

QST

devoted entirely to

amateur radio

march
1933
25 cents



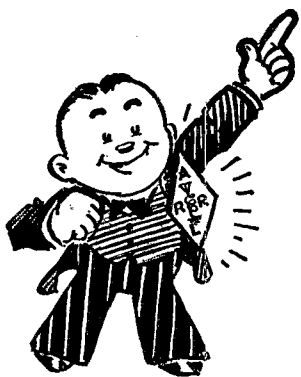
ARE you proud that you are an amateur — proud of your A.R.R.L. membership? Then proclaim it! Let the hams who meet you on the street, in the radio store, or traveling, know it. Wear your A.R.R.L. emblem!

The distinctive League emblem comes in four different forms. Its use by *members* is endorsed and encouraged by the League. Every *member* should endeavor to display the insignia of his organization in every possible way.

THE PERSONAL EMBLEM, in extra-heavy rolled gold and black enamel, just $\frac{1}{2}$ " high, supplied in lapel button or pin-back style, is recognized as the sign of a good amateur. Wear your emblem, and feel proud of having taken your rightful place in the radio fraternity. Either style, \$1.00, postpaid.

THE AUTOMOBILE EMBLEM, heavily enameled in yellow and black on sheet metal, will gain you friends. On the road, traveling, it identifies you as a real amateur. $5 \times 2\frac{1}{2}$ ", holes top and bottom. 50c each, postpaid.

THE EMBLEM CUT, a mounted printing electrotpe, the same size as the personal emblem, is for use by *members* on amateur printed matter, letterheads, cards, etc. \$1.00 each, postpaid.



PROUD OF IT!!

Special
EMBLEMS
for **HANDY'S**
HENCHMEN

All the King's horses and all
the King's men couldn't have
more attractive colors than those
available only for

Section Communications Managers
Route Managers
Official Relay Station Appointees

OFFICIAL A.R.R.L. EMBLEM in
Special red color for the S. C. M. . . . Special
green color for the Route Manager . . . Special
blue color for the Official Relay Station appointee

Note: Red and green colors in pin type only. Blue
emblem available both in pin and lapel button types.

$\frac{3}{8}$ " size \$1.00 each

The **American Radio Relay League**
West Hartford, Connecticut

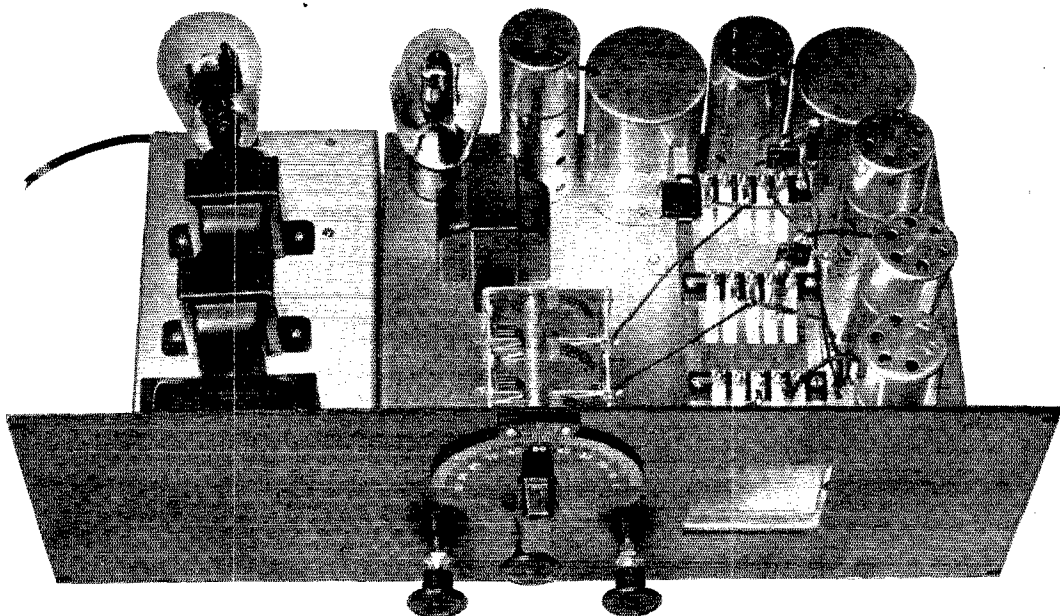




McMURDO~SILVER

presents

THE HAM SUPER



The Ham Super has been designed especially for amateur communication service. The greatest names in amateur radio — men for whom you have the most profound respect — have contributed their advanced engineering knowledge to give this instrument features heretofore unavailable in amateur receivers.

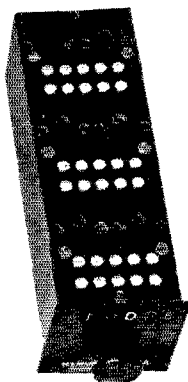
It is a seven-tube AC (or optionally six-tube battery) operated superheterodyne covering the range of 1500 to 15,000 kilocycles in four bands, each with full band spread and c.w. features for the 1700, 3500, 7000 and 14,000 kc. amateur bands. It provides a degree of sensitivity and selectivity exceptional in amateur receivers.

Through the use of the new Shielded Unit Inductors, all three coils for r.f., first detector and oscillator circuits are *simultaneously changed* in a single operation

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Regeneration makes overall sensitivity so high as to be difficult to measure, but sensitivity will approximate better than 1 microvolt absolute, or $\frac{1}{4}$ microvolt per meter.

Unquestionably . . . The Ham Super is the most useful receiver ever designed for the amateur. Mail the coupon with 3c stamp for complete specifications and performance facts.



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1136 W. Austin Avenue, Chicago

Send me all details of The Ham Super and other amateur transmitting and receiving specialties.

Name

Address

Say You Saw It in *QST* — It Identifies You and Helps *QST*

The Amateur's Bookshelf

GOOD TEXTBOOKS and operating manuals should be on every amateur's bookshelf. We have reviewed practically all the books in which the amateur would be interested, and have arranged to handle through the QST Book Department at A.R.R.L. Headquarters those volumes which we believe to be the best of their kind. Take pride in a small but good radio library; buy a few good books and get into the habit of reading them. Prices include postage.

Principles of Radio, by Keith Henney. This book is chock-full of meat for the experimenter. The subjects treated range from the fundamentals of electricity to the most modern concepts of modulation and detection. 477 pp., 306 illustrations.....\$3.50

Elements of Radio Communication, by Prof. J. H. Morecroft. This is a new book by the author of the "Principles" listed below. It is about half the size of the larger work, and the subject is treated in more elementary fashion. Simple algebra is sufficient. An excellent book for the "first-year" student. 269 pp., 170 illustrations.....\$3.00

Principles of Radio Communication, by Prof. J. H. Morecroft. An elaborate general textbook, and one of the recognized standards on theory for the engineering student. A working knowledge of mathematics is desirable for the reader who expects to get the greatest benefit from this work. 1001 pp., $5\frac{1}{4} \times 9$\$7.50

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Experimental Radio, by Prof. R. R. Ramsey. Revised Edition. A splendid book for the experimenter. This is a laboratory manual, describing 128 excellent experiments designed to bring out the principles of radio theory, instruments and measurements. 150 illustrations, 229 pp., $5\frac{1}{4} \times 7$\$2.75

Radio Theory and Operating, by Mary Texanna Loomis. Although giving a moderate amount of theory, it is essentially a practical handbook for commercial and broadcast operators, and as such ranks among the foremost publications of this sort. Used as a textbook by many radio schools. A good book for any amateur. 1000 pp., 800 illustrations.....\$4.25

The Radio Manual, by George E. Sterling. Another excellent practical handbook, especially valuable to the commercial and broadcast operator, and covering the principles, methods and apparatus of all phases of radio activity. Over 900 pp.....\$6.00

Radio Telegraphy and Telephony, by Duncan and Drew. Still another work along the lines of a general practical handbook. In size it is approximately the same as the two listed just previously, and the subject matter generally follows along the same lines. A good book in this class. 950 pp., 468 illustrations.....\$7.50

Practical Radio Telegraphy, by Nilson and Hornung. Written particularly for the student training for a commercial license, and covering theory and apparatus. A practical handbook. 380 pp., 223 illustrations.....\$3.00

Radio Data Charts, by R. T. Beatty. A series of graphic charts for solving, without the use of mathematics, most of the problems involved in receiver design. 82 pp., $8\frac{1}{2} \times 11$\$1.50

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Radio Operating Questions and Answers, by Nilson and Hornung. Fourth Edition. A companion volume to "Practical Radio Telegraphy" by the same authors. The 1932 Revised Fourth Edition is very complete, covering Commercial and Broadcasting, Amateur, Aeronautical and Police Radio, Beacons, Airways, Meteorology, and Teletype Operating. 356 pp., $5\frac{1}{4} \times 8$\$2.50

How to Pass U. S. Government Radio License Examinations, by Duncan and Drew. Intended as a companion volume to "Radio Telegraphy and Telephony" by the same authors, as a guide to the applicant for commercial licenses. It is not a text in itself. The chapter arrangement follows that of the sections of the commercial theoretical examination, each being made up of typical examination questions and their answers. 169 pp., 92 illustrations.....\$2.00

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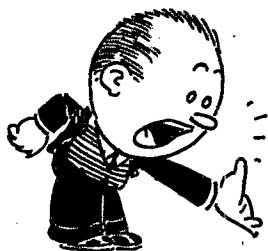
AMERICAN RADIO RELAY LEAGUE, INC.

West Hartford, Connecticut

QST

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devoted entirely to AMATEUR RADIO



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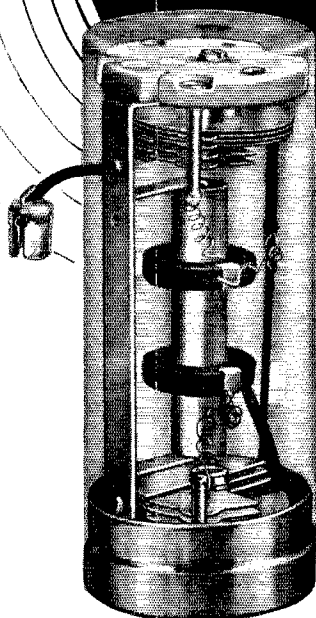
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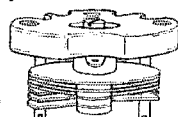
I.F. TUNING *Without an "if"*



The IMPROVED COMET "PRO" HAS THIS TRANSFORMER

Improved COMET "PRO"

The Only Professional
SHORT-WAVE RECEIVER
With Air-Dielectric I.F.
Tuning Condensers..



NOW — single signal characteristics on C.W., plus even greater sensitivity and selectivity on phone — with *easy tuning* for which the COMET "PRO" is famous.

Increased selectivity and sensitivity are gained in two ways. *First:* The I.F. transformers are tuned by *AIR DIELECTRIC, Isolantite-insulated condensers* which *hold their peak setting CONSTANT* regardless of temperature or atmospheric conditions. They take the "if" out of the I.F. amplifier by insuring stability never possible before.

Second: The improved "PRO" has a beat-frequency oscillator, with knob control, which permits varying the beat frequency over a small range, so that an interfering signal is lowered on the tuning curve while the desired signal is held full-strength at the peak.

Professional and amateur operators throughout the world hail the "PRO" superiority. Now, with these *exclusive* improvements, the "PRO" again steps out ahead of even its original leadership.

The new Hammarlund Air-Tuned I.F. Transformers are available for replacement in former COMET models — or for markedly improving other super-heterodynes.

HAMMARLUND MANUFACTURING CO.
424 W. 33rd St., New York

Please send folder giving detailed description
of the new Hammarlund Air-Tuned I.F.
Transformer.

Name.....

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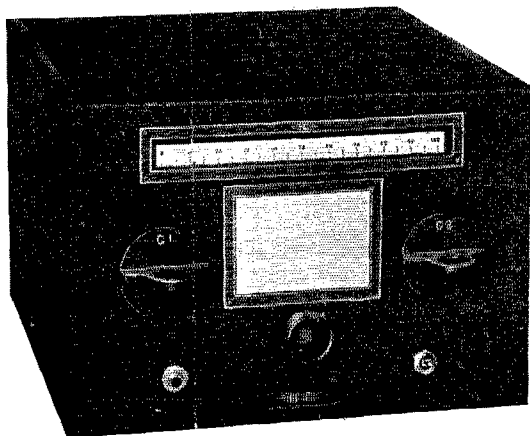
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with the greatest array of
Apparatus we have ever offered at one time



Factory Wired Receiver \$26.46
Coils (per pair) 5.88
5880—AB Power Pack 13.41

The New NATIONAL FB-7

The new NATIONAL FB-7 Super Heterodyne receiver in stock. This latest National receiver strikes a new note in simplified operation, combining as it does true single dial control with greater sensitivity, 10 kc selectivity and complete "image" suppression in a 7 tube circuit especially developed around the new "50" series of tubes. Wavelength range 15-200 meters in five steps and "ham spread" 20-40-80 and 160 meter coils.

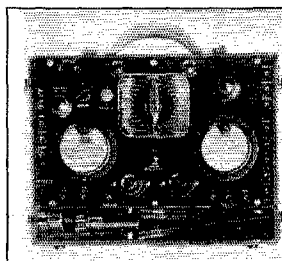
We know you will say F.B. seven times seven when you read these FB-7 prices. We have a complete stock of National parts and receivers on hand at all times, including the S.W.-3 — S.W.-58 — S.W.-34 receivers and the A.G.S. commercial type short wave super heterodyne. Bulletin and quotations furnished by return mail.

GENERAL RADIO FORMS

The new G.R. porcelain coil forms in stock. Designed especially for low powered transmitters, buffers, &c. These efficient forms may be put to a wide variety of uses.

677-U coil form 35c
677-PL spacers 15c
274-P plugs 6c
678-P plug base 35c
678-J jack base 35c
274-J jacks 5c

WESTON 566 SET ANALYZERS



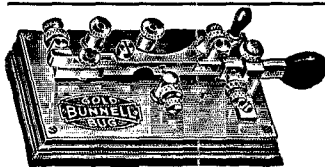
Brand new, original cartons, up to the minute factory guarantee. Complete with 6 and 7 prong adapters. Now you can secure these analyzers at better than the distributor price, only **\$55.95**

A few of the tube checker and oscillator advertising last month are still available at sensationally low prices; listed in Feb. QST. Descriptive bulletins on request.

All parts for the amplifier unit for Grammer's low powered crystal transmitter in stock. Complete kit **\$7.50**
R. C. A. 46 tube 91c

NEW LOW CRYSTAL PRICES

Y cut Crystals 160-80 M. bands .1 of 1% accuracy \$3.50
Y cut 160-80 M. oscillator blanks 2.00
X cut 40 meter Crystals, random frequency 6.50
LEEDS dustproof holder 1.40
De Luxe model 1.80
General Radio Xtal holder 2.20



No. 398 Gold Bug Automatic Transmitting Key
\$12.50 List. Simple in construction, correct mechanically, and electrically rugged and durable 3/32" contacts, complete with cord and plug. Brand new in original cartons. **\$4.45**
While they last
No. 10202 Extra heavy 3/16" contact **\$5.45**

LYNCH "No Stat" antenna systems are doing a great job for the B C L. troubled with man made static. As described last month; with 50 foot lead-in. **\$2.95; with 100 foot lead-in \$3.75**

Remember there is a Kenyon transformer for every amateur need. The prices on this high grade line are well within every amateur's pocketbook.

We carry a complete line of Hammarlund parts and receivers at lowest wholesale prices. Quotations furnished by return mail.

Leeds 300-Watt Universal Plate Transformer

750-v. — 1000-v. and 1500-v. taps each side of centre. Furnished in Crystalline finished steel case with porcelain stand off insulators for the high voltage taps. **Extra \$9.90 Special**

Our 5 meter 3 tube super regenerative receiver is still the standard of comparison. Uses 6 volt tubes, battery, A.C. operation; only **\$12.45**

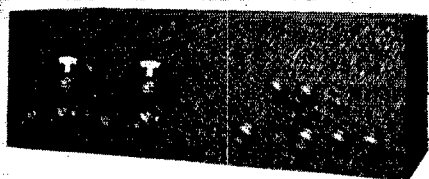


45 Vesey Street, New York City
New York Headquarters for Transmitting Apparatus
WHEN IN TOWN VISIT OUR STORE

Leeds Supreme Transmitting Key
Ideal for beginner's practice set. List **\$1.75. Special Now 55c**

OUT WITH A LAMB

Receiver developed to successfully cope with every receiving condition encountered in the regular amateur bands



The "SUPREME" Single-Signal Super

"Sensational" and many other adjectives may be aptly applied to this adaptation of J. J. Lamb's Single-Signal receiver design to commercial construction. But we feel it to be of greater interest to know that the operating

characteristics of the "Supreme" conform to the high standards of Single-Signal reception, including additional features such as amplified automatic volume control, plug-in oscillator coils, etc.

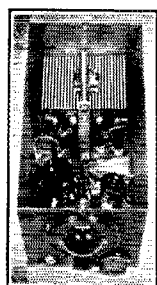
T.R.F. stage with 58 tube; 270° gang tuning with 58 linear first detector. Electron-coupled oscillator employing type 24-A tube. Coils for these three tubes are standard National plug-in type, so that dials track closely in all cases. Each stage completely shielded. Sensitivity control on r.f. and detector tubes to prevent cross modulation and overloading. Shielded crystal filter unit, including one-inch square crystal and air gap holder, with selectivity control and crystal switch on panel. 2-stage 465-kc. intermediate amplifier employing type 58 tubes. 55 duo-diode detector with latest amplified automatic volume control circuit, controlling r.f. and intermediate amplifier gain. Manual or A V C control at the flip of the switch. Headphone position on front panel.

High-C 56 beat-oscillator circuit adjusted to prevent "masking" of weak signals with modulation "hiss." Off-On switch and tuning control on panel. Resistance-coupled 247 power audio working dynamic speaker, with tone control to insure quality to suit the taste. Built-in 110-volt 60-cycle oversize power supply with 24-μfd condenser and speaker-field filter, insuring humless operation with 280 rectifier. All shielding, including case, 1/16" steel cadmium plated inside. Black crystal finish case 26 x 11½ x 9½".

Ham-spread 20-40-80-160 coils (3 coils per range) or regular 15-200 meter National coils in five ranges may be used without circuit changes. Complete kit including all parts with drilled cabinet and chassis, complete set of 9 Arcturus tubes, 8" Rola dynamic speaker and any three ranges of matched ham-spread coils, with detailed instructions for building and operating this simplified receiver. Only a screw driver, diagonals and soldering iron required. No deductions, substitutions or discounts at the remarkable price of \$95.00. Extra coil ranges \$6.50 net. Prices on custom built receivers furnished on request.

SPECIAL GENERAL RADIO BARGAINS

334-M — Metal end plate vernier .00025 condensers.....	\$5.50
247-K — .00025 hard rubber end plates.....	.50
565-A — Half wave 200 w. transformer 1-600 v. winding 2-7½ v. 2½ A winding, and 1-2½ v. 4 amp. winding.....	2.50
373 — Double impedance unit for audio amplifiers, contains two 55 H. chokes & coupling cond.....	1.50
369 — Parallel feed impedance 98 H. 15 M.A.....	.69
285-H — Audio transformer — 6:1 ratio.....	1.20
285-D — Audio transformer — 2.2:1 ratio.....	1.20
277 — Bakelite coil form 2¾" O.D. drilled to take G.R. 274 plugs.....	.25
366 — Double choke for medium size power supplies.....	1.75



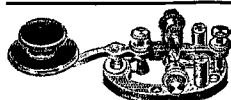
LEEDS Band Spread MONITOR

furnished complete — DeForest 430 tube, A and B batteries and 20-40-80 coils. 50 divisions spread on 20 meters — 35 divisions on 40 meters and 70 divisions on 80 meters. Unconditionally guaranteed.

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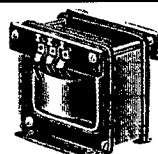
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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors.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

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THE EDITOR'S MILL



REMEMBER the fee bill of a year ago, seeking to charge for licenses? The thing has popped up again at this session of Congress and is a live issue at this writing. Partly by revising the amateur rates and partly because our licenses are all issued now for three-year terms, the proposed charge on amateurs has been lowered to an average of \$1.67 a year.

But that is too much. Any fee for amateurs is too much, we say. People who ought to know attribute much of America's leadership in radio communication to the wise national policy of encouraging amateur radio. We think of that policy as a kind of partnership between us and the government whereunder, in return for that encouragement, we train ourselves as technicians and operators for industry and government, contribute to the art, provide emergency communication, and accomplish all those other things of which we are so proud. What is the idea of one partner in an enterprise taxing the other? It is wrong in principle. Let them tax all the others in radio if that is proper; we're different -- we are the only ones not in it for profit, the only ones who derive no income, the only ones who invest all available cash in it with no hope of monetary return. And the amount! If you think that amateurs can spare \$60,000 a year easily, reflect that that is half again as much as all the amateurs of America pay into the League for the dues that keep our organization going. We would be paying the salaries of all five commissioners and then some. The government would be making a profit on us, for it doesn't cost anything like that to administer amateur radio.

At the hearings on this bill our league was represented by its secretary and its general counsel, who told our story, opposing any fees on amateurs -- which is the policy of our Board. What will happen to the bill now we don't know. We're waiting now to see which way the cat jumps. Congress dies with this issue of *QST* and the story will be told by then. If in the meantime anything more is necessary, remember that A.R.R.L. is on the job.

SPEAKING of three-year licenses, there is another minor A.R.R.L. accomplishment. With one-year licenses and 60-day applications and a rule that the license had to be displayed in the shack all the time, life was becoming just too complex. Twelve months slip around like nothing

at all, and with all the rigmarole of forms the frequency of renewal applications was plumb annoying. So we asked for longer terms of station license. Rule 27(e) of the Commission now reads:

The licenses for amateur stations will be issued for a normal license period of three years from the date of expiration of old license or the date of granting a new license or modification of a license.

The Commission is now sending out slips to every amateur licensee notifying him that his existing station license is extended two additional years, as a result of a proclamation issued on January 6th. These slips are to be filed and displayed with the license. All new hams are getting three-year licenses. And if you have to send in your license for modification, as for a change in address, for example, it comes back with a new expiration date of three years from the date of modification.

Regular amateur operator licenses have been on the three-year basis for some months now. That doesn't apply to the "temporary," however, which is still issued for but one year and isn't renewable. The idea is that every operator must be examined and the "temp" is merely to tide him over until the exam. Once examined and regularly licensed, however, renewals are granted without reexamination. Moral: Don't let your license lapse.

What we'd like to see some day is a consolidated station and operator license in one document, authorizing the holder to maintain an amateur station and to operate any amateur station. One application, one examination, one document. There ought to be a pocket "traveling card" too, certifying the existence of the license back home on the shack wall, so that the amateur in effect has his operator's license with him all the time, ready to try out anybody's brass. Some day we think we'll achieve that.

THERE is really a great deal of interest in the ultra-high frequencies. Undoubtedly they contain the answer to many of to-day's pressing radio problems. Our amateur work of the past two years has contributed a lot to this interest and has brought forth complimentary references to amateur development in government annual reports. As part of a policy of encouraging particularly development above 40 megacycles, the Commission has adopted a temporary rule reading:

Any person holding a valid radio operator's license of any class issued by the Commission may operate any station licensed for, and operating on frequencies above 40,000 kilocycles, provided in the case of amateur operators such operation shall be in conformity with Rule 363.

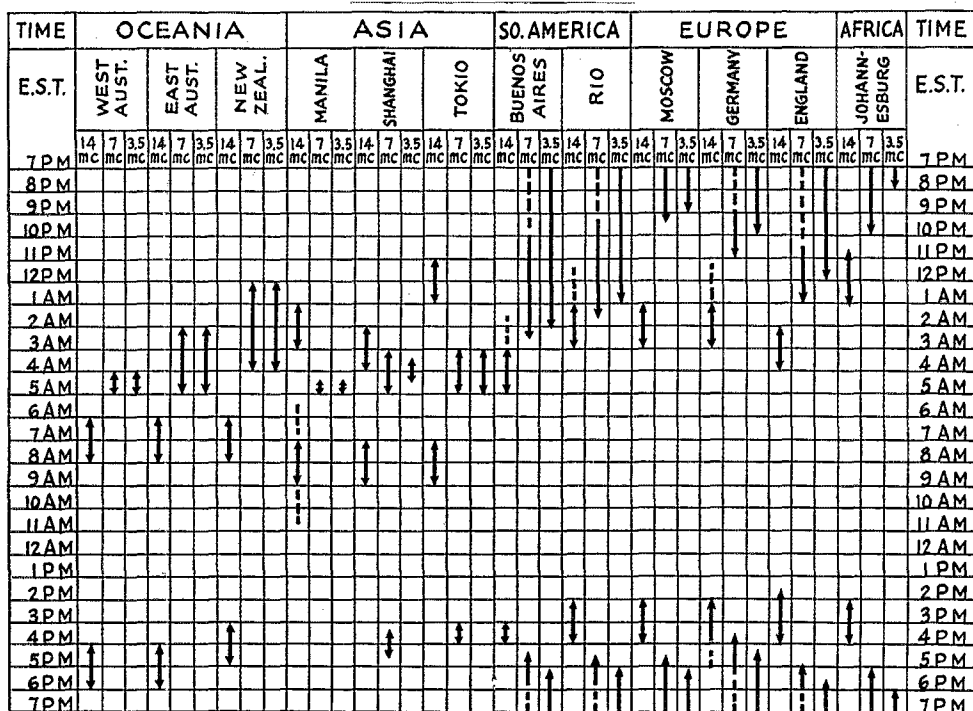
Rule 363 is the reference to personal aim and no pecuniary interest. An amateur operator license does not authorize the operation of any kind of station for pay; to work as a salaried operator you have to possess some class of commercial license. But if no compensation is involved a licensed amateur operator may now operate any kind of station on its authorized frequencies above 40 mc. The idea is to stimulate work in this field. The particular benefit to the amateur is in the case of experimental stations, which heretofore have required a commercial operator, and in the further fact that most experimental licenses for frequencies above 40 mc. permit mobile operation, denied to amateur stations. A secondary result of the new rule is that commercial operators, hitherto required to take out an amateur operator license to be permitted to operate a ham station, may now operate amateur stations in the 56-mc. and 400-mc. bands on their regular license.

The commission gives no indication of change

in its policy of being just a bit hard-boiled about applications for experimental licenses. They will not give them to amateur applicants if the work proposed can be done just as well in amateur bands. Where mobile work is necessary and the ultra-high frequencies are the object, however, it ought now to be easier.

WOULDN'T you like to have a station so patently good that all you had to do was call CQ a couple of times and sign, and hundreds of hams would hear you and reply? Well, *you have*, O.M.! Any amateur has, unless his rig is putting out a jittering gurgle, when no amount of CQ-ing will induce a hard-bitten brother to answer him. But any decent xmitter these days puts out a transoceanic sig the minute the key is pressed. Everybody on your frequency hears your first CQ and those not on you never will hear you. Moreover, if you CQ too long, many of those willing to reply will become disgusted and tune away from you. Simple but disregarded, that is the reason for the "three times three" recommendation in CQ-ing: it actually produces the maximum replies.

After four months of Madrid "vacation," your interpreter this month is again K. B. W.



TIME-FREQUENCY DX CHART

The above chart was taken from a similar summary of data by M. L. Prescott of the General Electric Company. The chart shows the time predicted as "best" (based on experience up to early 1932) for using different frequencies in attempting two-way communication between North America (Schenectady, N. Y.) and certain points in the five other continents. Note that the time given is Eastern Standard Time. The information is of course equally useful for amateurs in other countries who wish to communicate with North America.

A Power Type Electron-Coupled Exciter Unit

By Clyde J. Houldson, WIKP*

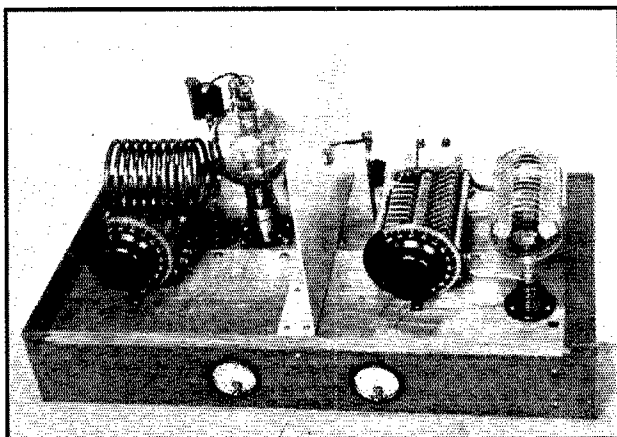
SINCE the introduction of the electron-coupled type oscillator in *QST* for January, 1932, it has found a variety of uses, particularly in heterodyne frequency meters, low-power transmitters and in the high-frequency and beat-note oscillators of superheterodyne receivers. For the low-power transmitter application, various tubes such as the '24, '35, 57 and several others may be used. But with these tubes only small power is delivered and it is usually necessary to employ two or more intermediate stages before sufficient power is obtained to excite the final stage. Tubes of the next larger type, such as the 865 and 844, do not seem to operate so well as electron-coupled oscillators, probably because the internal shielding or screening is not sufficient. But there is one tube that works unusually well and at the same time delivers sufficient power to excite a couple of 860's or 852's, or even a 500-watt 861. This tube is the 860, which we know normally as the 100-watt screen-grid amplifier. By using it we can eliminate the several intermediate amplifier stages that are required when using the receiving tubes.

Several circuits could be used, but most of them present some constructional difficulty, such as pulling the filament leads through the oscillator tank inductance, trick variable condensers connected across the oscillator tank coil or heavy radio-frequency chokes in the filament leads. The circuit that was finally chosen is shown in Fig. 1, recognizable as a Hartley arrangement. The filament of the 860 is operated above ground with respect to r.f. The strength of the oscillation and the harmonic content in the output are controlled by the position of the filament tap on the oscillator tank coil L_1 . This connection, when using a high- C tank having 12 turns of copper tubing $2\frac{3}{8}$ inches in diameter, would be approximately three to four turns from the grounded end. The coil is tuned by a $480\text{-}\mu\text{fd.}$ receiving type condenser, which proves to be quite satisfactory. The grid resistor is a 100,000-ohm two-watt size. This seems rather small for a tube of this size, although during the tests in which the key was locked no heating was noticeable.

In the output stage a Cardwell 110- $\mu\text{fd.}$ type

183 was used for tuning the inductance L_2 . For best results this circuit should have a low- C value. C_5 is the usual plate by-pass condenser and should have a voltage rating somewhat higher than the plate voltage to be employed. The remaining components are as specified in Fig. 1. The entire assembly is mounted on a 12x23-inch breadboard, which makes it ideal for experimental work, as each part is within easy reach for any adjustments that have to be made.

With the electron-coupled oscillator a signal



THE EXPERIMENTAL POWER TYPE ELECTRON-COUPLED OSCILLATOR HARMONIC OUTPUT ADEQUATE TO EXCITE A HIGH-POWER STAGE IS READILY OBTAINABLE

The frequency generating circuit is to the left and the output circuit is to the right of the aluminum baffle shield. The filament transformer is mounted under the baseboard, immediately below the tube.

comparable to one emitted by the average crystal-controlled set can be obtained. When using this circuit with the proper amount of shielding it is possible to realize all of the good features of the usual oscillator and separate amplifier arrangement because changes occurring in the output circuit — such as detuning, change of plate voltage, etc. — do not react to an appreciable extent upon the frequency generating circuit. In this way it is possible to retain the good points of the oscillator-amplifier but with a single tube.

The output circuit may be tuned to the second, third or even the fourth harmonic. Of course the power output decreases as the harmonic order increases and the recommended method is to tune the output to the second harmonic of the generator frequency. In other words, if one desired to operate on the 3500-kc. band, the oscillator coil should be designed to cover the 1750-kc. band; or if one planned to operate on the 7000-kc. band,

* Technical Information Service, A.R.R.L., West Hartford, Conn.

the oscillator should cover the 3500- to 3650-kc. band. The coils shown in the photograph were designed so that the output frequency would be in the 7000-kc. band. The output also may be tuned to the third harmonic. However, steady operation when using harmonics above the third is not recommended because then most of the power is dissipated in the tube which would undoubtedly result in shortening of its active life.

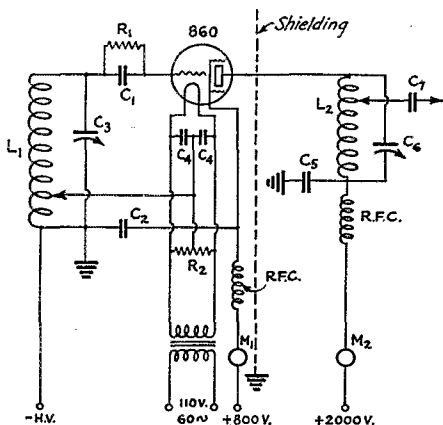


FIG. 1—CIRCUIT OF THE POWER TYPE ELECTRON-COUPLED UNIT

- C_1 —100- μ fd. Sangamo receiving type condenser.
- C_2 —.05- μ fd. Faradon condenser, Type UC-2200, 1000-volt rating.
- C_3 —480- μ fd. Cardwell receiving condenser, Type 123-B.
- C_4 —.01- μ fd. Dubilier fixed condenser, Type 9, (1200-volt rating).
- C_5 —.002- μ fd. Aerovox by-pass condenser, 5000-volt rating.
- C_6 —110- μ fd. Cardwell transmitting condenser, Type 183.
- R_1 —100,000-ohm grid resistor, 50-watt rating.
- R_2 —70-ohm center-tap resistor; may be omitted if transformer has a center-tapped secondary.
- M_1 —0-50 milliammeter.
- M_2 —0-200 milliammeter.
- RFC— $2\frac{1}{2}$ -inch winding (275 turns) of No. 36 d.s.c. wire on a $\frac{1}{2}$ -inch wood form.
- L_1 and L_2 —See text.

The output stage could be tuned to the same frequency as the oscillator, but this is not particularly recommended as it is accompanied by quite a bit of reaction or change in the oscillator frequency. Better results are obtained when the output is tuned to the second or third harmonic of the oscillator frequency. Although not absolutely necessary, it is advisable to use shielding between the oscillator and the output portion of the set. This helps in reducing the reaction on the oscillator when changes of load occur in the plate circuit. If it is planned to use the odd harmonic for operation in any of the amateur bands, then the entire oscillator circuit should be well shielded. For instance, the oscillator would cover the 4666 to 4800-kc. band when tripling frequency to the 14,000- 14,400-kc. amateur band. This means that the oscillator frequency would be outside the amateur bands and there would be likelihood of interference to other interests if the oscillator

output should be radiated. Complete shielding of the oscillator is especially urged if the oscillator is to be keyed. Various coil combinations may be worked out for operation in any amateur band by using the convenient coil table shown in the new *Radio Amateur's Handbook* (tenth edition).

ADJUSTMENT AND PERFORMANCE

When starting up, the screen voltage should be reduced to approximately 400 or 450 volts, while approximately 1000 to 1200 volts should be applied to the plate. In this way it is possible to prevent the set drawing excess plate current during preliminary adjustment.

When the set is operating satisfactorily, the frequency of the oscillator circuit should be adjusted to the desired value by varying the capacity of C_3 and checking with the heterodyne frequency meter or monitor. Then the output stage should be adjusted by varying C_6 . Up to this time the plate current will be anywhere from 75 to 150 milliamperes; but when the C_6 is set so that the circuit resonates at the fundamental or a harmonic frequency of the oscillator, then the plate current will immediately drop to approximately 40 to 50 milliamperes. This decrease in plate current at resonance is similar to that noted when tuning an amplifier stage of the m.o.p.a. set. After the L_2 - C_6 circuit is tuned to the frequency desired in the output, then it is safe to increase the screen and plate voltages to 800 and 2000 volts respectively. Without load the average screen-current is 12 milliamperes and the plate current 50 to 60 ma. With the tube running cool at the increased plate voltage, connect the load, preferably a dummy antenna system.

It is always best to use this unit to excite a power amplifier, a suggested arrangement being either two 852's or 860's. Another arrangement for those desiring higher power could be an 852 or 860 for the buffer and one or two 861's for the final stage. It would be better to employ blocked grid keying in the final stage, thus allowing the oscillator and buffer units to operate constantly.

The curve shows plainly the amount of power that may be obtained from the set when the output stage is tuned to various frequencies. For instance, with 825 volts on the screen and 2000 volts on the plate, the output was 85 watts with the output circuit tuned to the fundamental frequency of the oscillator. With the plate circuit tuned to the second harmonic, the output was 62 watts and when tuned to the third harmonic was 51 watts. The total input was practically constant. The curves of Fig. 3 show the plate efficiency as well as the relative power output for the various harmonics.

Although the plate efficiency may seem rather low, if one were to use a separate oscillator exciting an 860 power amplifier and figure the total power consumed (including filaments) and power obtained in the output, this 860 electron-coupled

rig actually would be more efficient. Hence the single-tube unit would be advantageous in simplicity of adjustment, in requiring only one power supply, and in the stability peculiar to the electron-coupled arrangement.

POWER MEASUREMENT

The method used to measure the power output is of interest. It is shown schematically in Fig. 2. A Weston Photronic cell and a standard lamp socket were mounted inside of a discarded wooden meter box measuring about 8 x 8 x 10 inches. Any box would do. The "Photronic wattmeter" was calibrated against a standard a.c. wattmeter, using 60-cycle supply. Calibrations for several power ranges were made, using lamps of 25-watt to 100-watt rating. The calibration is actually watts input for illumination obtained from the lamp, as measured by the current generated by the Photronic cell and indicated by the d.c. microammeter or milliammeter. In making the calibration, the resistance in series with the lamp was varied to give readings approximately every 10 to 12 watts. Curves were then drawn for the various bulbs including 25-, 60- and 100-watt sizes. The principle of operation is, of course, that when the light from the bulb strikes the Photronic cell it causes a current to flow in the external circuit, through the d.c. meter. In other words, for every reading obtained on the a.c. wattmeter, another in either microamperes or milliamperes would be obtained on the microammeter. In this way is obtained a curve that shows the number of watts consumed by the bulb in

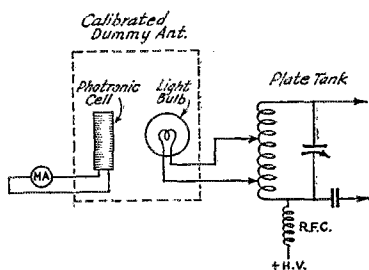


FIG. 2—SCHEMATIC ARRANGEMENT OF THE PHOTRONIC RADIO-FREQUENCY WATTMETER AND DUMMY LOAD USED FOR MAKING THE POWER MEASUREMENTS

terms of direct current from the Photronic cell. After the unit is calibrated it can be connected to the transmitter output to serve as a calibrated radio-frequency wattmeter and dummy load. The leads to the lamp are tapped on the tank inductance so that maximum power output is delivered with minimum plate input.

With the electron-coupled oscillator, as with any self-controlled rig, it should be kept in mind that the construction must be as mechanically stable as it is possible to make it. Any movement or vibration reaching the grid coil of course will

cause wobbling of the frequency. However, by careful construction and precautions against mechanical vibration it is possible to duplicate the signal of the average crystal-controlled set on the air at the present time, and at the same time

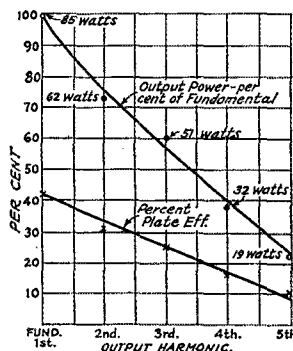


FIG. 3—POWER OUTPUT ON HARMONIC FREQUENCIES

eliminate the crystal-controlled oscillator and the several frequency doubling stages that are usually required. This one gives a d.c. signal, as checked by an electron-coupled frequency-meter-monitor, and as soon as the 860 filament reaches a constant temperature (a few minutes) no frequency drift is noticeable.

But one complaint has been received of unsteadiness of the signal, and this frequency wobble was finally discovered to be caused by the vibration from an energetic keying relay that made the grid coil move slightly. This was eliminated by mounting the relay on sponge rubber. With this done, the note immediately lost its chirp and crystal pure d.c. reports were received.

We are all familiar with the "adequate filter" clause in our regulations. We also know that high-voltage filter condensers cost real money. Therefore, one other point that should be stressed is the simplicity of obtaining a d.c. signal when only a very small filter is used with an oscillator of this type. In the power supply used the filter consisted only of a 9-henry input choke plus a one-half mike 2500-volt filter condenser. And the signal is "steady d.c." free from any a.c. ripple.

At first a small 10-volt shell-type transformer was used for furnishing the filament voltage for the 860. But with this transformer it was not possible to obtain a d.c. signal and plenty of a.c. ripple was present. Radio-frequency chokes were used, by-pass condensers were connected to ground, but to no avail. Finally an old 10-volt core-type transformer was tried—and the a.c. ripple immediately disappeared. Evidently the rather large electrostatic coupling between the primary and secondary windings of the shell-type transformer was causing the trouble. In the core-

(Continued on page 86)

Checking the Behavior of Ultra-High Frequency Waves

Interesting Transmission Tests Using Directive Antennas

By Frank C. Jones, W6AJF*

THE writer's home is located near the top of a range of hills overlooking San Francisco Bay area, and is north of most of the cities located around this bay. Such a location is ideal for 56-mc. work and allows the use of a directional antenna system, providing the transmitted beam is not too narrow. Such being the case, a number of experiments were undertaken on 56 mc. (5 meters) and also some constant oscillator output experiments on 150 mc. (2 meters). The latter frequency was chosen simply because of the small dimensions of various reflecting and directing systems which made the work much easier.

The experimental results from the 150-mc. tests checked closely with some 4.41 meter tests made by Japanese experimenters, so are un-

power input of ten watts using rectified but unfiltered current. The r.f. current at the center of the half-wave antenna was maintained at 100 ma. and this antenna was fed by a quarter-wave Zepp r.f. feeder which placed the oscillator and power supply out of the antenna field. Wave-

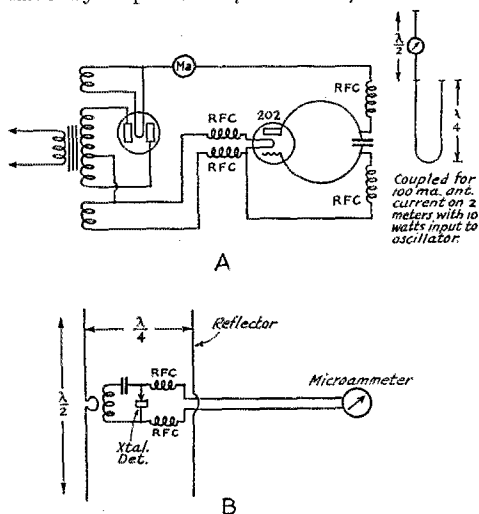


FIG. 1 — (A) CIRCUIT OF THE 150-MC. (2-METER) OSCILLATOR USED IN THE TESTS (B) THE RECEIVER ARRANGEMENT USED FOR EXPLORING THE RADIATION FIELDS

doubtedly suitable for the amateur 56-mc. band. Some empirical formulas were developed and used on the 56-mc. band with quite satisfactory results for phone transmission tests covering almost all of San Francisco Bay area.

THE TEST EQUIPMENT

The 150-mc. oscillator consisted of a split Hartley circuit, as shown in Fig. 1, with a plate

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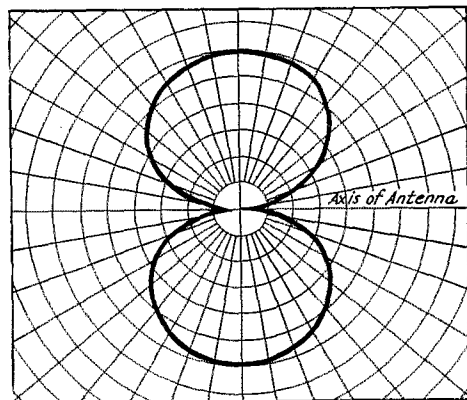


FIG. 2 — RADIATION PATTERN OF THE HORIZONTAL HALF-WAVE ANTENNA OPERATING AT 150-MC. (2 METERS)

length measurements were made by means of a long Lecher wire system using a copper shorting link at half-wave points as indicated by dips in the antenna current meter. A check on these measured values was made by means of beat notes in an oscillating radio receiver set at 20 meters and 22 meters, the tenth and eleventh harmonics beating against the 2 meter oscillator.

The field measuring equipment consisted of a half-wave antenna and reflector actuating a crystal detector and microammeter. This detector was used because no sensitive thermocouple was available. Its impedance was too high to insert directly into the center of the antenna so it was connected in series with a .001- μ fd. condenser and three turns of wire 2 cm. in diameter. These turns were close-coupled to a single turn in the antenna and so gave a better impedance match and greater rectified received current as noted in the microammeter. These three turns plus miscellaneous capacities resonated at two meters. The microammeter was connected by long leads across the detector through a pair of small r.f. chokes suitable for 150 mc. The re-

flector wire was placed a quarter wavelength in back of the receiving antenna, on a light wooden framework, mainly to enable a person to carry this equipment around and make readings quickly without appreciably disturbing the field around the receiving antenna. The human body is a good reflector at this wavelength so some form of "shielding" such as the reflector wire was necessary. With this equipment numerous field patterns were plotted, some of which are shown in Figs. 2 to 9 inclusive.

THE ANTENNA SYSTEMS

The transmitting antenna was made up from the familiar formula 1.56 times wavelength in meters equals length in feet. This is the same as .475 times wavelength in cm. equals length in cm. The antenna length is not exactly a half-wavelength, because of the end effect of the antenna; it isn't a filament of infinitely small diameter without end capacity. The exact amount of "shortening" depends on the insulators used, and the diameter of wire or rod, but above relation holds for average conditions. The end effects also shorten reflector or director wires by about the same percentage and so it should be possible to derive empirical formulas for their design similar to the one used for antenna length calculation.

It has been stated that reflector wires should be equal in length to the antenna or slightly longer. A study of the mathematics of radiation

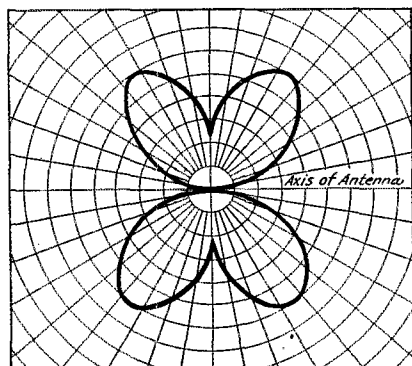


FIG. 3—PATTERN OF THE HORIZONTAL FULL-WAVE ANTENNA AT 150-MC.

uncovered the fact that the reflector wire should have inductive reactance (be resonant to a lower frequency), and a director wire should have capacitive reactance (be resonant to a higher frequency). Stated in ordinary English, generally the radiation field is 90° out of phase with the antenna current at the antenna but is in phase a quarter-wavelength away. Since the induced voltage in the resonant reflector would be 180° out of phase with the voltage of the antenna, the reflector's field would be 90° out of phase with

that of the antenna at the reflector position. Added vectorially, the resultant field would be larger. However, if the reflector is made to have inductive reactance, its radiated field may be made nearly 180° out of phase with the antenna field at the reflector position, so reducing the

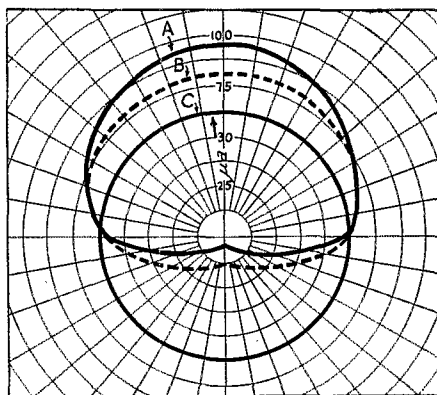


FIG. 4—HALF-WAVE VERTICAL ANTENNA FIELD

Curve C is without reflector, curve B with reflector too long and curve A with proper reflector length.

resultant field nearly to zero. By the same reasoning the reflector field at the antenna, or ahead of the antenna, would be nearly in phase with and would add to the antenna's field when the reflector wire had the correct inductive reactance. The net reactance is $X_L - X_C$ and lengthening the wire would increase both L and C but would make the inductive reactance term greater than the capacitive term. The two terms are equal at resonance, of course. A similar study of radiation fields shows that a straight wire having capacitive reactance would increase the radiation field in its direction, reaching a maximum effect when it has a critical capacitive reactance (length less than resonant) and is located in an optimum position in the antenna's field.

150-MC. MEASUREMENTS

These mathematical ideas are easily checked experimentally, although in this case the experimental work was done first with the practical objective of improving my five-meter 'phone station. Most of the tests were made with vertical antenna and reflector systems, although the curves of Figs. 2 and 3 show the field intensity as measured around a half-wave and full-wave horizontal antenna. It can be seen that the signal intensity is nearly zero in line with the antenna providing it is clear of nearby objects. Many amateurs have noticed this phenomena on 7 and 14 mc. when using horizontal Hertz antennas. This is particularly noticeable on 7 mc. at my station, where the horizontal antenna runs nearly north and south. Reception and transmission to

South America and Alaska are nearly zero, and there is no other apparent reason since the antenna is on top of a hill with no hills north or south for many miles.

The two-meter signals horizontally polarized were reflected from the earth much more than the vertically polarized waves, even though the

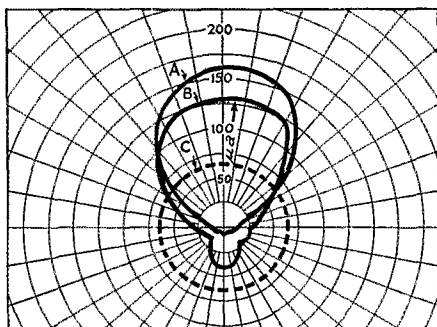


FIG. 5 — HALF-WAVE VERTICAL ANTENNA

Curve C is for no reflectors, while B and A are for three reflectors, one a quarter-wave back and one a half-wave to each side. B is with the reflectors too long and A with proper reflector length. The frequency is 150 mc. (wave-length 2 meters).

transmitting antenna in each position was adjusted above ground for best low angle radiation. The receiving antenna had to be raised up into the air considerably for the same received energy when horizontal as compared to the vertical position for both antennas in each case. More will be said about five-meter wave polarization later.

Fig. 4 shows the microammeter readings for a

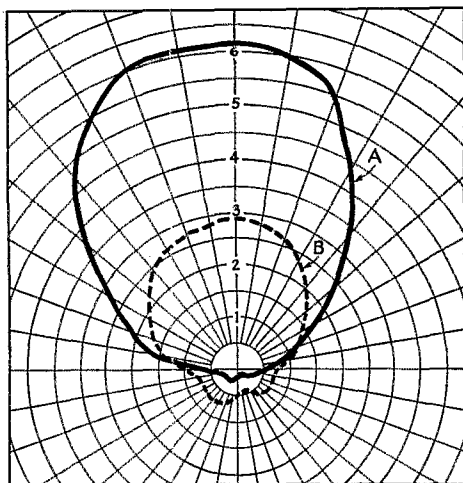


FIG. 6 — PATTERNS PLOTTED FOR THREE REFLECTORS, A BEING GALVANOMETER DEFLECTIONS FOR CONSTANT DISTANCE FROM THE ANTENNA AND B DISTANCES FOR CONSTANT GALVANOMETER DEFLECTION

constant distance away from the transmitting aerial using vertical half-wave antennas. Curve C is for no reflector wires, while A and B are for one reflector wire spaced a quarter-wave in back of the transmitting radiator. Best reflection was obtained when the reflector wire was adjusted to optimum length. The "beam" is very broad but it will be noticed that the radiation is considerably improved in a forward direction.

Fig. 5 shows the same conditions but with three reflector wires, one a quarter-wave in back and one on each side at about a half-wave distance. It will be noticed that the radiation is considerably improved in a forward direction and that the beam is sharper. Fig. 6 is shown as a matter of interest in that it shows the crystal rectifier to be a nearly square law detector. One curve is for constant distance and variable rectified crystal current and the other is for constant deflection at variable distance. Curve B is more subject to the tilt angle in a vertical sense, so would vary with the distance in that way also.

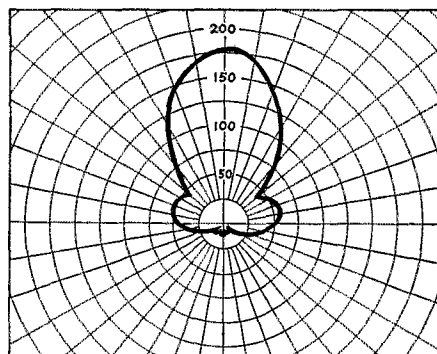


FIG. 7 — PATTERN WITH THREE REFLECTORS (ONE BACK AND TWO SIDE) AND TWO DIRECTORS, SIDE REFLECTORS TOO SHORT AND DIRECTORS SLIGHTLY OUT OF TUNE

The plot is for galvanometer readings at constant distance.

Fig. 7 shows the effect of using both directors and reflectors but with neither correctly tuned. Fig. 8 shows the same set-up with the three-reflector and two-reflector wires more correctly tuned. The intensity was increased so much that the readings were made around a circle further away. The beam is much sharper as compared to Fig. 5.

Fig. 9 shows the same two director wires but with only one reflector wire. More leakage takes place out at the sides and the beam is not as sharp.

Experiments were made with one director wire for best length and spacing on both the transmitting and receiving aerial. Best results were obtained when the wire was a certain length and spaced about $\frac{3}{8}$ of a wavelength in front of the antenna. The microammeter reading was ap-

proximately doubled when a director wire was added. As many as five director wires were tried with an increase of rectified received current corresponding nearly to the square of the number of director wires. The beam also became sharper. From these measurements the optimum spacing for a director wire was $\frac{3}{8}$, $\frac{6}{8}$, $\frac{9}{8}$, $1\frac{3}{8}$ wavelength, etc. That is, one every $\frac{3}{8}$ wavelength for as many as were used in front of the transmitting or receiving antenna. The best director length worked out to be, .435 times wavelength in cm. equals length in cm. This corresponds to 1.425 times wavelength in meters equals length in feet, which is seen to be smaller than the 1.56 value for the antenna itself.

Similar tests with reflector wires gave the best length as .485 times wavelength in cm. equals length in cm., or 1.60 times wavelength in meters equals length in feet. Slightly greater lengths gave nearly the same results, but shorter lengths caused a rather rapid drop in received current.

In proportion, the reflector wire is longer than the antenna and the director wire is shorter. This is because a reflector wire is a quarter-wave from the antenna, when directly back of it, while the director wire is $\frac{3}{8}$ -wavelength away. When the director wire was moved up to a quarter or an eighth wave from the antenna, its length had to be increased for best results. Tying the reflector or director wires along a stick for rigid support made the optimum lengths drop down 4 or 5 cm. and

to 532 cm. wavelength, so the reflector length worked out to be .485 x 532 equals 258 cm., or 102 inches. Likewise, the antenna length was .475 times 532 equals 252 cm., or 90 $\frac{1}{2}$ inches. The reflector was spaced $\frac{1}{4}$ -wavelength in the rear, which is

$$\frac{532}{4} = 132\frac{1}{2} \text{ cm.}$$

or 52 inches. The director wire was spaced nearly $\frac{3}{8}$ -wavelength to the front, approximately 200

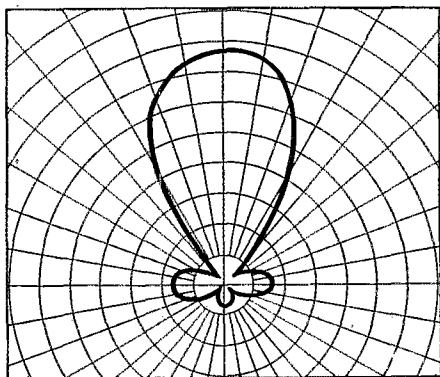


FIG. 9 — WITH TWO DIRECTORS AND ONLY THE BACK REFLECTOR THERE IS MORE LEAKAGE TO THE SIDES

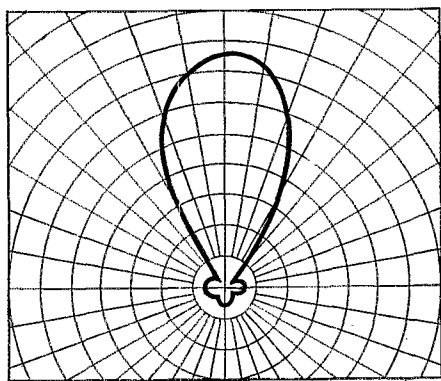


FIG. 8 — THE PATTERN IS IMPROVED WHEN THE THREE REFLECTORS AND TWO DIRECTORS ARE MORE CORRECTLY TUNED

the radiation dropped off also. Insulating spacers such as stand-off insulators are highly desirable.

These figures of .485 for reflectors and .435 for directors were used to check some experimental results obtained on 4.41 meters in Japan, and checked nicely. Next a 56.5-megacycle antenna system was built, using a single reflector wire spaced a quarter-wave in back of the antenna and a single director wire spaced nearly $\frac{3}{8}$ -wave in front. A frequency of 56.5 mc. corresponds

cm. or 79 inches. The antenna was fed with a single wire connected 14 inches from its center and coupled to the 56-mc. oscillator in the same fashion as the usual single-wire r.f. feeder is used. The resulting signal seems to be quite satisfactory over the whole San Francisco Bay area except in one locality where several small ranges of hills intervene. Possibly a director chain could be placed over the top of each hill to re-direct the radiated waves down into the valleys. Some such idea may be necessary to put ultra-high frequency television signals into dead spots such as valleys in suburban districts.

A few tests were made on 56-mc., using a 500 cycle plate supply with the transmitter coupled to various antennas. The receiving set consisted of a half-wave antenna, that could be swung horizontal or vertical to check polarization, a tube detector and one stage of audio amplification. The transmitter was left running while the writer walked around the nearby hillsides. The directional effects checked when using directional systems, the latter putting out much stronger signals than the half-wave vertical or horizontal antennas, or the 40-meter Hertz worked on one of its harmonics.

The following results were obtained when using a vertical half-wave transmitting antenna:

First, the received wave was vertically polarized until some small hill intervened, at which

(Continued on page 28)



STRAYS



An Apartment-House Station on Wheels

That ever-present problem of the ham living in a small apartment—space for the set—has been solved by George R. Underwood, W9GFK. He has his whole outfit built in one box—with the box mounted on the “chassis” of a small steel rubber-tired coaster wagon. When not in use the station is parked in a closet.

When W9GFK wants to go on the air the set is hauled out of its garage into the kitchen, the



power plug is inserted in a wall socket, antenna feeders connected, and all is in readiness. The photograph shows the set in position and ready to be operated.

The transmitter is crystal controlled, using a pair of 10's with 750 on the plates in the last stage, which operates on the 7-mc. band. The receiver is completely a.c. operated, having the usual tuned r.f., and ending up in a 47 which operates the loudspeaker on top of the station. The key sits on a small platform just to the right of the receiver.

It seems to us that this is just about the ideal way to have a station when there isn't any space for a regular operating table and all the other gadgets.

W1BVS has called our attention to a few minor errors in the dimensions given in the draw-

ing of the “Sure-Fire Condenser Microphone” described in November *QST*. The two dimensions $1\frac{5}{16}$ ”– $1\frac{5}{16}$ ” on the alternate mike head drawing should be inside, not outside. This should be obvious because the outside diameter of the head is three inches. In the drawing of the diaphragm tension ring the lip should be $\frac{3}{32}$ ” instead of $\frac{1}{16}$ ”.

Since the article was written it has been found advisable to do away with the back-plate tension spring and put a small set screw through the side of the mike head to lock the back plate in place. W1BVS also suggests using a shielded lead from the head to the first amplifier. The use of such a lead makes it possible to carry the mike anywhere around the transmitter while making adjustments to the r.f. end without the slightest sign of feedback or howling.

A Chance for Ten-Meter Records

Starting March 15th, Baron P. D. Hoyningen-Huene, of Tientsin, China, will be listening for 28-megacycle signals for the first fifteen minutes of every second hour from 0200 to 1400 G.M.T., continuing daily until April 15th. Three special directional antennas will be used, pointing south, east and west respectively. Each fifteen minutes of listening will be divided into three five-minute periods as follows: First five minutes, on the antenna pointing east from Tientsin; second five minutes, on the antenna pointing west; last five minutes on antenna pointing south. The receiver is a single-signal superhet. Baron Huene requests that the transmissions be made in the following form: “QST QST QST AC2BHH AC2BHH AC2BHH de XXXX XXXX XXXX,” repeated three times and followed by a one-minute dash.

Here's a good opportunity to cover some real DX on the ten-meter band. All stations heard will get QSL cards from AC2BHH. Remember that 0200 G.M.T. is 9 p.m., E.S.T., 8 p.m., C.S.T., etc., and this means that the tests actually start on the evening of March 14th for U. S. amateurs. If you live in the eastern time zone, transmit from 9:00 to 9:15 p.m., 11:00 to 11:15 p.m., and so on up to 9:15 a.m. of the following day.

We missed a name in the list under our photo of the amateur group at the Madrid conference, page 15 of our last issue. Top row, fourth from left, is Sr. D. José Mercé Luque, EAR219. Sorry, OM.

A Versatile Temperature-Controlled Master Oscillator Unit

By T. H. Kemp, W2AJA-W2BCN*

OPERATION of modern amateur transmitters requires that they can be adjusted accurately to a certain given frequency, that this frequency shall be held to a minimum drift or change under operating conditions, and that the emitted signal shall be clear and sharp. The unit to be described is designed to meet these fundamental requirements and in addition it has been found possible to incorporate the desirable features listed below:

1. Plug-in crystal control with output either at the fundamental frequency of the crystal or at its second harmonic.

2. Relatively high output as a stable self-controlled oscillator on any band to excite directly a Type '10 tube feeding the antenna.

3. Vernier control under all conditions.

4. Elimination of a doubler stage for transmission on the higher frequencies by doubling in the plate tank of the oscillator itself.

5. Simplified thermostatic temperature control without heat insulation, by thermostatic operation based on temperature gradient in heat radiation.

The circuit of the unit and values of resistance, inductance and capacitance used are shown in Fig. 1. A pentode is used as oscillator tube because it permits greater output for a given mechanical and thermal stress on the crystal and because its plate circuit can be operated high in harmonic content to permit effective doubling. The fundamental circuit, with the possible addition of the second harmonic tank circuit, is similar to those which have been covered in detail in recent issues of *QST*. A grid leak resistance of 9000 ohms is used because this value gives sufficient negative bias to bring out the harmonics in the plate tank circuit and at the same time permits the generation of

sufficient power when the unit is used as a self-controlled oscillator. However, this value is not critical. An accelerator grid resistance of 30,000 ohms, made up of 2-watt carbon type units, maintains about 125 volts on the accelerator grid with 400 volts on the plate. In a compact unit of this character it is desirable that the r.f. chokes be of some small type having individual shield cans over their windings.

In locating the condenser, inductance and resistance units it was found that in such a compact oscillator it was expedient to group all

electrically related units into close mechanical relationship. The accelerator-grid resistors are held firmly in place underneath the condenser by-passing them to ground; the filament center-tap resistance and by-pass condensers are securely bolted together and this assembly is fastened to the sub-base close to the filament terminals of the socket. All tuning inductances and the crystal have been mounted on G.R. plugs and jacks, indiscriminately located so as to provide the desired circuit flexibility discussed later.

CONSTRUCTIONAL DETAILS

The complete oscillator may be basically divided into four major portions, viz:

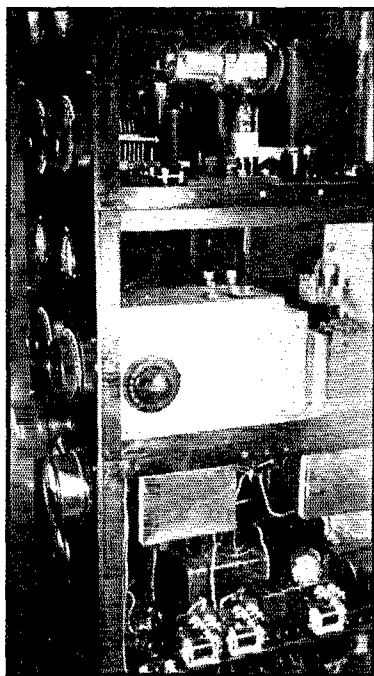
1. The aluminum shield case.

2. The oscillator sub-panel containing tube socket, crystal holder, fundamental-frequency tank circuit, miscellaneous condensers, resistors, etc.

3. The second-harmonic tank circuit with its high- and low-*C* variable condensers, and plug and jack arrangement.

4. The temperature-control unit.

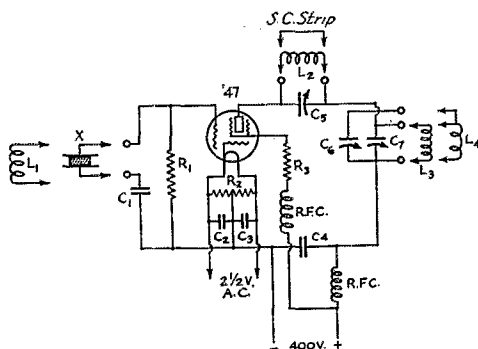
The aluminum shield case is made up of 3/32" aluminum and its overall dimensions are 5 x 6 x 9 inches. The individual pieces are held firmly together by heavy corner pieces tapped for 6/32 machine screws. No slotted corner pieces or



THE OSCILLATOR UNIT IN PLACE
IN THE 75-WATT RACK-MOUNTED
TRANSMITTER AT W2AJA

* 73 Lyall Road, Allwood, N. J.

The sub-panel, on which is all of the apparatus except the second-harmonic tank circuit, is assembled on a 3/16-inch bakelite plate whose dimensions are 5 x 6 inches. A sub-panel tube

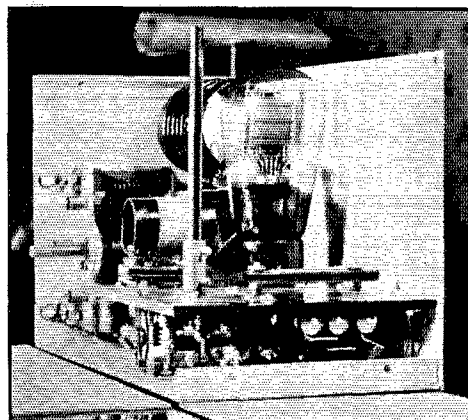


L₁—27 turns on 1-inch tube for 7000-kc. self-controlled operation.

- operation.
50 turns on 1-inch tube for 3500-kc. self-controlled operation.
L₂ — 29 turns on 1½-inch tube for 3500-kc. crystal-controlled operation.
43 turns on 1½-inch tube for 1750-kc. crystal-controlled operation.
L₄ — 10 turns on 1½-inch tube for 2nd harmonic of 3500-kc. crystal.
15 turns on 1½-inch tube for 2nd harmonic of 1750-kc. crystal.
L₄ — 5 turns on 1½-inch tube for 7000-kc. self-controlled operation.
9 turns on 1½-inch tube for 3500-kc. self-controlled operation.
C₁ — 0.006-μfd. mica fixed condenser.
C₂ — 0.01-μfd. mica fixed condenser.
C₃ — 0.002-μfd. mica fixed condenser.
C₄ — 25-μfd. midget variable.
C₅ — 500-μfd. receiving type variable.
C₇ — 25-μfd. midget variable.
R₁ — 900 ohms.
R₂ — 100 ohms, center-tapped.
R₃ — 30,000 ohms (three 10,000-ohm 2-watt resistors in series).
X — Crystal in plug-in holder.

shield can permitting adjustment of the fundamental crystal tank circuit from the top of the unit. Filament and plate connections are brought out to a strip of four binding posts mounted perpendicular to the sub-panel beside the tube socket so that the binding posts will project through the shield case. This arrangement can be seen in the photographs of the bottom and side.

The second harmonic tank circuit consists of a 500- μ fd. condenser, a 7-plate midget vernier condenser, a sub-panel with the requisite G.R. plugs and jacks to mount the inductance, and a fixed by-pass condenser. All of these integral parts are mounted on the aluminum panel forming the front of the shield case using insulating grommets around all through bolts. The 500- μ fd. variable condenser is mounted by means of angle brackets so that its shaft will project through the side of the shield case. The vernier condenser, for adjustment of the second harmonic circuit when using crystal control and for



ARRANGED FOR CRYSTAL CONTROL, WITH TWO SIDES AND THE TOP OF THE CASE REMOVED TO SHOW THE INTERIOR. IN PLACE ARE THE FUNDAMENTAL TANK CIRCUIT AND CRYSTAL HOLDER

closer frequency location when operating as a self-excited oscillator, is mounted with its shaft projecting through the front of the shield case and further extended so that it will project through the front of the apparatus panel of the assembled transmitter. The inductance sub-panel is located beside the large tank condenser over the vernier condenser; on it are three G.R. jacks so arranged that when the coils for self-excitation are used the large tank capacitance is connected in the circuit, providing high inertial stability; whereas when the inductance for picking off the second harmonic of a crystal is inserted only the vernier midjet condenser is in the circuit, thus effecting maximum excitation to the grid of the next amplifier. The lead from the "high" side of this tank circuit is taken through

the center of a stand-off insulator bolted to the side of the shield case opposite to where the large tank condenser shaft comes through.

TEMPERATURE CONTROL

The effect of temperature on frequency is something to be increasingly reckoned with as we make greater efforts to put a transmitter on a certain frequency and have it stay there. Curves plotted from the results of studies along these lines indicated that some form of temperature control would be entirely worth while both for a crystal-controlled oscillator and for a self-controlled arrangement. But a crystal oven in which temperature is controlled with the aid of a heat insulator is a rather expensive and cumbersome device. However, further investigation of the thermal requirements to be satisfied in order to effect a condition of very low frequency drift from temperature change indicated another possibility.

If a source of heat is placed within a metallic case and no heat insulation is provided around the metal container, then the metal surfaces will radiate heat and a straight-line, constantly descending, temperature gradient will exist from the source of heat to the outside surface of the container. Provided this source of heat radiates constantly the same amount of energy, the temperature gradient throughout the box will shift with the external temperature as a result of increased or decreased heat radiation from the surfaces and consequently the temperature of any given point within the case will be a function of the external temperature. Now, if a thermostat of some character is inserted between the source of heat and one of the radiating surfaces, it will operate at its own temperature and hence the shift of the temperature gradient passes through a certain value, determined by adjustment of the thermal contacts. If the make-and-break contacts of this thermostat are made to control the source of heat, the temperature

of the thermostat will tend to remain constant and hence a certain point on the temperature gradient will become fixed. Since the angle of the inclination of the temperature gradient tends to remain constant over the range of temperatures to be encountered, the temperature of all points in the case from the source of controlled heat to the radiating surface tends to remain at some constant value governed by the setting of the thermostat. If we assume further that all surfaces of the shield case have equal radiating ability per unit of surface, then it can be seen that the

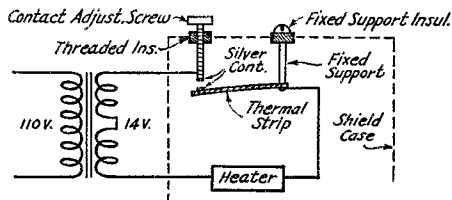
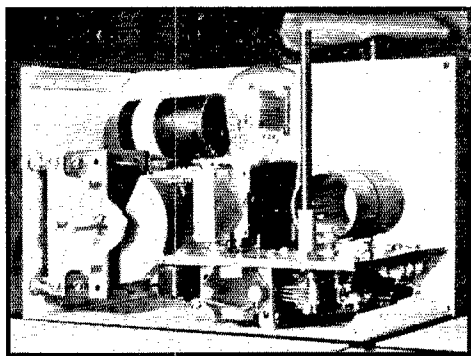


FIG. 2 — THE TEMPERATURE CONTROL CIRCUIT

The transformer has a 110-volt primary and two 7.5-volt secondaries connected in series to give 14 volts. The heater consists of three banks of 1.5-watt 3-volt lamps, each bank having five lamps in series and the three banks being connected in parallel. The lamps used are Graybar Type 2F. Alternatively, ordinary dial lamps could be used. The construction of the thermostat is described in the text. Its bi-metal strip material can be obtained from the Radio Control Co., 76 Rodney St., Glen Rock, N. J.

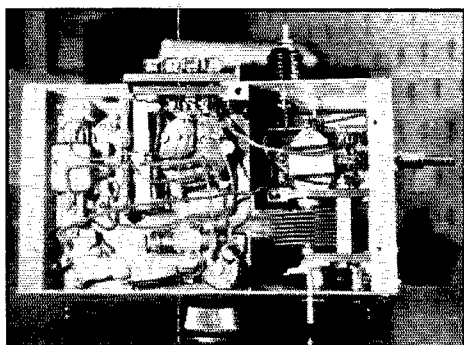
temperature gradient is fixed from the source of heat to each surface of the case and it follows that everything within the case has its temperature fixed by the thermostat, once the entire mass has reached its ambient temperature. Of course, objects within the case at different distances from the heat source will assume different temperatures, but this is immaterial for our purposes so long as the temperature they do assume is unchanging.

To utilize this effect, a bank of fifteen 1.5-watt lamps is suspended from the cover by means of small-sized stand-off insulators, thus separating it about one and one-half inches from the aluminum cover plate. The thermostat control consists of a 4-inch strip of duplex or bimetal with 20-watt silver contacts at its free end. The fixed end is firmly supported from the cover by a brass spacer $\frac{1}{4}$ -inch in diameter and $\frac{1}{2}$ -inch high. The variable silver contact is mounted on a threaded brass rod passing through a tapped bakelite insulating plate bolted to the cover. The thermostat contacts are shunted by a 0.1- μ f. condenser to prevent visible sparking and a click in the receiver when the contact is made or broken. The heater and thermostat circuit is insulated from the cover in order to eliminate any possible effect it might have on the oscillator. It was found that a heater unit of 22.5 watts was sufficient to bring the whole oscillator unit to its normal operating temperature within 20 minutes with a room temperature of 65 degrees.



WHEN USED FOR SELF-CONTROLLED OPERATION THE GRID COIL AND HIGH-PLATE TANK INDUCTANCE ARE PLUGGED IN

The operating temperature can be varied by moving the variable contact closer to or further away from the free end of the bimetal strip and should be about 20 degrees higher than the



BOTTOM VIEW WITH THE BASE OF THE CASE REMOVED, SHOWING WIRING AND ARRANGEMENT OF PARTS

maximum room temperature to be encountered to allow for the heating effect of the tube and resistors. Thus in our case it was set at 125 degrees.

OPERATION AND PERFORMANCE

When operating as a self-excited oscillator the 3500-kc. tank coil is removed and a short circuiting strip substituted. The crystal holder is replaced by a grid choke and the high- L coil used to pick up the second harmonic of the crystal is replaced by a five-turn coil made of heavy wire having three plugs, two of which are strapped together within the coil. The function of this third plug is to connect the 500- μ fd. condenser across the coil to give a Hi- C circuit. With the coil constants given in the diagram, this circuit will oscillate smoothly over a range of approximately 6000 to 15,000 kc. by tuning the 500- μ fd. condenser only. The 7-plate vernier in parallel with the large condenser will then spread the 7000-kc. band over approximately 90 percent of its 100-division scale. This same arrangement can be made to spread any of the amateur bands over the entire scale of the vernier condenser by properly adjusting the number of turns on the plate-tank coil.

If the output of this self-controlled oscillator is fed into a Type '10 tube in a conventional amplifier circuit with 500 volts on the plate of the amplifier, antenna power of approximately 20 watts can be obtained. The coupling condenser between the oscillator and the amplifier grid should not exceed 100 μ fd.

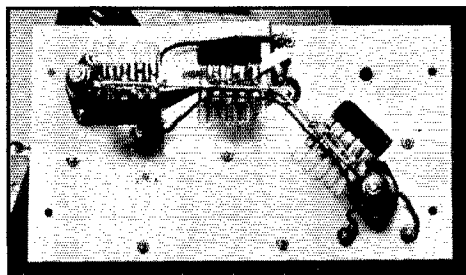
The circuit, functioning as a self-controlled oscillator, is adjusted by leaving the vernier set at midscale and varying the large tank condenser until the center of the band is passed as indicated by a monitor. Then adjustment of the vernier

either way will permit the location of the frequency accurately in any desired part of the band.

For crystal operation the short-circuiting strip is removed from the plate tank circuit and a coil which will resonate to the crystal's fundamental frequency (in the 3500-kc. band in our case) is plugged in. The crystal holder replaces the grid choke and the 3-jack low- L coil is removed and a 2-jack Hi- L coil is substituted in the second-harmonic tank circuit as shown. Now the cover of the shield case is bolted in place and the temperature-control device connected. The filament and plate voltages are applied and the tank circuit resonating at the crystal's fundamental frequency is tuned by means of the shaft projecting through the top of the case. Resonance is indicated, of course, by a dip in the external plate milliammeter. When this has been obtained the second harmonic tank circuit is tuned until a slight rise in plate current is indicated on the milliammeter. The point at which resonance occurs in the second-harmonic tank circuit can also be detected by means of a light bulb or thermogalvanometer in a coupled circuit or by listening on a monitor set at the second harmonic. When a monitor is used it will usually pick up the crystal's second harmonic whether or not the second harmonic tank circuit is at resonance. However, when the tank circuit passes through resonance it will be indicated on the monitor by increased volume.

When using this unit as a crystal oscillator to excite a Type '10 tube, a power of 9 watts in the antenna should be obtained. However, when using the unit as a crystal oscillator most satisfactory overall operation is obtained by feeding the output of the oscillator into a Type '10 tube (functioning either as a straight amplifier or as a doubler), from the '10 to a '65 and thence to a Type '52. In this way operation can be had on the 80-, 40- or 20-meter bands from an 80-meter band crystal; or on the 160-, 80-, 40- and 20-meter

(Continued on page 52)



THE TEMPERATURE-CONTROL ASSEMBLY IS MOUNTED ON THE UNDER SIDE OF THE COVER. THE HEATER, CONSISTING OF THREE BANKS OF LAMPS, AND THE BI-METAL THERMAL STRIP (RUNNING UNDER THEM) FIX THE POINT OF OPERATION ON THE TEMPERATURE GRADIENT AS EXPLAINED IN THE TEXT

Ten More Tubes

LOOKS as though we were a little over-optimistic in hoping that there would be a breathing spell in the release of new-tube types (a hope expressed, it may be remembered, when the tube tabulation was published in September *QST*). The new-tube business is still going strong, as evidenced by the fact that ten—at least—new numbers have been announced in the interim. And what numbers some of them were! No more simple two- or three-digit combinations; henceforth a new tube is likely to have a cabalistic designation from which can be gleaned some inkling of the kind of tube it is. More about this later, however.

Releases on some of the types to be described in the following paragraphs are just hot off the press, but a few of them have been out for three or four months. Let's clean up these old ones first. They are the Types 19, 48, 59 and 79. Only one or two of them are likely to have general interest for amateurs.

The Type 19

The Type 19 is a two-volt battery tube designed for Class B operation. Really two tubes in one, it is a complete Class B amplifier, but is not one of those tubes that can be used as everything from a triode to a pentode. When properly excited it will deliver approximately two watts of audio power with a plate voltage of 135. The bulb is the same as is used for the 37 and 56. The tube has a 6-pin base. The grid bias used with the tube may be between zero and 6 volts, depending upon the output power required and the plate battery drain considered desirable.

The ratings and operating conditions of the 19 are as follows:

Filament voltage.....	2.0 d.c.		
Filament current.....	0.26 amp.		
Plate voltage.....	135	135	135 volts
Grid voltage.....	0	-3	-6 "
Plate current (no signal).....	10	4	1 ma.
Plate current*.....	27	25	22 "
Load resistance (plate to plate).....	10,000	10,000	10,000 ohms
Power output.....	2.1	1.9	1.6 watts
Input power required (on grids).....	170	130	95 mw.

This tube should work nicely as the modulator in portable 5-meter 'phone transmitters, in addition to its obvious use as an audio power tube in battery receivers. For the latter application, the tube will deliver about 1.25 watts when excited by a single Type 30 tube used as an audio amplifier after the detector. For the higher powers shown in the table above, an additional audio stage will be necessary. The data on the 19 is from Sylvania.

* Signal 50 volts grid to grid.

The 48

The 48 is a power amplifier for the 110-volt d.c. broadcast receiver. A four-element tube, it has the general characteristics of a pentode without actually having a suppressor grid. A special ribbed plate construction minimizes secondary emission. The tube has an indirectly-heated cathode, the filament operating at the rather high potential of 30 volts.

Following are the ratings and operating conditions:

Heater voltage...	30.0 volts d.c.	
Heater current...	0.4 amp.	
Plate voltage....	95	125 max. volts
Screen voltage....	95	100 " "
Grid voltage.....	-20	-22.5 "
Load resistance..	2000	2000 ohms
Amp. factor.....	28	28
Plate resistance..	10,000	10,000 ohms
Mutual conductance.....	2800	2800 μ mbos
Plate current....	47	50 ma.
Screen current...	9	9 ma.
Power output (total distortion 9%).....	1.6	2.5 watts

The 48 has the large dome-top bulb and a 6-pin base. It is a standard item with all manufacturers.

The 59

Here is the first tube to have one of those long-heralded seven-pin bases. The 59 is a triple-grid power amplifier—with an indirectly heated cathode. It can be used as a Class A triode or pentode amplifier, or as a Class B amplifier by making the now-customary switches in the grid connections. Heater voltage is 2.5, a.c. or d.c., and the heater current is 2 amps.

For use as a Class A triode, the innermost grid (No. 1) becomes the usual control grid and Nos. 2 and 3 are tied to the plate. With these connections we get the following operating conditions:

Plate voltage.....	250 max. volts
Grid voltage.....	-28 "
Amp. factor.....	6
Plate resistance..	2400 ohms
Mutual conductance.....	2600 μ mbos
Plate current.....	26 ma.
Load resistance..	5000 ohms
Undistorted power output.....	1.25 watts

By using No. 1 grid as the control grid, No. 2 grid as a screen and connecting No. 3 to the cathode the 59 becomes a pentode with the following ratings:

Plate voltage.....	250 max. volts
Screen voltage.....	250 " "
Grid voltage.....	-18 "
Amp. factor.....	100
Plate resistance..	40,000 ohms
Mutual conductance.....	2500 μ mbos
Plate current.....	35 ma.

Screen current.....	9 ma.
Load resistance.....	6000 ohms
Power output (total distortion 7%)....	3 watts

The following operating conditions obtain when the 59 is used for Class B work, in which Grid No. 3 is tied to the plate and Nos. 1 and 2 are connected together:

Plate voltage.....	300	400 volts
Grid voltage.....	0	0 "
Static plate current (per tube).....	10	13 ma.
Dynamic peak plate current (per tube)...	200	200 ma.
Load resistance (plate to plate).....	4600	6000 ohms
Power output (2 tubes).....	15	20 watts

The 59 can dissipate continuously 10 watts on the plate and 1.5 watts on the Nos. 1 and 2 grids.

From the above it is apparent that as a Class A triode the 59 is about the equivalent of a 45; as a pentode it is similar to a 47, and as a Class B amplifier is approximately the same as a 46. It can likewise be put to the r.f. uses which those tubes perform in low-power transmitters. The indirectly heated cathode is advantageous because no filament by-pass condensers are needed and because a single filament transformer can serve for all the tubes in the transmitter, while at the same time each tube has an independent cathode. This is fine if center-tap keying is to be used on one of these tubes in an amplifier stage.

The 79

This tube is another "twin" Class B amplifier — two high- μ triodes in one envelope. It belongs to the 6.3-volt series of tubes, has a small dome-top bulb, a six-pin base, and sports a grid cap on top. Power output of about five watts at 180 volts which isn't bad for the modulator in a small 'phone set. Typical operation is as follows:

Heater voltage.....	6.3 volts
Heater current.....	0.6 amp.
Plate voltage.....	180 volts max.
Grid voltage.....	0 volts
Static plate current.....	7.5 ma.
Dynamic peak plate current (per plate)...	90 ma. max.
Load resistance (plate to plate).....	7000 ohms
Power output (with average grid power 380 mw.).....	5.5 watts

The 79 is capable of dissipating 7 watts continuously on its two plates.

The ER-1

The four tube types just described are, as we pointed out at the beginning, not exactly new journalistically speaking because they have been purchasable for the past three or four months, although no doubt a large number of amateurs have never heard of them. The group we are coming to now is unique because none of the tubes in it are multi-purpose affairs but are either bigger and better versions of some of the old straightforward types or else are miniature rectifiers. Number one of this bunch is the ER-1, made by Eveready-Raytheon.

The ER-1 is a half-wave high-vacuum rectifier. It has an indirectly-heated 6.3-volt cathode, and is intended to be used in series-operated a.c. receivers ("transformerless") or in automobile "B" substitutes, replacing the gaseous rectifiers in the latter. It has a small dome-top bulb and a 4-pin base. In looking at this (and other tubes of this miniature rectifier series) one can't help but be impressed by the unbelievably small separation between plate and cathode, yet all these tubes are rated to handle 250 volts r.m.s. on the plate. The voltage drop in the tubes is low in comparison with other high-vacuum rectifiers, probably as a result of the construction.

The ER-1 has the following ratings:

Heater voltage.....	6.3 volts
Heater current.....	0.3 amp.
A.C. plate voltage.....	250 volts r.m.s. max.
D.C. output current.....	50 ma. max.
Peak current.....	250 ma. max.
Heater-cathode bias.....	300 volts max.

This last refers to the maximum allowable difference of potential between the cathode and heater. In rectifier circuits for which this tube is intended the source of heater potential usually will be grounded, while the cathode will, as in other rectifier circuits, usually be at the plate potential above ground.

The 84 (6Z4)

The 84 (or 6Z4 under the new system of notation) is a full-wave companion to the ER-1. It is also being made by Eveready-Raytheon. It is designed for use in "B" eliminators made for automobile receivers, has an indirectly-heated cathode, and its ratings are approximately the same as the ER-1. They follow:

Heater voltage.....	6.3 volts
Heater current.....	0.3 amp.
A.C. plate voltage (per plate).....	225 volts r.m.s.
D.C. output current.....	50 ma. max.
Peak plate current (per plate).....	125 ma. max.
Heater-cathode bias.....	300 volts max.

The 84 has the small dome-top bulb and a 5-pin base. And now a word about the new system of tube designation. Each designation consists of a numeral, a letter and a second numeral, as in the alternative designation given above for the 84. The first numeral refers to the filament voltage (i.e., the number 6 means that the tube has a 6.3-volt filament), the letter identifies the particular tube, and the last figure gives the number of elements in the tube. Tubes carrying the letter "Z" are rectifiers, while those having "A," "B," etc., are radio and audio amplifiers, detectors, etc. Thus, the "6Z4" can be identified roughly as a rectifier with a 6.3-volt filament and having four elements—in this case the heater, cathode and two plates—if one has the key to the cipher. It looks as though the new system should be useful even though it does not

tell exactly what the tube is — and it *does* have some logic to it. The old system certainly didn't.

The 25Z5

Knowing the idea behind it, we immediately call this one a rectifier with 5 elements and a 25-volt filament. But why five elements in a rectifier tube? It's quite simple, after all: the 25Z5 has a heater, two cathodes and two plates; in other words, two entirely separate half-wave rectifier tubes with a single source of cathode heating.

The two separate cathodes make it possible to use the 25Z5 as a voltage doubler in a.c. receivers not equipped with transformers. Voltage doubling circuits (which, incidentally, are shown in *The Radio Amateur's Handbook*) will give a higher d.c. output voltage than could be expected from the source with ordinary rectifier circuits, but the regulation is generally poorer. The 25Z5 can be hooked up to the 110-volt line without any transformer but simply a series resistor for the heater and will deliver d.c. output voltages of the order of 180 at 100 milliamperes if the filter condensers are big enough. The tube also can be used as a half-wave rectifier in "universal transformerless" sets working from the 110-volt line, either a.c. or d.c. Seems superfluous to "rectify" the current from a 110-volt d.c. line, but that makes the receiver "universal." When used in this way the drop through the tube is extremely small — a matter of about 6 volts with a current of 100 milliamperes, better even than a mercury-vapor tube could do.

The ratings on the 25Z5 are as follows:

Heater voltage.....	25 volts
Heater current.....	0.3 amp.
A.C. plate voltage.....	125 max. per plate
D.C. output current.....	100 ma. max.
Peak current (per plate).....	250 ma. max.

The information on this tube comes from Eveready-Raytheon and RCA Radiotron-Cunningham.

The 25Z5 has a small dome-top bulb and a 6-pin base.

The 2A5

The 2A5 is a power pentode, indirectly-heated cathode, 2.5-volt heater. Its general performance is so nearly like that of the 59 when the latter is used as a pentode that we can't help but wonder just why it was thought necessary to bring out a separate type for pentode use only. Here are its tentative ratings and characteristics:

Heater voltage.....	2.5 volts
Heater current.....	1.75 amp.
Plate voltage.....	250 volts max.
Screen voltage.....	250 " "
Grid voltage.....	-16.5 volts
Plate current.....	34 ma.
Screen current.....	6.5 ma.
Plate resistance.....	100,000 ohms approx.
Amplification factor.....	220 approx.
Mutual conductance.....	2200 μ mhos

Load resistance.....	7000 ohms
Power output (total distortion 7%).....	3.0 watts

The 2A5 has a medium-size dome-top bulb and a 6-pin base. The information on the tube came from RCA Radiotron-Cunningham.

The 2A3

The introduction of Class B audio provided the means of obtaining relatively tremendous power outputs to take care of the fortissimo passages of large orchestras and at the same time made it possible to get a decent amount of audio power with an economy of plate input power. From the standpoint of the set manufacturer, however, it has its disadvantages. The exciter stage has to be capable of delivering real power also, which sometimes necessitates an extra audio stage, and the harmonic distortion is not so easily controlled, since an amplifier which has satisfactory distortion at full output may, to the hypercritical, have more-than-permissible distortion at low output.

So we find that the 2A3 tube is a step back toward fundamentals. It is a real he-man Class A triode amplifier. A 2.5-volt tube with three (only three!) elements; filament, grid and plate. This tube is not yet available, but the bulletin on it issued by RCA Radiotron-Cunningham states that a pair of 2A3's in push-pull can deliver 15 watts of audio power. Instead of a single filament the 2A3 has a large number of coated filaments arranged in series-parallel to give a large cathode area, which results in unusually high mutual conductance and low plate resistance.

The tentative ratings and characteristics of the 2A3 are given below:

Filament voltage.....	2.5 volts
Filament current.....	2.5 amp.
<i>Interelectrode capacitances:</i>	
Grid to plate.....	13 μ fd.
Grid to filament.....	9 μ fd.
Plate to filament.....	4 μ fd.
<i>As a single Class A amplifier:</i>	
Plate voltage.....	250 volts max.
Grid voltage.....	-42 volts
Plate current.....	60 ma.
Plate resistance.....	765 ohms
Amp. factor.....	4.2
Mutual conductance.....	5500 μ mhos
Load resistance.....	2500 ohms
U.P.O.....	3.5 watts

<i>In-push-pull:</i>		
	<i>Fixed Bias</i>	<i>Self-Bias</i>
Plate voltage.....	300 max.	300 max. volts
Grid voltage.....	-62	-62 volts
Plate current (per tube).....	40	40 ma.
Load resistance (plate to plate).....	3000	5000 ohms
Total harmonic distortion.....	2.5	5 %
Power output.....	15	15 watts

It is apparent that a single 2A3 is the equivalent of two 45's in power output as a straight Class A amplifier. The push-pull ratings are interesting because the operation runs into the variable plate current region. The tubes are slightly overbiased so that large grid swings can

be handled without grid current being drawn. The second-harmonic distortion in each tube is quite large in this method of operation, but it is cancelled in the output because the two tubes are in push-pull. Hence the power output obtainable for a given percentage of total distortion is much greater than twice that of a single tube.

The 2A3 may turn out to be a fairly good tube for r.f. as well, although from the published characteristics it would appear to have some disadvantages. The inter-electrode capacitances are rather large, and the plate resistance is so low that loss of bias probably would mean that the tube would draw dangerous plate currents.

The 2A3 has a large dome-top bulb and a 4-pin base.

The 5Z3

With a couple of tubes like the 2A3 going into a receiver, something has to be done about the plate supply. A Type 80 rectifier won't stand the gaff and the mercury tubes introduce filtering difficulties; consequently we find the 5Z3 being brought out. This tube is a high-vacuum full-wave rectifier capable of handling about twice the current that can be passed by an 80. The ratings on the 5Z3 follow:

Filament voltage.....	5.0 volts
Filament current.....	3.0 amp.
A.C. voltage per plate.....	500 volts r.m.s. max.
D.C. output current.....	250 ma. max.

The 5Z3 is just like the 2A3 in external appearance: large dome-top bulb and 4-pin base.

This completes the list of new tubes announced since the publication of our tube table in September *QST*. Undoubtedly some of them will find favor for amateur purposes. At any rate we now have an infinite variety of vacuum tubes with all sorts of cathodes and for all sorts of jobs. It seems, however, that the end of the procession is not yet in sight, for rumors are going the rounds that more new tubes are to be released in the immediate future. The "good old days" of three or four types which everybody knew about are gone forever—but the only people who are shedding any tears about it are the ones who refuse to keep up with technical progress.

— G. G.

Checking the Behavior of Ultra High-Frequency Waves

(Continued from page 17)

point there seemed to be elliptical polarization with the vertical component about three times as strong as the horizontal at the distances used in these tests. Second, going down over a small hill, the antenna usually had to be kept in a vertical position with respect to ground for maximum received signal; in other words, perpendicular to the wavefront.

Results similar to the latter were observed when using a horizontally transmitted wave, i.e., the receiving antenna always gave best results when perpendicular to the wave front of a transmitted beam such as plotted in Fig. 2 or 3. With the horizontal half-wave transmitting antenna, the vertical component was as strong as the horizontal down behind small hills but on top or in direct view, the horizontal was much stronger. Very little change of polarization seemed to take place on any type of simple antenna at distances of 10 or 15 wavelengths but beyond that, hills seemed to change the polarization.

Using a 40-meter half-wave horizontal antenna with single-wire feed, just as used in the 7-mc. band with no changes in feeder location, the vertical and horizontal components seemed to vary. Some places one would be louder than the other and further along in the same direction, or at a different angle, the other component would be stronger. There seemed to be several loops or beams from this antenna for both horizontal and vertical waves. The r.f. feeder was apparently radiating a fairly strong vertical component, itself being mostly vertical, because on the axis of the horizontal wire no horizontal component could be detected though a vertical component could be heard nicely. The horizontal loops or beams were much more noticeable than the vertical values of maximum signal.

The results of these tests indicated that either vertical or horizontal antennas could be used for distances of more than a mile or so but with usually better results if both receiving and transmitting antennas were in the same plane. Intervening hills seemed to alter these conditions, especially if the hills were near the transmitter.

Similar results were obtained when listening with a super-regenerative receiver to various 56-mc. 'phone stations. Sometimes a half-wave horizontal antenna would be best, even when the transmitter used a vertical antenna. However, by an average ratio of about 3 to 1, a vertical receiving aerial gave better results regardless of the type of transmitting antenna. The location of the transmitter with respect to hills and large buildings seemed to have an important effect on the degree of vertical or horizontal polarization at the receiving end. Often the combination of a long, high antenna plus a short vertical (half-wave) one gave the best received signal and is the one most used at this station. The directional antennas also work very well for receiving providing the natural resonant period is not at the wrong end of the amateur band—a director wire for the low-frequency end of the five-meter band becomes nearly a reflector at the other end.

One advantage of a vertical antenna is that its radiation is equal in all directions in a horizontal plane whereas the horizontal half-wave antenna has a figure-eight directional characteristic with minimum signal in its line of axis.

On the Top of New England

The Story of an Expedition of Radio Amateurs Coöperating with the "International Polar Year"

By Alexander McKenzie, WIBPI*

ALTHOUGH this will not be an exceptionally cold winter, scientists all over the world are concerting their efforts in certain polar weather studies. It has become well known that atmospheric processes in the polar regions play a predominant part in weather conditions of the moderate latitudes. Not less important is the part played by polar phenomena in the study of terrestrial magnetism and the aurora. Problems of radio propagation, for instance, can be more profitably studied with further additions to our knowledge of magnetic disturbances. This, in brief, explains the interest of the scientific world in the Second International Polar Year on the Fiftieth Anniversary of the First Polar Year.

Joseph Brooks Dodge, WIUN, manager of the Appalachian Mountain Club chain of huts, residing in Pinkham Notch on the eastern side of Mount Washington, has been for some years an experienced amateur meteorologist. Always interested in the weather of Mount Washington, Joe Dodge decided that this winter was the logical time to find out more about it. Presenting his facts to the N. H. Academy of Science, he gained the support of that body to the extent of \$400. Thus encouraged, he and Robert Scott Monahan, mountaineer and Alaskan explorer, went ahead with the plans which they had been forming for some time.

Salvatore Pagliuca and Albert F. Sise were chosen to complete the staff. Mr. Pagliuca is an electrical engineer by profession who has served as hutmaster in one of Joe's huts. Al Sise is probably best known as WIASF of Brookline, Mass. Unfortunately, Mr. Sise could not accept the invitation, and his berth was offered the writer, who snapped up the job with alacrity. However, WIASF has proved invaluable in handling the Boston end of the radio work.

The coöperation of the Blue Hill Observatory of Harvard University has made a scientific study of weather conditions possible. Blue Hill and the U. S. Weather Bureau have both loaned weather instruments, various food companies have contributed, individuals and societies have supported the project with cash, while miscellaneous equipment and wearing apparel has been supplied by interested parties.

The Stage Office, only summit building suitable for our purposes, was very kindly loaned for the

winter by the owner. Also we have access to the Summit House.

In short, here we are reading temperatures (which have gone as low as -26 degrees), cleaning frost from the anemometer on the roof (which then registered a wind velocity of 132 miles per hour), sending up hydrogen-filled balloons to determine upper air currents, cooking, washing,



WIFEX'S SHACK JUST AFTER A TOUCH OF BLIZZARD

One member of the expedition is to be seen chopping ice off the lead-in. His companion is taking readings from the various instruments.

building up and tearing down, hauling coal, repairing the ravages of stormy weather and rather enjoying it all.

But what you are most interested in is the radio end of the work. Because of the nature of our enterprise, which is mutually coöperative with no salaries mentioned, it is possible for us to use WIFEX with a clear conscience and no infringement of amateur regulations.

The primary source of power is a $1\frac{1}{2}$ kw. Kohler lighting plant delivering 110 volts d.c., not to mention a flock of storage batteries and B batteries. The Manhattan Electric Bargain House has loaned a motor generator with output of 220 volts, 500 cycles. This output is conveniently stepped up or down with transformers to be rectified by a pair of 866's.

Aside from ultra-high frequency equipment to be described later, there are two rather modest transmitters, one a TNT operated in the 1715-kc. band with a 210, pushed, at present, by 500 volts of B batteries. The other transmitter employs a

* Mount Washington Observatory, P. O. Gorham, N. H.

Type 46 crystal oscillator on 3573 kc. with two 46 tubes in parallel as output amplifiers.

For reception on the lower frequencies the National Company has loaned one of their SW-3 receivers with a complete set of coils. Frequency measurement is attained with a feeling of security from the electron-coupled frequency meter described in the tenth edition of the *Handbook* (courtesy of A.R.R.L.), the meter calibration being checked as often as feasible from standard frequency transmissions. For rougher frequency checking a harmonic monitor has been calibrated.



With the temperature outside probably Absolute Zero and with winds blowing at 130 miles an hour, Joseph Dodge and Alexander McKenzie (be-whiskered) calmly tune up the 56-mc. transmitter.

Antennas were a problem until it was decided to abandon, temporarily, the erection or replacement of any outside wires. Frost forming on antennas to a diameter of 3 inches, coupled with gusty winds not less than 40 miles per hour and not infrequently twice that velocity, were instrumental in eventually getting the antennas too near the ground for any practical use. Accordingly, a single-wire feed radiator was erected in the upper hall of the Summit House and a lead-covered cable brought along the railroad trestle to the Stage Office. It was previously found necessary to erect a receiving doublet in the Summit House in order to cut down noise from the power plant and motor generator. This antenna was transformer-coupled to the lead-covered pair lead-in and one side was grounded to the sheath at the receiver. Our ground, incidentally, is the cog railroad which runs up the western slope of the mountain.

For broadcast reception, the American Bosch Company has furnished us a specially wired all-wave set which pulls in almost anything you want on about any frequency. This set serves as an emergency amateur receiver.

When not washing dishes, cooking, or doing the thousand and one tasks which develop in living so close to nature, most of the time spent on radio has been diverted to 56 megacycles.

General Radio has succeeded in disguising the earlier Ross Hull five-meter transmitting and

receiving set so that they look too commercial to be true in an amateur station. (In fact, it is only recently that we have ceased to dust them daily.) One of their primary uses has been for communication with W1UN at Pinkham Notch, our base of supplies and meteorological comparison station. Thrice daily we exchange weather reports which are sent via 80 meters to W1ASF in Boston, who distributes them. Our mail is read to us and information sent down. Despite line telephone connection here, 56 mc. is our only link with Joe Dodge, who has no telephone service. Since there is no optical path between this particular point of the summit and Pinkham Notch, it seems rather lucky that communication is so easily effected. Power is low, type 201-A tubes being used as oscillators with 200 volts of B battery on the plates. Experiments show that an outside antenna about 10 feet higher than the one in the attic normally used brings about a tremendous increase in signal strength to W1UN.

Daily skeds are now being kept with W1FGA in Exeter, N. H., which is 91 miles distant and also out of the optical path. This station is operated by Mr. Henry Shaw, chairman of the board of the General Radio Company, to whom the Observatory is indebted for relatively huge quantities of General Radio apparatus, crystals, a frequency meter of the absorption type and great personal interest. Although reception from W1FGA is perfect, using a vertical doublet of about 6½ feet in overall length, coupled through a twisted pair lead and a single turn of wire to one of the receiver coils, W1FEX is not putting a satisfactory signal back. When this story goes down the mountain, a pair of Type 71-A tubes will be packed back up for use in the 56-mc. transmitter. The W1FEX signals have been heard very well on Stratham Hill near Exeter, and visible from Mount Washington.

On two occasions, W1ASF, in the guise of portable W1CSP, has contacted W1FEX from Mount Wachusett, Massachusetts, 130 miles distant and in an optical path. As would be expected, even with not more than .1 ampere in the transmitting doublet here, this circuit has proved reliable with loud speaker volume at both ends. At another time, W1DPA climbed Wachusett to work, in the opposite direction, the circuit he had so successfully used last summer. Inasmuch as Wachusett is an excellent location for 56-mc. DX, W1CSP was able to act as relay between W1FEX and W1DPP, W1CID and W1EXI, all in Greater Boston. The big thrill came in the wee small hours when W1FEX dropped voice transmission to send i.c.w. to W1NW in Brookline, via W1EXI in Winchester and W1CSP on Mount Wachusett, a total distance of 180 miles.

It is with hesitation that we offer the following under "calls heard on five meters." They are

(Continued on page 32)

A New A.R.R.L. QSL Forwarding Service

District Manager Distribution System, Effective Immediately, Will Permit Forwarding All Foreign Cards

By A. L. Budlong, Assistant Secretary A.R.R.L.

WELL, gang, we've finally got a system for QSL card distribution that will enable the much-desired forwarding of all foreign QSL cards — listener cards, QSO confirmations, or what have you — and will accomplish it with more dispatch than ever before. Not only do we have the system, but we've been giving it a trial in the second district, and for ten months it has demonstrated its ability to work perfectly. On this basis of proved performance, then, we now announce its extension to other districts.

League members will recall that on page 24 of the March, 1932, *QST* there was announced a change in the League's QSL forwarding service whereby the handling of "listener" cards was discontinued, and the service confined to cards relating to actual two-way work. We regretted the necessity for that step, but simply had to do it — we were being completely snowed under by floods of cards then and were forced to take steps to lighten the load.

Almost immediately, however, we began searching around for a solution that would enable us to again forward all cards, regardless of their nature. In April we doped out a system that looked as though it had possibilities. Briefly, it involved the appointment of a "District QSL Manager" — a volunteer worker — for each of the nine call areas. Here at League Hq. we'd receive and sort all incoming foreign cards by districts, and then ship the sorted batches to the various district managers. These fellows would maintain an alphabetical file of addressed envelopes furnished by the amateurs themselves, and the incoming cards would be sorted and put into their respective envelopes. When an envelope was full it would be mailed out to the amateur concerned, who would immediately send his district QSL manager another stamped envelope to take its place in the file.

The system looked good. The burning question was would it work out in practice? We yearned to find out. We'd been having some correspondence on the general subject of QSL forwarding with Mr. H. A. Schmidt, W2AEN, of Brooklyn, N. Y., a public-spirited ham if there ever was one. He came up to West Hartford for a visit about that time and we immediately "propositioned" him on the idea of giving the system a whirl in the second district, with himself to act as the QSL

manager. Very kindly he agreed, and so we got out a letter to all League members in the Hudson Division (which corresponds to the second district) explaining what we were going to try and telling them to send stamped envelopes to W2AEN, if they wanted to receive QSL cards.

That was early last May — just before the Board met for its annual meeting. The system has been working in the second district ever since, has the whole-hearted approval of everybody, and can definitely be regarded as the solution to the problem.

Now, to start off, let's name the new District QSL Managers who have volunteered to get this thing going. Here they are:

District	District QSL Manager
1st	Jack Keim, W1VP, 287 Warren St., Needham, Mass.
2nd	H. W. Yahnel, W2SN, Lake Ave., Helmetta, N. J. (Note: Second district amateurs are advised that Mr. Yahnel is replacing Mr. Schmidt for the second district, effective immediately. W2AEN now finding it necessary to relinquish the job.)
3rd	No appointment yet.*
4th	Thomas G. Smith, W4ATZ, 815 Telfair St., Augusta, Ga.
5th	No appointment yet.*
6th	Charles E. Spitz, W6FZQ, Box 1804, Phoenix, Ariz.
7th	L. Q. Kelly, W7BPC, 4919 So. Prospect St., Tacoma, Wash.
8th	F. W. Allen, W8GER, 30 Central Ave., Dayton, Ohio.
9th	H. C. DeMuth, W9FJB, 1411 Dempster St., Evanston, Ill.

What do you do about it? Simply this: From the list above, pick out the name and address of the QSL manager for your call district. Then mail him *immediately* a single stamped envelope, with 3c postage on it. Send only ONE envelope. Be sure that it bears your name, your address and your call on the outside. The call is important, since envelopes will be filed in alphabetical order by calls. It is suggested that your call be printed in ink *prominently* in the upper left-hand corner of the envelope, where a return address is usually inserted. Your name and address go in

(Continued on page 40)

* Appointments have not yet been made for these two districts; amateurs who wish to volunteer for the work are invited to get in touch with League headquarters immediately. Pending appointment of 3rd and 5th district managers, cards for amateurs in these two districts will continue to be forwarded direct by A.R.R.L. Headquarters.

Straightening Out the Socket Connections

REMEMBERING socket connections for the multitude of tube types available these days requires a memory of more than ordinary capacity. Sometimes the information is furnished in the wrapper that comes with the tube—but who saves the wrappers? The accompanying drawing and table gives the connections for all standard receiving tubes and a few others.

The left-hand column of the drawing shows how the bottoms of the various tube bases look, with the pins numbered consecutively on each base according to the system adopted by manufacturers. This column also goes for the lugs on the bottom of a sub-panel mounting socket. The right-hand column shows the corresponding numbering looking at the top of the socket. The table indicates the element connected to each pin number and also the cap on top of the tube if it is so equipped.

The letters in the table refer to the following elements:

F — Filament
H — Heater
C — Cathode
G — Control Grid
SG — Screen Grid
S — Suppressor Grid

BOTTOM OF TUBE BASE
OR
BOTTOM OF SOCKET

TOP OF SOCKET



4 PIN



5 PIN



6 PIN



7 PIN



● — SMALL PIN OR SOCKET HOLE
○ — LARGE PIN OR SOCKET HOLE

G1 — Inner Grid
G2 — Second Grid
G3 — Third Grid
P — Plate
DP — Diode Plate

(Continued on page 86)

TUBE TYPE	PIN NUMBER							CAP		TUBE TYPE	PIN NUMBER							CAP	
	1	2	3	4	5	6	7				1	2	3	4	5	6	7		
(2) 00-A	G	P	F	F						(2) 50	G	P	F	F					
(2) 01-A	G	P	F	F						52	G1	P	F	F					
(2) 10	G	P	F	F						55	DP	P	H	H	C	DP		G	
WX-12	G	P	F	F						56	G	P	H	H	C	C		G	
19	G ₂	P ₂	F	F	P ₁		G ₁			57	SG	P	H	H	H	S		G	
(1) 20	G	P	F	F						58	SG	P	H	H	H	S		G	
(2) 22	SG	P	F	F				G		59	G2	P	H	H	H	G3	G1		
(2) 24-A	SG	P	H	H	C			G		(1) 71-A	G	P	F	F				G ₁	
(2) 26	G	P	F	F						79	G ₂	P ₂	H	H	P ₁	C		G ₁	
(2) 27	G	P	H	H	C					(2) 80	P	P	F	F					
(2) 30	G	P	F	F						(2) 81	P	P	F	F					
(2) 31	G	P	F	F						82	P	P	F	F					
(2) 32	SG	P	F	F				G		83	P	P	F	F					
(2) 33	G	P	F	F	SG					84	P	P	H	H	C				
(2) 34	SG	P	F	F				G		85	DP	P	H	H	H	DP		G	
(2) 35	SG	P	H	H	C			G		89	G2	P	H	H	C	G3		G1	
(2) 36	SG	P	H	H	C			G		(1) 99	G	P	F	F					
(2) 37	G	P	H	H	C					112-A	G	P	F	F					
(2) 38	SG	P	H	H	C			G		2A3	G	P	F	F					
(2) 39	SG	P	H	H	C			G		2A5	SG	P	H	H	C	G			
(2) 40	G	P	F	F						5Z3	P	P	F	F					
41	SG	P	H	H	C	G				25Z5	C ₁	P ₁	F	H	P ₂	C ₂			
42	SG	P	H	H	C	G				841	G	P	F	F					
43	SG	P	H	H	C					842	G	P	F	F					
44	SG	P	H	H	C			G		864	G	P	F	F					
(2) 45	G	P	F	F						865	G	SG	P	F	F			P	
46	G1	P	F	F	G2					866			F	F				P	
(2) 47	G	P	F	F	SG					ER-1	C	P	H	H					
48	SG	P	H	H	C	G				ER-LA	G	P	F	F	SG				
49	G1	P	F	F	G2														

A Duplex Plate Supply Using Type 83 Tubes

By G. E. M. Bertram and R. S. Quimby*

A POPULAR type of amateur transmitter is that requiring a power supply of 1000 volts. Ordinarily this represents a considerable outlay for transformers and rectifier tubes. As a solution of this problem, a method of using inexpensive 83 tubes has been developed.

The new type 83 mercury-vapor tube lends itself readily to a bridge connected rectifier for obtaining 1000 volts, 250 ma.—a quarter-kilowatt of d.c. As these rectifiers are full-wave with two anodes in each tube, only 3 of them are required for bridge connection. Two of these are used half-wave with the plates connected in parallel and the other one is used full-wave for the other side of the bridge. This gives about the

shown in Fig. 2. Half voltage can then be drawn from the 83 tubes numbers 1 and 2 as in the ordinary center tapped full-wave rectifier connection. This makes a duplex rectifier circuit with one set of tubes, giving 500 volts from the center tap connection and 1000 volts from the bridge connection simultaneously. A separate filter section is necessary for the low voltage tap, the elements necessary to give a ripple of less than 0.1% being shown. This filter makes use of electrolytic condensers, for economy, and allows small chokes to be employed, but still provides excellent smoothing. A single-section filter could be used here but this practice is not recommended since the supply voltage ripple in the first stages will usually be amplified in the transmitter; and the amount of power drawn is so small that the cost of two small chokes is not objectionable.

Both circuits must have choke input filters since they both draw power from mercury-vapor tubes, which require protection against high current peaks. The total current drawn from both circuits should not exceed 250 ma., in order to keep within the tube rating. The inverse peak voltage just meets the tube manufacturers' recommendations. It is advisable when using mercury-vapor tubes close to their maximum allowable inverse-peak-voltage to employ a separate filament transformer.

This circuit has been set up and tried out thoroughly in the laboratory and the ripple values given above are the result of actual test. They check closely with computed values along methods discussed in previous articles in this magazine. A special search for tunable hum showed it to be practically absent. It was necessary to make direct capacity coupling between the rectifier and a receiving set to obtain any audible hum from this cause. As bridge rectifiers frequently are more difficult to control in this respect than the more normal center-tapped full-wave type, comparisons were made with a power supply using 2 Type 66 rectifiers and the usual center-tap connection. With the same method of coupling to the receiving set the tunable hum was of approximately the same magnitude. With ordinary antenna arrangements no tunable hum was observed at all. Freedom from this trouble was partly the result of the satisfactory operation of the tubes, partly the control by employing a swinging choke in the output and partly limiting

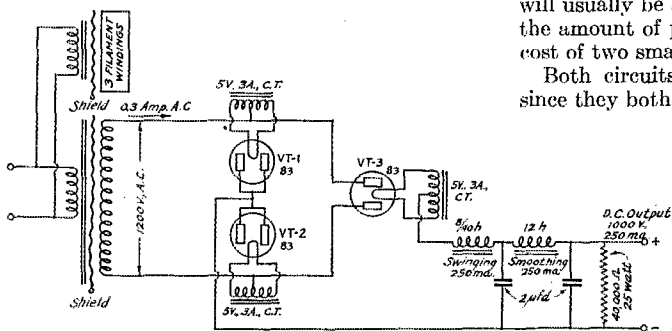


FIG. 1—BRIDGE RECTIFIER USING 83 TUBES

VT-1 and VT-2 operate as half-wave tubes with plates in parallel. VT-3 operates as full-wave tube. This allows double the normal output voltage of the Type 83 tubes. The plate transformer is rated at 350 v.a. The three filament windings are on a separate transformer, total rating 45 v.a. Both transformers are for operation on 115-volt 60-cycle supply.

cheapest combination possible for obtaining this amount of r.a.c. power. The combination will operate a m.o.p.a. transmitter with one 203 or other 50-watt tube in the output, and three lower stages such as an oscillator, buffer and doubler. Of course it can also be used to supply plate power for many other applications, such as the high-power audio amplifier or modulator, with a low-voltage tap for the preceding stages.

The diagram in Fig. 1 shows the connections together with proper constants for a filter which will give a ripple of less than 0.3% in the output. For telegraph operation the second filter section might be omitted, in which case the output ripple will rise to about 6%, which is pretty close to the maximum ripple that should be allowed.

An ingenious development in connection with this rectifier is the use of a center tap, which is

* Delta Mfg. Co., Cambridge, Mass.

the radiation of parasitic noises by properly grounded shields between primary and secondary in both transformers. Buffer condensers and r.f. chokes were not found necessary.

A swinging choke is recommended for use in

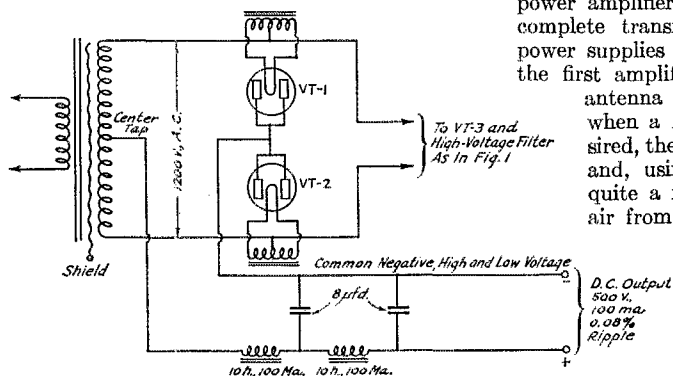


FIG. 2 — CONNECTION FOR HALF-VOLTAGE TAP

The plate transformer provided with center-tap delivers half voltage to the common negative, the tubes VT-1 and VT-2 operating as two half-wave rectifiers in this circuit.

the high-voltage power supply since the load connected at this point will usually be variable and the regulation is thus materially improved. The actual regulation obtained in laboratory tests was 11.2% from 25 ma. to 275 ma. In the 500-volt circuit chokes of fixed inductance are recommended, since the load on this part of the rectifier will usually be constant. If the load is not constant the first choke also should be of swinging type.

SUMMARY OF OPERATING RESULTS

High-voltage output with circuit shown in Fig. 1:

Voltage, 980
Current, 250 ma. (plus 25 ma. bleeder)
Ripple, 0.28%
Regulation, 11.2%

Output with circuit shown in Fig. 2:

	1000 Volt Tap	500 Volt Tap
Voltage.....	1000	500
Current.....	25 to 150 ma.	100 ma.
Ripple.....	0.25%	0.08%
Regulation.....	7%	3%

A Versatile Master-Oscillator

(Continued from page 22)

bands from a 160-meter band crystal, by also using the '65 as a doubler. When 80-meter output is required from an 80-meter crystal, the normal fundamental tank circuit is short-circuited and the 80-meter tank coil is placed in the normal second-harmonic tank circuit, thus operating with only one tank circuit in the crystal oscillator.

This oscillator unit is mounted in the transmitter as shown. It can be noted that this transmitter is made up of three distinct frames, a lower or power frame, the middle or oscillator and first amplifier frame and the upper or high-power amplifier frame. The middle frame is a complete transmitter in itself, containing all power supplies necessary for the oscillator and the first amplifier, together with an auxiliary antenna coupling coil. In the summer when a light portable transmitter is desired, the middle frame is merely removed and, using the oscillator self-controlled, quite a respectable signal is put on the air from it alone. When the transmitter is brought back to the main station the middle frame is placed back in combination as shown in the photograph, crystal control substituted as described above; and a high efficiency, high power, versatile transmitter results.

On the Top of New England

(Continued from page 28)

W1VW Fall River, Mass., and W1FFY, who happened to be in Stoneham, Mass., at the time heard. W1FEX in turn has been reported heard directly by W1EXI in Winchester and also on Institution Hill in Newton, Mass.

At the present, a tone is being sent out every evening from W1FEX between 7:45 and 8:15 E.S.T. It is about 600 cycles in pitch and is interrupted about 72 times per minute. The station call is, of course, signed at the middle and end of transmission. Although gasoline is precious and low power desirable, an attempt will be made to use increased power on Saturday and Sunday evenings. The transmitter used will probably have a pair of 852's with 3000 volts, 500 cycles on their plates. If it is found that these i.c.w. signals are getting out well, the possibilities of a higher power 'phone will be explored. Please QSL to Gorham, N. H.

Things are moving fast now. By the time this report goes to press we hope to have found out a great deal more about the 56-mc. possibilities from up here on the top of New England.

Strays

Don't worry about not being able to keep all the new tube numbers straight. Even their daddies miss one now and then. RCA Victor's own *Broadcast News*, for instance, shows a 50-gallon 862 being supported by a swell YL — and sez it's a "UV-864," which everybody knows is a little battery bottle no bigger than a 99!

Getting the Most from the Single-Signal Superhet

Lining Up the Filter Circuit and Checking Its Performance

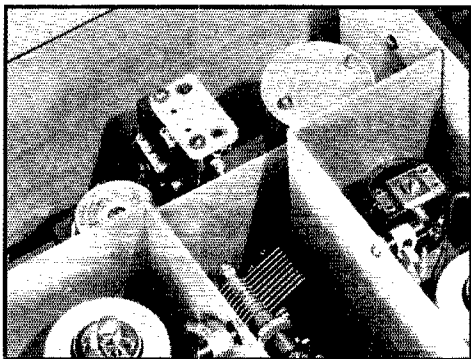
By James J. Lamb, Technical Editor

DESPITE the seeming complexity of the Single-Signal receiver as described in the August and September, 1932, issues of *QST*, hundreds that have been built have gone into operation with little reported difficulty. "Straight" superhet operation has been successful almost without exception. However, the crystal filter has failed to come up to expectations in some cases and it is the purpose of this article first, to point out features to be observed in setting up this essential of the receiver's circuit; and second, to give a sure-fire routine of adjustment that has been developed as a product of further experience.

Although the filter circuit is not temperamentally cranky, as radio-frequency circuits go, there are limits to what it will tolerate in the way of long leads and high stray circuit capacitance. Particularly, the crystal, the phasing condenser C_{15} and the switch should be closely grouped with short interconnecting leads. They are so arranged in the original receiver. All three are mounted on the one small bakelite panel, as illustrated and described in the August article, and are connected by leads so short as to be inconsequential. Also, none of these elements has appreciable capacitance to ground; all are spaced an inch or more from the surrounding shielding. The leads to the filter input tuning condenser C_4 , which is below deck, are several inches long but are symmetrical and spaced well away from the shielding throughout the greater part of their length. Perhaps these incidental features were not sufficiently emphasized as important in the first description. Ordinary good practice should dictate their observance without such emphasis. But we have examined several receivers, supposed to be "just like *QST*," in which the crystal mounting and C_{15} barely cleared the shielding, and in which a sub-base filter switch was so far away as to require connecting leads almost a foot long. One job in particular had these elements so widely separated and leads run close to the shielding for such length that the stray capacitance was high enough to make it impossible for the circuit to be tuned to resonance with the switch in the series position. Anyone experiencing such difficulty should look to his filter arrangement—and straighten it out before calling any names or putting all the blame on the crystal.

CRYSTAL AND HOLDER

Another point that still seems to need reiteration, although quite explicitly covered in the original description, is the type of crystal and holder that can be expected to give satisfactory results. The crystal should be a good one; one



THE CRYSTAL, THE PHASING CONDENSER AND THE FILTER SWITCH SHOULD BE CLOSELY GROUPED, WITH SHORT INTERCONNECTING LEADS

They are so arranged in the original receiver.

that oscillates poorly, or not at all, in the regular oscillator circuit may show some signs of life as a resonator and filter, but the more active crystal that is a good oscillator will be the better resonator and better performer as a filter. It is generally likely that X-cut crystals, because of their greater mass and greater equivalent inductance, are better qualified as filters than Y-cut crystals of equivalent frequency. When we can get our hands on a tourmaline crystal (an ambition of long standing) we hope to find it even better, because it will have even greater mass and equivalent inductance for the same frequency. We thought of that right at the start, and have proposed it to several people having access to tourmaline. Rumors indicate that the suggestion may bear fruit in the near future. But quartz is still the cheaper and satisfies our present requirements.

As to the general dimensions of satisfactory plates, we still lean to those of usual face dimensions (approximately $\frac{3}{4}$ -inch square or $\frac{3}{4}$ -diameter if of the disc variety), although several build-

ers have expressed satisfaction with midget "chip" crystals. However, the little fellows have less mass and, hence, should have less equivalent inductance. In addition to these general qualifications, off-resonance response points that may exist (described in the previous articles) should be several kilocycles or so from the main peak. Only one of a number of crystals that we have tried fell down in this respect. That one had a chipped corner, however, and was, therefore, not a normal plate.

The holder should be of the air-gap type. There is no alternative. Remember that the crystal is to work at its natural resonant frequency as a series resonant circuit and not at anti-resonance as it does in the grid circuit of the standard oscillator circuit. It should be relieved of mechanical load, to keep the equivalent resistance as low as possible. The simplest of arrangements is required to give the necessary gap between the crystal and top electrode. One completely satisfactory mounting that is popularly used has four small

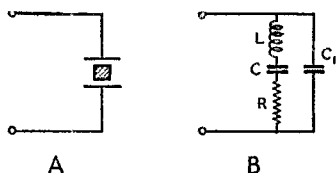


FIG. 1 — THE CRYSTAL WORKS AT ITS NATURAL RESONANT FREQUENCY AS A SERIES RESONANT CIRCUIT

Its equivalent electrical is shown at the right. The effective essentials are L , C and R , whose approximate evaluation for a 500-kc. crystal are L , 3.5 henries; C , .03 μfd ; R , 9000 ohms. The extremely high ratio of inductance to resistance accounts for the high selectivity. The parallel capacitance C_1 is that of the electrodes with the quartz as a dielectric. This capacitance is modified by the phasing condenser.

bakelite cubes, slightly thicker than the crystal, to space the two electrodes. The holder is otherwise the same as used for ham-band crystals in transmitters. The amount of spacing is not critical. About one-thousandth inch, just enough gap to allow the crystal to slide freely, is satisfactory. Whatever the spacing arrangement, the top and bottom electrode plates should be parallel.

We cannot go further without saying something about the phasing condenser C_1 . In the original receiver a compression-type adjustable mica condenser of 70- μfd . maximum capacitance was used, simply because one happened to be on hand and because it was readily fitted into the assembly. But, as was specified under Fig. 1 in the September article, a 50- μfd . midget air-type condenser could be used just as well. After further experience with mica-type condensers, it is our recommendation that the air-type is considerably more suitable. It seems, unfortunately, that the more convenient mica condensers do not run so uniform and are too susceptible to temperature and humidity effects.

Also, they may not all have the same characteristics. Mica may vary but air is pretty much the same from day to day the world over. A suggestion of this was given in the above-mentioned article in connection with the i.f. tuning condensers, air-type being proposed for that job too. Since then we have designed and had built up such i.f. transformers, and are using them in a receiver that we expect to describe in an early issue. But when putting in an air-type condenser to replace the other kind, remember the necessity for short leads and low capacity to the shielding. Don't just drill a hole in the aluminum, insulate the condenser with a couple of fiber washers and expect to get away with it.

THE TUNING PROCEDURE

The first step in tuning up is the alignment of the i.f. circuits to approximate resonance with the crystal frequency. This has been described but will bear repeating. The filter switch is placed in the "Off" position, making the receiver a straight superhet. The crystal, removed from the receiver, is connected in the grid circuit of an ordinary crystal oscillator, temporarily rigged up for the occasion if necessary. This oscillator can have a tank circuit consisting of an ordinary broadcast-band coil and a 500- μfd . variable condenser. The tube can be a Type 01-A, 27 or whatever triode happens to fit the filament supply available. Plate voltage of 135 or so will be plenty. Check for oscillation by the dip in plate current, as usual.

To couple to the i.f. circuits, use a length of insulated wire with one end looped around the oscillator tank inductance. The other end is first coupled to the grid of the second i.f. stage, by hooking the insulated wire around its grid cap. Starting at maximum capacity (adjusting screws all the way to the right), the tuning condensers of the i.f. transformer between the second i.f. and detector tubes are adjusted to resonance, as indicated by maximum second detector plate current. The coupling between oscillator and grid circuit should be loosened if the detector plate current goes past a half-ma. or so, to avoid detector overload. When this circuit has been lined up, the coupling is transferred to the first i.f. tube and the tuning procedure repeated on the other i.f. transformer. Then the coupling can be transferred to the first detector grid and the tuning of condenser C_4 adjusted to resonance. After this a few signals should be tuned in, just to make sure that the front end is working properly.

Now the crystal is restored to the receiver and the filter switch set in the "Parallel" position, connecting the crystal across the filter input circuit. The remaining adjustments are carried out best with a steady ham-band signal furnished by a local oscillator, such as the station frequency meter or crystal oscillator of the transmitter. The routine to be followed is this:

1. With the filter switched to "Parallel," tune in the local signal by adjusting the high-frequency oscillator and r.f.-first detector circuits. The c.w. beat oscillator should be "off." Adjust the selectivity-control condenser, C_4 , to resonance. "Resonance," of course, is always indicated by maximum second-detector plate current.

2. Switch the filter to "Off," shorting the crystal and putting C_{15} in parallel with the filter input. Without disturbing the selectivity control C_4 or any other adjustment except the high-frequency oscillator, vary the phasing condenser C_{15} to the point where resonance is again indicated. *This adjustment makes the capacitance of the phasing condenser approximately equal to that of the crystal assembly and is extremely important.* If it is impossible to strike resonance by adjusting the phasing condenser, there is too much capacitance in the circuit with C_{15} in parallel. Look for excessive stray capacitance in the wiring or too-large minimum in C_{15} .

3. Switch the filter to the "Series" position. Adjust the selectivity control C_4 , simultaneously adjusting the high-frequency oscillator tuning very carefully for the maximum response of the crystal. The peak adjustment of the selectivity control should be not more than 10 or 15% different from peak setting for the "Parallel" and "Off" positions (10 or 15 divisions on a 0-100 dial). If it is way off, or impossible to find, there is something radically wrong with the circuit arrangement. If the crystal performed satisfactorily as an oscillator, it isn't the fault of the crystal. If the stray circuit capacitances, previously covered, do not explain such a difficulty, and if the shielded lead from the filter to the grid of the first i.f. tube is not more than 8 inches or so in length, there is but one other possibility. The grid lead may be *too short* and the capacitance shunting the filter output may be *too small*. This consideration requires special treatment and introduces a newly uncovered feature of quartz filter operation.¹

IMPROVING THE FILTER OUTPUT CIRCUIT

As has been stated previously, the quartz crystal behaves as a series-resonant circuit and, hence, will not tolerate excessive resistance. Inspecting Figs. 3 and 4 of August, 1932, *QST*, it is evident that this series-resonant circuit includes not only the crystal, but also part of the input circuit (across one side of the selectivity control condenser C_4) and the grid coupling resistor R_8 , as well as the by-pass condenser C_{14} . If the resistance of R_8 , as shown in the schematic diagrams, were the only element across the series filter output the thing would not work at all. Fortunately it is shunted by the inevitable input capacitance of the first i.f. tube (some 10 $\mu\text{fd.}$) and the

capacitance of the shielded lead (some 25 $\mu\text{fd.}$ more). There are likely to be a few $\mu\text{fd.}$ of additional stray capacitance, bringing the total to something like 40 to 50 $\mu\text{fd.}$ in the usual case. These strays give sufficient capacitive reactance at frequencies around 500 kc. to nullify largely the damaging series resistance of R_8 . Complete removal of the resistor would be a solution were it not necessary to have a d.c. path for grid bias to the tube. On the other hand, increasing the shunt

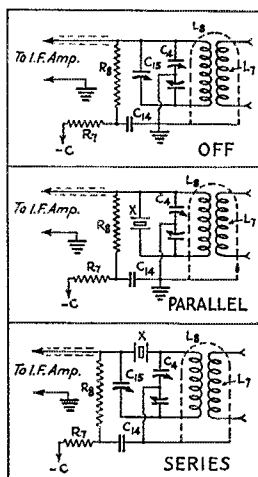


FIG. 2—THE CIRCUIT CONNECTIONS OBTAINED BY OPERATION OF THE FILTER SWITCH

The 5.5-millihenry primary of the input transformer (L_1) is connected to the first detector output and closely coupled to the 1.5-millihenry secondary (L_2). The split-stator tuning condenser C_4 has 140- $\mu\text{fd.}$ per section, 70- $\mu\text{fd.}$ for the two in series. This is the selectivity control. In the "Off" position the crystal is shorted, placing the phasing condenser C_{15} across the secondary, in parallel with C_4 . In the "Parallel" position C_{15} is shorted and the crystal replaces it. The shunt capacitance of C_{15} at "Off" should approximate that of the crystal at "Parallel," as explained in the text. In the "Series" position, the crystal becomes the coupling element between the input transformer and grid of the first i.f. amplifier. How excessive resistance from the 1-megohm grid resistor R_8 is kept from spoiling filtering action is explained in the text. The actual filter arrangement is shown in Fig. 3, page 13, August, 1932, *QST*.

capacitance, while improving the crystal's operation as a good series-resonant circuit, drops the r.f. voltage applied to the grid of the tube. Trial has shown that with a 525-kc. crystal, anything larger than 50 $\mu\text{fd.}$ or so makes no improvement.

Now theory points out that the reactance can be either capacitive or inductive in this position. A relatively large r.f. choke can be used without upsetting the circuit, because the 500-odd-kc. crystal's electrical equivalent is an inductance of over 3 henries in series with a capacitance of a few hundredths of a $\mu\text{fd.}$ ² Quite a few millihenries more in series are negligible. So we can shunt the grid resistor R_8 with a broadcast-band type r.f. choke of 10 to 60 millihenries and not only

¹ Colebrook, "High Selectivity Tone-Corrected Receiving Circuits," (Radio Research Special Report No. 12). Obtainable from the British Library of Information, 5 East 45th St., New York City; price, 35 cents.

² Terman, *Radio Engineering*, page 264.

make a filter with too-small output capacitance work well, but also make one that is working well work even better. Where some 50 $\mu\text{fd.}$ give capacitive reactance of but a few thousand ohms across the grid, a choke of 50 millihenries will give over a hundred thousand ohms inductive reactance—even with cancelling stray capacitive reactance considered. The increased reactance means just so much more sock to the grid.

The actual application fits in beautifully. The choke is simply connected between the otherwise blank "Series" point of the switch, and the junction of R_7 and R_8 . The choke should be shielded from chokes and coils in other circuits to prevent feedback coupling and possible oscillation. The insertion of such a choke in the original S. S. receiver gave for the series connection an increase of 35% in receiver gain and a corresponding improvement in selectivity. It is not useful for the "Parallel" and "Off" positions, where the input is strictly a parallel-resonant circuit. It will be found particularly helpful in receivers having a short shielded lead of low capacitance between the filter output and grid of the first i.f. tube. The only thing to watch for is a choke and stray capacitance combination that might resonate to the crystal frequency to give a parallel resonant circuit across the filter output. That would put the high resistance right back and spoil everything. There is little danger of this, however, with usual b.c. band type chokes.

ADJUSTING FOR SINGLE-SIGNAL RECEPTION

When series filter operation is according to specifications, the final step is to switch on the beat oscillator and make the single-signal selectivity adjustment for c.w. reception. This is not to be confused with the "off-set" tuning adjustment described for less selective superhets in previous articles. As has been stated, "everything is 'on the nose' with the series filter." Only a Single-Signal receiver will give true single-signal selectivity, it should be remembered, although superhets of less selectivity will give something of the single-signal effect with off-set adjustment. Continuing from Step 3 of the routine, the procedure is as follows:

4. With the switch on "Series," and adjustments of the selectivity control C_4 and high-frequency oscillator tuning for maximum response, switch on the beat oscillator and set for a beat-note of approximately 1000 cycles. The beat condenser can be tuned from either maximum or minimum capacitance, but remember the side from which zero beat is approached.

5. Without touching any other adjustment, shift the *high-frequency* oscillator tuning so that the beat-note goes down to zero and then comes up to approximately 1000 cycles "on the other side." This is the audio-frequency image of the signal and should be much weaker than for the first setting. Now carefully adjust the phasing

condenser C_{15} to the point where this image signal is minimum. There should be a fairly sharp null point, with the signal louder either side.

6. If there seems to be a response peak on the image side, where the signal should be reducible almost to inaudibility, it is probable that one of the off-resonance humps of the crystal is there. It can be escaped by repeating the process, this time tuning the c.w. oscillator from the side opposite to that used in the first case. The idea is to put both the desired and undesired humps on the same side of zero beat, to express it descriptively.

USING THE SELECTIVITY CONTROL—"PHONE RECEPTION

In the previous articles the unusual and useful working of the filter input, tuned by the selectivity-control condenser C_4 , was described. With the series connection, manipulation of this control gives a continuously variable range of selectivity from the highest that is practicable for c.w. reception to a grade sufficiently broad for intelligible 'phone reception with greatly reduced interference from other stations and from background noise. At that time a partial explanation was given by the statement that the maximum selectivity came with the input circuit tuned to give either capacitive or inductive reactance for the resonant frequency (circuit tuned to either slightly lower or higher frequency); while the broad setting was that at which the circuit was tuned to resonance so that its parallel impedance was maximum. At resonance it therefore acts like a pure resistance. In explaining the necessity for reactance in the filter output circuit, a little way back, it was pointed out that pure resistance in series with the crystal was undesirable for maximum sharpness of filtering and filter efficiency. The same reasoning applies to the input circuit, with the exception that here there is compensation for maximum resistance because the input voltage rises to maximum as resonance is approached and the resistance increases. The consequence is that the sensitivity of the receiver remains practically constant over a wide range of selectivity.

A further peculiarity of the selectivity control is that it distorts the resonance curve of the filter as it is varied, making it steeper on one side or the other as the reactance shifts from the inductive reactance side to the capacitive reactance side of resonance, or vice versa. This is particularly helpful in 'phone reception, because in many cases ruinous sideband and carrier interference from an interfering station can be reduced sufficiently to give intelligibility to the desired signal simply by shifting the selectivity control from one side of resonance slightly to the other side. This lops off some of the sideband energy of the desired signal, of course; but what of it? What's lopped off was all tangled up with the interference and was useless anyway.

Armistice Day Message, 1932

THE fourth annual Armistice Day message from the Chief Signal Officer, U. S. Army, to members of the Army Amateur Radio System and all other radio amateurs was transmitted from WLM (6990 kc.), W3CXM (3554 kc.) and W3CXL (3605 kc.) on Monday night, November 7, 1932. This message, broadcast every hour, on the hour, and every hour on the half hour, from 6:00 p.m. until 1:30 a.m. (Tuesday) E.S.T., was copied and mailed to the Chief Signal Officer by 1003 licensed amateurs.

The Armistice Day message to the Army Amateurs was inaugurated in 1929, and the results of the four years' activities including 1932 are as follows: In 1929, 125 amateurs mailed in copies; in 1930, 234 mailed in copies; in 1931, 542 received the message and sent in copies; and in 1932, 1003 stations copied and mailed in their copies of the message. The increase in personnel of the A.A.R.S. this year over last year was approximately 16%, whereas the increase in mailed-in messages was 85%. This indicates both a much higher A.A.R.S. efficiency and an increased interest in this annual maneuver on the part of the amateurs in general.

The nine A.A.R.S. corps area organizations were in competition relative to the reception of the message. The two points to be considered were (1) the percentage of active A.A.R.S. stations who copied and mailed in the message, and (2) the accuracy of reception. The leaders under the first point were the Fifth Corps Area (L. G. Windom, WLH-W8GZ, Radio Aide), the Third Corps Area (Corporal Fox, W3SN), and the Second Corps Area (Captain David Talley, ORC,

W2PF, Radio Aide). The leaders in percentage of accuracy, point two, were the Sixth Corps Area (Lieutenant C. W. Roth, ORC, W9DOU, Radio Aide), the Third Corps Area, and the Eighth Corps Area (Lieutenant A. J. Mandelbaum, Signal Corps, Liaison Officer). The relative standings of the corps areas is shown by the table below.

The text of the Chief Signal Officer's message for 1932 was as follows:

"To all Army Amateurs:

I desire again to express my admiration of the Army Amateur. Without material recompense he devotes his time and effort voluntarily to the cause of preparing himself to function in case of national or local emergency, and to furnish communication to the American Red Cross when established agencies fail. His services in the past have been invaluable and to him I extend my heartiest congratulations. Once more we pause to honor those who died to maintain our national honor and integrity. To us they have passed the signal torch. Pro Patria Vigilans.

IRVING J. CARR,
*Major General,
Chief Signal Officer."*



MAJ-GEN. IRVING J. CARR

All transmissions from the Army net control stations were effected on the dot and the percentage of accuracy of reception of the message was the highest yet attained, in this annual contest, the grand average being 99.66%. The A.A.R.S. efficiency (percent of participation) was also the highest yet attained, reaching 77.46%, an increase of 18% over last year. The Chief Signal Officer is very pleased with the results

ARMISTICE DAY MESSAGE, NOVEMBER 7, 1932

Corps Area	Active A.A.R.S.	Copied Message	Percent Efficiency	Corps Area Total All Stations	Percent Accuracy
1.....	75	42	56.0	54	98.929
2.....	56	48	85.71	85	99.723
3.....	46	40	86.956	62	99.900
4.....	134	110	82.09	129	99.623
5.....	58	56	96.534	76	99.815
6.....	61	42	68.852	65	99.917
7.....	184	157	85.32	220	99.700
8.....	159	87	54.71	106	99.701
9.....	158	129	81.0	177	99.690
Totals.....	931	711		974	
Unidentified.....				29	
Grand Total.....				1003	

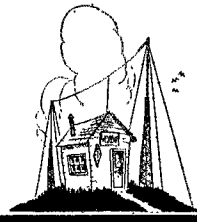
and desires to express his appreciation of the very gratifying response of all those who participated. The Honor Roll is as follows:

W1YU W1BJC W1BVR W1BZD W1HI W1BGW W1BMX
W1BWB W1BAC W1ATM W1DCW W1LP W1ET W1CCS
W1DEH W1DGM W1SC W1DND W1BD W1AZN
W1BDI W1BBJ W1DVF W1DMX W1CFG W1NR
W1BER W1BVV W1FL W1DXJ W1AMQ W1AXN
W1ALI W1CVP W1AHN W1NX W1AUC W1BII W1ATF
W1CGG W1CBB W1CCJ W1BEZ W1BWW W1BJP
W1BFA W1AAU W1SZ W1DTM W1CLN W1CFU
W1AXU W1BAS W1DF W2ACD W2AJQ W3AIW
W3BAK W2DIU W2BJA W8CYG W2DTB W2AGW
W2AHG W3ZI W2BZW W2BCQ W8DMJ W2OP W2ATI
W8FOY W2DIW W2DEN W2AIQ W2BLU W2QM
W3AXP W2DHH W8BME W2ATM W3AKF W2BRU
W3ASG W2AMV W2AZV W2DYJ W2SC W2FJ W3AOV
W2CA W2DAT W2CBB W8FDY W8BFG W8AWX
W2BGO W2HF W2AFT W8SEU W2UV W2FA W2PF
W8JU W8ATA W3CMC W2AUS W8DZU W8CID
W8BYO W8CN W2WP W8EEN W2AQJ W2AHN
W3AKH W2AIH W3AEJ W8KR W8FU W2CGT W3DQ
W3ARN W3HC W8ERP W8EFO W8DOH W2DBQ
W8DEQ W8ELU W2AA W8ERU W8DES W8BUU
W3CMI W2AOI W2CUH W8JE W8DXF W8AGW
W8CEF W3NB W3BRQ W8EUX W3AHD W8ASE W8VI
W8GN W8AIT W3ANZ W3AWU W8FCB W3COO
W3AFF W3BOL W8DJY W8AJE W3FJ W3CMJ W3AKB
W8API W3BED W3ADE W8EU W3OK W3FL W8BNH
W8CFO W3BEY W8UV W8DVA W8CPE W3ATX
W3CAH W8KX W3AQQ W8YD W8DBP W8EDG
W3BWT W8FLA W3BIO W8ELZ W8CEN W8DGV
W3BAI W3MC W8BKS W3BXN W3APT W8EPL W8SN
W8JFF W3ASO W8YA W3ON W8AXH W3BNS W8DYF
W8APF W3BRH W3OO W4ACH W4AAO W4ZH W4MA
W4NF W4AFM W4AYA W4AEH W4ACB W4BL W4DW
W4AVT W4KV W4ALH W4OI W4TJ W5EFQ W4RO
W4PDX W4SS W4TS W4MI W4BFK W4AJJ W4AUO
W4AHG W4UC W4PT W4DL W4JL W4WQ W4ZS W4FL
W4ACZ W4BIN W5ANX W4OH W4ANT W4APK
W4HM W4JR W4AGS W4AGO W4SK W4CQ W4AFK
W5CDZ W4DV W4AEZ W4AP W4OL W4TL W4RS
W4ASQ W4AFU W4ANU W4SM W4AFQ W4DS W4WZ
W4AAV W4BIH W4GS W4KM W4PM W4AHU W4ALA
W5ABS W5QJ W4SI W4AKJ W4ATZ W4AGR W4BW
W4WS W5ARJ W5BUI W4BMN W4AJH W4ACU
W4BAM W4AAS W4EX W4LY W4OT W5WF W4QZ
W5ZK W4BNX W5ID W5AGI W5AO W4BGE W4JB
W4AGW W4KP W4OV W4ANB W4KA W4AWY W4KB
W4BAI W4AYJ W4AYU W4ADB W4AAE W4AKV
W4BIZ W4AWO W4MN W5CEK W4LU W4VU W5AZV
W5CNG W4ABM W5BAG W5FR W4SP W4EG W4AAD
W4KR W4AZV W4AGI W5ANI W4AYB W4NB W4ACL
W5CLD W8DVZ W8BGS W8ARP W8OK W8CZ W9FUT
W8TI W8CRU W8CYN W8ANB W8BPI W8EL W9BWJ
W8UW W8CZR W8AEL W9EQO W8EIK W8CKX
W8DDS W8DVL W8EBY W8NP W8BJU W8JC W8CCP
W8BKM W8DQA W8DQY W8SI W9BOF W9CIM
W8BYD W8CIO W8CMI W8BZL W8HD W8DWT
W8DWT W8FAO W8CZS W8QC W9CKB W9BOI W9FQ
W9HPQ W8BOW W8ZG W9EXL W9ARR W9HBS
W9HYF W8BAS W9HAX W8MN W9CIS W9EOM
W9BJA W9ERH W9KCZ W9TE W9BCP W9GJS W8CNO
W8CDW W9CNE W3ACP W8VP W9ESU W8FAZ W9YB
W8CGR W8DCI W8GVV W8BAH W9FYB W9FYZ
W9CSB W9DOU W9RN W9ANR W9VT W8BDI W9IUP
W9FCW W9NN W8HL W8CEU W8HLY W9FGD
W9JCK W8COW W9FKO W9ATS W9CJM W9BNI
W9CVI W9HRM W9HZB W9DOW W8STC W9AFC
W8QT W9CGF W9ACE W9TF W9EGP W8DCQ W8ERQ
W9DZU W9IHM W9IVF W9JO W9FRA W9BRK
W8DCT W8ACU W9FHU W9BXR W9CGP
W9BIB W9GRW W9HUM W9HK W9AEX W9ALA
W8AZQ W9AMO W9ABM W9ABS W9HDT W9GYO
W9FSK W9DRO W8BMG W9AVG W9IYA W9BNL
W9HDP W8ZZM W9DDE W9ACL W9FNL W9IFI
W9ECE W9DJX W5IQ W5FM W9FRK W9BRA W9IO

W9ABP W9BPG W9IMI W9JDO W9IXI W9FDO
W9CWM W9EFK W9BJP W9CSU W9FYC W9FSZ
W9CSY W9DCM W9JD W9EPJ W9BPK W9DHC
W9DQ W9FYM W9GTK W9EFC W9BYM W9DMX
W9FJL W9EFK W9FZX W9BB W9ECF W9DHA W9JQL
W9IBK W9GP W9CWG W9FLI W9FFD W9EIV W9GQJ
W9DUN W9HTU W9FKF W9EKK W5BRI W9BQR
W9ERY W9IQE W9EVT W9FUW W9KJP W9LJC
W9FNH W9BNN W9DHF W9HRH W9BXC W9IGZ
W9FEP W9HCW W9AZR W9GCL W9DJN W9ABE
W9CSD W9KCR W9KDO W9CRL W9IHS W9AFM
W9EYY W5BED W9DZU W5ABI W9AFR W5AAJ
W5LV W9FAL W9BJR W9JDH W5BCS W9EHS W9EXP
W9HCP W9JPT W9EYG W9EDI W9DPP W9FYU
W9CZI W9ENT W9CJH W9IXO W5BSG W9FTJ
W9BNU W9CDM W9GQZ W5CR W5BXM W9CJR
W9JEF W9JCD W9IAA W9GWT W9HUG W9FGS
W9DCQ W9DMY W9FWC W5SI W5BZK W5ZZE W5WH
W5ABL W5BMI W5BDR W5CCY W5JK W9EWO
W9KQJ W9JUS W9TJA W9EVQ W9BWF W9FYP
W9AIR W9DM W9GUZ W9BNZ W9BKK W9DID
W9DYA W9BKX W9FSF W9EUN W9CKV W9FEL
W5BUX W9HTH W9JFH W9IDN W9FHV W9FNO
W9RR W9EIB W9KG W9JAR W9HUI W9FLG W9FFY
W9HNG W9EPD W9HZU W9ESL W9DZK W9COA
W9ANE W9HCH W9BGL W9EY W9ANY W9DNZ
W9FLM W9IK W9BYJ W9IVM W9EHW W9HGV
W9JVL W9FJV W9YC W9HSN W9IDW W9ALO W9DKL
W9FOQ W9GCB W9PB W9HNM W9CMW W9FUI
W9ELZ W9BNT W9CHG W9EIF W9IGR W9IEK
W9BCG W9AYC W9HYR W9KRS W5BLG W9CXW
W9EEW W5LK W9CUT W9GLM W9GXA W9BNJ
W5PX W9FL W9DGS W5FB W9KHY W9DDS
W9HMM W9AQG W9BN W9AIJ W5GN W9CAU W5MU
W5BZI W5BJZ W5ANU W9CDE W5AEV W5AUL
W5WW W5AKX W5BOE W5CT W5SE W5AJG W9HFH
W5BLT W5BPM W5BOR W5CNC W5BVR W5ALD
W5CEZ W5NH W5AET W5HL W5CAV W5AHY
W5BTD W5BHN W5CFM W5AUI W5DO W5IT W5AAZ
W9AYP W5ASF W5AT W5BUV W5AHJ W5OW W5UX
W5CNN W9EAM W5AJQ W5CLJ W5ASU W5IX W5TQ
W5MN W5BWM W5ABA W5CGO W5AUE W5BII
W5BKF W5BEZ W5BPI W5AHC W5AA W5BMU W5OJ
W5CEG W5CMG W5ASA W5ARS W5RV W9AUI
W9JY W5AFQ W5BOB W5NU W5BJU W5BDH
W5BZV W5RA W6BMC W5ADE W5AOP W6GBN
W5ACE W5CON W5CDS W5CGB W6DOW W9GYV
W5BJG W6CLL W5APW W6MX W5AVB W5CCD
W5CBS W6EFC W5BYF W5BRS W8DVJ W6ALU
W5GA W5BKJ W9GNK W5BUZ W5ALV W5RH W5CKJ
W6BJF W6CEC W5MS W7AMK W6DPO W7AEC W7HX
W7AXG W6DXT W7BFA W6DWH W6DQZ W7AMU
W7BAY W7FL W7AFY W7ASQ W6EYS W6FLY W7BME
W7BAA W6DLI W7BGC W6CBY W7PL W6GOO
W6ENN W6EII W6EGJ W6FEO W6CZZ W6BHM
W6EDW W7CHT W7WR W7AXJ W7AWH W7AWI
W7ACP W7GL W6AVW W7AYP W7SY W6EU W6BAR
W6HJ W6AQY W6PQ W6BUF W6DQV W7AED W7BNL
W6DLT W6DVD W7ACH W6DZW W6BFH W6DFR
W6CKO W6FII W6BEE W6AJG W6AUB W6DEH
W7ADS W7BGM W7AHF W7BCE W7BNU W7BMF
W6DEU W6DAM W6CGJ W7AZB W7DP W6ETQ
W6BSW W7NR W7CCN W7IK W7AFT W7BNI W6DHE
W6COJ W6DKN W6BSV W7BIU W6DZN W7BZZ
W7ASY W7BZS W7ID W6ETJ W6BPU W6CTP W6FW
W6CDA W6BSE W6EUP W6CQM W6AAK W7BMR
W6APE W6UO W6EKC W6BPC W6CVL W6DQR
W6ENA W7NV W7BUF W6CBW W6EYZ W6BCO
W6CGM W6CMN W6DQA W6FAE W6AK W6APM
W6BRU W7AFS W7ZZZ W6FIO W7AHJ W7ANP
W7BLN W7AJX W7AWG W7APE W6AAN W7IC
W7AEM W6AIF W6CVT W6BLS W6LEV W6DJP
W6AHD W7BHH W6DCI W6DWP W7AOD W7CBY
W6ENR W6FVD W6DNA W6AKW W7AIG W7APS
W7PE W7BT W6EWB W6FSF W7CFE W6GEG
W7FNY W6ETM W6DYJ W6BRV K7ARL K7QP
W6BZB W6GDM W6AJP W6AV W6BZU W7KV W7AJW
W7BDG W6ETY W6EBK W6CLV W7ALO W7BZJ
K7BMY W6FUO K7FF KAIHR KAILG



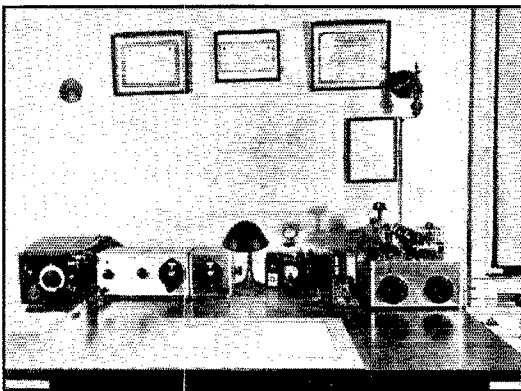
Amateur Radio STATIONS



W3NR, Washington, D. C.

THE call W3NR was assigned to Willard R. Burton, at 2631 Garfield St., N. W., in Washington, D. C., in May, 1926.

W3NR started off with a Type 10 in a Hartley circuit with a.c. on the plate, went through the usual rebuildings, ending up with a fifty-watter in an m.o.p.a. which lasted until January, 1931, when W3NR joined the ranks of the benedicts.



W3NR

Then came the necessity for condensing the outfit. After trying several small self-excited outfits, experiments with crystal-control were begun last summer, resulting in the present layout.

In the photograph, going from left to right, are the calibrated monitor, receiver, control panel and the transmitter.

The monitor is of the conventional heterodyne type with a high-*C* tuning circuit which is helpful in maintaining the calibration. The wooden cabinet which houses the monitor is lined with copper.

The receiver employs a stage of 235 tuned r.f., a 235 detector, and optionally, one or two stages of 227 resistance-coupled audio, the stage-changing switch being the knob on the left end of the receiver cabinet. The receiver is completely a.c. operated, the power supply being housed in the metal box visible beneath the table, directly below the receiver.

A plug and jack system is mounted on the control panel in conjunction with a milliammeter, to

permit reading the current to each stage of the transmitter. This panel also holds the switches controlling all apparatus.

Perhaps the most novel feature of the transmitter at W3NR is its compactness. The aluminum box in and on which it is built measures 10 x 12 x 6 inches. The right-hand dial on the panel controls the plate tuning of the 47 crystal oscillator. The left-hand dial tunes the plate circuit of the 47 buffer-doubler. The plate and antenna

tuning controls of the final push-pull stage project above the top deck. This final stage utilizes a pair of 46 tubes, used as pentodes, the plate input being fifty watts. On the right hand end of the cabinet, not visible in the photograph, is a switch for selecting the crystal to be used. Three crystals are housed in the transmitter cabinet, and any of them may be selected at will. On the left end of the cabinet is an anti-capacity switch, used to change inductances in the buffer-doubler stage. This system was worked out to avoid the necessity for removing the top deck to plug in coils when changing bands. No measurable loss of efficiency resulted from the change from plug-in to switching system.

The power supply for the transmitter is in a box on the floor to the right of the table. A single Type 82 mercury rectifier, with choke input filter, supplies 575 volts to the final stage, 450 to the doubler and 200 to the crystal oscillator.

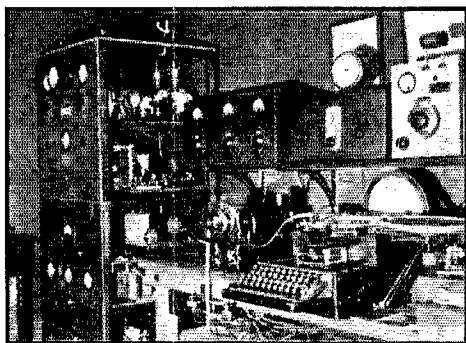
The transmitting antenna is a 7-megacycle flat-top, center fed with 45-foot feeders, spaced 2.5 inches apart. This antenna is used on 3.5 megacycles as a partly folded half-wave system.

The DX at W3NR consists of 24 countries in four continents, and all U. S. and Canadian districts. This station is an ORS and always MK for traffic.

W2AYN, Brooklyn, N. Y.

THE present owner-operator of W2AYN was on the air with spark in 1911. When amateur radio was shut down during the late war, he enlisted and served as radio operator with combat troops in the U. S. Regular Army, A. E. F., in France. Service at sea as radio operator and other itinerant positions delayed his return on the ham scene until 1926, when W2AYN went on the air from the same QRA as at present, 3204 Avenue L, Brooklyn, N. Y.

W2AYN is capable of being completely automatically operated in a manner similar to commercial high-speed automatic operation. A Kleinschmidt electric keyboard perforator is used to punch the Wheatstone code in a paper



W2AYN

tape. This machine is shown in the photograph without its silencing cabinet. The operator at W2AYN types on a conventional typewriter keyboard, and the Continental code is electrically punched in the tape. This tape is almost simultaneously run through an electrically driven tape sending machine, which in connection with a Western Electric polarized relay reproduces the Continental code at speeds up to 500 w.p.m. While W2AYN has been recorded perfectly at 155 w.p.m., in practice 40 w.p.m. is rarely exceeded.

W2AYN is also equipped with a syphon ink tape recorder which is capable of recording signals up to 250 w.p.m. The receiving automatic equipment is rarely used however, as it has been found that because of QRM and unsteadiness, records of amateur signals are rarely satisfactory.

The accompanying photograph shows the operating position of W2AYN. W2AYN occupies an 8-foot by 12-foot room built for it in the cellar. In the photograph, on the shelf at the extreme right is a Wireless Egert dynatron frequency meter. To its right, just out of view, there is a monitor equipped with a Type 30 tube.

To the left of the dynatron meter is a National AC SW5 receiver. A 15-foot indoor aerial is used with this and found to give all the sensitivity desired. Although this receiver looks inaccessible, it can be tuned without discomfort when the silencing cabinet is upon the perforating machine, which then serves as an arm rest. To the left of the receiver is a three-tube Gross crystal transmitter unit. Only slight changes have been made in this. A 47 crystal oscillator, then a 10 doubler, and a 10 buffer amplifier are contained in this metal cabinet. The output of the second 10 buffer is used to excite the grids of two 852 tubes in push-pull, which form the power amplifier. The 10 has been found to give ample excitation at

inputs to the plates of the last stage of up to 850 watts. However for the good of the signal, inputs to the last stage of up to about 500 watts are never exceeded.

To the left of the Gross crystal transmitter unit is the home-made rack-built amplifier unit, with power supply in the base. This whole unit was formerly a self-excited push-pull oscillator using two 852 tubes. By inserting a grid coil, it can be converted to a self-excited affair in a moment. Similarly, by inserting a set of antenna pick-up coils, the Gross unit can be put on the air in a moment, using the final 10 as the power amplifier.

Normal operation, by the use of an 80-meter crystal, is in the 40-meter band. By the use of a 40-meter crystal and changing of coils throughout, 20-meter operation is possible. Good reports, both by QSO's and by listeners, have been received at extreme distances, the best being an R7 by a long-way-round 14,000-mile QSO.

A New QSL Forwarding Service

(Continued from page 29)

the usual place, of course, on the face of the envelope. In order to make it easier for your QSL manager to maintain the system, it is earnestly requested that a standard size envelope be used, 9½" by 4½". This is known as size No. 8 and is obtainable at any post office. *And don't forget the postage.*

That's all there is to it. Your District QSL Manager will send you your envelope with cards in it whenever he has any for you. The thing for you to do then, of course, is to supply him with another similar stamped envelope immediately.

So there it is. We know the system works, without any hitches. Needless to say, prompt action on the part of every amateur in sending his envelope to his QSL Manager is essential, if the thing is to get started without delay. Incidentally, while it is intended that the service be supplied to all amateurs in the United States, we have thought it only fair to instruct the QSL managers that their primary duty is to League members (of whom they have a file) in case the work should occasionally get a little behind.

In closing, we want to express our deep appreciation to the men who have accepted appointment as district QSL managers. Theirs is volunteer service, in many ways a thankless job, and undertaken because of their desire to help their fellow-amateurs. A line of thanks from time to time will let them know you appreciate their work. And last but by no means least we want to express our appreciation to "Herm" Schmidt for making it possible to give this a trial in the second district and for the sterling job he's done in that section for the past ten months. FB and tnx, W2AEN.

A.R.R.L. Affiliated Club Directory

BEGINNING amateurs and active amateurs who have not heretofore availed themselves of the benefits of local club organizations but who now wish to do so will be interested in the directory of active affiliated radio clubs presented herewith. This list of clubs is presented alphabetically by states. Club secretaries will appreciate inquiries regarding membership in their several associations. Visitors are welcomed at regular club meetings, and the meeting place and dates of regular meetings has been included wherever possible to make it easy for *QST* readers and amateurs who travel to visit and benefit from club discussions, technical talks, code classes, and other activities sponsored by every live-wire club.

Club secretaries returning information too late to appear in our list may expect a listing of their club in our next published list which will appear in September 1933 *QST*. If your club is affiliated with the A.R.R.L. and is not included in our

directory please see that your club secretary (if he has not already just done so) sends us the necessary information at once, not only for listing, but so that your club can be reinstated on the mailing list for A.R.R.L. bulletins which are sent only to active clubs, i.e., only to clubs from which we have current and up-to-date information.

Suggestions for "an amateur radio course of study" suitable for club work, a "sample constitution" containing many useful suggestions and helps for newly formed groups, and "how to organize and maintain interest in the radio club" are all available to any amateur group on request. Also already organized clubs that may be interested in establishing an affiliation with the American Radio Relay League are invited to write for the suggested "resolution" to be considered by their organizations as a first step in bringing the subject before the A.R.R.L.'s Executive Committee for action.

— F. E. H.

Active A.R.R.L. Affiliated Radio Clubs

CALIFORNIA

Club	Secretary	Meeting Place	Dates
Amateur Radio Club of San Bernardino	Clarence R. Reynolds, 2133 Lugo, San Bernardino	Y.M.C.A., Fifth and F St.	First Wednesday of month
Amateur Radio Research Club	Ralph R. Short, 4933 Malta St., Los Angeles	Gibson's Cafe, 1800 So. Main St., Los Angeles	2nd and 4th Wednesdays
Associated Radio Amateurs of San Francisco	John Slater, 595 Marina Blvd., San Francisco	City Hall of San Francisco, Room 228	—
East Bay Section	S. G. Culver, 2303 7th Ave., Oakland	Central Trades School, 12th and Jefferson Sts.	2nd and 4th Fridays 8:00 p.m.
Glendale Amateur Radio Club	Roland L. Hansen, 610A East Elk Ave., Glendale	Glendale Chamber of Commerce, 116 East Wilson Ave., Glendale	Every other Thursday, Jan. 12, 26 etc.
Modesto Amateur Radio Club	Lester W. Johnson, 633 W. Main, Turlock	Arterraft Studios, 906 10th St., Modesto	Second and fourth Fridays
Oakland Radio Club	Hugh D. Avery, 1423 Ward St., Berkeley	Members' houses	Every Thursday 8 p.m.
Pasadena Short Wave Club	Ora F. Martin, 680 N. Bresee St., Baldwin Park	Pearl St., Clubrooms between North Marengo and Summit Aves. on Pearl St.	—
Santa Clara County Amateur Radio Ass'n	Mae E. Amarantes, 680 No. San Pedro St., San Jose	Chamber of Commerce Bldg., Cor. Market & West Santa Clara Sts., San Jose	Every Monday 8 p.m.

COLORADO

Greeley Radio Amateurs	E. E. Leonard, 1320 10th St., Greeley	Chamber of Commerce Bldg., Cor. 7th St. and 8th Ave., Greeley	Every 2nd and 4th Thursday
The Pikes Peak Amateur Radio Ass'n	Carl C. Drumeller, 411 North Cedar St., Colorado Springs	1315 North Weber St., Colorado Springs	Every Thursday evening at 7:45
Rocky Ford Amateur Radio Ass'n	Mrs. A. H. Haase, Sec. 4 Patterson Valley Road, Rocky Ford	Various members' homes, Call 666 on telephone for meeting place	Alternate Friday nights 7:30 p.m.

CONNECTICUT

Amateur Radio Research Club	William Beckwith, 40 Cape Ann Court, New London	Club Room, 573 Broad St., New London	Every Monday 8 p.m.
The Connecticut Brass Founders Ass'n	William D. Gibson, P. O. Box 214, Glenbrook	Clubrooms, 1 block north of Soldiers' Home, on right side of Noroton Ave., Noroton Heights	Every Thursday 7:30 p.m.
Hartford County Amateur Radio Ass'n	Forrest F. Howell, 3 Edgerton Pl., So. Manchester	Hatry & Young Store, 119 Ann St., Hartford	Every other Wednesday commencing Jan. 4.
Norwich Amateur Radio Club	Sigrid Anderson, R.F.D. 4, Norwich	Norwich Armory	Weekly (Tuesday)
Twain City Radio Club of Connecticut Incorporated	John J. Morris, 74 Gorham Ave., Hamden	Room 3, Howard Theatre Bldg., 416 Howard Ave., New Haven	Every Tuesday night each week
Yale Radio Club	Robert F. Wilson, 111 Grove St., New Haven	Room 330, Dunham Lab. of Electrical Engineering, Yale University, New Haven	No regular date

DISTRICT OF COLUMBIA

Washington Radio Club	Elizabeth M. Zandonini, 3633 Everett St., N. W., Washington D. C.	Benj. Murch Junior High School on Davenport St. During summer months at members' houses. Call W3CDQ for information	Second and fourth Fridays of month when meeting at the public schools and second and fourth Saturdays of month when meeting at other places
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FLORIDA

Jacksonville Amateur Radio Operators' Club	Mrs. Elerece Atkinson, 329 E. First St., Jacksonville	Winter's Radio Shop, 210 West Monroe St., Jacksonville	First Monday of every month
Lake Worth Amateur Radio Club	D. S. Exline, 531 North O St., Lake Worth	Lake Worth City Hall	Every Tuesday 8 p.m.
Seminole Radio Club	E. B. Vordermark, 25 E. Bay St., Jacksonville	Seminole Hotel	Every two weeks

GEORGIA

Atlanta Radio Club	G. A. Love, 1105 Stillwood Drive NE, Atlanta	Chamber of Commerce Bldg., or at some member's home	Thursday nearest the fifteenth of each month
Amateur Radio Club of Augusta, Ga.	F. E. Clark, 2356 Williams St., Augusta	Physics Lab. of Junior College of Augusta and at Ga. Power Co. office	1st and 3rd Wednesdays

† Section organization included at request of SCM.

ILLINOIS			
Club	Secretary	Meeting Place	Dates
Chicago Radio Traffic Ass'n	H. A. Hoym, 5519 Agatite Ave., Chicago	Atlantic Hotel—Clark St. & Jackson Blvd.	Every first and third Thursday 8 p.m.
The Chicago Suburban Radio Ass'n	George F. Levy, 5730 West 23rd Place, Cicero	At homes of the members	Every second and fourth Friday of each month
Egyptian Radio Club	Earl R. Linder, 713 St. Louis Ave., East St. Louis	Club Shack, Cor. Warren & St. Clair Ave., Highway Routes 3 and 4	1st and 3d Thursdays 8 p.m.
Fox River Radio League	Dwight S. Young, RFD 1, Oswego	Knights of Columbus Bldg., corner of Lincoln Ave. and Main St., Aurora. Use Lincoln Ave. entrance, turn right downstairs	2nd and 4th Thursdays of each month
The Illinois Ham Club	C. F. Schultz, 1600 Lake Ave., Wilmette	Rotated between homes of members	1st and 3rd Tuesday of each month
Mississippi Valley Amateur Radio Club	Elmer F. Eymann, Jr., Warsaw	Y.M.C.A. Bldg. at Sterling	Every Tuesday evening at 7:30 p.m.
Rock River Radio Club	F. P. Richards, 506 West 9th St., Sterling	St. Cyril's School, 6357 S. Dante Ave.	Every other Friday
South Town Amateur Radio Ass'n	Jack Trant, 7744 So. Ladin St., Chicago	Club rooms at 167th St. & Park Ave., Markham	Every Friday evening
Tri-Town Radio Amateur Club	Dayton L. Warner, 15423 Honore Ave., Harvey	At members' houses	1st and 3rd Thursday evenings
Vermilion County Radio Ass'n	Joseph Dentrou, Box 85, Westville		
INDIANA			
Fort Wayne Radio Club	Ivan Welty, 4006 Arlington Ave., Fort Wayne	Club rooms, 333-336 Farmers Trust Bldg.	Every Friday
Indianapolis Radio Club	Robert K. Caskey, 2355 Stuart St., Indianapolis	460 Century Bldg., northwest corner of Maryland and Pennsylvania Sts.	Every Friday evening 8 p.m.
St. Joseph Valley Amateur Radio Club	C. R. Putnam, 1116 Erwin St., Elkhart	Room 200, Mishawaka High School, Mishawaka	1st and 3rd Thursdays of each month 8 p.m.
IOWA			
Des Moines Radio Amateur Ass'n	E. A. Pedersen, 1808 Pleasant St., Des Moines	Savery Hotel, 4th & Locust Sts., Des Moines	1st & 3rd Friday of each month
Tri-State Amateur Radio Club	Walter H. DeKay, 416 W. 1st St., Sioux City	Club Rooms, Chamber of Commerce, 6th and Nebr. Sts., Sioux City	Alternate Wednesdays, namely, 1st and 3rd
University Amateur Radio Club	Paul E. Griffith, 45-B Quadrangle, Iowa City	Engineering Bldg., University of Iowa	1st and 3rd Fridays in every month
KANSAS			
Imperial Radio Club	Clifford W. Johnson, 1305 North 8th St., Independence	1305 North 8th St., Independence	1st and 3rd Friday 7:30 p.m.
Kaw Valley Radio Club	W. A. Beasley, 1451 Byron Ave., Topeka	Chamber of Commerce, 7th & Jackson, Topeka	Alternate Wednesday evenings 8 p.m.
Sunflower Amateur Radio Club	E. Earl Harden, Nickerson	Kansas National Guard Armory, 100 E. Sherman, Hutchinson	1st and 3rd Sundays 1:30 p.m.
MAINE			
Portland Amateur Wireless Ass'n	Stanley D. Mayo, 33 Merriam St., Portland	At homes of members	Every other Wednesday
Queen City Radio Club	D. H. Sutherland, 201 Wilson St., Brewer	245 Parkview Ave., Bangor	Every Friday night
MARYLAND			
The Amateur Radio Club of the U. S. Naval Academy	Midshipman C. C. Butterworth, 4261 Bancroft Hall, U. S. Naval Academy, Annapolis	Room 1109 Bancroft Hall, U. S. Naval Academy, Annapolis	Frequently, but irregular
The Delmarva Amateur Radio Club	George C. Downing, 103 Snow Hill Rd., Salisbury	West Church St., Salisbury	Tuesday night of each week
MASSACHUSETTS			
Falmouth Radio Club	C. A. Ilgen, Box 552, Falmouth	8th Floor, Section "F", Army Base, Boston	Every Monday 5:30 p.m.
First Corps Area Radio Club	Chas. H. Tuesley, Army Base, Boston	Attic of Police Station, North Adams	Every Friday 8:30 p.m.
Hoosac Valley Radio Club	Wendell L. Smith, 349 Springside Ave., Pittsfield	Undecided	Undecided
M. I. T. Radio Society	c/o Prof. Ed. C. Bowles, M. I. T., Cambridge		
North High School Radio Club	Thomas H. Kelly, 49 Coolidge Rd., Worcester	North High School, Worcester	Every Friday 1:10 p.m. commencing with 3rd one in Sept. and ending with 3rd Friday in June
North Shore Amateur Radio Ass'n	D. H. Bacon, 1257 Salem St., Malden	308 International Highway (Opposite the Miller Airport)	Every Thursday evening 8 p.m.
Springfield Radio Ass'n	Gordon F. Sias, 11 Girard Ave., R. F. D. 2, Springfield, Mass.	Rear 76 Cortland St., Springfield, Mass.	Every Saturday night 8 p.m.
Worcester Radio Ass'n	Rudolph R. Lind, 25 School St., Worcester	274 Main St., 3d Floor, Worcester	Every Monday 7:30 p.m.
MICHIGAN			
The Chair Warmers Club	Walt J. Colpus, 23 Henderson St., Pontiac	Curtice, Ohio	Members are shut-ins, one meeting each year at Curtice, Ohio, usually an early date in fall and when convenient to those who can go.
Copper Country Radio Amateurs	Ralph Ziegenbein, 237 Douglas St., Houghton	Various places. Call Secy or W9YX for information as to meetings	Last Friday of the month
The Gratiot County Amateur Radio Ass'n	Paul Woodland, 412 E. Downie St., Alma	Members' Homes	2nd and 4th Thurs. of month
Jackson Amateur Radio Ass'n	Donal L. Devendorf, 1106 Fourth St., Jackson	Colonial Theatre Bldg., East Michigan Ave.	Every 2nd Fri.
Lakeland Radio Club	Walt J. Colpus, 23 Henderson St., Pontiac	No permanent club rooms. See Secy for information	Twice monthly
The Monroe Amateur Radio Society	Adolph R. Peles, 824 S. Monroe St., Monroe	Homes of various members	1st and 3rd Fridays of each month 7:30 p.m.
MINNESOTA			
Arrowhead Radio Amateurs	John Anderson, Jr., 226 So. 70 Ave., W., Duluth	Palmer Anderson, Box 270, Route 1, Duluth	1st and 3rd Fridays of each month
Minneapolis Radio Club	Gene Charles, 3545 Elliot St., Minneapolis		
The Saint Paul Radio Club	W. C. Bowlin, 554 Fuller Ave., St. Paul	Banquet Room of the central Y.M.C.A. of St. Paul	First Friday of every month
MISSOURI			
Hannibal Amateur Radio Club	Ralph Gregory, 601 Olive St., Hannibal	2622 Radcliff Ave.	Every Wednesday evening at 7 p.m.
O. B. P.	Dr. Chas. L. Klenk, 3148 Halliday Ave., 420-21-22 Metropolitan Bldg., St. Louis	Homes of members in alphabetical order. Telephone Secy Laclede 2834 or Jefferson 5004 for information	Every other Tuesday
South Missouri Ass'n of Radio Amateurs	C. R. Cannady, 210 W. McCarty, Jefferson City	Indefinite	Indefinite
St. Louis Amateur Radio Club	Harvey Glatstein, 734 Kingsland Ave., University City		

MONTANA

Club	Secretary	Meeting Place	Dates
Associated Radio Amateurs of Helena	Fred A. Jeswine, 1125 Livingston Ave., Helena	A.R.A.H. Club Room on third floor of Lewis & Clark County Court House	2nd and 4th Tuesdays of each month
Electric City Radio Club	Walter Lundy, 1511-8th Ave., N., Great Falls	Y.M.C.A. 101-1st Ave., N., Second Floor	Every Wednesday night at 8:00. Code practice at 7:00
NEBRASKA			
Cornhusker Amateur Radio Ass'n	W. J. Bamer, 1710 R St., Lincoln (after June 1, Tobias)	Y.M.C.A. 13th & P Sts.	First Wed. of each month, 8 p.m.
NEW HAMPSHIRE			
The St. Paul's School Radio Club	Robert H. Shaw, St. Paul's School, Concord	Westinghouse Laboratory of St. Paul's School	Every other Sunday 7:45 p.m.
NEW JERSEY			
Bloomfield Radio Club	John Reynolds, 326 High St., Passaic	82 Broad St., Rear Community House, Bloomfield	Every Wednesday night 8:00 p.m.
Central Jersey Radio Club	N. Dmytrow, 308 West 5th Ave., Roselle	Recreation Hall, Taylor Park, Main St. & Ridgewood Rd., Millburn	2nd and 4th Friday evenings of each month
Cumberland County Amateur Radio Club	K. A. Durst, 34 Institute Pl., Bridgeton	Bridgeton Fire Hall	Twice a month
Delaware Valley Radio Assn.	Ed. G. Raser, 315 Beechwood Ave., Trenton	Old School House, Moon Tract, Morrisville-Yardley Road (about 1 mile west of Trenton Ave., Morrisville, Pa.)	1st and 3rd Wednesdays of each month
The Eastern Amateur Radio League	Albert S. Rydberg, 338 Hamilton St., Harrison	C. Robert Seybolt, 163 Stover Ave., No. Arlington	Every other Friday
Greater Camden Amateur Radio Ass'n	Harold A. Johnson, 6336 Wyndam Rd., Merchantville	Steelman Business School, 4th Floor, 25 Broadway, Camden	2nd & 4th Tuesday of each month 8:30 p.m.
Hudson City Radio Club, Inc.	J. V. O'Hara, 37-39 Sherman Ave., Jersey City	37-39 Sherman Ave., Jersey City, Corner of Franklin St.	For Trustees first Tuesday each month. Code classes every Sat. night 10 p.m. Thursday of each week
Inter-County Amateur Radio Ass'n	Leonard C. Hicks, 23 Shafer Ave., Phillipsburg	556 Main St., (3rd Floor), Bethlehem	Every Tuesday evening 7:30 p.m.
Newark Amateur Radio Ass'n	Harold R. Richman, 401 Roseville Ave., Newark	Newark Y.M.C.A. annex, 107 Halsey St., Newark	Every second Monday of each month
Ocean County Radio Ass'n	J. Burton Hall, Toms River	W2BQV, 15 Messenger St., Toms River one month; W2AWR, 118 4th St., Beach Haven the next month	Every Friday evening 8:30
The Passaic County Radio Amateurs Ass'n of Paterson, N. J.	Theodore Rhem, 327 Burhans Ave., Haledon	Room 409 of the Y.M.C.A.	Every Friday evening 8:30
Raritan Valley Radio Club, Inc.	W. A. Ambler, 109 No. 5th Ave., Highland Park, New Brunswick	Engineering Bldg., Rutgers University, Bleeker Place, New Brunswick	2nd & 4th Tuesdays every month 8:00 p.m.
South Jersey Radio Ass'n	Carroll D. Kentner, 389 Park Ave., Collingswood	American Legion Hall, Gralsbury Ave., Audubon	Third Thursday every month
Union County Amateur Radio Ass'n	J. Watson, 956 Monroe Ave., Elizabeth	Star Wheelmen Ass'n, 449 Marshall St., Elizabeth	Every Friday
NEW YORK			
Adirondack Amateur Radio Club	James H. Viele, 40 West Main St., Malone	At homes of members, in rotation. See secretary for information as to meeting place	2nd & 4th Mondays of each month
Bronx Radio Club	Jack Berliant, 740 Prospect Ave., Bronx	740 Prospect Ave., Bronx Corner of East 156th St., 2 blocks from Prospect Ave., station	Every Friday
The Crystal Radio Club	Theodore R. Harvey, 4 Maltbie Ave., Suffern	Club room, Blauvelt on the Western Highway, on the Leiper estate	Every Wednesday 8:00 p.m.
Elmira Radio Amateur Ass'n	G. Meeker, 624 Reynold St., Elmira	Members' homes	Last Sunday of each month
Finger Lakes Transmitting Society	Harold D. Gallery, Ensenore	Basement 1163 Wheeler Ave.	Every Friday 7:30 p.m. to 11 p.m.
Hunts Point Amateur Radio Club	Murray S. Kellman, 1135 Evergreen Ave., Bronx	Homes of members	Every other Friday evening
Jamestown Amateur Radio Assn.	Norman Smith, 10 Morse Ave., Jamestown	Calvary Episcopal Church, 966 Bushwick Ave., (near Grove St.) Brooklyn	1st and 3rd Monday of each month
Long Island Radio Amateurs	Robert M. Forster, 78-37 79th St., Glendale, L. I.	Public Library, 503 W. 145th St., N. Y. C.	Every Friday 8 p.m.
Manhattan Radio Club	Michael Reuter, 1128 Findlay Ave., Bronx	Cor. of Atlantic Ave. & Court St., Oceanside, L. I.	Every Friday 8:30 p.m.
Nassau Radio Club	Geo. K. Graham, 192 Merrick Rd., Rockville Center, L. I.	Gratwick Laboratory, 113 High St., Buffalo	2nd and 4th Saturdays of the month except during July & Aug.
Radio Ass'n of Western New York	R. J. Cunningham, 341 Colvin Blvd., Buffalo	Flatbush Chamber of Commerce, National City Bank Bldg., Church and Flatbush Ave., Brooklyn	Every second and fourth Friday 8:30 p.m.
Radio Club of Brooklyn	A. M. Wessel, 480 Linden Boulevard, Brooklyn	Central Y.M.C.A. Auditorium on Gibbs St.	1st and 3rd Thursdays 8:30 p.m.
Rochester Amateur Radio Ass'n	Vincent J. Dwyer, 74 Orchard St., Rochester	Alternative in Penn Yan, Bath, Hornell	Every fourth Saturday
Southern-Tier Transmitting Amateurs	Francis E. Larham, 112 Seneca St., Penn Yan	W2AMO, 79 Clinton St., Stapleton, Staten Island	Every Friday evening at 8:00
Staten Island Radio Club	George L. Percy, 79 Clinton St., Stapleton	Central Queens Y.M.C.A. 89-25 Parsons Blvd., Jamaica	8 p.m. Friday nights on alternate weeks in the month beginning with the first Friday in the month
Sunrise Radio Club	C. W. Fields, Jr., 216-19-111th Ave., Queens Village	Y.M.H.A., Cor. Montgomery and Jefferson Sts., Syracuse	1st and 3rd Tuesdays
Syracuse Amateur Transmitting Ass'n	L. R. Swartout, 604 W. Onondaga St., Syracuse	Y.M.H.A., 284 So. 9th St., Brooklyn	Every Monday 7:30 p.m.
Williamsburg Radio Club	Harold A. Metter, 261 Reid Ave., Brooklyn	NORTH CAROLINA	
Associated Radio Amateurs	Alva Parham, 1711 West Lee St., Greensboro	Y.M.C.A. (Greensboro)	1st & 3rd Fridays of each month 7:30 p.m.
Charlotte Amateur Radio Ass'n	Morris E. Dodd, Box 1042, Charlotte	Charlotte Chamber of Commerce	Every other Wednesday 7:30 p.m.
Winston Salem Amateur Radio Club	L. C. Hull, Care Western Union Tele. Co., Winston Salem	Clubhouse on Bellvue St., Ardmore, Winston Salem, near Westover Golf Club	January 6 and every two weeks thereafter
NORTH DAKOTA			
James River Radio Club	Clayton Koth, 592 Milwaukee St., E., Jamestown	Clubroom, Booth 12 in Grandstand at County Fairgrounds on South Fourth Ave.	Every Wednesday 7:30 p.m.

OHIO			
Club	Secretary	Meeting Place	Dates
Bluffton Amateur Short Wave Radio Club	R. V. Wentz, 118 E. Elm St., Bluffton	107 1/2 South Main St.	Every Monday night 8:30
Buckeye Short Wave Radio Ass'n	Robert F. Miller, 950 West Market St., Akron	At the homes of members	Every other Tuesday
The Cleveland Amateur Traffic Ass'n	Russell Karg, 2155 W. 81st St., Cleveland	In rotation at members' homes.	Every Wednesday evening
Cleveland Heights High School Amateur Radio Club — Cleveland Heights Amateur Radio Club	Harold Greenberger, 2985 Washington Blvd., Cleveland Heights	During summer at W8GQU, 3645 Cummings Rd., Cleve. Hts. During school year at Heights High School, Cleve. Hts.	Every Wednesday
Columbus Amateur Radio Ass'n	D. A. Young, 914 Ellsworth Ave., Columbus	58 E. Gay St., 4th floor, O.N.G. Armory, Columbus	Alternate Fridays 8 p.m.
The Lakewood Radio Club	Frank P. Fix, 2124 West 105 St., Cleveland	13606 Detroit Ave., Lakewood	Every Friday 8:00 p.m.
Maumee Valley Radio Ass'n	Lee R. Kemberling (Pres.) 1827 Cone St., Toledo	U. S. Army Toledo	Business meeting every fourth Friday
The Mike and Key Club	Donald Heisner, 1305 14th St., Lorain	Doherty Men's Fraternity Rooms in the O.P.S. service bldg., Olive St., Elyria	Every Tuesday 8:00 p.m.
Norwalk Amateur Radio Ass'n	Homer Lawrence (Pres.) 16 So. Garden St.	Central School Bldg., 3d floor, East Main St., Norwalk	Every Monday 7:15 p.m.
The Ohio Northern University Radio Club	John W. Howard, Phi Mu Delta Fraternity, Ada	Lehr Bldg. on the campus of Ohio Northern University, So. Main St., Ada	2nd & 4th Tuesdays of every month
QRR Amateur Transmitting Club of East Liverpool, Ohio	Kenneth E. Wright, 938 Railroad St., East Liverpool	Rear of 901 St. George St., East Liverpool	Every Friday night
OKLAHOMA			
The Frederick Amateur Radio Club	Owen Fry, 319 N. 11th St., Frederick	102 1/2 West Grand Ave., Frederick	1st and 3d Tuesdays
Tulsa Amateur Radio Club	Fritz Osseubeck, 1708 So. Newport, Tulsa	Room 207, Public Service Bldg., 6th & Main, Tulsa	Every Tuesday night 8 p.m.
Key Clickers Club	A. V. Ball, 315 W. Hazel, Ponca City	Club shack, located in the Conoco Playgrounds, 2 1/2 miles east of the city	Every Thursday 8:00 p.m.
OREGON			
Coos Bay Amateur Radio Club	George W. Worthley, 635 South 9th St., Marshfield	2nd Thurs. Marshfield City Hall, Marshfield 4th Thurs. North Bend City Hall, North Bend	2nd and 4th Thursdays
Deforest Club of Grant High School	James G. Kirwan, 4524 NE Broadway, Portland	Radio Room Grant High School, 38th Ave. & Gillbrook St. NE	Every other week starting Jan. 23
Rose City Amateur Radio Club	W. C. Ripke, 600 Belmont St., Portland	Room 615, Imperial Hotel, 104 Broadway, between Washington and Stark Sts.	Every Friday night
Valley Radio Club	Bradley Thompson, 1860 Willamette St., Eugene	Members' homes. For information inquire at Despons Radio Service located at 11th & Oak Sts., Eugene	Every other Wednesday
PENNSYLVANIA			
Amateur Transmitters Ass'n of West Pa.	R. M. Francis, 3577 Elmhurst St., Pittsburgh, Pa.	Eighth Floor City-County Bldg., Pittsburgh, Pa.	First Friday each month
Beaver Valley Amateur Radio Club	John S. Thell, 1031 Indiana Ave., Monaca	The Penn Heaver Hotel, Brighton Ave., Rochester	1st and 3rd Wednesday of each month
Chester Radio Club	Frank D. Gorman, 330 Taylor Terrace, Chester	1013 Butler St., Chester	Every Thursday 8 p.m.
"CQ" Club	A. C. Brown, 60 N. 63rd St., Philadelphia	Rear basement of the residence of 6484 Morris Park Rd., Overbrook, Philadelphia (Just west of Blind Institute.)	Every Tuesday at 7:30 p.m.
Electric City Radio Club	James Porter, 1009 N. Taylor Ave., Scranton	Reception Rooms of broadcasting station WQAN, Scranton	2nd & 4th Monday of each month
Erie Amateur Radio Club	W. H. MacIvor, 3408 Glenwood Ave., Erie	Club Rooms, 4th Floor of the Y.M.C.A.	Every other Friday
The Frankford Radio Club	Frances V. Rice, 202 E. Gorgas Lane, Phila.	Portable Schoolhours, Cheltenham Ave. & Oakland St., Frankford, Philadelphia	2nd & 4th Tuesday each month 8:30 p.m.
Haverford College Radio Club	Robert F. Hunsicker, Haverford College, Haverford	Radio room in Sharpless Hall, Haverford College, Haverford	2nd & 4th Tuesday of each month at 1:15 p.m. (No meetings during summer vacation.)
Lansdowne Radio Ass'n	Russell Simons, P. O. Box 4, Lansdowne	16 N. Wycombe Ave.	1st & 3rd Thursdays of each month
Lehigh Valley Amateur Radio Club	George Hart, Raubsville		
Quakertown Amateur Radio Club	Willis P. Smell, S. Main St., Quakertown	Benj. Achey's Sons Office Bldg., 2nd Floor across Railroad tracks at Phila. & Reading Station	Every Tuesday at 7:45 p.m.
The Sylvania Transmitting Amateur's Ass'n *	K. S. Walborn, 27 Melvin Ave., Bradford	Third floor, City Bldg., Bradford	First Sunday of each month 7:30 p.m.
Western Radio Club of the West Philadelphia High School	Frank K. McNaul, Jr., 2517 So. Pershing St., W. Philadelphia	Rooms 224, 226 second floor west in West Philadelphia High School	Every Monday 2:30 p.m.
The Western Radio Communication Society	John W. Callaghan, 719 S. 52nd St., Philadelphia	Dietrich's Hall, 60th & Girard Ave., 3rd floor, Philadelphia	2nd & 4th Monday of each month
The Wilkes-Barre Amateur Radio Club	Walter Riley, 431 George Ave., Wilkes-Barre	427 George Ave., Wilkes-Barre. Phone 2-2255	1st & 3rd Thursdays of the month
The Williamsport Radio Club	F. Alan Glaes, 21 Washington Blvd., Williamsport	Williamsport Y.M.C.A.	Every Monday 8:30 p.m.
RHODE ISLAND			
Associated Radio Amateurs of Southern New England, Inc.	Edwin Biltcliffe Jr., 171 Mendon Ave., Pawtucket	54 Kelley Ave., E. Providence	Every Friday 8:30 p.m.
The Providence Radio Ass'n	Thomas O'Connell, 432 Friendship St., Providence	Reservoir & Ansel Aves., Providence	Every Friday 8:00 p.m.
SOUTH DAKOTA			
The Aberdeen Amateur Radio Ass'n	E. B. Juell, 505 S. State St., Aberdeen	Aberdeen Y.M.C.A.	1st & 3rd Tuesday of each month 8:15 p.m.
Redfield Amateur Radio Club	Albert Dobratz, Redfield	Room 38, Issenuth addition, North Main, Redfield	1st & 3rd Thursdays of each month
TENNESSEE			
Chattanooga Amateur Radio Club	W. F. Gamble, 1231 Worthington St., Chattanooga	Members' homes	Last Friday each month
TEXAS			
Corpus Christi Radio Club	Ethel Henderson, 1107 Coleman Ave., Corpus Christi	Office of Oak Park Addition	1st & 3rd Friday of each month 8 p.m.
Dallas Amateur Radio Club	C. D. McCary, 2710 Grafton Ave., Dallas	Chamber of Commerce Bldg., Commerce St. at Martin St.	1st & 3rd Fridays of each month 8 p.m.
The Galveston Amateur Radio Club	J. F. DeBarbieris, 4701 Ave. O 1/2 Galveston	Club rooms, 4016 Avenue M	Every Tuesday 8 p.m.
* Affiliation pending.			

TEXAS—Continued

Club	Secretary	Meeting Place	Dates
Houston Amateur Radio Club	B. W. Pike, Jr., 738 East Ninth, Houston	Rooms of Westhelme-Vallin Co., 1917 Polk, corner of La Branch	Every other Friday night with meeting on January 6, 1933
San Antonio Radio Club	Vic C. Besancon, 1320 Fresno St., San Antonio	St. Anthony Hotel, San Antonio	Every Friday 8 p.m.
Transmitting Amateur Ass'n	Lon G. Wainman, 512 Myrtle Ave., P. O. Box 1433, El Paso	Club room, El Paso Electric Co., 504 West San Antonio St.	2nd & 4th Friday of each month
Wichita Falls Amateur Radio Club	Mrs. J. R. Martin, 816 10th St., Wichita Falls	Nafziger Bldg., Cor. Magnolia and Smarsh Sts.	1st & 3rd Tuesday
Utah Amateur Radio Club	Dick Andersen, 334 East 27th South St., Salt Lake City	UTAH Chamber of Commerce Bldg., Salt Lake City	Every other Thursday 8 p.m. starting Jan. 5, 1933
Richmond Short Wave Club	Lloyd L. Huckstep, 1609 Mosby St., Richmond	VIRGINIA Room 201 Central Y.M.C.A.	Every Tuesday 8 p.m.
The V.P.I. Short Wave Club	D. L. Webster, Jr., Co. N, V.P.I., Blacksburg	Patton Hall at V.P.I.	Every Wednesday 7 p.m.
The Amateur Radio Club of Seattle	Bill Beach, 5621 Park Road, Seattle	WASHINGTON Y.M.C.A. Bldg., Room 610, 4th Ave. and Madison St., Seattle	Every Tuesday 8 p.m.
Radio Club of Tacoma, Ind.	C. L. Ganes, 5240 Thompson Ave., Tacoma (send communications to clubhouse)	Clubhouse, 1462 So. Oakes St., Tacoma	Tuesdays 8 p.m.
Radio Operators' Club	W. B. sile, 905 East 18th Ave., Spokane, Wash.	Coeur d' Alene Hotel	Mondays 8:00 p.m.
Roosevelt High Radio Club	James Whitman, 4836 38th Ave., N. E., Seattle	Room 224, Roosevelt High School, E. 66th St. and 15th Ave., N. E., Seattle	Every Tuesday of the school year at 3:20 p.m.
Walla Walla Amateur Radio Ass'n	Vance C. Prewitt, 221 South Roosevelt St., Walla Walla	Assembly room of the Pacific Power & Light Company	Every other Thursday
Yakima Amateur Radio Club	Albert Mowery, 302 N. 2nd Ave., Yakima	Club rooms, 2nd floor of Y.M.C.A. Bldg., 6 South 4th St.	Every Friday 8 p.m.
Bluefield Amateur Radio Club	C. J. Thompson, Box 82, Bluefield	WEST VIRGINIA West Virginian Hotel (telephone 2349L or 625 for information)	Each Sunday
The Ohio Valley Amateur Radio Club	Ross J. Arlek, 136 North 11th St., Wheeling	Intermediate Courtroom, 2nd floor City-County Bldg., corner of 16th & Chapline Sts., Wheeling	1st & last Friday of each month
La Crosse Radio Amateur Club	A. D. Sanial, 424 Cass St., La Crosse	WISCONSIN Edison Steam Electric Plant at the corner of Front & Jay Sts.	First Tuesday of every month except June, July and August
The Milwaukee Radio Amateurs' Club, Inc.	Louis A. Wollaeger, 1606 Martha Washington Dr., Milwaukee	Trustee's Room of the Milwaukee Public Library	Thursdays 8:00 p.m.
Northern Wisconsin Radio Club	Bob Johnson, 1239 So. River St., Eau Claire	Determined by vote at each preceding meeting	Last Tuesday of each month
The School of Engineering Radio Club	Harold Reynolds, 1008 East Ogden Ave., Milwaukee		Wednesday nights 7:30
Sheboygan Radio Amateurs' Club	Robert Artman	Vocational School Bldg., Room 2	Every Thursday 8:00 p.m.
Alberta Radio Experimenters Ass'n	R. J. Dunn, c/o Bank of Nova Scotia, Calgary, Alta.	CANADA Usually a dinner in the Basement Dining Room of the Home Dainties Cafe, 8th Ave. W., Calgary	Once a month at 6:45 p.m. (No regular date)
British Columbia Amateur Radio Ass'n, Inc.	Ed S. Brooks, 2961 5th Ave., E., Vancouver, B. C.	Clubhouse, 2961 E. 5th Ave., Vancouver, B. C.	Every Tuesday
Manitoba Wireless Experimenters' Ass'n	Earl Harp, 116 Lipton St., Winnipeg, Man.	Radio Room, Free Press Bldg., Winnipeg, Man.	Thursday evenings, except during June, July, August & September
Regina District Radio Ass'n	Arthur Driver, 1900 Robinson St., Regina, Sask.	Room 107, Regina College, College Ave., Regina, Sask.	4th Tuesday
South Shore Radio Club	B. E. Franklin, 4405 Hingston Ave., N.D.G., Montreal, P. Q.	306 Desnaulniers Blvd., St. Lambert, P. Q.	1st & 3rd Wednesdays
Victoria Short Wave Club	David Scholes, 1743 Davie St., Victoria, B. C.	2024 Carnarvon St. & members' homes, Inquire phone E-2729	2nd & 4th Saturdays monthly
The Westmont Radio Club	Robert Prissick, 27 Bellevue Ave., Westmont, P. Q.	At VE2AP, 4334 Westmount Ave., Westmont, P. Q.	Twice monthly
Wireless Ass'n of Ontario	S. B. Trainer, 4 Shorncliffe Ave., Toronto 5, Ontario	Various homes of members	1st Friday
Frontier Radio Club	Arthur Walker, 320 Mill St., Sandwich, Ont.	Club rooms, 1816 Ottawa St., E., Windsor, Ont.	Every second Wednesday

Distortion With Class B Modulation

SOME fellows using low-power Class B modulators, either with Type 10 or 46 tubes, are getting swell results. Others sound not so good. Those experiencing punk quality of course follow the line of least resistance and blame everything on the Class B system as such, neglecting to consider other possible factors.

Now the worst that can be said of Class B as a system is that it *should* give its greatest distortion at low levels. This objection is actually of the purely academic variety, particularly where ham 'phone is concerned, because the low-level stuff is all lost in the background hash by the time it gets through even a good receiver — and under ideal

conditions distortion of as much as 15% is lost on most ears. We have used a pair of '10's in Class B for the power stage in a public-address amplifier that ran a trio of 10-watt speakers for all they were worth, and with better high-level quality than the same horns put out with the 20-watt Class A amplifier they were used to; and the low-level output was OK, too.

Most of the distortion troubles with Class B arise not because the system is used but because it is abused. The people who have trouble with it are the same kind that have the same type of trouble with Class A modulators and are not unlike those who expect a \$125 microphone and a

crystal in the oscillator to compensate for all the deficiencies in the outfit. In most cases the modulator is simply overloaded. When a modulator is rated at 25 watts output, and 100 ma. input to the Class C amplifier at 500 volts is specified to give a modulator load of 5000 ohms (see the *Handbook*), these ratings are meant to be observed. Class C amplifier plate current of 130 ma. or so may seem little different from 100 ma. on the meter. But it means dropping the modulator load resistance from its rated 5000 ohms to less than 4000 ohms—and giving it a severe handicap. Don't overload the modulator and expect full output without distortion.

Another source of distortion on the peaks is tubes of the wrong kind in the Class B sockets. In our experience every Type '10 tube that had an oxide-coated filament was a bad actor. The trouble with such tubes is that the grids "go positive," or start to emit electrons, when the tube works hard. It seems that such grid emission is almost inevitable with oxide coated filaments because some of the active filament material will get on the grid. Then, when the grid gets hot, it begins to act like a cathode. The grid current, instead of flowing from grid to filament, in the external circuit, actually reverses and flows the wrong way. That's bad business. If oxide filament tubes must be used, keep the excitation (and hence the output) below the level where distortion starts—or put in tubes with thoriated filaments. At plate voltage of 500, thoriated-filament Type '10's in Class B will push out as much as 40 watts of audio, we have found, without distressing distortion. The plate voltage must stay put over the varying load range, of course, because poor supply voltage regulation will give distortion on its own hook. That requirement is easily satisfied by using a mercury-vapor type rectifier and a swinging input choke in the filter.

— J. J. L.

An early morning CQ from W2BJP raised VE1AS, who thereupon volunteered the information that the only reason he was awake at such an hour was that the house was on fire! Further explanation revealed that the noise of firemen chopping away in the basement had awakened him. Which would seem to prove, we think, that VE1AS is hardly an excitable individual.

From VE2BT comes a page from a ham catalog offering a well-known manufactured receiver equipped with a "special election-coupled oscillator!" We suppose the set is at its best on certain November days.

W5AEJ has worked Japan three times on 'phone, using a 50-wattter with grid modulation. The dope is in the Experimenters' Section in November, '32, *QST*.

Not long ago W6DOO worked W2DOO. No doubt that sort of thing has happened lots of times before, but here's some more: Both these hams have the same name, G. Siegel, and an exchange of QSL's showed that both had crystal transmitters with 47 oscillators and 852 amplifiers, both have the same kind of antennas and their frequencies are only 50 kc. apart! Neither had ever heard of the other before the QSO.

W4AAE (working a station that had lots of punch), "You sound like an 852."

Other station coming back, "Thanks, am using a 204-A!"

W4AAE now keeps his ideas about the other fellow's station to himself.

Information Service Rules

PROMPT handling of inquiries concerning amateur equipment and problems will be greatly facilitated if the following rules are observed when writing to the A.R.R.L. Technical Information Service:

1. Before writing, consult *The Radio Amateur's Handbook* and your files of *QST*. Nine times out of ten you will be able to find the answer in *QST* or the Handbook.

2. If reference is made to the Handbook, mention the page and the edition to which you refer. If reference is made to *QST* mention the page and issue you have in mind.

3. Write on one side of the paper only, and use a typewriter if possible.

4. Number the questions and make a separate paragraph for each question. Make the questions as brief and as direct as possible.

5. Make diagrams on separate sheets of paper and fasten them to your letter with a pin or paper clip. All diagrams should be schematic—do not send pictorial diagrams.

6. Print your name and address in full on each sheet of paper. A return address on the envelope is not sufficient, as the envelope is destroyed by the office manager as soon as the letter is opened.

7. Keep an exact copy of your questions and diagrams, and mention that you have done so.

8. Do not ask for opinions on, or comparisons of, business concerns or their products.

9. Enclose postage for the reply but do not send an envelope. It is much more convenient for us to use our own envelopes with our stationery.

10. Address all questions to the Technical Information Service, American Radio Relay League, 38 La Salle Road, West Hartford, Conn.

Any back copies of *QST* to which we refer you may be obtained from our Circulation Department for twenty-five cents each.

The observance of the above rules will be mutually beneficial.

for the

EXPERIMENTER



An M.O.P.A. Transmitter Using Receiving Tubes

By Philip Neil, VE3PN*

FOLLOWING is a description of a transmitter, using receiving-type tubes throughout, which has recently been put into service at VE3PN. As shown by the circuit diagram, Fig. 1, it consists of a series-feed Hartley oscillator using a Type 56 tube, a Type 24 buffer or doubler, a second buffer stage with a pair of 24's in push-pull, and a final stage with a pair of 46's in push-

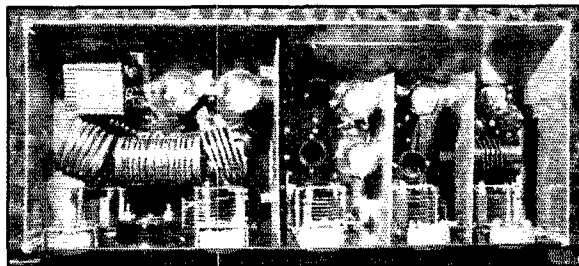
are sectionalized affairs wound on slotted forms made from large-size wooden thread spools. The flanges at each end of the spool are turned down flush with the spool and four slots cut in at regular intervals. Each slot is $\frac{1}{8}$ -inch wide and $\frac{1}{8}$ -inch deep. The slots are wound full of No. 30 d.c.c. wire and the finished choke is then baked in wax. Regular manufactured chokes could be used instead, but these are inexpensive and easy to make if one has access to a wood-turning machine. R.f. chokes mounted near coils should be shielded; a simple shield made of tin foil has been found to be perfectly satisfactory for this purpose.

Tuning and adjustment of the transmitter are the same as with other oscillator-amplifier transmitters. Specifications are given for coils for the 7- and 14-mc. bands, the two in which VE3PN is chiefly interested. Suggested specifications for 3.5 mc. would be: for L_1 , 12 turns similar to the 5 turns for 7 mc.; for L_2 and L_3 , 30 turns, center-tapped, on tube bases; for L_4 , 20 turns No. 12 wire wound on a $2\frac{1}{2}$ -inch form of sufficient length to mount in the same way as the copper-tubing coils for the higher-frequency bands. The 56 oscillator will draw about 12 milliamperes under load; the 24 buffer-doubler takes about 8 ma., the push-pull 24's approximately 20 ma.

(both tubes) and the final stage between 110 and 130 ma.

The radio-frequency choke in the negative power-supply lead to the 46's, shown in Fig. 1, has been found necessary to prevent the final amplifier from reacting on the preceding stage. In this connection, it is also important that the shields between stages be continued below the shelf, particularly between the last two stages. Shielding between the oscillator and buffer-doubler does not seem to be absolutely necessary, but is nevertheless advisable.

The meters indicated in Fig. 1 are as follows: oscillator plate, 0-15 ma., buffer-doubler, 0-15 ma., push-pull buffer, 0-25 ma., final stage, 0-200 ma. All are Readrites, mounted on the panel at the top of each stage compartment. The filaments of all tubes are heated from the same source, although the final stage has a separate plate supply.



AN INSIDE VIEW OF THE RECEIVING-TUBE M.O.P.A.

Showing how the compartments are divided off for the various stages. The plate and antenna coupling coils in the final stage compartment are mounted on porcelain stand-off insulators.

pull. The accompanying photograph is an inside view of the transmitter and shows the layout.

The box in which the transmitter is built is made of $\frac{3}{16}$ -inch aluminum and is 8 inches high by 24 inches wide by 10 inches deep. The panel is bakelite, 8 x 24 inches. The inside shelf on which tube sockets, coils, etc., are mounted is made from pieces of bakelite salvaged from the junkbox. It is mounted about $1\frac{3}{4}$ inches above the bottom of the cabinet. The oscillator is in the compartment at the extreme right, the other stages following in regular order to the left. All tuning condensers and meters are mounted on the panel, as is also the keying jack, *J* in Fig. 1. Radio-frequency chokes, by-pass condensers and resistors are mounted below the shelf. The neutralizing condensers for the 46's in the last stage are Pilot midgets cut down to 4 rotor and 3 stator plates, double-spaced, and the neutralizing setting will be found to be at about half capacity.

The radio-frequency chokes in the transmitter

*452 Runnymede Rd., Toronto, Ont.

Straightening Out Single-Wire Feed

Having concluded a series of tests and experiments with the single-wire feed antenna I would like to pass some good practical dope to other amateurs who are hunting around for some definite and accurate way to tune such an an-

tenna system the feeder should be arranged to run at right angles to the flat-top portion at least one-quarter of its entire length. Sharp bends in the feeder should also be avoided.

To make rapid comparisons of currents with the dummy antenna and feeder, a single-pole double-throw switch should be connected in so

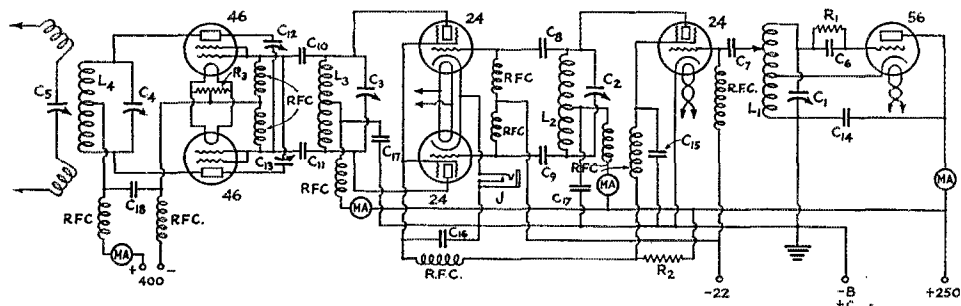


FIG. 1 — CIRCUIT DIAGRAM OF VE3PN's M.O.P.A. TRANSMITTER

C₁ — 500- μ fd. variable condenser.
C₂₋₄ — 100- μ fd. variables.
C₅ — 500- μ fd. variable.
C₆ — 250- μ fd. fixed.
C₇ — 500- μ fd. fixed.
C₈₋₉ — 300- μ fd. fixed.
C₁₀₋₁₁ — 250- μ fd. fixed.
C₁₂₋₁₃ — Midget condensers described in text.
C₁₄ — .1- μ fd. fixed.
C₁₅₋₁₈ — .002- μ fd. fixed.

R₁ — Variable grid leak (Pilot Resistograd).
R₂ — 8600 ohms.
R₃ — Center-tapped resistor, 20 ohms.
L₁ — 5 turns No. 18 wire on 2-inch form.
L_{2, L3} — Center-tapped coils wound on tube bases; 14 turns total for 7000 kc., 6 turns for 14,000 kc., both with No. 18 wire.
L₄ — 12 turns copper tubing on 1½-inch diameter for 7000 kc., 6 turns same for 14,000 kc.
J — Closed circuit jack.

tenna system. The idea conveyed here is not original, being a copy of the method used by United Airlines engineers in tuning their antenna systems.

The figures in the *Handbook* show that the feeder is attached at a point on the flat-top distant from the center by a length equal to 14% of the entire length of the flat-top portion. The length of the feeder is of course optional. With such an arrangement, the feeder will have a characteristic impedance of 500 ohms.

Now if the transmitter is tuned to a frequency which resonates exactly with the flat-top radiating portion of the antenna, and if the feeder is attached at the correct point, the r.f. current in the feeder and the plate current drawn by the final amplifier will exactly match the readings when the transmitter operates into a dummy antenna consisting of 500 ohms of non-inductive resistance. Such a dummy may be rigged up of carbon lamps — not Mazda or tungsten, which have some inductance — the size of the lamps being determined by the amount of power output. Here at W6AEW, I am putting out .5 ampere r.f. into the feeder, and use four 120-volt 120-watt lamps in series. Such a dummy is good from .4 to 1.5 amps r.f. and will serve everything from medium power up to and a little over 1 kw. output. Between these two figures, this dummy has a pure resistance of 500 ohms. Parenthetically, before one starts pruning and tuning the

that the transmitter can be switched quickly from one to the other. Connect the switch blade to the tap on the transmitter tank coil; one jaw goes to the dummy, the other end of which comes back to the low-potential end of the tank; the other jaw goes to the feeder.

First, tune the transmitter with the dummy as a load. Do an accurate job of it, and use your meters. The meters should not have too great a range. The chap who has a 0-1 or 0-1.5-ampere r.f. meter and an accurate milliammeter in the final amplifier can do an excellent job of tuning up. Now throw the switch to the outside antenna without touching any adjustments on the transmitter, and observe the readings. If by a stroke of luck the antenna length and feeder position are right, the meters will read exactly the same when the transmitter is connected either to the outside antenna or to the dummy. Chances are, however, pruning and tuning will be necessary.

I would suggest that first the feeder be tuned for the correct position. At first move the feeder a foot at a time and note which way the meters go. It will be quite apparent if you are going in the wrong direction. The final and accurate adjustment will require moving the feeder an inch or two at a time. If attaching the feeder at various points within reasonable distance of the 14% point does not bring about a match, it is an indication that the frequency of the transmitter does not resonate with the flat-top portion of the an-

tenna. If crystal control is used, pruning the antenna is in order. Cut off or add on about two feet at first. Then go through the process of moving the feeder around. If you added antenna where it should have been shortened, it will show up because in sliding the feeder around the match will be further off than before. Cut off the length added, plus a couple feet more. Now tuning the feeder will bring closer results. Keep this up until the absolute match is found. If a self-excited oscillator is used and frequency can be shifted at the transmitter, no pruning or adding will be necessary unless the antenna tunes out of the band, or one desires to work at some particular spot. Merely shift the frequency at the transmitter and watch the feeder current. The feeder current can be matched by this method, but if the feeder is attached at the wrong point, the plate current will differ from the reading shown when on the dummy. As the correct point is approached, the plate current will come nearer the match. And so, back and forth, until the objective is reached — a perfect match on dummy and outside antennas.

As for results, I can safely say that time spent getting this antenna system tuned up properly is worth while, as it certainly increased my DX per dollar. Also, $I_p R$ will give you the power output, from which the efficiency can be computed. And that will show up many things which may lead to further studies to increase the watts per dollar.

— J. H. Gurr, W6AEW-W6ZZCD

Overmodulation Indicator

The circuit of Fig. 2 is contributed by Howard A. Seyse, W8AGW, as a quite simple but effective indicator of that most common ailment of amateur 'phones — overmodulation. The only addition to the ordinary "100% modulation"

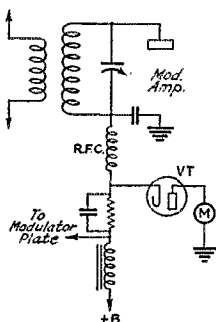


FIG. 2 — SIMPLE OVERMODULATION INDICATOR

circuit is a rectifier tube, VT, and a low-range milliammeter, M. The other circuit components shown in Fig. 2 are the usual modulation choke,

dropping resistor and by-pass condenser, as well as the tank circuit of the modulated amplifier.

W8AGW explains the operation of the device as follows: With full 100% modulation the carrier will at certain parts of the audio cycle be reduced instantaneously to zero amplitude, but if the modulation percentage is greater than 100% these negative peaks or modulation "valleys" will be widened out, making discontinuities in the carrier and resulting in distortion. The peaks are cut off as far as useful radiation is concerned, but in effect they are pushed across the zero line and when that happens the plate voltage on the modulated amplifier actually reverses. This reversed voltage is rectified by the vacuum tube and the resulting current read by the milliammeter. So long as the transmitter is not overmodulated, however, no reading will be observed on the milliammeter dial.

Almost any type of tube can be used in the rectifier. Its plate-to-filament insulation must be good enough to stand the plate voltage on the modulated amplifier plus the modulation peak voltages, as must also the insulation of the filament transformer. Tubes of the 45, 80, 12-A, 10 and 50 types have been used by W8AGW with equal success. The milliammeter may be any low-range instrument, preferably having a full-scale reading between 1 and 25 milliamperes.

A Single-Tube Converter

By R. B. Kingsbury*

Most ham receivers are operated with headphones, which are not very well adapted to letting the rest of the family hear the interesting things going on in the region below 200 meters. But with a couple of midget condensers, some coils and a few other odd parts it is quite easy to make a converter which will do the trick if one has a sensitive broadcast receiver. The outstanding features of the circuit, Fig. 3, described here are simplicity and very low cost; nevertheless it will give excellent results.

The converter will couple into any sensitive receiver using a screen grid tube in the first r.f. stage. No external power sources are required, since filament, screen and plate voltages are picked up from the broadcast receiver itself through the adapter plug — an old 5-prong tube base — which replaces the first r.f. tube in the receiver when this tube is placed in the converter.

The circuit resembles that of an ordinary single-tube regenerative receiver. The plug-in coils are wound on tube bases (only 4 prongs are necessary), both windings being in the same direction with the plate and grid terminals at the extreme ends to insure oscillation. The spacing between L_1 and L_2 will depend upon a number of factors and can be determined by experiment.

*215 N. 11th St., Wilmington, N. C.

The prime requisite is that the tube must oscillate. The primary coil is fixed and consists of 6 turns of No. 16 d.c.c. wire so placed that it surrounds the lower part of the plug-in coil when the latter is placed in its socket.

Several values of grid leaks should be tried. A 5-megohm leak has been found to be entirely satisfactory in most instances, however.

There will be one spot on the tuning dial of the broadcast receiver at which the converter will be the most sensitive. This spot must be determined

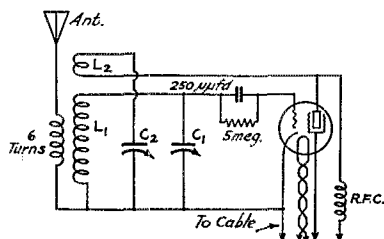


FIG. 3 — SINGLE-TUBE CONVERTER CIRCUIT

C_1, C_2 — 50- μ fd. midget condensers.

RFC — Short-wave choke (this choke must be big enough to permit the tube to oscillate but not big enough to choke off the i.f. signal fed through the plate wire to the broadcast receiver. Use a small choke.)

Coils — 3500 kc. — L_1 , 20 turns; L_2 , 12 turns.
7000 kc. — L_1 , 10 turns; L_2 , 7 turns.
14,000 kc. — L_1 , 5 turns; L_2 , 6 turns.

All coils wound with No. 22 d.c.c. wire.

by the builder himself, but the writer suggests that the receiver be tuned first to a frequency setting close to 800 kc. If this combination does not work well then another setting should be tried until the correct one is found.

Instructions for operating are very simple:

First: Remove the 1st r.f. tube from its socket and put it in the converter.

Second: Place adapter plug in vacated socket of the receiver.

Third: Plug one of the coils in the coil socket of the converter.

Fourth: Turn on switch in broadcast receiver and you are now ready to begin tuning in the short waves.

The broadcast receiver can be used as a vernier tuning control after a signal has been brought in, performing this function simply by changing the setting of the intermediate frequency. Should a broadcast station be coming in through the short-wave signal the offending signal can be entirely eliminated by shifting the intermediate frequency and then retuning the converter to bring in the desired one.

To log the converter, simply make a note of the setting of the broadcast receiver and the converter setting at which the signal was heard. Changing the intermediate frequency changes also the dial setting on the converter.

If the converter has been wired properly and the receiver used in conjunction with it is at all

modern no trouble should be experienced in bringing in foreign broadcasting stations in eastern U. S. as well as all kinds of domestic short-wave broadcast and amateur 'phone signals.

(EDITOR'S NOTE.—The ultra-simple type of converter, in which the functions of oscillator and first detector are combined in a single tube, is particularly subject to image interference and two-spot tuning. For casual listening, however, a converter such as Mr. Kingsbury describes can be built in a comparatively short space of time, whereas under the same circumstances the construction of a more elaborate converter might never be attempted.)

Another Blocked-Grid Keying Arrangement

A blocked-grid keying system which does not require a separate source of blocking voltage and which permits grounding the filament transformers of the keyed tubes as well as the negative power supply line is shown in Fig. 4. This diagram shows the essentials of the keying arrangement used by Bob Eubank, W3AAJ. An additional advantage is that the current in the key circuit is small so that thump elimination is not difficult even with a transmitter of sizable power.

The principle of the keying scheme is the familiar one of adding high bias to the grids of the keyed tube or tubes when the key is open and shorting it out when the key is closed. In this case the additional or blocking bias is secured

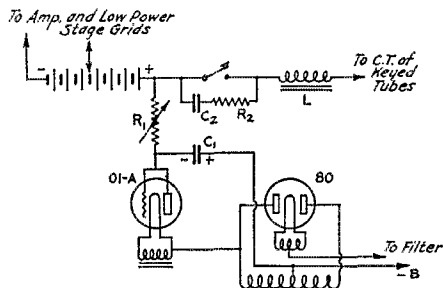


FIG. 4 — BLOCKED-GRID KEYING WITH BIAS SECURED FROM OSCILLATOR PLATE TRANSFORMER

C_1 — 500-volt filter condenser, 1 μ fd. or more.

C_2 — .5 μ fd., 300-volt rating.

R_1 — Bradleyohm, 1000-100,000 ohms.

R_2 — 350 to 500 ohms.

L — App. 2 henrys. Secondary of bell-ringing transformer satisfactory.

from the transformer which supplies the plate power for the crystal oscillator. The regular Type 80 rectifier for the oscillator plate is shown for the sake of completeness. The blocking bias voltage is obtained from one side of the transformer and is rectified by a Type 01-A tube. Condenser C_1 acts as a filter; its chief purpose is

to build up the rectified voltage to the peak value, however, since filtering in this circuit is not needed. W3AAJ likes the 01-A as a rectifier since it does not pass much current, which reduces sparking at the key. This one has been run on an unused 210 filament winding, showing that the filament voltage is not particularly critical.

The adjustment of the system is quite simple. With the key open, set R_4 for zero plate current on the keyed tubes. When the key is closed the extra bias is taken out of the circuit.

The inductance L , condenser C_3 and resistor R_2 constitute a thump filter which may or may not be found essential.

Standard Frequency Transmissions

Date	Schedule	Station
Mar. 3, Friday	A	W6XX
Mar. 5, Sunday	C	W1XP
Mar. 8, Wednesday	A	W1XP
Mar. 10, Friday	B	W9XAN
	B	W6XX
Mar. 15, Wednesday	BB	W1XP
	C	W9XAN
Mar. 17, Friday	B	W9XAN
	A	W6XX
Mar. 22, Wednesday	B	W1XP
	BB	W9XAN
Mar. 24, Friday	BB	W6XX
	A	W9XAN
Mar. 25, Saturday	BX	W6XX
Mar. 26, Sunday	C	W6XX
Mar. 31, Friday	A	W6XX
Apr. 2, Sunday	C	W1XP
Apr. 5, Wednesday	A	W1XP
Apr. 7, Friday	B	W9XAN
	B	W6XX
Apr. 12, Wednesday	BB	W1XP
	C	W9XAN
Apr. 14, Friday	B	W9XAN
	A	W6XX
Apr. 19, Wednesday	B	W1XP
	BB	W9XAN
Apr. 21, Friday	BB	W6XX
	A	W9XAN
Apr. 22, Saturday	BX	W6XX
Apr. 23, Sunday	C	W6XX
Apr. 28, Friday	A	W6XX
Apr. 30, Sunday	C	W1XP

STANDARD FREQUENCY SCHEDULES

Time (p.m.)	Evening Sched. and Freq. (kc.)		Time (p.m.)	Afternoon Sched. and Freq. (kc.)	
	A	B		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. & Freq. (kc.) BX
6:00	7000
6:08	7100
6:16	7200
6:24	7300

The time specified in the schedules is local standard time at the transmitting station. W1XP uses Eastern Standard

Time, W9XAN, Central Standard Time, and W6XX, Pacific Standard Time.

TRANSMITTING PROCEDURE

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 W1XP is "G"; that of W9XAN is "O"; and that of W6XX is "M."
- 1 minute — Statement of frequency in kilocycles and announcement of next frequency.
- 2 minutes — Time allowed to change to next frequency.

THE TRANSMITTING STATIONS

W1XP: Massachusetts Institute of Technology, Round Hill Research, South Dartmouth, Mass., Henry G. Houghton in charge.

W9XAN: Elgin Observatory, Elgin National Watch Company, Elgin, Ill., Frank D. Urie in charge.

W6XX: Don Lee Broadcasting System, Los Angeles, Calif., Harold Peery in charge.

REPORT BLANKS

Blanks for reporting on the S.F. transmissions will be sent postpaid upon request. Just send a card or message to Standard Frequency System, QST, West Hartford, Conn., asking for s.f. blanks.

WWV 5000-KC. TRANSMISSION

The 5000-kc. transmissions of the Bureau of Standards station, WWV, until April 1st will be given every Tuesday from 10:00 a.m. to 12 noon and from 8:00 to 10:00 p.m., E.S.T. Effective April 1st transmissions will be given continuously from 12:00 noon to 2:00 p.m., and from 10:00 p.m. to midnight, E.S.T. The accuracy of these transmissions is to better than 1 cycle (one in five million).

— J. J. L.

In April QST— A New Type Receiver!

JIM LAMB has cut the cost of single-signal reception. As a sequel to the hot-dog original S.-S. superhet, which was disclosed in August and September, 1932, issues of QST, he has wangled an entirely new five-tuber that almost rivals its big brother in performance. It's a real superhet, gives honest-to-gosh single-signal selectivity on c.w. and all the selectivity that can be used on 'phone — and has plenty of sock to boot. Best of all, existing tuned r.f. regenerative receivers — like Ross Hull's "Unorthodox," George Grammer's "Rationalized" rig, National SW3, etc. — can be rebuilt into the new S. S. Five at small additional cost. It comes in our next issue. Don't miss it.

• I. A. R. U. NEWS •

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Suomen Radioamatöörit to r.y.
Sveriges Sandareamatorer
Unión de Radioemisoros Españoles
Union Schweiz Kurzwellen Amateur
Wireless Institute of Australia
Wireless Society of Ireland

Conducted by Clinton B. DeSoto

THE first of February found the membership roster of the International Amateur Radio Union augmented by the addition of two new member-societies, admitted to membership as a result of the vote in their favor registered by the Union membership. The new societies are the Liga Mexicana de Radio Experimentadores (L.M.R.E.) and the Nederlandsch-Indische Vereeniging Voor International Radioamateurisme (N.I.V.I.R.A.), representing Mexico and the Dutch East Indies respectively.

The new societies are each devoted entirely to the interests of two-way amateur communication and experimentation in their respective countries, and the influence of each substantially covers the country in which it is located. Both societies are comparatively small, insofar as numbers are concerned, but each is rich in amateur spirit and embraces within its ranks the active amateur element in its territory. Their entrance into our federation will add considerably to the strength and geographical importance of the Union.

The official headquarters addresses of these two societies are as follows:

L.M.R.E., Sinaloa 33, Mexico City, Mexico.

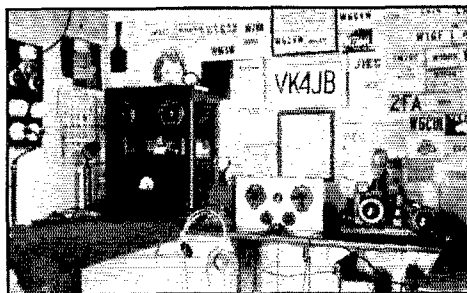
N.I.V.I.R.A., Bothstraat 4, Bandoeng, D. E. I.

The election of these new members is of particular importance at this time in view of the right granted the I.A.R.U. at the Madrid Conference to participate in the 1934 meeting of the C.C.I.R. at Lisbon. For this reason, the entrance of other active amateur societies in other countries of the world is especially desirable during 1933, and applications for membership from *bona fide* amateur societies, each preëminent in its own country and substantially covering it

geographically, will be welcomed. These applications should be addressed to I.A.R.U. headquarters at 38 LaSalle Road, West Hartford, Conn., U. S. A.

Effective January 1st, the official headquarters address of the N.Z.A.R.T. was changed from P. O. Box 617, Christchurch, to P. O. Box 517, Dunedin, New Zealand.

At the annual general meeting of the R.S.G.B., held in London on December 21st, J. Clarricoats,



VK4JB, OWNED BY J. R. KLING, 13 VALLEY PARADE, SOUTH CAMBERWELL, S. E. 6, VICTORIA, AUSTRALIA

formerly Honorary Secretary, was appointed to the position of Secretary. This change will enable Mr. Clarricoats to devote his full time to the conduct of R.S.G.B. affairs, and is an excellent indication of the growth in strength and effectiveness of the society and of British amateur radio in general.

The other officers of the society remain unchanged, except for the election of E. A. Dedman, G2NH, to the council. A complete report by the Secretary, outlining in review the past year's work, was published in the January issue of the "T & R Bulletin."

Among the normal membership activities being inaugurated by the newly organized Philippine Amateur Radio Association will be that of a QSL forwarding service. The address, for the present, is that of the secretary, S. Mathew Dakis: College of Engineering, U. P., Manila.

The rather involved system of VP prefixes has been considerably changed by official instructions recently issued. Jamaica is no longer VP2, but is



CTIAZ, OWNED BY ALBERTO BARATA PEREIRA, AV. SA. DA BANDEIRA, 91, COIMBRA, PORTUGAL
Ten watts to a UX245 in a Mesny circuit has contacted 33 countries in six continents.

now VP5; Barbados has been changed from VP2 to VP6. VP2, on the other hand, is now reserved for the colony of Fiji, according to C. L. Isaacs, formerly VP2PA, now VP5PA.

The new arrangement is as follows:

- VP1 Ellice Islands, Zanzibar
- VP2 Fiji
- VP4 Trinidad
- VP5 Jamaica
- VP6 Barbados
- VP9 Bermuda

The remainder of the numerous V prefixes remain the same, so far as is known.

Perhaps the best bit of inter-antipodes daylight (American end) work that has come to our attention is the QSO between C. S. Taylor, VE1BV, Stewiacke, Nova Scotia, and L. A. Paul VK3LP, Northcote, Victoria, at 1945 G.M.T. on January 1st. Taylor used 50 watts input to a '10.

The Norwegian Riiser-Larsen Antarctic Expedition, which started from Norway on New Year's Eve, seeks coöperation with amateurs all over the world. Original plans called for starting work with amateurs in the 14-mc. band on

January 8th. The call is LMZ, the frequency near the low edge of the band, and the working times every Sunday from 0700-0800 and 1900-2000 G.M.T. The transmitter used will have a power input of 80 watts.

The expedition expected to be at about 30° north on the first Sunday on its way southward. The Antarctic work will start at the southern polar ice region at about 60° east, just south of Madagascar, reports G. H. Petersen, President of the N.R.R.L. Little is known of radio conditions in this region, and reports will be very much appreciated by the N.R.R.L., as well as any information relayed from LMZ.

Scotland claimed all the honors in the recent R.S.G.B. 1.7-mc. contest. Overwhelming victories were scored by S. A. French, G6FN, the winner, and runners-up R. Miller, G6ND, and E. G. Ingram, G6IZ, according to J. Clarricoats, G6CL.

By the time this sees print hundreds of amateurs in dozens of countries of the world will be working feverishly to get their transmitters working tip top, in preparation for the slow approach of the zero hour (speaking in Greenwich) on March 11th, when the A.R.R.L. 1933 international tests begin. Better get busy if you haven't started preparations yet — it's going to be a great party!

The N.R.R.L. headquarters station, LA1C, has succeeded in making itself tremendously popular among Norwegian amateurs during the few months it has been in existence. Following preliminary tests during early summer, the station began its regular program of N.R.R.L. broadcasts, code practice sessions and general membership contacts in August, soon after the general meeting. Much valuable data regarding 3.5-mc. propagation data throughout Norway was gathered through the autumn months, and the same result is anticipated in connection with 7 mc. working, which is being inaugurated during the winter.

Ordinarily, of course, LA1C calls CQLA when general contacts are desired, and foreign calls are not answered. On those occasions when CQ alone is called, however, the station will be glad to enter into communication with any station answering.

A great deal of Norwegian activity at the present time is centered around the organization of a reliable inland amateur net, with the headquarters station LA1C as keypoint for the net.

The International Amateur Radio Association of China recently renewed publication of their official organ, "QSO," putting it out in printed form and making the new dress very attractive.

(Continued on page 86)



CALLS HEARD



CALLS Heard have outlived their usefulness in the manner we have been presenting them during the past years. International DX on the 14- and 7-mc. bands is no longer of great interest, since it is an everyday occurrence. This department needs to be revised to keep up with the times. We are therefore eliminating 7-mc. Calls Heard completely save for exceptional work. At the same time we believe further stress should be given other frequencies and we are therefore going to use only Calls Heard which come under the following classifications:

1. International reception on 1715-kc. band.
2. Coast-to-coast reception (on any continent) on the 1715-kc. band.
3. International reception on 3500-kc. band, both c.w. and 'phone.
4. Coast-to-coast reception (on any continent) of 'phone on 3500-kc. band.
5. Exceptional reception on 7-mc. band. (Example: AC, J, VS, KA, etc., heard in Eastern U. S. A. or Canada; W6, W7, VE5, K6, K7, KA, etc., heard in Europe, or vice versa.)
6. Exceptional reception on 14-mc. band of c.w. signals (as above).
7. International 'phone reception on 14-mc. band.
8. Any reception on the 28- and 56-mc. bands.

If you wish to report reception of signals which would not rate publication in this department it is suggested that the QSL card method be used, reporting directly to the station heard.

— EDITOR.

*W1MK, A.R.R.L. Headquarters, 38 LaSalle Road,
West Hartford, Conn.*

(7-mc. band between Jan. 21 and Feb. 3)
kally kalna kalne jlegg v88ac ar22he

*Mathew Sheridan, Leggah, Castletown, Havan,
Co. Meath, Ireland*

(3.9-mc. 'phones)

wlaah wlabv wladm wlahv wlauk wlaub wiber wibes
wibic wiblr wibse wibtz wlowh wldtj wlei wifl wloo

w2acj w2acr w2aih w2au w2az w2bnu w2bok w2ce w2che
w2cif w2cmh 2co 2coj 2dka 2go w2is w2kr w2wq w3ab
w3ahr w3aih w3alz 3auj w3axr w3blz w3bms w3cq w3cqn
w3is w3sm w3ud w4aad w4acz w4axz w4ln w4tr w4ok
w8avi w8ccs w8me w4mx velda ve2au ve2ba ve2da

(3.5- to 3.7-mc. 'phones)

d4uak g2lz g5sz g6cb g6mn on4au oh4ds pasam pasap
pasasd pasdw pasim pasmo pasmh paswsm uoicm
(14-mc. 'phones)

wldmo 2bg 2cif 3kv 8bly 8ayu 8glg ve2ca

Strays

Roger H. Hertel, W9CHB, chief engineer of KMMJ in Clay Center, Nebr., requests all hams in his region who wish to donate old BCL sets and parts for the use of shut-ins otherwise unable to enjoy radio broadcast reception, to send them to the "KMMJ Gospel Radio Singers," who have instituted a charitable radio fund for this purpose. To date more than 125 sets have been distributed as a result of gifts of sets, parts or money, and the number of applications is constantly mounting.

Silent Keys

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

Clarence E. Adelman, W8CBH, Butler, Pa.
Henry Bridges, W1EWX, Winchester, Mass.

Ben Buell, ex-7AFT, Seattle, Wash.
Stewart P. Cornell, W2BKN, Dobbs Ferry, N. Y.

Raymond W. Fowler, W9BK, Frankfort, Ind.

Robert C. Harlow, W9GID, Sturgis, S. Dak.

Archie D. Kramme, W5BQM, Kingsville, Texas.

Willard J. McElree, W9FBO, University City, Mo.

James W. E. Nigh, W8BPN, Columbus, Ohio.

Clyde M. Renfro, W4ADD, Valdosta, Ga.

Franklin B. Rowell, W1AMU, Pawtucket, R. I.

Permit P. Sanders, W6AYK, La Mesa, Calif.

Ralph J. Stephenson, W8DMS, Highland Park, Mich.

THE COMMUNICATIONS DEPARTMENT



F. E. Handy, Communications Manager
E. L. Battey, Assistant Communications Manager



Preparedness

AMATEUR radio is recognized as an invaluable aid in time of communication failures. Time and again has amateur radio served as the sole means of "emergency communication" when telegraph and telephone wires have been brought down by devastating storms. Amateur radio will many times in the future again be called upon to prove her worth. Appreciating this fact, far-seeing amateurs in various sections of the country are organizing "nets for emergency communication" in order that "amateur radio will be prepared when the elements again go on a rampage." Organization of the following networks has been brought to our attention.

THE GULF COAST STORM NET

The Galveston Amateur Radio Club has organized a network of amateur stations bordering the Gulf of Mexico from Brownsville, Texas, to Key West, Florida. This will be known as the Gulf Coast Storm Net. The principal purpose is to take care of emergency communications from areas affected by Gulf disturbances in case the established lines of communication are put out of commission. Stations in the net are: Texas: W5CGO Brownsville-Corpus Christi, W5ABH Bay City, W5BD Angleton, W5AHK Wharton-Galveston, W5BUZ Port Arthur. Louisiana: W5AMZ Opelousas—New Orleans. Alabama: W4OA Mobile. Florida: W4ASV Pensacola, W4BPI Perry, W4AFV Tampa, W4ANI Key West. Regular schedules are held once a week. In order to keep the net actively functioning it is also used to handle everyday amateur messages along the coast.

FLORIDA HURRICANE RELIEF

Members of the Lake Worth Amateur Radio Club of Lake Worth, Florida, have organized a special group for relief in case of hurricanes. Past performance has convinced the citizens of Lake Worth that amateur radio is an essential in the communication facilities of the community, and that city provides a room and power to the group for use in carrying out its work. Throughout the entire storm season the club keeps a record of weather reports from NAA. Also, when a hurricane is imminent, late weather reports and urgent news is obtained from the Weather Bureau in Washington by WLM (Army Amateur Control Station) at half hourly intervals and is sent direct to the club station, W4AWO. Since time is a very important factor in time of hurricanes, amateur radio is found an invaluable ally, for the information gets through first by amateur radio! A state-wide Florida net used in past emergencies is always ready for future operation.

THE WEST INDIES NET

During the hurricane season in the West Indies and vicinity, an amateur radio emergency net is in regular operation. This net has more than once been used to advantage, especially in obtaining storm warnings and

weather reports (via NAA). Among the most active net members are VP5PA, Jamaica, and V1BA, Bahamas. Numerous Cuban stations also play an important part in the operation of the West Indies net, as well as valuable cooperation being given by the "Florida emergency net stations."

PENNSYLVANIA STATE PATROL

The Pennsylvania State Patrol is being organized by WSCEO in conjunction with the West Penn Power Company. This net will cover Pennsylvania and West Virginia and will be ready to handle emergency communications in that area.

THE AIRWAYS PATROL

W8AOW, Syracuse, N. Y., A.R.R.L. Route Manager, Western New York, has organized what he terms "The Airways Patrol." He has observed while listening on the Airway's channel (3480 kc.) that sometimes planes in flight have difficulty contacting ground stations due to QRM from amateur transmissions. In time of bad weather such QRM could prove mighty serious, especially when the plane is depending on the ground stations for vital information. The Airways Patrol has been organized to prevent the occurrence of any disasters due to "amateur carelessness." The purposes of the Patrol are (1) to maintain a listening watch on the Airways channels when the weather is bad to ascertain when QRM exists, (2) to notify the offending amateurs immediately by QSO, if possible, or, this failing, to make formal report of the illegal operation to the proper authorities, and (3) to do everything possible to bring help to the planes whenever possible, and needed. A.R.R.L. Official Observers are extending full cooperation, especially during "heavy" flying weather, in listening on this frequency and "piping down" and reporting any off-frequency stations that might endanger Airways communications. This is a truly worthy move on W8AOW's part, and the cooperation of other amateurs will be appreciated by him. Also, if you careless fellows who get "out of bounds" would check your frequency more accurately, and, perhaps, more often, there would be little need for the Airways Patrol. How about that?

Traffic Briefs

LMZ

Amateurs the world over are requested to watch for the Norwegian Riser Larsen Antarctic Expedition signing LMZ near the low frequency end of the 14-mc. band. LMZ works Sundays from 2 to 3 a.m. and from 2 to 3 p.m. E.S.T. Contacts will be made en route southward and antarctic work from south of Madagascar will be from region where little is known of radio transmitting conditions. Please try to QSO and report LMZ via A.R.R.L.

The Second Annual Hamfest for Central New Jersey will be held at Turn Hall, Elizabeth, N. J., March 20,

starting about 8:00 p.m., under the auspices of the Raritan Valley Radio Club and Union County Amateur Radio Association. Cost will not be over 35 cents. Features will be prizes, short technical talks, entertainment and eats. Notify W2DRV of your intention to be there.

Article Contest

WE INVITE contributions on every phase of amateur communication activity. New ideas and viewpoints, criticisms of and remedies for conditions, hints on DX, suggestions concerning radio club organization, information on interference elimination, exceptional two-way communication work covering emergencies, athletic games and trips, timely attention to operating practice, commentary on radio-telephony, experimenting or development work in present-day amateur radio, data on low-power possibilities, 1750-kc. operation, etc., all are needed. Read the contributions presented in this department this month and throughout 1932 issues of *QST*. Then give us your views on different communications subjects of interest and importance to amateur radio.

In addition to publication of all the best articles on timely subjects (on any phases of amateur communications whatsoever) in *QST*, the author whose article appears to have greatest value to amateur radio of all those received marked for contest consideration, has his choice of one of the following: (1) A copy of *The Radio Amateur's Handbook* bound in leather cloth; (2) six pads of message blanks; or (3) six of the new type A.R.R.L. station-log books. This offer will be continued until further notice.

— Communications Manager.

The following contribution by Mr. F. H. Schnell, W9UZ, wins the C.D. article contest prize for this month. Your articles on any phase of amateur communication activity are solicited. Send yours today.

— F. H. H.

Superfluous—Meaningless Signals

By F. H. Schnell, W9UZ*

DURING a recent period of recuperation I have had a splendid opportunity to make some observations on amateur radio. I pass them along with experience of many years of "key pounding." In this regard, where a

*4915 N. Sawyer Ave., Chicago, Ill.

criticism appears, a constructive suggestion is offered; — a remedy for each ailment.

CQ is one of our most effective calls, and yet it seems to be the most abused by improper use. By actual count I have recorded 119 CQ's before a sign. Most of you know that long CQ'ing is the rule rather than the exception. We won't go into that; we all know it is bad. Let's take this form which is suggested by the Communications Department: CQ CQ CQ DE W9UZ W9UZ W9UZ CQ CQ CQ DE W9UZ W9UZ W9UZ CQ CQ CQ W9UZ W9UZ W9UZ AR. There are three CQ's and three signs, repeated three times. By getting into resonance with the second hand of the electric clock, this takes just one minute, one complete call and sign every twenty seconds. There are times when a two-minute call is used, following this same procedure. The point is, *get a system and stick to it and it will work*. Other amateurs get to know your habits. If they are good habits they will be followed. The proper use of CQ is extremely effective as you will learn once you try it.

Next, we find the amateur, who, in answering your CQ and when calling you, will call and call and call before he signs. The same procedure, with slight modification, will serve admirably in answering a CQ. Here's how to do it: W9UZ W9UZ W9UZ DE W1MK W9UZ W9UZ W9UZ DE W1MK W9UZ W9UZ W9UZ DE W1MK — this also requires about one minute. It is somewhat of a relief to run across an answering station using this form as compared with the one which calls and calls and calls for several minutes. Unfortunately there are all too few of the first kind.

Here is another example of excess waste of power and a cure. Usually this is what we hear: "UR PDC SIGS QSA5 R9 HR IN PODUNCK." Let us examine that closely and see what we can do to break it down into brevity and good sense. Every amateur knows what his own signals sound like, whether they are P.D.C., N.D.C., R.A.C. or R.R.A.C., or he *should* know. If he doesn't, he should give some thought to a monitor and *frequency meter*. Therefore, it is necessary to mention the character of the signal every time communication is established with another station? I don't think so, in fact, I see no point in mentioning it at all because reports are bound to be conflicting and the sum total still has accomplished nothing. Likewise "SIGS" can be eliminated from the report.

What really counts is the *reliability of communication* and not always the signal strength. As proof, there are times when you can copy a signal which is reported R3, and copy it solid, and there are times when the reported QSA5 R9 PLUS signal hasn't been copied because interference jammed the QSO at that point. Instead of using

Relative Standings of the Ten Highest Sections—Dec.-Jan.

Messages Per Station (25%)	Stations Reporting Traffic (25%)	Gain or Loss (Traffic Reports) (25%)	Traffic Total (25%)	Standing Based on Average of All Four Ratings %	Section Communications Manager
P. I. 405.5	Los Ang. (680)* 212	Wis. +21	Mich. 11616	Illinois 57.5	Hinds, W9APY-WR
Hawaii 239.8	Mich. (624)* 119	Ohio +19	Los Ang. 10762	Nebraska 52.5	Wallace, W9FAM
M.-D.-D.C. 235.2	Mo. (324)* 109	Ill. +18	Ill. 9171	Ohio 50.	Tummonds, W8BAH
Nebr. 201.8	Ill. (890)* 94	Neb. +13	Neb. 8277	Michigan 47.5	Conroy, W8DYH
Ark. 175.4	Ohio (868)* 83	Ill.-Wyo. +12	S. Minn. 7377	Los Angeles 47.5	Nahmens, W6HT
S. Minn. 163.9	Va. (158)* 77	La. +12	Ohio 6802	Wisconsin 35.	Kurth, W9FSS
W. Pa. 136.7	Wis. (353)* 58	Alaska +11	Mo. 6188	Missouri 30.	Cannady, W9EYG
E. Pa. 134.7	Wash. (374)* 55	Ore. +10	E. Pa. 5391	So. Minnesota 27.5	Beck, W9EPJ
E. Mass. 123.2	Conn. (370)* 51	Colo. +10	Conn. 5087	Philippines 25.	Thompson, KA1XA
Alaska 122.3	W. N. Y. (563)* 46	Tenn. +10	W. Pa. 5060	Hawaii 22.5	Slaten, K6COG



ILLINOIS carries the Banner! December-January was another record breaking month in traffic activity. 2153 stations report a grand total of 179,597, an average of 83.4 m.p.s. Never before in A.R.R.L. history was there such an active traffic month. Los Angeles again has over 200 traffic reporting stations while Michigan and Missouri each have over 100. Virginia, although smaller in size,* breaks through with 77 traffic reporting stations. The following Sections lead all other Sections in their Divisions, order of listing showing relative standing of their different Divisions: Illinois, Western Pennsylvania, Nebraska, Connecticut, Southern Minnesota, San Diego, Oregon, Colorado, Southern Texas, Northern New Jersey, Virginia, British Columbia, Tennessee, Georgia-S. C.-Cuba.

* Size membership of these A.R.R.L. Sections, as of mid-1932, is shown parenthetically.

BRASS. POUNDERS' LEAGUE

(DECEMBER 16TH—JANUARY 15TH)

Call	Orig.	Del.	Rel.	Total
W3CXL	593	364	1507	2464
W2DIU	623	374	1454	2451
KA1HR	565	315	1168	2048
W9FUT	105	84	1821	2010
W8EJF	112	81	1740	1933
K66WQ	414	289	1192	1895
W9VS	81	182	1441	1704
W50W	542	126	979	1647
W9ERA	9	75	1466	1550
W9ENH	212	35	1257	1504
W8PP	56	68	1335	1459
W9FRA	46	2	1276	1324
W6PQ	148	73	1084	1305
W6BMC	17	21	1264	1302
W9FUW	117	59	1080	1256
W3BKQ	201	74	953	1228
W9BMA	315	133	754	1202
W8EWT	85	72	1012	1169
W9LN	17	12	1132	1161
W4WZ	24	46	1041	1111
W8BJO	233	87	758	1078
W1CJD	30	71	961	1062
W5BMD	34	82	909	1025
W3NB	206	89	692	987
W1UN	293	122	508	923
W8CPE	106	104	710	920
W9HYR	68	73	754	895
W2BJA	54	73	727	854
W9HGG	18	60	762	846
W8BPU	61	191	591	843
W7ACH	21	56	764	841
W9FAM	26	14	784	824
W6CDA	29	36	758	823
W6ETL	126	166	530	822
W9HKK	91	55	658	804
W6DZ	139	69	690	800
W3ATY	51	23	701	775
W6CDU	352	42	310	774
W1AFB	209	96	426	731
W9AUX	15	28	657	700
W3BWT	54	58	574	696
W8FF	173	112	438	693
W6GVU	361	11	296	688
W8VP	51	536	98	685
W1ASF	77	36	529	642
K7BFO	51	526	64	641
W8DDS	78	131	638	638
W9DGS	40	66	427	636
VE3AD	26	48	524	630
W9BNT	105	286	552	626
W9BKK	91	36	233	624
W1MK	140	156	318	615
W9AND	54	22	337	613
W9JID	122	112	591	607
W6FGT	10	22	368	602
W9BN	28	56	560	592
W8BRH	91	142	490	574
W8HGG	158	126	346	569
W8EE	126	89	273	557
W9DHA	18	30	391	555
W9HTU	15	29	505	553
W3CL	61	135	506	550
W8AYO	37	352	548	548
W6CFT	67	55	455	547
W9EYG	29	86	428	547
W8FX	98	49	338	538
W8CEU	61	205	389	536
W1BEU	131	29	266	532
KA1JR	97	47	364	524
W9FGS	101	158	372	516
W8BMG	69	16	256	515
W9BB	17	66	400	515
W9KG	392	45	430	513
W9FA	12	28	76	511
W1ASI	87	126	471	511
W9PHV	12	24	472	508
W8DBX	6	25	292	505
W7BSX	8	22	474	504
W9KBM	9	85	408	502
W8FTW	71	23	408	502
W8DVL	96	14	392	502
	20	54	426	500

These stations "make" the BPL with totals of 500 or over. Many "rate" extra credit for one hundred or more deliveries. The following make the BPL for deliveries of 100 or more messages: the number of deliveries are as follows:

W6HM, 319	KAILG, 123	W9GVL, 109*
VE3GT, 205	W9AWP, 121	VE5HP, 106
OM1TB, 153	W6BSV, 119	W9CSY, 104
W9FRC, 147	W6DKM, 119	W1AMG, 102
W6EKZ, 135	W6NW, 118	W9HCE, 102
W1FEX, 133	W9YA, 117	W9AUC, 101
W6CEO, 132	W9ANR, 116	W6AMM, 101
W9GVL, 127	W9IVF, 116	W3CJS, 101
W6NFF, 124	W6EDW, 114	W4MR, 101

A total of 500 or more, or just 100 or more deliveries will put you in line for a place in the B.P.L. Make more schedules with reliable stations. Take steps to handle the traffic that will qualify you for B.P.L. membership also.

* Listing for this station for November-December.

QSA5 and R9, suppose we substitute some other signal such as QRK4. That indicates something on reception. I think it is worth trying, especially since we should do what we can to decrease the number of wasted watts and, with more and more stations coming on the air, it will be of some help. The rest of the above report can be dismissed entirely.

What have we done? Let's look at the report and compare it with the suggested one. First we have: "UR PDC SIGS QSA 5 R9 HR IN PODUNCK" . . . There are 24 letters and 2 figures, and does it suffice? We substitute a signal — "QRK4" — of 3 letters and 1 figure and pass along better information. In other words, the amount of unnecessary transmission has been reduced more than 80% and the meaning is more effective. If somebody wants to know your QRA and doesn't find it in the call book, he will ask for it, to be sure.

Brevity and clearness are two requirements of the sincerely interested traffic handler and it won't hurt any of us to clear up the air a bit by eliminating meaningless and superfluous signals.

INTERNATIONAL TESTS ON 28 MC.

The Experimental Section of Reseau des Emetteurs Francais announces a series of 28-mc. tests for the week ends of March and April. The test periods will be from Saturday at 8:00 a.m., E.S.T. (1300 G.M.T.) to Sunday at 7:00 p.m., E.S.T. (2400 G.M.T.). The test call will be "CQ" or "Test" TEN or 28 MC. North American stations should transmit only the first ten minutes of each even hour. The other five continents will transmit in rotation during the rest of the "even hours," so N. A. stations should use that time for listening. Each "odd" hour is reserved for attempts at two-way communication. Please report results of these tests to R.E.F. direct or via A.R.R.L.

CODE PRACTICE

The following schedules supplement the list of "1715-kc. Stations Sending Code Practice," December QST, and the additions to that list, page 60, January QST: W7CAC and W7BHG (alternating), Oroville, Wash., 1915 kc., Mondays, Wednesdays, Fridays, 7:00-7:30 p.m., P.S.T.; W8FAZ, Cleveland, Ohio, 1775 kc., Fridays, 10:00 p.m., E.S.T. We are interested in hearing from other amateurs who are able to send code practice for beginners on the 1715 kc. amateur band.

W2CZD, Bronx, N.Y.C., 1901-kc., Sundays, 10:30-11:30 a.m., E.S.T.; W7AEM, Tigard, Oregon, 1900-kc., Mondays, Wednesdays, Thursdays, 8:00-9:00 p.m., P.S.T.; Effective with this issue of QST the following stations in Toledo, Ohio will discontinue their code practice service: W8ARF, W8DDX, W8DPN, W8FO.

ATLANTIC DIVISION

WESTERN PENNSYLVANIA — SCM, C. H. Gros-sarth, W8CUG — It is with sincere regret that we learn from W8BBW's report of the passing of W8CBH. W8CPE leads the pack this month. W8HGG finally makes the BPL. W8HEE is now AA control station for W. Pa. W8DLG says QTA on schedules. The holiday vacation bumped W8YA. W8EIS is keeping up to scratch. W8GBC is new ORS. W8DYL applies for ORS. W8ELZ wants morning schedules. W8DYF reports for W8HAJ. W8CCD is looking for schedules Fast. W8FKU expects to build a new receiver. "If Xmas would come oftener we would have more traffic," says W8CLG. W8CMP had to invent a "better" electron coupled oscillator for his new SS receiver. W8BKS is pounding away. W8AJE promises a crystal signal. W8BML reports all five hams in Tyrone on crystal. W8EDG says new Zepp is FB. W8DGW, W8 DXI, W8CFR and W8VI-GN report. W8DYV reports a new ham, W8ASV, in Tarentum. W8DVZ has been working 7 mc. W8DRO uses low power. W8GUB has some nifty QSL cards. W8CQP is becoming quite a traffic fiend. W8AEG reports for W8DNV. W8HOS wants sched-

ule with W8HGG. W8GYH worked seven countries. W8FCV says DX is improving. W8HPQ fell heir to about 300 dry cells! W8AVY went back to work. W8GSV and W8DKL are active. W8KD is coming back, YL or no YL! W8AMP and W8BWB report for first time. W8CUG has new PP amp. W8BSZ is fooling with 56 mc.

Traffic: W8CPE 920 HGG 557 HEE 555 DLG 332 YA 322 EIS 316 VI-GN 261 GBC 243 ELZ 235 CCD-HAJ 206 FKU 164 CUG 163 CUG 152 DYL 102 DKL 50 DYF 34 CMP 25 BKS 27 AJE 26 BML 23 EDG 20 DGW 18 DTV-DVZ 14 DRO 13 CQP 12 AEG 11 GUB-DNV 10 HOS 7 GYH 6 PCV-BSZ 5 DXI 3 HPQ 2 AVY 1.

SOUTHERN NEW JERSEY—SCM, Gedney M. Rigor, W3QL—W3APN is lining up World Fair schedules. W3UT won a medal in SS. W3BDL is building a new c.c. job. W3ZI made nice record in Army contest. W3ARV may go in for 'phone. W3BYM says skip bad. W3BDO made a fine report. W3AEJ enjoys schedules. W3AOV is station of the 112th Field Artillery. W3PC is new ORS. W3ALG is having condenser trouble. W3ADL and W3BPD are on 14 mc. W3BPT's outfit went haywire. W3ATJ is QRL business. W3APV reports a new ham, W3CVB, in Atlantic City. Some nice delivery work was done by W3AXU on 1.7 mc. 'phone. W3IS took traffic from Los Angeles on 3.9 mc. 'phone, phoned to Newark and got reply back to Los Angeles in few minutes. W3ASG has his hands full with Cup contest. W3BWW reports for first time. W3BUU has heavy line noises. W3BFF has two '52s in his outfit. W3BSC reports complete rebuilding. W3BYR watched his fifty go west. W3AYA is having lots BCL QRM. W3BO is interested in Army work. W3BIC is back with more traffic. W3CLQ is rebuilding. W3VX at the mike of W3XAE handled important traffic on 56 mc. from W3XAF. The Greater Camden Amateur Radio Assn. elected W3ASG president, W3BSC vice president, W3COD recording secretary, W3CLO corresponding secretary, W3NS treasurer, W3BPH sergeant at arms, Directors, W3AAY and W3CMR. They meet the second and fourth Tuesdays of the month at 25 Broadway, Camden. All are invited. W3BYK was heard in Germany on 3.5 mc. W3BWR and W3ATJ are holding 56 mc. schedules. W3AWL took a cruise to Panama on USS Wyoming. W3CNR rebuilt his 7 mc. c.c. rig with 211E in final.

Traffic: W3QL 227 UT 138 BDL 83 APN 72 ZI 56 ARV 48 BYM 43 BDO 48 AEJ 34 AOV 32 PC 18 ALG 13 ADL-BPT 11 ATJ 10 APV 6 BPD-AXU 4 BWW-BUU 3 AYA 7 BYR 29 CLQ 5 XAE-XAF 2 BGP 1 BAA 20 GU-AKI 1 BIC 5 BO 3 AKF 6 IS 3 ZX 2 ASG 20.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA—SCM, Harry Ginsberg, W3NY—W3BAK, E. L. Hudson, R.M. W3BWT, Eppa W. Darne, Chief R.M. The hams at the University of Maryland have formed a radio society. At recent election of Westminster Amateur Radio Club W3BOR was elected president, W3CPQ vice-president, W3CDG secretary, W3BRS treasurer. The Frederick Amateur Radio Assn. has new QRA on 3rd floor of Frederick, Md. City Hall. W3HI and W3DG are running aeroplane 56 mc. tests. Non-ORS should write the RM for test schedule. District of Columbia: W3CXL complains of skip. W3BWT is making preparations for the Governor-President Relay. W3IL hammers out a few. W3AJL will soon be c.c. W3ASE has portable W3CVH. W3NR underwent appendectomy. W3CDQ is considering a move to 3.5 mc. Maryland: W3CJS makes BPL on deliveries. W3CDG rebuilt c.c. rig. W3CQS is doing excellent traffic work. W3SN is rebuilding. W3CTD has new Antenna Poles. W3BGI's new receiver works FB. W3BRS reports WARC code class going strong. W3CV has been sick. W3CIZ added a pair '45s. W3AFF is still hanging on. W3AOO was on during holidays. W3WN is experimenting with QRP. W3AVD is still pending on ORS schedule with W3BWT. W3ADO will handle Gov. Ritchie's message to our new President. W3ZT is using QRP on 14 mc. W3CKJ is new ham in Baltimore. W3BHE's license expired. W3BT has new layout. W3LA is using 4 50s with 1 KW input. W3NY is QRL work. Delaware: W3BAK is hitting his stride with FB total. W3CPG gets good results from '45 MOPA.

Traffic: W3CXL 2464 BWT 693 CJS 190 BAK 353 CDG 157 CQS 126 SN 113 CTD 35 BGI 26 BRS 24 IL-CV 11 CIZ 8 AFF 7 AOO 6 WN 5 AVD-AJL 3.

EASTERN PENNSYLVANIA—SCM, Jack Wagenseller, W3GS-W3BF—W3BKQ and W3CL make the BPL. The SCM visited several radio clubs. The Quaker Radio Association is new Phila. Club. W8CFF says his light bill looks like the treasury balance. W3MC was on only 30% of month. W3BEY increased power. W3CAA tried 3.5 mc. W3JF worked Holland on 3.5 mc. W3FY is QROing. W3TX is changing transmitter. W3ANS says traffic is picking up. W3ATR reports for W3BUK. W8VD is experimenting with cameras. W3AQN reports for W3CIK. W3AKB has switch to change from c.c. to regular MOPA. W8FLA has DX fever. W8EOH joined the AARS. W8FJF works west coast regularly. W3AHD is settled now. W3ZZD is in Florida. W3GJA can't get a message into Phila. on 7 mc. W3BPF was heard in China on 3650 kc. W3CQU and W3CQD report for first time. W3CHU reports in person. W3AAV, W3BRH, W3ALX, and W3YC are in line for ORS. W8CVS broke his record at playing chess over the air. W3BYS raised his power. W3OK says skip hinders schedules. W3ADE is going on 56 and 1.7 mc. W3NA reports the Quakertown Club now on the air. The Chester Radio Club wants some traffic handling competition from other clubs. Look at W3BKQ total! W3QP has new frequency meter. W8CFF is an OBS. W3WG moved to Bernsville. W3BBV is new OO.

Traffic: W3WG 21 MC 336 BKQ 1228 BEY 7 CAA 35 FY 17 TX 130 ANS 17 BUK 6 ATR 9 AQN 121 CIK 35 AKB 226 AHD 31 ZZZ 11 CJA 9 CL 548 BFX 24 AZF 28 CQU 9 CHU 148 AAV 74 YC 206 BYS 7 AVI 5 ALX 229 OQ 439 ADE 54 NA 32 QP 15 BRH 315 BBC 2 BF 47. W8AIT 15 VD 14 FLA 98 EOH 45 FJF 89 CVS 433 CFF 212.

WESTERN NEW YORK—SCM, Don Farrell, W8DSP-GYV—W8BJO handled a bunch of important traffic. W8FDY would like to hear from those around Utica interested in A.A.R.S. W8BFF is on every morning. W8BHK writes that the S.T.T.A. are holding a QSO Contest. W8DEH handles a little traffic. W8CPC and W8CN have completely rebuilt. W8DHU and W8BLH are QRL. W8DII is going strong. W8BR visited the SCM. W8AWX schedules VP4BA. W8GWT has been rebuilding. W8BQJ handled important AARS traffic. W8BFG moved to Auburn. W8BLP reports DX poor on 14 mc. W8DEJ reports FB QSOs on 1.7 mc. W8DSA will be in the hospital for several weeks. W8AFM is getting things lined up for Atlantic Division Convention. W8AED is awaiting new plate transformer. W8BGN is building new receiver. W8AYU had over 200 foreign contacts between July 17th and Dec. 10th, 1932. W8EWT beat W8BJO in traffic and wins the monthly prize donated by the SCM. These prizes will be awarded for five more months. W8DBX turns in a fine bunch of traffic. W8AOW is on "Airways Patrol." W8CJJ had several European QSOs. W8AGS had a bad case of flu. W8EUY contacted a bunch of foreign stations. W8DSS is lining up his old schedules. W8GWZ is spending the winter in Florida using portable W4PAU. W8DME has 500 watt outfit on 14 mc. W8CKQ is building c.c. job. W8AJS reports for first time. W8GPV, W8GWS and W8FFU want ORS. W8FYF and W8FTB have c.c. W8GEH wants N.Y.C. schedule. W8DMJ has reported each month for four years. W8AKX is getting out fine. W8ACY had a 100% QSO with England. W8ERU and W8HNZ have c.c. on 3.5 mc. W8EFO is on 7 mc. W8EEB is having transmitter trouble. W8ERP worked six countries in two nights. W8BDK reports the gang in Gloversville will hold a hamfest. W8DEQ joined A.A.R.S. W8HKF has been QRL business. W8EKM graduates from high school. W8DPS has a 200 watt rig. W8AAP is home from college. W8DSU gave a fine talk on vacuum tubes at the Dec. 23rd meeting of the Mohawk Valley Brasspounders. W8EXT lost \$90.00 in a QSO with a stickup man. W8GWP had his first W6 contact. W8ADG has an s.s. receiver. W8DST has a 65 ft. chestnut pole. Several of the Syracuse gang attended the Rochester hamfest. W8CP was seen wearing a new derby. W8FOY

is winding transformers for the SCM. W8QP can't get c.c. job perking. W8GZM is planning on attending radio school at Port Arthur, Texas. W8EWE operators are QRL the woods. W8CDB is building a 1.7 mc. 'phone for W8AXU. W8EMW is handling traffic again. W8AKC has a new junior op. W8BGL expects to lose his job again. W8FMF reports. Watch for the SCM on Sunday AMs on 3672 kc. W8DLA lost his mast in a recent high wind. W8QL is back on 3.5 mc. W8AXO will be on for the DX Contest. W8AFY and W8KW have been working Duplex 'phone on 56 mc. W8DES has been rebuilding. W8ABX is QRL the installation of new WHAM transmitter. W8BEN gets on for a day or two a week.

Traffic: W8BJO 1078 FDY 270 BFF 122 BHK-DHQ 35 CPC 34 DHU 32 DII 24 BR 18 AWW 14 GWT-BQJ 3 BFG 3 CJJ 64 AGS 39 EUY 35 DSS 30 GWZ 27 EWT 1169 DBX 504 AOW 478 DME 26 BDK 18 DEQ 15 HKF 3 FTB 4 QL 35 ERU 41 AKX 3 GEH 1 FYF 2 GWS 11 FFU 7 GPV 70 DMJ 27 EMW 58 CDB 43 EWE-AKC 7 BGL 4 FMF 75 DLA 15 AFY 71 AXG 9 ABX-DES 1.

CENTRAL DIVISION

KENTUCKY — SCM, Carl L. Pfumm, W9OX — All RMS and NCS A.A.R.S. are meeting in Louisville to organize state net and prepare for World's Fair traffic. W9BJA has been appointed RM. W9BAZ is Chief RM. Speaking of shacks, W9FBJ uses an Essex Sedan! W9EZG is coming on air. W9FQQ has new transmitter and receiver. W9CEZ is new station in Lexington. Santa brought W9IFM new power supply. W9CNE is working up 56-mc. state net. W9AUH is resting from effects of SS. W9BAN built e-c frequency meter for cost of 45 cents. Probi agents note — W9IQK was seen hauling a load of corn. W9DQC is having trouble erecting mast. W9DLU can't get out on 7 mc. After years of rebuilding W9ARU is on to stay. W9ERH is hunting 14-mc. DX. W9ZZBZ is building three transmitters with break-in. W9KYA has his station on 40-foot tower. W9IPG has new bread-board rig. W9ELL is struggling on new '51 transmitter. W9FZV requests booby prize for traffic. W9EYW is building new speech amplifiers. W9DK attended I.R.S.M. Convention in Chicago. W9QT is experimenting with x-rays. W9FKM installed '10 pp amp. W9BZS is rebuilding transmitter for all bands. W9BPB is experimenting with 3.9-mc. 'phone. W9CKH and W9OX build dynamic mikes.

Traffic: W9BJA 172 BAZ 172 JYO 159 OX 133 FBJ 81 HAX 63 FQJ 62 IFM 49 EQO 45 CNE 44 AUH 30 BAN-ARU 27 ERH 20 ZZBZ-IPG 15 ELL 7 FZV 3 IQK-BYW 1.

ILLINOIS — SCM, F. J. Hinds, W9APY-W9WR — RM N. E. Section W9DDE Ed Wilcox — RM N. W. Section W9ERU E. A. Hubbell. Old 9CA is on the air again under same call. Emergency traffic was handled at W9KJA in regard to Port Arthur Texas fog signal failure at Passage Island Lighthouse. W9KWZ is trying to get d.c. note. W9EQQ and W9FKI have new a.c. receivers. Equipment at W9BIN is "home-grown." W9OQ is building s.s. super. W9ZZBS worked W10XV. The Ogle County Radio Club has a Doctor, a Druggist and an Undertaker as part of its membership. Hi. W9EWN gets out well. W9FRA had to cancel some schedules due to key clicks from W9HFK. W9DOU rebuilt. W9AAR completed new rig. W9ATS is getting 1.7-mc. 'phone into operation. Over half of W9JKW traffic was handled with W9KEQ. W9AXM rebuilt to c.c. W9BYX is going on 14-mc. c.w. and 1.7-mc. 'phone. W9AD and W9DFH blew transformers. W9PU and W9BDU are on again. W9KHD spent Christmas cash on new rig. W9DCI received two new bottles from Santa. W9GVX did splendid emergency traffic work with W9MW, W2AFV and W9FSK in getting supply of lemons up to Red Lake, Ontario, to combat a flu epidemic. W9AYO was QSO K5. W9HSG and W9CHM were QSO CM. W9BPB says "c.c. forever." W9ERU is building new c.c. rig. W9BSR has a new crystal. W9BRX worked G5BY on 'phone. W9HYA purchased an aeroplane. W9IVG is experimenting. W9KEH worked 9 countries. W9KIM is building MOPA. W9FWD has a 50-foot mast. W9LW

is working DX. W9KSB bought an 800-ke. crystal. W9FOD tried 'phone. W9HSN has two '61s in last stage. W9HQH finally worked W1MK. The "Squawker" is a fine Army-Amateur bulletin put out by W9ANR. W9FYZ will soon be c.c. W9DZU has been appointed 5th dist. NCS A.A.R.S. W9CBW is on 3.5 mc. W9EZV says skip bad. W9PK is building small 1.7-mc. 'phone. W9FPN says Chicago Suburban Radio Ass'n going full blast. W9EGA is at work on the carrier-suppression system. W9CUH is at work on new outfit. W9CNO has a s.s. receiver. W9HUX uses three '80s in bridge rectifying system. W9JCK says Peoria Ham Club meets every 2nd and 4th Saturday and has broadcasts over "WMBD" at 12:00 midnight, Saturdays. W9DZG is erecting new antenna. W9FCW is on 1.7 mc. W9HPK is getting 'phone bug. W9AFN puts 400 watts into final. W9ALW and W9LAI use 1.7-mc. 'phone. W9IUF has 300 watts input. W9GSU is joining A.A.R.S. W9VS is getting tired of skip. W9DPD rebuilt. W9IVU worked first CM. W9FGD is building 56-mc. portable. W9EWV is back at W8CFL. W9IYP uses '10s PP. W9JLA blew filter. W9ICN has c.c. New c.c. job at W9DJG. New 'phone at W9ATS. W9JO and W9IVF are experimenting with 56-mc. W9FKO says: "Do your ticket shopping early." W9INJ is putting in c.c. The tubes at W9HFK gave up the ghost. W9IWX is holding QSO parties with his brother through W8QT. W9FXE is grinding crystals. W9HZZ uses 1.7 mc. exclusively. W9CSB's c.c. rig is going "Hot." W9CF is on at Wilmette. W9LET is new station. W9AFB put in '04A. W9DBO's brother is W9LNI. W9LIG is new ham at Mark. W9CZL reports weather poor. W9GDI says 5 hams in his town. W9ISM is playing with 1.7-mc. 'phone. W9HOS is working 14-mc. 'phone. W9FMN reports W9LBE and W9LIV new hams. W9BTY says the Rock River Radio Club puts on a stag party in Sterling, Ill., the second Thursday of every month. W9EXS is trying 7 mc. W9FGV is trying to get MOPA going.

Traffic: W9VS 1704 ENH 1504 FRA 1324 AND 607 ANR 283 IVF 281 IYA 264 FCW 260 DOU 203 CGV 173 HFK 166 ALA 147 CRT 129 GYX 127 BTT-EWN 101 IEP 92 ATS 81 FXE 76 KEH 74 DBO 73 HKC 72 FGN-FO 56 HOS 53 GDI-HZB 43 BPU-HMB 42 AFN-EWV 41 KJA 40 CZL-FKI 39 AMO-HQH 38 AD 34 CSB-DZU 33 APY 32 FKO 29 IVG 23 FGV-IWZ 26 IBA-JKW 25 AVB 22 LW 21 PA 20 BYZ-FYZ 18 FDJ-HUU 17 AXM 16 AFB-KA 15 ILH-JKJ 14 JCK 13 FGD-IJA 12 DJG-EMN-HUX-JO 11 DZG-HPK-IVU 10 CEO-FF 9 ACE-CHD-INJ 8 CNO-ICN-IYP 7 ALW-CF-HYA-FWD-ISM 4 AZI-DCI-IUF 3 BIN-BRX-DPD-GEF-IYP-KIM-LNI 2 ACU-BSR-ERU 1.

WISCONSIN — SCM, Harold H. Kurth, W9FSS — District No. 1 — W9GVL RM. W9GVL makes the BPL. W9FSS received a present from W9JDP and YF. W9HRM returned from Toledo. W9EYX is drawing sparks from anything metallic on his shack. W9ESE is good O.O. W9VD sends OB. W9RH is grinding crystals. W9ESJ is interested in ORS. W9EYH calls attention to his high totals. W9DTK W9LAD and W9DOR are on 56 mc. W9JBI has a d.c. note. W9HFI boasts new receiver. W9HQB is a service man. W9ESF hasn't told us about his new plans yet. W9ENP finished high power c.c. rig. W9EQP is known as "Barnacle Bill." W9HFA is on 14 mc. W9BVR is "spark coil Bill." W9GIL is running a pool hall. W9GHN pulls teeth. W9GKE is known as "Silent Cal." W9GSQ is going to use low power. W9HFJ is not seen in his old haunts. W9HHG transmitted the lion's roar from the zoo nearby. W9HKD is busy with poultry. W9IVN plans a new station. W9IZO and W9JWZ report. W9FMI's sister passed the exam. W9JPK is heard occasionally. W9NY razzes W9GVL. W9KVV is active in U.S.N.R. W9KVV has a hot 3.9-mc. 'phone. W9AFC brags about A.A.R.S. W9AFW is an experimenter. W9ANA has evaded the secret six of "QRZ." W9ATO is wanted at U.S.N.R. and M.R.A.C. meetings. W9BVB says business bum. W9BYE sold his 56-mc. rig. W9CPV cured BCL trouble. W9CRG declares traffic handlers should be doused! W9DAI is an-

nouncer at WTMJ. W9EPO attends State Normal College. W9FSV tells funny stories at M.R.A.C. W9GDT is reported married. W9ITZ has portable W9LKB. W9ITU is building into c.c. W9KHE is on 3.5 mc. W9LJU, ex-9EHM, is on 7 mc. W9FHG is located in Milwaukee. District No. 2—W9AVG RM. W9HGG makes the highest total of the past year. W9GWK has studies to attend to. W9BIB has YL QRM. W9AVG operates on all bands but 23 mc. W9KXA kept four schedules. W9AMB, ex-9ANU-K7LT, is Morse man. W9EEQ has five schedules. W9IYL uses 5 watts. W9GFC is a high-power station. W9DGL is building an e.c. set. W9QC built a 400-watt 'phone. District No. 3—W9AUX RM. W9AUX makes the BPL. W9ERS is a fast op. W9DXV sleeps days. W9JDP is recovering from holidays. W9HMS is almost finished with 56-mc. job. W9IQW has trouble keeping his crystal warm. W9JCH is showing an interest in traffic. W9KLL spent most of month chewing fat. W9BQM handled some U. S. Marine traffic. W9DJA is building 'phone. W9HKL wants "QRZ." W9FTH sends first report. W9ISD has been working 1.7-mc. 'phone. W9IHG has local QRM. W9GI is on 3.5 mc. W9HVB is working 7-mc. DX. W9GFL is back on. W9ARE talked on code practice at the NWRC. W9JXU draws big sparks off his antenna. W9KJR is interested in ORS. W9HSK applies for ORS. W9HNX has 'phone bug. W9IDG also. District No. 4—W9AZN RM. W9AON kept schedules. W9EOX would like to work an Aussie. W9GPQ handled weather messages. W9DNU is school teacher. W9ZY is in state ORS Net. W9HDP works three bands. W9DIT worked K5AR. W9FAW promises to be on regularly. W9ESZ blew high tension power pack. W9JNU dropped his crystal and "it go boom." W9GUT is known as "police." W9APB is giving 7 mc. a run. W9DRO has been oping at W9ZY. W9IQH has trouble with receiver. W9HSL lives on a farm. W9HYM got a crystal. W9ASQ reports. New Wisconsin hams: W9KNS, W9KYY, W9JBF, W9LOH, W9LAS, W9LNG, W9EHY, W9RM-ZZZ visited some of the Milw. hams. W9DKA is QRL YL. W9GAF is still at Sparta (YL). W9IUZ is the Sheboygan High School. W9JDP's YF presented him with a bug.

Traffic: W9HGG 846 AUX 696 GVL 436 KJR 188 FSS 165 HSK 156 ERS 152 DXV 125 HMS 120 AON 103 EOX 93 JDP 86 GWK 71 GPQ 66 FAV 57 DNU 55 ZY 54 ATO 51 HDP 47 DKH 42 DIT-BIB 41 AVG 39 KXA 35 AMB 33 EEQ 32 HRM 30 BVR 26 IQW 24 EYX-JCH 22 JCW-IYL 21 KLL 20 BQM 19 GFC 18 FAW 17 ESE 16 ESZ-DJA 14 VD 13 JXU 15 RC 12 FTH-JNU-ESJ-HKL 10 GUT 9 APB 7 EQP 6 ISD 5 HFA-IHG-ASQ 4 DRO 3 IQH 2 EYH 1 HTZ 34 EHD 14.

INDIANA—SCM, Arthur L. Braun, W9TE—Club News: W9CRP reports the gang around Warsaw have organized "The Tri City Amateur Radio Club." Members are W9FFA, W9KLS, W9CRP, W9JRG, W9JSQ, W9FBK. The Ft. Wayne Club has elected new officers. New officers of the Indianapolis Radio Club: W9TE, pres.; W9CRV, vice-pres.; W9DNQ, secy.; W9CUD, chief op.; W9CYQ and Mr. Johnson, directors. The Lafayette gang are trying to line up a hamfest. The Indianapolis gang have an unofficial QSO party every Sunday. W9DET can't make his rig perk on 3.5 mc. W9HIU is building a 50-watt c.c. rig. W9JIY is working on 1.7 mc. W9RS is planning a c.c. rig. W9KPD has new receiver. W9AET goes in for ORS party. W9JOQ is new ORS. W9HPQ uses both 'phone and c.w. W9FIY has lots of trouble. W9AUT has gone c.c. W9FUT is going strong with schedules. W9FQ and W9FRY have MOPAs. W9FZQ uses '45s in PP TNT. W9EGE blew a 50-watt. W9DEJ blew a filter cond. W9HUO has a new Jr. op. W9CKG is QRL Purdue. W9AEB is looking for an easy way to grind crystals. W9HUV increases traffic totals. W9JRR is building a c.c. rig. W9CRZ has his hat in the ring for ORS. W9CHA says no DX, no traffic no nothin'. W9KNJ worked a VK5. W9HML keeps schedules. W9CKB organized a local A.A.R.S. net. W9BKJ has new speech amp. W9GGJ is DXing. W9FYB says nix. W9EXL wants OBS. W9JNX goes c.c. W9AIP

is trying 7 mc. W9ABW is on when possible. W9GFS is lining up schedules. W9AXH is QRL the flu. W9JFA blew his filter. W9HUF has new SW3. W9YB has new manager now. Jack McMahan promises to do big things up there. W9HSF gets on now and then. W9HIU and W9DJU are putting in 50-watt c.c. rigs. W9GNY blew a power transformer. W9HKH shows an increase in traffic. W9QQ promises to be back soon. W9AKJ has new e.c. freq. meter. W9CIN works DX with couple '10s. W9JSD is on 7 mc. W9EPT is going to let the doctors cut on him. W9CB is going strong on 1.7 mc. W9DOD and W9TE get out FB on 3.9-mc. 'phone. W9ARR is organizing an A.A.R.S. 'phone net. W9KDD promises to stir up activity at Terre Haute. W9LLV is new ham at Goshen. W9JZP is coming on the air. W9HTX is building a new rig. W9DHH is prospective A.A.R.S. W9GGP is trying to make a DeForrest "H" perk. W9CZD is trying to get out on 1.7-mc. 'phone. W9ESU has departed to 1.7 mc. W9KPN has a new Zepp. W9IOB likes the way his c.c. rig perks. W9HZZ reports again. W9BZZ worked a K5. W9KJD gets out FB. W9KQE wants a c.c. layout. W9KYY uses a '45. W9AMT uses a couple of '216As. W9KOZ reports for first time. W9LMD and W9LMP are new hams in Indianapolis. W9FBP is going back to school. W9AHL has trouble with his 'phone W9KJF uses class "B" mod. W9DWL operates 3.9-mc. 'phone. W9ARK took a vacation in Fla. W9MQ gets on now and then. W9DSC has rebuilt. W9CTV is back on 3.5 mc. W9EMR tries to work DX on 14 mc. New Indiana hams: W9LKI, W9LLE.

Traffic: W9FUT 2010 ESU 244 FIY 206 YB 145 CKG 108 BKJ 51 EXL 32 EPT 23 GFS 19 HKH 15 CKB 87 HSF 9 GNY 8 AKJ 8 HML 18 KNJ 8 CRZ 41 JRR 7 HUV 47 AET 7 AXH-JFA 4 DJU 2 KDD 1 AIP 3 DHJ 76 EGE 7 FZQ 24 FRY 10 AUT 14 JRK 4 HPQ 51 JOQ 11 FQ 5 RS 18 JIY 12 FSP 23 KOZ 8 TE 34 LLV 5 KPN 1 JHY 150.

MICHIGAN—Acting SCM, Kenneth F. Conroy, W8DYH—Say! Lookie that total-ing—11,616 handled by 119 good amateurs! 136 stations reported! A bulletin containing dope on all stations reporting is mailed free to all stations reporting on 16th of month to SCM. DARA meets at Radio Specialties, 127 E. Jefferson, Detroit, at 8 p.m., second Thursday each month. W8EGI is now secretary JARA. W8BMZ is troubled. W8HSH reports U. of M. High-School Radio Club as W8IEK. W8GQQ, W8IFE W9LDC (1) W8HQB and W8FDPX are new reporters. W8AKN punctured one and shattered another crystal. OH! that W8FEE vs W8HFU "Battle of the century"! W8CEU BPLs with three schedules. No, W9CBE, W9HK's YF will not burn this ORS certificate! W8GBB yells 'cause W8DFE and W8HBZ grab all the traffic. W8EDO is stepping up! W8DA is MOPAic. W8GQS—yes and no. W8DSQ (C.W.C.) isn't taking any back-seats. W8GDR-W9IJE, "Abfalter Trunkline," am faltering "becuza" skip! W8AYO BPLs with nice schedules. It looks like W8HBZ will be next ORS around here. W8CST is slowing down for the big spur. Looks like "wimmen" got W8CJZ, spills W8WG! W8FAV is knocking 'em silly. W8FRW wants good, fast schedules. W8DED OBS's on 3800 kc. Wednesday, 8:30; Friday, 7 p.m., and Sunday noon. W8ECG turned civilized with filter on his amplifier! W8FTW makes the BPL and wants the banner again . . . So do we! Any suggestions for a QSO party? It looks like we (DARA) get that Ontario-DARA traffic contest trophy this time! W8DYH (Mrs.) announced change in O.B.S. schedule: Monday, Wednesday, Friday, 5:45 p.m., followed each time with beginner's code practice for 45 minutes on 3838 kc. W8PP still leads the pack! Yes, W8COW, that adv. in Bulletin by W8FX was because of a snag in latest romance! W8DFE brothers say, "You won't need a microscope to see next month's report." We're almost proud to say W8DZ is our bro.-in-law. W9BBP reports W9LKR and W9LNN as new. W9HBX schedules a flock. W8EVC is organizing N.E. Michigan. W8BMG gives advice to love-lorn, too late! W8GUC spent 100% on traffic. W9DAB threatens libel! See last Bull! W8GRN

claims ambidextrous-ity — only one in world can send with either foot! W8SS still pushes the old '10 TPTG. And do we thank W8CUX and W8CTD for FB contribs to Bulletin! Add to c.e. stations: W9IHM, W8IX, W8AZQ, W8BJ, W9DQT, W8FTW, W8EGX, W8FWG, W8HUD, W8BIK, W8QT, W8DWX and W9LBU bow. W8GUN '46s on 7 mc. W9DSJ says the U.P. gang is doing things. W8HLC: Don't forget your call on card next time, please. W8PQ is gradually getting back to his first love. W9ADV is sticking to 7 and 14 mc. W8GTN can't get the p.d.c. outta his rig! W8BGY handles nice schedules. W8RX has transmitter wired! W8HL is getting AARS organized. W8ARR pounds W8NR, W8DUR and ops at WPDX. W8AIU is coming back! W8NR needs more U.S.N.R.-ers. W8ICX is really doing things! W8CRP isn't so worse. W9EEM operates W9YX occasionally. W8GQB claims his is a "Zilch antenna"! W8BTK is building Grahams (cars). GET W8DA a job . . . he's gonna contrib when he gets one! W8PHI reports with no dirt. W9EQV promises to get going again. Sure, W8HKT, bring the gang to DARA second Thursday each month at 8 p.m. Flash! W8FX doesn't want to sell that ring — they made up.

Traffic: W8PP 1459 DZ 775 AYO 547 FX 532 CEU 524 BMG 513 FTW 502 GBB 438 DFE 380 CST 325 EVC 254 QT 220 FRW 213 BMZ 206 EGI 200 GUC 164 BGY 143 JX 125 DYH 105 HBZ 103 EDG 99 HOT 95 EHD 78 CPY 74 DA 73 GRN 69 ARR 63 AZQ-AKN 41 HUD 39 BIK 38 HPH 37 ICX 35 GQB 33 CFZ 29 BDH 28 FAV 25 GDR 23 DED-IDB 22 SS 21 BJT 20 BJ 19 NR-BTK-BHH 18 DUR 15 FPK-CUX 13 CRP 11 FTP-DWX-EGX-GWB 10 AFH 8 HFU 7 UD-CUP-NQ-FQD-FEE-GQQ 6 GUN-HL-ECG-GTN-DCQ-DSF-HSH-HQB-IFE 5 GMB-HA 4 FRI-HKT-GSP-WR 3 DSQ-PRF-HLC 2 GQS-ALL-DVQ-FWG-WGERQ-EZN 1 DCT 63 HZO 5 EJR 10 WO 2 CSG 11 FTV 293 AW 28. W9HK 804 CE 230 BHP 227 HXB 186 IHM 32 EEM 80 VI-CSI 71 DAB 70 HIS 34 EXT 31 HSQ 27 DCN 17 DQT 12 LDC-CEX 10 LGU 7 EQV 6 ADV 3 DSJ 2 GQF 20 FSK 1(24 AAM 4 IJH 11 CGP 38.

OHIO — SCM, Harry A. Tummonds, W8BAH — W8DDS Chief RM. District No. 1 RM W8DVL: W8DVL is still pushing 'em through W8PP. Reports are acknowledged from W8GUL, W8CEJ, W8BGC, W8BRB, W8RN, W8CXY, W8ZZA, W8ZZBA, W8HSX. W8HTM works his rig in a beauty shop. W8FF, Fenn College, leads the state. W8DDS makes the RPL. W8BAH maintains six daily schedules. W8CQF breaks the ice with a fine total. W8BMX wants schedules. W8BYD says W8HRI is being neglected. W8HUS has 50-watt MOPA. 50-watter at W8FGC. W8AGL is busy as usual. W8FVL has good total. W8EBY spends plenty time calling DX. W8FJX piles his up on 7012 kc. New a.c. receiver at W8FGP. Nice total from W8DVL. W8FXH is going well. Give W8DUP a buzz. W8BFT increases activity. W8CZT entertained members of CATA. W8EPP wants schedules. New c.e. rig at W8HVX. Back again reports W8DAT. First report from W8HGE. W8GKG is on 7060 kc. W8DQI almost got ten. An e.c. frequency standard at W8FFM. W8GDQ is a new reporter. W8CIO can operate on six different frequencies. Unlimited 'phone license for W8EFW. W8NGG ran out of report cards. W8BGZ wants 56-mc. tests. W8HXC reports by QSL card. We welcome back W8BAC. "Been on three weeks," says W8ICS. W8UC is now ORS. District No. 2 RM W8BKM: 2 to 3 watts on 3750 kc., says W8EJ. W8EEZ is at Fairport Harbor. W8UX applies for OBS. W8BKR reports by radio. W8BKM wants some support from the gang around Youngstown. District No. 3 RM W8APC: W8GOD has a job in Detroit. W8APC is called the "Boy Wonder." W8CMI schedules W8PP. W8DIIH schedules W9ENH. W8CSB schedules W8APC. W8BTT is at 184 13th St., Columbus. W8FO has a 56-mc. 'phone. The Maumee Valley Radio Assn. reports via W8EVS. District No. 4 RM W8EEQ: Fine report from W8DEM. W8WE delivered a message in Galion from an only son in Shanghai, China. "Moving to 56 mc.," reports W8AFU. W8UW is getting out FB. W8PO has portable

W8HSG. W8DAP reports a real total. W8QQ tells of fine work of Findlay Radio Club on Christmas traffic. W8EEQ has been under the weather. District No. 5 RM W8FGV: W8FGV schedules W8BAH, W8VP, W8APC, W8BKR. W8BLV and W8DCU report. New crystal at W8BMK. W8FDV got W8DRL to report this month. W8HWV uses two '45s in last stage. '52 perking at W8BSR. First report from W8DRL. Busy on 1.7 mc. at W8EXI. W8BZL reports by radio. W8HYV reports for QRK Amateur Transmitting Club at Liverpool. Visitors are welcomed at any time. Call at 901 St. George St. for information. District No. 6 RM W8BBH: W8BBH makes good RPL total. W8GDC is getting set at new QRA. We understand that Director Windom, W8GZ, has been sick and trust that he is now up and around and all OK. W8EQC sends some real dope. "Trying to keep body and soul together," reports W8CNM. C.W. and 'phone at W8ARW. "Hit air Dec. 22nd," reports W8IET. W8CXF has been on 14 mc. W8GSO will soon be ORS. W2ZZGA is located at Antioch College. Nice report on Springfield Amateur Radio Club by W8GCJ: Officers are: Pres., R. Hatfield; vice-pres. and traffic manager, Jerry Heeger; treas., V. Bowdle; secy., H. King. Write to 132½ Liberty St., Springfield, Ohio, for complete dope. W8HEY reports for W8HFR, W8GWG, W8ICF, W8EEEX, W8IBT. District No. 7 RM W8VP: Please note change in district. W8VR has been off the air. W8CKX is rebuilding. W8EQB has a new mast. W8VP wants map of his district. District No. 8 RM W8CGS: Welcome back to the ranks of regular reporters, W8ALQ. New reporter from Cinoy, W8IDY. W8CGS had transformer failure. District No. 9. No RM yet: W8FRV hails from good old Bridgeport. Let's see who is reading this report. Let's have a message RIGHT NOW. I am informed that plans are being laid for one large radio club to meet in Cleveland once each month. Hamfests are planned in February by the Medina County Radio Club and the Lakewood Radio Club. Ohio ORS party every month, the Sunday before the 16th. Ohio RM party, the Sunday after the 16th.

Traffic: W8FF 688 VP 642 DDS 636 BBH 569 DVL 500 FGV 451 BAH 322 QQ 220 CQF 205 EEQ 204 GOD 150 PO 146 APC 140 GCJ 110 BKM 107 BMX 88 CMY 84 BYD 74 BZL-CGS 72 HUS 67 GZ 66 BKR 62 UW 50 FGC 49 AGL 50 BMK 46 EQB 44 FVL 43 EBY 42 FJX 33 FDV 34 HWV 33 DIH 32 FRV 27 FGP 24 DVI 25 AFU-WE 19 HEY 18 FXH 17 UX-DUP 15 BFT-ALQ-EFZ-HGE-DAT 14 HVX 13 EPP 11 CZT-CNM-EQC 10 DQI-GKG-ARW 9 EJ-BSR 8 CSB-BTT 7 IET 6 FFM-DEM-GSO-CIO 5 DRL-GDQ 4 PO 5 BGZ 4 GNG-EFW-CXF 3 CKX-ICS-BAC-HXC 2 DAP 126 EXI 1 UC 9 GHF 39 GBG 2 HSG 7. W2ZZGA 67.

DAKOTA DIVISION

NORTH DAKOTA — SCM, Wm. A. Langer, W9DGS-IFW — W9HJC is using W9KXW, his portable call at new location. W9JVP reports newcomer, W9LBI. W9DPT is new ORS. W9IK is planning to increase power. W9ENM's m.g. went west. W9GCB is using B Battery plate supply. W9IHS is QRL. A.A.R.S. W9FIV sends nice report. W9FSF, W9DYA and W9GCB are active on 1.7 mc. W9CRL and W9EVQ are awaiting license renewals. W9JAR is keeping couple schedules. W9AZV is working on a second doubler stage. W9DM worked 8 districts in first 24 hours with new rig. W9JZJ has a liking for 14 mc. W9EGI is QRL semester exams.

Traffic: W9DGS 630 HJC 387 IK 155 JVP 142 DPT 127 IGR 56 FIV 52 DYA 51 FSF 33 GCB 25 EVQ 15 JAR-AZV 9 DM 4.

SOUTH DAKOTA — SCM, Carrol B. Miller, W9DKL-W9GIO — Congratulations to W9BLZ, winner of South Dakota Section medal in the SS. District No. 1, W9DGR, RM: W9DKL leads this district. W9BJV is out for RPL. W9HBA reports a higher sky-wire. A new '32 rectifier works FB, says W9GYG. Receiver difficulties at W9IQD. W9BAE is rebuilding. W9CFU's new 50-watt c.e. rig is about ready for launching. W9FOQ has neglected schedules. W9LGO is new ham at Redfield.

W9GLK reports an '04 on the air. W9CAU completed a trip through N. Dak. W9TY is off air. District No. 2, W9IQZ, RM: W9AZR takes Section traffic honors. W9EKL and W9HHW are going hot in A.A.R.S. W9ALO says join the AA ranks and you'll get traffic. W9CPB is about to create QRM with a four-tube PP rig. W9IQZ isn't having much luck with his flea power 'phone. W9HHW carries a pack of schedules. W9JLA is using a pair of '45s. W9HSY is using a Spark coil power supply. W9DUT wound a 750-0-750 power transformer. W9IDW says traffic FB on 1.7 mc. W9FLM worked Mexico on 3.9-mc. 'phone. W9GTG is working schedules. Be sure to get the next issue of the "Voice of the Amateur" for complete details on the Inner-South Dakota traffic contest. Prizes: Year's subscription to QST, Handbook, etc. Contest starts February 16th, ends April 15th.

Traffic: W9AZR 309 HHW 250 FKL 242 1DW 235 DKL 143 BJV 105 DGR 104 IQZ 76 ALO 53 FLM 43 FOQ 31 GTG 22 HBA 19 JLA 16 HSY 10 CFU 2 DUT 1.

NORTHERN MINNESOTA — SCM, Palmer Andersen, W9DOQ — W9HZ starts the year with a total of 229. W9BBL dropped to 14 mc. W9GVR is a preacher. W9ISA is putting up a doublet receiving antenna. W9DJW is building an e.c. frequency meter. W9JIE is keeping two daily schedules. W9EGU is starting in again. W9JIS moved to Litchfield. W9EHI has new 56-mc. receiver. W9IPN is ready for business. W9BHH is busy with the YLs. Eberhardt reports W9IFO, a new ham at Staples. W9BRA is busy keeping the wolf away from his door. W9BVI has gone in for high power. W9FNQ received appointment as Ensign in U.S.N.R. W9IAA is being kept busy. George Hanson reports W9LIP and W9LEX new hams in St. Paul. W9IPA reports. W9AEL wants to be ORS. W9AVZ ran up a nice total this month. W9HDN is on with c.c. W9KJT gets a lot of fun out of his little '45. W9FNJ has been shielding his oscillator and buffer. W9BAR reports on the St. Paul gang. Talk of a Division Convention is in the air. W9HEO is an ex-Navy op. W9GQP knocks 'em over with new MOPA. W9BGG enjoys Class V — and whist! W9GLM keeps A.A.R.S. schedules. W9FQI uses organic rectifier. W9EHO has c.c. on 3.5 mc.

Traffic: W9BBL 122 HZ 229 IEA 7 GWR 3 ISA 11 DJW 7 JIE 152 IPN 4 BHH 1 DOQ 17 BRA 53 FNQ 30 IAA 21 AEL 60 AVZ 138 HDN 16 KJT 30 LEX 18 FNJ 5 BAR 51.

SOUTHERN MINNESOTA — SCM, Norman Beck, W9EPJ-CGR-EMQ — I wish to thank the gang for the honor in this election of a new SCM. Six BPL members this month: W9EPJ, W9LN, W9BKK, W9JID, W9BN and W9CSY. W9LN is RM of Minneapolis. W9BKK is Chief RM of Section. W9JID, W9DH, W9BHZ and W9CSY are new ORS. W9BN maintains their place in BPL. W9BNN is now OBS. W9BKX got home safely from Faribault. W9FCS blew some tubes. W9YC starts another winter traffic contest. W9HRH kept a flock of schedules. W9EPD is rebuilding receiver. W9DEI went back to Milwaukee to school. W9JBA is in the Army now. W9JLV promises lots of traffic. W9EYS has a new receiver. W9ELW, W9KMG and W9KEM are new reporters. W9AQG crashes through with an FB report. W9CPP is rebuilding with '03A in final. W9GLE hopes to make BPL. Thanks for congrats, W9EFK. W9IMV has trouble with c.c. W9GNU had trouble with new rig. W9JMV is playing with an orchestra. W9ATD is building 56-mc. transmitter. W9GCN wants traffic schedules. W9DGE reports W9DGH rebuilding. W9ERT has five ops; W9JEQ blew his 211D. W9FNK says dental QRM! W9JQA is QRL school. W9IAE blew a 5000 voltmeter. W9FCC reports a new YL passed test with 90%. W9ZT sold the 1 KW tube. W9COS is very QRL. W9EVG and W9IAT say, "No news is good news." W9DMA says DX reception worst ever last month. W9CSJ visited in the Tall Corn State. W9EYL changed QTH. W9DLQ is new ham at Lamberton. W9LEN is the teacher of W9KDI and W9IDF. W9AIR acquired a new dynamotor. W9FMA received a copy of

"QTC" from ZT1H. W9DHP moved to 3.5 mc. W9FLE finished another good receiver. W9FFY says, "Changes in set: None." W9JHG is QRL Univ. W9DRG blew filament transformer. Ask W9IXQ regarding the meeting of SMRA there. W9LMR is new station in Minneapolis. The Minneapolis Radio Club elected officers: Pres., W9DCM; vice-pres., W9LN; secy., W9ILM; and treas., W9EPD. A meeting of SMRA was held at Faribault, Jan. 15th. W9DVH gave a 56-mc. demonstration. Remember, gang, all ORS in So. Minn. MUST average 25 messages per month or look-out! W9CSU put in condenser mike. W9GZQ is interested in traffic network. W9AJU erected 3.5-mc. zepp. W9CYA is dissatisfied with DX. W9FLE rebuilt his dynamotor. The Section extends sympathy to W9HQG, W9BTZ and W9GBZ on the death of their fathers. W9JEF rebuilt "bigger and better." W9ATP and W9HGN are QRL sports.

Traffic: W9EPJ 1933 LN 1161 BKK 615 JID 602 BN 574 BHZ 347 CSY 330 BNN 248 BXX 233 FCS 140 YC 134 AIR 100 HRH 99 EPD 85 DEI 75 JBA 74 JLV 69 EYS 54 ELW 46 AQG-CPP-GLE 42 EFK-HMV 33 GNU-JMV 30 DH 22 ATD-GCN 18 KKM 15 DGE 14 FNK 13 JQA 10 IAE 9 KMG 6 FCC-ZT 5 GUX-AQH 4 COS 3 EVG-IAT-DMA-CSJ 2 CSJ 16.

DELTA DIVISION

LOUISIANA — SCM, W. J. Wilkinson, Jr., W5WF — L W5KC worked SM7VR. W5BFP is getting operator's license. W5ANQ blew his '04A. W5AXU works 'phone and c.w. W5BPL blew his main filter. W5HR reports traffic. Report every month now, APR. W5NM and W5PG report. W5ZK wants traffic for A.A.R.S. W5BID is out of town most of time. W5BZR is new RM. W5RR worked FM8IH. W5BYX wants schedules. W5BMM reports traffic. W5CEW blew power supply. W5AYZ has a mighty wallop. W5QJ and W5ABS are active A.A.R.S. W5CSD is new man in N. O. W5BYY says conditions punk. W5CMV says, "If it isn't the '10 it's the rectifier." W5CW handles traffic. W5BFC invented carbonless spark plug. W5AIB has turned BCL. W5BYQ is building PP MOPA. W5APA applied for ORS. W5BBW and W5AO are on 3.5 mc. W5CMQ is rebuilding a.c. receiver. W5YW is on again. W5WF is on 7 and 3.5 mc.

Traffic: W5AYZ 11 BID 6 WG 2 BYX 10 BMM 9 BZR 49 BYY 19 BYQ 16 CW 104 CEN 64 KC 18 BPL 2 PM 12 AXU 25 WF 19 YW 10.

MISSISSIPPI — SCM, William G. Bodker, W5AZV — W5CLD has QRM. W5BUI has been working DX. W5AWU is new station in Gulfport. W5AZV and W5VJ are building new a.c. receivers. W5ANX turns in nice total. W5ANI now has c.c. W5ARJ has increased power.

Traffic: W5ANX 141 BUI 112 CLD 37 BJO 16.
TENNESSEE — SCM, Fremont F. Purdy, W4AFM — W4HA again leads in traffic. W4BOZ, KA, ABM and ACU are new A.A.R.S. Ex-4QT is contemplating a revival. W4RO and W4AFM are cooperating with W9BAZ to handle southern traffic from the World's Fair. W4BFH hopes to strike a happy medium with his outfit. W4ZZ and W4AYV want traffic schedules. W4BQK sends first report. W4EX acquired portable, W4BSF. W4ACU is QRL visiting. W4OV's outfit is on a rampage. W4EM has a Comet Pro. W4ADX's schedules went haywire. W4ABX is off until he can take exams. W4RO, our Chief Route Manager, will line the traffic hounds up. Write him, fellows. W4BBT sends a nice report. W4AAO is alternate NCS A.A.R.S. W4AXN says: W4ASC is rebuilding, W4TM is QRL the new YL, W4BDZ "I Tappa Key" Club is looking for new quarters, W4OI is sobering up after holidays, W4ABY is op at WPEC, W4BDZ wants calls from Tenn. gang, and Ex-4ANC, ZZAD, got married. W4BGQ and W4BOZ are new ORS. W4HA is RM for the second district. W4LU reported the Chattanooga gang's activities direct to the SCM by W4AAD's ingenious radiophone-land telephone remote control system. Forty members attended the Dec. 29th meeting of East Tenn. Amateur Radio Assn. held at

Johnson City. W4ATE QSOs plenty. WANTED: Report from every Tenn. station!

Traffic: W4HA 188 AFM 183 PL 141 RO 133 BOZ 115 BBT 101 AAO 97 EX 90 AAD 53 OV 51 ACU 30 MU 27 ADX 25 AYW 21 ATE 18 LU 17 OJ 14 BQK-BFH 13 BIZ 8 KA 7 ARP 5 ZZ 2.

ARKANSAS — SCM, H. E. Belte, W5ABI — Fellows, I want to thank you for re-electing me SCM. I will do my best. W5BMI works day and night! W5BXM reports by radio. W5BJF is handling traffic. W5FM is keeping schedules for W5IQ. W5BED had the flu. W5BZK sends second traffic report. W5SI is busy drilling the Navy. W5JK will soon be c.c. W5NJ is on 3.5 and 7 mc. W5BRI handled an emergency message, reporting a fog signal out of order at Passage Island Lighthouse, near Port Arthur. W5BDB is trying to get on the air. W5BDR is on with '52. W5BUX is planning on ORS. W5AHS is newcomer. W5ZZE-W5ZB has 50-watter. W5CR is in Missouri. W5ANR sends lots of dope. W5VZ is rebuilding. W5BMV is c.c. W5CFE gets mad if no more than one VE comes back to his CQ. W5EG and W5BMV are on 56 mc. W5CGW is back from Rio Grande Valley. W5CNK tried 1.7-mc. 'phone. W5BBS is on 1.7 mc. W5BRW lost a pair of '10s. W5AAJ and W5ABI get out well.

Traffic: W5BXM 8 AAJ 160 BJF 67 FM 124 IQ 185 BED 352 BZK 21 JK 42 BRI 16 BDR 3 AHS 5 ZZE 54 ABI 394.

HUDSON DIVISION

EASTERN NEW YORK — SCM, Robert E. Haight, W2LU — Congrats and best wishes to our new Director, W2BEG. W2BJA breaks all traffic records for Section. W2LU visited W2BJA, W2ANV and W2ENC. W2DTB is third high. W2ENC reports O.B. from W2ACD. W2BVR sends in nice total. W2BC pushes through to west coast on 3600 kc. W2ANV built click preventer. Why not handle some real traffic, W2EGQ? "Much unnecessary QRM around," reports W2ACD. W2UL built new power supply. W2ATM heard D4AFK on 3600 kc. W2DMH signed up with U.S.N.R. W2DVY blew all receiver tubes. W2DIJ is QRL regents at High. W2ENR is welcomed on the air. W2EGF joins the ORS boys. W2BLI visited W8DMJ. W2CJP QRL pounding from W2ENR. W2QY desires 1.7-mc. schedules. W2CFU is on daytime. W2DEL reports W2AUT on 1.7 mc. comes in nicely on 3.5 mc. W2EFU is now on 3.5 mc. W2ENY is putting in '52s. "Poor weather for local contacts brings down traffic," reports W2OP. W2BZZ is all set for more traffic. W2BJP reports many off-freq. stations. W2CBN promises c.c. W2CJS' sky hooks came down. W2KW is going to try 1.7-mc. 'phone. W2AMM is using 'phone so the YF knows what it's all about now.

Traffic: W2BJA 854 LU 381 DTB 311 ENC 208 BVR 204 BC 148 ANV 85 ACD 83 UL 83 ATM 63 DMH 47 DVY 41 DIJ 37 ENR 19 EGF 19 BLL 15 CJP 12 QY-CFU 11 DEL-EFU 7 ENY-OP 6 BZZ-BJP 5 CBN 3 CJS 2.

NORTHERN NEW JERSEY — SCM, Walter A. Cobb, W2CO — The Raritan Valley and Union County boys are holding a joint hamfest in March. W2DRV, ex-W2BME, is back on the air. W2DV schedules W1AJV. W2BXM handles messages whenever he gets a chance. W2ERL is new ham in Passaic. W2EKM handled traffic originated by AC2UA. W2CJX wants ORS renewed. W2CDG, W2BPZ and W2DPB keep in touch with other hams by visiting every Friday night. W2ETI is a new arrival in Rutherford. W2CIM built a broadband transmitter. Local schedules at W2BCG. W2DIU has 126 schedules weekly, or 18 per day. 1.7-mc. traffic picked up, writes W2CIZ. W2DQU gives the lowdown on local events. A radio club has been started in East Orange High School, with W2CEQ as president. W2EIJ as secretary and W2AZE, vice-president. W2ELP is a newcomer. W2BPY has lots of fun every Sunday with gliders at flying club. W2CGG is now ORS. W2TP handles many messages on 'phone. The Ocean County Radio Assn. reports new officers: W2AWR, pres.; W2BYM, vice-

pres.; and W2BQV, secy.-treas. W2AON worked all districts first 24 hours on the air. W2FR is master control for the southern division of the Army Net. W2AWR has new rig going. W2BYM hopes to have 1KW outfit working soon. W2BQV and W2DYR are tasting the fruits of 56 mc. W2DZW is moving his QRM foundry to New York City. W2CPZ works real DX on 14-mc. 'phone. W2EII is trying to master a bug. W2BKO has a yen to rebuild. W2APP is still blocking ZLs with his '12A. Paterson is very much on the amateur map, according to W2ETQ. W2BTT is building a 50-watt outfit. W2CFC is in the market for a mast. W2CNW has new receiver. W2BHN is on with c.c. W2DNX is busy with MOPA. W2DOV pounds brass regularly on 14 mc. W2ETR is new ham in Paterson. Two additions to hamdom are located in Jersey City, W2EQS and W2BLQ. W2EOH found the cause of his poor note to be one of his rectifier tubes. W2DUJ wants to get Western schedules. W2BPG offers an accurate QRH with every QSO. W2ALD is now Ensign, U.S.N.R. A daily schedule with OH5NG was accomplished on 14 mc. during January by W2CDP. Visiting W1CGV kept W2EJK from handling much traffic. Low power on 1.7-mc. 'phone is working out well, says W2BYJ. Six years ago, the SCM, at W2JX, handed W8BPL a group of 11 messages. The QSL card covering this particular QSO was returned to the SCM by W2ABT, ex-W8BPL, who has long since moved from Akron to Verona. W2JC, Bloomfield Radio Club station, is now actively engaged in traffic handling. W2FL, W2ATB, W2VQ and W2EK are inspiring the local fellows to build s.s. receivers. W2CO borrowed an RCA transceiver using the call W10XT, and floating around the countryside one chilly winter evening for 4 hours, between W2GG and W2MO. W2CBA, W2EIC and W2DIU applied for ORS. W2EIC and W2BZB are candidates for ORS. Ex-2PW is liable to bust out with a new call any day.

Traffic: W2BPY 279 DPB 118 CWK 62 CIZ 40 CJX 24 CGG 18 TP 12 DV 7 DIU 2451 EKM 94 BCG 88 ALD 31 FR 28 BXM 27 EJK 23 DUJ 18 BQV-ABT 11 CDP 10 AON 8 EIC-DZW 6 EOH 5 CO-AFC 4 DQU-DYR 2 EDV 1.

MIDWEST DIVISION

IOWA — SCM, George D. Hansen, W9FFD — W9EIV and W9BPG, RMs. W9ABE turns in a good total. W9IO has a new e.c. frequency meter. W9ACL placed ban on Christmas traffic after 25th Dec. W9BPG has schedules working better. W9FFD still holds the "fort." W9HMM handled Kiwanis messages. W9LAR, ex-9FLI of So. Dak., is with us. W9CWW is improving the transmitter. W9FYC is QRL A.A.R.S. W9HPA starts toward ORS. W9DUN and W9CYL are new ORS. W9JZC uses 25-watter. W9DLS is another roving portable. W9EOE says rig perks OK. W9DEA worked his first YL. W9FYX curtails activity to week-ends. W9BWF is QRL rebuilding. W9GWT is QRL night work. W9DMX, no news is good news we hope. W9DUE has c.c. on 3665 kc. (The W9DHE mentioned Feb. QST' should have been W9DUE.) W9DNZ has new MOPA. W9CWQ is on 14 mc. W9DLT is active. W9FEA is QRL school. W9AFQ has 'phone on 3.9 mc. W9ERY and W9FEB get a few. W9AEX says the transmitter is "buggy." W9JMB and W9JZM report. W9LBF, W9HPZ and W9IBK are first reporters. W9JXO has trouble with frequency drift. W9GPL says, "How come QSA5 in Ohio and QSA3 six blocks away?" W9CCY requests A.A.R.S. application blanks. W9FZO was active in the ORS. W9GP been under the weather. W9BJP says the "depresshun" is on at his shack. W9KBM makes BPL. W9DFZ has WAC aspirations. W9EIV reports arrival of a Jr. op!

Traffic: W9ABE 351 IO 221 ACL 189 BPG 145 FFD 119 LAR 116 CWG 102 FYC 70 HPA 68 DUN 66 JZC 55 DLS 53 BOE 50 HMM 54 DEA 45 FYX 38 CYL 22 BWF 19 GWT 18 IBK-DMX-DUE 17 DNZ 16 FEA 13 AFQ-AHX 9 ERY 6 JMB 2 JZM-LBF-HPZ 1 JXO 3 CCY 20 FZO 24 GP 91 BJP 127 FEB 22 KBM 502 DFZ 10 EIV 94. W6ZZBL 4.

KANSAS — SCM, O. J. Spetter, W9FLG — It is with great sorrow that we must record the passing of Mr. Wm. Lohr, a KVRG member. W9KG has moved. W9CFN built receiver per Jan. QST. W9FLG is making e.c. oscillator. W9BYV is on with 50-watt. W9HSN has '61A PP rig. W9IOL, W9IEL and W9LFN are new A.A.R.S. W9HL handles some traffic. W9IQI is on 14 mc. W9CYV and W9CPY are going in for real traffic handling. W9GHI is going to Radio School in K.C. W9DVQ says local 'phone QRM too much for him. W9BTG put up new lattice work mast. W9GCL has been accounted for! A former KVOR operator is second op at W9JVC. W9GQA was quarantined for scarlet fever. W9CJY is new ham at Clyde. W9PB is building 14-mc. rig. W9BYM, W9KCR and W9COA are new ORS. W9BUY handled a bunch of congratulatory messages for the Governor during his inauguration. W9HTF built a PP '45 rig. W9BEZ is NCS for U.S.N.R. W9DSD is moving to the new Federal building. W9AWP and W9CYV are keeping 7-3.5 mc. Newton-Wichita duplex schedule. W9ABG blew receiver tubes. W9GUO and W9LCC are new stations in Wichita. W9DAL is heard discussing plans for a new station. W9DMF is on 7 mc. W9CVN is again active. W9EAG-GRI and his brother, ex-W9CCM, are attending Wichita U. W9DWO is planning new rig. W9CKV has bad QRM from local BC station harmonic. W9LFB is becoming active. Ex-W5AKX is now in Wichita. W9BDB continues to pound brass. W9JMS is suffering with the flu. W9LGR-LLF is building e.c. rig. W9TV will soon be on. W9DEB reports following new U.S.N.R. members: W9KCR, W9LFN, W9COA. The Wichita Amateur Radio Club has been formed with the following officers: W9HTF, pres.; W9CVN, vice-pres.; W9AWP, secy.-treas.; W9BEZ, editor and publicity manager. W9GAY of Chicago is a Wichita visitor. The men behind the KNG station at Wichita are W9ABG, W9LFB, W9AWP and W9LCC. W9IOL reports the organizing of the Winfield Amateur Radio Club with Aug. McCollom as chairman. W9FMX, secretary Sunflower Amateur Radio Club, reports an initiation into Royal Razz Degree, Jan. 6th, and W9BSK far in lead on holiday QSO contest sponsored by the club. W9GXV, secretary of Hiawatha Amateur Radio Club, reports his club taking steps to become affiliated with A.R.R.L. The Kaw Valley Radio Club held their annual election of officers with following result: W9FLG re-elected pres., W9LJL vice-pres., W9FRC re-elected secy., W9LFN ass't secy., W9DEB re-elected editor, W9KCR circulation manager. New Topeka calls: W9JIV, W9LJG, W9KXB, W9KSY, W9GRA, W9EKO, W9KQO, W9LJL, W9LJN and W9ABX. W9FRC has been promoted to captain Headquarters Co., 69th Inf. Brig. W9KTG is new station in Augusta.

Traffic: W9KG 511 FRC 433 FLG 380 AWP 354 IOL 215 KCR 162 HSN 131 DVQ 127 CKV 120 DEB 119 BUY 112 IOV 82 IEL 79 KDO 76 GQA 74 KFQ 56 BTG 53 BSK 52 NI 52 PB 47 BGL 40 BYM 47 JVC 36 CYV 33 GCL 30 BEZ 25 CFN 23 ESW 20 FMX 19 CPY 18 CSK 16 HWW-LJN-HL 15 BYV 14 IQV 11 COA 9 IOG-HLE-HJF 5 LEN 2 IQI 1.

MISSOURI — SCM, C. R. Cannady, W9EYG — RMs: W9BMA, D. B. Lane for Western Mo., and W9FTA for Eastern Missouri. Another advance! Missouri leads the Contest. So let's win it! W9BMA led in both traffic and the Activity CUP race. W9CJR overcame the lead of W9FTA in the year's CUP standing and ended in a tie for first. St. Louis: W9BUL is teaching in St. Louis. W9EFC reports W9FAL out of hospital. W9HWE is FB OBS. W9EKY worked an F8. W9GHI has portable W9KWC. W9DOE reports for W9EQ, W9GGI, W9BC and W9EZX. W9DOE is Chief Engineer at KWK. W9GCH reports new Jr. op. W9GAC comes back for more. W9HVT and W9KHQ visited W9GCH. W9HHK is coming back. W9GPC uses MOPA. W9HVJ hunts new reporters. W9GTK installed RF stage. W9CCZ put 50-watt e.c. rig on 7 mc. W9BAF is on 3.9-mc. 'phone. W9ILI is using all 'phone bands. W9KIR uses 7 mc. W9KIK gets out on 3.5 mc. W9HWF is doing FB on 7 mc.

W9FAB got his extra first. W9KFL has e.c. rig. W9FZJ celebrates his first anniversary. OBP: W9PW resigns as ORS and RM. W9BGE-KJK gets traffic. St. Louis Amateur Radio Club: W9GDU reports for W9EKY. W9DUD works all bands. W9FTA is getting new traffic reporters. Kansas City: W9GSF is rebuilding. W9RR reports for W9ZZ, W9NP, and W9CFL. W9BMA blew Rectobulbs. W9AUC, W9CU, W9DPA, W9EL, W9EQC, W9FHV, W9FNO, W9GBB, W9HON, W9HFO, W9JOS, W9LBB and W9KXG report traffic through RM W9BMA. State News: W9JAP reports for first time. W9DCB keeps his New Year's resolution to report. W9DLC gets on 1.7-mc. 'phone. W9ARA is QRL. The YLs from Jamestown, W9FBF and W9FSI, send an FB report. W9ESI is in school at Warrensburg. Ex-W5CRK is now at Jefferson. Bks. W9DHN is QRL exams. W9DVV asks how much an amp. of rf in the sky wire is worth to a technocrat!! W9FYM has a hard time finding time to operate. W9HNM is QRL "giving" exams! W9FSU has trouble with a.c. receiver. W9JVL handles traffic. W9HVW handles FB traffic with W9ZZAC in Calif. W9CRM was down with the flu. W9CXB is home from the hospital. W9GAR is QRL BCL sets. W9IGX is strong on 1.7-mc. 'phone. W9IEF is working on 56-mc. rig. W9ECE keeps up FB reports. W9CZI is on 3.9-mc. 'phone. W9GEF is working on 56-mc. rig. W9JBV wants Mo. schedules. W9BGS still stays true. W9GQY is back after Texas visit. W9AIJ says e.c. rig working like nobody's business! W9IOU works some DX. W9JBZ keeps up good work. W9GLY has an e.c. '24 osc. W9ASV is on with new rig. W9CIQ is QRL WMBI. W9ENF is new O.O. W9FSL holds down regular schedules. W9KIJ reports for W9INX, W9HIZ-W9IGC and W9BWS. W9FJV needs more men in A.A.R.S. Hannibal Radio Club: At new election. W9GBC, pres.; W9FGJ, secy.; W9IRR, vice-pres.; and W9HBJ, technical director. W9FSZ and W9CJH continue AA work. W9CNS and W9KNH stick to 'phone. W9HSZ adds to his traffic total. South Missouri Association of Radio Amateurs: W9LJC increases activity. W9HUI reports by radio. W9EYG-2 coming back. W9EHS is getting the rig harnessed. W9IXO wants his that way. W9GBJ got in on ORS Party. W9DUM uses 'remote control from two Frat houses. W9HUG gets ORS. W9IGP is joining A.R.R.L. W9GJR is QRL Court. W9FVM gets little traffic. W9FYU has receiver trouble. W9EYG is now in temporary quarters at 210 West McCarty, Jefferson City. W9HUN and W9BTD are QRL college. W9EME is e.c. on 3.5 mc. W9AZL and W9CWH have new ops licenses. W9BAU built new e.c. frequency meter. W9FIZ is QRL business. New Missouri hams: W9EDK, W9IYU, W9IPT, W9KPX, W9IDF, W9DIC, W9LLN, W9LQK, W9LIT.

Traffic: W9BMA 1202 EYG 536 FHV 505 AUC 237 EFC 245 FJV 228 CJR 215 EGC 210 AIJ 164 HNM 161 FTA 146 NP 117 FSL 110 GCG 104 HCP 102 HWV 102 KJK 12 JBV 70 CU 66 FNO 64 HON-GSF 59 IXO 57 JPT 52 EME 50 IJW 48 ENF 45 RR 44 KLJ-EL 42 JAP 30 HUG 37 FYU 36 GDU 35 COZ-JYC-ECE-HUI 34 IMZ 33 GTK 30 KWC 29 BGE 28 EES-JVL 25 GLY-DJC 22 DCB 16 HSZ-IXN-AQX 14 BMT-HVJ 13 CJH-GBC 12 JBZ-HWE-JOS-IOU-GBJ-CRM 11 DOE-DUD-LBB-HIZ-BC 10 DPA-DUM-GQY-CFL 9 FYM-HFO-FEH-LLJ-HLK-BLR-IOS 8 FZJ 7 LCJ-FVM-IGC-GBR 6 KGX-GIH-BGS-DVV-ZZ 5 GBB-ENK-FKE-FAL-AWE 4 BWX-EWT 3 DHN-GCH-CON-KNH-ILI-HOW 2 PSZ-FSU 1 BIU 4 KIP 2 EKY 4 BWS 10 IYU 38 FIZ 12 AUB 10 BAU 4.

NEBRASKA — SCM, S. C. Wallace, W9FAM — W9FUW got scared and started busting the ether for fear Nebraska might lose the chance of winning the traffic contest ending Feb. 15th. W9HYR has not been asleep at the switch either! W9FAM comes dragging in third. W9BNT is still "up and at 'em." W9DHA comes in fifth. W9DMY won the medal for Nebraska in SS. W9DI is keeping tabs on the Lincoln gang. W9DFF is transferred back to Nebraska from No. Dak. W9EHW says A.A.R.S. traffic FB. W9EWO reports new hams W9CYJ,

W9L AH and W9L MT. W9DXY is QRL U.S.N.R. W9ISJ reports other stations active there, W9IRZ and W9KLD. W9BBS says the railroad business pretty slow. W9BCX is now ORS. W9DGL has now worked 12 countries. W9BQR let his ORS lapse. W9EEW can't get the 211E to perk. W9HTU busts loose with a fine total. W9FGS applied for ORS. W9BB lands in the BPL. W9IFE keeps his part of the state on the map. W9DEC says depression, half day, and half pay have slowed him up terribly. W9CWM is hitting on all six. W9HGO and W9EW consolidated. W9KPA says, "Look out for next month's report." W9QD sends first report. W9FZX has good schedules. W9EXP is still at it. W9GQW turns in good report. W9IRZ, W9KLD, W9FWC, W9JLP, W9AFD, W9CYJ, W9DZK and W9KQK report. W9DCC is working both coasts on 1.7-mc. 'phone. W9EDI is helping the Lincoln gang. W9EKP has been trying to have the flu. W9DEP is looking for schedules.

Traffic: W9FUW 1256 HYR 895 FAM 824 BNT 624 DHA 553 DMY 249 DI 101 DFF 115 EHW 100 EWO 174 DXY 75 ISJ 21 BBS 16 BCX 13 DGL 8 BQR 3 EEW 2 HTU 550 FGS 515 BB 513 IFE 402 DHC 151 HGO 230 CWM 60 KPA 68 JQD 47 IRZ 5 KLD 2 GQW 130 FWC 16 EXP 110 JLP 6 CYJ 1 DZK 4 FZX 137 DCC 68 KQK 120 EDI 31 EKP 8 DEP 13 AFD 61.

NEW ENGLAND DIVISION

VERMONT—SCM, Roy L. Gale, W1BD—W1ATF sends large traffic total. W1DHX and W1CBW desire ORS. W1EEZ has a '52 on 3.5 mc. W1AXN's station license expired. W1DEZ, W1ERU, and W1EMQ are experimenting with 56 mc. W1AAK received unlimited 'phone license. W1ELR is back down cellar. W1CNX is back at school. W1AWF, who is also W4AEA, sends a report from Florida. W1ATF, W1BJP, W1CUN, and W1CGV are on 1.7 mc. W1CGV's traffic took a drop. W1DGU originates much traffic. W1DHX is using remote control. W1BZD blew his filter. W1DAJ rearranged his shack. W1BNS is waiting station license. W1EFC gets out well. W1BD revamped his SW3 per Jan. QST. W1BCD drives a weekly bus to Rutland. W1ERJ reports traffic.

Traffic: W1ATF 269 BJP 60 DHX 62 BZD 58 BD 52 CGV 30 EFC 3 ERJ 15.

MAINE—SCM, John W. Singleton, W1CDX—W1BEU leads off with a bang. W1BOF comes next. W1CDX has been experimenting. W1CFG was on the sick list. W1BOZ has a fine c.c. signal. W1CRP and W1EWN attended Providence hamfest. W1APR and W1BWS are roommates. W1OR is getting out fine. W1BLI is working to keep Maine on top. W1BNC located a missing wife and got a message for the husband. Hi. W1CIP is better after an illness. W1DFQ has new zepp. W1DHH is joining A.A.R.S. W1EF is busy these days. W1CPT says to ask W1CFG how to make love via amateur radio. W1AXJ says W1OG is back. W1APU is getting ready to push traffic. W1BAE handled a few. W1BYV is ready to go. W1APX is ice boating on Rangeley Lake. W1BWB is QRL. W1EWF is new ham in Stonington. W1VF reports traffic. W1EEY is having trouble with sky wire. W1FNG is new ham in Strong. The Queen City Club is sponsoring a broadcast over WABI. W1DAW went hunting and cracked a couple of ribs. W1ANH is on the air again. Get ready for another big Maine Section traffic contest and some nice prizes. Contest will start Feb. 16th and continue for three months.

Traffic: W1BEU 516 BOF 291 CDX 227 CFG 167 BOZ 155 CRP 94 APR 92 OR 67 BLI 66 BNC 65 CIP 55 DFG 50 DHH 38 EF 32 CPT-DIW 30 AXJ 26 APU 24 RAE 20 EWN 15 EJS 12 BYV 13 APX 10 BWB-DEB-CBO-EFX-ELE-VF 2 BVF-EFY 4.

RHODE ISLAND—SCM, N. H. Miller, W1AEW—W1BUX was laid up with the gripe. W1CAB is QRL U.S.N.R. W1AEW is QRL BCL business. W1EOF reports a new ham, W1FEI in Barrington. W1EOE is new station in Providence. W1DDY is new ORS. W1OBP, W1BML, W1DBA, and W1AXS are on Sunday U.S.N.R. drills. W1ATM, W1BDQ and W1CMG are on 7 mc.

The P.R.A. had a real hamfest on Jan. 14th; hams attended from as far as Portland, Me. W1BES is QSO the world on 3.9-mc. 'phone. W1BGA, our RM, says 56 mc. got the best of him. W1CGO joined the A.A.R.S. W1ASZ is building new 150-watt job. W1AOP, W1AAD, W1ELU, uphold the reputation of Pawtucket. W1BTP has 3 schedules. W1ALI is on 3640 kc. W1CPV is having trouble with BCLs. W1TZ is getting out well. W1AGB was QRL.

Traffic: W1EOF 40 ALI 24 CGO 12 ASZ 9 BTP 8 AWE 5 BUX 1.

CONNECTICUT—SCM, Fred A. Ells, Jr., W1CTI—W1CJD pushed out a record total of 1062! W1AFB asks who the mysterious YL is who pulled W1BMP out of a certain pond! W1MK continues to pound out a bunch of traffic. RP applied for ORS for W1RP. W1AMG made BPL on deliveries. W1BDI missed BPL by two deliveries. The c.c. transmitter at W1DGG sounds better than a lot of crystal rigs. W1BHM handles New Haven end of Conn. net. W1APZ is working on '04A job. W1DOW is going in for c.c. W1FIO is now ORS. W1EAP did some rebuilding. W1BFS is building a c.c. portable. W1AVB passed operator's exam. W1YU was off due to vacation. W1AJB says W1FLQ is a new ham. W1FGV has been testing on 56 mc. with state Aviation Dept. Aeroplane, W1XL. W1ERU rebuilt for 1.7 mc. W1DMK-FIX says W1DWB got W1FIP as a portable. W1AUK, W1AKI and W1BWM report by radio. W1APW rebuilt to 100 watts c.c. W1BEW is building a c.c. job. W1ADW gets on for Naval drills. W1CIG is resuming schedules. W1EBT blew a rectifier tube. W1CNU-ZBMM had QRM from neighbor's ice box S.F.T. night. W1AGT pushed traffic on 7 mc. W1BYW says traffic slow. W1GC put an e.c. rig on the air. W1ATW won a crystal in the "Consistent-DX-QSOs Contest." W1UZ works W6 and W7 on 3.5 mc. W1FIE is studio engineer at W1TC. W1EMV schedules W1DDX. W1DEP reports W1EEQ building an MOPA and W1ATN back on 3.5 mc. W1EFW-EWZ and W1FIP report duplex operation with W1XL. W1FDM reports departure of an '03A. W1DGC says W1PF was heard in Germany on 3.5 mc. W1BOD has been appointed Commander Unit Five, Section 1, U.S.N.R. W1TD was laid up with the gripe. W1EAO continues to send in long lists of off-frequency stations. W1BNP was busy working on his S.S. receiver. W1DF demonstrated his beginner's crystal transmitter at a meeting of the H.C.A.R.A. W1BQS has portable W2ESR. The Bristol Radio Club has a 60-watt lamp on their 70-foot mast, connected to the key; it can be seen as far away as Farmington. W1ADW says W1OS is the proud mamma of a five-pound YL op. Congratts. W1CTI has a filter at last! Over forty hams attended a recent meeting of CBA at which U. S. Supervisor of Radio, Walter Butterworth, gave the gang a fine informal talk. The New Canaan Amateur Club has been issued the call W1FLA. Following report traffic: W1RP, W1FL, W1AOK, W1BNB, W1CVD, W1NE, W1AHC, W1BYW, and W1ES.

Traffic: W1CJD 1062 AFB 700 MK 613 AMG 416 BDI 357 DGG 346 ES 232 BHM 148 APZ 105 DOW 100 FIO 72 BYW 71 EAP 67 BFS 75 CTI 59 AVB 50 YU 48 AJB 45 FGV 44 ERU 42 DMK 40 AHC 34 AUK 31 APW 29 BEW 35 NE 19 ADW-CIG-EBT 18 CNU 17 AGT-BWM-BVW-GC 16 ATW 14 AKI 12 CVD 10 UZ-FIE 9 EMV 8 BNB-DEP-AOK 7 EFW-FDM-DGC-BOD 5 FL-TD 3 EAO 2 RP 1.

EASTERN MASSACHUSETTS—SCM, Joseph A. Mullen, W1ASI—W1ASF leads off as high man. W1ASI at last tops the RM. W1ABG is getting active again. W1KH regrets losing out on the Providence Hamfest. W1VS cancelled schedules due to QRM from work. W1WU was in bed with the "flu." W1WV is awaiting a 56-mc. receiver. W1ABF reports from San Juan, P. R. W1AGA is still agitating 1.7-mc. activity. W1BZQ does what he can to help the Section's traffic. W1LM is lonesome without "VS." W1ACH is reporting again. W1CAW has added a P.P. amp. W1BBY spends 100% of his time on traffic. W1CHR has promised to give the Section better support along traffic lines. W1ATX is

high and dry with mid-year exams at M.I.T. W1CUO is the secretary of the new Norfolk County Radio Club. W1BFR has been appointed alternate Trunk Line Station on Trunk "C." W1BMW is having key click trouble. W1JL is new ORS. W1CD is cancelling schedules. W1BEF is going on 'phone. W1BZO is on the list for ORS. W1AEP is lining up schedules. W1EVJ is ex-W3PM. W1BLU has a '52 on 7 mc. W1DZG reports the "goings on" from Melrose. Middlesex Amateur Radio Society had election of officers; W1EHT is new president. W1BYF is playing with c.c. W1AF is in DX contest with WEEI ops. W1AZ gets on once in a while. The new officers of the E.M.A.R.A. are: W1KH, pres., W1BRI, vice-pres., W1PH, secy., W1DK, treas. W1ALP reports a new ham in Wollaston. W1EUW. W1EVE reports for first time. W1BO is planning on high power. W1AAL and W1CCP report traffic. The Secy. of the Mystic Radio Society reports: W1VH acquired a new YL as result of BCL trouble! W1FFH is nearly as good a chiseler as W1DAR. W1AIO and W1VH are regularly seen at W1FJW's for "spaghetti feeds."

Traffic: W1ASF 641 VS 425 ASI 505 LM 399 CD 279 BFR 150 BBY 102 AGA 86 JL 78 ABG 77 KH 71 BZO 62 ACH 56 WV 43 CAW 45 AFP 40 BEF 34 CHR 33 BZQ 30 BMW-EVJ 28 CUO 21 BLU 9 ATX 7 ABF 3 CCP 28 AAL 43.

WESTERN MASSACHUSETTS—SCM, Earl G. Hewinson, W1ASY-W1RB—W1BCX leads this month. W1AZW comes next. The traffic contest is going hot! Don't forget the prizes T. F. Cushing made the goal of the contest. W1EFM now owns portable call. The SCM and RM, W1BVP, spent an enjoyable evening as guests of the Worcester Radio Assn. W1BZA sports portable W1IE. Mr. Hebert and Mr. DeSoto of A.R.R.L. were guests of the Springfield Radio Assn. on Jan. 21st, when Mr. Hebert was the principal speaker over WBZ on the opening amateur program. W1OF sends a fine traffic report. W1BVR is "carrying on" A.A.R.S. W1CJL applies for ORS. W1ARH is now c.c. W1BWY is constructing new receiver. W1APL sports his fourth receiver, "Miss 1933." W1AJD says traffic is slipping. W1DIE and the SCM had an FB QSO. W1EUU is a new Worcester amateur. W1EFJ has a new "Zepp." W1DLD is knocking them dead. W1DJQ wants form 1. W1EVZ is building c.c. 50-watter. W1CGV is QRL school. W1ADF reports a new ham, W1FNY. W1DCH says the depression has finally hit Baldwinville. W1TX and W1EBH are having a feud over a YL. W1DWW reports W1AUM back in town. W1EFQ reports W1FOY new ham. W1BNL is making his transmitter the last word. W1ECE is a "Worcester Tech" ham. W1BPT is number 30 ORS. W1CJR would like 1.7-mc. 'phone schedules. W1CIZ got his "First" license. W1BPN is back on the air. W1COI is experimenting with crystal holders. W1CCS' rig is "on the bum." W1AIC moved to Pittsfield. W1FDB reports for the Clinton gang; W1ADN and W1BCU await station licenses. W1DWO has worked all districts. W1DXK is on 1.7-mc. 'phone. W1EPY is on 3.5 mc. W1FKG has school QRM. W1FKM is active. W1EFO is coming back soon. W1FNV gets out FB. W1EXF tried 14 mc.

Traffic: W1AZW 56 EFM 68 BZA 62 OF 56 BVR 51 CJK 42 ARE 40 BWY 31 AFI 29 APL 23 AJD 27 DIE 25 ASY 23 BKQ 23 FFJ 22 DLD 19 AQM-DJQ 17 EVZ 15 CGV 14 BVP-CCH-ADF 13 DCH 12 DVW 11 ECF-BNL 10 ECE-BPT-CJR 8 CIZ 7 BPN 5 COI 4 CCS 1 BCX 132.

NEW HAMPSHIRE—SCM, V. W. Hodge, W1ATJ—W1UN continues to be high man. W1AEF's new 1.7-mc. rig is working FB. W1FEX schedules W1FGA, 90 miles away, on 56 mc. Outside work is cutting into W1P's traffic. W1EZT is rebuilding 'phone. W1AUy is experimenting with 56 mc. W1CCM contacted 107 stations on 'phone in two months. W1FCI is keeping daily schedules. W1CGH is at Phillips-Exeter. W1BRT and W1BCP are trying 56-mc. 'phone. W1BLA has new '52 Comet-Pro at W1DUK's is pulling in DX. W1BGL handled a bunch of traffic. W1DNC hopes for schedule with Dartmouth College. W1APK has been appointed

SCS, A.A.R.S. New receiver has been taking up W1AXL's spare time. W1BAC is building 56-mc. sets for locals. W1DSX is new reporter in Suncook. W1BMM is back after a year's absence. W1EES passed op's exam. W1DVG is on 56 mc. under call W1EOJ. W1BEO keeps regular schedules. W1SK is new ORS. W1DMI is breaking in the YL. W1ATJ is back with '10 c.c. on 3876 kc.

Traffic: W1UN 923 FEX 475 BAC 89 AXL 52 DMI 35 APK 29 SK 23 BEO 27 DNC 26 BGL 23 FCI 17 CCM 16 DVG 12 ATJ 11 AUy-EZT 5 IP 4.

NORTHWESTERN DIVISION

MONTANA—SCM, O. W. Viers, W7AAT—W7ASQ schedules W7ACH, W7BCE, W9ESA and W9CAB. W7FL took exam in Butte. W7BHB will soon be on. W7AOD worked T15FI. W7BYR schedules W9DKL, W7CCR and W7BNL. W7BMX worked K6EWQ. W7BMX is ORS. W7MC, W7AQN and W7CRH applied for ORS. W7BQG wants reliable schedules. W7BVE uses crystals 5/16 of an inch square. W7BOZ is now c.c. W7BSU reports W7AEB new station at Great Falls. W7CRH has regular license. W7AEF has extra first. W7CEG wants traffic. W7AFS is building a.c. receiver. W7BCE reported by radio to W7COX, the Montana XYL. W7BDS is new station at Roundup. W7BCE has four FB schedules. W7BKM has been QRL BCL "junk." W7BQG received his first-class license. W7COX raised voltage to 750 on the final stage. W7BSU had no luck grinding X cut crystals. W7AAT is busy pounding brass at W7COX.

Traffic: W7ASQ 415 AAT 4 FL 18 BHB 11 AOD 12 BYR 160 BCE 213 BMX 23 BVE 24 BOZ 30 BSU 17 CRH 118 BDS 8 COX 7 BKM 11.

IDAHO—SCM, C. R. Thrapp, W7AYH-CKO—W7BBE is building c.c. rig. W7BAA boosted traffic in A.A.R.S. ZAG contest. W7CHN is old Morse man. W7BKA annexed a YF. W7AOT has 250-watter. W7ARS built MOPA. W7CAP says schedules keep him QRL. W7BRU is QRL rebuilding. W7ADO is QRL sugar factory. W7AYZ is on the air in Twin Falls, as is Mrs. W7HN. W7BLT reports W7HN on regularly. W7JW and W7CJF are QRL KFTI. W7BLL has a bad case of YLitis. High School Station W7HK is being overhauled. W7CGR reports new gang at Nampa: W7CMD, W7AJH, W7CGU, W7CGW, W7COB and W7CQT. W7AT was hampered by sickness. W7AT is new OBS. W7BRY is going to high power 'phone. W7BAR has FB portable with c.c. osc.

Traffic: W7BAA 77 BRD 39 AYH 23 CAP 12 BLT 11 BBE 8 AT 5.

OREGON—SCM, Ray Cummins, W7ABZ—W7ACH leads the state with the best total so far. W7AMF wants a reliable schedule into Portland. W7AIG is new ORS. W7KR and W7BEE attended banquet at Walla Walla. W7AIP is having grief with new transmitter. W7BKD is not bothered by the depression. W7AQX is getting out FB. Pendleton Radio Club expects to have station on the air in near future. W7PL manages a few QSOs between rebuildings. W7BZS now has MOPA. W7DP has 50-watter in final. W7BKL reports. W7BMA, W7BQY, and W7AYV changed QTH. W7BOO's antenna broke and pulled transmitter thru window onto roof. W7BNK hooked his first "J." W7CBA has his eye on c.c. W7CLW is new ham in Astoria. W7AID wants 3.5-mc. schedules. W7COU reports traffic. W7AXO is back on the air. Finally heard from W7PE. W7AYN will do his part in "ALL OREGON TFC CONTEST." W7AXJ has two bugs. W7YG, Oregon Tech. station, holds open house. W7ZZAL spent most of last month with W7BQK. Klamath Falls has c.c. outfits in W7BUT, W7QP, W7ZZAR, and W7LI. W7LT can QSP anywhere. W7CRK is new Coos Bay ham. W7ZZZ rebuilt receiver with c.c. osc. W7BWD has new receiver. W7AZJ is c.c. on 3592 kc. NOTE: Correction—The Coos Bay Convention will be held April 8th and 9th. W7BLN types a mean letter. W7CEJ's antenna came down. W7PK put it up again. W7AHJ and her OM, W7AJX, are making a long trip to boost the Coos Bay Conv. W7AHZ continues to pep up the Eugene gang. W7BEK finally got his 'phone on

14 mc. W7QW cut twice too many spreaders for the new ant., boiled half of them, then used the wrong half. W7BDU moans the loss of his best headset. W7BGF entertains Valley Radio Club in his new radio shack. W7BRH burnt up an '83. W7UJ is bothered with local QRM. W7CFM is building a superhet. The Unholy Quartet is W7APE, W7BTH, W7CNY, and W7AQY. W7BLR works ZL with his '45s. Glad to hear from W7EO. W7AEM sends 1900 kc. code practice every Mon., Wed., and Thurs., from 8 to 9 p.m. W7ANX has the right idea on reporting. W7HD is fighting with his bug. W7CBD's portable is W7CTE. W7CGD paid the SCM a visit. W7APE is active. W7COR handles quite a bit of 7-mc. traffic. W7BMR blew his power transformer. W7CRG is ex-W9HKL. W7AWH gives up his TLS. W7BWK is among the unemployed. W7QY is going to get up a calls heard list. W7BVH acknowledges receipt of SCM's Bulletin. W7ED has his '04A going. W7ALM is looking forward to DX contest. W7BOH is troubled with frigid shack. W7SY has new power supply. W7AMF has ORS renewed. W7AKY conquered his c.c. rig. W7AOL from crystal from Univ. of Pennsylvania for his work in Consistent DX Contest. W7WR does FB work in lining up reports from out-of-town stations. The YF at W7ABZ presented the OM with a '52 for Christmas. W7AMQ is temporarily out of cash. W7MF promises more traffic. W7AWI is going 1.7-mc. 'phone. W7BYC is out a power supply — to W7AJW. W7AMR has brand-new plate bug. ALL OREGON TRAFFIC CONTEST NOW UNDER WAY. Let's go, gang!

Traffic: W7ACH 841 LT 370 AWH 327 AEM 168 AXJ 163 WR 156 AHJ 144 CEJ 115 DP 95 MF 96 AQY 74 AIG 61 AMF 61 ATC 55 SY 51 CBA 43 COR-HD 42 BLN-PL 33 YG 31 BWK 24 BMR 22 BTH 15 BVH-APE 14 QY 12 AHZ 10 ABZ 9 AMQ 8 BZS 7 ZZAL-BOH 4 EO-ANX 3 BLR-BOO-AOL-COU 2 CNV-AZJ 1 AYN 16 AWI 64 PK 6.

ALASKA — SCM, Richard J. Fox, K7PQ — This report received by radio at W7JF and mailed to HQs. K7ASM was appointed Ensign in U.S.N.R. K7BFO pounds the music box at Anchorage BC station. K7ZD is laid up in the hospital. K7BNW raised his plate voltage. K7AVU is new ham at Ketchikan. K7VH is on at Juneau. A very efficient emergency net-work composed of K7BFO, K7LW, K7ANQ and K7BVH has been doing some good work during the past months. K7ATD is on daily. K7LW made a flight to Kenai. K7BBQ got on the air. K7CKK and K7BZX have gone south. K7COF is new ham at Akiak. K7PK has a low power 'phone on 3950 kc. K7TF reports 7 mc. 'PB for working east coast. K7BNW made trip to the States. K7ANQ turns in a fine total. K7FF is busy suaring traffic. K7BFO made BPL! K7BMY is around again. K7ARL is visiting in Ketchikan.

Traffic: K7BFO 638 BND 289 BOE 194 LW 173 BVH 124 ANQ 111 FF 97 PQ 70 COF 34 CDV 32 BZX 18 TF 18 RNW 14 ASM 14 ALT 9.

WASHINGTON — SCM, John P. Gruble, W7RT — Attention: We're out to re-gain our "gain-in-reports" record lost to L.A.! Report promptly on the 16th of the month and do your part. RMs W7QI and W7AYO will help you with traffic problems. W7BSX and W7AUV schedule K6EWQ. W7IG makes a high place. W7AAF and W7CPI apply for ORS. W7NR reports via radiogram. W7BHH does heavy traffic-handling on 3.5 mc. W7AAX reports new hams in Tacoma. Both ops at W7LD possess 'phone licenses. W7BJV, of the "South Side Radio Club" reports two extremes in radio, both near Ocoosa: W7ADR, who weighs about 250 lbs., and W7CND, who weighs only 80! W7EM and W7BCC are preparing for higher license. W7CSS is new op at Walla Walla. W7BGO gets east consistently. Our new Director, W7KV-BIX, should have his high power 'phone rig going by now. Congratulations to W7TH-AMY, the groom of the month. W7BYG is now c.c. on 7016 kc. W7PC repairs BCL sets. Low power at W7BZC. Parties at W7BBD are declared to be FB. W7BWM sold out. W7AGP is Acting Commander of Walla Walla VCR Unit. New c.c. rig at W7BEX. W7AAM is going on 1.7-mc. 'phone. W7BKZ,

W7AHH, W7BPM, and W7BDD are active. 1/2 KW isn't much according to W7BCV. Holiday traffic helped W7AFC. W7BCB is Seattle YL op. W7BUL-W7BAI has worked all districts. W7CNS is Ensign connected with Coast Guard cutter *Haida*. A new man at Seattle is W7CTM. W7CJS clicked a W4 and a W8. A new '10 and a 600-volt transformer at W7CHH. W7WY turns in his ol' reliable total. W7CCF kept three schedules. W7BRE uses 3.5-mc. CW and 1.7-mc. 'phone. We are pleased to hear from W7BLX. W7BWK's portable is W7CTW. W7BBB's portable is W7ZZAN. W7AZI is busy truck-driving. Power at W7JF has been raised to 400 watts. No schedules at W7APR. W7AVM is very busy. W7CLJ works all districts. W7BMU is to be c.c. W7BDW is afraid the "big traffic men" will envy his total. W7BNI sends report on Wenatchee activity. W7BRW sends fine total. Frequency at W7AG-SL 3964 kc. W7CLK reports Aberdeen men interested in 1.7-mc. 'phone. W7AWF handled a message from W9JAP to Oregon. W7AHQ schedules W9s. 135 volts of B batteries power at W7CCN. W7BYS reports from Sunnydale. New Olympia station, W7CPF, reported by W7AIT. W7BWU clicked his first Australian. W7LM is another newly-wed. W7BBB is reported to have YLitis. Wind blew down antenna tower at W7BFB. W7CMJ teaches radio at night school. W7BIW, QRO 25-watt. W7BCC comes through with FB total. W7EX gets on occasionally. W7BYR is VCR member. W7BFG, W7CLH, and W7BGH took away most of prizes at Walla Walla banquet. W7BGL is on 1.7-mc. 'phone. W7VY clicks Africa, S. A., etc. New a.c. receiver at W7BWG. W7BB, new O.O., will cooperate with W7KO in giving precision frequency checks. W7BUL gets plenty of DX on 14 mc. W7ARQ is attending U. of W. W7BDQ is in hospital due to a motorcycle mishap. W7BHO says new handbooks are FB. A new Zepp will soon be working in conjunction with new rig at W7CPK. W7CKA increased power. W7AOP and W7OJ are holding the fort at Rochester. W7CPD is new ORS. A pair of '10s at W7CJG. W7TZ doesn't like the fall in Washington's traffic standing. W7APS does his bit. Ex-SCM Piety, W7ACS, would like more Tacoma experimenters on 28 mc. 25 schedules per week at W7BKE. W7CQB reports by 'phone. W7AJ made the Navy Day Honor Roll for 1932, being among the highest twenty-five. W7HS is new president of Spokane Radio Club. W7AXT is dropping traffic activities. W7RT clicked XU1U at 10:30 a.m. P.S.T. on 7 mc. W7JD is announcer at KPGB. W7UU clicks K7s on 3.5 mc. for QSP Alaska. Ed Cross, Renton, received call W7CUC. 1.7-mc. 'phone for W7CFV. W7BVA had a two-hour chat with Australia. W7ADS reports serious illness of YF. W7AAO is at Littell. Crystal grinding keeps W7HE and W7BRS busy. W7BAC pounds out on 14 and 7 mc. NOTE: A STATE-WIDE FIELD DAY IS BEING PLANNED FOR JUNE 10-11, 1933. Prepare now for a week-end of fun and experiment. A regular "radio expedition" of Seattle amateurs will leave for Mount Whitehorse and vicinity, on that date, where portable equipment on all bands will be used. Call letters W7CCZ, W7CEN, and W7ZZH will be employed. Reports on other parties are welcomed . . . let's make this the biggest and best field day ever held. We are especially interested in 56-mc. 'phone, 28-mc. c.w. and any other portable work on other bands. Remember the date: June 10th-11th.

Traffic: W7BSX 502 IG 401 BHH 281 AUV 202 BNI 162 WY 135 BRW 106 BCC 104 CLJ '103 AHQ 89 NR 84 BKE 70 AFC 57 BGV 67 BIW 59 BP 57 BRE 55 CCN-RT 51 CCF 49 BGH 44 ACS 41 BFG 38 APS 35 AAF 31 BYS 27 CNS 24 TZ 23 AAX 22 CHH-BMU 21 AF-UU 20 AIT-CJG 16 CQB 14 CJS 12 APR 11 BGO 10 KO-CPF-BLX 8 BEX-AWF-SL 6 BDW-CND 5 OJ 4 BCB-AYO-BKZ 3 AHH-LD-BUL 2 CLK 1.

PACIFIC DIVISION

PHILIPPINES — Acting SCM, Newton E. Thompson, KA1XA — OM1TB and KAILY are c.c. KAIRE is added to P. I. list.

Traffic: KA1HR 2048 JR 515 LG 434 NA 422 LY 234

CO 223 XA 88 CM 255 TS 17 KA9WX 77 KA4HW 20 OMITB 483.

SANTA CLARA VALLEY—SCM, Bruce Stone, W6AMM—Please POST your report on the 16th to insure inclusion in this report. W6HM is glad the Christmas rush from the Orient is over. W6AMM's 200 messages came from 8 one-hour schedules with P. I. RM W6FBW has been trying to scare up more traffic stations. W6YG's total was cut down by vacation. W6CEO has daily schedule with KAICO. W6BMW is keeping K6 traffic moving. W6BHX is looking forward to increased activity. W6DSZ is preparing for QRP contest the Santa Cruz Club is sponsoring. W6DBB expects to re-enter college. W6CDX uses 3.5- and 1.7-mc. bands. W6YL has new c.e. rig. W6QR is getting a big thrill out of 1.7-mc. 'phone. W6DDS sends a fine report. W6ALW has an '04A on 3.5 mc. W6FIK has new KW transformer. W6FPL has an SW3. W6GFW is another 1.7-mc. 'phone hound. W6DBQ spent Christmas vacation in other parts of the state.

Traffic: W6HM 464 AMM 200 FBW 198 YG 178 CEO 171 FQY 131 AZC 79 BMW 72 BHX 44 DSZ 40 FMT 39 DDB 27 DJP 18 CDX 13 YL 11 QR 8 DSE-DDS 6 NJ 4 ALW 3.

SACRAMENTO VALLEY—Acting SCM, George L. Woodington, W6DVE—W6CKO is high traffic man. W6DVD is AARS NCS. W6EAG is building his rig into a desk. W6CGJ reports new station in Maxwell. W6HER. W6APE has a fine c.e. rig. W6CRN is QRL college. W6GFX has a 56-mc. job. W6CIR is all by his lonesome in Rocklin. W6EHH having moved to Roseville. W6EHH is the proud papa of a brand-new YL! W6GSD is new ham in Roseville. W6DLO was heard pounding CQ on 7 mc. W6GAC schedules W7CAP and W6EOQ. W6DOA and W6CUE report FB results on DX. W6FEJ reports for Yuba City and Marysville. W6AIM is having key click trouble. W6GCM has 1250 volts on an '03A. W6FPH is using TPTG PP. W6GSS is new ham in Yuba City. W6GUK is new ham in Marysville. W6FYY is now using his portable W6GTZ. W6FEJ is having trouble keeping '45s in his transmitter. W6GFP is the only 'phone man reporting traffic. W6CDC is leaving on a trip around the world. W6FEJ, W6GUK, W6FYY and W6AIM joined the U.S.N.R. W6BYB reports traffic.

Traffic: W6CKO 66 CGJ 40 DVE 36 EWB 16 CMA 14 GAC 12 GR 10 DVD-CIR 8 GFP 7 AID 3 APE-GBA 2 BYB 21.

SAN JOAQUIN VALLEY—SCM, G. H. Lavender, W6DZN—W6EXH has an FB portable. W6GKE says skip is getting him down. W6DQR says holidays make mail men out of poor hams. W6FYM QSOed his 14th country. W6FZA, W6GKE and W6BFH are new ORS. Ex-W9GXY-W9ITI is signing W6GXE. W6BAR and W6FIO report for first time. W6AME put in c.e. W6FYM received portable W6HEX. W6EPQ has a hard time getting his transmitter on 14 mc. W6FBQ is rebuilding. W6FZA is youngest ham in the Section. W6BHQ had six crystals stolen from his car. W6FRH got job at KWG. W6DJQ is building e.c. frequency meter. W6FKL and W6GCP are keeping Atwater on the map. The Modesto Radio Club installed new officers. W6FFU has new frequency meter-monitor. W6FNO has new antenna. W6DIY and W6SM shipped over for another four years in U.S.N.R. W6EZG and XYL visited the SCM. W6EXB reports for Lodi. W6CUL schedules W6FLS, who is in the Orient. W6EBH can't get his a.s. super to perk. W6BIL reports for Tulare. W6GTO and W6GZE dispute the Los Angeles Section regarding having the closest stations in the Division; they claim that honor by having their stations only 20 feet apart. W6GFR and W6GUV joined the A.R.R.L. W6GZE is old spark 6AB. W6ASV has 50-watt c.e. job. W6BIL is working DX with portable W6ZZAK. W6EMI is QRL KJBS. W6BTN got married. W6GEG installed his 500-cycle 500-watt c.e. job in his apartment; BCLs cut his power mains! W6GEG has FB portable in a suitcase. W6DZN has longest flat top! 4500 feet long, FB on all bands.

Traffic: W6EXH 156 GKE 154 DQR 142 CYY 110 AV 98 CUL 82 AOZ 64 EUQ 52 DZN 51 AGV 48 BUZ 40

AME 36 FYM 36 GXE 33 CVA 33 FZA 29 AOA 28 CGM 23 FFU 22 GEG 19 DQV 17 BAR 13 FKL 14 FIO 9 GEI-GSX-ZZAK 8 GQZ 7 DJQ-CCW 6 FBQ 5 EXB 4 EPQ 3 GFR-GUZ 2.

EAST BAY—SCM, S. C. Houston, W6ZM—J. H. MacLafferty, Jr., W6RJ. Alameda County: W6CDA leads the county and section! W6AF has been rebuilding in one rack. W6CIZ pounded out a few. W6GMX has been handling Trunk "F" traffic. W6ZM handled a few Christmas messages from the Associated Charities through W6NM. W6AKB schedules W6ZZS (W6CUG), who is in Florida for the winter. W6RJ and W6DHS joined the A.A.R.S. W6YJ has been working XU1U (ex-W6AZH). W6CBE is trying the fourth crystal. W6FAH is a new E. Bay reporter. W6CTE is a "sixteen-year-old squirt." W6DBP reports again. Contra Costa County: W6EJA has a 1.7-mc. 'phone. Napa County: W6CAN blew his filter. W6EDR is building e.c. oscillators. W6CPE moved just two houses away from W6AVU! The Section cordially invites any amateur to attend the Section meetings, which are held at the Central Trades School at 12th and Jefferson Sts., Oakland, on the first and third Fridays of each month.

Traffic: W6CDA 823 AF 342 GMX 293 ZM 128 AKB 118 RJ 78 YJ 52 DHS 16 EJA 16 CTZ-CBE 10 CAN 11 CTL 6 FAH-CTE 8 DBF 5.

SAN DIEGO—SCM, H. A. Ambler, W6EOP—W6BMC makes the BPL and then some! W6GVU (ex-KA3AA) is with us with a BPL total, mostly transpacific; he reports W6HCU portable is W9HJR. W6EUC is in Encinitas. W6CYI is in Solana Beach. W6DQN turns in FB report. W6AXV lost a 50-foot mast in wind storm. W6EFK delivered some important traffic from Guam. W6AXN reports a message received and an answer back in eight minutes. W6CNB rebuilt receiver. W6BGL is on 7 and 1.7 mc. W6CNK has a pair of '66s. W6DWA is going on 'phone. W6DKN is busy in A.A.R.S. W6ACJ reports the Helix Radio Club still progressing. W6BOW has new receiver. W6DNS is trying for commercial ticket. W6AMO worked five countries. W6BHV has new 50-watt rig. W6GTM and W6GNT report. W6FQU's receiver is working FB. W6AKY put up new antenna. W6BLZ is new reporter. W6CTP reports antenna and shack wrecked by wind storm. W6QA reports a nice meeting of the Imperial Valley Radio Club. W6BCF is looking for K6 schedule. W6FCT reports new ham in Santa Ana. W6GSZ. W6BAM has a 28-mc. transmitter and also reports a new ham in Santa Ana, W6CIG. The SCM would like to receive reports of traffic from all new stations. W6CNQ has a new c.e. rig. We regret to report the passing of W6AYK of LaMesa.

Traffic: W6BMC 1302 GUV 685 DQN 220 EOP 91 AXV 64 EFK 59 AXN 53 CNB 46 BGL 17 CNK 16 DWA 14 DKN-ACJ 12 BOW 11 AMO 9 BHV-GTM-FQU 8 GNT 7 AKY-BLZ 6 CTP-QA 4 BCF 3 CNQ 1.

NEVADA—SCM, Keston L. Ramsey, W6EAD—W6DSD has '01A with B eliminator. W6ZO returns after long absence. W6FUO increased power. W6EEF is installing buffer stage. W6FMS is adding a pair of '03As. W6BUR is doing good work on 7 mc. W6BYR tried c.w. after a year on 'phone. W6UO took over W6AJP's point on Trunk Line B. W6CRF has four '10s in the last stage. W6GZH has been on the air a month. W6AFR schedules W6UO. W6AAX is doing good work as A.A.R.S. W6EAD is building portable receiver.

Traffic: W6UO 218 AJP 62 EAD 10.

ARIZONA—SCM, Ernest Mendoza, W6BJF-W6QC—W6CDU is the Section traffic leader. W6FZQ is printing QSLs. W6CEC is c.e. on 7100 kc. W6ZZBC has weekly 1.7-mc. 'phone schedule. W6BRI wants an ORS. W6BLP visited W6EK, W6CMQ and W6ZX. W6CVW's 1000-watt puts seven amps into feeders! W6GBN works all districts and Canada on 3600 kc. W6GFK received a QST subscription from his YF for Christmas. W6BVN added Hawaii to her DX. W6BJF's transmitter is at W6GJC, his receiver at W6CEC, and his frequency meter at W6GFK! W6FLG delivered a talk on "Army Radio Procedure" at the ASWR. W6CQL will soon be active on 7 mc. W6FIP takes part in dramas at KUMA.

W6DPS is getting ready for activity in New Mexico. W6HEU and W6GHC are new calls in Phoenix. W6HAX is newcomer in Cottonwood. W6CLL and W6CVW are only two blocks apart! W6DVJ shifts from 7 to 3.5 mc. by just turning his condenser dial a quarter turn! W6EUT reports two new hams in Tucson, W6HBF and W6HBQ; the latter 12 years old! W6CAP is still rebuilding. W6AWH had SCVP for his first license, in 1914! W6CQF wants information on ORS. W6BEP worked ZT2L. W6DCQ has new speech amplifier panel. W6DJH says the police radio is performing even above expectations. W6HCX reports new hams in Douglas: W6GUQ and W6FFK. W6GUQ has 500 volts on a '45. Ex-6DDE is attending the U. of A. W6FKX is QRL "servicing." Ex-5FU is operator at KGUP. W6DRE will have c.c. on 14 mc. W6EFC is experimenting with 14-mc. 'phone. W6COI will soon be at W5YH, where he will study for commercial ticket. W6DOW is an enthusiastic AA. W6GJC returned for his family to join him at the gold claim near Prescott. W6GFS is dividing time between 7 and 3.5 mc. W6FGO will rebuild his receiver. W6EKU has a new rack and panel job. W6AEK goes hamming with his new 8-cylinder bus! W6EJN and W6CVR were heard on 3900-ke. 'phone. W6BM is moving to Louisiana soon. W6BYD operates on 14, 7 and 3.5 mc. W6FAI on 3.9 mc. works duplex often with W6FOH and W6EFD. W6PFF is a retired Army "doc." W6FOH returned from a trip to California.

Traffic: W6CDU 731 FZQ 120 BLP 53 CEC 36 ZZBC 34 BJP 33 BRI 31 CVW 16 GBN 7 GFK 6 BVN 3 DOW 2 BYD 12.

LOS ANGELES — SCM. H. E. Nahmens, W6HT — Another rousing report! Over the 200 mark for the second month. TEN stations make the BPL: W6BPU ETL FGT CVF BSV EDW NW NF EKZ and DKM. We welcome these THIRTY-THREE brand-new reporters: W6FZK GGZ WT GQL BPD GLX GDH FDO GSL AFA EYW ZZCL GMA GXM AMF CEV GWJ EMT EVY FQK HCB ADJ FAP GOX AXQ GNK GAD BRB CWB GMC EZL DOJ. Los Angeles County: W6BPU leads the entire Section. W6ETL has been appointed A.A.R.S. relay station for Guam, China and P. I. "Who didn't make the BPL this month?" queries W6FGT. W6CVF handled rush messages to Orient and back. W6FRB of W6SU is working on state wide hook-up of unemployment relief net. W6BSV qualified for ORS. W6EDW schedules WLJ. W6NW is resting on San Nicholas Is. W6AUB is coming to front. Bogue of W6NF-CFN has been appointed Unit Commander of Unit 2, Section 1, U.S.N.R. W6EKZ received auto license 35-73-88. W6HT let the guy in line behind him walk away with 1Y-88-73! W6ACL blew plate trans. W6AAN received ORS. W6ADH gets '83 replacements after putting 1000 volts on the things! W6DKM, W6DTS and W6FKF had Naval Reserve cruise to San Diego. The s.s. super at W6DEP built by W6TB is a peach. W6LN comes across with a report. W6FGS receives traffic daily from KAICM. W6CVZ uses c.c. with ½ k.w. on '03A final! 200% rise in traffic at W6DVV. W6EGJ won first prize (3000-volt filter condenser) in Army ZAG contest for 9th Corps Area. W6FMK is building 800-watt MOPA. W6EK worked her 5th YL. W5AAX, ex-W6ETA. W6ENV and W6FKC are only 50 feet apart. Directional receiving antennas are in use at W6AM. W6AKW and W6AIF handled emergency traffic out of Lancaster and Antelope Valley during storm Jan. 17th-19th. W6DBC has 'phone on 1.7 mc. W6GYR is YF of W6DBC. W6HX has new '52s, W6CEM a new '03A and W6EAK a new '52. W6BVZ is all atwitter over 3.5-mc. card from VK2XO. W6DQZ has portable signing W6HEO. Clear your Alaska traffic through W6CJZ. W6EUV lost a power trans. W6FEW is traffic chairman of San Gabriel Valley Radio Club. W6BQF reports 56-mc. activity nil. Vacation cut into traffic at W6YBB. W6DWP finds his new QTH FB. W6ZZCL is portable of W6CVZ. W6FOW and W6GLX plan to consolidate. W6FZK is portable of W6ETJ. W6FWN is in line for ORS. W6BXL is QRL exams at U.S.C. W6EMT would like to know where all his DX QSLs are going! New '52 final at W6FKF. Portable

W6ZZBK is used for U.S.N.R. research work. W6DQ is building house (with help of W6ADP) on ranch in Mojave desert. W6BCT built new QST Autodyne. W6BXH is op on "Chicken of the Sea." W6DIO worked all districts on 3.5 mc. in 3½ hours. W6BLS is rebuilding. New rig at W6DQL. W6COF hears XIUT on 'phone on 7 mc. W6CGE is now on three bands, 250 watts on '11 at W6FMIH. W6AFU worked VS2 at noon. W6FLC has 7-mc. rig for DX traffic. W6HAG is new San Fernando ham. Ex-W2DGO is now W6EMT. W6CES tried to get on 14-mc. 'phone. W6LY has s.s. super. W6DH reports A.R.R.C. disbanded. W6CIX reports new hams at W6GFG: W6BGN, W6CMK, W6HEB and W6BEX. W6AXQ put low-powered 'phone on 1.7 mc. YU2AM is 51st country worked by W6CXW. W6TN is looking for work. PP '52 rig at W6EOG. W6CIX craves OBS. W6GNM is all-band-man. DX improving at W6FZY. W6DZP used W6XK and W9XAN to calibrate new frequency meter-monitor. New linear amplifier at W6EVY. W6AYF and W6DSP have new c.c. rigs. Tri-county gang operated portable W6CWB on 'phone at Lake Arrowhead. W6ERC came back with injured knee. W6CUH worked 60th country. W6EJZ garnered flock of Christmas traffic. W6MA has 'fourth operators' license. W6WO is bothered by power leak. W6EWY uses '12D in c.c. final. W6BGF shifted sky wire. W6HCB received her license. W6ESA needs a monkey or sumpin' to put a new rope through the pulley on his antenna pole. "Wimmin'" interfering at W6FPU. W6EMJ is bothered with 7150-ke. harmonic from KECA. There are 23 hams within a radius of ½ mile around W6EYJ. W6AM reports his son Bill can soon keep the home schedules when W6ZZA is on road. W6GAD is home from Stanford. W6BHP took 'phone exam. W6BZX has 'phone on 1.7 mc. Wind storm brought down mast at W6AGF. '10 at W6BER runs cold with 75 watts. W6EAT uses '10 in MOPA final. W6BOB has new single wire-fed hertz. W6GNZ improved note. W6ETX worked a Cuban. W6DOK gets less than 50% return on QSLs. W6LL has worked all districts. W6DOP claims if we could see his gal, we'd know why he's so nertz about her. Crystal at W6FEW is camel cut — two humps! W6GEX rebuilt. W6BEE and W6FXI are trying to span the harbor on 56 mc. W6CZT and W6GEU await return of licenses. W6BP schedules W2AFV, W8BAS, W8AKV and W3ARN. W6GYI is new Glendale ham. W6GPX worked his first Mexican. W6EV has completely rebuilt. New officers of South East Radio Experimental Assn. are W6EJZ, pres.; W6FMO, vice-pres.; W6BPP, treas.; W6TH, secy. San Bernardino County: W6FYT is in first place. New antenna at W6GKZ. W6FTV is looking forward to ORS. W6CVV says Ontario stations 100% c.c. W6GNS is new Ontario ham. W6GPS is new in Upland. YL W6EVA paid the old gang a visit. W6PNG acted as U.S.N.R. unit control station. W6BRB makes first report. W6BIK, W6DDJ and W6DXC located a bootleg station. W6CUJ reports another new Upland ham. Wind blew down W6FEC's sky hook. W6ERM is installing '52. W6AMF and W6EVV are starting new code class. Santa Barbara County: New rig at W6BZF. W6EZX is constructing c.c. rig. W6HBD and W6HBG are new Santa Maria hams. W6FFF received a 250-wattter for Christmas. W6AWY claims Santa Maria has more hams for its size than any other city in the world. W6DYQ was laid up with flu. W6EMY changed QTH. W6EDZ, W6DJS, W6ENJ, W6LC, W6GDH and W6GDU report. Ventura County: W6DTY leads county. W6GWJ, W6CEV and W6FAP are new reporters. W6GYB is new portable. W6EYE, sister of W6DCJ, joined the A.A.R.S.! W6FET rebuilt on bread board. W6ERU is building new receiver. New junior op at W6CVK. Cecil Goar, Activities Manager of Ventura Short Wave Club, expects call soon. San Luis Obispo County: W7ZZK is in lead. W6ALQ was in car wreck. W6DWW reports. W6FNP is trying to sell rig. Mono and Inyo Counties: W6FVD is new ORS. W6CUY reports 18 inches of snow. Riverside County: W6RJ has c.c. rig. W6EY reports W6FEQ c.c. on 7 mc. Mail your next report (March 16th) to new SCM — whoever he may be. 73.

Traffic: W6BPU 843 ETL 822 FGT 592 CVF 538 SU 422 BSV 403 EDW 370 NW 354 BZF 323 AUB 265 NF 234 ECK 198 ACL 178 AAN 177 EBK 176 ADH 170 DKM 135 CZZ 131 EZK-FYT-DEP 123 LN 119 FGS-EDZ 106 CVZ 105 DVV 104 FVD-EGJ 100 EII 97 ETJ 82 FMK 80 EK 73 ENV-GKZ 72 AM 71 DLI 70 BGN 65 AWY 58 BYF-AKW 55 DBC 54 HX 49 BVZ-DNA 48 DQZ-CJZ 47 EUV 46 GLX 44 FTV-FEW-BQF-YBB 43 AFO-EQW 40 DJS-EXQ 39 CAH 38 CVV-DWP 37 ZZCL 36 FSE 34 FZK 33 FWN 32 BXL-DZC-EMT 29 FNG-PKF-ADP 28 DTY-GLZ-BCT-DIO 27 EVL-GMA 26 BLS-DQI-ALD-FFN 25 GNK-GLZ-COF 24 CGE 23 FOW 22 HT 21 BXU-GQL 20 FMH-AFU 18 FLC 17 GXM-DYQ-BRB-FQK 15 CFS-LY-DH-AIX 14 DRQ-BIK-FMP 13 CUY-BPD 12 GFG-DEL-FFF-BIF-AIF 11 FJT-AXQ-ALQ-ENJ-CXW 10 TN-EOG-LC-CIX-GNM-ERL-FZY 9 GJW-EMY-CWZ-BVC-GOX-DOK-DZP-BCK 8 EVY-FLY-DSY-AYF-EHZ-CUJ-FHQ-FEC-PD-CWB-FDQ 7 DTX-ADJ-ERC 6 CUH-DQG-EJZ-ANN-FDM-MA-TJ-EZL-WO5EY-CEV-FQG-FGH-FDE-DWW-BGF-ETX 4 GMC-ECB-DZR-BYU-GDH-GDU-ESA-EWK-FPV-AAE-EMJ-EFY-EYJ-DZK-ZZA-FJS 3 GSL-DOZ-GAD-DOJ-DLN-GGZ-VO-FVW-FMO-BHP-ON-FXF 2 ERM-BZX-GRF-FET-DCJ-WT-FDO-AFA-FNP-UU-AGF-BER-EAT-DYH-BOB-GNZ-CTZ 1 CJS-RZ 3 ETM 123 FPP 6 GVS 5 EIW 3 ZBJ 2 W7ZZK 28.

SAN FRANCISCO — SCM, Byron Goodman, W6CAL — And still we climb! W6PQ leads as usual with some total. W6NK has a nice total. W6BGW is going in partnership with W6OC. W6DZZ has a good schedule with XU1U. W6CIS listens to Europe between schedules. W6DNC is to take that fatal plunge — matrimony. W6ARG heard 45 countries in all continents in three weeks on 7 mc. W6BTZ is good "trafficker." W6EYY likes 1.7 mc. A new Comet Pro at W6GIS. 3.9-mc. 'phone DX is FB at W6EQA. Another trans-Pacific schedule is that of W6BVL with K1AIN. W6CAL is back at U. of C. W6MV worked Mozambique. W6FPU finds some time to warm up his '52. W6ZS is back on. W6DQH is on 75 mc. using the call W6XAR. W6WU and W6DWJ worked India on 7 mc. The NR on 3.5 mc. keeps W6WF busy. W6BIY, ex-W6ADK, is back. A new rig is being built at W6GKO. W6GUU reports for first time. W6GMD wants to know who "this guy W6ADA" is. W6IU is awaiting license return. Wait until you see the new c.c. rig of W6ZF! W6WB is sharpening up the super for the Internationals. We get another report from W6BII. W6AZK blows '10s so he'll have an excuse to put in a '03A. Remember, gang, you get your copy of "HAM FLASHES" when you report your activities.

Traffic: W6PQ 1305 NK 174 BGW 162 DZZ 136 CIS-DNC 116 ARG 105 BTZ 54 EYI 61 GIS 59 EQA 43 BVL 37 CAL 35 MV 13 WU 10 FPU-ZS 8 DQH 7 WF 6 BIY 5 GKO 5 GMD-GUU 4 ZF-IU 3 DWJ-WB 2 BII 1.

HAWAII — SCM, C. D. Staten, K6COG — This report received by radio at W6AOR and mailed to HQs. K6GUA collects traffic from local stations for K6EWQ. K6FAB, in filling out his license application blanks, stated his frequency as 748 kc. instead of 7048 kc. Hi. K6ALI's dynamotor supply caused too much QRM. K6DHW ordered parts from the coast. K6EWQ, RM, schedules K7UT and others. See his total! K6AIU is suffering from YLitis. K6EDH is active. K6CRT is going to remain on Oahu. K6CIB has been working the coast on 3.9-mc. 'phone. K6GQF and K6DBE have been on 1.7-mc. 'phone. RM K6AJA reports for Hilo. K6FOL is erecting two 60-footers. K6BMY is doing nice work with pair '52s. K6ANA is "in love — etc." Hilo High School will soon return to the air.

Traffic: K6EWQ 1895 GBY 204 CRT 85 GAS 75 GQF 54 EDH 33 EEI 20 ACW 16 COG 10 CIB 6.

ROANOKE DIVISION

WEST VIRGINIA — SCM, C. S. Hoffmann, Jr., W8HD-W8NS — W8ELO took exam for entrance to Annapolis. W8HWT has portable W8HWS. W8ETX and W8EZJ are building c.c. jobs. W8BKG wants to join

A.A.R.S. W8BJB desires 7-mc. traffic schedules. W8DSI wants to exchange notes with someone who has built the "Unorthodox Receiver." W8HCL worked his first "6." A new Antenna-Counterpoise is helping DX at W8DJD. W8AZD worked OA4AL. W8DPO is rebuilding for International Contest. W8EL wants to swap stuff for a '52. W8ELJ is new A.A.R.S. with W8CMJ joining on Sunday mornings. W8GUQ is new Huntington ham. W8CAY moved to Elkins. W8CZ and W8OK are on 1850 kc. Ex-W9FQQ, a YL, is now in Charleston. W8HIU and W8BKI are experimenting on 56 mc. W8CHM and W8CHP are working DX on 3.9-mc. 'phone. W8LS is changing from 'phone to c.w. W8DMF is working ZLs. W8BTV and W8GBF have been ill. W8GBF schedules W8GEG, W9FUT, W2AFV, W3CAH and W4WZ. W8GAL, W8AIT, W8HSA, W8CBS and W8HBB are on 1.7-mc. 'phone. W8SP had his license renewed. W8CVX schedules W3BOE. W8FQB is back at college. W8HHP is getting out FB. W8IB says the "repression" has at last hit his station! W8HSA says someone is illegally using his call. W8GEG has c.c. on 3620 kc.! W8TI is doing good O-O work. W8MN, W8BIZ and W8EIK visited Roanoke, Va. W8BIZ is teaching a YL radio. Mrs. W8HD will be on at W8HD soon. W8DFC handled important death message.

Traffic: W8GBF 216 GEG 205 OK 64 CMJ 48 BWK 44 EL 42 CFB 36 CVX 35 BJB 32 HSA 34 FQB 30 TI 19 AZD 18 DPO 14 HCL 11 BOW 10 DJD 7 HD 6 ELO-GRJ-DFC 3.

VIRGINIA — SCM, R. N. Eubank, W3AAJ — S. T. Terry, Jr., W3CVU, Chief RM. C. E. Hedrick, W3WO. Asst. Route Manager. W3NT has 3 fast ops. W3ATY has fine schedules. W3AG schedules K5AA. W3AKN is president Peninsula Radio Club. W3AUG is back in traffic. W3BRY is rebuilding receiver. W3CAH had license QRM. W3AAJ had to cancel schedules due to working hours. W3BAD uses remote control. W3CVN is ex-4CE of Dillon, S. C. W3CSY is adding a stage. W3AIJ has plenty wallop. Following stations are new reporters: W3CVN, W3ASK, W3BFQ, W3BZA, W3CFL, W3CLX, W3CNY, W3CVU, W3IQ, W3AJA, W3APF, W3MT, W3BUY. W3GY is O.O. W3AGW entertained the R. I. Virginia had 29 ORS active at October ORS Party out of 30 in state. W3AHC schedules Venezuela, YV2AM. W3COJ has new c.c. rig. W3KA wants schedules. Following appointed ORS: W3CVN - W3BLE - W3BAD - W3CVU (ex-W3AGH) - W3KA. W3BZA sends nice report. W3AVU is QRL work. Richmond Club had 45 at Jan. 17th meeting. W3BAI is going to increase power. W3BGS' antenna broke down in storm. W3BSM is secy.-treas. Richmond Club. W3BPI is rebuilding to c.c. W3BZE has new a.c. receiver. W3CMJ sends new ham QRA. W3HV had receiver trouble. W3BXP passed exam. WIZZAR is still at Norfolk. W3CLH is QRL work. W3CNY and W3BIW are on 1.7-mc. 'phone. W3BEK reports two new hams. W3CUV is new call in Norfolk. W3CSD and W3CUV are new at Norfolk. W3BAN is world's best O.O. W3BWA is on 3507 and 7014 kc. W3BUR reports 30 took exam at Roanoke. W3MQ, our Radio Inspector Foley, gave 211 amateur exams during month. W3BYA is rebuilding. WIZZBO-3CVU is ex-W3AGH, our Chief R.M. W3AAF is using c.c. '59 Osc. W3BPR is moving to suburbs. W3ASK is c.c., thanks to Santa. W3CPN is putting in c.c. W3FE is now c.c. W3NE QSOs OK with antenna down. W3BFQ has c.c. '47, '46, '11. W3CLX is building 1.7-mc. 'phone. W3CLD worked a "6" on low power. W3IQ has rectifier trouble. W3BTR is building rig for 7 mc. W3CFL is going after BPL. W3AEW is planning 'phone. W3GE has numerous rigs. W3TJ says "extension" saved his license. W3VZ is new call of ex-3TC-3PQ-3BAM. W3AOT suggests 1.7-mc. party. W3BRA is QRL business. W3AAR passed exam. W3ADD uses c.c. Osc. W3BSW has new receiver. Every station reporting only one message or more will receive next month's Virginia Bulletin with compliments of Section Manager. W3APU is using c.c. W3AJA is now on 3.5 mc. W3CVQ is new call at Roanoke. W3BSB worked all W and VE on 3.5 mc. W3BPA was off most of month.

W3BEP says Norton 100% c.c. and 1st class tickets. W3BTM has been sick. W3BLE is ORS. W3BJX received ORS. W3CXM reports QRM holidays. Staunton Radio Club reports fine activity. W3ALS is secy. VPI Radio Club. W3BCI is building c.c. rig. W3BNE has new high power rig. W3MT changed QTH. Va. A.A.R.S.: W3FJ - W3NB - W3ATY - W3CAH - W3BAI - W3CMJ - W3BTM - W3WO. W3ZA is 100% 'phone. W3WM works lots DX. W3BXL is new in Norfolk. W3CDW is c.c. on 7100 kc. W3BUY schedules his brother, W6CAL, weekly. W3BKS is too QRL to make schedules. W3AZU has new a.c. receiver. W8HXM is ex-3RS. W3BUO is operating at 3NB. W9QN, Miss Gwynn, is Club Librarian. W3BJE is now at Langley Field. W3AVR is on little. W3BZ has business QRM. W3JG will operate W3AZI. W3JG passed exam. W3BIG passed 'phone exam. W3RL is back on air. W3BEN is attending R. M. College. W3NO is QRL. WTAR. Send stamps for Virginia Bulletin to W3AAJ, or report traffic to get it FREE. W3ADJ is trying 1.7-mc. 'phone. W3APT has new a.c. receiver. W3CHE has been in hospital. W3ARX is V.P.I. Club president.

Traffic: W3NB 987 ATY 774 CXM 191 AAJ 183 FJ 172 BJX 153 BKS 95 AG 96 BEP 72 AKN 58 AUG 57 BRY-CAH 52 BAD 44 BLE 43 CVN 40 BTM 38 CSY 37 AIJ 34 GY 25 AGW-AHC 20 COJ-KA 19 APF 17 BZA 16 AVU 15 BAI-BNH 14 BGS-BPI-BZE-CMJ-HV 12 BUY 11 BXP 10 BPA-CLH 8 CNY 7 BEK-BIW-CDW-CKM 6 BAN-BWA-BUR-BYA-WM-ZA 5 AAF-BPR 4 AJA-ASK-CPN-FE-NE-MT 3 BFQ-CLX-CLD-IQ 2 APU-AZU-BBS-BTR-CFL 1 ADJ 48 APT 21 CHE 8 MQ 4 CLV 15 BSX 4 TTN-CEY 4 BKS 92 LY 1. WIZZAR 10 WIZZB 5.

NORTH CAROLINA — SCM, H. L. Caveness, W4DW — One of the most successful hamfests yet was held in Raleigh on January 8th with between 60 and 70 hams present. W4RV invited the gang to meet with him in Durham on February 5th, and on March 5th the hams of Greensboro will entertain the Club. Be there. Have you seen a copy of "The Tarheel Ham"? Write the SCM or either RM and ask for a copy. Are you taking part in the Sunday afternoon parties on the air? Congrats to W4TO on leading North Carolina in the SS and to W4ZH in leading the Fourth Corps Area in ZAG contest. The Naval VCR, under the direction of W4CQ, now has several members in the State. W4AOA got unlimited 'phone license. W4TR's 'phone gets out exceptionally well. W4ABW reports. W4TJ is still flying. W4JR and W4NC complain about skip ruining schedules. Exams at W4AOE kept the operators off the air. W4ALD is a consistent traffic man. W4AGD lost time account of sickness. W4AEH resigned his AA work. W4TP has c.c. rig ready for 3.5 mc. W4ATS finds some traffic on 14 mc. W4BHR rebuilt. W4AMC has his c.c. rig nearly ready. W4AVT changed QTH. W4TN is working from W4WE. W4AAE is back again. W4DQ had a bad case of "flu." W4AGF has fine traffic total. W4RE is VCR Commander Unit 5, Section 3. W4AIS will give a crystal holder to the ham in the Roanoke Division making the highest score in the International contest in March. W4MR made the BPL on deliveries. W4AL's push-pull job is putting out real 1933 signals. W4ANN and W4BKH are heard on 7 mc. W4ABN was off due to sickness. W4AXZ was heard in ZL on 3.5-mc. 'phone. W4ANE is changing to c.c. W4TH and W4AWZ have FB c.c. jobs. W4EG is building 14-mc. c.c. job. W4TS hopes to be on regularly. W4TO observes: "When you deliver a message, you make a friend for amateur radio."

Traffic: W4ZH 450 DW 397 NC 280 VN 132 JR 127 MR 110 AGF 102 ALD 93 AIS 92 AVT 68 AOA 44 TO 36 ATC 27 AAE 25 ANU 24 AGD 21 TP 20 AEH 16 IF 15 TR 14 ATS 14 TJ 12 RE 8 AMC 7 DQ 4 AL-JB-ABW-TH-HX 2 AWZ 1.

ROCKY MOUNTAIN DIVISION

UTAH-WYOMING — SCM, C. R. Miller, W6DPJ-W6ZZZ — Wyoming: W7ARK left for California where he will sign W6CST. W7COV increased power. W7COH is disgusted with 3.5 mc. A. J. Feedin, Sheridan,

forgot to sign his call to report. W7CJR heads Wyoming traffic list. W7AMU is active A.A.R.S. W7ADF puts 1000 volts on '45s. W7BXS can't keep his tubes cool. W7NY is working on a 1934 receiver. The Casper Club elected following officers: Pres., W7ADF; vice-pres., W7BXS; secy.-treas., W7CHR. W7CMN burned up four power packs. W7AWG has a new set of batts. Utah: W6EXL rebuilt receiver five times. W6APM is trying c.c. W6FRN was on one week. W6AFN reports nothing new. W6DAM is building MOPA for 1.7 mc. W6GQR wants schedules. W6GQM uses his '82 and '45 for foot warmers. W6FEF rewired his station. W6AVW has new portable, W6GWI. W6DTB's a.c. receiver pulls 'em in.

Traffic: W6DPJ 790 EXL 205 APM 91 AFN 35 FRN 22 FEB 15 AVW 13 DAM 8 DTB 6 GQR 4. W7CJR 153 AMU 30 ARK 21 COH 11 ACG 10 COV-?? 6 ADF-BXS 5.

COLORADO — SCM, T. R. Becker, W9BTO — The P.P.A.R.A. is going to publish a magazine, "The Colorado Am-Meter." The A.R.O.D. and C.R.E.A. have consolidated. The Four Fellows Club of Denver is going strong. The A.A.R.S. gang has a little social club which is going over R9. W9ESA makes the BPL with a total we can all shoot at!! W9GVN is running W9CJJ a close second for FB reports on 14-mc. 'phone. W9CBU graduated to c.c. W9AUJ has finished the partnership transmitter. W9EMU is installing a condenser mike. W9GUW is now at Fort Warren, Wyoming. W9AQN has c.c. perking OK. W9JGF has MOPA. W9CND reports plenty of DX. W9JFA makes the BPL and reports all schedules going FB. W9IPI is trying to get the bugs out of s.s. super. W9BYJ has trouble with his super. W9CVE is going strong. W9AAB was reflected as our Director. Congratulations, OM. W9EAM keeps A.A.R.S. on the map. W9BQO is servicing BCL sets. W9FYY is RM for this part of the Section. W9HGL is busy at North High. W9IJU handles little traffic. W9BJN reports a good crystal business. W9KGR is rebuilding his crate. W9HRI is employing the services of FYY to rebuild his c.c. set. W9DDF works in the wee hours of the a.m. W9APR is QRL KGPX. W9FRP has his 'phone going FB. W9RJ is pounding regularly. W9BYK applied for ORS. W9HFV has '10s MOPA. W9ITE has a new super. W9EAV is QRL Rifle Range. W9BCW is holding up the U.S.N.R. W9BNK and W9CSR are QRL school. W9BOJ is trying to get on. W9BVO and W9EPC get on now and then. W9BXQ is QRL KGPX. W9CAB schedules his son, W9CAA. W9ECY, W9WO and W9FFH are QRL. W9ESX will be on soon. W9FN is still in town. W9CNL reports his '52a perking. W9EJW gets out FB. W9HFZ uses '10s. W9GBQ threatens to come back. W9EKK keeps A.A.R.S. on the map. W9HJS is on sick list. W9HGK is on part time. W9FCK and W9ACV get FB reports. W9DGJ and W9IJM are building new receivers. W9ASD and W9HFZ are QRL work. W9IAV sticks to '45s. W9JB is still in service business. W9KIN has '04A final. W9HOO is manned by the operators at North Side High. W9JGA and W9IAV are on 1.7-mc. 'phone. W9HOU is using '10. W9ATM is on often. W9HPY will be on soon. W9CVE reports a nice total. W9BTO has 1000 watts input. W9FUQ is in need of new rectifier tubes. The Radio Club at Boulder is very active. W9HIR built receiver per Jan. QST. W9FYK has QRM from YLs. W9BYK only needs a QSO with Asia to gain WAC. W9YL is teaching at University. W9FYL is on with low power. W9JFQ and W9KGS are QRL. W9PFU will be c.c. soon. W9JRV is active. W9CKQ reports as visitors W9KPA, W9JLP. W9GNK is QRL navy work. W9JRM and W9IDC are new hams. W9FPZ blew a rectifier tube. W9GLG is applying for ORS. W9BRZ hopes to schedule W9EHZ, who moved to Calif. W9GCM is getting out FB. W9KKY is still trying to make receiver perk. W9CKO is enjoying c.c. W9JFD has new receiver. W9IFD has MOPA. W9DRQ and W9FRQ are on 14 mc. W9CDE schedules A.A.R.S. stations. W9CIW is going strong. W9FDP has '03A in final. W9DMD-W9EII is going to apply for ORS. W9JNV is now Route Manager for the Spring and surrounding territory. W9FQJ has been trying 'phone. The

"HAMLET" will soon be ready to go. Following new appointments: W9JCQ, OO, OBS, ORS; W9BYK ORS; W9EEC ORS; W9JNV RM; W9FYV RM. Following cancellations: W9GBQ RM; W9AUJ ORS. New hams: W9LFE, Ex-9DUI; W9KZS, Ex-W9FGK; W9LIU, W9LJF. New portables: W91IJ, W9KWJ. W9FXQ is now a resident of Colorado Springs. W9JCQ is on low power. W9EPN rebuilt to MOPA. W9EXV sold his equipment. W9JAV is putting in 1.7-mc. 'phone. W9HDI finally wore out all his crystal blanks. W9EYN gets out on 3.9-mc. 'phone. W9IQS gets some traffic. W9AMS worked all districts and half the states. W9EHC is working around town with 2-watt input. W9LLS is now W5ZZK. W9DYP is QRL YF. W9DNP and W9DYP keep KVOR going.

Traffic: W9ESA 1550 FA 508 FYY 90 CDE 21 JGF 24 CND 49 KCQ 19 GNK 174 FPZ 5 IFD 3 CWA 15 FDP 41 HPW 20 GVN 28 JNV 173 EII 21 AQN 27 EHC 45 FXQ 17 AMS 11 IQS 17 KZS 1 EPN 1 JCQ 14 LFE 38 EYN 66.

SOUTHEASTERN DIVISION

EASTERN FLORIDA—SCM, Ray Atkinson, W4NN—The "100 total" stations are: W4VP, W4BRO, W4NN, and W4AYD. W4ALP tells us W4PQ was QSO 5 continents in one month. W4TOT worked VS2GY, a ship near Hawaii. W4AI is increasing power. W4AJX won a gold medal in the EAR DX Contest. W4AMQ is preparing to split the ether. W4TZ has new 50-watt rig. W4IZ is coming on with pair of '04As. W4AKJ has the traffic bug. W4ACC is now W5CDM in Beaumont, Texas. W4VP suggests using technocracy to bring in QSOs. W4BDM is increasing his traffic. W4ASA-ZZQ works between Lakeworth and Palm Beach. W4BIN sends in his best total. W4ATA is building c.c. rig. W4AUL is handling traffic. The bug has again bitten W4BDG. W4BL is working lots of DX. W4ACZ and W4QN have FB traffic totals. W4WS is Florida's most consistent traffic-reporting 'phone station. W4MF is the proud daddy of a baby girl. W4DU reports traffic. W4NN and W4AGB have been handling 'phone traffic. W4ASQ is DXing. W4ANY is using 1.7-mc. 'phone. W4AWE is handling 'phone traffic. The following 'phones were heard at W4NN: W4CJ, W4LS, W4BAM, W4ADB, W4AOK, W4PK, W4UH, W4ATG, W4PT, W4AKA and W4AGR. W4BRO schedules W4EC, W2EJP, CM8YD and K5AD. W4GS made high score in ZAG Contest. W4BGG sends dandy total. W4BGL applies for ORS. W4UX has c.c. 500-watt outfit. W4AZB is building an c.c. frequency meter. W4HY is too busy for much traffic. W4ZU is trafficking.

Traffic: W4BRO 158 NN 109 AVD-VP 101 BDM-GS-UX 75 OT 66 ZU 53 BGG 52 QN 32 BT-ALP 26 BIN 27 BGL 25 BMN 51 AGB 24 WS 17 AKJ 24 PQ 16 AII 10 AUL 20 ACZ 15 ASA 11 AJX 7 AZB 6 HY-ATG-MF-LU-ADB-PT-RAM-TS-CJ-UH 4 BNR 1.

WESTERN FLORIDA—SCM, Edward J. Collins, W4MS-W4ZZP—Route Manager, S. M. Douglas, W4ACB-W4PCN. W4QR-W4PEL passed the exam. W4BKV is going FB. W4AUA is rapidly shaping his U.S.N.R. unit. W4ACB-W4PCN joined the F.N.G. W4BOW is getting out FB. W4BKD is on every noon for West Florida QSOs. W4ASG is on with c.c. W4AUV works ZLS. W4AUW is using c.c. osc. W4AXP is on 1.7 mc. W4BJF sold out to W4AQY. W4AQA is helping W4ABK. W4AGS-W4PCK was W. Fla. winner in the Sweepstakes. W4KB has a new oven for his crystal. Mrs. W4KB has c.c. W4BPI has all a.c. receiver. W4BCB has trouble with '52. W4ARV uses spark coil plate supply. W4ZZR will soon renew West Fla. schedules. W4BFD steps out FB. W4UW-W5NO is QRL WCOA. W5ZZR-W4BSV is building a dynatron freq. meter. W4ATF visited Pensacola hams. Any hams interested in attending Pensacola Hamfest can get full information from W4MS. W4QK built a new shack. W4QU is QRL U.S.N.R. W2ABC is thinking of getting a portable call. W6FTB has applied for a portable. W3ADO stands watch at W5ZZR. W4ZZAO rebuilt receiver. W4BGA was heard in Spain by Ex-4QV. Work keeps W4VR off

the air. W4ASV-W4ZZW is rebuilding. W4BMJ is getting set for a big 1933. Ex-W4BKQ is selling out. W4AIJ is keeping W4BEW's call. W4ASV is using '10s in his receiver. Everyone is trying to figure why can't W4AQY ever get any further than Milton when he starts for Pensacola? A new 64-ft. mast is going up at W4MS-W4ZZP.

Traffic: W4AQY 6 ACB 16 AXP 22 KB 70 AGS 252 MS 21 BGA 14 BFD 11 AUW 8 W5ZZR 24.

ALABAMA—SCM, L. D. Elwell, W4KP—W4AAQ is high traffic station. Second high is W4PDX. W4BAI has new shack. W4AYK has gone to 1.7 mc. W4AJY spends his time between college station and home station. W4ALA has new '52 c.c. rig. W4BOU is new reporter from Tuscaloosa. W4FL handled W. U. traffic during recent sleet and snow. W4AG is now ORS. W4DD is on 14-mc. 'phone. W4APU got the c.c. oscillator going. W4BPT is using m.g. W4BGO is planning on a 50-watter. W4PFR is portable of W4BAU. W4BIW is on 7 mc. W4ADJ has a time with high voltage filters. W4BBO has low-power MOPA. W4BEI has '10s in PP. W4BFM is using old reliable Hartley. W4BSD has low power c.c. rig. W4ZS is installing 50-watt modulator. W4ALG gets FB reports from west coast. W4BCI is rebuilding. W4GP was burned out of home and station. W4BL and W4GL are new hams in Mobile. W4AQO is on 1.7-mc. 'phone. W4OA is building dynamic mike. W4DS worked British Honduras on 3.5 mc. The club in Birmingham elected W4BOE pres., W4DD vice-pres., W4BCV treas., and W4ARF secy. W4AGI is back home. W4BSH is new ham in Tarrant. W4KP is on 'phone and c.w. W4AP handles traffic on 14-mc. 'phone. W4AEZ, W4AXU, and W4BFA helped the SCM get an urgent message via 'phone from his parents through W4BCU. W4APJ is still perking fine. W4AJF handled some traffic. W4ALV is back.

Traffic: W4AAQ 59 PDX 55 BAI 48 AYK 27 DD 20 FL 17 ALA 15 BCL 14 BOU 9 AJY-AG 8 AP 7 ZS 6.

GEORGIA-SOUTH CAROLINA-CUBA-ISLE OF PINES-PORTO RICO-VIRGIN ISLANDS—SCM, Chas. W. Davis, W4PM—CM8YB is a regular traffic-reporting station, regardless of the Jan. issue of QST (hi). Apologies, OML CM2WW sends a voluminous report. CM8YB schedules W4BRO, TT2WD, W2AFV, W6BDD. CM2DO is 61 years old. CM8EU is new ham. W4WZ is knocking 'em for a loop. W4SM is no longer the 4th CA NCS. W4IR takes it on. W4BQX is old Morse op in Augusta. W4BZ is a real old-timer. W4KU received and delivered his 6 messages in 5 minutes on 'phone. W4BAG's antenna came down. The Atlanta Radio Club pitched a swell Old-Timers Party Jan. 19th, and had Mr. Turner, the new R.L., as guest. W4MA is looking for schedules. W4AJI worked F3SMI. W4AUO is AJI's brother. W4VX reports his OW sick. W4KU wants to get in touch with stations willing to cooperate in a state-wide Department of Agriculture net for state of Georgia.

Traffic: W4WZ 1111 SM 140 BJX 185 AJI 40 BQX 35 VX 20 ATZ 34 BW 10 MA 7 ROJ 18 AAY 16 BZ 12 MO 28 KU 6 AAR 11 PM 70 SS 26 BAG 23 CM2WW 24 CM8YB 154 AZ-JP 43 EU 35.

WEST GULF DIVISION

NEW MEXICO—SCM, Jerry Quinn, W5AUW—W5AOP has consolidated with W5AOE. W5CPO shot his filter. W5CFY is on 7 mc. W5CSR will be on soon. W5AAX is pounding along. W5CGJ is on 3.5 mc. W5AIC changed QRA. W5BVC has been QRL. W5ZMI is getting R9 on 1.7-mc. 'phone. W5ZU is QRL work. W5AUW's c.c. rig is working. Note SCM's new QTH: 518 West Marquette, Albuquerque.

Traffic: W5AUW 322, ZZQ 127 BVC 16 ZM 4 ZU 3. **OKLAHOMA**—SCM, Emil Gisel, W5VQ—W5CEZ is high man. W5GA reports for first time. W5AUA has first-class ticket. W5CJZ blew three rectifier tubes. W5ALD moved his station to the Armory. W5CBBY is on 56 mc. W5BDX is rebuilding. W5BPM finds traffic light. W5BOE has a nice schedule list. The Tulsa Amateur Radio Club is active with W5AYF as president.

W5NF sold his station. W5AVN is on with '45s. W5AXA is active on 7 mc. W5GW is on 3.5 mc. W5BTF is QRL school. W5WR hooked an Aussie. W5AA is getting out FB. W5ALH is new ham in Oklahoma City. W5AND has been QRL school. W5GF is coming on with c.e. W5AUG uses the ancient soup rectifier. W5ALJ is active OBS. W5AJO is QRL grinding crystals. W5PP works all bands. W5BQA has trouble with BCLs. W5ATO has hopes of unlimited 'phone ticket. W5CNC has FB c.e. rig. W5BEX has a '51 on 1.7 mc. W5AJP is back on 3.9-mc. 'phone. W5AAQ is new O.O.

Traffic: W5CEZ 156 GA 119 BOE 84 BPM 72 BDX 64 CBY 41 VQ 39 ALD 30 BQA 19 AVN 20 BTF 11 CJZ 10 AUA-AXA 7 AA 16.

SOUTHERN TEXAS—SCM, D. H. Calk, W5BHO—Fort Sam Houston, San Antonio: W5OW sends the largest report so far. W5APX is organizing Texas A.A.R.S. 'phone net. W5MN has been working DX. W5PF reports power leaks cut his traffic. W5NU is working VKs. W5CAS is using a pair of fifties. W5PF worked seven "J"s. W5AWY works A.A.R.S. W5BVG is QRL painting autos. W5JC is coming on. W5BUV wants traffic. W5AJW is the son of W9EFE. W5OR has dismantled. Married life is keeping W5ABQ and W5JC off the air. X W5LX keeps the tubes hot at W5YL. W5AQB is building QST receiver. W5BNK works daily on 14 mc. W5AUC revamped his Scott-super-12. W5AAI is QRL school. Ernest Vaughn of Randolph Field Hospital is seen collecting apparatus. Port Arthur: W5YH was heard on 'phone by K6BAZ. El Paso: W5AOT's 14-mc. 'phone is working FB. W5ES has new QRA. W5BNJ keeps four schedules. W5COE is new ham. W5BQU-W5ZZL send nice report. Kerrville: W5BKE hopes to be on soon. W5BKZ is on 14-mc. 'phone. W5BSF is working "J"s. San Benito: W5AEV is keeping the trunk line hot at his end. Corpus Christi: W5MS is getting WAC. W5BWZ worked J2CE. Brownsville: W5BQI will be on soon. W5BIG worked the SCM. W5CKS is getting ready to go. Kingsville: W5ABA reports an Ex-Morse operator getting started. W5CLP says Brownsville hams attended a hamfest in Corpus Christi Jan. 8th. Bay City: W5BZO is building a portable. W5CHM acquired most of W5BOZ's rig. W5CNX has his licenses back. W5BSP has one of the new three-year licenses. W5CGE is awaiting change of QRA on his license. W5ABH has a '60 operating on 14,388 kc. Rock Island: W5BKL had FB Christmas. Freer: W5AQN will be remembered as Ex-5ALA. W5BFL is off due to license expiration. Austin: W5BB was QSO W5VV while W5VV was at VK2BG. W5AXY is building 1.7-mc. 'phone. W5BXH is QRL BCL work. W5CT visited W5BB. W5BDA is experimenting. W5KA is QRL Public Address Systems. Missouri City: W5BKY-W5UW worked T1BD. Houston: W5ADZ reports school QRM. W5TD says 7 mc. is getting "buggy." W5ON is handling lots of traffic on 'phone. W5ANW and Miss Fannie Simpson were married on December 31st. W5OX is QRL Houston Police transmitter. W5BTD is QRL KTRH. Your SCM has portable. W5CTZ.

Traffic: W5OW 1647 YH 224 BKE 151 MN 90 BNJ 76 BQU 40 HKL 59 VV 26 AEV 23 ON 34 MS 16 AOT 14 APX 13 BZW 12 PF 12 YL 27 BVG 10 TD-BUV 9 CIP 11 ADZ-RV 7 CAS-BKY 4 ES 3.

NORTHERN TEXAS—SCM, Roy Lee Taylor, W5RJ—Hoorah for W5BNF. W5BII can route traffic most any place in the country. W5CII is building new shack. W5AUL is now Alternate CA NCS AARS on 3497.5 kc. and 6990 kc. using the call WLJA. W5ANU has been QRL working. W5AJG is just getting over the effects of Christmas. W5BKH says "always QSP." W5ARS reports W.F.A.R.C. will have its annual banquet in spite of the depression. W5AID will have to go back to straight key as W5ATG is going to learn to use the bug. W5AID has borrowed so long. W5CAV's rig is in bad condition. W5AHC reports, W5CPX looking for new QRA and W5BJC on 3.9-mc. 'phone. W5BBQ is still clicking with A.A.R.S. W5BCW is moving into new shack. W5IT had to call off traffic schedules. W5AFQ is looking forward to an ORS. W5LU is the star "trafficker" of Ft.

Worth. W5COJ and W5IA are also active. W5SN-W5BXW has new '52 job. Every little bit helps. W5ASA, OMI. Not much doing at Neches since W5NW got married. W5BJX expects traffic will pick up. W5CEE worked bunch of DX. W5CHJ reports a radio telephone ticket. W5ARV is going strong as W1OXV. W5BUA is on 3.5 mc. W5BEY reports from way out in the ranch country: W5CJG is QRL bank. Dr. E. W. McKenzie has applied for a ticket. W5CAM is trying to change to MOPA. W5SU reports about Dallas gang: W5BSV is putting up a Zepp. W5AGR is recovering from pneumonia. W5ZD is practicing on a mill. Mac McCreight gets license. W5UJ is installing car radios. W5NP sends regards. Abilene has six A.A.R.S. W5BXY, W5BJU, W5CPH, W5AW, W5AZB, and W5AUL. W5CPH is building a TNT. W5AZB is still working on the new c.e. rig. W5BXY is trying to grind a crystal. W5BJU is on at times. W5AW has a p.d.c. note. W5AVX pounds out a few. W5BAY is rebuilding the big 'phone. W5QA is QRL service work. W5BST is on c.w. part time. W5BNS and W5NV were home for holidays. W5BTB is rearing to go. W5BCE can't make his MOPA work. W5SP is busy buying cotton. W5AUJ blows 50-watters. W5AUN is now a big "5 and 10 man." W5KL is back in Ft. Worth. W5AGJ is playing with 'phone. W5BNO is oping at WFAA. W5WP is oping and announcing at XEPN. W5QY is rebuilding. Dad Cowan is on some (W5CF). W5RJ lost that 73-ft. pole two weeks after it was put up. W5BGW is on a lot. W5BA and a school mam may form a life partnership. W5BXV reports for Central Texas Amateur Radio Club: W5AMK is completing his 250-watt c.e. rig. W5AKA is moving into new home. W5AMW gets out on 1.7 mc. W5BAS is new ham in Temple. W5AHZ is still waiting for Santy to bring him power pack. W5BEQ has c.e. fever. W5CKP is going to rebuild. W5LM wants to sell out. W5KA was visitor at club meeting. W5BEO worked his first DX. Central Texas Amateur Radio Club meets first and third Wednesday each month. Get in touch with W5BXV for details.

Traffic: W5BNF 308 BII 285 CII 157 AUL 144 ANU 142 AJG 138 BKH 128 ASR 110 AID 105 CAV 102 AHC 91 BBQ 89 BCW 68 IT 51 AFQ 41 LU 68 COJ 50 IA 36 ASA 17 NW 12 BJX 10 CRE-ARV 9 CAM 50.

CANADA

MARITIME DIVISION

NOVA SCOTIA—SCM, A. M. Crowell, VE1DQ—VEIER piles up the highest total. VE1EP worked FM8IH. VE1DI-DH are taking a swat at 14 mc. VE1AX has started work on new high-power Class "B" 'phone. VE1BL-CC have been renewing old acquaintances on 3.5 mc. VE1BV works schedules with NX1XL, Expedition, North Greenland. VE1AG has returned to the air. VE1EK QSOed "CT." VE1DQ is on regularly. VE1BM reported for the C.B. gang. VE1AH has increased power. VE1BN is gathering FB reports on his new 3.9-mc. 'phone. VE1AL and VE1BO step out well on 3.5 mc. VE1CY is QRL business. VE1DC reports the YL passed the code test. VE1CO gets in some heavy work on 14 mc.

Traffic: VE1ER 170 BV 37 EP 35 DI 14 CY 17 DC 12 DP 9 BM 2.

ONTARIO DIVISION

ONTARIO—SCM, H. W. Bishop, VE3HB—W8DYH, Acting SCM Michigan, has issued a challenge to the Ontario Section, in the form of a traffic-handling competition, from January 16 to May 15, 1933; a silver cup is offered as the prize by VE3WX. On your toes, Ontario, and at 'em. Please note: Those eligible are all stations in the Ontario Section, and *only* the Michigan stations within a 20-mile radius of Detroit. The hamfest put on by the FARA at Windsor was a huge success. VE3HA is now RM and OBS. VE3PY is new ham in Ft. William. VE3GG visited VE3GB, VE3HA and VE3FW. VE3ET is operating VE9BD. VE3HU is getting the bug again. VE3DX is troubled with a.c.

set going dead. VE3CX is nearly ready to go. VE3GB gets out. VE3FW has MOPA 14-mc. 'phone. VE3OZ breaks out of town. VE3LY thinks his '10s don't push any better than '45s pull. VE3NI is at Dryden. VE3IH is rebuilding. VE3HY is changing osc. to '47. VE3JI schedules VE2AP. VE3DU had the flu. VE3LI is going to rebuild. VE3OF is ORS applicant. The Hamilton Club met at the home of VE3KM. VE3DB gave a talk on microphones. VE3HP, new RM, gave a talk on cooperation. VE3MG schedules VE3OJ. VE9AL's SS receiver is working FB. VE3LI and VE3RK are having trouble with key clicks. VE2FQ may become a VE3. VE3MX and VE3VO gave interesting talks at their club meeting. VE3SA is c.c. on 3529 kc. VE3JW rebuilt SA's receiver. Mr. and Mrs. VE3DW entertained the local gang at their home. VE3PT is trying 1.7 mc. VE3GT handled important traffic from Capes Hopes Advance. VE3AD sends good total. VE3LZ works local 7-mc. stations via 1.7 mc. rebroadcast from VE3MJ's 'phone. VE3OO is QRL MOPA. VE3RL and VE3NU are QRL new receivers. VE3LN is rebuilding. VE3PM is heard at 5:00 a.m. VE3RH is new station in Weston. VE3IB has now monitor. VE3JE has c.c. rig. VE3EJ worked Chicago with one tube in a PP job. VE3CA has MOPA. VE3AM and VE3CA schedule W2KU. VE3PN still makes excuses. VE3TM is looking for schedules on 3.5 mc. VE3LM is QRL OKOK. VE3BV worked his first VK. VE3WX is new RM. VE3OC is on 3.9-mc. 'phone. VE3OM is on 1.7-mc. 'phone. VE3WA, VE3FJ and VE3ON are DX bound. VE3WF is a lone wolf. VE3RO and VE3WT handle some traffic. VE9BY is building a high power 'phone. VE3IY is awaiting filter condensers. VE3IC has an experimental 'phone. VE3XA is on 14 mc. VE3XL is QRL service. VE3EC has 10-watt c.w. rig. VE3PK is on 3.5 mc. VE3MX and VE3JW got poor results on 56 mc. The Ottawa Club is on 3.5 mc. every Sunday a.m. VE3NE is a prof. at Queens. VE3GL has been sick. VE3AU has been tinkering with three-band c.c. rig. VE3WK is making some changes. VE3MI has been blowing filter condensers. VE3QB replaced his 5-year-old antenna. VE3HB and VE3CM are on 'phone and c.w. VE3WM is giving MOPA a rest. VE3KC put in new filter condenser. VE3CG will soon be on with new MOPA. VE3FD is gaining headway. VE3HZ is heard occasionally. VE3DD is tuning up a Pontiac, and totes the OM, VE3CB, to club meetings. VE3LW hopes there is room for Ex-VE3IA in it too. VE3CP schedules VE3AD, VE3WX, W8CST.

Traffic: VE3AD 626 GT 363 WX 214 HA 208 DV 143 JI 86 CP 76 IH 60 TM 54 RO 44 WJ 44 HB 30 IB 29 HY 16 AM 15 DJ 13 HP-GL 12 WK 10 LI 10 QB 9 BV-SA 8 OF 5 CA-AU 4 LZ 2 RK 1. VE9AL 8.

QUEBEC DIVISION

QUEBEC—Acting SCM, J. C. Stadler, VE2AP—VE2DR recommends key-click filter of Jan. '33 QST. VE2DW's mast fell down in recent storm. VE2DB is rebuilding. VE2BC operates on 7 mc. VE2AA reports conditions bad. VE2BE schedules VK4JU. VE2CX reports traffic moving nicely. VE2AX reports handling a message! VE2DD has increased power. VE2AW is on c.c. Welcome to VE2FF and VE2FZ. VE2FW has returned to ham radio, having been with VE2BJ in the "NC" days. VE2CA worked South Africa on 14-mc. 'phone. VE2DY is trying 1.7-mc. 'phone. VE2HT is coming on again.

Traffic: VE2BB 165 DR 8 AC 111 FE 71 CX 66 CO 14 AP 104 EM 13 DD 9 CA 1 BG 35 DY 15.

VANALTA DIVISION

ALBERTA—SCM, C. H. Harris, VE4HM—VE4DT is back on the job. VE4BD is looking for traffic stations. VE4BZ is new RM. VE4CU is changing receiver to a.c. VE4DQ has the fifty perking. VE4EA is ready for 14-mc. 'phone. VE4EC is in hospital. VE4EO is hoping for a card from the "J" he worked. VE4GM is fighting key clicks. VE4IZ works Mexico. VE4FI and VE4HW have a fifty going. VE4HQ is on regularly. VE4JI is announcing at CFAC. VE4GD is building

'phone for VE4DX. VE4KI has no filter. VE4CY and VE4IQ rigs for sale. VE4HM received a message via VE5EM from NX1XL in Greenland and put it to destination, Detroit, by 14-mc. 'phone. The Northern Alberta Club is flourishing. VE4BV is on week ends.

Traffic: V04DQ 48 BZ 47 HM 42 JK 23 EA 10 IZ 9 BV 8 EO 6.

BRITISH COLUMBIA—SCM, J. K. Cavalsky, VE5AL—During a recent windstorm many of the gang lost their antennae poles; among the victims were: VE9AJ, VE5AL, VE5BR, VE5HP and VE5HR. Recent visitors to Vancouver: AC8GO, VE5IE, VE5EC and VE5DX. VE5BI worked Cuba. VE5FE increased power. VE5EH left town. VE5FH is experimenting. VE5FG is main outlet for traffic east. VE5BR does nice relaying for Provincial Police. VE5AC is trying new rig. VE5HJ gets out well. VE5GS made nice total. VE5AL tries to get out with only a lead-in VE5BL is running a Police radio boat. Santa gave VE5DV a 50-watter. VE5DF is back in Victoria. VE5EZ is now located in VE5EC's shack. VE5CB is working on c.c. VE5AW has new receiver.

Traffic: VE5HP 238 HQ 14 HZ 8 HJ 10 HO 5 FC 50 BR 21 GT 59 FG 222 GS 50 AC 76 ID 21 FE 34 AL 20 DF 12 JC 9.

PRAIRIE DIVISION

MANITOBA—Acting SCM, Reg Strong, VE4GC—VE4AC announces the arrival of a junior operator. VE4CS was QSO Toronto on 14 mc. VE4AG will soon be c.c. VE4CT's mike couldn't stand VE4AG's experiments. VE4DJ worked ZL2CL in the afternoon on 7 mc. VE4BQ's activities are sure missed by the gang. VE4DK is QRL. VE4FP wants schedules on 1.7 mc. VE4FT experiments with receivers. VE4FU eliminated key clicks. VE4GG was transferred east. VE4IU and VE4AE are heard occasionally. 56 mc. interest VE4FN and VE4GC. Both VE4NA's are on the air. VE4BS doesn't like the cold weather. VE4TD is going strong. VE4LB is getting out on 3.5 mc. VE4LN has schedules on 3.5 mc. VE4IP is the pioneer of 56 mc. VE4WK succeeds with push-pull. VE4KX starts c.c. MOPA. VE4PX, VE4EF and VE4FU are heard on 7 mc. VE4KU and VE4CI are on 'phone. VE4JF is having a rest. VE4BQ Jr. has no '73' for '88' tubes. The M.W.E.A. held a swell banquet. VE4IC was a recent visitor.

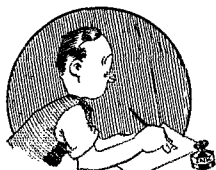
Traffic: VE4AC 88 LN 75 GC 55 CI 19 FP 14 DJ 12 DK 7 CS 5 BQ 2.

SASKATCHEWAN—SCM, Wilfred Skaife, VE4EL—New hams: VE4MH, Biggar; VE4LZ, Landis; VE4MA and VE4MB, Saskatoon. VE4GF reports 3.5 mc. good for local QSOs after 23.00. VE4BB turns in nice total. VE4CV reports VE4DI with new rig, VE4IL still in trouble, and VE4JG working up ambition to put his junk together. VE4AZ reports VE4BG moved to Viscount. VE4LP sends first report. FB. VE4IE is going on 1.7-mc. 'phone. VE4HX reports VE4EM with transmitter trouble. VE4JV gets out fine. VE4EJ is holding post mortem on receiver. VE4FD and VE4LI are heard now and then. VE4BF is pounding daily. VE4KB sent message to Alta, and got reply telegraph collect! Hi. VE4KV, VE4KB, VE4KR and VE4GN often get together Saturday nights. VE4BR is "regured" with his r.a.c. VE4GF debased a '10 three time before getting it OK. VE4BN is making new receiver. VE4AV expects to be on 3.5-mc. soon. VE4AU schedules W9DGS, W9DPT, W9IGA and VE4AC, VE4LN, VE4AT.

Traffic: VE4AT 171 BB 168 CM 70 BN 24 BF 23 HX-EL 20 GR 15 HE 12 AZ 9 CV 8 LI 6 AV 5 MH 4 LP 3 JV 2 AU 229.

Traffic Brief

Two amateur stations, KA1ZC and KA3TC, have been installed in the Philippines for the Bureau of Education. KA1ZC is located in the Radio Department, Philippines School of Arts and Trades at Manila. KA3TC is at the Teachers' Camp, Baguio. These stations have a regular schedule on approximately 7070 kc. Two operators are on duty at each station. An average of 500 messages per month are handled.



CORRESPONDENCE

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

Temperature Control

1513 South 4th St., Wilmington, N. C.

Editor, QST:

During the past year I have constructed several crystal control boxes, all of which work on the principle of keeping the crystal at a temperature above that of the room to keep it constant. I find that all this effort has been useless.

A salesman was out trying to sell me an electric refrigerator the other day, and one of his talking points was the fact that it was possible to maintain a constant temperature with it. I saw the light at once, and now have a crystal temperature box what is a box. I keep the crystal frozen instead of trying to keep it hot. The beauty of it is that I can keep ginger ale on ice right in the temperature box for my crystals so when the visiting hams drop in I can be sociable.

Laying jokes aside, I think a word should be said about the boys that insist on attempting to operate a crystal control transmitter right on the edge of one of the bands. I have worked many stations with beautiful crystal notes right on the edge or perhaps one or two kilocycles out of the band. Inquiry would bring the information that they were using the harmonic of, say, a 3500-kc. crystal. They get indignant when informed that they are out of the band. They just don't realize the amount of drift possible with a crystal, especially when it is operated on a harmonic.

As an experiment W3BZA and myself carefully checked the frequency of three of his crystals at room temperature. He does not have a temperature control box. They checked up as follows: No. 1 (X-cut) 6999 kc.; No. 2 (X-cut) 7016 kc.; No. 3 (Y-cut) 7031 kc. Having no way to raise the temperature of these crystals it was decided to place them in the refrigerator and lower the temperature. When the crystals were lowered from room temperature of about 85 degrees to about 40 degrees *F*, they checked up as follows: the 6999-kc. X-cut crystal had moved to 7004 kc. The 7016-kc. X-cut crystal had moved to 7021 kc., and the 7031-kc. Y-cut crystal had moved to 7026 kc.

In each instance the crystals moved 5 kc. with a decrease in temperature, the only difference being that the X-cut plates drifted up in kilocycles and the Y-cut drifted down in kilocycles. I failed to mention above that all these crystals were in the 3500-kc. band and operating on the

second harmonic, which would mean that for fundamental operation a crystal can be expected to drift $2\frac{1}{2}$ kc. when the temperature change is as much as 40 degrees.

I have an excellent temperature-control box with bimetallic thermostat and thermometer and lined with celotex that cost me less than \$2.00. I am sure this is a cheap price to pay for holding to a desired frequency despite changes in room temperature.

— Guy E. Pigford, W4EC

Antennas

Route 8, Box 827-A, Seattle, Wash.

Editor, QST:

I have read so many suggestions concerning competition between high- and low-power stations that I wish to make a comment. I have found that changes made in the antenna system can greatly affect one's signal as received by foreigners.

Two Zeppelin antennas identical except for direction may be so diverse that by changing from one to the other a good R6 or 7 signal may be reduced to nil and vice versa. As an example of this, my friend W7BAC has two Zeppelin antennas. The one that is fed on the west end and runs east is very good for South America but no good for Australia, while the other, which points south-east, is very good for Australia and poor for South America.

At my own station I am using an 80-meter Zeppelin with 60-foot feeders. By using it as a Zepp I get good reports from all except South America. One evening I answered two CQ's from K5AA with my Zeppelin antenna. On his 3rd CQ I disconnected the cold feeder and tuned up the single wire 196 feet long and raised him, getting a good report. Since then, though conditions have been poor for South America, I have raised a number on my own CQ's.

Any experimenting done with the antenna that produces results will be profitable to both high- and low-power stations, but since a high-power man is more likely to take his ability for getting out for granted, thoughtful changes made by the low-power man may even their chances for raising DX.

— Harry R. Cedergren, W7VN

(Continued on page 78)

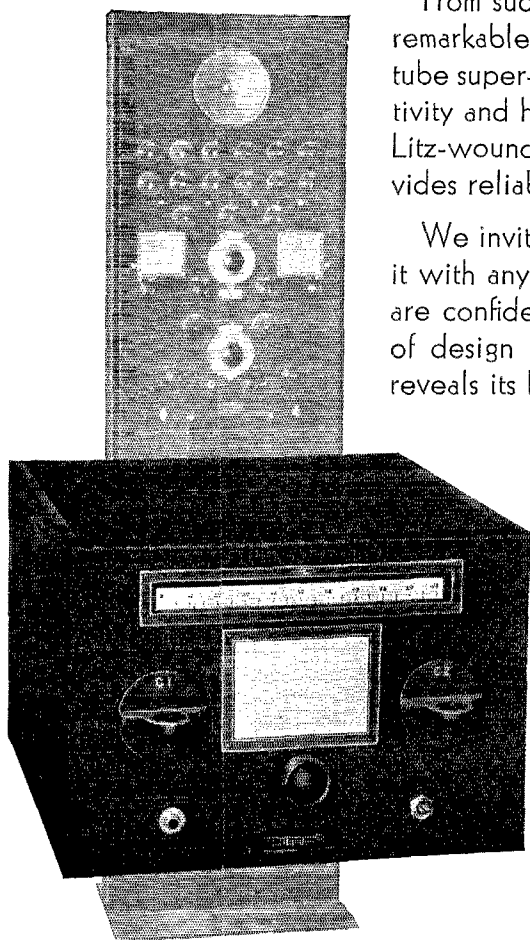
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THE FB-7

Designed specifically for the amateur, but embodying professional design details, this exceptional receiver offers a number of unusual refinements. Strictly single-control tuning and front-of-panel coil changing for swift and convenient operation — full vision dial and panel-mounted calibration curves for fast logging — efficient — compact — and inexpensive.

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We invite you to inspect the FB-7 and to compare it with any other H. F. Receiver on the market. We are confident of your approval, for by every nicety of design and mark of fine craftsmanship, the FB-7 reveals its heritage from the "AGS."



THE "AGS"

is shown in the background of the FB-7 in a complete rack-panel installation. Panels from top are speaker panel, spare coil panel, "AGS" Commercial Type Receiver, T. R. F. Standby Receiver, and Power Supply.



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H. F. RECEIVER



Your distributor will be glad to show you the new National FB-7. The list price, equipped for 80 meters, less tubes is **\$55**

(subject to the usual trade discounts)

FB-7

SPECIFICATIONS

THE CIRCUIT

- 7 tubes; one 57, two 24's, two 58's, one 56, and one 59.
- Electron Coupled Oscillators.
- Separate Oscillator for CW beat frequency giving "semi-single signal" or "offset" tuning.
- High efficiency Litz-wound IF Transformers.
- Class A Power Pentode Output.
- R-39 Coil Forms with grounded metal shield handles.
- Band Spread Coils available for 20, 40, 80, and 160 meter amateur bands, each covering 100 full dial divisions.
- Standard coils for continuous coverage from 20 MC to 1500 KC.
- No frequency drift.
- Double Shielding.
- May be used with either conventional antenna or "doublet" with transposed transmission-line lead-in.

THE CHASSIS

- Single Control Tuning. (No trimmers.)
- Full Vision Dial with SFL 270° condenser.
- Front-of-panel coil changing, without disturbing shielding.
- CW Beat Oscillator Switch on panel.
- Front of Panel Switch for "cutting" B voltages during transmission.
- Phone Jack, connecting ahead of final audio stage.
- Calibrated Volume control located under tuning knob, for one hand operation.
- All fixed adjustments, such as I. F. peaking, accessible from top without removal of chassis from cabinet.

SINGLE SIGNAL OPERATION

- Both the circuit and the chassis layout have been designed for ready addition of mechanical filter (quartz crystal) when desired for full "single signal" operation.

THE POWER SUPPLY

- May be operated from a filament transformer and B batteries; the new National 5887 low price Power Supply, or the standard National 5880 Power Supply (as used with the SW-3), R. C. A. Licensed.

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improve the performance of any receiver

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Makers of the famous **LYNCH** Resistors

Correspondence Dept.

(Continued from page 76)

Reply Cards for QSL's

1118 Mifflin St., Huntingdon, Pa.

Editor, *QST*:

Concerning these QSL hounds: Many hams are feeling the depression more than the others think, and when you ask a man with no job to QSL it really seems unfair to me. These wallpaper collectors who really want a collection should buy some of those double cards with a stamp on each one, and request the op to whom the card was sent to detach the other card and return it with the proper reports and other data filled in. The form could be made to fit any amateur station. A rubber stamp can be bought to print the call letters of stations answering these cards for a small sum, and I find that most hams usually own a stamp of this kind already.

I think this system would be satisfactory to everyone as the proportion of cards sent out and cards received would be much better for the "hound." This should compensate for his added expense of paying for the other fellow's stamp and card.

— John O. Sponeybarger, W8DVZ-W8ZZBC

Hash

708 Harrison St., Monroe, Mich.

Editor, *QST*:

One of my pet grievances happens to be the matter of rotten signals. I've never been able to figure out just what goes on in the minds of hams (?) responsible. I'd very much appreciate it if you will suggest possible answers to some of the problems encountered in trying to put a "bug" in the ears of the owners of such atrocities.

I have recently worked two stations using spark-coil plate supply. The first of these had been using battery plate supply until the batteries went dead and OM depression prevented any further purchases of that type of supply. I happened to be the first QSO with the Ford coil on duty and asked him frankly what he thought of the signal he was putting out. He readily admitted the lousiness of the signal and that it certainly wouldn't stand up under R.I. inspection.

The second station has been on for about a year now and with the same type of supply during that time. I had heard the signal quite frequently and cursed it as much. One day I received a message from this station to the effect that, having slept through the same physics lectures together at college, we should renew our acquaintance and QSO. We were QSO the same day and I followed it up with a letter in which I tried to convince my friend of the advisability of doing something about the note. The reply I received showed me he was fully aware of the quality of note. He suggested that I "do not tell the R.I."

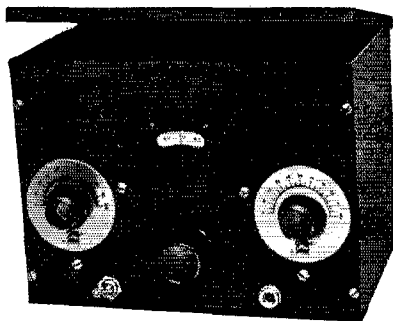
Tie this one!! The 3-tube "Eagle" S.W. Receiver \$10.95

We do not know how long we can sell the "EAGLE" at this astonishingly low price. A lucky buy of standard parts enables us to give you this outstanding value. If everyone could see the "EAGLE" we believe our stock of these sets would be sold out very quickly. *Orders will be filled in the order in which they are received.*

No kits sold —

We have no catalogue on the "EAGLE" and we cannot afford to enter into correspondence about it. Below is all the dope you want and the "EAGLE" is *guaranteed by JERRY GROSS to be exactly as represented.*

Those with very limited means NOW do not have to buy inferior



CHECK THESE FEATURES!!

SCREEN GRID 232 R.F. and screen grid detector offering highest possible gain and most efficient regeneration.

PENTODE POWER AUDIO — 233 gives more audio gain than obtained from two ordinary transformer coupled stages. Will operate speaker on most stations.

TANK CONDENSER — is operated from the front of panel and eliminates the objectionable necessity of lifting the cover. Speedy range changes at your finger tips. The **ADDITIONAL** condenser employed here gives much finer tuning than is possible with the ordinary large condenser.

BAND SPREADING CONDENSER — Very small capacity permits widest possible calibration spread over a multitude of ranges. This feature gives you really two receivers for the price of one.

DIAL — Latest design, real vernier control over any position of the frequencies covered. Absolutely will not jump or slip — very rugged.

REGENERATION CONTROL — Employs condenser for stability, ruggedness and velvet-like smoothness, not noisy like resistances.

POWER CABLE — Eliminates possibility of wrong connections and insures absolute electrical contact.

CABINET — Size 6" x 7" x 9½", metal, compact, hinged cover, crystallized finish. Completely shields the receiver. Also ideal for portable use.

NEW type Eby Isolantite, 4, 5 & 6 prong sockets.....	\$.28
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Na-Aid S.W. coils 20-200 meters set of four.....	\$1.15
NEW Hammarlund "Pro" with SINGLE SIDE BAND feature in stock at no increase in price.	

RANGE 15 to 200 meters — 4 plug-in coils are supplied with each receiver.

Unusually flexible, designed for continuous short wave broadcast coverage or ham band spreading. Constructed of finest material available, such as Hammarlund Isolantite Insulated Condensers, etc.

This Receiver was designed for the discriminate buyer desirous of purchasing the finest short wave receiver of its kind, and should not be compared with any of the "junk piles" selling at anywhere near the price of the "EAGLE."

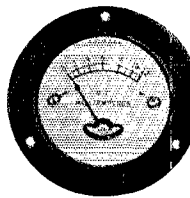
The "EAGLE" is guaranteed to give you the satisfactory performance you would naturally expect from apparatus sold by JERRY GROSS.

Economical to operate. Employs the new 2 volt tubes which can be operated from two dry cells on the filaments for extended periods of time.

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Hoyt perfectly damped meters at a price. These are not to be confused with the usual meter "bargains." 2" mounting hole, flange 2½" diameter, supplied in the following sizes: 10 m.a., 50 m.a., 100 m.a., 150 m.a., 250 m.a., 300 m.a., 4 volt A.C., 10 volt A.C., 15 volt A.C., 10 volt D.C. Price each..... **\$1.60** three for..... **\$4.50**



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3/32" thick per sq. inch.....	3/4c
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Billie superior crystals exclusive in New York with Jerry's — 40, 80 or 100 meter guaranteed crystals..... **\$5.50**
They must be good — otherwise Jerry would not sell them.
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PRICES OUT Plated copper tubing inductances wound and ends drilled free

Inside dia.	3/16"	1/4"	5/16"
1½"	5c turn	5c turn	
2½"	6c turn	6c turn	10c turn
3½"	10c turn	10c turn	12c turn

ACME SOLID ENAMELED COPPER ANTENNA WIRE

No. 14 (any length) per 100 ft.....	\$.30
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High grade filament transformers shielded in metal cases, center tapped secondaries 2.5 volt 10 amperes for 866's
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Special — 10 to 12 volt 7.5 amp. filament transformer, extra special..... **\$.95**

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THE AMERICAN RADIO RELAY LEAGUE, INC.

WEST HARTFORD

CONNECTICUT

In another instance, an "S" some 200 miles distant was almost wrecking the whole 3.5-mc. band with his chirp and key clicks. I resolved to QSO if possible and see if the clicks couldn't be confined to just half the band instead of all of it. He did come back — no one else wanted to worry along with that kind of signal I guess — and after I had suggested my standing by for a test in an effort to clear up the signal, he came back with the information that he was using a 50-watter with 1500 volts, said cul 73 and was gone. About four weeks later I went after him again (yes, he had been on regularly during those four weeks), determined to find out what it was all about. He said he knew very well that his signal was bad but that he had blown some filter and couldn't afford any more. He suggested that if I wanted to hear an improvement in his signal, I send him some filter. HI. He went on to say he was building a crystal transmitter. Running a 50 ragged for a couple months — no money for filter but evidently some for a crystal transmitter! Fewer long CQ's and a little coaxing and decent treatment for the 50 would have helped plenty. With the signal he was grinding out, 1500 volts on the plate was nothing to be shouting about. A second offer to stand by for assistance in tests was turned down. He did NOT want to improve his signal. Shades of Hertz!

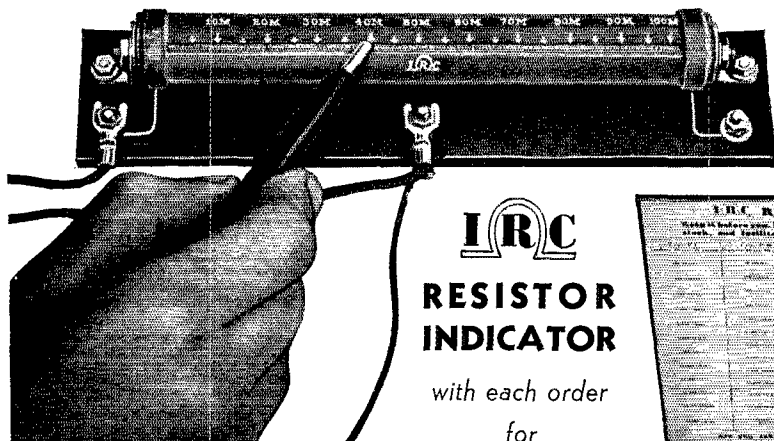
The question I'd like an answer to is, what can be done about that type of amateur? Must those of us who try to abide by the Radio Act of 1927 and all Regulations of FRC, sit by, with all that trash on the air, and like it? Apparently there is no limit to how rotten a signal can be or how long it can continue in use. No one seems to offer any resistance and the signals continue in use and get out! It is easy to hear them and the fellow with the none-too-stable receiver goes after the r.a.c. signal rather than the p.d.c. signals which the r.a.c. hash is QRM'ing.

Lousy signals aren't entirely a matter of poor monitoring methods, or none at all. They are too often a willful violation of regulations, a lack of the true amateur spirit of consideration and coöperation, and pure selfishness. Too many amateurs go on the air fully aware of the illegality of the signals of their transmitters. Because they can get by they feel no restraint. A QSO for their own particular pleasure is their goal — the signals of dozens of law-abiding amateurs be QRM'ed and be hanged!

It's been my experience that only a small percentage of operators of stations responsible for poor signals really appreciate an honest report. A QSO, regardless of signal quality or stability, is too often the rule. More power, rather than detuning for quality and stability!

With the ever-increasing number of licensed operators, it seems time we devised some means of ridding ourselves of such types as clutter up our amateur bands with illegal signals, without beating about the bush to avoid hurting some one's feelings.

— Harold E. Falk, W8PP-W8UU



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- 4 Since 1925, we could be depended upon to make Prompt Shipments. This coupled with a crystal Second to None considering Output and Accuracy of Frequency has earned during these years a reputation which we jealously guard. Therefore, Get the Best.

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Ultra-sensitive unit for D. C. in coil circuit and either D. C. or A. C. in the contact circuit. This unit is practically adapted to operation in the plate circuit of small vacuum tubes. Contacts rated at 2 amps. at 110 volts A. C. Size 2 1/4" long x 2 1/4" wide x 2 1/4" long, special \$5.00.

We carry a complete line of Keying Time Delay and Remote Control Relays. All standard makes.

M. & H. DE LUXE MONITOR

For anyone desiring a permanent means of monitoring their transmitter carrier.

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Coils for 20, 40 and 80 meter amateur bands. Uses two number 4 Burgess dry cells and one No. 4156 B Battery.
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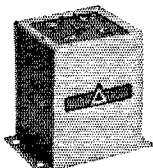
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CONTENTS

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OUTPUTS 20 WATTS & 200 WATTS

- | | |
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| a. Preface | e. Assembly Instructions |
| b. Power Supply | f. Operating Instructions |
| c. Tubes | g. Performance Curves and Data |
| d. Circuit Diagrams | h. List of Parts with Description |

AD 70 — Type A, Class B Input '45, '50 or '46 to '03A, '11 or W.E. 242.... **Price \$4.90**

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Editor, QST:

An imposing array of QSL cards brightens up any ham station, but it often happens — unless the “shack” is located in the attic or behind the garage — that the OW objects strenuously to having the walls marred by thumbtack holes, or to contending with a wallpaper of QSL cards at cleaning time. Or perhaps the OM hesitates to put up his cards because he's not sure just how soon he'll be driven to some other part of the house. Or, again, perhaps he finds that thumbtacks don't work so well in plaster, or concrete, if he's located in the basement.

Now here's how every self-respecting ham can display his treasured QSL's to his heart's content — and it will work on the roughest of concrete as well as on the finest oak panelling.

Just fasten strips of eight or ten cards together with small bits of adhesive tape and then fasten the top card of the string to the wall, again using the tape. You can put up row after row like this without endangering the standing of the A.R.R.L. in the family circle and without a twinge of conscience, because nothing is marred, not even the cards. It is simple to take them down quickly and fold them up like the old-fashioned scenery folders. If it is done carefully, the tape may be removed from the cards themselves without tearing them in the least. This plan works excellently on plastered walls and is much neater and handier all the way around than using tacks.

I hope this suggestion will be of use to that persecuted section of humanity, the hams of the world.

— Harvel Baker, W7ALH-W7BKE

The Atlantic Division Convention

THE affair was a “humdinger.” The incidental sports accompanying the convention were at the New York State Fair, then in session. Visits to WFBL transmitter, aeroplane rides, casino and parchesi games (Hi!), whizzlewetting and yelticus. There was everything from crooning (by Pat Hook, W8CYG) to lecturing, by Turner, W8AYU. The variety was endless and each and every individual found what he or she desired. Not only did the fellows bring in their YL's and YF's, but we also had the Zandonini Sisters from Washington, D. C. Doc. Woodruff, our Director, with his unusual bag of “tricks”; Mr. Bliley and his Xtals; L. C. Waller, W2BRO, from R.C.A.; W8BAH, Tummonds, SCM of Ohio from Cleveland; M. K. Kunnins, the R. I., are just a few of the prominent folks who attended.

Putting this convention across was a hard job and that it was successful is due to Don Farrell, W8DSP, SCM for this section. As assistants, Joe Smith, W8AXC, the aviator; Chuch Noxon, W8QP, who handled the money and Jack Kendall, W8AED, as well as several others are to be commended for their coöperation.

— A. M. W., W8AOW

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678-J Jack Base with 7 jacks......65

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Panel units are in multiples of 1¾" high x 19" wide.

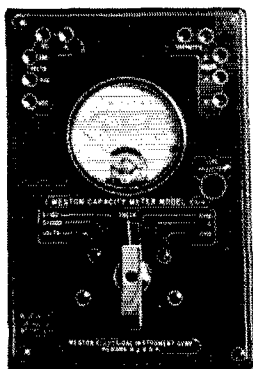
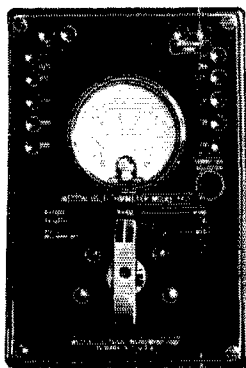


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The Missouri-Midwest Division Convention

THE convention held in Jefferson City, Mo., on August 27th and 28th is a thing of the past, but there will remain memories for some time to come. The South Missouri Amateur Radio Association is to be congratulated for assuming the responsibility of again directing this affair. The Committee in charge through the Chairman, C. R. Cannady, saw to it that the delegates were properly received on arrival. Promptly in the afternoon a general forum of communication department affairs was started with discussions by Director Kerr, Frank Davis, President of the Association; Cannady Missouri SCM and Atkins the Route Manager.

Sunday morning was devoted to visiting points of interest, and Mr. Loeber, one of the R. I. from the Chicago office gave examinations and several of the gang were made happy. The afternoon was devoted to technical talks: F. M. Davis, W5CR, Arkansas University spoke on Class "B" Modulation; G. L. Tevis, Engineer KMOX, High quality modulation for 'Phone Transmitters; Receivers, by W9FIS and "Filters," Prof. G. O. Ranes, Missouri School of Mines. Hannibal Radio Club demonstrated the operation and characteristics of 5-meters. The convention coming to a close with a good banquet at which Dr. C. L. Klenk, W9AAU-W9ZHH of St. Louis opened the discussion for the 1933 Midwest Division Convention. With the presentation of prizes 1932 delegates are already planning for St. Louis, 1933.

Midwest Division Convention

WITH the Kaw Valley Radio Club as hosts, the annual Midwest Division Convention at Topeka, Kan., last September 10th, and 11th, established a new record for attendance with registration 65 percent higher than for the Division's previous big show. Approximately a third of the gang on hand took the operator's examinations given by W. F. McDonnell, Assistant Inspector, to the tune of one Amateur Extra First, 57 Amateur First, 6 Amateur Unlimited Radio-telephone and 4 Commercial.

Director Kerr presided over the opening session, introducing Jim Lamb, A.R.R.L. headquarters representative, who sketched the amateur aspects of the Madrid Convention. At the technical sessions talks were given by Prof. J. D. Stranathan of Kansas University, K. W. Pyle of KFBI and J. J. Lamb. A paper by R. S. Kruse was delivered by proxy. Lieut. Col. W. F. McFarland and Lieut. W. A. Beasley described the National Guard radio activities during the summer encampment. Seventy-two initiates into the Royal Order of the Wouffhong enlivened the midnight conclave, cutting down the sleeping time of many who had accommodations at the Armory, provided through the courtesy of the Adjutant General of Kansas.

The *grande finale* was the mid-day banquet on Sunday, with the presentation of the Kansas Wouffhong to O. J. Spetter as the high spot.

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... "How to Become a Radio Amateur"

☞ It must be good! ☞ It is the textbook of new amateurs everywhere. ☞ It has interested thousands in amateur radio. ☞ Its 32 pages outline the entire field of amateur radio, clearly, concisely, thoroughly. ☞ It, unaided, will enable the rawest beginner to pass the license examination. ☞ It makes learning the code easy. ☞ It tells how to build a simple station, with clear illustrations and easily followed building instructions. ☞ It's an inexpensive introduction to amateur radio and preliminary to the Handbook. ☞ Give it to that friend who wants to be an amateur.

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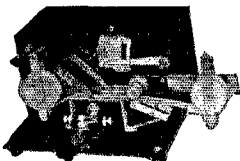
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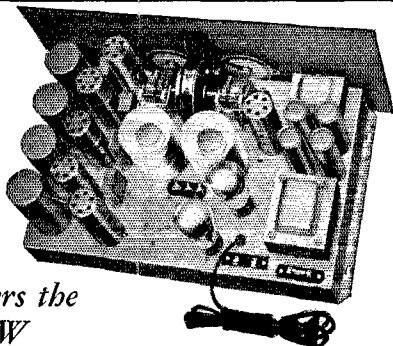
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Straightening Out the Socket Connections

(Continued from page 50)

A distinction is made here between a "filament" and a "heater," the former being used for tubes having directly-heated cathodes and the latter for tubes with indirectly-heated cathodes. The "G1 — G2 — G3" refers to multi-grid tubes in which the grids are connected in various ways for different services. G1 is the inner grid (next the cathode), G2 is the outer grid in a two-grid tube or the middle grid in a three-grid tube, and G3 is the outer grid of a three-grid tube (the grid next to the plate). Some types contain two separate tubes in one envelope, and in those cases the elements forming a single tube are labelled with the same subscript number; for example, in the 79 G₁ and P₁ are the control grid and plate of one triode, while G₂ and P₂ are the corresponding elements of the other triode.

One point of interest — and incidentally one which simplifies the thing slightly — is that pins 3 and 4 are invariably filament or heater pins on all tubes, whatever the number of pins. The same is true of pin No. 2, which always carries a plate, and the cap on the tube, which is always a control grid. This last is true only of receiving tubes, however, since the caps on the 865 and 866 are plate terminals.

— G. G.

A Power Type E. C. Unit

(Continued from page 13)

type finally used the primary and secondary windings were on opposite legs, thus reducing the electrostatic coupling between windings to a small value. It was not necessary to use radio-frequency chokes or by-pass condensers in order to prevent the r.f. from feeding back into the line when using the core-type filament transformer, although such chokes might be necessary with some transformers.

Strays

W3CRL took an involuntary vacation from ham radio not long ago. His OM hid the transmitting tubes after CRL brought home some bum reports from school!

And then there's that 8-milhenry r.f. choke, with a distributed capacity of 3 μ f. and a current-carrying capacity of 125 amps. At least that's what the catalog said about it!

I.A.R.U. News

(Continued from page 54)

The revival of this needed amateur organ should enhance amateur activity in the Far East.

Here is one for the book! F. Werner, OK1WF, reports working a station signing XXSJSUKQ,



**when
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costs so little?**

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Centralab resistors in your replacement jobs . . . they cost so little more that they put to shame the usual "bargain type" products.

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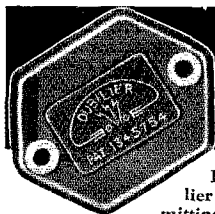
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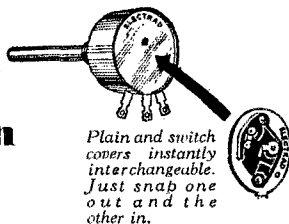
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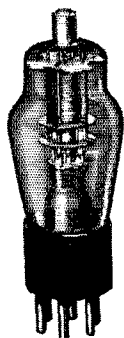
Don't take any chances on flunking out! Prepare yourself — get a copy of the new reprint of *QST*'s popular articles, "Passing the Government Examination for Amateur Operator's License." Typical questions, and their answers — covering every point in the amateur first class examination — are given in full.

Originally these articles appeared in the January and February, 1930 issues; so popular were they that the entire back copy supply of these issues was exhausted within a year. Rewritten, they were again published in October and November, 1931, and reprints prepared for distribution. This supply has again been exhausted, and now —

Revised in terms of latest amateur practice, with complete information on the new amateur regulations, a new reprint of the "Passing" articles is ready for distribution. In convenient, economical pamphlet form, you can find the answer to every exam question in it. 20c per copy postpaid. No stamps, please.

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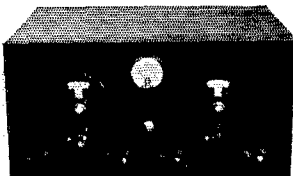
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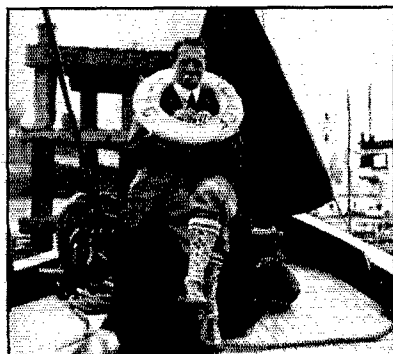
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(W6FBI located in Building)

QRA unknown. There's been some puzzlement in the past as to how users of "bootleg" calls happened upon the combinations they do, but we'd say that this one was more probably the product of American bathtub gin than any boot-



PAUL DE NECK, ON4UU, PRESIDENT OF THE RESEAU BELGE ABOARD ON4FT'S YACHT "TENACE"

legged stuff. Sort of a "pink elephants on the ceiling" version of amateur radio.

Unlicensed amateur transmitting stations have been a source of trouble to the legitimately licensed amateurs in South Australia for some time, but the crisis came recently when Radio Inspectors Harrington and Beare located three unlicensed stations in as many suburbs of Adelaide, with the result that the three "bootlegging" hams came before the court and were fined. According to Eric W. Trebilcock, one of the stations, illegally signing VK5XI, was heard in the United States. The other stations used the calls VK5ZL and VK5MC.

Just as a bit of forewarning: The A.R.R.L. Communications Department has under consideration at the present time the idea of holding a sort of general national field day at the same time the R.S.G.B. is holding its national field day — June 10th and 11th (see this department of January QST). Amateurs in all other countries are invited to arrange similar tests, combining to form an international field day with portable stations in all countries working portable stations in others.

The following amateurs were issued WAC certificates during the year 1932:

A. T. Boshier, ZT6J; Basil R. Adair, ZL2GD; George De La Matyr, W5BRR; A. W. Martin, Jr., W6UC; J. D. Watson, VK3NQ; W. H. D. Nightingale, G5NI; Dr. E. B. Gerlach, W8CMG; James A. Philpot, G5PL; Ed. Hayes, W6SA; Fumio Horiguchi, J5CC; Eduard Jagër, U0WN; Kurt Caspar, YL2RA; Esteban Munoz, EAR136; Erwin Heitler, U01ER; John W. Conn, W3FQ; K. Svensson, SM4ZF.

Allan Avery, W8BCK; E. F. George, CE3DE; S. U. Grimmett, VK2ZW; A. L. Munzig, W6BY;

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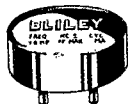
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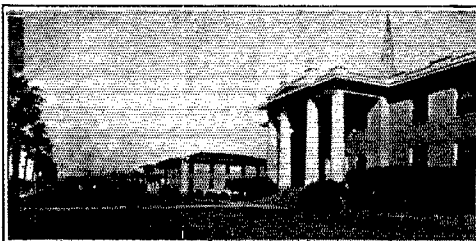
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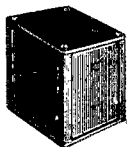
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OVER six pounds radio data, circuits, bulletins, 50¢ postpaid. Beyond Rockies, 75¢. Kladag, Kent, Ohio.

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QUARTZ—Direct Importers from Brazil of best quality pure Quartz suitable for making piezoelectric Crystals. Diamond Drill Carbon Co., 719 World Building, New York.

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TRANSFORMERS, reactors made to order. Accurate, dependable. Prompt shipments. Write for quotations. Baker Engineering Laboratories, Fort Wayne, Indiana.

VOLOVOX Dynamic Microphone. A new standard of microphone value. \$7.75 postpaid in U. S. Baker Engineering Laboratories, Fort Wayne, Indiana.

TUBES repaired, 852s, \$9; 204As, \$20. Up to 2 kw. Write for prices. Trades accepted. Thorium Tungsten and high vacuums. Perfect jobs. W2AWZ, Irvington, N. Y.

PHONE MEN—High class, two stage, bomb type condenser microphone, assembled \$27.75, in kit form \$18.75 complete. Send 3¢ stamp for descriptive bulletin. Sound Recording Studios, 147 Cooper Avenue, Peoria, Illinois.

IMMEDIATE shipment on trial: Comet Pros, \$79.38; SW3s, \$20.87; Thermionic 866s, \$1.95. Distributor for National, Hammarlund, REL, Thoradson, Cardwell, Weston-Jewell, others. Teleplexes, Omnigraphs, rented \$1. week. All types transmitting tubes. Buy, sell, trade used apparatus too. List free. Inquiries welcomed. Henry's Radio Shop, Butler, Mo.

COMET pro, metal cabinet and coils, \$65. Like new. C. Arnold, 636 Lotus Ave., Oradell, N. J.

CALBOOKS—new March issue Radio Amateur Call Book with latest ham calls, Px, Tx and Vx skeds, high frequency commercials, fones, is yours for \$1.00. Issued Quarterly. Annual Subscription \$3.25. W9FO—610 S. Dearborn, Chicago.

FINISHED crystal blanks, X or Y cut, one inch square or larger. Suitable for finishing in any amateur band. Guaranteed free from twinning. \$1.50 postpaid. Prices on finished crystals upon request. Bellefonte Radio Eng. Lab., Bellefonte, Pa.

QSLs, WIDNF, Taunton, Mass.

TRADE or sell—Teleplex, tapes, oscillator \$15. 50 watt transmitter, tubes, meters, complete, \$35. Silver Marshall a.c. screen grid s.w. receiver, \$14.50. New RCA 210s, \$2. Sylvania, \$1.25. Want service analyser, test equipment, 2 button mike, cathode ray tube. Smith, 2319 M Street, Omaha, Neb.

SELL—trade, 211Es, 203As, 261As, 276s and others. W9ER, Timken, Kan.

.001 Duraluminum 32 square inches, 25¢. W9ER, Timken, Kans.

FOR sale—W. E. dynamic microphone. W9ER, Timken, Kansas.

BUY, sell, trade. Anything. W9ER, Timken, Kans.

SELLING three excellent all a.c. four tube receivers. Laboratory built on cadmium plated chassis. Complete \$27.50 each. Also two xtal 3 stage transmitters \$20. each. Jordan, W8DL, Milford, Ohio.

Three Dubilier type 661B 10,000 volt .00025 mica condensers \$4 each. One Dubilier type 664, 10,000 volt .02, \$6. Surplus tubes, transformers and meters for sale. W8DGV, Chas. Drescher, 1145 Erieview Rd., Cleveland Heights, Ohio.

BEAUTIFUL cast aluminum transmitter chassis for sectional construction. Also cast aluminum boxes. New reduced prices. See page 83 October QST. T. F. Cushing, 345 Worthington St., Springfield, Mass.

SUPERHET, Lincoln d.c. SW32 10 tube, 15 to 550 meters. Excellent condition, \$50. W6BWQ.

QSLs, SWLs, log forms, message blanks, delivery cards, stationery. Write WIDBM, North Falmouth, Mass.

QSL cards, message blanks, stationery, snappy service. Samples free. Write today. W1BEF, 16 Stockbridge Ave., Lowell, Mass.

QSL cards with personality. No cheap trash. Reasonable prices. Free samples. W8DED, Holland, Mich.

QSL Service.

COMPLETE a.c. 3 tube shortwave receiver with band spread on 20, 40, 80 and 160. Humless power supply. Only \$20. W4UT.

FREQUETER-monitor custom built, \$20. George Pickels, Urbana, Ill.

WANTED: leading amateurs to distribute popular brand of crystals. Monitor Crystals 2802 W. Ave., 33, Los Angeles.

ONE Pilot superwasp d.c. New two volt tubes, \$14. Pilot superwasp a.c. complete power pack and tubes, \$15. Want 203A tubes. W4PW, Guilford College, N. C.

RELAY racks—make your station look like \$1,000,000.00. Panels, shield cans, hi-pwr xtals, monel-metal holders. Rectifier Engineering Service. See other hamad.

QSLs. Get our samples and prices before ordering. Maleco, 1512 Eastern Parkway, Brooklyn, N. Y.

SELL complete station ready to operate. Rack and panel class B phone and cw transmitter. National ACWSW3 and power supply. Details from W. A. Brecht, Pine Crest Manor, Southern Pines, N. C.

CRYSTALS—guaranteed oscillators, \$1.25. Large cut. Near desired frequency, 80, 160 meters. Write W9GKH, Milledgeville, Ill.

US Navy ball bearing dynamotors. Ideal high voltage supply operating from storage batteries. General Electric 24/1500 volt 350 watt \$37.50; 24/750 volt 150 watt \$25. On 12 volts output 375. Westinghouse 27½/350 80 mills \$10. Mounted twins \$15; 500 cycle 500 watts (generator) \$7.50. List. Henry Kienzie, 501 East 84th Street, New York.

204A tube in perfect condition. First \$25. takes it. WIDZU, S. Portland, Maine.

WANTED—small lathe. Will trade transmitting or receiving apparatus. Ernest Ruland, Natick, Mass.

WANTED—National a.c. SW3 or 5 complete with power pack, band spread coils. Must be in good condition. Homer J. Owen, Blythe, Calif.

1000W transformers, 1100-2200-4400 volts each side center tap. Mounted on marble. \$13.50. Guaranteed. F. G. Dawsou, 5740 Woodrow Ave., Detroit, Mich.

VE3JC selling a.c. receiver, parts, Chambers, 189 Earl St., Kingston, Ont.

QSLs, 100 one color 50¢, two colors, 80¢. Samples, 2143 Indiana Ave., Columbus, Ohio.

FINEST QSLs! 75¢ up. Postpaid. W6FZQ, Box 1804, Phoenix, Arizona.

WANT superhet all-wave Silver, Scott DeLuxe, preferred. What have you? Give description, price. Glenn Watt, Chanute, Kans.

QSL Service.

SELL—two new 503As, in original cartons; two REL sockets; one M & H 500 watt 1000-1500 volt plate transformer; one M & H 10 volt filament transformer; both center-tapped, mounted and perfect. First \$35. takes 'em all. W3CKT.

APRIL 1st up go "R/9" rates. Subscribe now. Real technical articles, policies, politics. \$1.00. Sample, 15¢ (Canada, \$1.75, 20¢). Box 666, Hollywood.

DISTINCTIVE QSL's in modern trend; cost more — worth more. Samples for stamp or see February "R/9". Box 666, Hollywood.

"SWELL" said subscribers of February "R/9".

QSLs. Designed by QST's cartoonist. Samples "Gil" Cartoon Service, West Hartford, Conn.

GUARANTEED crystals, near specified frequency, \$1.35; holders, \$1.10. Ed Hlavaty, Box 407, W. Lafayette, Ind.

TRANSFORMERS. 750-0-750, 100ma, 2-7½V, \$2.50; 1200-1000-750, 200ma each side, \$5.00; 7½V, 2½A, 50¢; 7½V, 5A, 75¢; 2½V, 10A, \$1.50; RCA licensed UX210's, UX250's, UX281's, \$1.20. Satisfaction guaranteed. Postage extra. Spear Company, Waterville, Ohio.

QSLs, two color, 150 — \$1; 100 — 75¢. Samples. W9GOF, Mishawaka, Ind.

CRYSTALS: X cut, 1" or 1 1/16" sq. Accurately and neatly finished, \$2. Holders \$1.25. Oscillating blanks with compound, \$1. Money-back guarantee. W8DLM, Rochester, Mich.

QSLs, 70c. W8DLA.

TRADE — 250 watt crystal transmitter or power supply, 1 kw, for movie camera — Bell Howell, Victor, W9AXH, 4130 N. Meridian, Indianapolis, Ind.

PHOTO-stamps for QSLs, \$1.25 hundred. Samples. E. Rawlins, 4628 Chester Ave., Philadelphia, Penna.

TRANSMITTING and receiving equipment manufactured to order. Holmes C. Miller, Radio Engineer, Box 105, Palo Alto, California.

BUY or sell radio equipment. Wanted model 52 rifle and scope. Lowell Ecker, Sedan, Kans.

SELL — complete equipment of W8MS, 250-W PP crystal control CW or phone transmitter, receivers, filtered-power supply, all in self-contained cabinet, also many extras. 378 S. Chalmers Ave., Detroit, Mich.

TRANSFORMERS — 450 watt 1500-2000-3000 c.t. \$10. 225 watt 1100-1500-2000 c.t. \$6.50. 700 watt 2000-3000-4000-5000 c.t. \$14. Filament, polyphase, 25 cycle transformers. Frank Greben, W9CES, Accurate Radio Service, 2920 W. 22nd St., (Phone Crawford 2050), Chicago, Ill.

237-238 shielded receiver, nicked base, Vibroplex, condensers, meters. Write for information. W9BUA, Carthage, Ill.

HAM band receivers. AC models use 56, 58, 59. DC models use 30, 33, 34. Full vision bandspread tuning, beautiful crackle finish cabinets. Three tube AC \$15.10. Four tube \$17.95. Three tube DC \$14.00. Four tube \$16.95. 211-E's, \$2.99 excellent oscillators, modulators, amplifiers. Edbern Radio, 1340 Merriam Ave. NYC.

AMATEUR receivers, AC — using 56-58-59 tubes — Two tubes — \$11.50. Three tubes \$14.75. Four tubes — \$17.55. Power supply for above \$3.46. Battery models use 30, 33, 34 tubes. 2 tube, \$10.85. 3 tube \$13.50. 4 tube \$16.75. Self-powered AC frequency meters calibrated, guaranteed, complete \$21.35. Free bargain sheet on request. Beam Supply Co. 547 E 180 St. NYC.

ELECTRON Coupled-AC Monitor Frequency Meter, complete, tubes, calibrated, \$16.95. Receivers newest three tube sets. \$12.75. QST TRF Autodyne Receiver 56 or 59 pentode output, \$19.95. Latest "Dow" Electron detector circuits, (20, 40, 80) meter band spread coils in above (AC-DC) receivers. Regular monitor complete. \$7.75. Beginners crystal transmitter completely built. \$20.00. With parallel 46 amplifier. \$27.75. Five meter receiver, \$12.25. Transmitter, \$7.00. Write for catalogue. We build to order. Precision Radio Laboratories, Dept. 7C: 307 West 79 Street, NYC. Su7-9759.

TRANSFORMER, chokes, built or rewound. New low prices. New 4000 volt c.t. 800 watts, \$11. Boston Transformer Co., 886 Main St., Cambridge, Mass.

NAVY standard receivers, SE1420, SE1220, SE143, overhauled and guaranteed. Mariners Radio Service, 58 W. 25th, New York.

MICROMETER condenser \$12.75. Calibrated a.c. micrometer frequency, \$36. W8ALK.

TUNED RF chokes, 500 milliamperes, completely shielded. Cover 20, 40 and 80 meter bands, \$2. Fifty watt sockets, \$1. 212-D sockets, \$2. Zepp feeder spreaders, \$1. dozen. All above postpaid and guaranteed. Quality transmitters for sale and built to order. Reasonable prices. Cino Radio Shop, 1115 Murray Rd., Cincinnati, Ohio.

RELAY racks. All sizes. Low prices. Write Harvey Robey, East Lansing, Mich.

203As, brand new, late model, Westinghouse or GE \$12. Class B transformers, pair 210, \$7; for 203As, \$10. Counter-balanced Cardwell 166Bs, \$22.50. 10,000V heavy duty 86Bs, \$3. New RCA UX250s, \$1.75. WE387 mikes, \$15. Weston 301 milliammeters (some new, all new condition, most all ranges) \$3.75. 204As, \$20. 212Ds, \$20. New RCA 860s, \$20. List. E. Ewing, Jr., 1057 Pratt Blvd., Chicago.

NEW receiving tubes, meters and other parts accepted for quality crystals and holders. Get your SW-3 or radio parts from W9DOQ, Route 1, Duluth, Minn.

BRAND new converters, 32V. to 110V. filtered, \$22.50. Two ampere 2500V, double commutator generator and filament generator coupled to 3-phase motor \$500. Esco 150 Ampere filament motogenerator, 3-phase drive, \$75. Other bargains in motors and generators. Queen City Electric, 1734 Grand Avenue, Chicago.

TRANSFORMERS — 46s class B, \$4.50 pair. 203As class B, \$9.95 pair. Plate, filament and audio transformers and chokes. Write for circular. Earl Anderson, W8UD, Douglas, Mich.

TRANSFORMERS — push-pull 210s with 600 volt power supply. Completely self-contained rack and panel job \$22. Ernest Ruland, Natick, Mass.

CRYSTALS: Smith-precision power, new \$2. postpaid. Over 1400 sold. Frequency 0.05%. Unconditionally guaranteed. W6BCX, Santa Maria.

CRYSTALS: Free plugin, dustproof holder with every amateur band crystal purchased this month. \$2.25 value. Power crystals: X cut, 1" square carefully ground to within 0.1% of your specified frequency. Guaranteed excellent oscillators. The best buy on the market. 1750 and 3500 kc. bands — \$4.50. Special 7000 kc. band (within 15 kc. of your frequency) — \$5.50. Calibration 0.05%. Plugin holders — \$2.25. Ovens and commercial crystals. Quotations on request. Precision Piezo Service, 427 Asia St., Baton Rouge, La.

GUARANTEED: Rectobulbs at \$5; 211E-D at \$5. Crystals 3505-3545-3640 and others at \$4. 7010-7190 at \$6. Few power transformers. Practically new RCA 852s, \$14. W9ANY, 3327 College Ave., Kansas City, Mo.

QSL Service.

CRYSTALS: commercial — amateur — experimental. Quotations on specifications. K & H Labs., 3327 College Ave., Kansas City, Mo.

SELL RCA course, 71 lessons. Best offer. W9AHX.

CRYSTALS: Your approximate frequency, 80 or 160 meters, \$1.35 prepaid. Guaranteed excellent oscillators. 1" blanks selected highest-grade Brazilian quartz, 65¢. Irregular shapes 25¢. Standard dust-proof plug-in holders, 75¢. Fisher Lab., 1200 E. Nevada, El Paso, Tex.

FREQUENCY meters, special introductory offer, satisfaction guaranteed, for 3500-7000-1400 kc. bands complete with calibration chart postpaid \$5. Additional frequencies \$1 each with chart. All types frequency and wave meters calibrated 75¢ per band. Andrews Radio Lab., 3520 Wisconsin St., Oakland, Calif.

QSLs? QSLs? Write W2AEY for the best!

CLASS B for 46s, 3 stages. Parts complete with tubes, power \$15. SW receiver, shielded, 232, 233, \$7. No c.o.d. S. Magid, 275 Corbin Place, Brooklyn, N. Y.

CRYSTALS: 80 or 160 meter band, inch square, powerful oscillators. Your specified frequency \$2. 40 meter \$4. Immediate delivery, satisfaction guaranteed. W2BVF, 188-03 Jamaica Ave., L. I.

WANTED — 1 or 2 kw spark transformer, condenser and rotary gap. Sell Grebe CR9 150-3000 meter receiver. WIATJ, Claremont, N. H.

CRYSTALS ground from finest Brazilian quartz. Absolute satisfaction guaranteed or your money refunded. 160 and 80 meter bands X or Y cut \$3.00. 40 meters \$5.50. 1" square. Ground to your approximate frequency. Calibration accuracy 0.1%. Sent C.O.D. R.C.A. Radio Lab., 113 Riegel St., Dayton, Ohio.

QSLs — samples — QSL Service, 2220 Linden Ave., Baltimore, Maryland.

CODE machines, tapes and complete instruction for beginners or advanced students — both codes — for sale or rent, very reasonable. Rental may apply on purchase of new equipment. Special offer to Amateurs. Extra tapes for all machines. Instrutograph, Dept. Q, 912 Lakeside Place, Chicago.

CRYSTALS — Brazilian quartz. See last month's two hamads, for prices, etc. William Threm, W8FN now located at 4021 Davis Ave., Cheviot, Ohio.

\$750 commercial transmitter 6 stage CC, a 1933 advance design — trade for used 1931 auto-motor boat. Cash. Adapted CW tone, any band. Will send complete every angle photos. Write W. Ryder, Jr., Hibbing, Minn.

FINEST QSLs. T. Vachovetz, Elmsford, N. Y.

NEW Vibroplexes, \$12. Rebuilds, \$6. to \$10. Guaranteed. Lydeard, 28 Circuit, Roxbury, Mass.

QSLs, W6DOU, 1562 "B" St., Hayward, Calif.

QSLs, stationery. Samples free. Radio Press, Monroe, N. C. TRADE radio engineering correspondence course, Cost \$125. W7BRY, Boise, Idaho.

SELL — transmitting tubes and accessories; new and used. List 300 items. Howard, 5508 Fulton St., Chicago.

Q R A SECTION

50c. straight with copy in following address form only:

W4EM — Wm. Wright Mitchell, 1455 Peabody Ave., Memphis, Tenn.

WIMK, A.R.R.L. Headquarters

R. B. Parmenter, Chief Op "rp"

The following calls and personal sines belong to members of the A.R.R.L. Headquarters gang:

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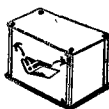
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To Our Readers who are not A.R.R.L. members

YOU should become a member of the League! That you are interested in amateur radio is shown by your reading of *QST*. From it you have gained a knowledge of the nature of the League and what it does, and you have read its purposes as set forth on the page opposite the editorial page of this issue. We should like to have you become a full-fledged member and add your strength to ours in the things we are undertaking for Amateur Radio. You will have *QST* delivered at your door each month. A convenient application form is printed below — clip it out and mail it today.

A bona fide interest in amateur radio is the only essential qualification for membership



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I hereby apply for membership in the American Radio Relay League, and enclose \$2.50 (\$3.00 outside of the United States and its Possessions, and Canada) in payment of one year's dues, \$1.25 of which is for a subscription to *QST* for the same period. Please begin my subscription with the issue. Mail my Certificate of Membership and send *QST* to the following name and address.

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Do you know a friend who is also interested in Amateur Radio, whose name you might give us so we may send him a sample copy of *QST*?

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Thanks

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Collins Announces Important New Transformers



CLASS B 59's

The announcement of the type 59 tube extends the possibility for the use of Class B modulation in low and medium powered transmitters. Two 59's in Class B driven by push pull 45's in Class A will deliver 30 to 35 watts of audio power. The 59's displace the 210 as a Class B modulator. COLLINS transformers are now available for use with these tubes.

Type 770. 59's Class B to 5,000 ohm load\$6.75
designed to carry 150 Ma. d.c. in the secondary (similar
transformers for other load resistances are available)
Type 715. Class B input 45's to 59's.....\$4.00



5 METER CLASS B MODULATORS

The advantages of Class B modulation for 5 meter transmitters have recently been pointed out in *QST* and in the new Handbook. It is possible to use UX 230's or 49's as Class B modulators for a portable 5 meter transmitter and obtain the advantages of extremely light weight, low battery consumption and compactness. It is safe to predict that within a short time Class B modulation will be considered a requisite in all portable 5 meter transmitters. COLLINS has developed new transformers specifically for this use, which measure $1\frac{1}{4} \times 1\frac{1}{4} \times 1\frac{1}{4}$ inches and weigh $6\frac{3}{4}$ ounces. They are available in two types, as follows:

FOR UX 230's

Type 750. Class B input.....\$2.00
Type 751. Class B output to 5,000 ohm load 2.00

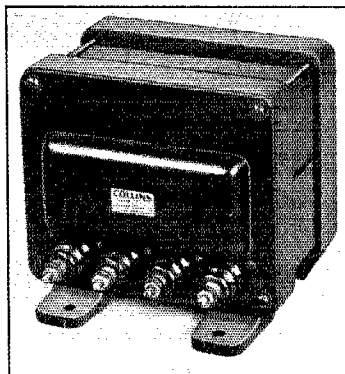
FOR TYPE 49 TUBES

Type 753. Input..... 2.00
Type 754. Class B output to 5,000 ohms..... 2.00

5 METER MICROPHONE TRANSFORMER

Type 757. Single or double button..... 2.00

These transformers are furnished either in an open frame with insulated leads, as illustrated, or totally incased with screw lug terminals for 75c additional. The Class B output transformers are designed to carry the plate current to the modulated stage through the secondary.



BROADCAST CLASS B TRANSFORMERS

Several broadcast stations in the 100 to 750 watt range have recently modified their transmitters to employ Class B modulation in order to effect operating economies and to improve transmitter performance. Special COLLINS transformers have been built for these stations embodying improved features, including low flux density cores and accurately balanced windings. The new series of broadcast Class B transformers include transformers for use with '03A's, '11's, '04A's and '49's. The larger transformers are oil insulated. "Quality conscious" amateurs will be interested in these transformers for use in their own transmitters. Full information sent free upon request.

NEW Velocity Microphone Transformers

Following careful development work, Collins announces a real commercial type transformer for the new velocity microphones (see article in February *QST*). Designed to couple the ribbon to a 200 ohm line, it permits the microphone to be located remotely from the input amplifier. Your present microphone transformer or Collins Type 605 Input Transformer can be used to couple the 200 ohm line to the grid of the first tube. This is the system used in commercial models and permits greatest fidelity. The Transformer is compact and can be mounted directly on the microphone. A primary of heavy copper ribbon and special interspaced windings give a flat response from 30 to 12,000 cycles. *The transformer is really the most important part of a good velocity "mike."*

Type 515 — Velocity Microphone Transformer Ribbon to
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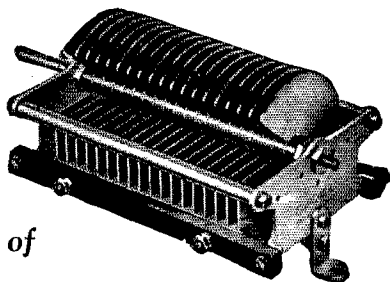
fundamentally right, not by Cardwell, but by a host of imitators who have borrowed, and who, turn where they would, have inevitably gravitated to some or all of the essentially sound principles of the basic design originated years ago by CARDWELL and still considered by legions of Engineers and Amateurs alike, the "Standard of Comparison."

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