, we can perhaps give the foreign stations some encouragement and a tip or two. And we'll guarantee the W station plenty of DX! .. .. .. Out of the 288 WAS certificates that have been awarded, four went to foreign stations: XE2N, XE2C, K6CGK, and OA4J .. .. .. W2IXY, who does things in a 'phone way, worked SV1KE for 3 hours and 35 minutes one evening, which should qualify them for RCC several times over.

—*W1JPE*

Briefs

A short Short Story: "Sell or trade for BC receiver: Aero automatic short wave tuner; 5 dial omnigraph mounted on baseboard with key and buzzer." (From *QST*, July 1931.)

The Columbus Amateur Radio Association announces its Field Day, incorporating a 56-Mc. Treasure Hunt and Family Picnic, for Sunday, June 6th. The place: "The Trees," 8 miles north of Columbus, on Route 23 to Worthington, Ohio. Follow arrows to "The Trees." The Hunt starts at 10:00 A.M. from Worthington. R. H. G. Mathews, W9ZN, Central Division Director, will be present. Bring the YL, YF and junior ops and your own basket lunch. Free coffee and lemonade. Registration 50¢, includes treasure hunt and chance at prizes. There will be games, swimming, golf, fun for all. Don't miss this Gala Event!

When the government radio station at Bayamo, Cuba, broke down April 7th, CM8GV handled official dispatches until repairs could be made.

W1INB, Narragansett, R. I., suggests that amateurs sign the name of their state after each CQ to indicate at once the location, thus: CQ CQ de W1INB RI K. This would be helpful when we're searching for a particular state and would save wear and tear on call books.

Hams Afloat

W3GBB is operating aboard the S.S. *Plow City*, KJVG, a coastwise freighter plying between Galveston, Texas and Atlantic coast ports. The transmitter on KJVG uses a 50-watter. W2ITH is deck steward on the T.S.G. *Shawnee*, WOBG, running between New York and Miami. W5BJ pounds brass on the *Cities Service Koolmotor*, WGAO. W9RTG is chief operator on the S.S. *Pannco*, WECY. W4CPL is still pushing 'em out on the S.S. *Colorado*. W3BDH is an operator on the S.S. *Santa Barbara*. Chief operator on the S.S. *Exochorda*, WBEF, is W2BVJ; this ship runs from N. Y. to the Mediterranean and W2BVJ will be glad to listen for any hams; address him: C. A. Luckenbach, S.S. *Exochorda*, American Export Lines, New York.

OA4AB, Oroya, Peru (radiophone, 14064-kc.), is expected to work with the American Museum of Natural History solar eclipse expedition to Peru in contemplated broadcasts to New York. W2ZC may handle the N. Y. end.

Time Signals

W1HWZ passes along the following information: Official radio time is available from Ottawa, Canada on 7335-kc. 24 hours per day, accuracy to .02 sec. Dots each second miss 29th second (½ min.), 55th to 59th sec. (min.), 50th to 59th sec. (5 mins.), and 40th to 59th sec. (½ hour and hour).

WILL Ham Forum

The "Ham Forum," 10:00 A.M. Saturday feature of WILL, the University of Illinois radio station, for several years, is now on the air on 580-kcs. since the station's change of frequency April 19th. In charge of this weekly hamfest is Bill Livesey, W9MLH. The "Forum" presents news of mid-Western amateur affairs and sponsors periodic code speed, interference and other contests. The program was started by Fred Wiley, W9ACZ. Last summer it was carried on by Dan Hazen, W9HUM, who is one of the three student operating engineers of WILL who also have amateur stations. Others are Walter Sparf, W9SZP, and Frazer Leslie, W9RLV. A. James Ebel, the station's new chief engineer, is licensed as W9KJV. He replaced W. E. Phillips, W9CMZ, who now has other connections.

W1ZO (portable), set up at the Leisure Show, Mechanics Hall, Boston, worked Ohio, Georgia, Washington, Indiana, Canal Zone and Hawaii on 3.9-Mc. 'phone during the Show. The same Collins rig used was taken to Siberia with the Harvard Expedition.

Briefs

W9RMN lives on *Telegraph* Road, Waukegan, Ill. He's a C.W. man, too!

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1.75-Mc. 'Phone Round Table

On Easter morning, 1937, fifty-two 'phone stations in thirty states, coast-to-coast, all operating on frequencies between 1955 and 1965 kcs., took part in a "round table" QSO party, organized by Lloyd Miller, W8NYY, O.P.S., Akron, Ohio. The stations were selected in advance as consistent at W8NYY and were invited by card to participate. Starting at 2 A.M., EST, W8NYY called the roll in numerical and alphabetical order. Each station then called the Round Table for one minute while the rest listened, and after the round each station reported the other stations heard, with signal reports. The party lasted until 6:20 A.M., and a "good time was had by all." Souvenir QSL's were sent to all participants.

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Alberta Hamfest

The Northern Alberta Radio Club will stage the Alberta Hamfest in Edmonton, Alberta, Canada, July 10th and 11th, and a cordial invitation is extended to all hams. Address inquiries to A. Stollery, Sec'y, N.A.R.C., 10608 73rd Avenue, Edmonton.

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Hams who do some listening on the BCL channels will be interested to know that Eddie Green, comedian, who is heard on the NBC Blue Network at 9:00 P.M. (Eastern Time), Fridays, is one of the gang—W2AKM.

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W5FBQ, Dallas, Texas, claims that he has worked all states five times and has at least five QSL's from every state (including five from Nevada!). He works 7 and 14 Mc. with 30 watts input.

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Columbus A.R.A. Field Day

May *QST* mentioned the work of W9WIJ, Des Moines, Iowa, during a snow and ice storm in early April. Word has now been received of the amateurs who worked with him. A severe storm on the night of April 3d disabled all normal communication out of Mason City, Iowa. Amateur radio was used to bring news from Des Moines to this city of 25,000. Radiophone W9GLR was on the receiving end at Mason City, W9WIJ transmitting at Des Moines. W9YWG, Charles City, assisted in relaying between W9GLR and W9WIJ.

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The Louisville and Nashville Railroad Company is desirous of forming an emergency net to handle L. & N. traffic in the event of failure of regular communication facilities. The present thought is to work out a trunk line for possibly each railroad division, having a control station for each line, with the master control located in Louisville, the location of the company's general offices. The trunks will operate on a spot frequency. Amateur operators interested in coöperating in such a project, and being properly located geographically to fit into an L. & N. network, are requested to communicate with Mr. D. A. Downard, W9ARU, Room 700, Accounting Dept., Louisville & Nashville Railroad Co., Louisville, Kentucky.

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W1KJP, East Lyme, Conn., is interested in forming a traffic net for W1's under twenty years of age. Anyone interested should get in touch with W1KJP, giving opinions on the time such a net should meet, what days, frequencies, etc. Address Ralph W. Curtis, Box 51, East Lyme, Conn.

"The sentiment seems to be, 'Give a good report and the other fellow will give you one'. That isn't right. Let's have true reports and not a lot of applesauce."

—*WAAXP*

Speaking of rag chewing, W9LEZ knows how it's done. On April 4th he worked the following stations, in the order given. The length of each QSO is indicated with the call. LEZ was on 14,002 kc.: W9IQY 14 mins, W4CSZ 48 mins, W8EKC 51 mins, W6NQG 8 mins, W7FUR 35 mins, W2JWZ 9 mins, W3BSB 36 mins, W1HWH 93 mins. A total of 294 minutes of QSOing with 8 stations, each in a different district, for an average of 36.75 minutes per QSO.

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ELECTION NOTICES

To all A.R.R.L. Members residing in the Sections listed below:

(The list gives the Sections, closing date for receipt of nominating petitions for Section Manager, the name of the present incumbent and the date of expiration of his term of office.) This notice supersedes previous notices.

In cases where no valid nominating petitions have been received from A.R.R.L. members residing in the different Sections in response to our previous notices, the closing dates for receipt of nominating petitions are set ahead to the dates given herewith. In the absence of nominating petitions from Members of a Section, the incumbent continues to hold his official position and carry on the work of the Section subject, of course, to the filing of proper nominating petitions and the holding of an election by ballot or as may be necessary. Petitions must be in West Hartford on or before noon of the dates specified.

Due to resignations in the Eastern Florida and Northern Minnesota Sections, nominating petitions are hereby solicited for the office of Section Communications Manager in these Sections and the closing date for receipt of nominations at A.R.R.L. Headquarters is herewith specified as noon, Tuesday, June 15, 1937.

Section	*Closing Date*	*Present SCM*	*Present Term of Office Ends*
Maritime *	June 1, 1937	Arthur M. Crowell	June 14, 1937
North Dakota	June 1, 1937	Hartwell B. Burner	June 14, 1937
Nevada	June 1, 1937	Edward W. Heim	June 14, 1937
Sacramento Valley	June 15, 1937	George L. Woodington	Apr. 15, 1937
Idaho	June 15, 1937	Nellie Hart	Mar. 1, 1937
Ga. Cuba-I. of P.-P. R.-V. I.	June 15, 1937	Bannie L. Stewart	Dec. 14, 1936
Oklahoma	June 15, 1937	Carter L. Simpson	Feb. 15, 1936
So. New Jersey	June 15, 1937	Carrol D. Kentner	May 8, 1937
Northern Texas	June 15, 1937	Richard M. Cobb	Apr. 15, 1937
Eastern Florida	June 15, 1937	William C. Shelton (resigned)	.....
Northern Minn.	June 15, 1937	Leonard Hofstad (resigned)	.....
West Virginia	July 1, 1937	Dr. Wm. H. Rheidaffer	July 12, 1937
Arizona	July 15, 1937	C. C. Day	July 24, 1937
Eastern Pa.	July 15, 1937	James M. Bruning	Aug. 7, 1937
Alaska	Aug. 16, 1937	Richard J. Fox	Sept. 3, 1937
Eastern Mass.	Sept. 1, 1937	Albert N. Gliddis	Sept. 16, 1937
Eastern N. Y.	Sept. 1, 1937	Robert E. Haight	Sept. 16, 1937
So. Carolina	June 15, 1937		

* In Canadian Sections nominating petitions for Section Managers must be addressed to Canadian General Manager, Alex Reid, 169 Logan Ave., St. Lambert, Quebec. To be valid such petitions must be filed with him on or before the closing dates named.

1. You are hereby notified that an election for an A.R.R.L. Section Communications Manager for the next two year term of office is about to be held in each of these Sections in accordance with the provisions of the By-Laws.

2. The elections will take place in the different Sections immediately after the closing date for receipt of nominating petitions as given opposite the different Sections. The Ballots mailed from Headquarters will list in alphabetical sequence the names of all eligible candidates nominated for the position by A.R.R.L. members residing in the Sections concerned. Ballots will be mailed to members as of the closing dates specified above, for receipt of nominating petitions.

3. Nominating petitions from the Sections named are hereby solicited. Five or more A.R.R.L. members residing in any Section have the privilege of nominating any member of the League as candidate for Section Manager. The following form for nomination is suggested:

(Place and date)

Communications Manager, A.R.R.L.
38 La Salle Road, West Hartford, Conn.

We, the undersigned members of the A.R.R.L. residing in the ..... Section of the ..... Division hereby nominate ..... as candidate for Section Communications Manager for this Section for the next two-year term of office.

(Five or more signatures of A.R.R.L. members are required.)

The candidates and five or more signers *must* be League members in good standing or the petition will be thrown out as invalid. *Each candidate must have been a licensed amateur operator for at least two years, and similarly, a member of the League for at least one continuous year, immediately prior to his nomination or the petition will likewise be invalidated.* The complete name, address, and station call of the candidate should be included. All

such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon of the closing date given for receipt of nominating petitions. There is no limit to the number of petitions that may be filed, but no members shall sign more than one.

4. Members are urged to take initiative immediately, filing petitions for the officials for each Section listed above. This is your opportunity to put the man of your choice in office to carry on the work of the organization in your Section.

—*F. E. Handy, Communications Manager*

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed in a number of Sections, as provided in our Constitution and By-Laws, electing the following officials, the term of office starting on the date given.

East Bay	H. J. Burchfield, W6JTV	April 15, 1937
New Mexico	Joseph M. Eldodt, W5CGJ	April 15, 1937
Rhode Island	Clayton C. Gordon, W1HRC	April 15, 1937
Western Florida	Ellis R. Curry, W4BSJ	April 15, 1937
Indiana	Noble Burkhart, W9QG	April 15, 1937

In the North Carolina Section of the Roanoke Division Mr. H. S. Carter, W4OG, Mr. Gordon S. Smith, W4BX, and Mr. W. J. Wortman, W4CYB, were nominated. Mr. Carter received 69 votes, Mr. Smith received 35 votes and Mr. Wortman received 33 votes, Mr. Carter's term of office began March 18, 1937.

In the New York City and Long Island Section of the Hudson Division Mr. Edward L. Baunach, W2AZV, and Mr. Robert L. Poucel, W2AYJ, were nominated. Mr. Baunach received 246 votes and Mr. Poucel received 158 votes. Mr. Baunach's term of office began April 22, 1937.

STATION ACTIVITIES

CANADA

MARITIME DIVISION

MARITIME—SCM, A. M. Crowell, VE1DQ—EY tops the list this month. HJ is getting ready for the Field Days with air-cooled gas engine and generator to power his portable. JK schedules CU Mon., Wed. and Fri. 12:45 P.M. and CD nightly at 6:30 P.M. HH resigned as R.M. and cancelled all schedules due to lack of time. GL is going on 14-Mc. 'phone. CO completed a new 'phone transmitter for all bands. AF is working 3.9-Mc. 'phone daily. AP is experimenting on all bands. AC is sticking to 3.5 Mc. but building 'phone rig. CW is doing FB with 10 watts. BD is doing well on 14-Mc. 'phone. KQ is new man in Bathurst using a single '45 on 3.5 Mc. JO sends some nice dope on the Fredericton gang. BO, HB and AM are active on 56 Mc. BO and HB got a write-up in the *Telegraph Journal*. HM blew a '10 recently. 9AS is active now. BX blew two '80's. HM built a swell bug—all brass and stuff. AJ wants to hold a hamfest. EV sends us the dope on the M.A.R.C. boys. BB visited the local gang on his way home from Halifax, accompanied by R.C.M.P. escort IL. GS is swatting Aussies with single '45 TNT. KO had his key klicks eliminated by having his skyhook cut down by B.C.L.'s. FF is getting into shape with 6L6's in parallel. IR of Sussex is a new member of M.A.R.C. GI is back on 14 Mc. after much bug hunting in the final. IJ is going on 56 Mc. CX is dusting off the 56-Mc. rig for portable. DI accepted a new position in St. John; we wish him luck. KJ works scads of W4's and got an RST 579 from England. The L.C.A.R. of St. John held a meeting at Ketepc, a summer resort about five miles from town. The boys had to cut the wood for the two large fireplaces. FL, GP, GQ, and BF acted as self-exciters when it came to splitting the wood, but EJ and EE formed a great push-pull rig on the cross-cut saw. GP's YF and GQ's YL supplied the eats for hungry hams. HL, the president of the club, gave a talk on sound, which was supplemented by "talkies." The S.C.M. would like to hear from all the gang interested in re-organizing the Maritime Traffic Net. If you are on c.w. and interested in traffic, let us have your ideas on this topic. FLASH—The Halifax Amateur Radio Club announce the dates for the Maritime Hamfest as Sept. 4th–5th–6th. WATCH FOR DETAILED ANNOUNCEMENT NEXT MONTH. The H.A.R.C. station has been issued the call VE1MK. Newfoundland News (via VO1W): VO1A is importing an "All Star" kit of transmitter parts. VO1C is plugging away with a single '45. VO1D is very pleased with his new Sky-Challenger. VO1H changed his portable rig from pair of '41's in P.P. to 6L6 crystal on 3800 kc. VO1I as active as ever on 14-Mc. 'phone, also schedules VO4C daily on 7 Mc. VO1J has a 6L6 crystal on 3.5-Mc. c.w. now in addition to the Collins which is kept on 14-Mc. 'phone. VO1K has single 6L6 crystal on 3.5, 7 and 14 Mc. and is working Europeans on 3.5 Mc. VO1M is quite active on 3.5 and 7-Mc. c.w. VO1N is quite active on 28 and 14 Mc. VO1O is going places with his 6L6 e.c. osc. and pair in final on 3.5 Mc. VO1P's two rigs on 3.5- and 14-Mc. 'phone and c.w. are working FB; 100 watts on 3.5 and 150 on 14, remote-controlled. VO1Q, an op. years ago, is back again on 1.75 Mc. VO1S schedules VO4C on 3.5-Mc. 'phone every night. VO1U is using a 211 osc. with 700 volts on the plate. VO1W is active on 3.5- and 7-Mc. c.w. and has grid-mod. 'phone on 3.5. VO1X with 50 watts on 14-Mc. 'phone is going places. VO1Y is active on 3.9-Mc. 'phone with 15 watts. VO1Z is heard on with single '10. VO2N is active Sunday mornings on 14 Mc. VO2S is active on 3.5 Mc. VO3's active: VO3O, VO3P, VO3R, VO3Y, VO3X. VO4A is active with his Gross CB25. VO4C is on 3.9-Mc. 'phone as well as c.w. on 3.5 and 7 Mc. VO4K is heard working VO2S. Also active are VO6L, VO6Q and VO6W. The VO1 Club is trying to get a room and then put together a transmitter.

Traffic: **VE1**EY 105 HJ 18 JK 16 EV 15.

ONTARIO DIVISION

ONTARIO—SCM, Fred H. B. Saxon, VE3SG—R.M.'s: ABW, DB, GT, MB, QK, TM, WK, WX. P.A.M.: NX. The VE/W contest was a great success. EO incorporates a fan in his half kw. rig. AEJ is a member of the R.C.C. ZQ (Ottawa) has commercial ticket. TY finally hooked a VK. YE has one-watt carrier on 1.75-Mc. 'phone. ANA is the OM of JU. AGV sends nice report on AKL at Camp Borden. The "SCM's Cup," donated by QK for Field Day operation, and won last year by KM is up for competition again this year and must be won three times by a station before it becomes the property of that station How about it, fellows, are you going to let KM win it again this year? Your S.C.M. made enquiries at A. & A. Radio and was told they are sold out of the NON-CONDUCTIVE solder advertised on page 37 of their catalogue. TG has new rig with '03A's Class B and 100TH in final on 14 Mc. The Hamilton gang are quite proud of their 56-Mc. work. ADO is holding up the end of the Toronto gang on this band. WW had the call 4XF before coming to this Section, and now has to use power from a gas engine plant. HP (Chatham) has made W.A.C. AGQ has two-letter call now—VU. YY is applying for O.P.S. PE is qualifying for O.R.S. DH (St. Catharines) is new O.R.S. MB sent in his thirty-second consecutive report. ES is member of A.E.C. Supporting Division. The Beamsville gang took in the Buffalo hamfest on April 10th and FH is reported as having had an FB time there. UA worked a VK. FW got himself a ZO. GS has a T55 as buffer, ZU, FQ, GS, GB and VB are on 56 Mc. at the Lakehead. FW invites all ops, ham or commercial, to visit the Lakehead Wireless Experimenters' Club Room in the KAM Club Building when in Fort William or Port Arthur. PE has pair of T20's final. ACN is president of Brantford Club which is getting gear ready for the Field Day. YQ is having fun getting a 7-Mc. crystal tp perk. HX has T20 and a pair of 35T's in Class B and has gone to 14 Mc. DB is bragging about his DX with 125 watts to an 860. ZG is on 7 Mc. with a T55 final. VC has 300 watts on 7 Mc. TP is staging a comeback—had that call 1921–1925, 1OBQ on 1200 kc. from 1926–1934, and is now expecting to raise a crop of QRM on 1.75-Mc. 'phone. AW is fighting 14 Mc. with a pair of '46's. BZ and OC are back on 3.5 Mc. OH is now crystal-controlled. AKR is working DX on 1.75 Mc. ZO has 5 watts on 1.75 Mc. AHL has new super. QL is rebuilding for higher-power 'phone. AIL is operating all bands. VN worked 20 VK's during first half of April. AGG had a visit from 2AR. VZ has antenna up again. KR is moving to Lake Erie for the summer. ABW schedules 2LC in Montreal, using cross band, 7 to 3.5 Mc. 9AL is putting in band-switching exciter and changing final over to RK38's in place of '52's to put big rig on 28 Mc. Very sorry to hear that ABC lost his mother in March. EK, KG, ABC and 4RA have round table talks Sunday mornings on 7 Mc. FLASH—GT had 238 contacts in 51 sections in the W/VE contest.

Traffic: **VE3**SG 210 QK 148 WK 143 TM 74 MB 68 DH 67 SS 56 HV 52 ABV 46 DU 28 AGM 14 OI-WZ 12 LI 9 GT-AKL 7 NC 6 KM-TO 4.

QUEBEC DIVISION

QUEBEC—SCM, Stan Comach, VE2EE—New QTH's: EX is now located in the Hams Paradise; FG we understand is in N.D.G., with HP close by; DU is almost next door to IE; JK has moved a little closer to JJ and LC is the fourth within 300 yds. of the S.C.M. FO is building a home at Senneville and has the angles marked out for his Diamond beam. KK lost an RK-20. BO is new member of the Rag Chewers Club. CV is a newcomer at Clova. Cupid has scored a hit at BW. W2BNX is with us for another summer at Belmont Park and this time Bill brings with him his YF. Congrats. HG is due for congrats also; he worked all continents on 'phone; this gives *our* district the only two W.A.C. 'phone tickets in Canada. DF of Quebec City is new W.A.C. AB has purchased an oscilloscope. 3DA of Ottawa was a visitor at HT. BU built a new exciter unit. JD is using a pair of T55's. IN has been playing around with a modulator. KM is still rebuilding. LC is pinch hitting as Trunk Line op. LU built a new power supply. EC is building a new exciter with 6L6 osc. DR has been having trouble with his receiver. CO sold out. Your S.C.M. is going to rebuild with new rack. LV is using a T20 final. DQ is going 'phone in a big way. EW blew two tubes in new final. CR wants to trade ten chickens for an Eimac 150T! Hats off to AX, top VE in DX Contest, with a score of 62,000!! BK is a newcomer on 14-Mc. 'phone. DN, the station at the Club Les Amateurs Canadien Français, is soon to be put on 'phone; FS is building the modulation equipment. JY is the proud owner of an RME69 with noise silencer. BH is rebuilding his battery-operated station. IP and EU are active on 7 Mc. HZ has completed his transmitter. AB and DW were visitors at the aforementioned club. EV is active on all 'phone bands. KZ had to pack up 79 tubes to move. AH has been transferred to Toronto; another good man gone VE3. CA has deserted 14 Mc. for 28 Mc. Miss DA is very anxious to get down on 14 Mc. ER has moved bag and baggage to Ottawa. FF has bought a Sky Buddy. FO brought a new Ultra Sky Chief across the line. KS is rebuilding to 'phone. BG is building special rig for 28 Mc. GA works 14 Mc. occasionally. The date: July 1st. The event: M.A.R. Club picnic . . . keep in touch with us for further details. FLASH—2DQ shagged U9AW for W.A.C.

Traffic: **VE2**AB 15 HT 52 BU 33 KM 6 LC 58 LU 16 KF 22 EC 15 IN 6 DR 40 HH 27.

VANALTA DIVISION

ALBERTA—SCM, Alfred D. Kettenbach, VE4LX—EA works good DX on 14-Mc. 'phone. PH tried 'phone and went back to c.w. LQ is working four bands regularly. HJ is new Edmonton call and is secretary of N.A.R.C. VJ tried new vertical antenna on 14 Mc. AEN made 100 QSO's in month. ADM popped 7-Mc. crystal and is trying electron-coupled oscillator. ABH is using beam antenna on 28 Mc. BW is back at old QTH, on the "Civilized" (3.9-Mc. 'phone) band and has FB new shack in attic. HM gets a kick out of 28-Mc. 'phone. XF uses electron-coupled oscillator to drive '45. FR is building 14-Mc. rig. BJ, LG, SZ and UY are heard on 3.5-Mc. 'phone. AEF in Irma gets FB reports on 1.75-Mc. 'phone with input of 5 watts. N.A.R.C. held monthly club meeting April 10th, with good attendance. Impromptu speeches by EA, AH and QX were much enjoyed by all. JO of Cadogan is in the hospital, Edmonton. Plans for the Alberta Hamfest at Edmonton, July 10th–11th, to be staged by the N.A.R.C., are going ahead and an entertaining and instructive time is assured all those attending. LX visited HM in Edmonton. SW is breaking into the traffic game. CT rebuilt and is getting out FB on 14 Mc. GD is chasing DX. Ex-KN was renewing old acquaintances in Alberta during the Easter holidays; he is now located at Kelowna, and operating under the call 5QW. KX is piling up a nice total of countries worked. GE worked 150 stations in 46 sections in the W/VE contest. Nice going, Stu. LL increased power. IN is our most consistent 3.9-Mc. 'phone station.

Traffic: **VE4**GE 20 LQ 15 SW 14 LX 7 QK 5.

BRITISH COLUMBIA—SCM, D. R. Vaughan-Smith, VE5EP—The 1.75-Mc. gang held a meeting at 5UP's. Twenty-two were present. 5AS was chairman. The Island Net now operates on a spot frequency of 1752 kc. at 8:15 nightly. On April 3rd the B.C.A.R.A. held its big party. 5EH at the key of 9AJ hooked a ZS during his contest time on the air. The Trail-Rossland Club is going and planning a Field Day soon. 5CH gave the Victoria Club an interesting talk on secrecy in telephone transmissions. DQ walked the plank with DF's sister. DV's first QSO on 14-Mc. 'phone was CE3DC. HG, ex-AY, uses 35T on 3.9-Mc. 'phone. HP took a run over to Vancouver and helped the boys at the Vancouver Club make merry. IL runs off the odd bit of DX with new Sky Hook. MG claims honors for tallest ham in Victoria, 6 ft. 7 inches. OR has gone to England to join the R.A.F. SP is planning a pair of T20's in final. Two new Victoria calls, EK and RB. SW is new O.R.S. and takes OK's place with Vancouver schedule while OK takes JL's place on Anyox and JL moves up to the Snohomish. AV supervises this report. Hi. NG got her RK-23 to perk at last. GF put in Tobe band spread tuning in his noise box. EO left us for Taylor windfall. KQ was in the VE-W Contest. The 6 o'clock round table is busily engaged in a cable count vs landline controversy.

Traffic: **VE5**AV 22 KQ 24 ND 21 HP 37 FG 50 UK 14 EP 26 SW 6.

PRAIRIE DIVISION

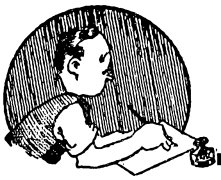
MANITOBA—SCM, A. J. R. Simpson, VE4BG—GL has installed a pair of 814's. IP keeps on the 14-Mc. 'phone band. KX is in California, and we will probably hear him over a W6 during his vacation. We welcome KU back to the 14-Mc. c.w. band. The LH brothers have their Class B 'phone working very FB on 14 Mc. NI cleared up his exciter troubles on 28 Mc. by replacing the RK-23 with a 6L6. NT is back on 14 Mc. QA, who recently moved to Vancouver, has been in contact with the local bunch on several occasions. QC divides his time between 14 and 7 Mc. VI has a T200 final after putting his T250 out of commission. ZK finds 14 and 7 Mc. best to work on. UX will be located at Eskimo Point, 300 miles north of Churchill, and expects to be there for about a year. QF took an operating post for one of the airways companies at Island Lake. RO is planning another trestle tower as a mate for the one already up. AE finds his push-pull T55's very FB. AFM has a very FB job with a pair of HK 154's final. The record for the longest QSO around here is held by EJ on 1.75-Mc. 'phone when he worked a W4, W9 and VE5 from 11:30 P.M. to 6:30 A.M. AC is the first president of the Radio Club just formed at Brandon. Good luck and success, Frank. The M.W.E.A. and Winnipeg Radio Club are preparing for the summer activities.

Traffic: **VE4**AAW 49.

SASKATCHEWAN—SCM, Wilfred Skaife, VE4EL—The Regina Gang paid a visit to the Airways Beam station. XM gets going once more. BD is doing well on 14-Mc. 'phone. UK with 20-watt 14-Mc. 'phone gets good DX. FW has 3.5- and 14-Mc. 'phone. CM uses Faraday shield and notes good results. GA, CE, AU, AC, CM, ACR and EL have nice round-table QSO. The Saskatoon gang at their official station 4AAA test equipment on 7 Mc. for portable use. BF works 28 Mc. with good results. BL did a little operating at XB's station. JB puts out plenty of sock on 3.9-Mc. 'phone. IQ is using 6A6 osc.-doubler and 6A6 amp. on 14 Mc. QZ hooked TF3GM, Iceland, on 7 Mc. first night of DX contest. RJ installed Faraday shield per Mar. *QST* and cleared up sundry 'phone harmonics and parasitics nicely. TW and TN are working out well on 14-Mc. 'phone. UC runs regular schedules with QP at Elstow on 3.9-Mc. 'phone. UD is heard on all bands. UG has T20 buffer in new rig. VP and CE schedule bi-weekly. XB knocks off DX on 14 Mc. in nice style, running 105 watts to two '10's. PQ, now O.R.S., is running daily schedules East and will gladly take traffic from anywhere at any time. UL and PQ got nicely designed card from W1AW for the "Maxim Memorial Relay." YC is building 3.9-Mc. 'phone rig. KJ has trouble getting 89 to double to 14 Mc. ES installed Q antenna. The Moose Jaw gang is busy preparing for hamfest.

Traffic: **VE4**QZ 24 FW 23 PQ 11 EL 5 UL 1.

(Continued on page 116)



CORRESPONDENCE

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The Mis-Used DX Bands

Pinehurst Road, Eau Claire, Wisc.

Editor, *QST:*

. . . The condition of all bands here in the Midwest is such that international communication is becoming impossible. This condition can be remedied. A great majority of the newer hams are using the high-frequency bands for short haul communication, for no apparent reason, during hours that formerly were considered "DX" hours. It is possible to hear very good DX on 7000 kc. from 7 P.M. until 7 A.M., but it cannot be copied except for a few hours in the early morning. The interference at all other times is of the short-haul communication type. By investigation I have found that many hams do not know that foreign stations come in at other hours than three to five in the morning, and consequently they cannot be blamed too heavily, but there is no reason why they should not be educated to the facts that do exist. Whether they are newcomers or not they would be interested in DX if they knew they could hear it, and work it. They can, if they would sacrifice their nearly local S9 communication for a lot of S6 international communication. Why should any ham work stations from 12 A.M. until 8 A.M. that he can work all day and all evening?

I have been speaking principally of the 7000-kc. band. Conditions on 14,000 kc. are almost as bad. On 14,000 kc. DX can be heard at nearly any hour of the twenty-four, therefore why use that band at all for any United States communication except daytime coast to coast work? Witness the number of foreign and American stations working outside the 20-meter band. Witness the rapid increase of crystal-controlled foreign stations outside the band, and witness the percentage of stations working those foreign stations outside the band as compared to those inside the band. The greatest portion of 14,000 kc. DX that I work is that which is operating outside the band.

We have had many good campaigns within the last few years in ham radio. We have put crystal control on all bands to five meters. We have developed for ham use signal squirters with a handle on them, and sights on them too. Now, to be consistent, let's put on a campaign, an educational campaign for all, for real operating, and while we're at it let's help the rest of the world maintain peace by our friendly, easily-maintained international communication. . . .

—*Cletus M. Dunn, W9DIT*

Observations During a Strongly Marked Dellinger Effect

Schad-Str. 24, Ulm (Donau), Germany

Editor, *QST:*

The conditions of propagation on the ultra-high-frequencies had been quite unusual on November 6, 1936. On the morning of this day the sub-harmonics of some European short-wave stations appeared with great field-strength on the wavelengths between 8 and 10 metres. Skip-distances had been very small, an evidence of a strong ionisation in the Kennelly-Heaviside layer.

At 14:20 GT I received the Australian amateur station VK2GU on 28,120 kc. when 80 per cent of the Great Circle line connecting Europe with Australia was on the night-side of the globe. I was calling this station at that time with my station D4MDN and was heard there with a good strength until 14:25 GT when the propagation broke off. It is remarkable that my station had operated with not more than 5 watts output, but using a 5λ directional antenna system for the east-west direction.

14:30 GT I received the sub-harmonic of the commercial station WQE, Rocky Point, L. I., on 37,940 kc. with an unusually high field strength. On about 40,000 kc. I observed—but couldn't exactly identify—another station from the U.S.A. In the following time I observed the sub-harmonics from commercial stations between 40,000 and 27,000 kc.

16:12 to 16:15 GT I was calling "CQ TEN" on about 28,250 kc. with my station D4MDN over my east-west radiator and observed—when I began listening—that no more stations could be received on the amateur band. The sub-harmonics of the commercial stations WQT on 27,770, WQP on 27,800, and WIY on 27,740 kc. had disappeared completely. On the wavelength of 14 meters the stations PPX, Rio de Janeiro, on 20,720 kc. and W2XE, New York, on 21,520 kc. had disappeared also. I observed these last two stations 16:10 GT at normal field strength. On 21,470 kc. I received, however, the British Broadcasting Station GSH, Daventry.

During the whole period of the fadeout I received

the sub-harmonic of the commercial station WQH, Rocky Point, L. I., on 37,760 k.c. or 7.9 meters.

16:20 GT I heard as only one station on 10 meters the South African amateur station ZS1H, Capetown, on 28,300 kc. calling "TEST TEN".

16:26 GT a W9 station appeared on the 10-meter amateur band with a very weak signal.

16:28 GT W2XE, New York, could be heard weakly.

16:30 GT normal conditions again on 10 meters. The commercial station PPX, Rio de Janeiro, on 20,720 kc., could not yet be heard. The fadeout lasted longer for stations from South America than for stations from North America, and longer for the lower frequencies than for the higher ones.

On my inquiry at the Solar Observatory in Zurich, Switzerland, I came to know that the sun-spot activity had been quite unusual on November 5 and 6, 1936. On November 6th occurred a bright eruption on the sun from 1310 to 1355 GT with intensity 2 on 16° S., 24° W. Evidently the ionisation of the Kennelly-Heaviside layer became very strong at this time.

I received lately a report from a German amateur short-wave receiving station, near Berlin, concerning the unusual daylight conditions on the ultra-high frequencies on November 6, 1936. This German amateur writes me having received on November 6, 1300 to 1330 GT a sub-harmonic of the commercial station RIS on a wavelength of *about 5.6 meters*. This time coincides closely with the time that a bright solar eruption had been observed at the Solar Observatory, Zurich, Switzerland.

At the time of the fadeout (1613) no solar-observations could be made in Europe (sunset in Berlin about 1530 GT). I asked therefore at Mount Wilson Observatory at Pasadena, California, if solar eruptions occurred on November 6th, 1613 to 1630 GT. I was informed in a letter by Dr. R. S. Richardson that no observations were made at the time of the fadeout at Mount Wilson.

In a letter I got from Mr. S. C. Pleass, ZT6K, Bramley near Johannesburg, South Africa, I learned that he received European 7-meter signals on November 5–6–8, 1936.

The conclusion to be reached from my observations is that propagation over long distances has been possible on the ultra-high frequencies near 40 Mc. over the illuminated side of the globe during the period of the fadeout, which affected frequencies between about 13 and 30 Mc.

—Hanns A. G. Hess, D4MDN

Modulation Limits

163 East Bettlewood Ave., Oaklyn, N. J

Editor, *QST:*

The writer, having been inactive in amateur radio for a considerable period and observing the struggle from the sidelines, holds the following to be self-evident, viz:

1. A limited number of kilocycles is available to all.

2. Each amateur, 'phone or c.w., is democratically entitled to an equal swath of the ether.

Good intelligibility of voice communication may be realized if a pass-band of 250 to 2500 cycles is considered. The land-wire telephones operate essentially within these limits without difficulty, enabling subscribers to understand lisps, stuttering or foreign accents.

The writer suggests that each 'phone station operating within the valuable bands of 20, 80 and 160 meters be required by law to insert a simple band-pass filter of the above limits between the microphone and the transmitter input. Such a device could be defined electrically by the Federal Communications Commission in the manner of broadcast station modulation monitor or frequency deviation meters and would be sold generally at a reasonable price by manufacturers bearing the F.C.C. approval stamp or number.

By the compulsory use of such apparatus on frequencies below 14,250 kc., those hams desiring to project their voices into DX regions might do so with a minimum of heterodynes and low frequency growls while those more seriously interested in high-fidelity performance and psuedo-broadcasting of phonograph records may confine their activities to the 5-meter regions where space is not at such a premium.

The writer believes the foregoing suggestion, while not original, to be worthy of consideration as a means for the greatest good for the greatest number.

—R. H. Axtell, W1BWS

Editor's Note.—Once made the subject of a recommendation by the A.R.R.L. Board of Directors, later rescinded, the idea of limiting sideband width has been viewed unfavorably by the majority of amateurs in the past. Perhaps it is now time for renewed consideration.

Mr. B. Is Irate

Madison, Ohio

Editor, *QST:*

Well, the 1937 DX Tests are over, and for the second time in my life I am thoroughly "het up." After the first night I started keeping count of stations doing one of three things during DX hours, namely, calling CQ-DX, continuous testing or spending idle time rag-chewing. The last item I realized is anybody's privilege if he holds a license, but it does indicate a lack of thoughtfulness. Anyhow and otherwise, the grand total for the eight days was 254 stations logged.

You, Mr. W6 – –, famous DX man,—Do you think that, because your call is known the world over, half the DX stations from parts "over there" will flock to answer your CQ-DX? Do you think that your "California kilowatt" is the only W6 signal plopping outside your state borders? Your action seems to indicate an unhealthy conceit.

You Mr. W2 – – –, spent a lot of time rag chewing about nothing, right smack on top of two of the scarcer countries. No doubt it is your right to chew as much as you like (I enjoy nothing better than a good chew) but you have fifty weeks out of the year in which to chat. I wonder if it would cause you any unbearable grief if you had to let the rig collect dust for just nine days? Don't think that your cooperation is not appreciated, because I know of several DX stations who were absolutely QRT during S.S. contests, believe it or not.

You, Mr. W9 – – –, 'phone man,—did you know that you were over-modulating your 14-Mc. 'phone so badly that you ruined several DX stations that were near you? I wonder how much of a squawk you would make if a c.w. station invaded your 'phone band and smeared some valuable DX for you?

And you, Johnny Twiddledial, spent the better part of two hours sliding between 13,950 and 14,200 kc. Possibly you were looking for a hole for your self-excited rig but the stations were ten deep all over the band. A little intelligent listening would have shown you the futility of it all.

After all that has been printed in radio magazines about making short calls and not calling CQ-DX, a small minority still had to fish for s.w.l. cards, which is about all that either thing amounts to. One wonders, if their heads are as thick as they seem, how they managed to absorb enough theory to get a ticket.

The point I am trying to bring out is that this is our hobby and it will be just what we make it. We should do things as a body. If the majority of hams enter a contest such as the S.S. or DX, then we should all abide by the majority. It may build character to be different and pursue your own course, but it pretty near ruins a wonderful hobby.

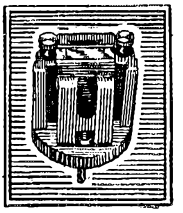
The lack of coöperation among our 40,000 amateurs is appalling. We form a "Drapers Club," an "Old Buzzards Club," a "Perfect Operators Club" and a host of other cliques and clans. One club disagrees with another and the 'phone and c.w. fellows still rattle skeletons.

This is a plea for more thoughtfulness and commonsense in our dealings with other amateurs. May I suggest a motto for each and every ham? It could and should be, "All for one and one for all."

And remember, fellows, "No matter what the goal may be, the victory is not worth the winning if, on the way up, you have hurt someone's feelings or trodden someone under foot." . . .

—W. D. Benjamin, W8GQU

(Continued on page 72)



DURING the past few months Dana Bacon, who heads our circuit development laboratory, and his staff have been working on the design of a receiver to fill the place once taken by the FB-7. Such a receiver must necessarily combine low price with performance of a high order, and like most National Receivers its design has required quite a bit of research. This research has resulted in one very interesting development: — the use of a rather high frequency for the IF. Results are quite surprising.

One result — the practically complete elimination of image frequencies — was to be expected. However, it was found that the use of the high IF also made it possible to design a crystal filter with continuously variable selectivity from 200 cycles or so, up to the other extreme of perhaps eight or ten kilocycles. In other words, the selectivity range is so wide that it covers every requirement of amateur work, and the crystal filter is left in circuit all of the time. We think this is pretty hot stuff.

The reasons why a high IF frequency helps in the design of the crystal filter are quite complex. The most obvious reason is that the available change of selectivity is shifted to a more useful range of values. In other words, suppose that a certain filter has a selectivity range of from 100 cycles to 1500 cycles when the IF is 475 KC. Then it would be expected to have three times the range (300 cycles to 4500 cycles) when the IF frequency is three times as high (1425 KC). This is a help because 100 cycles is much too sharp for any practical purpose even on CW, and selectivities sharper than about 300 cycles are almost never used. Consequently, the change in the IF can be said to make the *useful* selectivity range much wider.

Actually, however, the results are even more far reaching than that. In the HRO (with 456 KC. IF) the minimum/maximum selectivity ratio is about fifteen when using the crystal. With the new filter, the ratio is thirty or more without sacrificing other desirable characteristics. This improvement is explained best by the vague statement that the high IF helps the designer in a number of small ways that are hard to explain theoretically. For example, crystals ground for 1550 KC are easier to wangle in a filter than those ground for the more usual IF frequencies.

In the paragraph above we used the phrase "without sacrificing other desirable characteristics" when giving figures for selectivity ratio. This is important. A modern crystal filter is expected to do a lot of things. It is expected to give high gain on a desired signal, and high attenuation on an interfering signal, and furthermore the frequency difference between the two signals as well as the selectivity must be adjustable. Unfortunately, these various effects are mutually incompatible, and in designing the filter it is necessary to make a compromise. For example, it is possible to increase the gain by 500% if certain changes in the design are made. However, selectivity will not be adjustable *at all*, and will be so high that even slow speed code is mushy, and clicks of static sound like a bell. In practice it is necessary to make a compromise on gain to achieve other equally important characteristics. Consequently, it means very little when anybody says that the selectivity ratio is so-and-so, unless they also give figures on a lot of other things too.

The major field for the new crystal circuit seems to be in low priced receivers. In our opinion, only a new development of this kind can make the cheap receiver suitable for use in the amateur bands. Of course, the new filter would improve any receiver, but in the HRO the filter is so good already that the possible improvement does not justify a new model.

JAMES MILLEN

Correspondence Dept.

(*Continued from page 70*)

Good Work

715 W. Cedar St., Olathe, Kans.

Editor, *QST*:

Believe it or not, but W9BSP holds the world's record for the producing of hams. Mr. Ensor (W9BSP) and his sister, Miss Loretta Ensor (W9UA), have spent some 90 hours on the air this past winter sending code lessons.

I am very proud to say that I am a product of W9BSP. W9BSP has been a ham since 1914 and every winter that W9BSP sends code lessons he has splendid results. Not a single day goes by that he does not receive many letters from his listeners. . . .

Keep up the good work, W9BSP and W9UA!

—*Harlan H. Harper, W9UEX*

EDITOR'S NOTE.—The above is typical of many letters received in recent months commending the work of W9BSP, perhaps the outstanding code-practice station of the country. With an annual turnover in amateur ranks exceeding one third, the training of new amateurs in such fashion that "newcomer QRM" is minimized, is a vital and highly worthwhile performance.

Power, Etc.

Hustisford, Wis.

Editor, *QST*:

Surely am glad to see the gang wake up to low power. Some of the gang on 160 meters, where F.C.C. observations probably are more lax than on the other bands, seem to take pride in putting in 1000 watts or more and at a splashing percentage of modulation. Some of the gang also accuse one of extremely low modulation at 100 per cent, and question one when observations made by meters, oscilloscopes and calculations check to 100 per cent. They evidently do not figure peaks but low spots or average. No wonder there are so many b.c.l. complaints.

My suggestion would be to put aside the lower half of the 160 band, or of all bands for that matter, for power less than 50 or 100 watts, and measure it by accurate instruments in the final stage plate.

I am beginning to wonder if this high power affair is a "racket" sponsored by part manufacturers or if those of us with low power have to get off the air, and let the big boys run the place. Some of us may as well sell out because we can't afford the big job needed to cut through the QRM. Looks as though fishing, gossiping by telephone, card parties or "benders" will be cheaper and more enjoyable than blah—blah—blah!

Here's more power to the little fellow—may the ether through A.R.R.L. be delegated to his use. May we have a vote on the situation and make this a land of equal opportunity regardless of monopolies by "corn fed kw.s." Give our "razor-back watts" a place.

Yours for the underdog whose bark is quenched by the *blast* of the *beast*.

—*C. R. Wentland, W9OTL*

Praise for Merrill

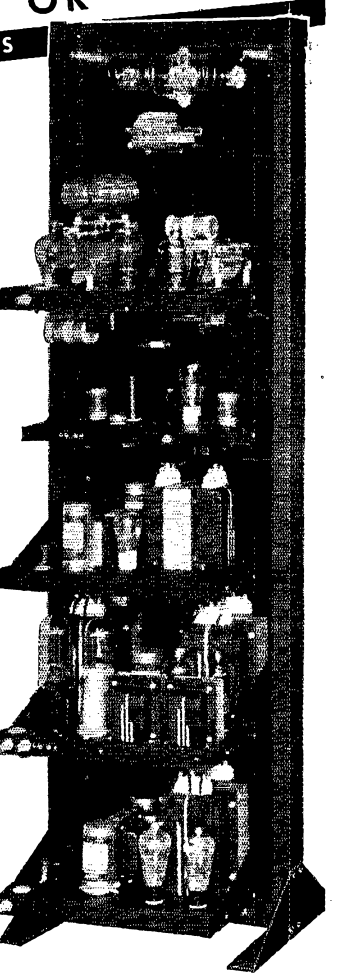
St. Joseph's College, Mountain View, Calif.

Editor, *QST*:

My heartiest approval to Mr. Merrill on his recent article on radio vocations! I was well pleased in seeing and reading his article. Would they could be found more frequently! Vocations are of vital importance, for on them depend the success or failure of one's entire life. Failure is tragic, and consequently has to be obliterated. No one can afford to let that article go by unnoticed—it is meant for all. It is primarily directed to high school students to give them some norm in judging their fitness for radio—I urge them to read it most cautiously. To those whose days of deciding what vocation to follow have long passed, I likewise suggest that they read it. How frequently it happens that "Bob's boy" is considering radio for a career. You, being a friend of "Bob," and considered as knowing something about these

BUILD THE NEW PROGRESSIVE III STEP BY STEP TO 450 WATT INPUT C. W. OR PHONE

OPERATES ON 10-20-40-80-160 METER BANDS



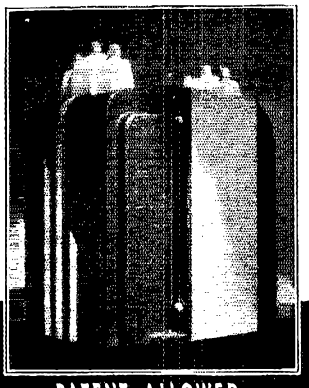
Beginners! Old-timers! Brass-pounders all! Here's the transmitter for everyone! Start, if you wish, with the low power and exciter units alone. Then, when you're ready to add phone or more power, keep right on building — without discarding parts.

A screw driver, pliers and soldering iron are all the tools needed to build the Progressive III from *standard parts*, obtainable from your jobber. Panels and chassis are furnished completely drilled.

Ingenious symmetrical arrangement of parts above and below the chassis reduces lead wires to a minimum and utilizes the chassis for shielding. Circuit capacities are extremely low, permitting full power input — either phone or C.W. — even on the 10 meter band. Band changing with standard plug-in coils is fast and easy, because the circuit *remains neutralized* at all frequencies.

Complete details are contained in the PROGRESSIVE TRANSMITTER GUIDE, 25c postpaid from your jobber or Amateur Press, 1300 W. Harrison St., Chicago. Send for your copy today!

See the Progressive III in Booths 100–101 1937 National Trade Show Stevens Hotel, Chicago June 10–13



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And... BUILD IT WITH

STREAM LINE TRANSFORMERS

You won't be annoyed with lamination hum. All-over metal housings solidly clamp the core all-around, and act as a shield. And you won't risk break-downs due to moisture! Coils are moisture-proofed by the famous GTC "Pull-Push" Process. What's more, radically new design saves as much as 25% in space and weight on your chassis. There are *Stream-Line* Transformers and Chokes for every amateur transmitter requirement. Ask your jobber or write for Bulletins 35 and 44 — FREE!

GENERAL TRANSFORMER CORP.

518 SOUTH THROOP STREET • CHICAGO, ILL.

matters, are consulted. It's embarrassing to say, "I don't know," and yet it is most unjust and highly injurious to give blind advice.

Mr. Merrill has been cautious in stating his points—and rightly so. Such a matter is not a case of, "All hope abandon, ye who enter here."

Vocations have to be considered from a negative standpoint, consequently we cannot be certain of anything regarding them: yet the signs of the nonce can serve as somewhat reliable guides. But this is beside my point. If anyone has been so unfortunate or careless as to have overlooked or passed over this article, I earnestly urge him to turn to page 52 of April *QST* and take about ten minutes out to read and digest what Mr. Merrill has to say. It will prove well worth the while. Then, when the high school student has any intention of devoting his life to the radio field, he has this test to go by, or when a friend asks about his son's intentions, he can be fittingly and *honestly* informed of the truth.

—*Leonard W. Bose, W6BSO*

Beginner's License

1731 Douglas St., Rockford, Ill.

Editor, *QST*:

Many prospective hams would like to get on the air with their own rigs as soon as possible. They learn enough of the fundamentals of radio and have a code speed of just thirteen words per minute. With this scant knowledge many fellows pass the examination and get their own transmitters on the air. If you listen in on the 160, 80, or 40-meter bands you will hear many beginners, and anyone familiar with these bands knows how, with the bands crowded and QRM heavy, a beginner adds to the confusion.

A proposed idea which I am trying to emphasize is to have another class of license. This license would be just for operation on the five-meter amateur band and would be issued for a limited time, not more than twelve months, not being renewable.

This examination would be easier than the Class B exam. The code exam would not be more than eight or so words per minute, with simpler questions pertaining to radio principles, etc. While on this band the beginner would learn how to keep the transmitter adjusted and running, and get better acquainted with ham radio. After a required length of time on this band, he could apply for the Class B exam.

. . . This idea would eliminate the inexperienced ham and would make for better bands all around.

—*Jim Miller*

Alaskan Reverie

Ohogamute, Alaska

Editor, *QST*:

Just a chirp from the Top of the World, where radio and airplanes mean so much to isolated villages.

Ohogamute is a little Eskimo village on the most southern bend of the Yukon River in Western Alaska. Here we depend upon planes for our winter mail service, which by the way, comes only once a month, and upon a river steamer, twice a month in summer. I am waiting now upon slow mail service for my new transmitter parts for the ham bands, and until they arrive I must stay put on the commercial bands (frequencies of 3092.5 kc. and 5167.5 kc.).

Almost all the small villages in Western Alaska, from Point Barrow to the last of the Aleutian Islands, can boast of only one or two white families, but in all cases radio communication has become essential. It may be only a peanut power like my own, but it means connections with at least the nearest Signal Corps station and a chance for a friendly visit with some neighboring ham when weather permits. With no roads, no cars and only the planes, boats and dog-teams for transportation it means much to all Northerners to know that little rig may be the means of contacting a doctor or calling a plane when an emergency arises.

We have the finest group of hams on the air. The K7's are always ready to push a message through or to stand by when needed and are as regular as clockwork in keeping schedules.

The planes must have weather reports, so the commer-

cials, the hams and the Signal Corps boys all coöperate in weather reports at least twice a day and if a plane is coming to any section, hourly reports along his route are given.

K7FDK at Egavik, a little Eskimo village on Norten Sound, is owned by R. P. Julian, who with his wife operates a store and the butchering plant of the Loman Reindeer Co. "R. B." has many weather skeds as he's on a regular airline route between Nome and Fairbanks, so Mrs. R. B keeps a short sked with me each evening for some c.w. practice which only the isolated can appreciate.

My *QST*'s are always weeks late in reaching me but they make excellent reading when they do arrive, so they are well worth waiting for.

The strikes that tied up shipping along the Pacific coast worked many hardships on Alaskans. Listening to two lighthouse stations gave us some idea of the general condition throughout the North. One fellow said: "I hope the strike will end pretty soon, for we've had no eggs, no butter and no potatoes for weeks." The second voice came back: "Even our beans are getting low and I'm tempted to break the game laws and shoot a goose or two for a change of diet."

Stations throughout Alaska and Canada were all counting their shortages in the same way. We of the interior were not so badly off, for our supplies come only once a year, so we were squared away for the winter when the strikes began. However, our mail and parcel post showed the effects of the strike, as very little mail came through and newspapers are unheard of till summer comes, so again we must depend upon the radio for news from all the world.

In closing, I hope this little ditty will not be too crude for publication.

UP WHERE THE NORTH BEGINS

In the village of Egavik,
O, so many miles away;
I am welcomed there each evening
When I call my KIOJ.

Where is that place, Egavik?
I can hear so many say.
It's on the coast of Bering Sea.
And the call K7FDK.

Just a cosy little cottage,
Where a lone white couple dwell.
They have charge of Santa's Reindeer,
Which all children love so well.

When the Northern Lights are flashing,
It's the lady with her key.
She is sending dots and dashes
In a practice test with me.

—*Sidney W. Moore, KIOJ-K7GDD*

Foreign Fones

256 Greenway South, Forest Hills, N. Y

Editor, *QST:*

I wonder how many of those operating in the 20-meter c.w. band feel the way that I do about the interference which is being caused by foreign 'phone stations.

Under the present international treaty regulations, each country is allowed to assign the use of frequencies within the limits of the amateur bands as it sees fit. As a result foreign 'phone stations (especially those in Mexico and South America) make a deliberate practice of operating outside the American 'phone band to avoid interference. Since each 'phone station causes many times as much interference as a c.w. station, a few of these stations can spoil the band for c.w. Very few 20-meter 'phones have any interest in contacting c.w. stations and will not even answer when called. They belong in a 'phone band and it is up to the c.w. men to petition their respective governments to see that they are put there. The 100-kilocycle American 'phone band represents a fair division of territory which is in approximate relation to the number of 'phone and c.w. stations.

I believe the c.w. men should get together and present a petition to their delegates to the Cairo conference requesting that 'phone stations the world over shall be restricted to the same frequencies as those in the United States.

—*Charles W. Finnigan, W2BJQ*

How Would You Do It?

(Continued from page 32)

W1ALJ, 1DEC, 1FGC, 11AV, 11LX, 2AHW, 2AMD, 2BUU, 2CTH, 2DSY, 2HTW, 2IQQ, 3AWQ, 3CPT, 3ETM, 4BBX, 5EOW, 6BOY, 6CDA, 6LCD, 7DXZ, 8AZY, 8OKC, 8PCI, 8PCU, 9EWU, 9GBT, 9HQD, 9IEJ, 9BLP, 9VQN, 9VVW, 9WPP, VE3SA, 3XU, 4XM, GM6RG, R. M. Arnold, T. J. Barnes, W. D. Clague, Gordon Jacobs, Fenwick Job, R. J. Kircher, Joseph McGrath, James Roark, George Statham, William Thompson, Chester Voorhees.

Before we pass on to the essential rules and regulations we might ask whether you, dear reader, have a hero in your home. Ours has turned in some problems of general interest so far but before we know it he will have his station completed and be so engrossed in operating that his only real problem will be keeping peace with the family. What we mean is that we should appreciate deeply any list of practical problems that any of you fellows may have bumped against.

Now, the rules:

1. Solutions must be mailed to reach West Hartford before the 20th of the publication month of the issue in which the problem has appeared. (For instance, solutions of problem given in the March issue must arrive at *QST* before March 20th.) They must be addressed to the Problem Contest Editor, *QST*, West Hartford, Conn.

2. Manuscripts must not be longer than 1000 words, written in ink or typewritten, with double spacing, on one side of the sheet. Diagrams and sketches may be in pencil, but must be neat and legible.

3. All solutions submitted become the property of *QST*, available for publication in the magazine.

4. The editors of *QST* will serve as judges. Their decision will be final.

Prizes of $5 worth of A.R.R.L. station supplies or publications will be given to the author of the solution considered best each month, $2.50 worth of supplies to the author of the solution adjudged second best. The winners have the privilege, of course, of stating the supplies preferred.

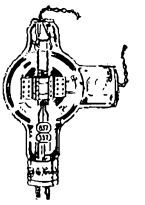
—*D. H. M.*

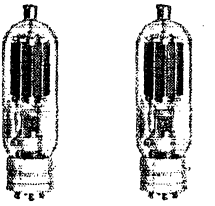
FIRST WITH RCA

New all-time high scores set by the winners of the 1937 DX contest were made by users of RCA Transmitting Tubes. Subject to final checking of their logs by the A.R.R.L., some of the stations using RCA Transmitting Tubes placed as follows:

CW CONTEST:

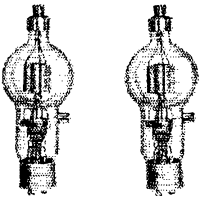
Place	*Station*	*Score*	*Tubes in Final Stage*
1st	W2UK	123,216	PAIR OF RCA 852's
2nd	W1SZ	116,665	PAIR OF RCA 805's





'PHONE CONTEST:

Place	*Station*	*Score*	*Tubes in Final Stage*
1st	W9ARA	45,367	PAIR OF RCA 806's
3rd	W2UK	39,000	PAIR OF RCA 852's



—and the station which was WORLD-HIGH:

Station	*Score*	*Tube in Final Stage*
K5AY	256,997	RCA-211

We congratulate these amateurs upon their fine operating performances and their choice of tubes.

Outstanding stations are made by a combination of outstandingly good operation and outstandingly good equipment. You usually find RCA tubes in such stations.

For further information on these and other RCA Products, see your distributor or write to

RCA *for Amateur Radio*

RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J.

A 28-Mc. Mobile Installation

(Continued from page 49)

properly shielded, very little interference was noticed. Passing autos are the worst offenders in this respect, but many local and DX signals had sufficient strength to over-ride the noise level. Excellent duplex operation has been obtained by working with locals on 75- and 160-meter 'phone.

Numerous contacts on ten-meter 'phone have been made with W5's and W9's, with an average report of S7 at 1000 miles. Coast to coast QSO's can be made when conditions are favorable.

Installations of this type will be very valuable in emergency work, and can be used in conjunction with police u.h.f. systems which are used in many cities and communities at the present time. Six-band operation may be obtained by using proper plug-in coils, with crystal control on all bands except 56–60 Mc., which is electron coupled. However, mobile operation is legal on the 5- and 10-meter bands only. With the ten-meter band continuing to hold up as it has in the past, we are assured of much success.

VE4LQ

(Continued from page 56)

The receiver is a home-made nine-tube superhet with built-in speaker and power supply, and uses a 57 first detector (regenerative), 57 h.f. oscillator, two stages of i.f. with 58's, 57 second detector, 2B7 a.v.c., 58 beat oscillator, 2A5 audio and an 80 rectifier. Complete band-spread on all bands is obtained by the tapped-coil method.

The rack-mounted transmitter operates on four bands: 14, 7, 3.5 and 1.75 Mc., and is equipped for 'phone on the latter band. The r.f. line-up is 47 crystal oscillator, 46 buffer-doubler and a pair of 45's in push-pull in the final amplifier, with an input of 45 to 50 watts on all bands. A single power supply using an 83 rectifier and choke-input filter delivers 425 volts to the final and 375 volts to the oscillator and buffer.

The speech equipment consists of a No. 10 Continental double-button microphone, a 6C6 high-gain amplifier into a triode-connected 6C6, into a pair of 6L6's in push-pull Class-AB as modulators. The power supply, with the exception of a 5Z3 replacing the 83, is identical to the r.f.

power supply. All chassis and panels are of sheet aluminum, burnished with a wire brush and clear lacquered. The fronts of the panels are painted with black crystaline lacquer.

The antenna used on all bands is a half-wave center-fed Hertz 44 feet above ground, fed through tuned feeders 45 feet in length. Collins matching networks are used to couple into the antenna on all bands.

With the exception of time spent on traffic handling on 3.5 Mc., the station operates on all bands approximately an equal amount of time, and the station activities cover DX, rag-chewing, traffic and experimenting. 'Phone will be used on 14 and 3.9 Mc. as soon as a first-class license is obtained at the end of this year.

WWV Services Expanded

(Continued from page 10)

second may occur in the audio modulation frequency as received. It is generally possible, however, to use the audio frequency with an accuracy better than a part in a million by employing that one of the three carrier frequencies which has the least fading. It is helpful to use automatic volume control and audio-frequency filters to reduce the effects of fluctuations in amplitude or phase of the received audio frequency.

Any desired frequency may be measured in terms of any one of the standard frequencies, either audio or radio. This may be done by the aid of harmonics and beats, or, in the case of the 1000-cycle standard, also by the operation of a simple motor-generator.

The standard 1000 cycles per second is especially useful in the accurate measurement of audio frequencies and time intervals, calibration of tuning-forks, etc.

3. Standard time intervals. The c.w. standard frequency emissions each Tuesday and Friday, described under 1 above, will be modulated (30 per cent) by a short pulse once each second (except during announcements). The pulse lasts about 0.005 second and consists of a 1000-cycle modulation on the carrier frequency; this type of pulse was chosen to facilitate its reception by ordinary radio receivers. The length of the inter-

vals thus marked between each second and the next is accurate within 0.000,01 second, as sent out from the transmitter. Measurements to this accuracy have not been made of these signals as received, but measurements made at one receiving location showed no error within the limits of precision of the measurement, which was about 0.000,03 second. Vagaries occurring in the transmission medium may cause fluctuations materially greater than this at particular places or times where there is excessive fading.

These standard seconds signals constitute a standard frequency of one cycle per second, and are derived from the Bureau's primary standard of frequency which is in turn based upon the standard time service maintained by the U. S. Naval Observatory. They are of special value in physical measurements, in geodetic, seismological, and similar work, in rapid checking of pendulums and chronometer rates, and wherever short time intervals of great accuracy are needed. They are not capable of giving absolute time, as needed in navigation, for example, for which astronomical observations or the Navy's time signals are required.

4. Standard of musical pitch. The American standard of musical pitch, 440 cycles per second, for A above middle C, will be broadcast as a modulation frequency every night except Saturday and Sunday (and except nationally legal holidays). It will be a 440-cycle modulation on a radio carrier frequency of 5000 kc. The service will be given daily from 4:00 P.M. to 2:00 A.M. EST. The station call letters (WWV) will be given every ten minutes on the even ten minutes by telegraphic keying, so that musicians using the service may be sure they are listening to the right station. The letters WWV are dots and dashes as follows:

- - - - - - - - - - The radiated power will be one kilowatt, with 100 per cent modulation. The accuracy of the 440-cycle standard pitch is approximately the same as that of the 1000-cycle tone as described under 2 above, i.e., far beyond any musical requirements.

5. Ionosphere bulletins. Data on the ionosphere and a summary of high-frequency radio transmission conditions will be broadcast each Wednesday afternoon, the same day on which the 1000-

cycle modulated emissions are given. The bulletin will be given by voice on each of three radio carrier frequencies, as follows:

1:30 to 1:33 P.M. EST, 10,000 kc.
1:40 to 1:43 P.M. EST, 5,000 kc.
1:50 to 1:53 P.M. EST, 20,000 kc.

The broadcast includes statements of the normal-incidence critical frequencies and virtual heights of the ionosphere layers, and estimated skip distances for a number of frequencies, all based on observations at Washington the day of the broadcast. Both day and night values are given. The information is an aid in choosing optimum frequencies for long-distance communication.

Further information is given in the Bureau's Letter Circular, "The Weekly Radio Broadcasts of the National Bureau of Standards on the Ionosphere and Radio Transmission Conditions."

General. Information on how to receive and utilize these various services is given in pamphlets obtainable on request addressed to the National Bureau of Standards, Washington, D. C.

The Bureau welcomes reports of use and comments upon services. It is desired that users report to the Bureau their experience in using them, including: description of method of use; statement of relative fading, intensity, interference, etc., on the three carrier frequencies; and suggestions for improvement of any details. Correspondence should be addressed National Bureau of Standards, Washington, D. C.

A Complete Dry-Battery Portable Station with Crystal-Controlled Transmitter

(Continued from page 13)

changeable in the case, may be used to provide for operation on that band. Connection to the power batteries is made automatically by banana plugs and jacks when the panel unit is slipped into its position in the case. These plugs are located at the left lower rear corner of the panel unit, with the jacks mounted correspondingly in the case. Looking at the rear of the set, the oscillator coil and its shield are at the left, followed in order by the transmitter tube, the amplifier coil, the receiver tube, and the receiver coil and its shield. Resistors, r.f. chokes, and other components are mounted under the shelf, which is supported on 2-inch brackets.

For convenience in the use of an existing b.c.l. antenna, a trio of antenna loading coils is carried in the case. The first of these is wound on a 1½-inch tube, with 70 turns of No. 22 d.c.c. wire, tapped at 30, 50 and 60 turns. A selection of loading inductance can usually be made which will enable the tuning of almost any antenna. This coil is supplemented by two smaller coils, on 1-inch tubing each of 40 turns, which are slipped inside the larger coil when packed for travel. The use of a split Hertz antenna of small dimensions is made possible with these coils, and they are often handy to provide additional loading for makeshift field antenna arrangements.

From the interest expressed by operators who

have heard and worked this little "peanut whistler" on the air, it is believed that there is a real field for the application of similar equipment. For local operation and the reduction of neighborhood QRM, the results obtained are most satisfactory. On at least one occasion during preliminary tests with this set, the power input was reduced to less than one-quarter of a watt to the amplifier section of the 19, yet maintaining solid readability of signals on the 80-meter band at a distance of about 250 miles. This particular QSO took place during the early evening, when the band was fairly well covered with the usual QRM.

For emergency use, this type of equipment is invaluable. Battery life has been quite satisfactory, especially that of the plate batteries, which require renewal only when the signal becomes chirpy. With intermittent use, even the filament batteries will last for months, and replacement is both easy and cheap. Modification for complete operation from an automobile battery is perfectly feasible, and, with proper choice of tubes, such a set will result in much better signal strength. One outstanding advantage of the dry battery power, however, is the distinctive, clean, absolutely pure d.c. note, which pierces through an unbelievable amount of interference. After all, power alone does not mean operating satisfaction; there is a much greater thrill in having some fellow ham call you a liar when you tell him your input is only a watt or two, than there is in the disappointment you feel when a VK or ZL reports your "California Kilowatt" only RST 479!

The 100-Foot Lattice Tower at W9DNP

(*Continued from page 59*)

power leeches, I have only to say that the signals radiated from this tower were checked and rechecked with a commercial-built field intensity meter and no difference was noticed when the ropes were replaced with the permanent guy wires. These checks were made on three amateur bands for a radius of seven miles from the transmitter location. Additional tests were made with stations in nearly every part of the world with the same results being reported. These tests were made with a vertical radiator fed with a 600-ohm untuned transmission line, the power used ranging from 50 to 1000 watts input to a pair of 150T's.

A Three-Stage Transmitter Unit for 1.75- to 30-Mc. Output

(*Continued from page 23*)

in which case only the 6L6G need be used. The 42 will not give any appreciable second harmonic output.[2] With the 6L6G in this oscillator the crystal current is extremely low when working

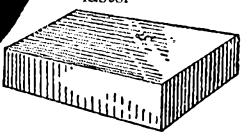
[2] As shown in the April *QST* article previously cited, this circuit is inherently a fundamental-frequency output type and will give a fair amount of second-harmonic output only with tubes of high mutual conductance such as the 6L6 and other beam types. The grid-cathode type Tri-tet circuit would be more generally adaptable for both fundamental and second-harmonic output, in which case a 6L6 metal tube or transmitting type with better internal shielding should be used.—EDITOR.

NEWARK LEADS AGAIN

A real BUY on RELAY RACK PANELS AND CHASSIS BASES

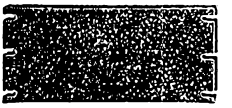
at Newark's Special Prices

Another Steal! We made a special quantity purchase at a spectacular price concession. Now we offer you an opportunity to SAVE 30% to 40% . . . if you BUY now while this limited quantity lasts.



Size	No.	Price
5 x 9½ x 1½	200	$.35
7 x 7 x 2	201	.40
7 x 9 x 2	202	.45
7 x 11 x 2	203	.50
7 x 13 x 2	204	.55
7 x 15 x 3	205	.65
7 x 17 x 2½	206	.73
10 x 12 x 3	207	.70
10 x 14 x 3	208	.83
8 x 17 x 3	209	.85
10 x 17 x 3	210	.80
10 x 23 x 3	211	.90
12 x 17 x 3	212	1.20
13 x 17 x 3	213	1.40

These chassis bases are made of cold rolled specially treated steel. Cadmium plated for easy soldering. Electric welded and reinforced corners. Easy to drill. Ends turned in.



BLACK CRYSTALLINE STEEL PANELS

These standard panels are 19" long, ⅛" thick for relay racks.

Size	No.	Price
1¾	100	$.42
3½	101	.46
5¼	102	.50
7	103	.55
8¾	104	.59
10½	105	.73
12¼	106	.82
14	107	.95
15¾	108	1.10
17½	109	1.24
19¼	110	1.35
21	111	1.45

BASSETT CONCENTRIC FEEDER

SEE AD IN THIS ISSUE

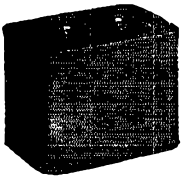
The BCF-50 is a complete concentric feed system with end seal and leads brought out through the seal for soldering to the center of a doublet half-wave antenna.

BCF — 50 ft. $9.75
BCF — 75 ft. 12.75
BCF — 100 ft. 16.75

VERY SPECIAL

Oil Filled and Oil Impregnated

FILTER CONDENSERS



Lucky Purchase of 10,000 all well known makes enables us to offer astonishing low prices. All Guaranteed at rated voltages. Already sold down to limited supply and going fast.

Order Now!

1 mfd., 2000 V.DC, 5 x 3¼ x 1, 1¼ lbs. $1.25
2 mfd., 2000 V.DC, 5¼ x 3½ x 2½, 3 lbs. 1.50
8 mfd., 2000 V.DC, 5¼ x 3½ x 4, 4 lbs. 2.75
9 mfd., 3000 V.DC, 5¼ x 3½ x 11, 9 lbs. 7.25

(Including 2½" Bakelite Standoffs)

4.4 mfd., 1500 V.DC, 5 x 3¼ x 1¾, 1¾ lbs. 1.75
5 mfd., 1500 V.DC, 3½ x 3¼ x 1⅛, 1½ lbs. . 1.90
5.2 mfd., 1500 V.DC, 5 x 3¼ x 2½, 2½ lbs. 2.00

Filament Transformers

If you like to save money on quality merchandise here's some real bargains.

2.5 Volts, 10 Amps. — 2500 Volts Insulation No. 2510 ..... $0.95
5 Volts — 4 Amps. — 1000 Volts Insulation — No. 50S $0.95
6.3 Volts, 3 Amps. — 1600 Volts Insulation — No. 63S $0.95
7.5 Volts, 3 Amps. — 1600 Volts Insulation — No. 75S $0.95

CHOKES

18 Henries, 125 M.A. $1.15
A real quality choke. Resistance 130 Ohms. No. NS115 ..... $1.15
Thordarson No. T6877 Heavy Duty Choke. 15 henries at 250 MA. $1.95

NEWARK HAM BARGAIN

Thordarson No. T6878 Plate and Filament Transformer, 600–0–600 V. at 200 MA. 2½ V. at 10 amp. 5 V. at 3 amp. 7½ V. at 3 amp. $2.45

Thordarson Transformers 115 V. — 60 Cycle 400–0–400 — 200 MA. 6.3 V. — 5 amp. C.T. 5 V. — 3 amp. Electrostatic Shield Fully Shielded $2.95

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BC-3 ..... $3.95 LD-2 ..... $4.80 HF-2 ..... $6.50

Varimatch Modulation Transformers

VM-1. Will handle any power tubes to modulate a 20 to 60 watt Class C stage. Maximum audio output 30 watts $4.70

VM-2. Will handle any power tubes to modulate a 40 to 120 watt Class C stage. Maximum audio output 60 watts $7.35

VM-3. Will handle any power tubes to modulate a 100 to 250 watt Class C stage. Maximum audio output 125 watts $11.76

VM-4. Will handle any power tubes to modulate a 200 to 600 watt Class C stage. Maximum audio output 300 watts $19.11

THORDARSON TRANSFORMERS

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T-11M75 — Will handle any power tubes to modulate a 40 to 150 Watt Class C Stage. Maximum audio output 75 Watts. 4⅛" x 5" x 4¾" High $7.35

T-11M76 — Will handle any power tubes to modulate a 100 to 250 Watt Class C Stage. Maximum audio output 125 Watts. 5⅛" x 5¼" x 6" High $11.47

T-11M77 — Will handle any power tubes to modulate a 200 to 600 Watt Class C Stage. Maximum audio output 300 Watts. 6¾" x 6¾" x 7¼" High $17.64

T-11M78 — Will handle any power tubes to modulate a 450 Watt to 1 KW. Class C Stage. Maximum audio output 500 Watts. 7¼" x 7¾" x 8¼" High $35.28

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straight through on 160 or when doubling, and is below the maximum safe value when working straight through on 80 meters. Its big advantage is that it has only one tuning adjustment and the minimum number of inductances. Even a relatively poor crystal will operate straight through on the fundamental frequency but a good crystal is necessary for useful second-harmonic output.

The T-20 buffer doubler stage is entirely conventional. It is plate neutralized and the neutralizing circuit provides regeneration when doubling, improving the efficiency. The 10,000-ohm grid resistor is a compromise value between that required for efficient doubling and straight through operation, so is higher than would ordinarily be used for buffer operation only.

The T-55 stage operates normally with grid currents of 20 ma. or more. In no event should the rectified grid current exceed the maximum rated value of 40 ma. No improvement in performance is noted if the grid current exceeds 25 ma. and it is recommended that the stage be operated with 25 ma. of grid current under load. Condenser C_{14} may be used as the excitation control. If tuned to exact resonance, particularly on the lower frequencies, the grid current may be as high as 80 ma. or C_{14} should be tuned on the low frequency or high capacity side of resonance until the 28 ma. optimum value of excitation is obtained. Operation on the high capacity side of resonance is advantageous because it helps to make the driving voltage more sinusoidal.

The unit is very flexible and may be used in 4 different combinations on 20, 40, 80 and 160 meters, and in two combinations on 10 meters:

1. The unit may be operated straight through on the crystal frequency. A 42 should be used in place of the 6L6G on 20 and 40.

2. The crystal may be one-half the output frequency, doubling in the crystal oscillator and working straight through in the buffer and final. This is recommended for 20 and 40.

3. The crystal may be one-fourth the output frequency, doubling in the crystal stage and again in the T-20 stage.

4. The crystal may be one-half the output frequency, working straight through in the crystal stage and doubling in the T-20 stage. The 42 should be used in place of 6L6G when using 20- and 40-meter crystals.

Combination 3 or 4 is necessary for 10-meter operation, 3 with a 40-meter crystal and 4 with a 20-meter crystal. It was not found feasible to use a 20-meter crystal and double to 10 in the crystal stage with this oscillator circuit because the 20-meter crystal appeared to be a 60-meter fundamental type which operated on its third harmonic.[3] With this circuit, the 10-meter output apparently was the sixth harmonic of 60, and was too low to be usable.

For c.w. operation the transmitter may be keyed in the cathode of the crystal stage or in

[3] Certain "thick-cut" 14-Mc. crystals (such as the Koga R-cut Bliley HF-cut) have this ability to vibrate at a fundamental and a third-harmonic frequency, while "thin" types which are cut with 14-Mc. fundamental thickness dimension do not.—EDITOR.

Photos courtesy NBC

Wherever There's NEWS There's a Use for Burgess Portable Power

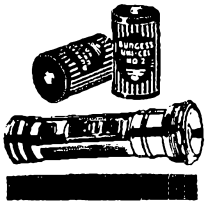
A disaster—a great historical event—an Easter parade—attract the eyes and ears of the modern civilized world.

The miracle of radio makes possible an accurate first-hand word picture of these events. It is published instantaneously in the minds of countless listeners many thousands of miles away.

Behind and supporting the miracle of radio stands yet another. It is the miracle of Burgess Portable Power.

Phenomenally dependable and economical, Burgess Batteries are regularly called upon to supply electrical life to the modern wizardry of scientist, professional, and amateur everywhere.

BURGESS BATTERY COMPANY
Freeport, Illinois



BURGESS

any other conventional manner. If keyed in the crystal stage, the key should be in series with the r.f. choke and the following stages should be biased to cut-off with some source of fixed bias.

The 10-meter T-20 and T-55 plate coils should be wound as shown. The inductance of each should then be varied by compressing or expanding the coils (reducing or increasing the spacing between turns) until resonance is achieved with the minimum amount of capacity in the circuit which will permit proper tuning. In other words, the highest L-C ratios possible are necessary for best efficiency. The coils for all other bands will be correct if duplicated mechanically.

All of the grounds for each stage should connect together and to the chassis at a common point near the mechanical center for that stage, to make all leads as short as possible. The chassis measures 10 by 17 by 3 inches and the layout should follow that illustrated as closely as possible.

The number of turns in the output coil coupled to L_4 will depend upon the impedance of the feeders and the coupling method used. Coupling should always be to the cold end of the coil. All link coils coupled to L_2 and L_3 are one turn each.

The first two stages, the 6L6 and T-20, make a satisfactory lower-power transmitter with an output of 40 to 45 watts from 20 to 160 meters and 15 to 20 watts output on 10. With suitable power supplies this would make an excellent portable transmitter. For 'phone work, the excitation to the T20 is sufficient for plate modulation.

Briefs

W3EXI advises east coast hams who are looking for Nevada for W.A.S. to watch out for W6HJZ, who is on 14294-kc. from 8:00 to 9:00 P.M., EST. HJZ promises a QSL to all contacts requesting same for W.A.S.

—···—

An example of real amateur accomplishment in spite of physical handicap is the case of Perley Swasey, W1GOJ, Maine Route Manager and operator on A.R.R.L. Trunk Line "C". A victim of infantile paralysis, Perley cannot walk by himself and has to be helped in nearly everything he does. He cannot even hold a pencil. He contents himself in his wheelchair, maintaining enough control over his hand to wiggle a bug. His dad does all the band-changing on the transmitter, turns the rig on and off, checks the tuning, etc. His mother acts as secretary and does all the message copying, with GOJ telling her what to write down. When she says, "OK", Perley sends out his "R K". W1GOJ does a remarkable job in operating fields. He organized the Pine Tree Net and has kept it functioning in excellent style. Amateur radio means a lot to Perley as it does to so many others in similar circumstances, and the fraternity should respect these fellows for their perseverance and results against odds which to the ordinary individual seem insurmountable.

—···—

S.A.R.O. Field Day

On Sunday, April 18th, there was held an emergency powered transmitter field day by the Society of Amateur Radio Operators for the purpose of testing and checking the various portable rigs and emergency powered a.c. systems in use by the members. Climaxing several weeks of preparation the gang started out bright and early to assemble at predetermined locations and hold the drill. Loading transmitters, gas engines, portable antennas and a good supply of lunch in the cars the trek was started. Those members who live in the East Bay had a beautiful early morning view

of the Bay Bridge and after crossing took leave for their respective locations. One group located at the top of Twin Peaks in San Francisco, another at Hunter's Point, another out by the beach, while groups from the San Francisco side of the Bay located at Belmont, San Mateo and Burlingame.

Promptly at 9:30 A.M. the roll call was started on 1.75-Mc. 'phone by W6CBX acting as control station. Those answering were W6ZA, W6ZAE, W6BGY, W6BUY, W6IPK and W6HOW. Each station had three or four members along as a crew and the stations were all equipped with gas engines which drove 110-volt a.c. generators. After a check on signal strength and a little ragchewing the gang was told to shift to their other spot frequency on 1.75-Mc. 'phone and were given five minutes to do this. In almost all cases the groups were reporting back on in about twenty seconds. Again the various stations contacted the control station as well as each other and then a shift was made to 3.9-Mc. 'phone. This too was accomplished in all cases with no troubles and everyone was back on in the allotted five minutes. After another report on signal strength and conditions encountered the various groups continued on for another hour at which time the stations were dismantled and all the gang met at W6BGY's portable location for a picnic lunch. This was in the hills south of San Francisco at Belmont overlooking the bay.

After lunch various notes were exchanged and the various portable rigs compared. One of the stations was set up and operated for the benefit of all the gang. Those who participated were W6ZA, BGY, BUY, HOW, IMA, LRD, IPK, DSV, PB, ZAE, EHS, LJG, HJN, CBX, DMY, NZG, OBJ, GPY, IKQ, ZF, LCT.

—*W6PB*

Strays

A ham, who was loved by relations,
Had worked only four or five stations.
He was lighting his pipe
Near some stick dynamite
And was picked up in fifty-two nations!

—*W8MBT*

—···—

No wonder some BCL sets fold up when the transmitter goes on. W3EZF, installing a wavetrap to prevent blanketing in his BC receiver, hooked a flashlight bulb in series with the trap and, after losing it, found there was even enough juice to blow out a 14-volt Xmas-tree bulb!

Circulation Statement

PUBLISHER'S STATEMENT OF CIRCULATION AS GIVEN TO STANDARD RATE AND DATA SERVICE

This is to certify that the average circulation per issue of *QST* for the six months' period July 1 to and including December 31, 1936, was as follows:

Copies sold	41,594
Copies distributed free	376
Total	41,970

K. B. Warner, Business Manager
D. H. Houghton, Circulation Manager

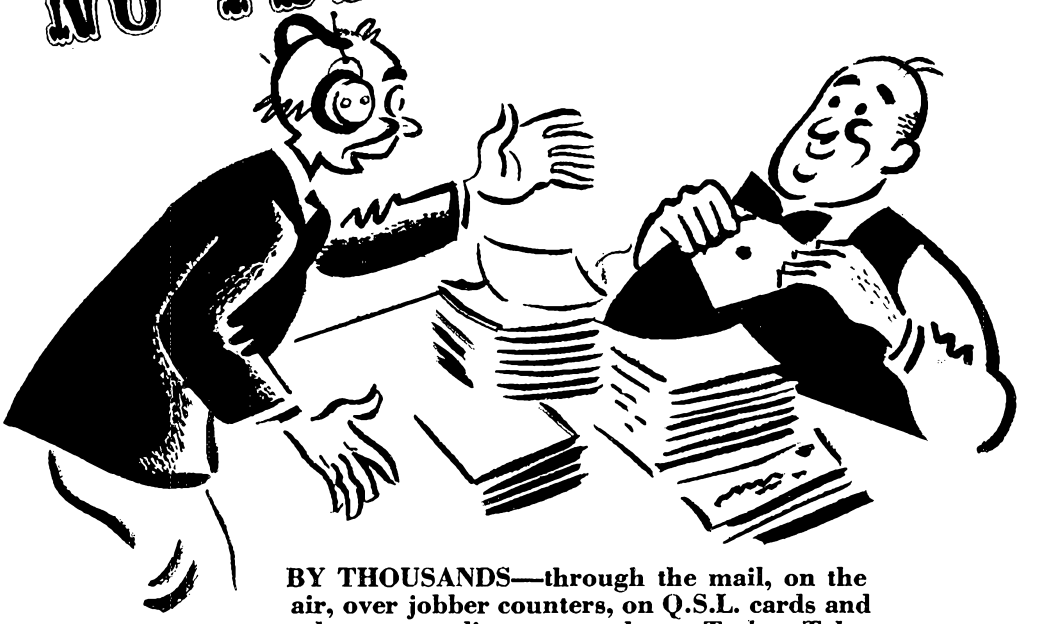
Subscribed to and sworn before me
on this 8th day of March, 1937
Alice V. Scanlan, Notary Public

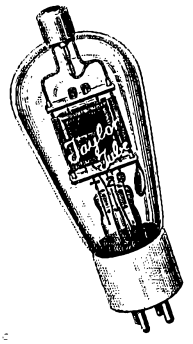
Notes on High-Power Electron-Coupled Oscillators

(*Continued from page 52*)

success; and, of course, blames the gang. But the story is that key-thump filters are not parasitic filters and serve only to smooth the front of the

WHAT—
NO TESTIMONIALS?





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keyed wave rather than to clean up spurious "bricks" in the transmitter's output.

It is preferable to operate the E.C.O. rather lightly loaded so as to produce a good clean signal, although I have found that the oscillator can be operated at full load and provide a good signal *if* the screen voltage is carefully adjusted. To accomplish this, R_2, in the circuit of Fig. 2, should be adjusted for the best obtainable note while the oscillator is working into a load equal to that which will be applied in service.

That's all there is to it.

Simple Rotary Beam Antenna

(Continued from page 50)

the pole, is placed as shown in Fig. 2 to hold the pipe close to the pole at the top.

"The ropes that cross over the piece of wood on top of the crosspiece support the weight of the antenna assembly. Good rope should be used here; it is best not to use wire because of its tendency to get mixed up in the operation of the antenna.

"An antenna of this type takes very little space and therefore can be used in crowded locations. It can be mounted on top of the house on a short length of 2" by 4", but a good light pole is better for longer lengths since it is not so flexible as 2" by 4". The antenna can be turned quite easily; I use two strong fish-lines off each end leading down to the ground and to turn it all one has to do is pull on the lines until the antenna is in the desired position. The lines can then be anchored to anything conveniently available.

"A 600-ohm transmission line is used to feed the 'Q' section. The line terminates on insulators on the pole, with a pair of No. 8 house wires running to the ends of the 'Q' bars, an arrangement which permits full rotation of the antenna."

W5BZR uses the beam for receiving as well as transmitting, the feeders being switched from one to the other by means of a d.p.d.t. switch. Compared with a vertical beam of similar electrical construction the horizontal arrangement has been found to give more complete cut-off of signals in the back direction, and in the forward direction shows a definite gain over a half-wave doublet. The antenna has given excellent results for W5BZR, with strong 'phone signals being received from Europe, Oceania and Africa, and has proved equally effective for transmitting.

VK-ZL Contest Results

(Continued rom page 47)

Australian Open Section

VK3EG 235,970; 2AE 138,940; 4BB 127,818; 4YL 105,750; 3MR 104,670; 2HF 93,060; 3KX 83,353; 5FM 71,410; 2DA 50,470; 3GQ 44,736; 6FO 44,400; 2XT 40,703; 2NY 40,524; 7JB 39,092; 3GP 35,815; 5HW 32,400; 2TI 32,172; 7AB 29,302; 5WJ 25,208; 6MW 24,732; 2EG 22,132; 2QE 21,525; 4HR 21,120; 6FL 20,372;

★ . . . . . International DX CHAMPION . . . . .

XE2N, Juan Lobo y Lobo of Monterey, N. L., Mexico, who won the 1936 contest with 189,081 points, and this year finished second with 201,520 points, using only 150 watts input. Nearly 2,000 QSO's on 5 bands in only 18 days . . .

RADIO-EXPERIMENTAL
XE2N

JUAN LOBO Y LOBO — OCAMPO 925 — APARTADO 710

MONTERREY, N. L., MEXICO

Amperex Electronic Products Inc.
79 Washington Street
Brooklyn, New York

Gentlemen:

It took me only two hours to build up on a bread-board a final with the HF-100 and a few minutes later, I was ready to use it from 10 to 160 meters with the same power supply used for my old 210's (1,000 volts). Even capacitative coupling was tried for more simplicity, neutralizing was so easy on all bands and Oh Boy!!! What an out-put from only 150 watts input that was all I could get from my power supply!!!

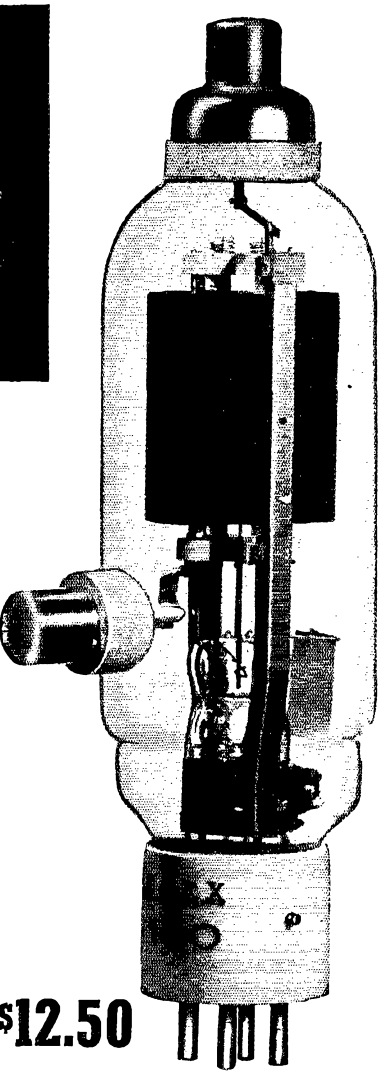
Next day the "CW" International DX Contest started and I don't need to say any thing of my signal as there are many thousands of stations all around the world that heard me during those days.

Five bands were used: 10-20-40-80 and 160 meters and near 2,000 QSO's were made during the eighteen days of the Contests. Several WAC's both on "PHONE" and "CW" were also made even it was supposed that I must work W & VE's only.

To close this letter, permit me to congratulate you for the excellent performances of the HF-100 and at the same time, recommend it to all those amateurs interested on "REAL DX."

Yours very truly,

Juan Lobo y Lobo
"xe2n"



$12.50

Thank you, XE2N, amateurs everywhere agree with you that the AMPEREX HF100 is the easiest tube to drive.

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79 WASHINGTON STREET • BROOKLYN, NEW YORK

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VK Handicap Section

	Power	*Total Points*	*Points Per Watt*
VK2HV	20	33,372	1638.4
VK3HK	25	39,520	1580.8
VK2YC	20	20,300	1015.0
VK3TU	25	4875	195.0
VK3RJ	19	478	25.1

VK Receiving Section

VK3-ERS 109,134; C. H. Miller 24,340

Great Britain

G6CJ 6970; 2YL 6540; 5YG 6420; 6RB 4910; 5KG 4430; 5MS 4390; 6XN 3360; 2IO 3168; 6BS 2940; 6XL 2808; 2WQ 2016; 2LB 1792; 5TB 1656; 5VB 1592; 2TH 1050; 5VQ 900; 6IJ 705; 5SR 564; 6GH 355; 6ZO 70

Irish Free State

EI8B 5650; 5F 3720

North Ireland

GI5UR 460

Germany

D4XCG 6350; 4SNP 4500; 4BUF 3090; 4LTN 2646; 4YWM 1953; 4XQF 1672; 4GAD 1608; 4VRR 1520; 3CUR 1458; 4NXR 1080; 4DMC 984; 4BEC 744; 4YUM 364; 4MOL 312; 4BMH 300; 3DLC 300; 4YFI 236; 3FZI 198; 4SIG 192; 4QET 174; 4LIM 108; 4DLC 108; 4RVC 108; 4GDF 108; 4YBF 108; 4YTM 108; 4GFF 48; 4LQM 48; 4OUT 48; 3CSC 23; 4BBF 12; 4ANF 12; 4GOF 12; 4KRJ 12; 3CPC 12

United States of America

W1JPE 6050; SZ 5700; FH 5520; TW 3800; AVJ 1575; 1QF 1432; FPP 141; BBN 108; AVB 12. W2BHW 6520; AIW 5810; HHF 5110; CJM 3450; DZA 3440; JME 2930; AXZ 2750; FAR 1827; GVM 1421; FU 959; GVX 875; BJ 515; EYG 24. W3BES 7290; 3EVT 6920; SI 6580; CZO 3024; AWH 2510; EUJ 2250; CHH 1672; BYI 887; BGD 141; BVO 12. W4CYC 3750. W5EHM 8850; FI 6440; FRD 1632; ARO 1449; KC 1113. W6HX 8460; FZL 8300; CIS 4820; IPH 3990; MVK 3940; GPB 2241; OGA 1864; IWS 1548; GVM 1127; LPC 1106; FRN 984; CFK 276; LFX 12. W7EUY 2240. W8ZY 6540; DFH 6440; BTI 6180; JIN 6120; FGA 4890; CJJ 3630; BXC 1440; BTK 1421; OQV 1288; LVH 735; OQF 630; CXR 355; NQL 355; IFY 174; APD 23. W9TB 8390; AEH 7550; PLM 4310; PTC 3672; PST 3096; AMM 3080; BEZ 3080; UBY 2970; VKF 2088; RPW 1561; CTR 1440; IYA 990; CFB 130; MUX 70; SRT 48; VVR 23; INY 12

Czechoslovakia

OK2OP 6550; 2LO 3640; 2RM 742; 2CM 356; 2HX 320; 3MB 70; 1AM 23; 3MGS 12

Switzerland

HB9AT 6020; 9AK 4290

Austria

OE3FL 3780; 7JH 2090; 1ER 1712

Hungary

HAF4H 3360; 8C 1280; 1G 889; 8D 756

Norway

LA2Q 1687; 4K 355; 5Y 108; 2U 48

Sweden

SM6WL 1904; 7UC 360

France

F8EO 4380

Denmark

OZ7KG 1155

Belgium

ON4NC 1980

Holland

PA0AZ 6590; 0UN 6430; 0QQ 1032

Italy

I1KD 896

Estonia

ES2D 355

Danzig

YM4AA 1792

Finland

OH3NP 48

Lithuania

LY1J 48

Argentine

LU9BV 4437; 2CW 3762; 6AX 1288

Peru

OA4J 3366

India

VU2LJ 2288; 2EB 48

Japan

J2JJ 3645

Singapore

VS1AL 1869

Hawaii

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Mauritus

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Egypt
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Rhodesia
ZE1JV 1740

New Zealand
ZL1DV 95,964; 1AA 69,030; 1FT 51,020; 4BQ 47,589; 4CK 38,950; 1GX 37,310; 1LM 35,802; 2DS 31,248; 2OQ 26,472; 2QA 23,940; 1FE 19,075; 3AB 15,523; 3AJ 14,200; 3GR 13,904; 2BP 10,556; 3KG 9600; 1BC 9420; 1CV 8196; 2OD 5109; 3JX 4676; 2CP 2947; 3CS 95

ZL Receiving Section
ZL166 48,600

Canada
VE1IW 4350; 2AX 3850; 3AU 3096; 5BI 3042; 5PW 2106; 1HK 835; 3GT 294; 4ABH 141

Canal Zone
K5AY 4707; AC 3080; NY2AB 3760

Cuba
CM7AI 2196

Mexico
XE1AY 6660; 1CM 4590

Porto Rico
K4RJ 825

OVERSEAS RECEIVING STATIONS

Germany
DE2415h 7230; 1729u 7180; 2881o 6410; 2750c 6290; 2981c 6120; 1609c 6030; 3559n 5511; 3166n 5460; 2449t 5450; 2327m 5320; 2409f 5310; 3587n 5280; 3197r 5190; 3250m 5110; 3282c 5060; 2497k 5030; 2680g 4880; 3313c 4830; 1480i 4830; 3234f 4710; 3042u 4580; 3648n 4270; 1971o 4130; 1977b 4060; 3095r 3190; 3623m 3100; 3149i 2520; 3329u 2439; 3388o 2385; 2574i 2349; 2518f 2223; 3368u 2160; 3204p 1784; 3647m 1719; 3264c 1519; 3603i 1440; 3642r 1280; 2371t 1280; 2836u 1200; 2581i 1200; 3214h 1092; 3394c 944; 2555i 810; 3745i 768; 3492c 756; 3641f 741; 2784c 610; 3600i 500; 1082h 498; 2403u 410; 3443t 350; 2102g 261; 2877t 190; 2224k 171; 2982c 171; 3168b 110; 3395e 108; 3345u 92; 3384h 48

Great Britain
2CAR 7780; BRS1535 7710; 1173 7470; 1885 6720; 2AZX 6540; 2AWX 6530; 2AOU 6300; 2ADC 5760; 2AOZ 5720; 2AZF 5620; 2ASH 5250; 2ADY 4570; 2BIU 4300; 720 3590; 1948 4010; 1371 3420; 2BDT 3360

Austria
OE-059 6534; 151 4279; 053 1845

France
FR1940 3880

U. S. America
W2BBK 5790; 5FIT 970

Canada
Allan H. Pratt 2610; S. G. Clark 850

Hong Kong
BERS 3265; 3040

India
BERS 311; 7270

Holland
L208 108

Frank Talk about Ratings

(Continued from page 29)

promise you the moon usually give you results which are about as useful as the moon would be if you really did have it sitting right there in the shack.

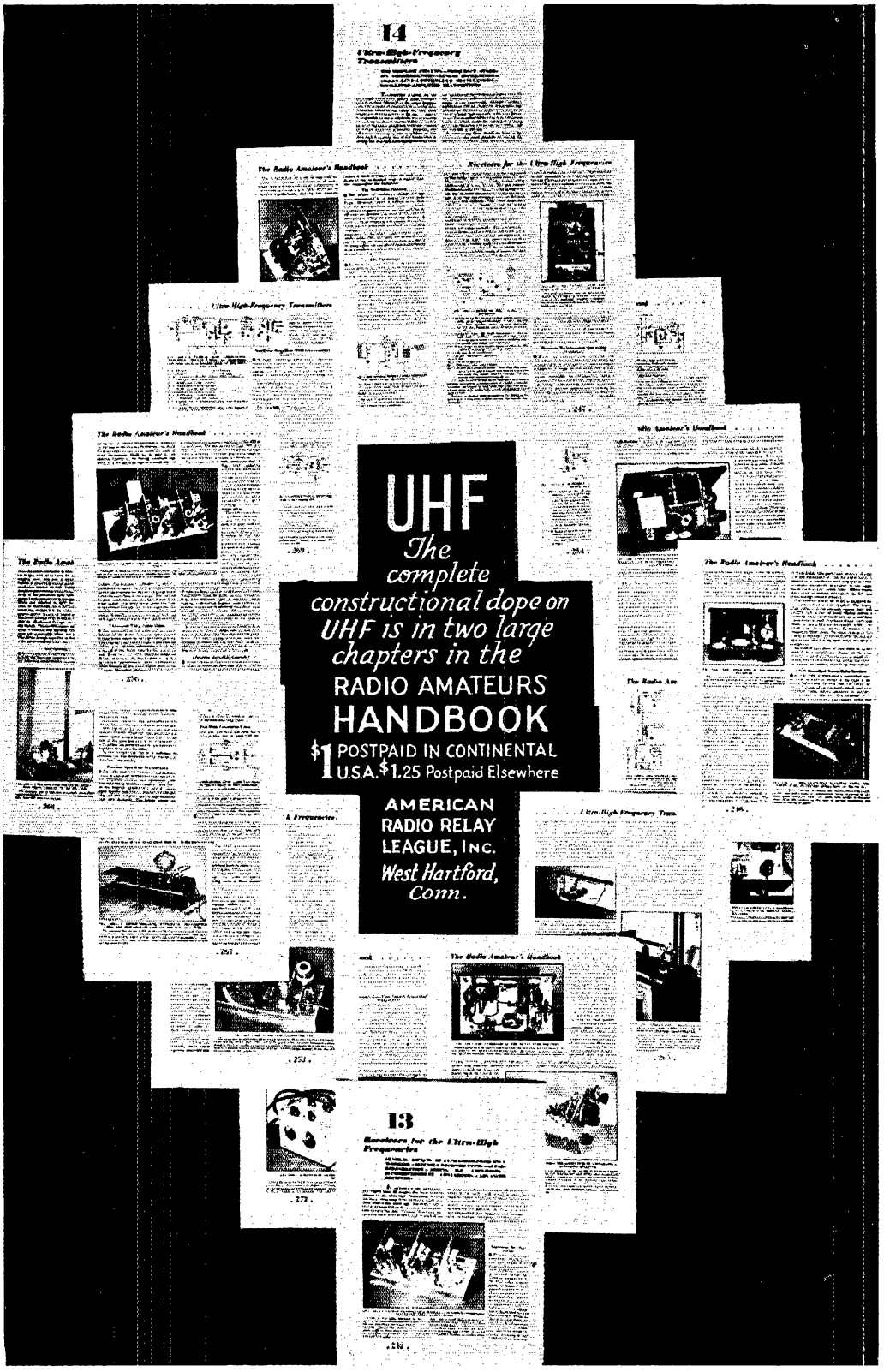
Ratings form the basis of the manufacturer's guarantee; in order to protect yourself within that guarantee, ratings should be observed.

It probably isn't tactful to make this point, but here goes, anyhow. Some amateurs return tubes to the manufacturer for adjustment with a letter pointing out in all sweet innocence that these particular tubes were run well under their ratings at all times and the owner simply can't understand why the tubes failed. Now, no engineer worth his salt can fail to detect in many of these returns the evidences of excessive plate dissipation, excessive voltage, filament burn-outs due to high voltage, and many other like symptoms. As a word of advice, I would suggest that you give the manufacturer the whole story when you return tubes, since it won't materially lessen your chances for an adjustment, and it will help the manufacturer produce better tubes in the future so that all may benefit.

HOW RATINGS ARE DETERMINED

It is very difficult to lay out in one, two, three, four fashion the steps taken in determining the ratings for a transmitting tube. Every manufacturer probably has his own theories and procedure, so we will have to be personal and tell you how we do it at RCA and why we think it is a good method.

When the tube is in the design stage, tentative ratings, which the tube is to meet, are set up. Materials, dimensions, and arrangement of parts are selected on the basis of known properties of materials, the laws of science, our research work and the experience, both in the laboratory and in the field, of our engineers with other similar types. Sample tubes of the new design are then checked for compliance with the desired ratings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13
Receivers for the Ultra-High Frequencies

and characteristics. In addition, destructive overload tests are made to determine if there is a reasonable margin of safety in the tube's design.

Most important of all, however, are life tests in the determination of final ratings. The procedure is simple but expensive. A number of tubes is placed on the life-test racks and operated under maximum rated conditions. At intervals they are removed for electrical check tests and the life tests are continued until the tubes fail. Final ratings are released when life tests indicate that the tubes will give satisfactory performance under these conditions.

Now, if we examine the results of life tests on a large quantity of tubes, we find some interesting facts. A few tubes will fail very early in life and then after a prolonged period the rate of failure will increase rather rapidly for a while. Finally, we will have a few tubes which will hang on for exceedingly long life. This sort of thing is typical of many mortality propositions, and is particularly comparable to the human mortality curves from which life-insurance companies figure their rates.

UNIVERSAL TEST SET FOR CHECKING CHARACTERISTICS AND PERFORMANCE OF HIGH-POWER TRANSMITTING TUBES

It is obvious, therefore, that the life of a single tube, even under rigidly specified operating conditions, cannot be accurately predicted. The average life of a group of tubes, however, can be predicted for the conditions under which the tubes are operated. The point to get fixed in our minds is this: if operation of tubes is confined within well-established ratings, satisfactory service and life will be obtained.

THE BASIS FOR RATINGS

When a tube is built we have little idea into what class of radio service it will find its way. Accordingly, the ratings must be established so that the tube will give long, reliable service in all services requiring it. Now long life is capable of a number of interpretations, depending on the point of view of the user.

The broadcasting station, for instance, operates tubes on an average of 18 hours a day. Tube

failures are expensive both in themselves and in advertising revenue lost because of interrupted programs. Consequently the broadcaster insists that his tubes operate for over a thousand hours without failures.

On the other hand, let's look at the requirements of the aviation companies. They operate the tubes with plate loads for perhaps only 15 minutes per day altogether. It takes a good many days of operation at 15 minutes per day to run up even 1000 hours of tube life. However, with lives at stake it is imperative that the tubes be ready for operation when necessary, since failures may mean damage to an expensive airplane or loss of human life. Picture yourself as a pilot sitting "upstairs" on top of the "ceiling." You have to come in for landing soon. You want to find out exactly where you are by bearings. If the tubes in the transmitter have failed and you can't raise the ground, you are in that sort of a mess which requires unpublishable adjectives to describe it.

The amateur, however, usually does not demand the utter reliability that some other services require nor, relatively speaking, does he require the extreme long life of still other services. As nearly as we can estimate from surveys, the average amateur transmitter is on the air about 300 hours or less per year. Of course some stations far exceed this figure and others fall far below it. On the whole, however, it takes Johnny Q. Amateur about 3½ years to run up a thousand hours of operation on his transmitting tubes. All of which means that many amateurs figure they can overload their tubes a certain amount and shorten the life to one year and still come out about right on the cost of their tubes. But the point remains, inescapably, that the manufacturer doesn't know and cannot find out, because of the varied applications, conditions, etc., how much overloading the average tube will stand and still give a desired fraction of its probable normal-rating life. This problem may look simple, but take it from one who knows, it isn't.

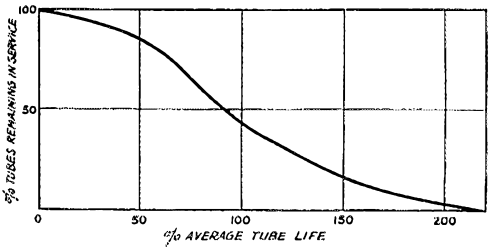
The maximum operating conditions, or ratings, which are established for any tube type must of necessity be conservative enough to insure that the vast majority of tubes of a given type will give the long, reliable service required in certain applications. Again, ratings must be conservative enough to take care of all classes of service.

You are probably thinking in the back of your mind that the foregoing sounds like a backhanded invitation to amateurs to overload their transmitting tubes in order to obtain greater output per dollar of tube cost. From the sales standpoint, every manufacturer is anxious to rate his tubes as high as possible. That's a fact, even though I know numerous amateurs believe we rate tubes "conservatively" out of pure cussedness. A reputable manufacturer establishes conservative ratings for *your* protection as well as his own. He wants to sell tubes, and they are easier to sell when he can establish higher ratings. Conservative ratings, therefore, would seem to work against him and his product. But we want, just as every other reliable manufacturer wants, every customer to obtain long, trouble-free operation. Ac-

cordingly, ratings are guideposts to tell you how to obtain the most *watt-hours* per dollar operation out of your tubes. A tube costing you $10 which gives you an output of 100 watts for 500 hours isn't as cheap as another tube costing $10 which gives you only 75 watts output but lasts 1000 hours. Don't forget this point, for it means money in your pocket to buy additional gear. Similarly, a tube operated in excess of ratings is as expensive as the first-mentioned tube above.

OPERATING TUBES IN EXCESS OF RATINGS

What I have said heretofore is not intended to convey the idea that the minute you exceed any rating on a tube it is either going to fall to pieces or blow out. The tubes of manufacturers who rate them conservatively will usually stand overloads which far exceed the ratings. Some few tubes of a given type will even reach a ripe old age and still be operating under conditions which would make the engineer who designed the tube blush with pride. Reliable manufacturers build tubes with every intention that they will operate that way, but they can't guarantee it. If they could, the ratings would be increased. There are certain to be variations in the power-handling ability of

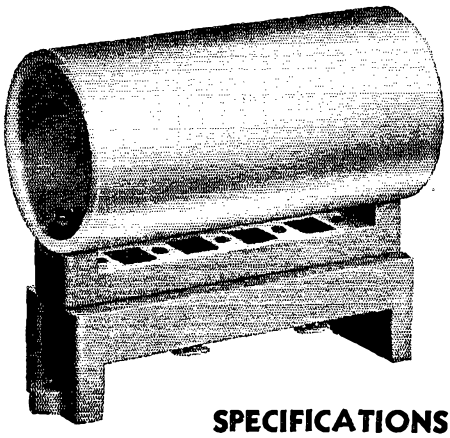


TYPICAL TUBE-LIFE CURVE; PERCENTAGE OF TUBES VS PERCENTAGE OF AVERAGE LIFE

The average life (100%) has no particular significance in hours, but is simply the total number of hours of life divided by the total number of tubes. A small percentage of tubes will fail relatively early; the rate of failure then increases over a long period, followed by a decrease in rate toward the end. In normal service the average life will be many times the 1000-hour figure.

tubes of the same type. Accordingly, ratings must be set to take care of those tubes which for some undetected reason will not have the overload capabilities of certain other tubes. The unfortunate part about it all is that you don't know whether your tube has exceptional overload capabilities until you have tried it. If it hasn't, you are minus one tube. The conscientious manufacturer, therefore, protects you by establishing ratings which he states his tubes will meet. He tries to build additional capabilities into all of his tubes so that you will get better value, but he can't guarantee these capabilities in every case.

From the practical standpoint, the amateur overloading transmitting tubes to obtain slightly better output is oftentimes "washing his feet with his socks on," to use the vernacular. And here's why. It takes four times as much power output from the transmitter to double the voltage strength of the received signal. Now a 100% increase in signal strength represents an increase of

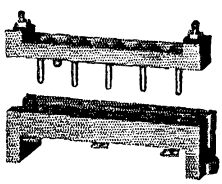


BUFFER COIL FORM

The Buffer Coil Form Assembly illustrated at the left is both versatile and efficient. The Coil Form is drilled for leads and may be used alone, mounted on stand-off insulators. The Coil Plug also may be used alone as a base for self-supported coils. Construction throughout is of low-loss material, and contacts are rugged and positive.

SPECIFICATIONS

The Isolantite Coil Form is 1¾" diameter x 3½" long. The base shown at the right is of R-39, and has five prongs with heavy side-wipe contacts.



UR-13, Assembly complete, **$1.50** PB-5, Plug only . . . . . **$.45**
XR-13, Coil Form only . . . . **$ .66** XB-5, Socket only . . . . . **$.45**

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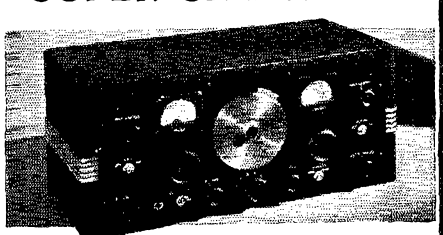

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about 6 db—a 6-db increase in signal strength being a very small increase as detected by the human ear. If it is assumed that the efficiency of the tubes remains the same, four times the output means four times the input. Very few people will recommend that manufacturers' tube ratings be exceeded by this amount. Any *less* increase in power input will probably not make a worthwhile difference in the strength of your signal at the receiver as detected by the ear.

To drive this point home, let's take an example: A 203-A is rated at 1250 max. plate volts and 175 ma. in Class-C telegraph service. The maximum *rated* plate input is therefore 220 watts and the maximum plate dissipation is 100 watts. Under these conditions, assume that we are taking 154 watts out of the tube, which means that we are dissipating 66 watts at a plate efficiency of 70 per cent. Now suppose your pal in Dubuque reports you S6 but you decide you really want to show the lad something in the way of signals and start feeding the apples to that good old 203-A. Up goes the plate voltage to 2500 volts and the plate current to 350 ma. You are now putting 875 watts (four times the rating) into your faithful old wheel-horse and you ask for a QRK. If he doesn't let his imagination run away with him, he may tell you that you are now S7.

Now try to picture what would happen to that 203-A should the final get off resonance. Without taking anything out, you are putting about 900 watts into a tube rated at 100 watts dissipation. You think of the consequences!

Don't forget, though, what you were doing to that 203-A. Assuming the plate efficiency did not increase with the higher voltages, you are now asking that tube to dissipate 264 watts when it was only intended to dissipate 100 watts, you have doubled the plate voltage, increasing chances of breakdown, and you have doubled the plate current, causing more gas bombardment, which is surely going to cause loss of emission before long.

Now I am not asking you to take my word for all this. When you go on the air to-night, try reducing (not increasing) your power output after you have made a contact, and ask the fellow on the other end to give you a report as you reduce power. To make the test fairly, be sure that your power output comes down proportionately with any reductions you make in input, since there is a possibility that efficiency may fall off badly with reductions in plate voltage below rated value. You will find that, as a rule, your reports will hold up surprisingly well even after the power output has been reduced to one-half of its original value.

Of course, higher power is worthwhile in those borderline cases where your signal is *almost* able to break through heavy QRM. In such cases, a sizeable increase in power may make the difference between a readable signal and one that is unintelligible. But, as theory so well indicates, there is seldom a shadow of an excuse or reason for crowding just a little more input into a final amplifier tube that is already operating at or near its maximum ratings. Therefore, when you need

higher power, get it by using more tubes of the same type or by means of a larger tube. If you do not care how often you have to buy tubes, disregard this advice.

And now, boys and girls, I grab my hat and rush out to have my head examined; for whoever heard of a manufacturer trying to tell you how to save money on your tubes by keeping you from blowing them out and thereby reducing the potential market?

Standard Frequency Transmissions

Date	*Schedule*	*Station*	*Date*	*Schedule*	*Station*
June 2	C	W9XAN	July 7	BB	W9XAN
June 4	B	W9XAN	July 9	BB	W6XK
	A	W6XK		A	W9XAN
June 9	BB	W9XAN			
June 11	BB	W6XK	July 10	BX	W6XK
	A	W9XAN	July 11	C	W6XK
June 12	BX	W6XK	July 16	A	W6XK
June 13	C	W6XK	July 23	B	W9XAN
June 18	A	W6XK		B	W6XK
June 25	B	W9XAN	July 28	C	W9XAN
	B	W6XK	July 30	B	W9XAN
June 30	C	W9XAN		A	W6XK
July 2	B	W9XAN			
	A	W6XK			

STANDARD FREQUENCY SCHEDULES

Time (p.m.)	*Sched. and Freq. (kc.) A*	*B*	*Time (p.m.)*	*Sched. and Freq. (kc.) BB*	*C*
8:00	3500	7000	4:00	7000	14,000
8:08	3600	7100	4:08	7100	14,100
8:16	3700	7200	4:16	7200	14,200
8:24	3800	7300	4:24	7300	14,300
8:32	3900		4:32		14,400
8:40	4000				

Time (a.m.)	*Sched. and Freq. (kc.) BX*
6:00	7000
6:08	7100
6:16	7200
6:24	7300

The time allotted to each transmission is 8 minutes divided as follows:

2 minutes—QST QST QST de (station call letters).

3 minutes—Characteristic letter of station followed by call letters and statement of frequency. The characteristic letter of W9XAN is "O"; and that of W6XK is "M."

1 minute—Statement of frequency in kilocycles and announcement of next frequency.

2 minutes—Time allowed to change to next frequency.

W9XAN: Elgin Observatory, Elgin National Watch Company, Elgin, Ill., Frank D. Urie in charge.

W6XK: Don Lee Broadcasting System, Los Angeles, Calif., Harold Perry in charge.

Schedules for WWV

For complete new WWV schedules effective June 1st see the article, "WWV Services Again Expanded," elsewhere in this issue.

Each Tuesday, Wednesday and Friday (except legal holidays), the National Bureau of Standards station WWV will transmit on three frequencies as follows: 10:00 to 11:30 A.M., E.S.T., 5000 kc., 10,000 kc., 2:00 to 3:30 P.M., E.S.T., 20,000 kc. On each Tuesday and Friday the emissions are continuous unmodulated waves (c.w.); and on each Wednesday they are modulated by an audio frequency. The audio frequency is 1000 cycles per second.

Station Activities

(*Continued from page 68*)

NEW ENGLAND DIVISION

CONNECTICUT—SCM, Frederick Ells, Jr., W1CTI—Traffic figures went over last month's high total of 4404 . . . 5783 this time. FB, gang. HSX takes honors again this month. JXP is doing fine work in two nets. AKH, ITX and JUD are on 56 Mc. JFN put up new antenna at South Lyme. UE started on a field trip May 13. JYE handled six times as much traffic as last month. AW missed B.P.L. by just *one* delivery! JMY keeps West Hartford on the map in the net. ITI had trouble with osc. and buffer stages. GKM arranged details for Nutmeg get-together May 2nd. Many thanks for a swell time, Dave. KFN has a new '03A. GMR schedules KFN. APZ gets his traffic on the A.A.R.S. net. GME acted as Alternate for N.C.S. when UE was unable to be on. IKE has new all-band exciter for RK-20 nearly finished. CTI received 23 traffic reports by radio this month. BDI has his new emergency portable rig all set for the Field Day. BFS changed frequency to 3830 kc. BHM's traffic was all deliveries. HPI offers to steal the Dural pole at Darien Police Headquarters if some one will get them tight some night! KAY reports Connecticut Valley 56 Mc. opening up with good DX for that band. JFN is new O.R.S. ES schedules 8CMP. JTD is trying 14 Mc. to fill in the gaps for W.A.S. TD built a new power supply. EH is working DX on 14 and 28 Mc. HXZ holds down Danbury for the net. HYF dropped one of his pet crystals. Yeh, it busted. Tough luck, Rog. EAO blew a flock of fuses and filter condensers and worked England on 1.75 Mc. c.w. JJL is on 14 Mc. with 200 watts to a 211. IMV says that KKY of Hazardville will be on the air soon on 1.75 and 28 Mc. George is a shut-in, being paralyzed in waist and hips and just enough in arm so cannot use key long; frequency about 1925 kc. BIH is rebuilding. EER-JYQ has been working all kinds of DX on 28 Mc. BCG is back with a 6L6 pushing a '10. CDR finds 3.5 Mc. C.W. still holds interest after extensive work on 56-Mc. 'phone; he has a 6L6 pushing an '03A on 3575 kc. GBX keeps 1CBA on the air—3504–3700 kc. and 56 Mc. 'phone. APW has new steel rack job near completion; he worked 8 different European countries on 3600 kc. during the DX contest.

Traffic: **W1**HSX 1066 JXP 919 UE 357 JYE 311 AW 309 JMY 219 AFB 213 ITI 132 GKM 112 KFN 111 GMR 110 APZ 100 GME 86 IKE 75 JQD 70 CTI 73 KJP 53 BEO 49 IQC 43 BDI 40 BFS 38 BHM 32 INP 29 HPI 22 KAY 21 JFN 19 ES 12 JTD-JHK 11 TD-GC 7 EH-HXZ 6 HYF-DWP 3 EAO-JJL 2 BNB 1 APW 15 KV 462 (WLGI 132) FAJ 162 AJB 94 (WLGG 58) FE 63 FRK 40 DMP 267.

MAINE—SCM, John W. Singleton, W1CDX—IST is winner of first prize in the Maine traffic contest. INW is running for S.C.M. and will make a good man if he is elected. GOJ is doing a real job as chief R.M. IVV'S new frequency is 3709 kc. CDX's new QTH is 26 Walton St., Portland. Winners of prizes in the Maine Section traffic contest: 1st prize IST, 2nd prize INW, 3rd GOJ, 4th IVV, 5th HSD, 6th IBR. Congratulations, OM's! The S.C.M. officially announces his resignation to take effect at the end of his present term. He feels it necessary due to business pressure.

Traffic: **W1**IST 1658 INW 959 GOJ 796 IVV 462 IBR 198 IKC 9 KLQ 5 HSD 191.

EASTERN MASSACHUSETTS—SCM, Albert N. Giddis, W1ABG—IHI was appointed A.A.R.S. Liaison R.M. IWC cleaned up on the O.R.S. Contest of E. Mass. FRO is the champ on "deliveries." HWE just missed the B.P.L. JZU got a new Super Skyrider. HKK was appointed P.A.M. IIC uses 47 crystal and 6L6G. IUQ is with us again. HKY piled up total of TWO points in 'phone DX contest! QW organized 56-Mc. net to handle Merrimack Valley Marathon. HIL has new job and new station. HHR is back with 6L6 portable. WV worked his 35th state on 28 Mc. EVJ writes from Ecuador and says he will be with us again soon. EMG and IIN joined the O.R.S. ranks. DIA, JNF and JZU applied for O.R.S. HKK and WV will be two new O.P.S. appointees. GMD resigned as P.A.M. FL is now an O.O. for Eastern Mass. DDE shipped out for Mackay Radio on the S.S. Yorba Linda. FAR, GLE and HFJ report for the first time. Time to tune up the old portable gear. Now that summer is approaching, we should take the opportunity of developing our emergency apparatus. A little experimenting on the really ultra-high frequencies might not be amiss during this season. Don't let yourself go "stale." Keep your hand in.

Traffic: **W1**IHI 733 AKS 624 IWC 565 INA 535 FRO 481 ABG 415 JCK 394 AGX 262 HWE 333 EPE 202 DMF 134 FAR 118 HFJ 127 KH 126 JTM 118 BMW 106 EMG 103 GLE 66 JZU 42 HKK-IIN 31 BEF 30 IIC 31 IUQ 29 HKY 27 RE 21 EPZ 8 QW 27 HCH 14 ZQ (WLMQ 206) (Feb.-Mar.: W1QA 222 IIC 1 JCK 178).

WESTERN MASSACHUSETTS—SCM, William J. Barrett, W1JAH—IOR makes the B.P.L. with plenty to spare. IOT also gets in the charmed circle. The news from Worcester: DIE returned from cruise.—IDG applied for O.R.S. and is moving to Delaware.—JNA has gone to Europe.—IOR is doing a very good job as R.M. ZB raised countries worked to 98 and is still keeping daily schedule with WCFT, now in Samoa. JAH is getting gray trying to stir up some sign of life in this Section.—How about a little coöperation from you guys? BKQ resumed traffic activity. EOB got into R.C.C. ISN keeps schedules on 7 Mc. IPK is newcomer to our Section, QTH Chicopee Falls. Welcome. AJ is still using temporary antenna at new location. JOP is doing most of his operating at club station BKQ. COI built e.c. rig for 3.9-Mc. 'phone. IJR is building a real rig. Applications for Official Relay or Phone Stations are very welcome. IEI volunteers for O.O. FTS is on with 59–59–46's.

Traffic: **W1**IOR 1273 IOT 507 (WLGN 58) ZB 235 JAH 62 BKQ 28 EOB 26 ISN 6 AJD 2.

NEW HAMPSHIRE—SCM, Carl E. Evans, W1BFT—On April 17th, the Fourth Annual N. H. State Hamfest was held at the Hotel Carpenter in Manchester, George Bailey, KH, Vice-President of the A.R.R.L., was toastmaster at the banquet. Charles C. Kolster, KF, of the Federal Communications Commission, Percy Noble, BVR, New England Division Director, and F. E. Handy, BDI, Communications Manager of the A.R.R.L. were guest speakers. Three hundred hams from all over New England and New York State attended. One hundred and three nice prizes were distributed and a good time was had by all. GMH, HPM, IVU, APK, JCA and BFT served on the committee. ITF has a nice emergency portable power supply consisting of a 700-watt 110-volt 60-cycle generator mounted on his truck. HJI reports relay of an Easter message from son in England to father in California. FB. AVJ is building a new bias supply to do away with the ole B batts. IJB is going to try 28 Mc. IDY is building new transmitter. GJH has completed new transmitter in a nice looking six foot rack. JCA has completed his W.A.S. BII was presented with a nice 56-Mc. transceiver for his birthday. The N.H.E.N. is drilling bi-monthly now thru June. In the fall the 3840 net will also act as a state traffic net, operating three nights a week. Any suggestions for this net will be appreciated. SK is on the sick list.

Traffic: **W1**IP 787 FFL 298 (WLGB 27) GMM 292 BFT 213 IDY 55 JDP 42 CEA 39 ITF 31 HJI 3.

RHODE ISLAND—SCM, Clayton C. Gordon, W1HRC—A.A.R.S. had traffic contest which accounts for two B.P.L.'s in ham bands and one B.P.L. in A.A.R.S. this month. BVI is on 1.75-Mc. 'phone. HJ is on board the C.G *Argo*. JNO is getting good results on 3.9-Mc. 'phone and had flag pole donated for mast. JPJ, IRF, INB and JNO held two hour 4-way QSO March 26th—all but JNO on c.w. The Newport Amateur Radio Club resumed activities with election of officers: Pres., KFB; Sec., JIK; Treas., JUC; Tech. Com., JPJ-BLS; KIV (ex-K6AUQ). Meetings are held Tuesdays and visitors and new members are always welcomed. IKZ is pounding brass on S.S. *Berwindvale*. JFF is working 56-Mc. portable-mobile. KFB is new ham in Newport. GTS has succeeded BJA as new secy. of P.R.A. Seen at Framingham hamfest—GTN, FAH, JXA, JEZ, HRZ, HRC and Roy VanWart, from Providence Gang. HRC is back in A.A.R.S. as local. Everybody is busy getting ready for convention.

Traffic: **W1**GTN 612 INU 545 IEG 160 (WLGK 409) IAV-HRC 2.

VERMONT—SCM, Alvin H. Battison, W1GNF—C.R.M.: 1FSV. R.M.: 1EZ. P.A.M.: 1AVP. ELR made W.A.C. and worked 16 countries on 28 Mc. during the 'phone DX contest. JVT is using a '47-2A3-P.P. '45 transmitter on 3691 kc. AVP has added a G.R. 535A frequency meter to facilitate greater accuracy with his O.O. work. EZ made the highest SS score in the U. S., a goodly score in the DX Contest, and is now returning to traffic work. BJP is building a new transmitter using 6L6-841-P.P. T-55's. FPS is still holding up his end at Brattleboro. CND and IQC visited the Rutland amateurs. The following went to the Manchester, N. H. Hamfest: IRO and YL, GAN and YF, AVP and YF, DQK and YF, BDX (of 1927 Flood Fame) and YL, FSV,

ATZ. CBW, JLF, JMO, and Ex-AAG. GAN and IRO won the "Booby" prize in the 56-Mc. treasure hunt. IQG, KJG and JRU are members of the Lamoille Valley Net. HEV is experiencing the trials and tribulations of the beginning amateur. BD reports "Chubby" is doing nicely; so are the Pups.

Traffic: **W1**FSV 370 GAE 47 EZ 13 AVP 5 AHN 6 GNF 4.

HUDSON DIVISION

EASTERN NEW YORK, SCM, Robert E. Haight, W2LU—We welcome Jim's FB traffic totals again. GZF reports broken arm in auto accident. LU is on 3530 kc. for N.C.R. drills and traffic. HYC has new Sky Challenger and worked K7PQ, VO2W and K5AY on 3.5 Mc. ISQ gets out FB with '47-801, 50 watts. JWT visited Hdq. and enjoyed meeting the boys. CC is DXing per usual with VK's. JSL is getting Class A ticket and playing with 14 Mc. ATM was transferred to S.S. *Santa Maria* and sends his 73 to the 3.5-Mc. boys. CYW, only Horsetrader in E.N.Y. Section, attended meeting in Middletown, Conn. HLA has rig on 56 Mc. HYK removed antenna from ground and put it up in the air again. KFP, HON, CMG and CYW are active on 56 Mc. JAX is heard consistently in Albany by CYW. ITK reports for *HUM*. ITK is using RK-20 in final. HUB has high power. IUR has new 35T on 28 Mc. Kingston gang went full blast at Foods and Progress Show. ALP is building new 500-watt transmitter to buck local QRM from DC, CBO, DSB, CYZ and GFH. 5ABD lives in Scotia now. E.N.Y. welcomes him. CJS is rebuilding for '47 crystal, 807 doubler, HF100 final. HCM tried 28-Mc. 'phone. HNH holds Class A ticket. DDW is back on the air again. BZZ paid him a visit. E.N.Y. misses BZZ and would like to see him return.

Traffic: **W2**EGF 539 GZF 308 LU 137 HYC 85 ISQ 74 JWT 45 CC 8 JSL 4.

NEW YORK CITY AND LONG ISLAND, SCM, Ed. L. Baunach, W2AZV—The S.C.M. wants to thank his supporters for their whole-hearted coöperation in the election and appreciates the large number of congratulatory letters and messages received. JND is out for O.P.S. INF is again out for O.R.S. DOG has been doing extensive u.h.f. research work for R.C.A. UK did some FB work in the DX contest. KAM works consistently through local QRM with five watts to a 2A5. HWS is getting ready for summer QSO's on 28 Mc. EVA still has plenty more cards. Send him a stamped envelope, if you expect any. JVU, who sends in his first report, can be heard working the VK's on 14 Mc. with 100 watts to a T55. JGC has been after DX on 14 Mc. JLG is rebuilding rig using HF100 in final. BGO got in an eleven-station QSO that covered eight districts. BMG has a new bug also a new straight key, one for each foot. FIJ dropped his crystal so had to get another. JBL met KGO in Automat. EYS replaced his old '10's with a pair of T20's. HXT takes traffic on 14 Mc. and reroutes it on 7 Mc. through 3ELN. HGO receives plenty of European S.W.L. cards. IHT worked TI2LR on 14 Mc. HXT finds RME69 FB. HMJ is using p.p. T55's on 7014 Kc. JFP's rig went dead about an hour before the W/VE contest. BYL is rebuilding at his new QTH. IOP has a new NC101X. HNS got Radiotelegraph 1st. BOT has a new Sky Challenger. JHB is adding a 35T final. ELK is looking for a schedule with California. OQ is WLNS on 3497.5 kc. in the A.A.R.S. APV schedules 6NNR. Tu-Boro Radio Club is going on a camping trip, Decoration Day week-end, to Phoenicia, N. Y. FF has been in Miami enjoying the sunshine. Telcoli Radio Club put on a radio show in Telephone Co. Building, April 28th. GWZ is back from Penn. State College. AHG, AZV, FRZ, HSO and OT are on 3.9-Mc. 'phone every day at 2 P.M.

Traffic: **W2**BMG 282 BGO 208 (142) DBQ 194 (WLNB 172) PF 181 KI 169 JBL 147 OQ 118 (WLNS 50) DQW 104 EYS 80 HXT 51 HGO 34 AZV 33 GDF 26 IHT 21 HXT 20 JEQ 16 HMJ 15 ADW 14 AA-CIT 12 SLR 11 HJT-BIK-BFA 10 ENS-BKP 9 JRC-IED-GG 8 AVS-JFP 7 JJN 8 BYL-HWS 6 APV-AHC-IOP 5 HBO 4 JHB-HYL 2 KAE 32.

NORTHERN NEW JERSEY, SCM, Fred C. Read, W2GMN—GKQ has new superhet receiver and will be on 1.7-Mc. 'phone shortly. GLH (ex-8OPJ) has new rig with 150 watts input on 14 Mc. John Reinartz, 1QP, gave a talk at the spring meeting of the Tri-County Radio Ass'n held in Plainfield on April 12th. HRN made trip to Washington to see the cherry blossoms and received royal welcome from the hams. JMX has built new power supplies and is getting ready for higher power. GNW is back at his old QTH after spending the winter at Bound Brook, N. J. ILF worked 19 countries on 7 Mc. with self-excited p.p. 250's. The N.C.R. keeps HBS busy in his extra time. CIZ is building 75-watt all-band transmitter. JUC is installing break-in system. Proceeds of the dance given by the N.N.J. QSP Club helped defray cost of crystals for net operation. HTX will have his '03A back on the air when he comes home from college. GVZ has installed Faraday shields on two of his rigs and finds harmonics completely eliminated from 3.5-Mc. transmissions. The Original Tri-County Radio Ass'n had its annual election and dinner on May 3rd. HVK is rebuilding. GZG is spending all his spare change on records for his phonograph amplifier set-up. FFY has new antenna mast; he made arrangements with about seven of the Plainfield Radiophone gang to help him raise it—an electric company lineman living next door put it up with one hand! GYY, Sparton-like, decided to put up his mast alone; it went up all right, but Nels didn't dare let go of it to fasten the guy wires; an "SOS" to the YF was necessary! IMB is working for Western Electric. IIA is experimenting with a "trick" long-lines transmitter on 56 Mc. Raritan Valley Radio Club has Vigilante Committee. JKQ is new O.O.; he is going to Europe the last week in June to compete in the international rifle matches; and by the way, he has one of those new "signal squirters" for use on 14-Mc. 'phone. GDB doesn't seem to be able to build a preamplifier to take care of his new velocity mike. HNP is through with the exams and back on the air again. Welcome, George. IYG has new 3.5-Mc. Zepp antenna. FZE is back on 1.75-Mc. 'phone. FOI is rebuilding.

Traffic: **W2**HNP 181 GVZ 119 HTX-8 117 IAP 116 HBQ 89 HTW-1 68 GGW 112 GMN 46 JUC 36 CMC 26 IQM 10 (WLNR 48) CIZ 9 ICJ 7 GGE 549 (WLNQ 111) HQL 120 CJX 4.

ROANOKE DIVISION

VIRGINIA—SCM, Charles M. Waff, Jr., W3UVA—P.A.M.: 3AIJ. R.M.'s: 3AKN. 3BJX, 3BYA. FQO worked PAØQZ with a ten-foot untuned indoor antenna on 14 Mc.; he is now W.A.C. having worked U9ML. GLV is keeping schedules on 56 Mc. DWE is troubled with line noises. FHF worked a U9 for his sixth continent. BIG is quite active on 4-Mc. 'phone. UVA had six U9 QSO's in two weeks; VP6MR, CN8MI, I1IR, YL2CG, K6OJG (Guam), PZ1AB, FY8A, FY8B, and the U9's brought total of countries worked to 73. GKB handles traffic on 14 Mc. FQP has new NC-101-X receiver; U9AW and U9AV brought his total to 60 countries. BSB has worked several U9's lately. GAP worked YI5NN on 7 Mc. for W.A.C. GAP, FQP, and EMM are planning new vertical rotating beam antennas. FGJ is putting in a pair of T-200's. CHE has a pair of HB-354's now. EMM made 34,721 points in 'phone DX Contest. DQB tried to rebuild his SW-3 but thinks now that National can build 'em better than he can. Hi! AII is using a '10 final. GIC is putting 500 watts into a 100-TH for the V.P.I. Radio Club. EXW gets on 14-Mc. 'phone occasionally. AIJ schedules 3BIG, 8ZX and 8KVE daily. AVR is giving 28-Mc. 'phone a fling. GUZ is a new ham in Richmond. GPC now has T-20 final; he wants traffic schedules. GTS is S.N.C.S. Va. A.A.R.S. and handles lots of traffic. GTS made 2160 points in W/VE Contest. GGB operates 4-Mc. 'phone The VIRGINIA FLOATING RADIO CLUB meets next in Danville on Sunday, July 18th. This will be a joint meeting with the North Carolina Floating Club, so you may expect a large attendance. Write 3BIW or 3FHF for information. CA and DDY are rebuilding.

Traffic: **W3**GTS 236 (WLQE 63) GKB 64.

WEST VIRGINIA—SCM, Dr. Wm. H. Riheldaffer, W8KKG—PHY is on 7040 kc. OLV is using a '45 as a keying tube. PMA now has 24 countries. PSR is on W. Va. Net regularly. BOW has Commercial Radiotelephone First. KIU is looking for 28-Mc. DX with a vertical radiator. NAU blew up his rig. PTJ is using bi-push osc.-exciter. HD is running away with traffic honors with his work in the trunklines. BDD has an 808 final on 3.9-Mc. 'phone. D. E. Phillips, Sr., is operating KSJ. LCN has worked U9MI, U9MJ, U9AV and is W.A.C. NTV won a set of tubes in M.A.R.A. Membership Contest. JKN got an S8 from LU on 28-Mc. 'phone. JWL is on again. PQQ is putting in a 354; he is W.A.S. now. OXO is W.A.S. and needs Asia for W.A.C. LCN worked FY8C. JRL worked five continents on 28-Mc. 'phone in 45 minutes with a signal squirter and 30 watts. KKG worked VK4KC,

(Continued on page 120)

A.R.R.L. QSL Bureau

FOR the convenience of its members, the League maintains a QSL-card forwarding system which operates through volunteer "District QSL Managers" in each of the nine United States and five Canadian districts. In order to secure such foreign cards as may be received for you, send your district manager a standard No. 8 *stamped* envelope. If you have reason to expect a considerable number of cards, put on an extra stamp so that it has a total of six-cents postage. Your own name and address go in the customary place on the face, and *your station call should be printed prominently in the upper left-hand corner.*

W1—J. T. Steiger, W1BGY, 35 Call Street, Willimansett, Mass.
W2—H. W. Yahnel, W2SN, Lake Ave., Helmetta, N. J.
W3—R. E. Macomber, W3CZE, 418 10th St., N. W., Washington, D. C.
W4—B. W. Benning, W4CBY, 520 Whiteford Ave., Atlanta, Ga.
W5—E. H. Treadaway, W5DKR, 2749 Myrtle St., New Orleans, La.
W6—D. Cason Mast, W6KHV, 423 East E St., Ontario, Calif.
W7—Frank E. Pratt, W7DXZ, 5023 So. Ferry St., Tacoma, Wash.
W8—F. W. Allen, W8GER, 324 Richmond Ave., Dayton, Ohio.
W9—George Dammann, W9JO, 319 Sherman Ave., Evanston, Ill.
VE1—J. E. Roue, VE1FB, 84 Spring Garden Rd., Halifax, N. S.
VE2—C. W. Skarstedt, VE2DR, 236 Elm Ave., Westmount, P. Q.
VE3—Bert Knowles, VE3QB, Lanark, Ont.
VE4—George Behrends, VE4RO, 186 Oakdean Blvd., St. James, Winnipeg, Manitoba.
VE5—E. H. Cooper, VE5EC, 2024 Carnarvon St., Victoria, B. C.
K4—F. McCown, K4RJ, Family Court 7, Santurce, Puerto Rico.
K5—John J. Carr, K5AV, 78th Pursuit Squadron, Albrook Field, Canal Zone.
K6—James F. Pa, K6LBH, 1416D Lunalilo St., Honolulu, T. H.
K7—Leo E. Osterman, K7ENA, Customhouse, Wrangell, Alaska.
KA—George L. Rickard, KA1GR, P. O. Box 849, Manila, P. I.

Strays

A red light (110-volt variety) conspicuously mounted near or inside a transmitter and connected directly across the primary of a "lethal" transformer, may call any ham's attention to the fact that the soup is on and that he had better keep his mitts out of it.

—*W1GBY*

Note that it ought to be *inside* the transmitter where it can't help but be seen when some work is being done on the rig.

(Continued from page 117)

Papua, for the latter's first W contact. ELJ is back on 3.5 Mc.! GDF just received Radiotelephone First. New O.R.S. in West Virginia: OLV, KYJ, OHW and NLE.

Traffic: W8HD 243 PTJ 116 KKG 63 NAU 10 KIU-BOW 9 PSR 8 LXF-KYJ 6 PMA-OLV 5 PHY 3.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA—SCM, James M. Bruning, W3EZ—R.M.'s: 3AKB, 3AQN, 3EOP, 8AS W.P.A.M.: 3EOZ. 3GJY bought new NC101X receiver. 3EOP is installing some Kenyon Broadcast Transformers in his 'phone rig. 3EDC replaced his '10 with a T20. 3GDI has been busy sending out Legislative press dope on Morse lines. 8PCL increased power. 8FLA worked his first VK, ZL and K6 during the DX Contest. 3CZS enjoyed some recent DX contacts. 8UV made W.A.C. in DX party. 3CHH took active part in the W/VE tests. 3IU is getting ready to move to the "Han's Paradise" in Bustleton. 3DGC took time out from schedules to make two chaps eligible for R.C.C. 3AKB attended Baltimore Hamfest. 8EKG is building a final amplifier using 100TH's. 3GLQ is a new R.C.C. member. 3FLX has a new Radiotelephone First ticket. 3EUP is now working for Hamilton Watch Co., and met 3BRZ and several other hams there. 3NF moved to a new location. 3EWJ is now D.N.C.S. 3FXZ reports her K6NXD schedule still going fine. 8AXH has a new Sky-Rider. 3BRZ (O.P.S.) sends another fine report; El worked over a dozen VK 'phones along with SU1CH and a nice assortment of DX 'phone and c.w. catches. 3NF sent his report via Western Union Day Letter to make the deadline! 3DYL has been collecting VK's. 3FLY worked a ZB on the Isle of Malta. 3BGD worked three new countries. 3FPW joined the "Emergency Gang" and is ready for trouble. 3CXE and 3FUH applied for O.R.S. New appointments are 3FPW, 8AXH and 8PCL for O.R.S.; 3FPW for O.B.S. and 3FRY for O.O. Stations active as usual were 3ECA, 3ETA, 3ETM, 3EZ, 8ASW, 8NNC. The Beacon Radio Amateur Club members now have 7002-kc. spot-frequency crystals for DX and schedules. The S.C.M. wishes to call attention to the traffic death of 3AYI brought about by business worries, in the hope that other hams will not take their reverses too much to heart. 3FLX obtained a 1st Class Radiotelephone license.

Traffic: W3EOP 692 QP 589 ECA 382 EWJ 375 FXZ 242 AKB 163 NF 99 (WLML 262) GJY 51 EDC 46 DGC 44 ETM 40 (WLQF 48) GLQ 31 GMK 19 FPW 10 BGD 9 EZ-GDI 8 CHH 6 ETA 3 AGK-AQN-EUP 2. W8FLA 225 (WLQC 93) EKG 101 UV 26 NNC 25 PCL 21 MRQ 8 AXH 7 ASW 2.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA—SCM, Edgar L. Hudson, W3BAK—R.M.'s: 3CXL, 3EOU, 3CQS. Chief R.M.: 3BWT. KA worked 18 new countries and attended the Balto. Hamfest. CDG is trying a little 'phone work; grid modulation. EHW is getting set for the Field Day. GKT is moving his rig. BAK, FAQ and EZN are rebuilding. CWE still reports from Michigan College. CDQ attended the Balto. Hamfest, took part in W-VE contest, worked Asia. GNO worked 48th state April 13th; came on the air Oct. 28, 1936, using low power. EYX has been visiting a Phila. YL, 3GHU. Following from Bill Brantley, 3EZN of the Washington Radio Club: EYC plans kw. rig soon. ADQ is building h.f. rig. AWS walked off with the first prize at the Balto. Hamfest. EUJ won first prize in Club DX contest. ZD gave demonstration of oscilloscope in the elimination of key clicks.

Traffic: W3CXL (WLM 2735) SN 720 BWT 502 CIZ 430 BKZ 187 GKZ 62 FSP 46 FVF 28 KA 8 CDG-FIU 5 EHW 4 BAK-FPQ 1.

SOUTHERN NEW JERSEY, SCM, C. D. Kentner, W3ZX—DQO has a new superhet and is preparing for some 56-Mc. work this summer. The QRA of FBM is temporarily New York. DNU, who works only 3.5 Mc., reports receiving more foreign QSL's on 7-Mc. QSO's. ZI works Phila. and all South Jersey with new higher power 56-Mc. rig and 50-foot mast. ZX has new 'Phone W.A.C. ticket on the wall. FTX added a '10 in the final. FXV hooked his first two VK's and now has W.A.C. GBM has brand-new signal snatcher. EFM advises by radiogram that DSC has moved to California. FPA in Atlantic City is putting the final touches on a new final stage, and is a new applicant for O.R.S. BIR expects to be off all bands except 56 Mc. during the summer in order to replace receiver and rebuild transmitter. CZN reports that AAY, BYK, DJR and himself, representing the Greater Camden Amateur Radio Ass'n, attended the hamfest of the "Mike and Key Club" at Baltimore. All walked off with prizes. EFM has changed QTH to 100 N. Rosboro Ave., Atlantic City. Due to pressure of business QL has resigned as R.M. FTK, who again turns in a grand total, has accepted appointment as new R.M. This report will be the last for your present S.C.M. May I sincerely thank you for your loyal support, and urge that you give your new S.C.M. your full coöperation.

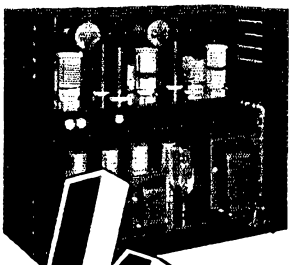
Traffic: W3BYR 16 FTK 1627 AEJ 10 EFM 139 (WLNJ 56) EEQ 11 VE 86 BO 23 FPA 3 GMY 8 FTX 6 ZI 212 DNU 237 BEI 29 FBM 66 DQO 23 ZX 25.

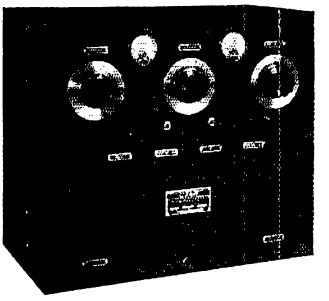
WESTERN NEW YORK—SCM, Charles Smith, W8DSS—R.M.'s: 8JTT, 8BJO, 8AQE. L.O.: 8CSE. P.A.M.: 8CGU. The Buffalo Hamfest drew the remarkable crowd of 184 Western New York amateurs, a goodly number of VE hams, and was a big success all around. Congrats, fellows. Another record was broken this month when four of our traffic pushers made the B.P.L. Old reliable JTT led this select group with a truly remarkable total. He is leaving the Section now and W.N.Y. is losing one of its most consistent high traffic men. Best of luck and success to you in your new job, Roger. CSE sent in the next best total with MQX and JQE making the B.P.L. with over 100 deliveries. BJO, who has taken over Trunk Line "G," only lacked a few of going over the top also. PLA, a comparatively new O.R.S., is doing very fine work; he will be on with a portable at Conesus Lake during the summer. GWY and NWZ are very regular in net drills. PCW keeps schedules in both W.N.Y. nets. DHU spends 50 per cent of his time on traffic and expects to join Net W.N.Y.-1 very soon. 2HTX-8 has been operating portable at Cornell University. 8CGU is getting very proficient examining new O.P.S.; he is working some nice DX on 14-Mc. 'phone. KYR, our YL O.R.S., spent two weeks in Washington, D. C. QHX is working good DX. EBR is now W.A.S. HTT is working for G.E. in Erie, Penna. AOM is chairman of the Emergency Flood Relief Committee and will discuss future emergency operations at the Atlantic Division Convention. PFM successfully passed the O.P.S. examination. Mr. and Mrs. 8DGV of Cleveland Heights, Ohio, were recent overnight guests at the home of Mr. and Mrs. 8DSS. 8DGV attended the Coronation. In a comparison of traffic activities with the other Sections of the Atlantic Division, our W.N.Y. Section is well up near the top. This fine showing is nearly all due to the managers and members of our two Section nets, W.N.Y.-1 and W.N.Y.-2. The S.C.M. congratulates all of you on the excellent work during the past traffic season. 73, gang, and on to Erie.

Traffic: W8JTT 1907 CSE 523 (WLNM 84) MQX 475 BJO 475 PLA 400 AQE 285 JQE 212 GWY 193 FCG 86 FUG 81 NWZ 71 PCW 74 DHU 69 DSS 51 CGU 20 KYR 15 AOR 12 QHX-LUQ 5 EBR 4 2HTX-850.

WESTERN PENNSYLVANIA—SCM, Kendall Speer, Jr., W8OFO—R.M.'s: 8KWA, 8KUN, 8MOT. New O.O.—GUB. Prospective O.R.S.—DFY, JSU. Prospective O.P.S.—GUB. WLMA-8YA heads the Section this month with A.A.R.S. traffic. WLMA-W8YA, QAN and OFO make the B.P.L. QAN rates on both total and deliveries. (Splendid consistent work, Ken.) MOT made the B.P.L. last month but report arrived a day too late. The S.H.B.P. & M. held a very nice hamfest on March 30th with over 120 present. KUN came close to B.P.L. NDE and JZR (father and son) are keeping schedules on 56 Mc. KWA and GUF bet each other on their score in O.R.S. party. EFA has been reporting into the W. Pa. O.R.S. Net. LGD is now a member of the R.C.C. GBC is adding 805 to his 3.5-Mc. rig. DGL is on the sick list. RG received S.W.L. card from Europe and Hawaii on 3.9-Mc. 'phone. FIP has completed the rig for the Penna. Ass'n for the Blind. The Valley Key & Mike Club is making plans for its second annual outing. The N.C.R. Unit at Farrell had a nice write-up with large photo in their local paper. CCQ is recovering from a nose injury. FXK broke his RK-18. QHS blew his 89 osc. CJB bought a new ACR-136. ODH rebuilt with pair of T55's final. KXP is building new rig with pair of HF-100's final. IOI has a new Super Skyrider. The McKeesport MYATA had Brad Martin, 3QV, Division Director at their meeting, April 23rd. From there 3QV went to the A.T.A. of W. Pa. Hamfest at Etna held the following day. JSU has blown up about everything in his rig except the antenna. Hi. DFY is working 7 Mc.

Traffic: W8QAN 555 OFO 513 KUN 427 NDE 326 KWA 264 EFA 218 LGD 119 MOT 91 CMP 85 JSU 38 YA 31 (WL MA 606) AXD 25 KOB 21 MIW 20 GBC 19 DGL 13 MWV 16 RG 4 IYQ-FXK 1. (Feb.–Mar.: W8MOT 512.)





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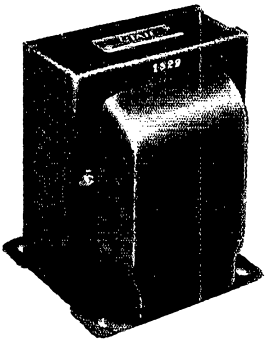

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Strays

And speaking of 40 meters, to the casual observer activity on that band seems to be divided about as follows:

CQ's (long and longer)—75%
Sending "V", "test" or just holding down key —24%
Communication—1%.

Full Range Selectivity

(Continued from page 21)

second detector always has r.f. signal voltage present in actual reception. The c.w. noise equivalent in microvolts is calculated by substitution in the following simple equation:

$$NE = E_s\sqrt{\frac{P_n}{P_s}}$$

where

NE = noise equivalent in microvolts.
E_s = signal input microvolts.
P_n = noise power output with no signal input.
P_s = signal beat-note power output.

The signal input was sufficiently great so that the noise output was negligible with the signal present, and the beat oscillator voltage was always large enough so that the signal output power varied as the square of the signal voltage in the range of the measurements.

The relative sensitivity figures are especially interesting in that they show the large signal-to-noise ratio improvement with increasing selectivity. In the case of c.w. reception with the crystal filter at maximum selectivity, for instance, the sensitivity is about 700 percent of the straight superhet sensitivity, while the 'phone sensitivity with Transfilter-sharp or crystal-broad selectivity is raised over 300 percent.

In the range of adjustment of the selectivity or bandwidth control with these circuits, the resonance frequency of the crystal filter varies but a few cycles. This variation is so small that if the signal is first tuned in with the crystal set at maximum selectivity, the resonance frequency shift is not noticeable when the control is adjusted to the minimum selectivity point. With the Transfilter, the resonance frequency variation is a few hundred cycles at the most, although here again the variation is so small as to be hardly noticeable if the signal is first tuned in on resonance with the filter adjusted for maximum selectivity.

RESISTANCE CONTROL OF TRANSFILTER SELECTIVITY

In a previous article,[2] suggestion of varying the selectivity by adjustable resistance in the common ground connection of the Transfilter was made. Impedance-matching circuits incorporating resistance control of selectivity are shown in Fig. 4. The circuit of Fig. 4A is the same as Fig. 1B with zero resistance in the ground lead from the Transfilter and the input circuit adjusted for

maximum selectivity (C_1 adjusted for slightly higher capacitance than the resonance setting). Fig. 4B is of the type in which impedance stepdown at the input is obtained by a transformer with a low-impedance secondary instead of the divided-capacitance stepdown used in the other circuit. When used as a crystal filter, the circuit of B is of the fixed-selectivity type.[3]

The selectivity curve of Fig. 5 shows the decrease in selectivity which occurs as the resistance in the ground lead from the Transfilter is increased. The curves for zero resistance and for 2500-ohm resistance are not shown since they practically coincide with the 1000-ohm curve. The most interesting feature of these selectivity curves is the "notch" which appears with 20,000-ohm resistance. This double-hump effect indicates the equivalent of over-coupling with a transformer. As compared to the selectivity curves of Fig. 2, it is apparent that increased resistance tends to broaden the nose of the selectivity characteristic less effectively, while the skirts of the curves spread out more rapidly. They also show that the selectivity characteristic is generally less symmetrical with resistance variation than with variable impedance control. The curves of Fig. 6 show the total bandwidths for the various values of resistance.

The gain of the circuit falls off somewhat more rapidly with increasing bandwidth as compared to the gain variation with impedance control of selectivity, although the loss is not especially noticeable in practice. On the whole, adjustable impedance control of selectivity appears to be preferable to resistance control with the Transfilter, just as it has been found to be preferable with the quartz crystal filter.

BAND-PASS TRANSFILTER CHARACTERISTICS

An interesting band-pass type of selectivity characteristic was obtained with two similar Transfilter units connected in parallel in the circuit of Fig. 7. Except for the additional unit, the circuit is identical with that of Fig. 1B. The two units had the same rated frequency of 465 kc. and actually differed only 200 cycles in resonance frequency. The band-pass curve of A of Fig. 7 was obtained with the bandwidth control condenser C_1 critically adjusted so that the same output was obtained on both "humps" with constant signal input. The mid-frequency of this selectivity curve is approximately 1.2 kc. lower than the maximum-selectivity curve obtained with the input condenser C_1 adjusted for slightly greater capacitance than the broad-band adjustment. The greater broadening of the selectivity curve near resonance is especially desirable in broadcast program reception, although the overall c.w. gain with this circuit is practically the same as with a single unit.

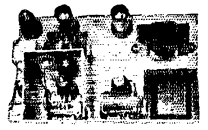
PRACTICAL APPLICATIONS

Detailed suggestions for incorporating these full-range selectivity methods in existing receivers are hardly necessary. For instance, many sets with two-stage 465-kc. amplifiers and crystal

The RADIO SHACK
46 Brattle St Boston

Now the UHF 6

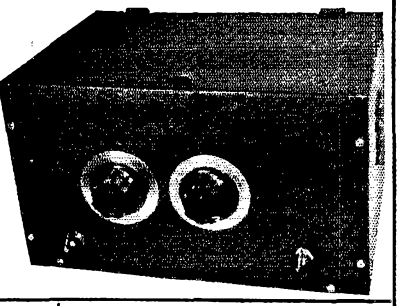
At last that 5 and 10 meter superhet with low background and high sensitivity — 6 tubes, special IF's, will bring in modulated oscillators but selectivity favors MOPA, punched chassis, and instructions and layout with each kit.



Complete Kit less tubes and cabinet **$26.50**

Tubes, **$5.43** Cabinet, **$2.25**

Wired and Tested, **$5.00**



There are kits and kits, but the UTC PAK kits for 6L6's give more undistorted output, cost less and are easier to build than any we know of — ideal for PA or modulators.

Chassis-Special
Cadmium Plated

9 x 7 x 2	$ .51
17 x 7 x 3	.90
17 x 10 x 2	.96
17 x 10 x 3	.96
17 x 13 x 3	1.41

R-S SPECIALS

Triplett Thermo RF Meters	$6.66
3" Bakelite 0-1, 1¼, 2½, 5A	
Triad HD866's	1.00
Limited Supply	
New Tobe Micranol 2 mfd. 2000V	2.50
Stand-off insulators — mounting feet	
R-S 110V Keying Relay	2.95
15 A contacts — follows a bug	
C-D 8 mfd 500v can electrolytics	.30
C-D 16 mfd 500v can electrolytics	.55

A TIMELY TIP

VE90B transmits time signals continuously on 7,335 and 9,350 KC for Expeditions etc. — every 29th second beat dropped, 55th thru 59th second each minute, 50th thru 59th each 5 minutes, and 40th thru 59th each ½ and hour. Hrs. QTR fer u. 73 walt.

The R-S modulator-speech amplifier is made to run on 110 AC, direct from crystal or hi impedance mike or phono pick up, output transformer for 500 ohm line-output is sufficient to drive T55's class B audio, grid modulate 10 KW or drive a speaker or cutting head — we rate it 10 watts.
Completely wired and tested . . . **$17.50**
Set of selected Raytheon tubes... 3.78

Panel — Stan. 19" (Black Crackled)

1¾	$.54	10½	$1.17
3½	.60	12¼	1.38
5¼	.69	14	1.59
7	.72	15¾	1.77
8¾	.96	17½	2.00

TAYLOR TUBES

T-20	$ 2.45
T-55	8.00
T-155	19.50
T-200	21.50
756	4.95
203B	7.50
814	18.50
822	17.50
866	1.65

More Watts per $

THOSE HARD-TO-GET NECESSITIES

Dunco relays, R1 series AC and DC **$2.00**; CDBX1 DPDT **$6.60**; sensitive and time delay in stock — Peak Pre-Selector **$19.80**, covers 10, 20, 40, 80, 160 — Bliley BC3, LD2, HF, VF1 at **$3.90, $4.80, $6.50, $8.50** — International chokes 12H — 200 ma **$2.50,** 12H 300 ma **$3.75,** 12H 500 ma **$6.50** — swinging chokes 5/25 H 200 ma **$2.50,** 5/25 H 300 ma **$3.75,** 5/25 H 500 ma **$6.50** — Brush crystal devices from **$5.40** phones to **$81.00** mikes — Birnbach EO1 cable **$.06** per foot — Aladdin IF transformers — International standard drilling 6 foot racks **$13.50** — Fish pole and door hinge broadcast and UHF antennas — millivolt, microamp and db meters in addition to regular AC volt and millamp measuring gear — and Clough Brengle oscilloscopes.

Western Electric

300A	$ 9.75
304B	12.50
305A	38.50
306A	10.80
307A	13.65
316A	10.50

And 633A "Salt Shaker" Mikes.....$42.50

All Prices Subject to Change Without Notice
Mail Orders Filled — Send Money Order or Check

filters are also adaptable to the Transfilter by simple plugging-in of this unit in place of the crystal and slight readjustment of the filter circuit. Receivers of different i.f. frequencies would require retuning of the i.f. circuits throughout, in which case it would be advisable also to re-align the signal input circuits and to replace the original crystal with one of 465-kc. frequency. At the present time this is the only frequency for which the Transfilter units are available. For greatest convenience in operation, of course, an additional switch to change from crystal to Transfilter would be included. As shown in the circuit of Fig. 1B, the ground lead of the Transfilter should be opened when switching to crystal or "straight super". Otherwise, the Transfilter capacitance to ground throws the input circuit out of balance for crystal and straight superhet operation.

Among other variations which we have tried, a particularly interesting one is use of a variable-selectivity Transfilter and a quartz-crystal filter of the same type in cascade; that is, the crystal filter circuit as the coupling element between the first detector and the first i.f. amplifier, and the Transfilter as the coupling element between the first and second i.f. amplifiers, provision being made to switch either one in and out. A notable improvement with the Transfilter adjusted for medium selectivity is that the crystal filter selectivity characteristics are steepened in the skirts. While such cascade filters require fairly close tolerances in the resonance frequencies of the Transfilter and crystal, there appears to be no great difficulty in meeting the requirements with production types. The fact that the Transfilter frequency can be shifted over a range of a few hundred cycles, by tuning the input circuit above or below resonance, aids in accomplishing close alignment. Tests on three sample production-type Transfilter units have shown a maximum resonance-frequency difference of 380 cycles, the variation being a plus or minus 200 cycles or less from the average.

Further interesting and useful selectivity characteristics are obtained with two variable-selectivity crystal filter circuits similarly in cascade. With one filter adjusted for minimum selectivity and the other for optimum selectivity, for instance, independent rejection control in c.w. reception makes it possible to eliminate two interfering heterodynes of different frequencies, whether both are on the same side of resonance or on opposite sides of resonance. The crystals may differ 100 cycles or so in frequency without appreciably impairing operation, it has been found. In fact, such a difference actually may prove advantageous, since it gives a band-pass characteristic in the region near resonance.

With present production control facilities and the manufacture of both types of filter elements promising even better tolerances, we can look forward with confidence to wide-spread use of such cascaded electro-mechanical circuits in our coming receivers. For the present, we may proceed to make good use of practical full-range selectivity employing the working circuits described in this article.

Where to buy it

A directory of suppliers who carry in stock the products of these dependable manufacturers.

super skyrider hallicrafters ultra skyrider

ALBANY, N. Y.	Uncle Dave's Radio Shack	356 Broadway
BALTIMORE, MD.	Radio Electric Service Company	3 North Howard St.
BOSTON, MASS.	Radio Shack	46 Brattle Street
HARTFORD, CONN.	Radio Inspection Service Co.	227 Asylum Street
NEWARK, N. J.	Wholesale Radio Service Co., Inc.	219 Central Ave.
NEW YORK, N. Y.	Gross Radio, Inc.	51 Vesey St.
NEW YORK, N. Y.	Harrison Radio Co.	12 West Broadway
NEW YORK, N. Y.	Wholesale Radio Service Co., Inc.	100 Sixth Ave.
NEW YORK, N. Y.	Terminal Radio Corp.	80 Cortlandt Street
POTTSVILLE, PENN.	Sylvester Radio & Supply Co., Inc.	E. Norwegian & George Sts.
READING, PENN.	George D. Barbey Company	404 Walnut St.
SPRINGFIELD, MASS.	T. F. Cushing	349 Worthington St.

RCA Amateur Products

ALBANY, N. Y.	Uncle Dave's Radio Shack	356 Broadway
BALTIMORE, MD.	Radio Electric Service Company	3 North Howard St.
BOSTON, MASS.	H. Jappe Company	46 Cornhill
BOSTON, MASS.	Radio Shack	46 Brattle Stree
BURLINGTON, VERMONT	Vermont Hardware Co., Inc.	
CAMDEN, NEW JERSEY	Radio Electric Service Company	811 Federal Stree
GREENWICH, CONN.	Mead Stationery Company	252 Greenwich Ave.
HARTFORD, CONN.	Radio Inspection Service Co.	227 Asylum Stree
MONTREAL, CANADA	Canadian Electrical Supply Co., Ltd.	285 Craig Street, Wes
NEWARK, N. J.	Wholesale Radio Service Co.	219 Central Avenue
NEW YORK, N. Y.	Bruno-New York, Inc.	460 W. 34th St.
NEW YORK, N. Y.	Sanford Samuel Corp.	136 Liberty St
NEW YORK, N. Y.	Wholesale Radio Service Co.	100 Sixth Avenue
NEW YORK, N. Y.	Harrison Radio Company	12 West Broadway
NEW YORK, N. Y.	Grand Central Radio, Inc.	124 E. 44th Stree
PHILADELPHIA, PENN.	Eugene G. Wile	10 S. 10th Street
PHILADELPHIA, PENN.	Raymond Rosen & Company	117 North 7th St.
PHILADELPHIA, PENN.	M & H Sporting Goods Company	512 Market Stree
PHILADELPHIA, PENN.	Radio Electric Service Company	3145 N. Broad Street
PHILADELPHIA, PENN.	Radio Electric Service Company	N.E. Corner 7th & Arch Streets
PITTSBURGH, PENN.	Cameradio Company	963 Liberty Ave
POTTSVILLE, PENN.	Sylvester Radio & Supply Co., Inc.	E. Norwegian & George Sts
READING, PENN.	Bright & Company	8th & Elm Street
SPRINGFIELD, MASS.	T. F. Cushing	349 Worthington Stree

Listings on this page do not necessarily imply endorsement by QST of the dealers or of other equipment sold by them.

Where to buy it

A directory of suppliers who carry in stock the products of these dependable manufacturers.

SPRINGFIELD, MASS. 1540 Main Street
S. S. Kresge Radio Department

WASHINGTON, D. C. 938 F Street, N. W.
Sun Radio & Service Supply Co.

RME
RECEIVERS -- PRE SELECTORS
AMATEUR RADIO EQUIPMENT
RADIO MFG. ENGINEERS, Inc.
PEORIA ILLINOIS

ALBANY, NEW YORK 356 Broadway
Uncle Dave's Radio Shack

BINGHAMTON, NEW YORK 25–27 Sturges Street
Radio Testing Station

BUFFALO, NEW YORK 216 E. Genessee Street
Dymac Radio

HARTFORD, CONNECTICUT 210 Chapel Street
Stern Wholesale Parts Company

NEW YORK, N. Y. 12 West Broadway
Harrison Radio Company

NEW YORK, N. Y. 80 Cortlandt Street
Terminal Radio Corp.

PITTSBURGH, PENN. 963 Liberty Ave.
Cameradio Company

ROCHESTER, NEW YORK 244 Clinton Ave., N.
Radio Service Shop

WASHINGTON, D. C. 1837 Vernon St., N.W.
Upshur Radio Company

RAYTHEON
TRADE MARK
AMATEUR TUBES

ALBANY, NEW YORK 356 Broadway
Uncle Dave's Radio Shack

BOSTON, MASS. The Radio Shack 46 Brattle Street

BOSTON, MASS. Selden Radio Company 28 Brattle Street

BUFFALO, NEW YORK 326 Elm Street
Radio Equipment Corp.

CONCORD, NEW HAMPSHIRE 80 N. State Street
Carl B. Evans

NEWARK, NEW JERSEY 219 Central Street
Wholesale Radio Service Co.

NEW YORK, N. Y. 12 West Broadway
Harrison Radio Company

NEW YORK, N. Y. 100 Sixth Avenue
Wholesale Radio Service Co.

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Uncle Dave's Radio Shack

BOSTON, MASS. Radio Shack 46 Brattle Street

BOSTON, MASS. Selden Radio Company 28 Brattle St.

MONTREAL, CANADA 285 Craig Street, West
Canadian Electrical Supply Co., Ltd.

NEWARK, N. J. 219 Central Ave.
Wholesale Radio Service Company

NEW YORK, N. Y. 100 Sixth Avenue
Wholesale Radio Service Company

PITTSBURGH, PENN. 963 Liberty Ave.
Cameradio Company

POTTSVILLE, PENN. E. Norwegian & George Sts.
Sylvester Radio & Supply Co., Inc.

READING, PENN. 404 Walnut Street
George D. Barbey Company

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Some Practical Receiver Kinks

(*Continued from page 46*)

through condenser C_{12} to a tap on the grid coil L_2. The location of the tap is not critical, and is about the same as the cathode tap on the h.f. oscillator coil L_4. A more precise job of ganging the mixer tuning to the h.f. oscillator tuning must be done because of the increased selectivity.

The increase in gain and selectivity was as good as was previously obtained by adding a regenerative pre-selector, and the image suppression nearly as good. It is true that there is a certain amount of the interlocking of the controls, especially between the gain control and the first detector regeneration, but in practice this does not introduce any difficulty in tuning the receiver. In fact, once the regeneration control is set on any band it is rarely touched. In general, the regenerative mixer is preferred at this station to the use of a pre-selector because of its economy and, even more important since much changing of bands is done because there are only two coils to change instead of three.

There is also included in this circuit a slight modification of the method of coupling the h.f. oscillator to the suppressor of the mixer. A condenser C_{13} and a second National Type 100 choke permit operating the suppressor at ground d.c. potential, which seems to result in a slight increase in selectivity.

Silent Keys

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

Clarence A. Carlson, W9VYQ, Maywood, Ill.
Merle W. Estey, W6BFP, Hollywood, Calif.
Augustin E. Fredette, W1AGA, New Bedford, Mass.
Harry J. Johnson, W9IJD, Minneapolis, Minn.
T. M. Jones, Jr., W4BEI, Decatur, Ala.
Paul D. Maxwell, W9MZB, Fort Wayne, Ind.
Edward R. McCaskey, W3AV, Philadelphia, Pa.
Dale N. McDonald, W6LAA, Santa Barbara, Calif.
J. Rady Miller, W3AYI, Ardmore, Pa.
J. C. Moore, VE5HK, Victoria, B. C.
Walter L. Morris, W9RQW, Galesburg, Ill.
David B. O'Donnell, W9OAE, Urbana, Ill.
John Orr, Plano, Ill.
Gorman C. Palmer, W5FBP, Tyler, Texas
Capt. A. Patterson, SU1AP, Cairo, Egypt
H. V. Routzong, W8ICF, Gettysburg, Ohio
A. R. Swisher, W6LID, Corcoran, Calif.
William J. Tracey, W6AKU, Daly City, Calif.
Lee A. Tucker, W5TL, Fort Worth, Texas

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 15c 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 7c 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 7c rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and takes the 15c rate. Provisions of paragraphs (1), (2), (4) and (5) apply to all advertising in this column regardless of which rate may apply.

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 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.

RADIO engineering, broadcasting, aviation and police radio, servicing, marine and Morse telegraphy taught thoroughly. All expenses low. Catalog free. Dodge's Institute, Byrd St., Valparaiso, Ind.

NATIONAL—Hammarlund, RCA-RME used sets, 60% off list. W3DQ, 405 Delaware Ave., Wilmington, Del.

QSL's, W2SN, Helmetta, N. J.

CLASS B transformers—Universal for two or four 46's, 6L6's, 210's, 800's, etc., $7.75 pair postpaid. 70 watts audio from 46's, 100 watts from 10's. Write for details. W8UD, Douglas, Mich.

QSL'S—Distinctive—Individual—Colorful—Striking—Vivid—Astonishingly inexpensive—Write for free kit. QSL Company, Box 481, Hartford, Conn.

CALLBOOKS—new DX calls, new prefixes, thousands of new W and VE calls, in the Summer, 1937 Radio Amateur Call Book. Sent postpaid $1.25, or a whole year (four issues) for $4. (In foreign countries $1.35 and $4.35.) Your call and QRA printed in large type $1 per year. Radio Amateur Call Book, 610 S Dearborn, Chicago.

TELEGRAPH speed keys in kit form, only $2.89. A post card brings full information, Electric Specialty Mfg. Co., PO Box 645 Cedar Rapids, Iowa.

AMATEUR radio, commercial radiotelephone and radiotelegraph licenses, complete training. Resident and correspondence courses. Every graduate a licensed operator. N. Y. Wireless School, 1123 Broadway, N. Y.

GENERAL Electric 24/750 volt 200 mill ball bearing dynamotors with filters, $25. On twelve volts deliver 375. Westinghouse 6–15 volt 500 watts with propeller, $10. 500 watt 500 cycles with exciters, $10. Slightly used $6. 900 cycle 200 watts, $15. Henry Kienzle, 215 Hart Blvd., Staten Island, N. Y.

SPECIAL: Reconditioned Emerson generators. Input 6 volts 1.75 amperes. Output 135 volts 20 ma., $3 f.o.b. Walter Ashe Radio Co., St. Louis, Mo.

WANTED: Antique radio sets, parts, tubes, catalogs, magazines, cuts, for museum. All letters answered. W6LM.

QSL's. Better designs; better stock; better workmanship. Free samples to hams only. W2FJE, 143 DeKalb Ave., Brooklyn, N. Y.

TRANSFORMERS, custom-built. Plate specials—any voltage. Compound-filled cases. ¾ KVA—$11; 1 KVA—$17; 2 KVA—$23. Baker Engineering, Ft. Wayne, Indiana.

QSL'S—New production process—Ready when you read this—Write for free kit. QSL Company, Box 481, Hartford, Conn.

SELL: 59—RK20 fone, CW rig, four power supplies, 60 watt mod. unit, six meters—fine built. Sacrifice for cash. Photos. W9YSR.

QSL'S—2 color extra quality, 75¢ hundred. Samples. Stamp. W5EEJ, Little Rock, Ark.

VE Hams: write for price on new ACR-175 or used FB7. Both complete and priced right. VE3SY.

$25—complete transmitter 47–46–10. Includes unused modulator and new tubes. Armin H. Meyer, Capital University, Columbus, Ohio.

QSL'S—2 color—$1. hundred. Samples. Stamp. W8NOS.

QSL'S. Cartoons. Free samples. Theodore Porcher, 7708 Navahoe St., Philadelphia, Penn.

QSL'S. Samples. Stamp. Printer, Corwith, Iowa.

FOR sale: FB7 tubes, four bands bandspread coils, $30. W6UK.

QSL'S, QSL's. World's finest. Samples? (stamp) W8DED, Holland, Mich.

CRYSTALS. Free circular. W8DED.

SELL or trade. Meissner noise silencer. New, complete. Will trade on receiver. Make offer. W9SGI.

CRYSTALS—80 X-cut 1" square, $1.50; Y-cut, $1.25, within 10 k.c. guaranteed. W9KDE, 538 Wyandotte St., Laurium, Mich.

QSL'S, SWL's, 3 color, 75¢ a 100. Lapco, 344 W. 39 St., Indianapolis.

WANTED: good receiver. Cash. W2INO.

WANTED: used nationally advertised Ham receivers; can use any quantity; quote lowest prices. Hancock Export Co., Rensselaer, N. Y.

QSL'S—New sensational idea—Write for free kit. QSL Company, Box 481, Hartford, Conn.

RECEIVER, Ham superhet wanted. Will exchange transmitting tubes or cash. W2AWZ.

QSL cards, neat, attractive, reasonably priced, samples free. Miller, Printer, Ambler, Penn.

BARGAINS: pair 805's, $20. RK20, new, $10. WE-242A, $8. National TML-60DD 1500 volt, $12. Triplett A.C. milliammeter 0 to 250, $2. Thordarson modulation trans. for RK-20–T67-73, $2. Coto-Coil for 160 meters, $1.75. RCA 802, $2.50. Every article guaranteed OK. W8BCA.

SWAP SW5 complete for printing press complete or make offer. Bill Morgan, Chalmette, La.

SALE: Gardiner-Levering automatic sender, $7.50. T. Porcher, Chestnut Hill, Penn.

QSL'S, all colors, cartoons, snappy service. Write for free samples today. W1BEF, 16 Stockbridge Ave., Lowell, Mass.

COMPLETE kit for one tube 5 meter amateur receiver, $1.59 postpaid. Munson Radio, 151 Quincy St., Brooklyn.

QST'S before 1923 wanted. Issues 1923–1935 for sale or trade. W9EWH.

QSL'S—SWL's—prices slashed. June, July. Fritz, 203 Mason, Joliet, Ill.

TRANSFORMERS—1200 watt 1200–2200–3000 each side, $23. Frank Greben, W9CES, 2012 S. Peoria St., Chicago, Ill.

QSL'S: buy yours from a Ham. $1.80 for 300 two colors. Buy them from W9DGH.

CRYSTALS: zero cut. Guaranteed to compensate at near zero without oven. 80–160 meters, $1.85. Forty meters, $2. Holders 75¢ postpaid. Small crystals, $1. Fisher Lab., 4522 Norwood St., San Diego, Calif.

QSL'S. Finest cards. Lowest prices. Free samples. Maleco, 1512 Eastern Parkway, Brooklyn, N. Y.

SELL: 175 watt 110 D.C.-A.C. Janette Converter, $15; SW-3 A.C.-D.C., $13; 53 oscillator, push-push 6L6 Doubler, $12. Wanted: superhet. W2EJM, 2013 77 St., Brooklyn, N. Y.

QSL'S. 300 one-color cards, $1. Samples. 2143 Indiana Ave., Columbus, Ohio.

COMPLETE outfit described in How To Become a Radio Amateur, brand-new, ½ net price of parts. Card brings full information. Albert Stuart, 1220 N St., N.W., Washington, D. C.

TRANSMITTER—complete—Fone, CW, all band, 250 watts—goes to highest bidder. W8OIZ, Charleroi, Penn.

QSL'S—Special introductory offer extended. Radio Headquarters, Ft. Wayne, Ind.

WESTERN Electric amplifiers and equipment: 8A, $25; 8B, $35; 17B, $35; volume indicators, $20; 10A, $35; rectifier panels 1B, $59; 6000A, $75; 514A meter panels, $17.50; 57AF condensers 2 mfd., 59¢; 95D 1 mfd., 75¢. Assorted transformers, chokes, resistances, condensers, and Weston meters. List available. Hass Radio, 427 Fulton St., Brooklyn, N. Y.

QSL'S—Different from anything you ever saw before—Write for free kit. QSL Company, Box 481, Hartford, Conn.

TRANSMITTERS, receivers, coils, power packs, tubes. Surplus. Call, write, W1HIL, 51-A North Ave., Melrose, Mass.

SELL, trade 6 inch telescope, 4 eyepieces, excellent condition for candid camera, Contax preferred. Joseph Dolgos, Norwich, N. Y.

CRYSTALS: 80 and 160 meters mounted in shielded holder, $1.25. Guaranteed. White Radio Lab., Standpoint, Idaho.

T9 crystals: Eidson fracture resisting, powerful, dependable X cut, 40 and 80 meters, $1.60 postpaid. Close frequency always supplied. Spot frequencies, $2.50. Try a really good crystal just once OM—fully guaranteed, accurately calibrated. T9 ceramic plugin holders, $1.10 postpaid. C.O.D.'s accepted. Commercial crystal users inquire prices. Eidson's, Temple, Texas.

CRYSTALS: X cuts, mounted in beautiful bakelite holders, GR plugs. 80M within 10 kilocycles, $2.50. V cut, $3.50. Catalog. Ham Crystals, 1104 Lincoln Place, Brooklyn, New York.

RECEIVER headquarters—new and used. W8ANT.

RME-69's and DB20's in stock. W8ANT.

UTC transformers. W8ANT.

COTO-coils in stock. W8ANT.

EIMAC tubes. W8ANT.

VALPEY crystals, $3. W8ANT.

CRYSTAL mikes. W8ANT.

CARDWELL condensers. W8ANT.

NEW Sargent Model 11—special—$30. W8ANT.

PYRANOL condensers. W8ANT.

NEW transmitters. W8ANT.

QSL'S—Autogenous—Write for free kit. QSL Company, Box 481, Hartford, Conn.

ALL lines of new and used amateur equipment bought, sold, exchanged. Write to Southern Ohio's only amateur owned amateur business. Jos. N. Davies, W8ANT, 2767 N. Bend Rd., Sta. A, Cincinnati, Ohio.

WANTED: 500 watt phone rack mounted and complete. Will pay cash for rig now on air—should be in 1st or 2nd district. Please submit photograph and all particulars. Kendall, Deepwell Park, Stamford, Conn.

SELL National PW4 unit, PP T20 transmitter complete. W9ERU.

CRYSTALS: see May QST hamad for prices and dope on crystals. William Threm, W8FN, 4021 Davis Ave., Cheviot, Ohio.

CANADIAN hams in the Maritime Provinces: VE1CR Sydney has Taylor tubes at current Canadian ham prices. Ask us about them.

TRANSFORMERS, 425 volt, 150 mill, 110 volt Pri. $1.25. Dope sheet on 75 other bargains on request. J. D. Larkin, 3rd, Larkin Co., Inc., Radio Dept., Buffalo, N. Y.

WANT speech amplifier—modulator with power supply. Xtal mike input—250 watts output. W9ULJ, Emerson, Iowa.

WEAK headphones rejuvenated scientifically. Makes them like new. Any except crystals. 70¢ per pair in U.S.A. (no stamps). Postpaid, insured. W2AMP, Box 731, Newark, N. J.

MCMURDO-Silver Masterpiece also Scott Imperial. Both custom high quality, extremely sensitive, all-wave receivers. Glenn Watt, Chanute, Kansas.

SELL: RME-69, $99; Super-Pro, $145; PR-16C, $64; S9, $54; S5, $35; Super-7, $29.50; All Star receiver complete, $17.50; SW5, $10; other sets. W9ARA, Butler, Mo.

FOR sale or swap—Volumes I, II, III, Rider's Trouble Shooter's Manuals, used. Make cash offer or will swap for meters or what have you? W9SVH.

SELLING out: high power 1000 watt C.W.—750 watt fone Class B modulated—five separate power supplies, filters, and bleeders—thirteen tubes in R.F.—eleven tubes in modulator. Complete details. Write W8CRF, 3 W. State St., Gloversville, N. Y.

HAMSTAMPS: FB with QSL's. Send us your picture or snapshot. We reproduce it postage stamp size, 1¢ each (100 minimum). Call letters included. Perforated and gummed. Let the gang see who they QSO. Samples. Hamstamps, 1730 East 17th St., Brooklyn, N. Y.

TRANSFORMERS: heavy duty factory jobs. Guaranteed year. Dual primary cuts voltage 50%. 3200V centertapped.500ma, $12; 300ma, $8. W8EQ, 902 S. Elizabeth, Lima, Ohio.

CRYSTALS—Eidson's—40 meter X-cut near specified frequency, $1.60. Ceramic holders, $1.10 each. C.O.D. orders O.K. W4DDF, Stratford Ave., Nashville, Tenn.

QSL'S—The newest thing in QSL cards—Write for free kit. QSL Company, Box 481, Hartford, Conn.

TRADE: 1000 volt 500 mil generator. W1BNO.

USED 04A's guaranteed. W3FBL.

COMPLETE Skyrider stock. W3FBL.

USED receivers, all kinds. W3FBL.

PLENTY used 242A's. W3FBL.

COMPLETE stock of ham parts. W3FBL.

1000 watt transformers 4400–2200–1100 each side center. Marble mounted, oilless, $13.50. Dawson, 5740 Woodrow, Detroit, Mich.

SELLING out: 46 modulator complete, $22; complete 6L6 modulator, $28; 203A modulator with power; 200 watts transmitter. Plenty good buys. 112 S. Main, Blackwell, Okla.

TRANSMITTERS constructed to order. Suitcase portable, three bands, 80 watts, $48 with accessories. Write. Howard Radio, 5514 Lake St., Chicago.

METERS—stamped envelope brings price list. Henry Muns, 312 W. 109th St., N. Y. C.

KENYON High Fidelity 2A3 amplifier, practically new; humless power supply, tubes, $18. A real buy. W2EXR.

SELL or trade—Ainsworth button balance, Voight pulp balance, 204A, 10–350 dynamotor. Want power saw, drill press, thread cutting lathe, 0–1 milliammeter, ham super. W6AWH.

QSL'S—Don't order any until you've seen this new idea—Write for free kit. QSL Company, Box 481, Hartford, Conn.

TELEPLEXES, instructographs, omnigraphs, vibroplexes bought, sold, traded. Ryan Radio Co., Monroe City, Mo.

QSL'S free with 100 2-color cards, $1. W8JDW, Lima, Ohio.

Your Nearest Dealer Is Your Best Friend

Your nearest dealer is entitled to your patronage. You can trust him. He is equipped with a knowledge and understanding of amateur radio. He is your logical and safe source of advice and counsel on what equipment you should buy. His stock is complete. He can supply your needs without delay. His prices are fair and consistent with the high quality of the goods he carries. He is responsible to you and interested in you.

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Complete stocks transmitting equipment

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W8OBK — Ham, service and sound equipment — W8OLB

BUFFALO, NEW YORK
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Quality parts and equipment for discriminating buyers

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Quoted from *QST*'s advertising rate card.

Every conceivable need of a radio amateur can be supplied by the advertisers in QST. And you will know the product has the approval of the League's technical staff.

For Your Convenience QST'S INDEX TO ADVERTISERS IN THIS ISSUE

RME POLICY

regarding the

"NEW MODEL" IDEA

Your 1938 communication receiver will have one (or more) radio frequency stages, a first detector, a radio frequency oscillator, two stages of IF, a second detector, an audio frequency oscillator, and audio amplification. It must have a fine crystal filter circuit, a phasing device and a variable audio beat control. It must have coil switching. It cannot be without a good indicating device. It must be excellent in design, workmanship, and overall efficiency.

This, in substance, will be your "NEW MODEL."

Of course, special features are many times desirable, but not always necessary. For instance — a noise suppressor may or may not be needed, depending on locality or operating frequency or both. High audio output power may be asked for by some users. Combination AC and battery operation has its advantages in some radio stations. RME has consistently coöperated in meeting these requirements and making fine radio operating possible.

Fundamentally a receiver layout for communication purposes calls for the adaptation of basic principles to operating conditions *as they are*, not as we might visualize them. In the RME-69 and the several special models *now* available, all of the above requirements have been met.

Did you ask for a "NEW MODEL"? RME has many models to choose from which will do your job as you would like to have it done.

In bulletin 69 and special folders all details are given.

RADIO MFG. ENGINEERS Inc., 306 First Ave., Peoria, Ill., U.S.A.

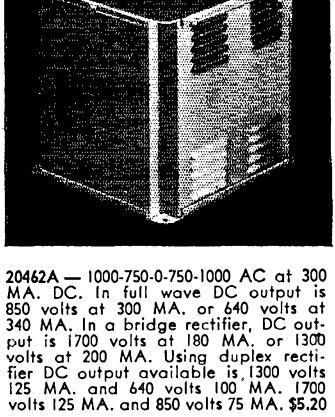
RME — 69

NEW LOW PRICES
on UTC amateur "specials"
TRANSMITTING PLATE TRANSFORMERS AND REACTORS

These units are doing legion duty for thousands of experimenters and have been in use now for more than six months.

Increased production and expanded plant facilities now make possible further reductions in price which UTC is glad to pass on to its satisfied customers.

- ✶ ***HUSKY***
- ✶ ***WELL VENTILATED***
- ✶ ***HIGH VOLTAGE STANDOFF BUSHINGS***
- ✶ ***RIGIDLY MOUNTED***
- ✶ ***A UTC PRODUCT***



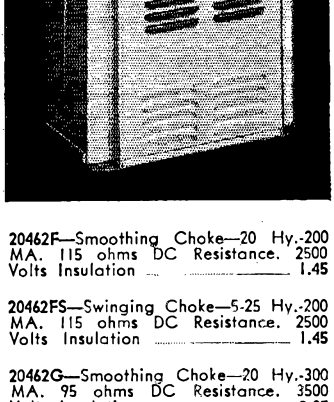
20462A — 1000-750-0-750-1000 AC at 300 MA. DC. In full wave DC output is 850 volts at 300 MA. or 640 volts at 340 MA. In a bridge rectifier, DC output is 1700 volts at 180 MA. or 1300 volts at 200 MA. Using duplex rectifier DC output available is, 1300 volts 125 MA. and 640 volts 100 MA. 1700 volts 125 MA. and 850 volts 75 MA. **$5.20**

20462B—1500-1250-1000-0-1000-1250-1500 AC at 300 MA. DC. In full wave DC output is 850 volts, 340 MA. 1060V.-310 MA., or 1275V.-300 MA. In a bridge rectifier DC outputs are 1700V.-200 MA., 2130V.-190 MA., or 2600V.-180 MA. Using duplex rectifier DC outputs available are: 1700V.-130 MA. and 850V.-100 MA. 2130V.-125 MA. and 1060V.-90 MA. 2600V.-125 MA. and 1275V.-75 MA. **6.75**

20462C — 2500-2000-1500-0-1500-2000-2500 AC at 300 MA. DC. In full wave rectifier DC output is 1275V.-340 MA., 1700V.-320 MA., or 2120V.-300 MA. In a bridge rectifier DC output on 1500 Volt taps is 2600V.-200 MA. on the 2000 volt taps 3420V.-180 MA. Using duplex rectifier DC outputs available are: 2600V.-130 MA. and 1275V.-100 MA. 3420V.-125 MA. and 1700V.-90 MA. **10.95**

20462D — 1500-1250-1000-0-1000-1250-1500 AC at 500 MA. DC. In full wave rectifier DC outputs are 850V.-570 MA., 1060V.-520 MA., or 1275V.-500 MA. Using bridge rectifier DC outputs are 1700V.-330 MA., 2130V.-315 MA., or 2600V.-300 MA. respectively. Using duplex rectifier DC outputs are: 1700V.-220 MA. and 850V.-170 MA. 2130V.-210 MA. and 1060V.-150 MA. 2600V.-200 MA. and 1275V.-140 MA. **10.95**

20462E—575-525-0-525-575 AC at 500 MA. DC. In full wave rectifier DC outputs are 425 Volts-550 MA. or 495 Volts-500 MA. In full wave rectifier condenser input, DC outputs are 660 volts-360 MA. or 760 Volts-340 MA. In a bridge rectifier DC outputs 850 Volts-350 MA. or 100 Volts-330 MA. Using duplex rectifier DC outputs are 850 Volts-250 MA. and 425 Volts-125 MA. or 1000 Volts-225 MA. and 500 Volts-125 MA. **5.20**



20462F—Smoothing Choke—20 Hy.-200 MA. 115 ohms DC Resistance. 2500 Volts Insulation **1.45**

20462FS—Swinging Choke—5-25 Hy.-200 MA. 115 ohms DC Resistance. 2500 Volts Insulation **1.45**

20462G—Smoothing Choke—20 Hy.-300 MA. 95 ohms DC Resistance. 3500 Volts Insulation **2.85**

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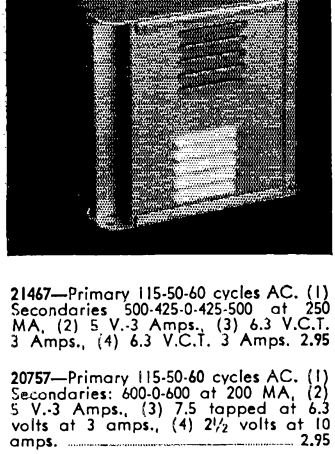
20462I—Smoothing Choke—20 Hy.-550 MA. 55 ohms DC Resistance. 6000 Volts Insulation **4.95**

20462IS—Swinging Choke—5-25 Hy.—550 MA. 55 ohms DC Resistance. 6000 Volts Insulation **4.95**



21467—Primary 115-50-60 cycles AC. (1) Secondaries 500-425-0-425-500 at 250 MA, (2) 5 V.-3 Amps., (3) 6.3 V.C.T. 3 Amps., (4) 6.3 V.C.T. 3 Amps. **2.95**

20757—Primary 115-50-60 cycles AC. (1) Secondaries: 600-0-600 at 200 MA, (2) 5 V.-3 Amps., (3) 7.5 tapped at 6.3 volts at 3 amps., (4) 2½ volts at 10 amps. **2.95**

22283 — Primary 115 volts-50-60 cycles AC. Secondary 2½ V.C.T. at 10 amps. 5000 volts insulation for 2-866's **1.65**

23160—Primary 115 V. 50-60 cycles AC. (1) Secondaries: 600-525-0-525-600 at 300 MA, (2) 5 V.-3 amps., (3) 7.5 tapped at 6.3 volts at 3 amps., (4) 6.3 V.-5 amps. also tapped for 2½ V. at 10 amps. **5.50**

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ALL PRICES NET TO AMATEURS

UNITED TRANSFORMER CORP.

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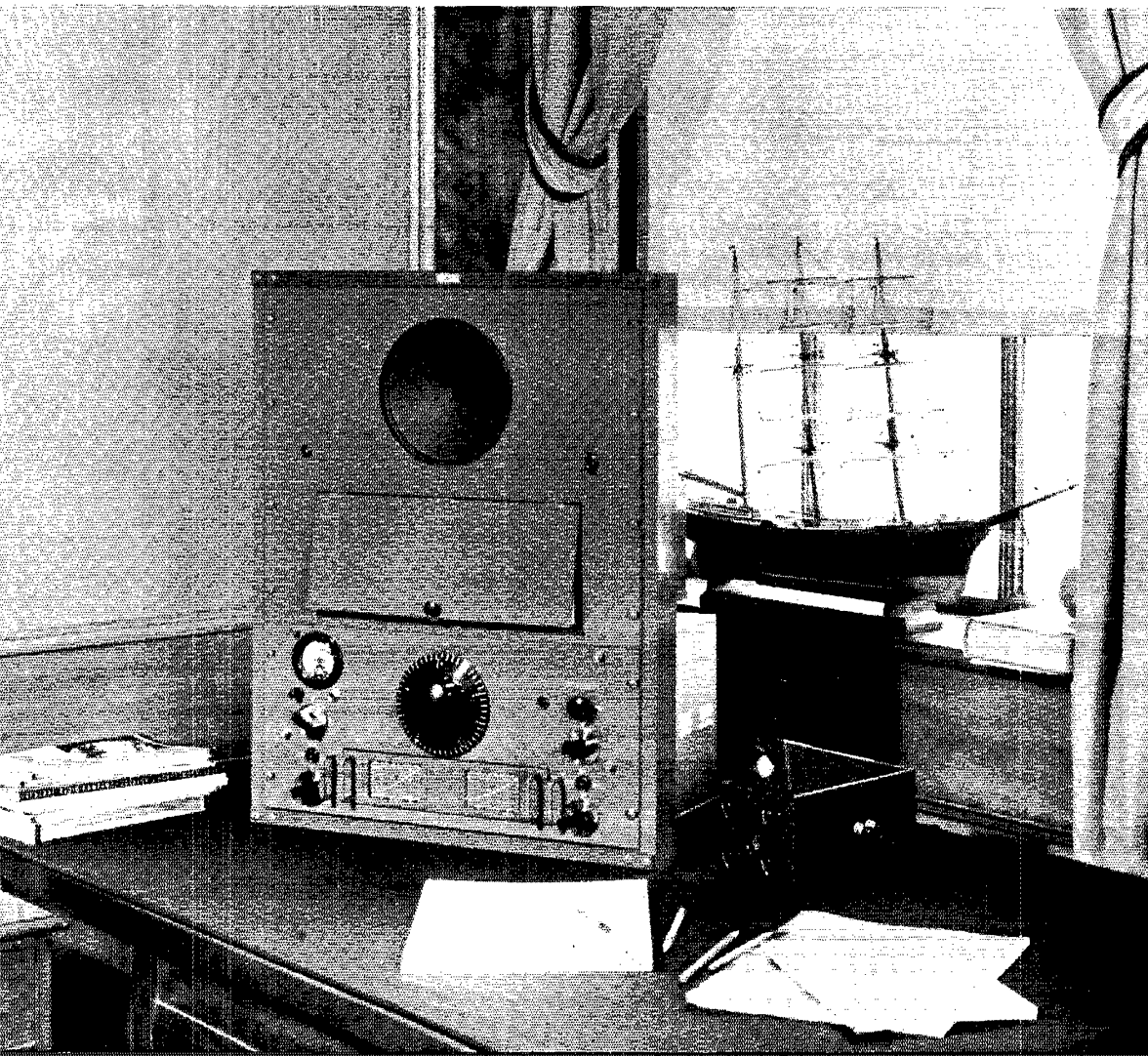
EXPORT DIVISION 100 VARICK STREET NEW YORK, N.Y. CABLES: "ARLAB"

The HRO

This pleasing HRO combination comes in two choices of finishes, either rich grey (as shown) or black leatherette. Get complete prices on the HRO receiver, relay rack type, [illegible]; coil kits covering 1.7 to 30 megacycles [illegible]; speaker, [illegible]; panel containing [illegible]; cabinet [illegible]; table-model relay rack type MRR — $13.50.

NATIONAL

RADIO PRODUCTS



It isn't what you put in that counts—

It's what you get Out

Use RCA Tubes to be sure of better performance at high frequencies

IT seems to us that much emphasis has been placed on tube input ratings with little regard to tube and circuit efficiencies and the resulting output. After all, the other fellow only hears what you put into the antenna—not what you put into the final stage. Why gamble, therefore, with the operation of your transmitter? Give it a good start by designing it around RCA tubes. There are many types to choose from which will give you long, reliable service at high efficiencies.

High plate efficiencies in many tubes are obtainable only at very high plate voltages. This means costly power-supply equipment. RCA offers you a line of tubes designed to give high efficiencies at reasonable plate voltages, thus permitting you to save money on your power supply equipment. The money saved can be used to improve other portions of your transmitter.

Efficiency at ultra-high frequencies is an important matter. Naturally, overall circuit efficiency is lower. Don't let the tubes be the weak link in the system—use RCA ultra-high-frequency types which have been carefully designed and rigidly tested to assure good ultra-high-frequency performance.

For full information on any RCA type, see your supplier, or write to

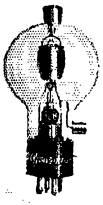
RCA 801

RCA 802

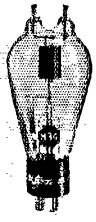
RCA 803

RCA 805

RCA 807



RCA 808



RCA 834

RCA 866

RCA

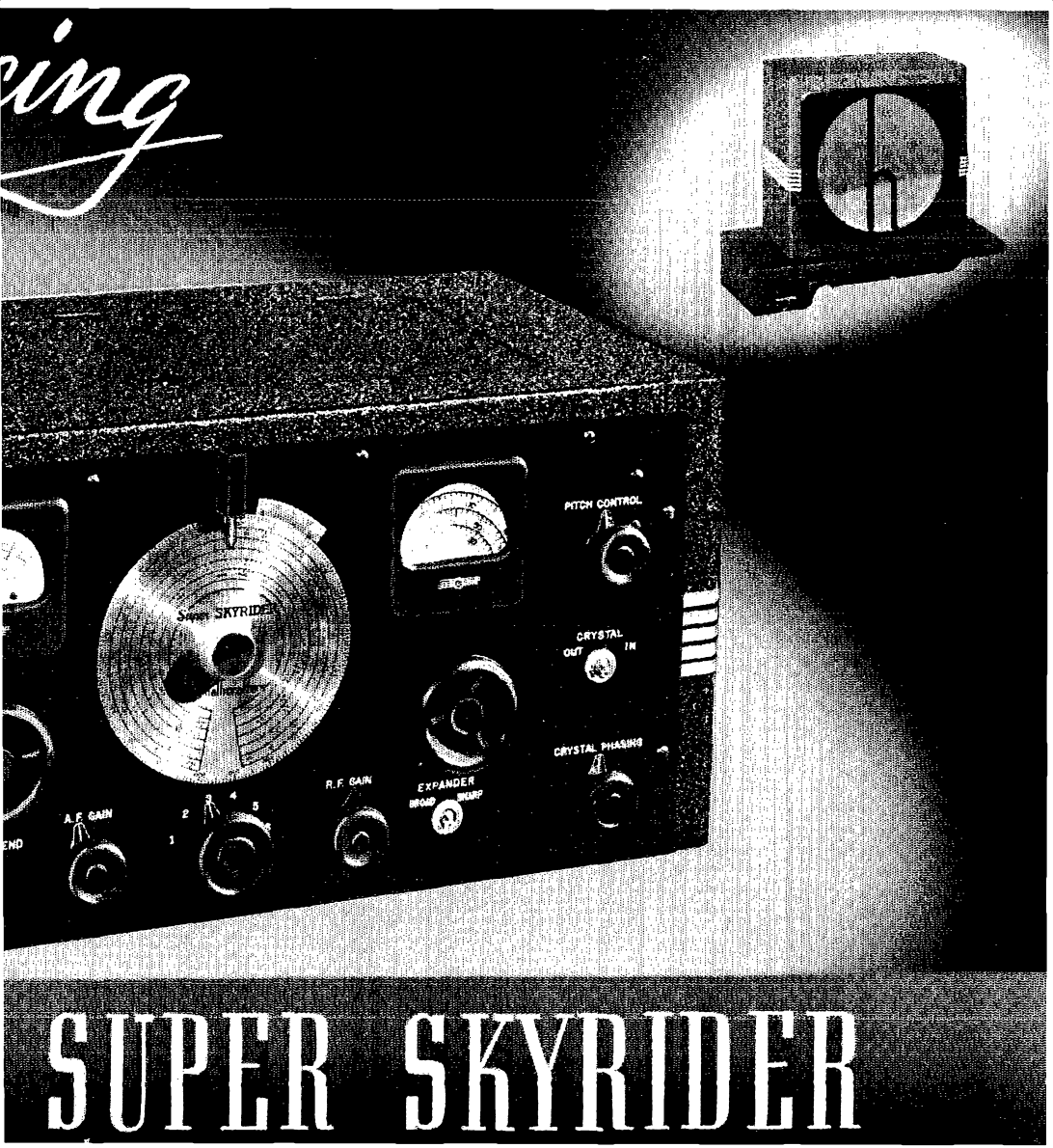
for Amateur Radio

AMATEUR RADIO SECTION

RCA Manufacturing Co., Inc., Camden, N. J. · A Service of the Radio Corporation of America

Announc

The 1938


PITCH CONTROL
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SUPER SKYRIDER

The New 1938 Super SkyRider

A WORD ABOUT OUR NEW RECEIVER

Since the inception of our organization, Hallicrafters receivers have won a rapidly growing acceptance in the amateur radio fraternity. We are grateful for this approval, but consider it an obligation to continue our efforts toward constant improvement.

We had visualized a receiver tuning from 5 meters to the top of the broadcast band, with wide range, variable selectivity (single signal, razor sharpness to broad high fidelity); with an electrical band spread equalling the standards set by the A.R.R.L. HANDBOOK; with improved image and signal-to-noise ratio, with an "S" meter that would work on weak signals.

"A large order", said our engineers. "With all these features, what else could we want?" our amateur friends asked us. So we went to work.

We've realized our objective. It has taken many hours of painstaking design, research and study. We had to "invent" an ingenious new method that gives us 1000° OF BAND SPREAD with 5KC PER DIVISION ON THE 20 METER BAND and proportional spread on other bands. We sweated over the *5 meter band* but it's there — and it's "hot". We improved the Q of all the RF coils — and got substantially better image suppression and better than 1 microvolt sensitivity average on all bands.

We've made improvements all through the receiver — redesigned the I. F. coils to provide wide range selectivity and improved signal-to-noise ratio — improved the crystal filter circuit, the beat oscillator, the audio — and now the job is finished — surpassing our most hopeful expectations.

Our hats are off to Mr. Karl Miles and his competent staff — including Mr. J. L. A. McLaughlin, co-designer with Mr. James J. Lamb of the famous "*dual diversity*" receiver.

So here's the New 1938 Super Sky Rider. Even to us it's amazing — and its price, in the Hallicrafter tradition, is exceptionally attractive. Be sure to see it at your dealers.

W. J. Halligan

PRES.

the hallicrafters inc.

2611 Indiana Ave., Chicago, Ill.

Cable Address: "Hallicraft" Chicago