**February, 1949**

**40 Cents**

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**devoted entirely to**

**amateur radio**

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**FEB 3**

| 0210   | GQ    | 579 |
| 0220   | G8FM  | 579 |
| 0235   | OK1LM | 579 |
| 0240   | PAGNG | 579 |

**FEB 12**

| 0001   | KV4SA | 14  |
| 0003   | PY1DS |    |
| 0005   | PY1DH |    |
| 0007   | LU3EL |    |
| 0009   | CM25W |    |
| 0012   | HK3CK |    |
| 0014   | PY4FI |    |
| 0017   | EL3A  |    |
| 0019   | ET1IR |    |
| 0022   | OH1NR |    |
| 0025   | JA2H1 |    |
| 0028   | ZS6KY |    |
| 0030   | ZS6FN |    |
| 0033   | VO6J  |    |
| 0035   | M6SGE |    |

**1949 DX CONTEST**

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the hallicrafters co.

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### Reports Invited

All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio Club reports are also desired by SCMs for inclusion in QST. All ARRL Field Organization appointments are now available to League members. These include ORS, OBS, OPS, OQ, and OBS. Also, where vacancies exist SCMs desire nominations for SEC, EC, EM, and PAM. In addition to station and leadership appointments for Members, all amateurs are invited to join the ARRL Emergency Corps (ask for Form 7).
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is a noncommercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

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

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

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite, although full voting membership is granted only to licensed amateurs.

All general correspondence should be addressed to the Secretary at the administrative headquarters at West Hartford, Connecticut.

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7730 Joplin St., Houston 17, Texas

THE AMERICAN RADIO RELAY LEAGUE, INC.
The A.R.R.L. International DX Contest

No DX man worthy of the name needs to be told that this month (and March, too) are the Big Months. The casual- and the non-DX man will get the idea from this month’s cover, we hope. The annual League contest has gone through quite a few evolutionary stages, and we would like to take a little “time out” to review them, just to show you how the thing has grown.

The first contest, held in 1927, bore little resemblance to the present pattern. Long messages, complete with text and coded preamble, had to be sent, and a reply had to be routed via a different station. The contest ran for two solid weeks, and W and VE stations (“nu” and “nc” in those days) had to enter their stations officially before the contest started. The 7- and 14-Mc. bands took the entire load of the contest, with a leaning of the majority toward the former. By 1930 the rules had been revised a little, and a lot of presently well-known DX men were beginning to show up in the final results. The most foreign contacts were made by a W who “exchanged messages with 83 stations” and, to demonstrate how peachy conditions were, “17 Ws and VEs worked five continents.”

In 1932, the “Calls Heard” department of QST was quite popular, and it seemed logical that a giant calling-and-listening contest would be well received. Times were split up around the world, with some continents transmitting while others listened. All calls heard were to be reported. While new DX was heard for the first time by many Ws and VEs (70 different countries, all told), and Ws and VEs got into spots they never expected to, the old thrill of a two-way contact was lacking, and the 1933 contest began to take the present form, with its exchanges of self-assigned serial numbers. WSCRA worked 42 countries in that shindig, and a lot of Ws finagled their WACs out of it. In 1936 the country quotas and band multipliers were introduced, to provide more DX for everyone and to encourage multiband operation. Participation continued to increase each year, only to be interrupted by the war.

Since that time, however, the contests have been bigger than ever, and in 1948, as you know if you read the report, W2GWE and W4FU worked over 100 countries during the two week ends, enough to qualify for DXCC!

The history has been an interesting one, as we are sure you will agree if you dig back through your dusty files of QST and recapture the enthusiasm of those earlier days. The record is a proud one, we believe, but of course there has always been the unhappy side. Each year violators of the rules have been listed, in an attempt to stop out-of-band operation, whether deliberate or inadvertent. There have often been complaints that such-and-such a station used a whole regiment of operators, which is perfectly permissible, of course, so long as it is reported that way — which it isn’t, always. There are always accusations that so-and-so ran more than a kilowatt, and we have just a faint suspicion that sometimes it is true. But the League organizes the contest and polices the event to the practical limit — beyond that, unreported multiple-operator work and augmented inputs are something we can only regret and despise.

During each year between contests we always receive letters or hear directly from honest and sporting amateurs who, deploring the practices of their less-honest brethren, feel that the League should “do something” about the violations of FCC and ARRL rules that occurred in the previous DX event and will probably show up again the following year. Well, we agree wholeheartedly that it is a pity that the otherwise splendid record of DX contests is always marred by a selfish few who won’t play if they have to follow the same rules as everyone else. We’d like to see something done about it, too, and if we get proof that will stand up we’ll do it. But most often we run into the attitude that no one wants to be a “squealer” and turn in a fellow amateur.

For our money, such reluctance isn’t justified; the people we’re talking about are no more “fellow hams” than the guy with loaded dice and marked cards or cold deck is a “fellow gambler” in the sporting sense of the phrase.
But maybe there is a way to relieve the individual amateur of the onus when some violator should be turned in. It strikes us that if anything is ever to be done about these infringements of ethics and fair play, it must come from local clubs and other groups. If they have a sincere desire for a clean contest, these organizations can not only raise the standards of conduct by their own spotless records, but they have it within their power to see to it that no amateur in their area is guilty of unfair and unethical tactics.

— B. G.

With all six continents displaying intense amateur activity, QST for February, 1924, sounds the call for an international organization of amateur societies. It is believed that such a union would help to solve the many problems of language, operating procedure and technique now cropping up on amateur wavelengths. President Maxim is carrying the idea abroad, having sailed to meet with representatives of European amateur groups.

It has been a busy winter on all operating fronts. Early recapitulation discloses that almost a dozen European countries are participating in the current Transatlantics; and that approximately 150 U. S. and Canadian amateur stations have been heard in the Antipodes during the recent Transpacifics. On the domestic scene, President Coolidge has sent Christmas greetings, via amateur radio, to the MacMillan Expedition in the Arctic.

"Low-Loss Tuners" is this month's main technical article, Technical Editor Kruse discussing the many design considerations involved. For examples of practical couplers, working models by Perry O. Briggs, 1BGF, Boyd Phelps, 1HX, and F. H. Schnell, 1MO, are presented. For the ham contemplating operation in the spectrum below 200 meters, the Technical Editor authors an equally informative article, "Amateur Wave-meters." Other equipment articles include H. H. Tilley's description of a unique circular mounting arrangement for using six UV-202s in parallel, E. J. Atkinson's notes on electrolytic rectifiers, and James L. Jenks' data on the improved Arrlad "S"-tube rectifier.

ARRL has a new constitution, the result of many months of work and study by the League's officers and board of direction. Published in full this month, the new constitution provides for divisional representation of members instead of the director-at-large representation previously afforded.

The public-service record of amateur radio has been enhanced by two creditable performances—the work of 7GI and 7IP in bringing help to a stricken West Coast cannery, and that of 1ARY and Canadian 2CG in assisting telephone and telegraph companies during a breakdown of service between Burlington, Vt., and Montreal. Anticipating the communications needs of the nation's rail lines during emergencies, the ARRL Emergency Service Committee, A. L. Budlong secretary, announces newly-formulated plans to meet any contingency.

The transatlantic mail arrived in time to present in this issue pictures of the first French and English amateur stations to communicate two-way with the United States—Leon Deloy's F8AB, Nice and J. A. Partridge's G2KF, London. In the "Who's Who" section we have portraits of QST's capable illustrators, Carl D. Hoffman, SUX, Clyde E. Farr, SZZ, and Harry R. Hick, ex-IESS.

Our ranks are showing a steady growth! The latest Department of Commerce figures reveal the U. S. ham population as 16,570 strong.

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Strays

Quartz for crystals is now being produced synthetically in high-grade quality under a program sponsored by the Signal Corps Engineering Laboratories, Fort Monmouth, N. J.

If you are planning a mobile 3.9- or 14-Mc. 'phone station for your car but don't know what to do about a receiver/converter combination, W8MGQ reminds us that there are car radios built that include the broadcast band and short-wave. Some can stand a little bandspreading, but otherwise they should be a natural.

A heart attack on December 4, 1948, added to the ever-growing list of Silent Keys the name of Morrill P. Mims, W1BDB, of Waban, Mass. Most of us still think of him as W5BDB, prewar, a call that was as well known on 20 and 10 'phone as any can hope to be in these days of multiple bands and specialized operation.

Author of a number of QST articles and developer of the "Signal Squirter," Mims was a graduate of Texas A. & M. (1922) and started his ham career about 1928 in Texarkana, Ark. During the war he was in charge of Raytheon's part of the Manhattan project, and left that company in June of 1946 to establish his own business as a manufacturers' representative in the New England area. Like many hams, he had a keen interest in photography, and at the time of his death was president of the Boston Camera Club. His passing at the untimely age of 49 will be greatly regretted by the very many amateurs who knew him both personally and by radio contact.
The "Little Slugger"

A 10-Meter Transmitter for Use in TV Areas

BY PHILIP S. RAND,* W1DBM

* RFD 1, South Norwalk, Conn.

The low-power transmitter described in this article incorporates the principles advocated by the author in earlier QST articles for eliminating TVI. Complete in itself, it is also a TVI-proof exciter for a high-power amplifier.

So you think narrow-band f.m. can't compare with a.m. for ten-meter DX through the week-end QRM? Within 36 hours from the time the last wire was soldered in place this unit, driving the pair of 813s TVI-treated as outlined in May QST, made WAC. It took that long because you have to hear 'em before you can work 'em, and the Asians didn't happen to be coming through at WIDBM until the third day the transmitter was on the air.

In my two recent articles on TVI certain steps were laid down for the elimination of TVI from existing transmitters and suggestions were made to be used in the design of new transmitters. The "Little Slugger" to be described follows out these ideas in practical form, and is easier to build than many rigs designed for beginners' construction.

There should be a reason for writing an article. Here is what prompted me to sit down and write this one. Last night during a QSO on 10 meters a visitor at the other end said: "I expect my ticket any day now and hope to work you with my own rig some day soon. It will consist of a VFO with 20-meter output driving an 813 doubler to ten, which will drive the 1-kw. final, consisting of a pair of 304TLs. The 813 will run about 300-400 watts input."

Now I'll bet dollars to peanuts that that 813 will not only have 100 watts output on 10 meters but also 25 to 50 watts on dear old TV Channel 2, and should make our friend very unpopular over a radius of at least 10 or 20 miles. Fellows, please let's not butt our heads against a stone wall; let's use them for what they were intended. Let's do our frequency multiplying in low-power stages where we can control the unwanted harmonics.

The "Little Slugger" is designed to do just this. It may be used as a complete low-power transmitter for the beginner, as a narrow-band f.m. exciter for the regular a.m. rig, or as a local rag-chew rig for use during TV hours. At any rate it will get the new ham off to a correct start in that it is one of the first ten-meter rigs we know of that has been designed especially for eliminating TVI. The "Little Slugger" was built to demonstrate the following principles: (1) frequency multiplying in low-power stages; (2) the use of good narrow-band f.m.; (3) adequate shielding and filtering; (4) proper r.f. by-passing; (5) use of fixed high-Q tank condensers plus variable tank condensers.
inductance; (6) use of an output harmonic filter; (7) use of short leads and compact layout; (8) use of low bias and drive and Class B operation.

It is not necessary that the physical layout be followed exactly. The main idea is to follow the general principles just outlined.

**Circuit Details**

In looking over the circuit diagram of the r.f. portion you will see nothing new or different with the possible exception of slug-tuned coils, ceramic condensers, and the output arrangement. It is a perfectly straightforward circuit utilizing miniature components, good shielding, short leads, and adequate filtering, plus link coupling and an output harmonic filter. The miniature 6AQ5 tubes in the exciter, Fig. 1, are run at only 150 volts on both plate and screen. The entire six-tube exciter draws only 75 ma. at that voltage.

The exciter portion starts off with a 6C4 Pierce crystal oscillator on 3.5 Mc. This is followed by a 6AK5 amplifier on the same frequency. This stage is reactance-modulated by a separate unit to produce phase modulation. Then come successive 6AQ5 doublers to 7, 14 and 28 Mc. The last doubler is link-coupled to the grid of a 6AQ5 straight amplifier on 28 Mc. This amplifier is link-coupled to a tuned output circuit which rejects everything except 28 Mc., and this output circuit is in turn linked to the following stage.

The push-pull amplifier, Fig. 2, uses a pair of 6AQ5s with a separate tuned output circuit similar to that used in the exciter. It operates at an input of about 20 watts.

You will note from the photographs that the exciter stages zigzag back and forth across the chassis as they progress through each of the "egg-crate" cells or compartments that make up the shielding. This was done only in the interests of compactness; almost any reasonable layout should work as well.

Slug-tuned coil forms were used throughout for convenience as well as because of their small size, and also to avoid the necessity for variable condensers. This allows us to use a fixed condenser of adequate size to by-pass the harmonics directly from the plate to cathode and at the same time the circuit can be tuned to resonance by means of the iron or brass slug inside the coil. The condenser referred to is of the miniature ceramic type with pigtails, and is soldered with as short leads as possible directly from the plate pin to the cathode pin on the 6AQ5 sockets.

The by-pass condensers for the heater, screen grid, cathode and "B" plus in each stage are of the ceramic stand-off type, mounted in a circle around the sockets and soldered directly to the respective pins with ¼ inch leads. The grid leaks and cathode resistors are also mounted right on the socket. The 50-µfd. ceramic coupling condensers are insulated with spaghetti and are centered in a ¼-inch hole in the copper shield between stages.
Filtering the Leads

It was thought that extra harmonic filtering might not be needed in this unit; however, with the exciter sitting three feet from the television receiver a faint pattern could be seen on the screen. V.h.f. chokes were therefore installed in each heater and plus-"B" lead, with additional 500-µfd. ceramic condensers across them, and this slight trace of TVI disappeared. In fact, the exciter could then be operated without TVI from the same power supply that ran the booster amplifier on the TV receiver.

Wherever a power lead goes through the chassis or shielding it is by-passed by means of a 50-µfd. ceramic feed-through condenser.

Output Circuit

The output harmonic filter is really a conventional antenna tuner in miniature, with the exception that the r.f. is linked both in and out. It consists simply of a parallel circuit tuned to 28 Mc. and having two links. It does such a good job of harmonic reduction that we now use one between each of our final amplifiers and the antenna. In fact it should be just as important a part of any transmitter as the power supply or metering circuits and really should be permanently built in.

The Push-Pull Amplifier

The push-pull 6AQ5 stage also uses slug-tuned coils. The design of suitable coils presented something of a problem, inasmuch as we wanted the slug to come into the coil uniformly with respect to the two tube plates. This was solved very easily by winding one half of the coil the full length of the coil form and then, after cementing on four small strips of polystyrene, winding the second half of this coil back over the first half.

This puts the two ends of the coil at the bottom end while the center-tap comes at the top end. It looks somewhat strange at first but it is easy to do and works nicely.²

² Although it may not be especially important, inasmuch as the r.f. center-tap of the tank is established by the tank condensers, this type of construction results in some unbalance in the coil because the outer portion has more inductance than the inner and the two coils are not exactly balanced with respect to the tuning slug. A refinement would be to use "binocular" construction, two solenoids side by side, and tune them with two identical slugs mounted on a common adjustment mechanism. However, the construction of such a unit would not be as simple mechanically as the author's arrangement. — Ed.

February 1949
Speech Amplifier and Modulator

Since the purpose in designing this exciter was to avoid TVI, the obvious type of modulation to employ was narrow-band f.m. This not only avoids modulation bars in the picture but, more important, allows you to run your amplifiers straight Class B.

The f.m. unit shown in the photographs and in Fig. 3 is simply a combination of well-known circuits, and uses miniature tubes only for the sake of compactness. The requirements were for f.m. that would work DX, that would punch through QRM, and that would sound like a.m. on an a.m. receiver, with none of the distortion that so many have and that has given f.m. such a bad name, nor with modulation so weak that the audio on the receiver has to be turned away up in order to hear it.

To meet these requirements it was decided to use crystal control, multiply the frequency at least eight times, use severe clipping, and restrict the audio range to from 500 to 2500 cycles. Since putting the transmitter on the air we have worked many DX stations and their usual answer to the question "Did you know we have been using n.f.m.?" at the end of a QSO is "No, are you?"

The push-pull amplifier is a separate unit using a pair of 6AQ5s, running about 20 watts input. In the view at the bottom, the coil to the right of the shield plate is the antenna-coupler coil. Wiring of this circuit had not been completed at the time the photograph was taken. The grid and plate coils for the amplifier use an unusual method of construction to permit slug tuning without excessive unbalance.
In checking out this unit with an audio oscillator and 'scope it was found that the greatest single contribution to good quality when clipping heavily was the elimination of the low-frequency response ahead of the clipper. This is done by tying a small a.c.-d.c. filter choke, 10 henrys or so, from grid to ground in a speech-amplifier stage. The reason is quite clear when you realize that the clipper makes square waves out of all the frequencies it clips, and a square wave is a sine wave plus an infinite number of harmonics. Now when a 2000-cycle tone gets clipped into a square wave and is passed through a filter having a 2500-cycle cut-off all the harmonics are filtered out, so you still have a 2000-cycle sine wave. But when a 100-cycle sine wave gets clipped and passes through a 2500-cycle filter you have the darnedest mess you ever saw, because you not only have 100 cycles but 200, 300, 400 and so on up to the 25th harmonic.

Also, by cutting off frequencies below 500 cycles you get rid of 60-cycle and 120-cycle hum from your first stage of audio, as well as audio pick-up of buzzing relays and low-frequency room echo. In other words, you have clear, crisp, clean-cut speech that is easily understood and that will take a lot of clipping without noticeable distortion.

Now when you take this kind of solid audio and deviate the full amount a receiver will take, you have the kind of n.f.m. that is hard to tell from a.m. by the usual methods. Of course if you think to tune to the exact center of the carrier there is a null, but unless there are other telltales of f.m. you don't think to do this.

**Chassis Construction**

All three chassis are made of 1/4-inch aluminum with a half-inch lip folded over so that the chassis forms the cover for a box. The box portion is made of the same material with the sides folded up to fit inside the cover. The approximate dimensions are as follows: exciter, 5 by 10 by 2½ inches; amplifier, 4 by 6 by 2½ inches.
The n.b.p.m. modulator is also a miniature unit, as shown by the cigar alongside. It incorporates speech clipping and filtering, along with low-frequency attenuation, to get maximum speech effectiveness. The microphone connector is at the left-hand edge and the reactance-modulator output connection is the feed-through at the far right. Internally, most of the parts are secured to mounting boards as shown by the lower photographs.

inches; modulator, 5 by 7 by 3 inches. Shielding is made up of soft sheet copper cut with tin shears, folded in a vise and soldered together. Two mounting boards run lengthwise in the modulator unit to hold the miscellaneous condensers and resistors. The three i.f. cans hold the 125-mh. r.f. chokes used in the audio filter.

The tiniest chassis are designed to be mounted together on a standard 17 by 13 by 3 chassis also containing the power supply and metering facilities. The front panel is an 8½-inch standard relay rack panel and a complete copper screening shield covers the entire unit, which then goes into the relay rack.

The modulation and exciter chassis should be so placed in relation to each other that there is a short lead between the modulator plate and the 3.5-Mc. amplifier (6AK5) plate.

All slug-tuned coils except those in the two 28-Mc. amplifier stages are ready-wound CTC units. These coils are wound with heavier wire, with the turns adjusted to tune to 28 Mc. with the brass slugs pretty well out of the coil. (The iron half of the CTC slug has been removed.)

**Tuning Procedure**

The first step in tuning up is to check each of the tuned circuits with a grid dip oscillator to be sure they all tune to the proper frequencies. Plate voltage should then be applied to the crystal oscillator. Check on a receiver to determine if the crystal is oscillating. If so, apply plate voltage to each stage in succession and, with a plate meter connected in, tune each coil to resonance indicated by a dip in plate current. Adjust the link between the 28-Mc. doubler plate and the grid of the first 28-Mc. amplifier for optimum coupling, as indicated by maximum grid current. After the plate coil of the 6A05 amplifier is tuned to resonance the next step is to couple a 60-ma. flashlight bulb on a one-turn loop to the output coil and tune this for maximum brightness. The link between the plate and output coils should then be adjusted to show maximum bulb brightness and the two tuning slugs should be touched up slightly.

At this point it is interesting to note the effectiveness of the output circuit by putting the 56-Mc. coil in the “Gimmick” or “Little Gem” and checking for 56-Mc. signal. You probably won’t find much unless your “Gimmick” is equipped with a 6- to 8-inch probe and a 0-100 µamp. meter. I found a 20-µamp. reading at the plate of the doubler, none at the grid of the amplifier, 10 µamp. at the plate of amplifier, and none at all in the output circuit. The “Gimmick” was coupled to the circuits as tightly as possible.

A short coax line should now be connected over to the push-pull 6A05 grid circuit and this grid coil should be tuned for maximum grid current. The links on each end of the coax should be adjusted for optimum coupling and the slugs should be touched up for resonance again. The grid currents should be ½ to 1 ma. for the first 6A05 amplifier and 1 to 2 ma. for the push-pull stage. Plate currents in the exciter stages should be somewhere around 15 to 20 ma. and in the push-pull stage around 50 to 70 ma., depending on the plate voltage. We run 300 volts on the plates of the push-pull stage.

Tuning the output filter on the push-pull stage is the same as already described; that is, the links and tuning are adjusted for maximum grid current to the following Class B amplifier in your rig, whatever that may be. If you are feeding an antenna with the push-pull 6A05s it is essential to have some means of indicating the power that is being put into the antenna, adjusting the two links and the tuning of the output coupler for maximum radiation. This also applies to tuning up this same type network between your regular final amplifier and your antenna. Too-tight or too-
loose coupling or improper tuning can give you considerably reduced output.

In our case the problem of output indication was very nicely solved by laying a 28-Mc. folded dipole made of 300-ohm ribbon on the attic floor, aiming the ten-meter beam at the house, and coupling the "Gimmick" with a 10-meter coil to the end of the feeder in the shack. We then could make adjustments to the output coupler links and tuning, always striving for maximum reading on the improvised field strength meter. We found that we actually got a higher reading with the coupler than without it.

Adjusting Deviation

Setting up the deviation to the proper value is done easily, regardless of what follows the exciter. The exciter is turned on alone and tuned in on the communication receiver on ten meters. The carrier should be absolutely clean. In our case a slight f.m. hum was observed, and upon investigation it was found to be coming from the power supply. It was completely cured by adding one more filter choke and two 20-μfd. electrolytic condensers to the power-supply filter.

The modulator unit is next connected in circuit and the clipping and deviation controls set at the halfway position. While you listen with a headset on ten meters, have the XYL talk into the mike. Remember only the exciter is running so you are not putting out a signal on the band to bother anyone! There should be a definite null when the carrier is tuned on the nose, but on tuning off either side about ½ to 1 "S" unit clear crisp speech should be heard. Now advance or retard the clipping and deviation controls, one in each hand, until settings are found where the audio sounds loudest and best. Bear in mind that too much clipping will give you some distortion even though you are not deviating enough. Too much deviation will make the signal too broad and distorted, and it will spatter beyond where you can get a reading on your "S"-meter. With the deviation correct and not enough clipping the audio will not sound so solid. With not enough deviation the audio will be nice and clean but just too weak to copy without turning the audio gain on the receiver away up.

Results

Your friends who are used to hearing your voice with plenty of bass won't like your quality at first now that you are cutting the lows at 500 cycles, but they will get used to it. Strangers you work will like your crisp quality. DX will say it's easy to copy through QRM.

This exciter was finished on a Saturday afternoon and immediately put on the air to see what it would do. It replaced our old exciter and the rig ended up in the old pair of 813s running 600 watts.

With the beam southwest we called CQ-ZL at 5:10 P.M. and were answered by ZL1KN. Mac said it was the best n.f.m. he had heard and had thought it was a.m. The next contact was ZL1QX (who gave the same report) and was followed by XE2KW. On Sunday EA3HM, ZS6AM and LU3DH were worked. The band not being open to Japan, we had to wait until Monday to work J2BAE. Within 36 hours of soldering the last coil form

Any convenient constructional arrangement may be used for adjusting the position of the tuning slug. The slug itself is simply a short piece of brass rod small enough to fit inside the coil form and made to about the proportions shown in the drawing.

The coils are made by first taking a section of wire having twice the length necessary for four turns on the half-inch form and then soldering another conductor at its center for the center-tap. The inner coil is then wound on the form, the thin polystyrene strips doped in place, and the remainder of the wire wound over the strips. Having the same length of wire in both sections of the coil tends to compensate for the difference in inductance with difference in coil diameter. The tuning slug is not grounded.

(Continued on page 189)
A "Plumber's Delight" Beam for 14 Mc.

More Ideas on Rotary-Beam Construction

BY WILLIAM I. ORR, * W6SAI

WE were all set to go! W6SAI was balanced atop the 4 × 4 mast mounted on the roof. W6WKU was leaning precariously over the roof edge, ready to heave on the rope attached to the huge beam framework. W6TEZ was in the yard flexing his biceps, ready to boost the beam skyward.

The little woman, taking in all this preparation from the kitchen window, said, "Well! Things are pretty sad when it takes three hams and a hundred pounds of wooden framework just to hold three lil pieces of aluminum tubing up in the air."

WKU relaxed his hold on the rope and we all looked at each other. Sunny was right. It was silly to put all that framework up in the air to support three lil pieces of aluminum tubing.

"OK, fellows, forget it! Let's quit and have a beer," I said.

So ended the glorious antenna-raising party at W6SAI. We stood around and looked at the remains of a 14-Mc. beam that, by the power of a woman's tongue, had never left the ground. "Look at that beast," said TEZ, pointing at the beam, "a beautiful ladder frame, guy wires, egg insulators, braces and plates! Eighty-five pounds of junk just to support twenty pounds of elements. There certainly should be a better way of doing it!"

There was a better way of doing it. W6TEZ, VFR, WKU and I spent the better part of a year's worth of week ends finding out that better way and we sincerely hope that the following information will be of some assistance to someone on the verge of erecting a 14-Mc. rotary beam antenna.

Electrical Design

The two main reasons for erecting a rotary beam are (1) to blot out the other guy and (2) to improve reception of the station you are working — or trying to work. Obviously the best answer to this problem is either a rotary Sterba curtain or a brace of rhombics. Unfortunately, the city ham, hampered by fifty-foot lots, building inspectors and neighbors, cannot resort to these simple and pleasant solutions. The best way out is a comparatively-light rotary beam, one giving maximum gain per unit of area, without overhanging the property line. Also, it must be passably neat looking, with a minimum of guys and bracing. We believe that the three-element wide-spaced beam is the best answer to all these requirements. It has high gain, it is not critical of adjustment and, although it isn't small, it can be made to look small by proper construction. At the same time, it can be made light enough (fifty pounds or less) for one man to handle alone. Finally, it takes a rhombic or the equivalent thereof for some other joker to override the signal from the beam.

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QST for
The final design we arrived at uses 12-foot spacing on the director side of the radiator and 10-foot spacing on the reflector side. The radiator is moved a little "to the left of center" to aid in mounting the beam. The supporting boom is 22 feet long. The director is 31 feet 2 inches long, the radiator 33 feet 3 inches long, and the reflector 34 feet 10 inches long. A "T"-match is used to couple the beam to a 600-ohm open-wire flat line.

Mechanical Design

The lightest, simplest and easiest beam to build for 28 Mc. is the so-called "plumber's delight" — an array constructed entirely of metal, with no insulating members between the elements and the supporting structure. This basic design was adapted for 14-Mc. operation and has proved very satisfactory under some rather trying weather conditions. Four different beams have been built after the following pattern and they all give uniformly fine results. Best of all, they are easy to build, easy to install, and inexpensive.

Boom Design

The supporting boom consists of a 22-foot tube assembled from two 10-foot lengths of 3-inch diameter 24ST dural tubing of 0.072-inch wall thickness. The two sections are spliced together

Element Design

Each of the three elements is composed of a 12-foot length of 1 1/2-inch diameter, 0.050-inch wall, 24ST dural tube, with each end slotted for about four inches. This slitting operation can be done easily with a hack saw. Into each end of this tube is pressed a 12-foot length of 1 1/2-inch-diameter 0.032-inch-wall 52ST tubing, as shown in Fig. 2. The correct element length is set by changing the overlap of the tubes. To prevent oxidizing at the joints, a special compound was obtained that is used in the aircraft industry to seal aluminum joints against oxidization. The best source of this compound, or paste, is in large aluminum electrical tube is pressed a 12-foot length of 1 1/2-inch-diameter 0.032-inch-wall 52ST tubing, as shown in Fig. 2. The correct element length is set by changing the overlap of the tubes. To prevent oxidizing at the joints, a special compound was obtained that is used in the aircraft industry to seal aluminum joints against oxidization. The best source of this compound, or paste, is in large aluminum electrical
electrical lugs were bought and the paste extracted and smeared inside both ends of the three center tubing sections. As an added precaution after assembly, an expandable aircraft-tubing clamp was slipped over each joint and tightened.

**Reflector and Director Assembly**

Before the elements are assembled, the center-element sections of the reflector and director should be inserted in their respective holes in the ends of the boom and accurately centered. It is a good idea to slot these center sections after they have been passed through the boom holes instead of before, as the tubing expands slightly after it is slotted and it may be quite a job to compress it enough to get it through the boom holes. With the center sections aligned with respect to the boom, a %4-inch hole is drilled and a %2-28 machine screw is run through the top wall of the boom and through both walls of the element, as in Fig. 3. When this joint is tightened the element will be firmly anchored to the boom. Any play at this joint will lead to bad element vibration in a wind, so any slippage here should be shimmed out with thin brass strips inserted in the boom hole. The end tips may now be inserted in the reflector and director and the clamps tightened.

**Radiator Assembly and Mounting**

The radiator is placed atop the center boom, a little off center in order that it will clear the center stay. The radiator is attached to the boom by a special clamp, constructed as illustrated in Fig. 4. Two pieces of iron pipe a foot long each are obtained. These should be of proper inside diameters to slip tightly over the boom and radiator, respectively. These pipes are then cut lengthwise into two pieces and two of the halves welded to each other back-to-back at right angles to form a mounting that will sit astride the boom and provide a cradle for the radiator. This mounting should be bolted to the boom by means of three %4-inch bolts 4 inches long. The mounting should be placed as close as possible to the center of the beam, so that at least two of the mounting bolts can pass through the oak block. The radiator is seated in the cradle and held in place by two adjustable aircraft-tubing clamps.

**The "T"-Match**

The "T"-match section is made of two 4-foot pieces of 1-inch diameter dural tubing joined together by a 1-foot piece of oak dowel rod (broomstick to you). The tubes are driven onto the rod until they are spaced two inches apart. Holes are then drilled through the tubes on each side of the joint, and two machine screws are inserted for the connection of the transmission line. The "T" is connected to the antenna by two brass clamps, fashioned of 1-inch brass strip and formed as shown in Fig. 5.

**The Supporting and Rotating Mechanism**

The choice of power for rotation of the beams was the surplus "prop-pitch" motor available from many sources for a modest sum. These have performed excellently. A pipe flange was welded to the spline gear, and a threaded section of %2-inch iron pipe was used as a supporting and rotating member. To prevent slipping of the threaded joint, it was pinned by a %2-28 bolt after assembly. It is a good idea not to let the pipe exceed twelve feet in length or else it will develop axial twist in a heavy wind and allow the beam to whip about.

We all developed different systems for mounting the beam atop the pipe. Each of us had different mounting problems that necessitated different arrangements, so it might not be a bad idea to study them all. In all cases, the completed beam

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**Figures:**

- Fig. 4 — The clamp for the driven element is made by splitting 1-foot lengths of iron pipe and welding them together as shown.
- Fig. 5 — Details of the "T"-match assembly.
- Fig. 6 — The mounting plate used in the W6SAI beam. Since the plate is supported at only one point, it is necessary to guy the boom to the rotating vertical member. (See photograph.)
is light enough to be pulled up a tower by a rope or passed up hand-over-hand. When it arrives at the top it can easily be swung into a horizontal position and dropped into some kind of a cradle at the top of the pipe. Now, while you are holding the beam at the top of the mast, let’s look at the mounting cradles:

**W6TEZ (or “Brute-Force”) Method**

Bill procured a large pipe flange that would thread onto the top end of his vertical supporting pipe and bolted it to the underside of his oak center block. The beam was then pulled up the side of the tower by a rope and then he swung it up and over his head and set it down atop the vertical pipe. The prop-pitch motor was then started and the rotating vertical pipe screwed itself into the flange on the oak block. The joint was then pinned. This is an exceedingly simple scheme but it has two undesirable drawbacks: (1) it isn’t easy to swing a three-element beam over your head when you are perched precariously atop a 45-foot tower, and (2) the beam cannot be tilted down for adjustment and repairs without completely removing it from the supporting pipe.

**W6SAI Method**

I had a tiltable iron mounting bracket welded at a local machine shop. It was welded to the supporting pipe and it provided a flat tiltable metal plate the exact size of the bottom of the oak center block. The plate was drilled to correspond to bolt holes in the block. The beam was passed up the mast hand-over-hand until the oak block centered with the mounting plate. It was a simple job to bolt the block to the plate and then swing the beam up into a horizontal position. It is held horizontally by two short guys running between the boom and the vertical pipe. (See Fig. 6 and photograph.)

**W6VFR Method**

Marv constructed a “U” channel into which the boom would fit and which had extended side flanges at each end, drilled to fit corresponding holes in the boom. The boom was hoisted atop the tower and positioned between the two flanges and a bolt run through the flanges and the boom. The boom was then swung up to a horizontal position and the second bolt put in place. (See Fig. 7.)

All these three methods are practical, so take your choice!

Once the beam is UP, the battle is over. Hook on a balanced line of 200 to 600 ohms and load to the transmitter. The beam will cover the complete 14-Mc. band with very little evidence of frequency discrimination. Keep the line well clear of metal objects that would tend to unbalance it, and you are all set to roll.

**Afterthoughts**

As any ham knows, once a piece of equipment is pronounced perfect, it is high time to tear it down and rebuild it. We haven’t done that yet, but we do have some good ideas gained out of using the beam for over a year and they may prove of value.

1) An all-metal 14-Mc. beam often, for obscure reasons, will develop resonant vibrations at certain wind velocities if it is pointed into the wind.

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Because of this, it is important that all joints be vibration-proof. In my case, I have a brisk onshore wind every afternoon that often reaches amazing proportions. If the beam is left head-on to the wind, the elements will start a periodic vibration that is harmless but annoying. In the distant future the beam is coming down and the reflector and director will be removed from the boom holes and two additional cradle clamps, similar to the antenna mounting clamp, are going to be made. The ends of the boom will be plugged with oak plugs and the clamps bolted to the ends of the boom. The reflector and director will rest in these clamps. This modification will provide a rigid joint and also allow the use of two umbrella guys to each end of the boom. The beam, as it is, is rigid enough for locations that are not too windy. It has stood up for a year so far with some winds of 40 m.p.h., and it doesn't look as if it will come down for some time!

2) It is a good idea to paint the whole beam with aluminum paint to prevent corrosion of the dural.

3) The boom can be constructed with square dural tubing instead of round. In some cases square tubing is more easily obtainable. Either type will work well. W6VFR is erecting a 4-element wide-spaced brute with a 28-foot boom made of square tubing. (Why anyone with 215 countries wants a four-element job is beyond me!) Tubing measuring about 2 by 4 inches on edge is satisfactory.

4) It is permissible to replace the oak center block with a splicing piece of dural tubing. This makes the beam easier to assemble but a little more floppy. The flop may be taken out by the umbrella guys, however. This substitution works better with square tubing as it provides a flat mounting surface.

5) In case of vibration, in the element tips, it can be damped out by plugging the tips with wood blocks.

After a year of operation we have found the beams to be well worth the effort. They perform in an excellent manner and have survived several bad windstorms that have wrecked other more pretentious beams. They are easy to service and neat-looking. They are not costly to build. What more could one want? (I know — a rhombic!)

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A.R.R.L. QSL BUREAU

For the convenience of American and Canadian amateurs, the League maintains a QSL card distributing system which operates through volunteer district QSL managers in each call area. To secure such foreign cards as may be received for you, send your district manager a stationer's size No. 10 stamped self-addressed envelope. If you have reason to expect a considerable number of cards, put on an extra stamp so that it has a total of six cents postage. Your own name and address go in the customary place on the face, and your station call should be printed prominently in the upper left-hand corner. If you have held other calls in previous years, submit an envelope for each such call to the proper manager — there are many thousands of uncalled-for cards in the files. All incoming cards are routed by Hq. to the home district of the call shown in the address.

W1, K1 — Frederick W. Reynolds, W1JNX, 53 Needham St., Dedham, Mass.
W2, K3 — Henry W. Yaknel, W2SN, Lake Ave., Holmen, N. J.
W4, K4 — Johnny Dorchet, W4DDF, 1611 East Calah Ave., Nashville, Tenn.
W5, K5 — L. W. May, Jr., W5AIG, 9428 Hobart St., Dallas, Texas.
W6, K6 — Horace R. Greer, W6TI, 141 Fairmount Ave., Oakland, Calif.
W7, K7 — Frank E. Pratt, W7DXZ, 5023 S. Ferry St., Tacoma, Wash.
W8, K8 — William B. Davis, W8INF, 4228 W. 21st St., Cleveland 16, Ohio.
W9, K9 — John P. Schneider, W9CFT, 311 W. Ross Ave., Wausau, Wisc.
W0, K0 — Alva A. Smith, W0DMA, 238 East Main St., Caledonia, Minn.
VE1 — L. J. Fader, VE1EQ, 125 Henry St., Halifax, N. S.
VE2 — Austin A. Smith, VE2UW, 0164 Jeanne Mance, Montreal S. Que.
VE3 — W. Bart Knowles, VE3OB, Lanark, Ont.
VE4 — Len Cuff, VE4LC, 236 Rutland St., St. James, Manitoba.
VE6 — W. R. Savage, VE6IZO, 329 15th St., North, Lethbridge, Alta.
VE7 — H. R. Hough, VE7HR, 1785 Emerson St., Victoria, B. C.
VE8 — Jack Spall, VE8AS, P. O. Box 268, Whitehorse, Y. T.
KP4 — E. W. Mayer, KP4KD, P. O. Box 1061, San Juan, P. R.
KH5 — Andy H. Fuchikami, KH5BA, 2548 Hamas Dr., Honolulu, T. H.
KL7 — J. W. McKinley, KL7CK, Box 1533, Juneau, Alaska.

Note: Bold-face listings indicate changes from last-published QSL Manager list. Remember this new address when sending your next envelope.

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NATIONAL EMERGENCY FREQUENCIES

C.W. 7100 kc. (day) 3550 kc. (night)
PHONE 3875 kc.

During periods of communications emergency these channels will be monitored by stations of the National Emergency Net for the handling of third-party personal-inquiry traffic.

SWITCH TO SAFETY!
A Compact Converter for 6 and 10
A Bandswitching Unit for Mobile or Home-Station Use

BY C. VERNON CHAMBERS,* W1JEQ

A converter, to be used with the car broadcast receiver, is the generally accepted way of providing mobile reception on 6, 10 and 11 meters. Yet, because mobile operation is something of a sideline to most of us, we do not give the converter for the car as much thought as we would a similar unit for the home station. Most fellows contemplating mobile work buy a commercial unit as the simplest way out, and others build simple one-tube affairs which seldom give entirely satisfactory performance. Almost never do we find a mobile station with a converter which permits reception on 6, 10 and 11 meters at will.

One occasionally hears the complaint from 10-meter mobile enthusiasts that they have difficulty in making ground-wave contacts, often the most desirable sort of mobile QSOs, because of the QR M from sky-wave signals. When 10 is wide open, with signals from 2000 miles away knocking even the locals out of the picture, the 10-meter mobile man has the choice of taking the one-in-a-hundred answers he gets to his calls or waiting until the band goes dead in order to work the local gang. This would be a good time to be able to give 6 a whirl. Six does open up, of course, but only a fraction of the time that 10 is open, and ground-wave range is usually appreciably greater. It's an excellent band for mobile work — here's the receiving arrangement that will permit you to try it.

The mobile receiver must be a good one. At the home station we hook a converter onto a 4-element beam and feed it into a $400 communications receiver. In the car the converter has to do its stuff with a whip antenna and $39.95 broadcast set. Obviously, the converter for the car must be at least on a par with its home-station counterpart, if we are going to hear anything but the loud ones on 10 or 6! This one is just that — if mobile work loses its appeal the converter can be pulled out and used at the home station with good results.

Circuit Details

The converter circuit diagram is shown in Fig. 1. A 6AK5 broadband r.f. amplifier is followed by a 6J6 mixer-oscillator. The oscillator circuit is the ultraducion type, operating 1500 kc. below the signal frequency. The need for gang-tuned circuits is eliminated by the broadband r.f. amplifier; thus only the oscillator tuning condenser, C1, requires adjustment during normal tuning operation. Band-changing is accomplished with a 5-section selector switch, shown on the diagram as S1A, B, C, D, E.

Seven commercially-available coils are used, six of them being identical except for the setting of the slugs. The wide inductance range of the slug-tuned units makes it possible to use similar coils for the r.f., mixer and oscillator coils for both ranges. Padder capacitance is added across
Fig. 1 — Circuit diagram of the bandswitching converter.

C1 — 15-µfd. variable reduced to one stator and 2 rotor plates (Millen 20015).
C2, C3, C4 — 3-30-µfd. mica trimmer (Millen 27030).
C5, C7 — 0.0015-µfd. ceramic (Centralab DAO t8002A).
C6, C1 — 0.0015-µfd. ceramic (Centralab CC32Z).
Cs, Co — 100-µfd. ceramic (Centralab CC20Z).
C6, Cm — 10-µfd. ceramic (Centralab CC20Z).
C12 — 0.1-µfd. ceramic (Centralab DAO-t8003A).
R1 — 220 ohms, 0.4 watt.
R2, Ro — 680 ohms, 0.4 watt.
Ha — 1.5 megohm, 0.4 watt.
L4, L5, L6 — 12,000 ohms, 0.4 watt.
Ro — 47,000 ohms, 0.4 watt.
R1 — 5000 ohms, 10 watts.
L1, L2 — 4 turns No. 28 d.s.c. close-wound over ground ends of L3 and L4.

Circuit diagram of the bandswitching converter.

L4, La, L5, L6, L7, L8 — 6 turns No. 20 enameled wire close-wound on 3/16-inch diameter form; slug-tuned; inductance range 0.35 to 1.0 µh. (Cambridge Thermionic Corp. Type LS3 — 30 Mc.).
L9 — Scramble-type winding on 3/16-inch slug-tuned form; inductance range 325 to 750 µh. (Cambridge Thermionic Corp. Type LS3 — 1 Mc.).
Lo — 20 turns No. 28 d.c. scramble-wound next to L9.
It — Adjustable-beam dial-light assembly.
J1, J2 — Coaxial-cable jacks (Amphenol 75-PCIM).
J3 — 3-prong cable connector (Jones P-303AB).
RFC1 — 300-µh. r.f. choke (Millen 34300).
S1, S2, S3, S4 — 2-gang 6-circuit bandswitch (two Centralab SS sections).
S2 — S.p.s.t. toggle switch.

The 10-meter r.f. and mixer coils, L4 and L6, and across both oscillator coils, L7 and L8. Varying the slug position takes care of the necessary differences in coil inductance for all these positions.

A single whip antenna may be used for both broadcast and amateur reception. A jumper connection between sections A and E of S1 completes the circuit between the antenna and the broadcast receiver, with the switch in the position marked B.C. on Fig. 1. A filament switch, S2, is provided to remove the load of the converter tubes from the car battery when the receiver is being used for broadcast reception.

Broadbanding of the r.f. and mixer circuits is accomplished through the use of low-Q coils and tight coupling in the antenna circuit. The plate coil of the mixer is self-resonant at the r.f. frequency, giving a degree of broadness sufficient to permit tuning the receiver over a limited range near the high end of the broadcast band, providing a vernier effect.

Construction

The case and chassis were designed for the job, as no commercially-available units appeared suitable. All the metal components are formed from 3/16-inch aluminum stock. The interior view shows the "L"-shaped section which serves as the front panel and the bottom plate of the unit. The panel and the bottom areas are each 5 inches square. Lips, 3/8 inch wide, are folded over along the top and side edges of the panel and also along the sides of the bottom section. The rolled-over edges are drilled and tapped to accommodate 6-32 machine screws.

A three-sided portion and a square top plate complete the converter cabinet. The sides are 5 inches square and the rear wall is 5 3/4 inches wide. All three sides are 5 inches high with 3/4-inch flanges folded over on the top edges and drilled and tapped for 6-32 screws. The sides and bottom edges of the case are drilled to clear machine screws; the holes should line up with the tapped holes of the panel-bottom assembly. A rectangular hole, 1 3/4 inches high and 2 inches wide, is cut at the bottom left-hand corner (as seen from the rear of the converter) of the rear wall, to provide clearance for the cable connectors. The top plate for the converter measures 5 by 5 inches. Holes, drilled along the edges, allow the cover to be fastened to the flanges at the top of the cabinet.

The physical shape of the converter chassis can best be visualized by study of the interior views. The chassis is 5 by 4 5/8 by 1 3/4 inches in size, with flanges 3/8-inch wide folded over along the front
and the bottom edges to provide a means of mounting. A 2½" x 3¾-inch cut-out at the center of the chassis allows clearance for the bandswitch. A large round hole located in the rear wall of the chassis simplifies the job of finding the oscillator padder condenser when this control requires adjustment.

A vertical partition used as the mounting surface for the oscillator tuning condenser, \( C_1 \), also serves as the shield between the plate and the grid circuits of the r.f. amplifier. It is 3½ inches wide and 4¾ inches high, and is notched to clear the main chassis and the spacer bars and rotor arm of the bandswitch. The partition is held in place by a spade lug which passes through the chassis and by a mounting lip which is screwed to the bottom side of the cabinet. It is located 3 inches in from the front edge of the chassis.

The heater switch and the pilot-light assembly are mounted at the lower left- and right-hand corners of the front panel with the bandswitch at the center, 1½ inches up from the bottom edge. The selector-switch index plate should have a rotor-shaft length of at least 3 inches, and the switch wafers should be mounted on the shaft with the first separated from the index plate by 1-inch spacers and with the second wafer separated from the first by 1½ inches.

The National MCN dial is centered above the bandswitch with the control shaft 3 inches above the bottom edge of the panel. It is wise to cut the large mounting hole suggested in the dial mounting instruction sheet and then do the final fastening down of the dial after the tuning condenser and its mounting plate have been permanently secured in place.

The interior view of the completed converter shows the 6AK5 amplifier tube in front of the shield partition, with the grid inductances to the right of the tube. The padder condensers for 27 and 28 Mc. are mounted on the forward coil. From left to right across the rear of the chassis are the mixer-oscillator tube, five of the slug-tuned inductances, and the regulator tube. The i.f. output coil and the two oscillator coils are mounted below the chassis, as seen in the bottom view of the chassis subassembly. The r.f. plate coils are above the chassis to the left of the 0B2 regulator, the 28-Mc. coil being the one with the trimmer condenser mounted across the terminals.

Construction will be simpler if the builder procures the CTC inductors described in the converter parts list. These coils have a wide range of inductance because of combination brass-iron tuning slug employed. The Type LSS 30-Mc. inductors will resonate at 50 Mc. with the tube and circuit capacitances, and only a small amount of padder capacitance is required to tune them to 27 and 28 Mc.

Coaxial jacks for the antenna and i.f. output cables are at the rear of the chassis to the left of the power-cable jack. They are closely grouped so that the input and output cables may be taped together to form a compact common cable.

Wiring of the converter can be done more readily if the subassembly method is employed. The bottom view of the chassis subassembly shows how the circuit components are closely grouped around the tube sockets, with wiring completed to the point of making connections to the bandswitch. The 2-terminal lug strip at the left of the chassis is used as a mount for the oscillator decoupling resistor, \( R_5 \), and as the tie point for \( C_{11}, RFC_1 \) and \( R_5 \). The various fixed condensers shown in the photograph are items of a new line of ceramic types now available from Centralab and others, and it can be clearly seen how their small physical size fits in with a piece of compact construction. The 10-watt resistor shown at the top right-hand corner of the view is the limiting resistor, \( R_7 \). Twin-Lead of the 75-ohm type is used to make connection between the antenna input jack and the bandswitch. The two wires enclosed in spaghetti at the right of the chassis are the 6.3-volt leads which go to the heater switch.

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Testing

The heater requirements of the converter are 6.3 volts at 0.625 amp. and the plate supply should deliver 200 to 250 volts at 25 to 30 ma. These may be drawn from the receiver with which the converter is to be used, or a separate supply may be employed. With power turned on, the plate voltage of the mixer and r.f. amplifier should measure 105 volts and the 6AK5 cathode resistor should provide a drop of approximately 2 volts. The 6AK5 cathode current should be about 8.5 ma. The regulator-tube drain will be about 8 ma.

Alignment of the converter is made most simple if a calibrated signal generator is available, otherwise amateur transmitter signals of known frequency may be used. The r.f. and i.f. circuits can be peaked on background noise. The oscillator should be on the low side of the signal frequency. It is possible to vary the bandspread of the converter tuning range over a wide range. With a fairly low order of padder capacitance, and with the inductance increased by the tuning slug, the 10- and 11-meter bands can be covered with one swing of the tuning dial. Anyone not interested in 11 meters can increase the bandspread on the 10-meter range by adding more padder capacitance and by decreasing the inductance of L4. The converter as shown has 13 divisions of bandspread at 11 meters and 52 divisions at 10 meters, with the logging of frequencies made on the B scale of the dial. Bandspread for the 50-Mc. band is 48 divisions on the A scale. This spread may be increased by the same method.

Some operators favor a selected group of frequencies within a band. A slight improvement in the performance of the converter can be made in this case by peaking the r.f. amplifier circuits at a favorite spot rather than at the center of a band. There may be a tendency toward regeneration in the 50-Mc. r.f. amplifier, however, if the input and plate circuits are peaked at precisely the same frequency, making stagger-tuning desirable.

The converter has been used with various types of receivers serving as the i.f. system, including several table-model broadcast sets. Quite satisfactory performance can be obtained with any receiver except those having built-in loop antennas, though the communications type is much to be preferred, if the converter is to be employed for home-station use.

Reducing Spurious Responses

In localities where there are stations operating in the high f.m. band a converter or receiver having broadband r.f. stages will experience considerable interference on the 50-Mc. range. This results from the second harmonic of the oscillator beating with these signals, they having reached the mixer through the lack of selectivity in the front end. This trouble can be corrected in several ways, the simplest being the insertion of a 100-Mc. trap in the antenna lead.

Interference from the f.m. stations in the Connecticut Valley was reduced below the troublesome level with a fixed-tuned trap consisting of 7 turns of No. 18 enameled wire $\frac{1}{2}$ inch in diameter, connected across a 5-µfd. ceramic fixed condenser, and inserted in the lead between L1 and the switch terminal. The turns may be spread apart or squeezed together to reduce the interference from the most troublesome signals. There is practically no change in the 50-Mc. operation otherwise, with the insertion of such a trap.

Feed-Back

In case some of you have forgotten the technique, W2FXN points out that a single-ended condenser can be used for $C_7$ in the crystal-controlled converters described by W1DX in our December issue. The only other change necessary is to provide an r.f. return to ground from the center-tap on L5, which is easily done through a 500- or 1000-µfd. mica condenser. Bob built his converters on 5 X 6-inch sheets of copper, further to continue the policy of "building it just like QST, except..."

In the same article RFC1 under Fig. 1 should read "National R-88," and CTO in the coil table stands for Cambridge Thermionic Corp., whose address is 445 Concord Ave., Cambridge 38, Mass.
IS YOURS A 5-YEAR LICENSE?

If it isn’t, OM, you’re out of luck! The series of temporary FCC orders which automatically extended the terms of certain amateur licenses until the end of 1948 are no longer in effect. As of January 1, 1949, all valid amateur licenses are the new five-year-term tickets. So take a look at your license; if it is of the prewar three-year-term variety, it has expired and it will be necessary for you to qualify again by examination before you may engage in amateur operation.

PROOF OF USE REQUIRED FOR RENEWALS

While it will be several years before any holders of the five-year amateur licenses will have to renew, we call attention now to the fact that “proof of use” is again required as of January 1, 1949, as an essential to renewal. Each application for renewal must henceforth show proof of use as required by the pertinent provisions of Section 12.27 of the amateur rules:

§ 12.27. Renewal of amateur operator license. An amateur operator license may be renewed upon proper application showing that within the last six months of the license term the licensee has lawfully operated an amateur station or stations licensed by the Commission, and has thereby communicated by radiotelegraphy with at least three other such amateur stations in the United States. The applicant shall qualify for a new license by examination if the requirements of this section are not fulfilled. Application for renewal of an amateur operator license shall be filed not more than 120 days prior to date of expiration of such license and not later than the date of expiration.

Note that the contacts on which your proof of use are based need not have been effected from your own station; they may have been made while operating any amateur station. But they must be by radiotelegraphy — ‘phone contacts won’t qualify.

MISUSE OF AMATEUR ‘PHONE STATIONS

Headquarters has had correspondence indicating some misunderstanding among amateurs concerning the conditions under which an unlicensed person may transmit by voice over an amateur ‘phone station. Pertinent FCC regulations are quite clear-cut. Section 12.23 provides that “When an amateur station is used for telephony, the station licensee may permit any person to transmit by voice, provided that during such transmission call signals are announced as prescribed by Section 12.32 and a duly licensed amateur operator maintains actual control over the emissions, including turning the carrier on and off for each transmission and signing the station off after communications with each station have been completed.”

This means that an unlicensed person may be permitted to call CQ, establish initial contact and make subsequent transmissions only if a duly-licensed amateur operator actually turns the carrier on and off and otherwise retains control over the station and, at the conclusion of communication with each station, signs the station off. It isn’t enough for the licensed operator to be present and supervise such functions; he must actually perform them himself. So when Uncle Willy (unlicensed) insists it’s your turn to make up the next round of sandwiches and get the beer from the kitchen, while he works a few, throw the book at him and sit tight.

Don’t forget, too, that Section 12.136(b) prescribes that the name of such unlicensed person as may talk over a station must be entered in the log.

STAFF NOTES

It is with genuine regret that we announce the separation from Headquarters of Al Hill, W1QMI and ex-W6JQB, communications assistant in charge of handling DXCC certificates and manager of NTL for the past 16 months, and Bill Papanos, our efficient and faithful janitor for more than six years. Al returns to California to rejoin his family and associate himself with research work on guided missiles with Northrop Aviation — and, of course, to resume ham operation with his old call. Bill, it turns out, was once an expert grape-pruner back in his home-country, Greece, and when he took his vacation last year with a first trip to California, it was just too much for him; he’s going out around Fresno way and expects soon to start fixing up those vines, but right! The best wishes of the entire Hq. staff to you, OMs; we’ll miss you both! (What is it California winters have that Connecticut dittos don’t?)
Harmonic Suppression in Class C Amplifiers

Effect of Operating Conditions and Circuit Components on Harmonic Output

BY FREDERICK Q. GEMMILL,* W2VLQ

Designing Class C radio-frequency amplifiers to minimize harmonic generation and radiation is not an easy task. While the fundamentals have been outlined in QST, this subject has not been fully explored. Recent experiences of the author are reported here in an effort to further general knowledge on this subject.

Class C Amplifiers

The source of our harmonics lies in the pulse-shaped currents flowing in the grid, screen-grid, plate and filament or cathode circuits of the Class C radio-frequency amplifiers which form the basis of our transmitters. For analytical purposes these current pulses can be treated as parts of sine waves, as shown in Fig. 1. Analysis of the harmonic content of recurrent pulses of this nature shows that the amplitude and distribution of harmonics is a function of \( \theta/T \); that is, the "conduction angle" or "operating angle." At certain values of \( \theta/T \) the amplitude of a particular harmonic becomes zero. Table I gives the first few zeros. Unfortunately, it is not possible for the second harmonic to become zero, Table I gives the first few zeros. Unfortunately, it is not possible for the second harmonic to become zero. Table I gives the first few zeros. Unfortunately, it is not possible for the second harmonic to become zero. However, by adjusting the conduction angle \( \theta \) higher-order harmonics can be made to approach zero, one at a time.

Operating conditions — plate voltage, grid bias, excitation voltage, etc. — establish the grid-

and plate-conduction angles and, hence, the harmonic content of the grid- and plate-current pulses. In general, the grid-conduction angle will be appreciably smaller than the plate-conduction angle.

While it is true that conduction angles cannot be varied without corresponding changes in efficiency, the fourth harmonic can be suppressed without any sacrifice in efficiency. An attenuation of 20 db. can be attained readily, as shown by the data in Table II, simply by proper adjustment of the grid bias and grid signal. These measurements were made on the output from the author's 14-Mc. transmitter using the set-up shown in Fig. 2.

When a given harmonic such as the 4th or 5th is causing interference, this transmitter adjustment can be very effective. Unfortunately, the particular plate-current conduction angle which cancels a given harmonic may cause the higher-order harmonic output to increase.

The Tank Circuit and Harmonic Output

The parallel-resonant tank circuit is the filtering device which changes the plate output-current waveform from a pulse to a sine wave with a small amount of harmonic content. As has been shown, the tank circuit does this by reason of

![Fig. 1 — Typical current pulse shapes in grid and plate circuits of a Class C amplifier. When the time of one cycle \( T \) is expressed as 360 degrees of angle, \( \theta \) is the "operating angle."](image)

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<thead>
<tr>
<th>Harmonic Order</th>
<th>( \theta/T )</th>
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<tbody>
<tr>
<td>3 *</td>
<td>1/6</td>
<td>180</td>
</tr>
<tr>
<td>6</td>
<td>1/6</td>
<td>135</td>
</tr>
<tr>
<td>5</td>
<td>1/6</td>
<td>108</td>
</tr>
</tbody>
</table>

* Note: For this condition, all odd harmonics are also zero.

---

* 82 Wyatt Road, Garden City, N. Y.

1 Grammer, "Keeping Your Harmonics at Home," QST, Nov., 1940.
the difference in the impedance it offers at the fundamental and at harmonic frequencies.

The tank circuit may be represented as being driven by a constant-current generator of pulse waveshape as shown in Fig. 3. The output voltage $E_0$ at fundamental frequency is $I_1Z_0$, where $I_1$ is the fundamental component of the generator current and $Z_0$ is the impedance of the tank under load. At parallel resonance $Z_0 = \frac{L}{RC}$ and is a pure resistance. If the ratio $L/R$ is assumed constant, $C$ must be properly proportioned to match the impedance of the driving generator for maximum power output. The design charts for plate-tank tuning capacity given in the ARRL Handbook are based on this fact.

The currents in the two branches of the tank circuit are nearly equal and opposite in phase at resonance. Hence, for a given vector line current,

$$I_{c1} = \frac{3}{4} I_1 Q$$

and

$$I_{c2} = \frac{8}{9} I_1 Q$$

Equations (3) and (4) show the importance of $Q$ in the ability of the tank circuit to discriminate against harmonic-output currents flowing in the tank coil.

In the above analysis, the tank circuit has been idealized. Actually, plate-lead inductance, tube output capacity and the tuning capacitor may resonate at a harmonic frequency. This, of course, causes harmonic currents of far-different values to flow through the tuning capacitor and tank coil than indicated by the foregoing analysis.

This phenomenon can be measured using the set-up of Fig. 2 by artificially lowering the resonance frequency $f_0$ around the circuit formed by the plate lead and tuning capacitor by introducing small inductances $L_p$ in the two plate leads. Table III gives typical results.

If the plate-lead inductances are shunted with a capacitor $C_p$ to form a wavetrap and are tuned to a given harmonic, some interesting results are obtained. Harmonic-output data for two cases, first with a wavetrap in one lead with the other lead as short as possible, and second with wavetrap in both leads, are given in Table IV. No particular pains were taken to shield the wavetrap from the main plate tank circuit. The coils used had 5 turns, 1/2-inch diameter, and were tuned with 50-µfd. capacitors.

These data illustrate the fact that different
harmonics circulate around different circuits. The odd harmonics go around the tube plate circuits in series while the even harmonics go around the tube plate circuits in parallel. Note that a single trap tuned to 56 Mc. increased the output at 56 Mc. over two traps tuned to 56 Mc., while two traps tuned to 42 Mc. increased the 42-Mc. output greatly and two traps tuned to 70 Mc. increased the 70-Mc. output greatly. Coupling between the two traps and the main tank circuit is undoubtedly responsible for this increase in the 42- and 70-Mc. cases, while unbalance is responsible for the increase in the 56-Mc. case. Plate-lead wavetrap should be well shielded to eliminate this undesirable coupling, otherwise harmonic output can be increased greatly as shown by the above data.

Tuning the plate tank circuit to exact resonant frequency has a noticeable effect on harmonic output. The minimum harmonic output usually coincides with minimum plate current, but not always. Variable-frequency operation must be examined carefully to determine what effect mistuning will have on harmonic output.

The tank circuit shown in Fig. 4-B has been found superior in over-all performance from the harmonic-output standpoint when compared with the circuit of Fig. 4-A. This result comes about because harmonic currents flowing in Circuit I do not flow through the power-supply by-pass capacitor C1 and because Circuit I generally has a much higher resonance frequency. The circuit of Fig. 4-B has the following disadvantages:

1) The tuning capacitor must have sufficient voltage rating to withstand twice the plate power-supply voltage.

2) The by-pass capacitor C1 must have sufficient r.f. current carrying capacity to handle the tank current at fundamental frequency and must have low impedance at this frequency. This circuit does have an advantage from the safety standpoint inasmuch as the rotor is grounded.

Push-pull circuits corresponding to the single-ended circuits of Fig. 4 are shown in Fig. 5. Introducing the d.c. plate voltage at the center of the push-pull tank coil is a complication which can materially affect the harmonic output from a push-pull amplifier. The center-tap circuit (Circuit 1) can resonate at harmonic frequencies and actually increase harmonic output, depending upon the r.f. choke used.

By-passing the center-tap to ground as shown in Fig. 5-C will make the center-tap assume ground potential for harmonic frequencies, but this makes Circuit 1 resonant at a frequency very near that of Circuit 2. For example, a continuous solenoid (B & W 20-JCL) tuned to 14 Mc. (Circuit 2) will resonate at 18 Mc. around the center-tap circuit (Circuit 1). A split coil (B & W 20-BVL) will resonate around the center-tap circuit at about 15 Mc. Harmonic output from the circuit of Fig. 5-C using a continuous solenoid was found to be considerably less than when using a

### Table III

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Short Leads</th>
<th>Long Leads</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 Mc.</td>
<td>460,000 µv.</td>
<td>460,000 µv.</td>
</tr>
<tr>
<td>28</td>
<td>1000 µv.</td>
<td>1000 µv.</td>
</tr>
<tr>
<td>42</td>
<td>300 µv.</td>
<td>300 µv.</td>
</tr>
<tr>
<td>56</td>
<td>500 µv.</td>
<td>500 µv.</td>
</tr>
<tr>
<td>70</td>
<td>1000 µv.</td>
<td>1000 µv.</td>
</tr>
<tr>
<td>84</td>
<td>1000 µv.</td>
<td>1000 µv.</td>
</tr>
<tr>
<td>112</td>
<td>500 µv.</td>
<td>500 µv.</td>
</tr>
<tr>
<td>126</td>
<td>1000 µv.</td>
<td>1000 µv.</td>
</tr>
<tr>
<td>140</td>
<td>1000 µv.</td>
<td>1000 µv.</td>
</tr>
</tbody>
</table>

### Table IV

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>460,000 µv.</td>
<td>460,000 µv.</td>
<td>460,000 µv.</td>
<td>460,000 µv.</td>
<td>460,000 µv.</td>
<td>460,000 µv.</td>
</tr>
<tr>
<td>28</td>
<td>900 µv.</td>
<td>900 µv.</td>
<td>900 µv.</td>
<td>900 µv.</td>
<td>900 µv.</td>
<td>900 µv.</td>
</tr>
<tr>
<td>42</td>
<td>3000 µv.</td>
<td>3000 µv.</td>
<td>3000 µv.</td>
<td>3000 µv.</td>
<td>3000 µv.</td>
<td>3000 µv.</td>
</tr>
<tr>
<td>56</td>
<td>5000 µv.</td>
<td>5000 µv.</td>
<td>5000 µv.</td>
<td>5000 µv.</td>
<td>5000 µv.</td>
<td>5000 µv.</td>
</tr>
<tr>
<td>70</td>
<td>1000 µv.</td>
<td>1000 µv.</td>
<td>1000 µv.</td>
<td>1000 µv.</td>
<td>1000 µv.</td>
<td>1000 µv.</td>
</tr>
<tr>
<td>112</td>
<td>5000 µv.</td>
<td>5000 µv.</td>
<td>5000 µv.</td>
<td>5000 µv.</td>
<td>5000 µv.</td>
<td>5000 µv.</td>
</tr>
<tr>
<td>126</td>
<td>1000 µv.</td>
<td>1000 µv.</td>
<td>1000 µv.</td>
<td>1000 µv.</td>
<td>1000 µv.</td>
<td>1000 µv.</td>
</tr>
<tr>
<td>140</td>
<td>1400 µv.</td>
<td>1400 µv.</td>
<td>1400 µv.</td>
<td>1400 µv.</td>
<td>1400 µv.</td>
<td>1400 µv.</td>
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Resonance Frequencies of Radio-Frequency Chokes

<table>
<thead>
<tr>
<th>Manufacturer and Type</th>
<th>Shunt-Resonant Frequencies</th>
<th>Series-Resonant Frequencies</th>
<th>Relative Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ohmite Z-2 (Solenoid Type)</td>
<td>28.5</td>
<td>54</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>76</td>
<td>98</td>
<td></td>
</tr>
<tr>
<td></td>
<td>120</td>
<td>143</td>
<td></td>
</tr>
<tr>
<td></td>
<td>166</td>
<td>190</td>
<td></td>
</tr>
<tr>
<td></td>
<td>215</td>
<td>238</td>
<td></td>
</tr>
<tr>
<td>Ohmite Z-1 (Solenoid Type)</td>
<td>86</td>
<td>148</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>210</td>
<td>262</td>
<td></td>
</tr>
<tr>
<td>National R-100 2.5 mH (Pole Type)</td>
<td>1.8</td>
<td>17.4</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>38.2</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>209</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ward-Leonard 5-Watt 250-Ohm Wire-Wound Resistor</td>
<td>78</td>
<td>180</td>
<td>Low</td>
</tr>
</tbody>
</table>

Performance of Lumped Circuit Components at High Frequencies

The various circuit components represented by the electrical graphical symbols are not the ideal devices which we often assume. Consider the common mica by-pass capacitor and its ability to by-pass over a given frequency range. Lead inductance causes series resonance to occur at surprisingly low frequencies and prevents a very low impedance being attained at high frequencies. For example, a 0.01-µfd. mica capacitor with ½-inch leads will be series-resonant at about 10 Mc. If this capacitor were perfect, it would have an impedance of 1.6 ohms at 10 Mc. and 0.32 ohm at 50 Mc. Actually, this capacitor has approximately zero ohms impedance at 10 Mc. and 8 ohms at 50 Mc. While the low impedance of a series-resonant capacitor can sometimes be used to advantage, performance above resonance is poor because the impedance increases with frequency. Short, low-inductance leads are quite important when using conventional capacitors. Button-type mica capacitors have superior performance at high frequencies because their lead inductance is quite low. Newer capacitor designs, especially suited for radio-interference suppression, have no resonance frequencies up to approximately 200 Mc. and have very low impedance over a wide frequency range.

Radio-frequency chokes are not pure inductances; instead they generally have a number of resonant frequencies which in some cases are of fairly high Q. Data on several popular types as determined with a grid-dip oscillator (Measurements Corp. model 50) are given in Table V.

R.f. chokes should have appreciable resistance to lower the Q of any resonances. Pie-wound chokes have an advantage over the solenoid types in that the resonances are broken up and more irregular. Wire-wound resistors make good r.f. chokes because they are generally wound inductively and have low-Q resonances. Molded-composition or metal-film resistors are noninductive and have no resonances in the high-frequency range and consequently make good broadband impedances, although of limited value. A noninductive resistor of several hundred ohms is often more effective as a choke for power-lead filtering than a wire-wound choke.

Tank coils have multiple resonances just as do r.f. chokes. Data on three popular types as determined with the grid-dip oscillator are given in detail in Table VI.

These multiple resonances are caused by phase shifts of the magnetic flux coupling adjacent turns of the coil. Standing waves actually appear along the length of a continuous uniform coil much as they do on an antenna or resonant feedline. Short-circuiting the terminals of a coil removes the first shunt resonance. The first series-resonant frequency is the one most likely to cause abnormal performance.
harmonic output, if it should coincide with a harmonic frequency, since tank inductors are shunted by a low impedance (the tank condenser) which at harmonic frequencies acts like a short-circuit.

**Suppression of Harmonics on Power-Supply Leads**

The power-supply leads carrying the largest direct currents are the most likely to carry large harmonic currents. Cathode circuits are, therefore, the hardest to by-pass. Low-impedance by-pass capacitors at each and every filament lead and grounding of all available cathode leads are necessary measures to keep appreciable harmonic currents from flowing in filament and heater circuits. Low-pass filters, in addition, are usually required to obtain the necessary suppression in locations where the signal subject to harmonic interference is weak. Cathode bias is not recommended for any but the lowest-power stages using receiving tubes because of the difficulty in getting low cathode-ground impedance.

Plate circuits will require at least one pi-section low-pass filter and the use of dissipative r.f. chokes is highly recommended. Where the plate current is not too high, 2-watt composition resistors of several hundred ohms often will give better performance than a conventional r.f. choke. A composition-resistor "r.f. choke" for the push-pull circuit shown in Fig. 5-B is especially recommended.

Screen-grid circuits are hard to by-pass because there is no load circuit, except the by-pass capacitor. A pi-section filter using dissipative r.f. chokes or molded-composition resistors is necessary. The effectiveness of a single r.f. suppression capacitor compared with a postage-stamp mica capacitor of equal value and a button mica capacitor of \( \frac{1}{4} \) of the value can be gained from the data given in Table VII. These data were taken using the measurement set-up shown in Fig. 6. The relative level at different frequencies is not accurate, but at any given frequency the data for the three by-pass units are directly comparable. The superior performance of the r.f. suppression capacitor is remarkable and its use is highly recommended for inclusion in all power leads.

![Fig. 6 — Experimental set-up for measuring harmonic currents carried by power leads.](image)

**The Antenna Coupling Circuit**

Regardless of circuit design, some harmonic voltages will be developed across the output tank. Coupling of this output to the antenna by stray capacities between the tank coil and antenna coupling coil will take place unless adequate electrostatic shielding is applied to the antenna coupling coil. The importance of adequate shielding at this point cannot be overemphasized. Magnetic coupling, of course, cannot be avoided if there is an unbalanced harmonic current flowing in the tank coil. Double-tuned circuits or transmission-line filters are the only ways to suppress this type of output. In the case of push-pull amplifiers, the position of the antenna coupling loop for minimum harmonic output has been found to be critical for even harmonics, but not for odd harmonics because of the different paths taken by such currents in a push-pull circuit.

**Conclusions**

The above data resulted from the author's experiences with this problem during the past nine months. While laboratory equipment was used in making the measurements reported, the above design principles for reducing harmonic output from Class C amplifiers can be applied using standard amateur grid-dip oscillators, high-frequency wavemeters and receivers to make the fundamental measurements required.

The following procedure in applying these principles is recommended:

1) The high-power stages are going to be the hardest to suppress, so use no more of them than necessary. Plan to do all the necessary frequency multiplying at as low a power level as possible.

2) Use grid and plate circuits such as those illustrated in Figs. 4-B and 5-B which have the tuning capacitors connected as directly as possible between the tube grid or plate and cathode or heater. Tuned grid and plate tanks with link coupling between stages, or unity inductive coupling attained by interwinding the grid coil with the plate coil of the previous stage tank circuit, will give superior performance.

3) Study circuit layout to ascertain the likely harmonic current paths and determine the resonance frequencies of these paths with a grid-dip oscillator. A little study will usually show how to raise the resonance frequencies of these paths by shortening leads and lowering impedances through using all available parallel paths. Do not stop until you have attained resonance frequencies of 150 Mc. and above. Work on one stage at a time, beginning with the lowest-powered stages.

4) By-pass all power leads with a full pi-network using the most effective capacitors available and low-Q r.f. chokes as far as possible. Use all available parallel paths for grounding of tuning...
Table VII

<table>
<thead>
<tr>
<th>Screen-Grid By-Pass Capacitor Performance; 2E26 Doubler, 7 to 14 Mc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sprague 0.01 &quot;Hy-Pass&quot; 1000-mfd. Mica 0.000-µµFd. 0.01 Mica</td>
</tr>
<tr>
<td>Freq. with ¾-Inch Button Mica Leads</td>
</tr>
<tr>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>21 Mc.</td>
</tr>
<tr>
<td>28</td>
</tr>
<tr>
<td>35</td>
</tr>
<tr>
<td>42</td>
</tr>
<tr>
<td>49</td>
</tr>
<tr>
<td>56</td>
</tr>
<tr>
<td>63</td>
</tr>
<tr>
<td>70</td>
</tr>
<tr>
<td>77</td>
</tr>
<tr>
<td>84</td>
</tr>
<tr>
<td>91</td>
</tr>
<tr>
<td>98</td>
</tr>
</tbody>
</table>

5) Install adequate interstage filament and antenna coupling-coil shielding.
6) Explore the r.f. field about the tank circuits and power leads of each stage with a sensitive wavemeter. Check each harmonic frequency and make a record of the results and the set-up used so that your progress can be evaluated later. Energize the lowest-powered stage first and work up one stage at a time. Higher-power stages frequently feed back into the lower-power stages at harmonic frequencies, and measurements must be rechecked frequently to determine such effects.
7) Adjust operating conditions of grid drive, bias and loading to minimize harmonic output, checking a number of harmonics, not just one or two. Class B operation of high-power r.f. stages is not to be overlooked as a very practical solution in severe cases. Harmonic output from a Class B stage should be quite low because a 180-degree conduction angle produces only even harmonics. These can be substantially canceled out in the tank coil of a well-balanced push-pull amplifier.
8) Do not stop until you have so improved things that harmonic output as measured on the antenna feedline and power-supply wiring is not detectable with a sensitive wavemeter.

Appendix

The current waveform of Fig. 1 can be represented by a Fourier Series of the form:

\[ i = \frac{A_o}{2} + C_1 \cos (\omega t - \phi_1) + C_2 \cos (2\omega t - \phi_2) + C_n \cos (n\omega t - \phi_n) \]

where \( \frac{A_o}{2} \) = the average value, i.e. the d.c. value,

\( C_1 \) to \( C_n \) = harmonic coefficient depending on the order of harmonic and width of the current pulse, and

\( \phi_1 \) to \( \phi_n \) = phase angle with respect to the fundamental.

The formula for the harmonic coefficients of this Fourier Series is:

\[ C_n = \frac{A_o \cdot \pi \theta}{2T} \sin \frac{\pi \theta}{T} \sin \frac{\pi \theta}{T} \frac{\pi \theta}{T} \]

\[ \frac{\sin(n - 1) \cdot \pi \theta}{(n - 1) \cdot \pi \theta} \frac{\sin(n + 1) \cdot \pi \theta}{(n + 1) \cdot \pi \theta} \]

The portion of this formula in the brackets becomes zero for certain values of the harmonic order, \( n \), and the conduction fraction \( \theta/T \).

The grid- and plate-conduction angles \( \theta_g \) and \( \theta_p \) of an idealized Class C amplifier may be computed from the following formulas:

\[ \theta_g = 2 \cos^{-1} \left( \frac{E_b}{E_o} \right) \]

\[ \theta_p = 2 \cos^{-1} \left( \frac{1}{1 + \mu E_{E_{max}} + E_{p_{min}}} \right) \cdot \frac{E_b}{E_b - E_o} \]

\( E_b \) = d.c. plate-supply voltage,

\( E_o \) = grid bias,

\( E_s \) = grid signal voltage (peak value),

\( \mu \) = amplification factor of tube,

\( E_{E_{max}} \) = maximum instantaneous value of grid voltage,

\( E_{p_{min}} \) = minimum instantaneous plate voltage.

Values of \( \theta = 2 \cos^{-1}X \) versus \( X \) are given below for reference.

<table>
<thead>
<tr>
<th>( \theta = 2 \cos^{-1}X )</th>
<th>( X )</th>
</tr>
</thead>
<tbody>
<tr>
<td>180 degrees</td>
<td>0.000</td>
</tr>
<tr>
<td>160</td>
<td>0.174</td>
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<tr>
<td>135</td>
<td>0.383</td>
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<td>90</td>
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<tr>
<td>72</td>
<td>0.809</td>
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<tr>
<td>60</td>
<td>0.866</td>
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<tr>
<td>45</td>
<td>0.924</td>
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<tr>
<td>30</td>
<td>0.966</td>
</tr>
<tr>
<td>0</td>
<td>1.000</td>
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</tbody>
</table>

See "Reference Data for Radio Engineers," published by Federal Telephone and Radio Corp., for a discussion of these formulas.


SWITCH TO SAFETY!
The Military Amateur Radio System

Army and Air Force Jointly Announce Postwar Training Program; Initially Open Only to Hams in Service and Reserves

The first step toward the postwar renewal of traditional Army-amateur cooperation in a training program was accomplished in mid-December when the office of the Secretary of Defense announced the activation of the Military Amateur Radio System, for the present open only to amateurs in the military service or its reserves. MARS will be a joint project of the Air Force and the Army under the direction of Major General Francis L. Ankenbrandt, Air Force director of communications, and Major General Spencer B. Akin, chief signal officer of the Army.

Amateurs in military service, including those in overseas commands, or in the Organized Reserve Corps, National Guard or ROTC, are invited initially to apply for MARS membership to form a nucleus of a training project which, it is hoped, will soon be expanded to include civilian amateurs along the general lines of the prewar AARS. Application for membership may be made as detailed hereinafter. Commanding officers of each base, installation or other unit will, as soon as possible, each designate an officer to act as MARS director for his command.

The purposes of the Military Amateur Radio System are "to create interest and further training in military radio communication; to promote study and experimentation in military radio communication; to coordinate practices and procedures of amateur radio operations with those of military radio communication; and to provide an additional source of trained radio communication personnel in the event of a local or national emergency."

MARS will not operate on amateur frequencies. The System has obtained the use of special military frequencies for its drills — 3497.5, 6997.5, 14,405, 20,995 and 27,995 kc. — and crystals will be supplied members. Time on these net frequencies is equally divided between the Army and the Air Force and will be further apportioned by Army areas and Air Force subdivisions, with ample time left on all frequencies for "free" net operation. Top-level net control stations are WAR for the Army and AF4AF for the Air Force, both located in the Pentagon Building in Washington, D. C.

For general amateur operation outside of drill periods, amateur stations at military posts are being assigned calls with a "K" prefix, a numeral coinciding with the FCC amateur call area, and suffixes of FAA through FZZ for the Air Force and WAA through WZZ for the Army. These calls are, of course, obtained by making the usual application on FCC Form 602. MARS member call signs will have an "A" prefix for Army and an "AF" prefix for Air Force, with numeral and suffix the same as the amateur call. Thus station K4AF becomes AF4AF when operating on MARS frequencies; W9USA would become A9USA when entering the regular Army net.
A considerable quantity of surplus electronic equipment has been allocated to MARS, to be made available to active and reserve units through usual channels, as specified in the joint announcement (SR 105-75-1 and AFR 102-3). The military proposes to sponsor amateur training in many types of communications and expects, for example, that certain stations will conduct facsimile experiments on MARS frequencies and that MARS members, outside drill periods in amateur status, will enter 2-meter teletype nets. Amateur support will be asked in propagation studies, solving of u.h.f. communications problems, etc. A monthly bulletin to members will carry not only general news and operating notes but an occasional technical or construction article as well as antenna and propagation data. WAR will transmit an official bulletin each Monday simultaneously on 6997.5 and 14,405 kc., in addition to special bulletins pertaining to MARS. Early appointments to this committee are expected to be Major Rawleigh Ralls, W3RO, who has been designated MARS chief for the Army, and Captain Edward Nielsen, W4ODI, MARS chief for the Air Force (Signal Corps). ARRL has nominated its communications manager, F. E. Handy, W1BDI, as one of the civilian members of the MARS advisory committee.

And now, here's how to address applications for membership, assuming, of course, that you are in military service or the reserves and wish to become a "charter" member of MARS. In certain Air Force commands (FEAF, USAFE, SAC, AMC, ATC and ATRC) applications will follow command channels, addressed to the Commanding General of the particular command to which the applicant is attached, marked to the Commanding General of the particular command to which the applicant is attached, marked to the particular service and in the Army the applicant will send an official application blanks to the applicant. When these are processed, a MARS call sign and net allocation will be made at the proper command level and a MARS certificate will be sent to adorn the walls of the "shack" alongside the FCC ticket.

Upon receipt of an inquiry for enrolment in MARS, the Signal Officer of the Army area or the MARS Air Force Director will forward application blanks to the applicant. When these are processed, a MARS call sign and net allocation will be made at the proper command level and a MARS certificate will be sent to adorn the walls of the "shack" alongside the FCC ticket.

A.R.R.L. ACTIVITIES CALENDAR

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb. 4th</td>
<td>CP Qualifying Run — W6OWP</td>
<td></td>
</tr>
<tr>
<td>Feb. 11th-14th</td>
<td>DX Competition (c.w.)</td>
<td></td>
</tr>
<tr>
<td>Feb. 15th</td>
<td>CP Qualifying Run</td>
<td></td>
</tr>
<tr>
<td>Feb. 18th-21st</td>
<td>DX Competition (phone)</td>
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</tr>
<tr>
<td>Mar. 5th</td>
<td>CP Qualifying Run — W6OWP</td>
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</tr>
<tr>
<td>Mar. 11th-14th</td>
<td>DX Competition (c.w.)</td>
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</tr>
<tr>
<td>Mar. 16th</td>
<td>CP Qualifying Run</td>
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</tr>
<tr>
<td>Mar. 18th-21st</td>
<td>DX Competition (phone)</td>
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</tr>
<tr>
<td>Apr. 3rd</td>
<td>CP Qualifying Run — W6OWP</td>
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<tr>
<td>Apr. 18th</td>
<td>CP Qualifying Run</td>
<td></td>
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<tr>
<td>Apr. 23rd-24th</td>
<td>CD QSO Party</td>
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</tr>
<tr>
<td>May 6th</td>
<td>CP Qualifying Run — W6OWP</td>
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<td>May 20th</td>
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<td>June 3rd</td>
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<td>June 4th-5th</td>
<td>V.H.F. Contest</td>
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<td>June 15th</td>
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<td>June 18th-19th</td>
<td>ARRL Field Day</td>
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<tr>
<td>Jan. 1st-Dec. 31st</td>
<td>Most-States V.H.F. Contest</td>
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United States Naval Reserve

Navy Day QSO Party Results

The QSO Party held on Navy Day-1948, in connection with the annual Receiving Competition, resulted in several hundred contacts between amateurs who are Naval Reserve members and those who are not. Naval Reserve participants who submitted scores made 759 contacts, and non-Reservists made 402 contacts.

High scorer among Reservists in the Navy Day QSO Party was CRM N. D. Sather, W6ISH, a member of Naval Reserve Squadron VR-69, based at Wold Chamberlain Field NAS, Minneapolis, Minn.

Leader in the Naval Reserve group was Norman Sather, W6ISH, Minneapolis, Minn., whose 44 contacts in 24 states yielded 3312 points. Second place was taken by George Bird, W5HGC, operating K5NAF at Pawhuska, Okla. K5NAF made 45 contacts in 22 states plus Puerto Rico, for a score of 3220. J. M. McCoy, W5OM, at W5USN, New Orleans, La., was a strong third with 2904 points from 41 contacts in 22 states.

Well done, W6ISH, W5HGC and W5OM!

Among the non-Reservists, it is interesting to find W9USA (Army!), Chicago, Ill., in first place, with W. F. Spanke, W9CQU, at the key. W9USA made 37 contacts in 19 states, or 2356 points. Second-high was Robert M. See, W5LTD, Garber, Okla., with 1666 points from 24 contacts in 17 states. A close third was Charles M. O'Brien, W2EQS, Westwood, N. J., with 30 contacts in 15 states and a score of 1650.

W. F. Spanke, W9CQU, in "Ham's Paradise," W9USA, Headquarters Fifth Army, Chicago, Ill., which he operated to win first place among non-Naval Reserve participants in the Navy Day QSO Party.

W9USA, Headquarters Fifth Army, Chicago, Ill., which he operated to win first place among non-Naval Reserve participants in the Navy Day QSO Party.

Scores — USNR Members

<table>
<thead>
<tr>
<th>USNR Members</th>
<th>Contacts</th>
<th>States</th>
<th>Score</th>
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<tr>
<td>W6ISH</td>
<td>44</td>
<td>24</td>
<td>3312</td>
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<td>K5NAF (W5HGC)</td>
<td>45</td>
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<td>W5USN (W5OM)</td>
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Scores — Non-USNR Members

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<td>W2EQS</td>
<td>30</td>
<td>1650</td>
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Examination of logs shows that 102 different USNR members and 353 different nonmembers were worked by those submitting scores. Non-members made 78% of their contacts on 7 Mc., 20% on 3.5 Mc. and 2% on 14 Mc. Reservists' contacts were distributed 67% on 7 Mc., 17% on 3.5 Mc., 10% on 14 Mc. and 2% each on 28-Mc. 'phone, 14-Mc. 'phone and 144-Mc. 'phone and m.c.w.

Misinterpretation of the rules as announced in October, 1948, QST resulted in numerous Reservists working other Reservists and in non-Reservists working other non-Reservists. The rules permitted only contacts between Reservists and non-Reservists, and some claimed scores had to be adjusted accordingly. Several participants who copied the Navy Day message applied the 50 points _after_ multiplier rather than _before_ multiplier. In most cases they will find their final scores to be higher than originally calculated.

Suggestions received from operators taking part in this first Navy Day QSO Party should result in improved rules and increased participation in future Navy Day contests.

The following tabulations of 1948 scores list number of contacts, states-plus-territories worked, and final score in each case.
Conducted jointly by the Navy Department and ARRL, the Twentieth Navy Day Receiving Competition was held on October 27, 1948. A message from the Secretary of the Navy to all radio operators was transmitted from NSS, Washington, and NPG, San Francisco, at approximately 25 words per minute. Letters of commendation from the Secretary of the Navy were offered to all operators making perfect copy of the text transmitted from either of the Naval stations.

The special letters have been sent to 310 operators who made perfect copy of the message. Entries in the competition were received from 674 operators, 462 of whom copied NSS, 137 NPG; 75 copied the transmissions of both stations. A total of 462 participants were present or former members of the Naval service.

All entrants are included in the Honor Roll, which is divided into two sections, the crediting operators who made perfect copy, and the second listing all others who submitted entries. We extend our heartiest congratulations to the letter winners. To those who were not able to make accurate copy of the 1948 message for lack of code proficiency we offer a bit of advice: make regular use of the WIAW code practice transmissions and try your hand at the monthly Code Proficiency Qualifying Runs. By the time October 27, 1949, rolls around, you'll be much better equipped with the skill necessary to win one of the Navy Department's letters of commendation. —J. M.

1948 NAVY DAY HONOR ROLL

Letter Winners

As Secretary of the Navy it gives me great pleasure to extend Navy Day greetings to amateur and professional radio operators participating in this Twentieth Annual Navy Day Receiving Competition. The Department of the Navy looks forward to this event as an appropriate time to extend its appreciation to you who by your continued interest and enthusiasm in the field of radio are a source of inspiration to others whose talents in many fields are necessary to help preserve the security of the United States of America. Rapidity and accuracy to a degree beyond human appreciation to you who by your continued interest and enthusiasm in the field of radio are a source of inspiration to others whose talents in many fields are necessary to help preserve the security of the United States of America.

John L. Sullivan

Text of 1948 Navy Day message.
“Souping Up” a War-Surplus HRO
Suggestions for Improving H.F. Receiver Performance

BY PAUL D. ROCKWELL, * W3AFM

SINCE the war, a number of war-surplus HROs have hit the market at very reasonable prices. However, the one that landed at W3AFM turned out to be singularly dead. It was one of the old originals with glass tubes, and somebody must have stored it in a wet moss heap frequented by pigeons. A new crackle job, a new dial, and some work on the 8-meter improved the appearance, but the performance left much to be desired on ten and twenty meters. The i.f. seemed reasonably good — the trouble was that shorting either of the r.f. grids to ground through a 0.01-µfd. mica condenser made practically no difference in noise output, indicating insufficient gain ahead of the mixer. Besides, it was difficult to distinguish between T7 and T9 c.w. signals on twenty and T6 and T9 signals on ten meters because of hum modulation in the first oscillator. The warm-up drift was over fifty kilocycles at twenty meters, and calibration could not be depended on from day to day. A jump in line voltage would "yoop" c.w. signals out of tune, and changing the r.f. gain control would cause some detuning of signals. The gain was so low that the set was being run all the time with both r.f. and a.f. controls wide open on twenty meters.

All this was after alignment and clearing up of corroded joints and other obvious troubles. Something had to be done to bring the set up to date, so the following measures were taken.

1) A preselector was built into the area beside the antenna binding posts.
2) The first r.f. stage was changed from a 6D6 to an 1851, and removed from the a.v.c. line.
3) A VR-150 was mounted under the chassis, to regulate the d.c. voltages to the first oscillator.
4) Temperature-compensation condensers were added to the first-oscillator circuit, one inside the coil can and one on the chassis. A calibration trimmer was added to facilitate setting the band edge.
5) R.f. chokes were placed in the first-oscillator heater leads, to reduce hum modulation.

Helping Out the R.F. Amplifier

About the time this program was getting underway an article appeared 1 describing a low-noise wideband amplifier that looked like a natural for topic No. 1, and a simplified version, using a 2C51 as suggested by the authors, was built and tried out, with the idea that broadbanding would save having to turn another dial. On twenty meters this was fine; but on ten meters a need was felt for help against images, there being quite a few powerful locals in this area. So a dial was added after all (visible on the side of the modified receiver in one of the photographs). The dial is taken from a surplus TU tuning unit, the brass bushing having been drilled out to take the shaft of a 100-µfd. APC condenser used for preselector tuning. The large capacity was used so that coils would not have to be changed between ten and twenty meters, the gain on twenty being

The preamplifier is mounted inside the receiver right at the antenna terminals (front left). The first r.f. amplifier tube has been replaced by an 1851. The capacity "flipper" for adjusting the oscillator frequency is visible just to the left of the rear of the crystal filter. One of the oscillator compensating condensers is mounted on a ceramic stand-off insulator between the oscillator tube and the oscillator tuning condenser. The audio amplifier tube (a 42) is removed, since all work is with headphones at W3AFM.

February 1949

* 910 Overbrook Road, Baltimore 12, Md.
more than sufficient anyhow. For those who still favor the broadband idea: look out for stray shunt capacity in the input-stage grid circuit, or the passband will not be as wide as you may expect. The higher the capacity, the higher will be the Q of the tuned circuit and the narrower the passband. If broadbanding is your object, do not use bulky (banana-plug) connectors on a metal chassis, as is done here, or all you will get will be about one-and-a-half megacycles bandwidth on the 28-Mc. band. No measurements have been made on the performance of this preselector, but it sounds good. As it stands, it works right into the low-impedance primary that formerly went to the antenna posts, except on ten meters where this winding was increased to six turns. More gain, up to the point of instability, could probably be obtained by adding turns to this winding, but with the 1851 following, and a control-grid return, and run the a.v.c. voltage to the suppressor grids. In the case of the 6AS6, the suppressor has a reasonably-good control characteristic. However, all of this looked like too much work in this case. Admittedly, the subject of a.f. peak limiters may be controversial, but those who think they are worth the trouble should be able to mount them in any old place. The r.f. wiring takes priority, and the place we picked looked like the ideal spot for a preselector, even if later-model HROs do have a limiter here.

On topic No. 2, the 1851 r.f. stage — men, take it easy, and think twice before making this change. The 1851 is a 6AC7 with the grid coming out the top. It has six times the transconductance of a 6D6, and if your set is hot to begin with, this change may make it take off and give you a lot of trouble. Maybe you can do just as well by leaving this stage as it is and messing around with the turns on the primary, which used to be the antenna coil. However, too many turns here may cause the preselector to leave its moorings. If you feel you need more gain, and decide to install an 1851, you can get a clip for the grid by tearing apart a wafer socket made for one of the old-type tubes with a large filament pin. The cathode resistor is 150 ohms, one-half watt, with the same by-pass condenser that served the 6D6 before. The screen-dropper is a 47,000-ohm ½-watt resistor, giving 150 volts from a 250-volt B-plus line — it is by-passed by a mica 0.01-mfd. As the 1851 is a sharp-cut-off tube, and it was felt desirable from a signal-to-noise standpoint to let this stage run at full gain regardless of the setting of the r.f. gain control, the grid return is to ground rather than to the a.v.c. line as before. A 'phone man might not care to accept the slight impairment of a.v.c. action that results.

**Oscillator Stabilization**

The VR-150 was installed under the chassis. Instead of going directly to B-plus, the oscillator plate goes through a 10,000-ohm 2-watt resistor to the 250-volt B line, and the VR-150 is in parallel with an 0.01-mfd. mica condenser from oscillator plate to ground. The fact that the mixer screen is also controlled is a good thing, as considerable pulling is present.

Some temperature compensation is obtained by using two N750 p.p.m. padders: a 10-mfd. padder located above the chassis and a 3-mfd. padder inside the plug-in oscillator-coil can. The idea of splitting the compensation was suggested by W1RY, who reasons that a certain amount of heat comes down to the plug-in units, and that

![Fig. 1 — Wiring diagram of the 10/20-meter preamplifier that was added to the HRO.](image)
To improve oscillator stability, heater r.f. chokes have been added, and the supply for the oscillator is stabilized by the VR-150.

there will be slow drift when coil units are interchanged unless individual compensators are used. No tests have been made here on the magnitude of this effect or what the best division of capacities should be, but with the present values the warm-up drift after five minutes is normally within ±2 kc. at 14 Mc. There is, however, a variation from day to day. This is believed to be largely a result of humidity variations. This shift usually stays within ±8 kc. at 14 Mc., and is taken care of by the capacity flipper shown in one of the photographs. This is just a \( \frac{1}{2} \times \frac{1}{2} \) inch scrap of metal bent and mounted on a \( \frac{1}{4} \) inch bakelite rod that is rotated from the front panel. The dial light was removed, and a little rat-tail file work was required to locate a panel bushing for the shaft. A collar inside and the knob outside the bushing prevent axial movement of the shaft. The oscillator grid lead is dressed so that turning this flipper gives enough capacity variation to line up the band edge with an external marker crystal oscillator. Sometimes, on a very wet day (this correlation is only suspected — not proven, as no hygrometer is on hand here), the stabilization point is as much as 25 kc. off the 14-Mc. band-edge calibration. This situation may be met by pushing or pulling on the plug-in tray a sixteenth of an inch or so, or perhaps even better by using a small APC of 2 or 3 \( \mu \)fd. instead of the lash-up shown. Does anyone have an easy answer to this humidity problem?

Now for the matter of the hummy c.w. signals on ten and twenty. A great many sets — not just HROs — have this trouble. Selecting tubes will get rid of it in many cases, but in this case seven 6C6s were tried before a passably clean one was found. The trouble seems to be that in the electron-coupled circuit generally used in receiver first oscillators, the cathode-to-filament capacity is across the tank. The a.c. supply imparts a mechanical modulation to the heater wires, which may be packed either tightly or loosely into the cathode sleeve, and this 120-cycle vibration of the wires causes frequency modulation of the oscillator. As the frequency of the signal goes higher, say from 4 to 14 Mc., this frequency modulation, which is some very small percentage of the oscillator frequency, becomes appreciable with respect to the audio beat in use at the second detector. The various cures are to use a d.c. heater supply, to use a circuit that permits the cathode to operate at r.f. ground or, if the cathode must be at an r.f. potential, to get the filament up to the same r.f. voltage. A d.c. heater supply, with a selenium rectifier and several thousand microfarads of electrolytic capacity, was used here for a while, but it was a nuisance and added to the already abundant supply of haywire and gadgets around the operating desk. Changing over the circuit to ground the cathode did not work in this case without a change of tube type or coil tap, which was considered too much labor. So a couple of r.f. chokes were taken out of a surplus TU unit and wired in series with the oscillator heater, as shown in the photograph. They helped a great deal: but it is still necessary to select a tube for cleanest injection. The HRO here is used only for bandspread work — on continuous coverage there could be trouble from these chokes pulling at certain frequencies. For a try, any chokes having a d.c. resistance of one ohm or less should do.

As it stands now, the receiver is much better than before. In stability, it is still a good way from the ultimate. But a little more improvement looks as if it would cost a great deal of work from this point on. To get nice, clean, stable 28-Mc. c.w. signals with rock-of-Gibraltar calibration, the best low-cost attack at the moment may be to leave the HRO, pick up a surplus h.f. receiver and use it as the tunable middle section of a home-spun double-conversion job, with a crystal-controlled first oscillator working at 18 or 20 Mc. With two good, tunable r.f. stages ahead of a rig like this, image and stability worries should be a thing of the past.

For those with time and energy to refine the refinements described, two hints (which have not been exploited here as yet because of the many time-consuming jobs associated with moving down from the First District) can be offered. Examination of the diagram shows that output of the first triode is somewhat loaded by the second triode’s cathode resistor. Since input impedance at the second cathode is about 200 ohms, this loading is not very serious, especially when considered in terms of sensitivity rather

(Continued on page 108)

\footnote{As, for example, "New Life for Old Receivers," \textit{QST}, Dec., 1948.}
Every year at this season we run into the same problem so far as v.h.f. activity is concerned. There are thousands of v.h.f. enthusiasts during the summer months, when sporadic-E skip is providing frequent opportunities for assorted kinds of DX on 50 Mc., and the working range on 144 Mc. is opening up to 400 miles or more every few evenings. V.h.f. is great stuff then, everyone agrees, and each year more stations climb on the bandwagon. Some of them even become crusaders for the cause, and they go to considerable trouble to sell v.h.f. to members of the amateur fraternity not yet within the fold.

"Look," they say, "I worked 38 states on 6 in the last couple of weeks — can you beat that on any band?" "I worked everything from Nova Scotia to North Carolina in the past week on 2 — just as good as 75, without the QRM!" So on they go, recounting the joys of working on the v.h.f. bands; selling v.h.f. on the strength of what happens at the peak of the season. And not without result, for the working of unusual distances has a basic appeal to all of us, whether those distances are statewide or worldwide.

The word gets around fast, and more and more stations appear to join the fun — and then, p-f-f-t — winter, and the horizons draw in again. The newcomer to 6 listens for days and nights on end and hears no DX bounding in from all over the country. The 2-meter neophyte scans the band in vain for signals from beyond the confines of his own call area. Almost together they decide that it's all over for another year, and they go back to 10, 20, 75 or whatever band they were working when they were first bitten by the v.h.f. bug. There they spend the rest of the year talking about the big things they're going to do on the v.h.f. bands when next spring rolls around.

Well, what's wrong with that, you say? Plenty! As any of the real v.h.f. enthusiasts will agree, DX is only a part of the picture. A legitimate part, to be sure, for making the utmost of every DX opportunity that comes along provides some of the real high spots of our radio lives. Few of us would want any less emphasis placed on the DX angle; what we would like to see is more emphasis on the other angles.

Listen on 10 any evening, after the band has gone dead, and what do you hear? In any popular area, at least, you'll hear dozens of ragchews going on over distances of less than 10 miles; and it's a safe bet that at least half of the participants are running 200 watts or more. They could work the same distances, and much more, with one-tenth of the power, on 6 or 2 — and they'd be much less likely to be running into trouble with their television-minded neighbors!

How about 75-meter 'phone, or 80 c.w.? On 75 there will be plenty of kilowatts being burned to work v.h.f. distances, and with an amount of heterodyne interference that makes the speech seem almost wholly unintelligible to the average

Just waiting to work some real 2-meter DX from Tulsa, Okla., is this 48-element array at W5DFU. It is of all-metal construction, and is pivoted at its center, permitting it to be used in either vertical or horizontal positions. It is rotatable through 360 degrees, and it may be raised or lowered, by means of the winch system shown in the "Hints and Kinks" section of this issue. The array consists of 16 half-waves in phase, fed through a "Q"-section and 300-ohm line, with reflectors spaced 0.2 wavelength and directors spaced 0.15 wavelength. Two-meter DX enthusiasts are asked to remember this array, and aim in the direction of Tulsa when the band is open.

QST for
v.h.f. man, who is accustomed to having the noise level as his only competitor! On 80 we find scores of short-haul traffic nets—a dozen stations in as many communities, for instance, using high-priority channels to handle traffic over distances which would be a cinch on 6 or 2. Even 20 and 40 are not without their local ragchews. Not a few of the occupants of these bands will be growing over the lack of frequencies available for their particular brand of hamming—and yet, just a few bands higher, there are megacycles and megacycles of useful and interesting amateur territory going begging for increased occupancy!

The bad part of the picture, so far as those of us who do stick with the v.h.f. bands the year around are concerned, is that many opportunities for interesting v.h.f. contacts are lost for lack of activity in the right places at the right times. Summer is far from having a monopoly on unusual v.h.f. propagation phenomena. Aurora, with its chances for contacts in the 200- to 400-mile range, so hard to tap by other media, comes most often in the late fall and early spring—all too often at times when there is too little activity on 50 Mc. to make its full extent realizable. The month of December offers more sporadic-E openings than any other outside the May-July period. The December just coming to a close as we write was highlighted by several Es openings which were the equal of any we experienced last summer, but they were enjoyed by only a fraction of the stations that would have been in on spring and summer sessions. Winter is not without its tropospheric openings, too. The inversions are not so frequent as in the warmer months, but when they come the signals are usually more steady, and sometimes fully as strong, as those which characterize the summer openings.

Even when no unusual propagation is in prospect there is plenty to be done on the v.h.f. bands. We can have friendly and leisurely ragchews with the fellows in neighboring towns—QRM-free contacts which do not mess up a channel for others hundreds of miles away. There are networks to be organized, procedure to be practised, emergency plans to be perfected—work which can be done best when there is no distraction in the form of DX signals. There are improvements to be made in our equipment: new antenna coupling methods, new circuits to be tried out, speech clippers and filters to be installed and adjusted, keying methods for c.w. to be installed, new preamplifiers or converters to be built and adjusted, checks for BCI and TVI to be made and scores of other projects to be carried out which will improve the performance of our stations and give us the jump on the fair-weather v.h.f. boys when the DX does begin to break through again. And, most important of all, there is occupancy to be maintained, so that our right to our v.h.f. assignments can be incontestably defended, should it be challenged at some future date.

The Annual V.H.F. Sweepstakes, from which you will just be recovering as you read this, was scheduled at what is normally the low period of the year, with exactly this thought in mind. It was hoped that a nationwide contest would encourage quite a few of the gang to give the v.h.f. bands a big play, at a time when they would normally not bother to get on. The 1949 V.H.F. SS was still in the future, as this material was being prepared, of course, but we'll bet that a lot of fellows are due for a big surprise, when they find out how many stations can be worked under winter conditions, when everybody gets in there and really tries. If you were one of these, don't let the lesson of the SS be lost—stick with the v.h.f. bands, at least a couple of nights each week, right through the year. If all of us would guarantee to do only that, life on the v.h.f. bands would be a lot more fun for everyone!

**Around the World on 6 and 2**

There were some really good openings for the few 6-meter enthusiasts who were on the band during December. The 12th provided a 4-hour opening, as good as any of the past summer. Its prime feature, for most of the gang, was the appearance of W4CPZ, Gaffney, South Carolina, the first 6-meter regular in his state, and South Carolina contacts were made by the dozen in what was probably the last big state-rush in 50-Mc. history. Your conductor was one of the few left out of this one, having chosen that date to break through again. And, most important of all, there is occupancy to be maintained, so that our right to our v.h.f. assignments can be incontestably defended, should it be challenged at some future date.

The Annual V.H.F. Sweepstakes, from which you will just be recovering as you read this, was scheduled at what is normally the low period of the year, with exactly this thought in mind. It was hoped that a nationwide contest would encourage quite a few of the gang to give the v.h.f. bands a big play, at a time when they would normally not bother to get on. The 1949 V.H.F. SS was still in the future, as this material was being prepared, of course, but we'll bet that a lot of fellows are due for a big surprise, when they find out how many stations can be worked under winter conditions, when everybody gets in there and really tries. If you were one of these, don't let the lesson of the SS be lost—stick with the v.h.f. bands, at least a couple of nights each week, right through the year. If all of us would guarantee to do only that, life on the v.h.f. bands would be a lot more fun for everyone!

**Around the World on 6 and 2**

There were some really good openings for the few 6-meter enthusiasts who were on the band during December. The 12th provided a 4-hour opening, as good as any of the past summer. Its

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### 2-Meter Standings

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</table>

* Leading contestant for 144-Mc. Medallion Award.
Terre Haute, Ind., W9ALU, Metamora, Ill., VEIQY, Yarmouth, N. S., W4FWH and W4MXB, Nashville, Tenn., W4DJZ, Atlanta, Ga., W4MS, Pensacola, Fla., W5JT, Jackson, Miss., and, of course, W4CPZ. Skip signals were heard over most of the country, and down in Mexico City, XEIKE worked HC2OT for the first time since November 27th. Other good openings came on December 21st and 22nd, but both sessions were characterized by light activity.

A kron, Ohio — WSLBH announces the formation of the Potlickers 6-meter net, which meets each Monday and Friday at 7 p.m. EST, with W8CEQ, Kent, Ohio, as control station, and W8LHV as alternate. About 10 stations are participating, and the net effect is improved activity in the area around Akron, not only on the above evenings, but on other nights as well.

Garmisch, Germany — At the recent Allied Hamfest held in this Bavarian town it was decided that an organized effort aimed at the setting of European v.h.f. records would be scheduled coincidentally with the second hamfest, to be held in April. Transmitters operating on 20, 10, and 2 meters will be installed at the summit of the Zugspitze, highest peak of the Bavarian Alps. Receiving watches will be kept on 50 Mc. for possible crosstown contacts. For further information, contact Sgt. Alvin D. Siak, D4AHK, 189th AACS Wing, APO 633, New York, N. Y.

South Devonshire, England — What must be near the top of the v.h.f. countries-worked list is the total of 20 posted by G6BY, as a result of his 145-Mc. contact with ON4PG, near Antwerp, more than 350 miles distant. Hilton's best DX, and the current European 2-meter record, is his contact with PA0ZQ, about 390 miles.

Meudon, France — FSOL, who made the first two-way 50-Mc. contacts from France with the United States and Canada, is now doing business on 144 Mc., and has added more firsts to his record. During the phenomenal propagation which prevailed in mid-November, FSOL made the initial 2-meter contacts with England (G6DHI), the Netherlands (PA0ZQ), and Belgium (ON4PG), all more than 200 miles distant.

He also worked G5TZ and G5DEP, Isle of Wight, 200 miles, G6W6T, Torquay, Devon, 250 miles, during this period. Again, between the 22nd and 28th, conditions were good, and FSOL worked numerous other Gs, including G2IQ, Sheffield, 375 miles. FSOL uses a 30-watt rig, a 4-element horizontal array, and a crystal-controlled converter.

Maplewood, La. — That it is possible to work on 50 Mc. with a minimum of power is amply demonstrated by the record of W53BW. His 1948 total of 32 states on 6 was worked with 12 watts input.

Montreal, Que. — Here's one fellow who has no trouble getting Vermont contacts. VE2FO is having consistent results with WIQY and W1BLC, Richford, W1CUN and W1FYO, Newport, and WIT, North Troy. For more information on equipment used by the Vermont stations, watch for the 522 story by WIYQ in an early issue.

Champlin, Minn. — Activity on 2 meters in the Upper Mississippi Valley continues good, despite winter conditions. Stations include W1S HXY, SW and FSD, St. Cloud, HCY and QIC, Minneapolis, KQ, Robbinsdale, VUZ, St. Paul,
ZQQ, Pine City, ZNE, Waite Park, and JHS, Champlin. JHS made his first South Dakota contact on December 17th, when he worked W9TTI at Milbank, at 7:30 p.m. A schedule was made for the following morning, and TI was heard first at 7:40 a.m., building up to a peak at 7:27, and fading out again by 7:35. The early-morning peak is fully as pronounced in the winter as in the summer months, it should be remembered, and many good contacts could be made, particularly over weekend, if more of the gang would get on.

Oaktree, N. J. — W2NLY can vouch for the fact that nearly 2000 stations are or have been active on 144 Mc. in the east. Jim's total now is up over 1000 different stations worked, but it includes quite a bit of territory: 12 states and VE1. Most of these were worked with “the antenna that multiplies by 50” described in QST for September, 1947, and duplicated, with uniformly good results, in many parts of this country, and in Europe.

Hyannis, Mass. — As he was running tests with a horizontal array this past summer, W1BCN had only a coaxial dipole for a vertical antenna. Even with this, Ed rolled up a total of 11 states with the dipole in 1948, one more being added with the horizontal array. This total of 12 states and VE1 stands as the highest yet reported, as we write, for the 1948 Medallion Award for most states worked on 144 Mc. during the year. No, don't send in your total if it was higher — the deadline was January 10th.

Council Bluffs, Iowa — The 2-meter band is moderately active in the region around Council Bluffs and Omaha, according to W6CCY. He lists W6s QXR, LRD and FBK as the principal Omaha stations, all of whom are able to work W9WHZ in Red Oak, Iowa, some 55 miles southwest of Omaha. Council Bluffs is represented by W9URY and W9CCY. W9IZE, Lincoln, Neb., and W9BIP, Elliot, Iowa, are the DX at present. Several of these fellows use crystal-controlled 522 receivers on 146 Mc., which is the calling channel. When contact is established they shift to other frequencies, leaving the calling channel open for the use of other stations.

Sacramento, Calif. — Interesting reflection effects are observed on 144 Mc. by W6KUI, WILLOWS, and W6LYQ, Corning, according to a report from W6PIV. They are in the same flat valley as Sacramento, but roughly 50 and 100 miles to the north. They find that the signals from Sacramento may be received in any of several beam directions with about the same signal as the direct path. W6KUI formerly lost mobile stations when they went more than 12 miles north of him, but he has been able to work W6LYQ/mobile anywhere within a 30-mile radius, by aiming his beam west, toward the mountains. Both stations report that signals coming from the south have severe phase distortion, when received on nondirectional antennas, probably because of their arriving over several different paths, any one of which can be selected with a directional array.

Wauwatosa, Wis. — “Two-meter time in the Valley” is 9 p.m., a schedule arranged by the Wisconsin Valley Radio Association, in the hope of promoting more 2-meter activity. The club is also sponsoring a long-term contest, with scoring based on the number of contacts made, plus a bonus for the best DX worked. This information is from Wisconsin SCM, W9QM.

Roanoke, Va. — Extension of the Eastern chain of 2-meter stations into North Carolina is the aim of the 2-meter gang in this area, according to W4CA. W4KQC, W4JXE and others heard signals from the south on December 2nd, and on the 9th W4KQC heard W4DKG, Ashboro, N. C. They are ringed around by mountains they feel sure that consistent effort on schedules would produce results, and they will be glad to cooperate with any interested parties, to this end. Send information to W4CA, who will see that it gets around.

Chicago, Ill. — The swing to horizontal polarization, previously reported, has not worked out well in the Chicago area, so far as consistent activity is concerned. Some of the gang have migrated to other bands as a result of their inability to make contacts since the change to horizontal was started. Quite a few of them have put their ground planes and other verticals back up again, in order to stimulate local activity. As in other areas where there is heavy concentration of population over a considerable geographical area, the vertical antenna has a definite advantage in its lack of directivity. If it is a good one, and well in the clear, it provides good coverage without the necessity of installing complex ro-

(Continued on page 108)
The Invisible Antenna
How To Get on the Air Unobtrusively
BY A. F. SCOTTEN,* W6ZMZ

At this station we put up what we please. But we feel deeply for those of the brotherhood who are harried and oppressed by unfeeling landlords and uncooperative neighbors determined to see in a simple piece of wire an intolerable eyesore and a menace to aerial navigation. When you live in a three-room apartment bounded on all sides by hostility, you may expect trouble in getting out on eighty meters.

In the past there have been two general lines of attack on the difficulty. One is to cut the antenna down to a mere stump and coax it to radiate a watt or so with more or less ingenious loading and matching systems; the other is to disguise the antenna as anything from a clothesline to a dumb-waiter hoist. Neither gives universal satisfaction.

But a third approach is possible, appropriate where space exists but is made unavailable by objections to the conventional antenna on aesthetic grounds. Just put up a good old 130-foot voltage-fed horizontal with wire so thin that it cannot be seen. We are using one here made of No. 40 enameled, approximately half the size of the hair off a small yak. It defies detection.

Well, aha yourself, and don’t be so dogmatic. What makes you think the ohmic resistance must always have first crack at the power? Look at it this way: When the gismo under consideration constitutes an efficient radiator, virtually all the power will be radiated, leaving none for the resistance to dissipate. Or look at it some other way. The fact remains that stations worked report the No. 40 antenna one to two S-points better than the comparison antenna. The comparison antenna has for all practical purposes the same length, location, orientation, and height (some 20 feet), but is made of about No. 16.

“There’s no way to account for it.”

After considerable deep thought and research into the literature, a satisfactory explanation has been hit upon for the phenomenal performance of the invisible antenna. It is that radio-frequency power abhors a fine wire. As is well known, r.f. travels in the skin of a conductor, and when the conductor just hasn’t got any skin to speak of, the r.f. is obliged to leave for distant points. It is gratifying to record that this hypothesis has been accepted by several amateurs in polite silence; one station even went off the air immediately after hearing it put forward, probably to begin remodeling the antenna.

“A half-wave of No. 40 won’t support its own weight.”

It will too; the break-point is six ounces, while the weight is near 0.06 ounce.

“Any breeze or sprinkle of rain will bring it down.”

It hasn’t come down yet. Anyway, one can learn from the spider and put up another. The wire costs nothing; it comes out of discarded audio equipment by the thousands of feet.

“Considering such an antenna as a single-conductor line, and substituting in the appropriate formula, we find by inspection that a wire of

* 1045 South Orange Grove Ave., Pasadena 2, Calif.
finite length but infinitesimal diameter exhibits an infinite surge impedance, so that when the line is terminated in the infinite resistance represented by an open end, it becomes nonresonant, and the development of standing waves is improbable, to say the least."

Huh?

"Birds."

Yes, birds do arouse some apprehensions. Not that they roost on the wire — like to see them try — but if they go flying along thinking about something else and not looking where they are going, they are likely to do some damage. Fortunately, the birds hereabout seem to be pretty alert.

And now if you, too, wish to be at the forefront of the march of progress in antenna construction, here are a few practical suggestions to bear in mind.

Handle the wire on a reel and avoid kinks. An empty spool with a pencil through it makes a good reel.

Don't rear back and heave as though tightening the top strand of a barbed wire fence; use the fingertips.

Forget masts and towers, rope and cable; think of slender sticks, small string and coarse thread.

Glass-headed "push-pins" will serve for knob insulators. Light rubber bands are excellent strain insulators. A theoretically superior article can be made by sticking a tiny wire loop into each end of a 1-inch length of fine glass tubing with sealing wax, but rubber bands should be used also, as jerk insurance.

To fasten the wire anywhere, bind it with a narrow sliver of Scotch Tape.

Don't try to lead fine wire into the shack, but terminate it on a tie-point outside the house and lead in with a strand of lamp cord or whatever is handy.

If you must see what you are doing when raising the antenna, hang a bent but not creased scrap of paper over the wire, with a long thread attached therewith to pull it off later.

Can anyone tell us where to lay hold on some No. 60?

HAMFEST CALENDAR

MICHIGAN—The Grand Rapids Amateur Radio Association is again staging a Mid-Winter Hamfest, this year's affair to be held on Saturday night, February 19th, at the Morton Hotel Banquet Room, Grand Rapids, Mich. Admission will be by ticket only, 50 cents per person in advance, 75 cents at the door. For those interested, dinners will be available at the Morton Cafeteria, from $1.50, and in the Main Dining Room, from $2.00. All hams and their YLs or XYLs are invited. Further information and tickets may be obtained by writing Secy. Harry R. Dinley, W8ASX, 614 Shamrock S.W., Grand Rapids, Mich., or GRARA, P.O. Box 333, Grand Rapids, Mich.

Silent Keys

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

W1BDB, ex-W5BDB, Morrill P. Mims, Waban, Mass.

W1WR, Floyd L. Vanderpoel, Litchfield, Conn.

W2VGH, Dave L. Farrell, Schenectady, N. Y.

W6KWP, ex-6AB-6TW-4GA, William L. Comyns, Atascadero, Calif.

Ex-HZ1AB-TR1P, Harold Berger, Vallejo, Calif.

W7KWF, Ernest Painter, Tucson, Ariz.

W8OUN, Maurice H. Jepson, Bethany, W. Va.

W9IUM, Howard J. Clark, Auburn, Ind.

VE3AUM, Herbert W. Adams, Ottawa

G2TI, Henry Bevan Swift

OX3GC, Donald H. Werner, American Vice-Consul, Godthaab

February 1949
Amateurs anywhere in the world are invited to take part in the 15th Annual ARRL DX Competition. Two weekends devoted to c.w. participation and two to 'phone are scheduled. Engraved medallions will be given to the highest-scoring c.w. and 'phone stations for each country and each continental U.S.A. and Canadian ARRL section entered in the contest. Operators outside the U.S. and Canada will attempt to work as many W (K) and VE stations as possible. Exchange of serial numbers will be required. Complete rules and details on scoring appear on page 42 of January QST.

The contest periods will be divided for c.w. and 'phone, as follows: The first c.w. period will begin Feb. 11th at 7:00 p.m. EST (2400 GCT) and end on Feb. 13th at 7:00 p.m. EST (2400 GCT). The second c.w. period will be scheduled during the same hours March 11th to 13th. The first 'phone period will begin 7:00 p.m. EST (2100 GCT) on Feb. 18th and end at 7:00 p.m. EST (2400 GCT) Feb. 20th. The second 'phone period will be scheduled during the same hours from March 18th to 20th.

Though not necessary for entry in the contest, ARRL will supply convenient report forms upon request. You may make up your own forms following the sample shown in last month's complete contest announcement. Alternatively, W and VE contestants only may use the log form shown in this announcement, supplies of which are also available from ARRL upon request. This new type of reporting form has been designed with two advantages in mind: (1) to facilitate the extensive checking necessary in compiling the final results of the DX Contest; (2) to make record keeping easier for the contestant. The outstanding feature of this form is that it shows automatically when the quota for a particular country has been filled. As shown, it is arranged for use by U.S. stations, which have a quota of three stations per country per band. Canadian participants should rule their sheets to provide for five countries per band in accordance with the larger quota allowed them under the rules. Where a certain station is worked for less than the maximum number of points allowed (as for example, the contact with G2MI shown in the sample), the additional contact to make up the points not earned in the first QSO may be indicated at the end of the form. A separate set of sheets should be used for each band. If used, this form must show the time of each contact in GCT. We repeat that use of this new log form is optional. The old or new form may be employed, as desired. In either case, the score recapitulation and the signed statement shown in the sample accompanying the full announcement in January QST must be submitted.

If you are located in mainland U.S. or Canada, here is your chance to enjoy the thrill of contacts with the far corners of the earth and to compete for the attractive medallion awards. You will be afforded the opportunity to work new countries for the DXCC and other awards. If you are located outside the U.S. and Canada, you likewise have the opportunity to compete for an award and to pick up states for WAS or Canadian provinces for a WAVE award. Wherever you are, if you want to put your antennas, transmitting and receiving gear, and operating skill to a good test, and have lots of fun in the process, be sure to get on the air for the 15th Annual ARRL DX Competition!
CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

One thing every DX-minded amateur knows is that operating on DX bands these days is just about the most keenly competitive phase of the game, day in and day out. So competitive, indeed, that decorous operating ethics and procedures appear at times to be the exception rather than the rule. Propriety has often been overlooked, mainly by we W/VE prefix-chasers, in favor of elbowish bargain-basement techniques.

Realizing that the overseas DX stations are really the control grid of this situation, the ARRL communications department, after considerable objective study and soliciting of representative opinion from various concerned quarters, has evolved the DX Operating Code (ARRL Operating Aid Number 5) reproduced in this department this month. The text is quite self-explanatory, and we hope the points stressed therein will provide enough bias on the rare-DX grid to keep the W/VE plate current from soaring to future feverish heights.

We strongly recommend to DX stations, wherever located, adoption of these simple suggestions. A minority of rare-country stations are at present employing similar measures with gratifying results. Not only are such operators earning a wholesome respect for their clean-cut performance, but they are being paid rich dividends in maximum efficiency of communication.

These Aids are being widely distributed via radio societies and QSL bureaus throughout the world, and are also available to individuals upon request. We believe they will exert a highly beneficial influence toward a greater enjoyment of DXing by the entire fraternity.

Hey, Jeeves, what's new?...

What:

Those displaying the temerity to make their WACs the hard way have been lavishly rewarded on eighty the past month or so. Among the early birds contacting ZC8PM are Wls BPX, DHD, FTX, CEG, NJM and W2QHH, the feats taking place on 3508 kc. W2QHH's 17-watt 6L6G now has 41 3.5-Mc. countries by way of VP9U (3530), E19J (3545), FASBG (3508), W7KPA/VP2 on Antigua (3515), LA2UA (3662), HH2BL (3501), KV4AA (3508) and VO2BL (3510). . . . . ZC8PM gave W4BRB Gene's second WAC on the band, other additions being VP2LA (3577) and VP9U. Gene says that VX8AY and VP5AO will be on before long and CN8MI plus CT3AB have been squeaking through around 3515 kc. . . . . W2EQS did well with HClAW (3521), HClJl (3501), FASIH (3520) and many Gs and Fs. . . . . It's not as easily done from W8CFB's location but KP6AA, KP1BR, ZL4AE, KH6BA, KH8IJ, G6CJ and G6GM were raised. . . . . Things are buzzing on 75 phone, too, according to PY4ZL. Ibsen's log features G5VB, GI2DG, PA3NG, CT1AS and CT1LP. The following phones in South America are out after DX this season: PYs 1AGR, 1RC, 2ADH, 2AHS, 2ANF, 4DW, 4NS, 4OF and 4QE; LUs 3EL, 4DJB, 6AF; CEs 4AJ, 5BG; CT1IF; ZP2XA.

DX activity on forty has hit a new high, beyond a doubt. Here's W2RDK with two separate WACs within five hours! Charlie's latest are ZC1CL (7040), ZC5UN (7040), ZC8PM (7060), FE8AB (7015), UR2KAE (7010–50), UA9KAA (7025 t8), UA9KWA (7025 t8), TF3C (7033), SI1AFM (7025), HClAW (7010), KJ6AB (7045), KM6AK (VFO), CN8AN (7060 t8) and HRIAT (VFO) plus a load of less-scarce items. . . . . A cute number heard at W5FXN was P05AE (7049 t7) claiming to be in Borneo with Shell Oil. . . . . Just a sample of the situation at W9KFO reveals QSOs with CT3AB (7020), KG6DI (7018), J2LIO (7025), FASJO (7040), FA9JO (VFO), FA9RZ (7022), CN8MZ (7050), LAY7 (7005), OX3J (7030), ZS2CR (7050), ZS6AM (7025), TG8MO (7010), T4AMR.

* DX Editor, QST. Please mail reports of DX activity to W8BRD's home QTH: 1517 Fargo Ave., Chicago 26, Ill.
Gordy also hooked up with **OY3IGO**, a stroke of luck on any band. -- -- --

W1PTX accounts for another Middle East catch, **Z9QVU**T (7030). -- -- -- In addition to scads of **VKs**, **Gs**, etc., W5CFB snatched up **OH2SR**, **CE4AD**, **CE3BM**, **HI1FB**, **K66AA** and **VO6BL**. -- -- -- The light bill at W2EQS took a beating because of **UBSAK**, **UBS8G**, **UQ2AB**, **ZD2T**, **HK3CT**, **FP6AB**, **CE4AD**, **CE3BM**, **HI1FB**, **K66AA** and **VO6BL**. -- -- -- Between bursts of unidentified QRN, W9ABS socked **EI9J**, **PA0PN**, **VE8BL** and **VE8CM**.

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**DX OPERATING CODE**

(For W/VE Amateurs)

Some amateur DXers have caused considerable confusion and QRM in their efforts to work DX stations. The points below, if observed by all W/VE amateurs, will help make DX more enjoyable for all.

1) Call DX only after he calls CQ, QRZ? or signs SK, or 'phone equivalents thereof. Make your calls short.

2) Do not call a DX station:
   a) On the frequency of the station he is calling until you are sure the QSO is over (SK).
   b) Because you hear someone else calling him.
   c) When he signs KN, AR or CL.
   d) Exactly on his frequency.
   e) After he calls a directional CQ, unless of course you are in the right direction or area.

3) Keep within frequency-band limits. Some DX stations can get away with working outside, but you cannot.

4) Observe calling instructions given by DX stations. (Example: "15U" means "call 15 kc. up from my frequency." "15D" means "down", etc.)

5) Give honest reports. Many foreign stations depend on W/VE reports for adjustment of station and equipment.

6) Keep your signal clean. Key clicks, ripple, feed-back or splatter give you a bad reputation and may get you a citation from FCC.

7) Listen and call the station you want. Calling CQ DX is not the best assurance that the rare DX will reply.

8) When there are several W or VE stations waiting, avoid asking DX to "listen for a friend." Also avoid engaging him in a rag-chew against his wishes.

---

F/Lt. Harry Pain of the RAF and his station, VS7PH, at Negombo, Ceylon. Gear in use: a 6L6-807 transmitter at 25 watts, an AR-88 receiver, a coax-fed dipole for 14 Mc. Currently one of the most active Ceylon c.w. men, Harry has produced previous QSOs under the calls G3ATH, ZB2A and Z2ZHF.

---

with his lil ole BC-459 while W3JAK tried D5BK, LA3UB, UA3KAA, SM3FY and SM5PW on for size. -- -- -- Another BC-459 addict, W7MIC, chatted with such as J2AF, UA3RL (7025), ZC6UNJ (7005), VP3GB (7005), VP8PX (7007) and ZS6TE (7009). -- -- -- Between bursts of unidentified QRN, W9ABS socked **EI9J**, **PA0PN**, **VE8BL** and **VE8CM**.

---

50 **QST** for
DX OPERATING CODE
(For Foreign Amateurs)

To All Foreign Amateur Stations:

In their eagerness to work you, many W and VE amateurs resort to practices which cause confusion and QRM. Most of this is good-intentioned but ill-advised; some of it is intentional and selfish. The key to the cessation of unethical DX operating practices is in your hands. We believe that your adoption of certain operating habits will increase your enjoyment of amateur radio and that of amateurs on this side who are eager to work you. We recommend your adoption of the following principles:

1) Do not answer calls on your own frequency.
2) Answer calls from W/VE stations only when their signals are of good quality.
3) Refuse to answer calls from other stations when you are already in contact with someone, and do not acknowledge or act upon calls from amateurs who indicate they wish to be “next.”
4) Give everybody a break. When many W/VE amateurs are patiently and quietly waiting to work you, avoid complying with requests to “listen for a friend.”
5) Tell listeners where to call you by indicating how many kilocycles up (U) or down (D) from your frequency you are listening. Examples: c.w. — “CQ DX CQ DX CQ DX 15U DE AC4YN AC4YN AC4YN 15U K”; ‘phone — “Answer 15 kilocycles up from my frequency.”
6) Use the ARRL-recommended ending signals, especially KN, to indicate to impatient listeners the status of the QSO (see the ARRL Handbook or write for a free copy of Operating Aid No. 2).
7) Let it be known that you avoid working amateurs who are constant violators of the above principles.

041), UA9KOG (14,000), UA9SH (14,132), UA8LD (14,050), UNIAB (14,017), UQ2AE (14,050), C10H (14,066), C700 (14,080), VS6AE (14,040), KA6AC (14,045) and, last but not the leastest, OY3IGO (14,034). [I think that’s what we need, boss, some punk conditions. — Jeeves]

Still ranked among being taken in by AC3GG, W1KUF sought solace in ZD0AA (14,025), ZD4AB (14,120), ZC6UN (14,085), TF3JS (14,040), ZBIQ (14,080) and a CR6. —— ——

After eliminating W9 QRM with a new 3-

excellent results with low power is the forte of Dr. Constantino Feruglio, I1VS, of Udine, Italy. His 35-watt 28-Mc. ‘phone has accounted for some 100 countries worked and 50 confirmed, employing dipole antennas, while the inhaling is done by an S20R. The OM is presently engrossed in the pursuit of an elusive WAS.
warms to a 6L6 didn’t keep W5OYD away from KV4AA, HC1JW, YN1LB, VO2RF and ZS6CH, either. A new one for almost every­
watts to a 6L6 didn’t keep W5OYD away from KV4AA, HC1JW, YN1LB, VO2RF and ZS6CH.

Ten has been moving up fast on the rail and W2VCZ struck a 4-hour WAC with ZC6XY, VO4SC (28,200f), HC1KY, VO2CO, VK2ASN and G2HK. Others worked:

• KV4.A.A, HCIJW, YNILB, VO2RF and ZS6CH,

operating from Norfolk Island.

• W4MRA’s missile dwells upon body will be found in

and W8SIR &K6 make it 100 verified on 28-Mc.

• ZS8A, MF2AA, ZP7FA, VPSAD, VQ2.T0, W2AEB adds ZD4AX, CP5FB, EA3HM, AG2AD

VQ4SC

• ZElJH, W3NKS/ZS3 (!), GD6IA, KJ6AB, W2VCZ struck a 4-hour WAC with ZC6XY,

where:

• ST2FU, ZElJ,T, ,J2AAL, J2AHI, OE3CC, ‘phone. Any takers?

• OX3MG, FA9IO, FESAB, VPSAD, VQ4RF and

Cliff needs just ten cards to catch WIEKU

MT2D and 4X4AA, all ‘phone exclusively.

These addresses should do somebody some

help yourselves. Naturally, the use of

equipment. Modulator and power supplies are bot

left with two final-amplifier stages mounted above. To

Here’s the elaborate installation at PA8CN, Glimmer, Holland. An all-band exciter can be seen at the lower left with two final-amplifier stages mounted above. To

the right of the NC-1013 receiver is a 6-meter superhet and farther to the right stands the speech-amplifier equipment. Modulator and power supplies are not shown.

M13FG

Box 513, Asmara, Eritrea

M13LZ

APO 843, 9% PM, N. Y. C.

M13NO

APO 843, 9% PM, N. Y. C.

PK4GZ

W. B. Mully, B.P.M./Shell Oil Co., Tan­
djong, Bandjarmanis, Borneo, N.E.I.

VP8FX

APO 692, 9% PM, N. Y. C.

VP2CG

R. A. Smith, St. Georges, Granada, B. L.

VP2CW

C. Wiltshire, 25 Upper Norton St., Wortsm

Here’s the elaborate installation at PA8CN, Glimmer, Holland. An all-band exciter can be seen at the lower left with two final-amplifier stages mounted above. To

the right of the NC-1013 receiver is a 6-meter superhet and farther to the right stands the speech-amplifier equipment. Modulator and power supplies are not shown.

M13FG

Box 513, Asmara, Eritrea

M13LZ

APO 843, 9% PM, N. Y. C.

M13NO

APO 843, 9% PM, N. Y. C.

PK4GZ

W. B. Mully, B.P.M./Shell Oil Co., Tan­
djong, Bandjarmanis, Borneo, N.E.I.

VP8FX

APO 692, 9% PM, N. Y. C.

VP2CG

R. A. Smith, St. Georges, Granada, B. L.

VP2CW

C. Wiltshire, 25 Upper Norton St., Wortsm

Where:

These addresses should do somebody some

good; help yourselves. Naturally, the use of

airmail is recommended to best advantage.

AR1OD

CM7RA

Apartado 185, Ciego de Avila, Cuba

COSOH

P.O. Box 16, Antilla, Cuba

C86AW

Box 180, Luanda, Angola

EASMH

J. Jans, Apartado 5041, Barcelona, Spain

E44ZH

P.O. Box 12554, Madrid, Spain

ex-6I3AB

D. Goldberg, 7 Pretoria Road, Southsea, Hampshire, England

PF8FP

% PAA, P.O. Box 863, Dakar, French West Africa

HAI1KK

P.O. Box 185, Budapest 4, Hungary

HAC

Deeno Felkay, Bethlen-Utica 50, Rakospudka, Hungary

HZ1AU

(via ARRL)

J9ACX

APO 259, % PM, San Francisco, Calif.

J9ADE

APO 259, % PM, San Francisco, Calif.

J9ANZ

Navy 1872, FPO, San Francisco, Calif.

KMM4K

% CAA, Midway Island

KX6BB

Navy 824, FPO, San Francisco, Calif.

LZ1AA

Box 271, Sofia, Bulgaria

MD2BU

(via RSGB)

The above thanks to the generosity of Wl5

FII, FTX, HX, IKE, KUF, QMI; W2s AEB,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

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CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

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CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,

CJX, EQS, MUM, OST, VCZ; W3s AFW,
mail addressed to Hong Kong. _____._
W8CXN is seeking good words concerning
TA6OBM. Can anyone oblige? _____._
W4DGW struggled with the call W4DGW/K6J
for months. Upon his arrival back home - he
found his ticket converted to KJ6AC! Now
you'll find him getting the 40-meter men excited
as KJ6AC/W4. To this writing, Earl has received
just 30.17% answers to QSLs sent out - fine
thing.

In months of operation, VE8RB has run
across just one station able to pronounce his
location. No wonder -- it's
TA60BM. Gan anyone oblige?___._

Out of 110 countries worked, YU7KX has received QSLs from a mere 41.
Oton may be reached via ARRL or through the
listed address. _____._. VQ3HJP (also famous
as VQ4HJP) has migrated to Kenya and should
presently be heard sporting a new VQ4 label,
advises G5YM. _____._. Those who have not
received their VO2AR wallpaper can obtain
same by writing W1CGS, according to W8DON
_____._. Quoting a box score in the latest
PEARL News, we see that the DX parade
lines up in this manner: J2AII with 140 worked;
J2CDJ, 94; J2AAL, 88; J3GNX and J2TYS, 81.
A large shake-up in call letters can be expected,
Japan-proper prefixes being changed to JA2
through JA9.

W2CJX learns that G3s DBO and DFI are ex-
VU2KM and ex-VS1BX respectively. _____._
It took some six months for VO4ASC to jar
a batch of QSLs loose from the printer -- directly, to quote W1BEQ. _____._
Get out your Countries List and add the follow­
ing two fresh ones: Norfolk Island (VK9) and
Vatican City (HV). Congrats if you have 'em,
OMs. The former is really in the sticks, being
about 850 miles due east of Australia and 400
miles northwest of New Zealand. It's a strategic
spot in the South Seas shipping lanes. The
Vatican City needs no introduction, its affirma­
tive country-status only having awaited amateur
activity there.

The Habana DX crew evidences a somewhat
cosmopolitan matrimonial taste. CM2CT mar­
rried an English girl and CM2JK is being hitched
to a Mexican senorita. CM2SW, however, boosts
the home product, anticipating a May wedding
with a fortunate Cuban lady. _____._. If any
of you folks have some concrete data regarding
postwar activity on St. Pierre and Miquelon,
will you please bend our ears? Several fellows
report working FP8AB, for instance, but the
gentleman does not elucidate. _____._. HZ1AB
is fighting heavy atmospheres in Dhahran and
reports reception on ham bands below 14 Mc.
as washed out. Don asserts that HZ36D, sup­
posedly operating airborne in the Arabic area,
has no legitimate status so far as he knows.
In fact, HZ1AB is assumed to be the only au­
thorized amateur station presently operating in
Saudi Arabia. The staff includes Don, W7KUC,
Carl, W8DLX, George, W6TND, Joe, W2OHN,
Smitty, W6UMQ. LAs assume the prefix LB
when operating portable and prefixes LF, Ld and
Lj, sometimes used in the ham bands, represent
Norwegian army, navy and technical-school sta­
tions. _____._. VQs are now showing up with
legit two-letter calls. We have it that several
prominent DXers sprained eardrums trying to
copy the missing members. _____._. Far Eastern
gleanings from the mail of W11KE: VU2EV will
QRT for a spell while he goes on leave and
AC4YN the same. Bob Ford, now AC4RF, in­
tends to take Reg's place on the air for awhile.

W1BIH and W6DIB offer a helping of Green­
land gossip: OX3MG lost an outgoing mail boat
in an ice crush last summer and suspects some of
his cards have gone astray to the bottom of
Denmark Strait. Awaitees who feel their veries
are overdue should reapply. OX3BC is laboring
over a new supply of pasteboards and should be
all caught up by this time. _____._. The gang
around Seattle is doing much better since
W7BE left the vicinity in favor of KH6. Bill is
having great fun as W7BE/KH6, having
bowled over 40 countries through the use of a
10-watt VFO and a dipole in just over two weeks
of operation. _____._. Another certificate for
you DX hounds --- see "IARU News," this issue.

_____._

Jeeves reports less TVI in the neighboring
groshop receiver since he installed his latest­
design anti-interference measures. These include
r.f. chokes in the feeders plus copper spreaders.
But we still don't get out worth a darn.

February 1949
Results, Twelfth ARRL Field Day

More Than 4600 Participants Afield in Annual Test of Portables

The number of individuals participating in an ARRL Field Day is any indication of the willingness and ability of amateur radio to prepare for service in emergency, then amateurs in the field territory of the League are doing a fine job. Dedicated to emergency preparedness, this popular annual activity has enjoyed wider participation each year since its inception. The Twelfth ARRL Field Day, held last June 12th and 13th, dwarfed previous affairs, made them seem like mere trial runs by comparison. It was the largest field testing of amateur facilities ever held and one of which we may well be proud. There were 4660 individuals in the field; 305 club portable stations, manned by 4084 participants, were active; among the nonclub groups, 576 individuals kept 144 portables on the air.

The FD was rich in experience for its participants. It provided to many a better appreciation of the problems involved in operating portable equipment afield; it showed up defects in gear and pointed the way to improvement. Some groups gained a new awareness of the importance of operator proficiency and have come to realize that this is a factor equally as important as efficient transmitters, receivers and antennas. Aside from its serious aspects, another point stands out: the FD was fun! It was filled with interesting and amusing incidents that will linger pleasantly in the memories of those who took part. If you've taken part in an FD, you'll know just what we mean; if not, you'll just have to try a Field Day some time!

Under the rules, competition in Field Day is considered to be among stations employing similar numbers of transmitting set-ups. Score listings are arranged below according to the number of transmitters that were in simultaneous operation at each station. There always is, however, intense interest on the part of FD participants in knowing which groups, regardless of transmitter classification, had the highest scores and what combinations of gear and bands were used. Some of the top scores in the various classes will be mentioned along with brief descriptions of layouts used.

Each year has seen Field Day groups on the West Coast inching up on their competitors to the east. In the 11th FD the Society of Amateur Radio Operators managed a second-place score which augured the possibility that the banner would move to the West in 1948. SARO's apparent ambition was realized in this Field Day; by a comfortable margin their 17,017-point score earned first-place honors. Operating 7 transmitters at W6AEX/6 from a ranch location near San Carlos, Calif., 30 members assisted in making 822 contacts. Power for all rigs was supplied from batteries charged by a gas-driven generator. Each transmitter used VFO control and was operated at 30 watts or less input. Efficient antennas helped the success of SARO's operations in no small measure: radiators for 3.5 Mc. were two half-waves in phase; for 7 Mc. a "V" beam; 14-Mc. c.w., two 8JKs; 14-Mc. 'phone, three-element rotary; 28 Mc., a three-element beam and a ground-plane job; 144 Mc., sixteen-element rotary. A breakdown of the contact total by bands shows the following: 78 QSOs on 3.5-Mc. c.w., 148 on 3.85-Mc. 'phone, 223 on 7 Mc., 109

It didn't rain everywhere during Field Day! From this sun-drenched location, Geiger Summit, in their home state, the Nevada Amateur Radio Association had four transmitters on the air. Their regular FD site on Mount Rose was covered by six to ten feet of snow! Left to right: W7BIC, W7CX and a visitor.
The Wisconsin Valley Radio Association, W9ROM/9, turned in a good FD performance; they had the third-highest score in the two-transmitter class, made the greatest number of contacts, 632, in that category.

In this shot W9JBF pours coffee for W9FZC and W9CIC at one of the operating positions.

The Metropolitan Radio Club of Los Angeles gave an excellent account of itself. Signing W6AMT/6 from a spot in the Santa Monica Mountains of Southern California, 25 operators rolled up 15,129 points. Their contact total, 1159, was higher than that of the SARO group, but they were outscored as a result of not gaining the advantage of the battery multiplier, all power having been obtained from a portable a.c. generating plant. Power input was kept at 30 watts or less on all except the 14-Mc. 'phone rig, which ran 85 watts. A varied assortment of antennas was employed, including doublets, parasitic and phased arrays, square-corner reflector and a ground plane. Operation was conducted on all bands from 3.5 through 144 Mc.

In the nonclub category, score listings this year were divided into two sections, those submitted by groups consisting of three or more participants that operated one or more transmitters, the other including single-transmitter scores obtained by one or two operators. The top nonclub score was made by a station in the latter classification, W6EYH/6, operated by W6EYH and W6VUC at Big Bear, Calif.; their score of 6197 points resulted from 281 contacts on 3.5-, 7- and 14-Mc. c.w. The rig, a VFO-507 job running a maximum of 28 watts, was powered by a PE-103 dynamotor; an NC-101X using storage-battery supply for filaments and dry batteries for plates provided reception. W6EYH and W6VUC deserve special congratulations for their score, which was obtained in the face of competition from groups using many more transmitters and operators.

Second-high nonclub score, 5225 points, was turned in by a Midwest group of 8 operators and 4 assistants who were set up at the Rockford, Ill., Ski Club Grounds under the call W9ERU/9. A BC-459-A was used on 7 Mc, and a VFO driving 6L6GX doublers on 3.5-, 14-Mc. c.w. and 3.85-Mc. 'phone. Receivers were NC-200s and batteries powered all gear.

Located at the Omaha Rod and Gun Club near St. Paul, Minn., and with 5 transmitters on the air, 17 operators participated in the activities of W6IE/6, third-high nonclub group. A total of 552 contacts was made for a score of 4908. Gas-driven generators powered rigs on 3.5-, 7-, 14-Mc. c.w. and 3.85-, 14- and 28-Mc. 'phone.

W3AXT/3, operated afield at Conestoga, Pa., by 5 members of the AEC of Lancaster County, was the leader among the ARRL Emergency Corps groups. Calling themselves the Conestoga Glass Arm and Elbow Bending Society for the occasion, this group operated a single battery-powered transmitter on 3.5- and 7-Mc. c.w., and chalked up 226 QSOs for a score of 3389.

V.H.F.-Only

From a favorable location in the Whittier Hills of California, four amateurs had three transmitters operating simultaneously at W6WSQ/6 to produce the outstanding v.h.f.-only score. On 50 Mc, a converted surplus MFB rig, running 8 watts input, and a half-wave dipole enabled them to work 34 stations. An SCR-522 with 25 watts input, an ARC-3 receiver and a sixteen-element beam logged 128 contacts on 144 Mc. A second 522, with a tripler as the output stage, working in conjunction with an ASB-5 receiver and a twin-4 beam added 6 420-Mc. QSOs to the contact total. All power for the set-up was furnished by a portable a.c. generating unit.

Second place, 756 points (31 contacts), in the
v.h.f. class went to a 3-operator single-transmitter station, W3KRJ/3, active from a hilltop in Gambrill State Park, Md. All operation was on 144 Mc. with a PE-103 dynamotor-powered SCR-522 running 20 watts, a homebuilt superhet receiver and a five-element beam. A novel feature of the antenna system was a 20-foot rotatable mast with arrangements for changing from horizontal to vertical polarization at will by means of control ropes.

At Equinox Mountain, Vt., W1NH and W1MEF set up W1NH/1; with a 522 powered by a PE-103, they scored 297 points from 22 contacts for the third-highest reported v.h.f. entry.

Miscellany

Amateurs are resourceful people! Here's a tip on the elimination of standing waves from a 150-ohm Twin-Lead transmission line when it gets extremely wet. The Lancaster Radio Transmitting Society, W3NMR/3, experienced rainy weather Saturday and Sunday morning. Forty-meter contacts kept dropping off in the wee small hours and it was noticed that antenna current was practically nil. Hurried checks showed all to be in order except the antenna loading. After a few minutes of conference the following were rustled up around the cabin shack: 2 raincoats, 1 flashlight, 1 strong set of shoulders, 1 light ham with a long reach and, most important of all, 5 slices of bacon. You can probably guess the rest: the light ham dragging the bacon strips along the feeder while perch precariously on the strong set of shoulders! The net result was antenna current again and ten contacts during the next hour.

W6PDV operated from the “high seas.” After a difficult sail from Santa Barbara, he anchored his 40-foot ketch, the Tiburon, a quarter of a mile off Santa Rosa Island and had an enjoyable time working the gang on 3.55-Mc. phone and 7-Mc. c.w. . . . The boys at W7BTV put out a potent signal on 3.55-Mc. phone with a 365-foot vertical antenna supported by a five-foot Air Corps balloon and worked Alaska . . . “Without a doubt this was the best Field Day to date. Even now, bigger and better plans are being made for next year. The club in general is getting more emergency-minded. Many of our 28-Mc. contacts were made with equipment to be set aside for possible future emergency use.” — Minneapolis Radio Club, W6CRO/9. . . . “Despite heat, insects and frequent threats of rain, we all thoroughly enjoyed the FD, and feel a definite sense of accomplishment as we almost doubled our last year's contact total.” — W4ELO/4. . . . “We found the U.S. war-surplus transmitters ideal for FD operation, both for simple operation and quick QSY. . . . used a field telephone loaned to us by the Canadian army to keep in touch with the various tents. All in all, a fine time was had by all.” — Hamilton Amateur Radio Club, W3EKG. . . . “The Field Day proved to be worth while in every respect. It proved how poorly we were actually prepared to meet a communication emergency, even in the light of advanced planning. Many of our mistakes have been rectified and we are waiting anxiously for next year.” — W2WJU/9. . . . In common with the experience of numerous other groups, the Raritan Valley Radio Club, W2QW/2, had a wet FD. They suggest that in the future a multiplier based on the number of inches of rainfall be allowed! . . . “Weather: terrible, thunderstorm, high winds and antennas down, but through the height of the storm the sound of the gas generator was most reassuring. Suggest new picture on cover of June QST next year. No use encouraging the weather!” — Mountaineer Amateur Radio Association, WSBIA/8. . . . “Much fun had by all. Big excitement when pilot from near-by airfield shot down surplus balloon supporting 75-meter vertical antenna. Plans being made to make next year’s event bigger and bet-
tenna wire." — Radio Club of Tacoma, W7AEA/7. "We sure had a fine time and the experience we gained last year did us a lot of good on this Field Day." — Electric City Radio Club, WSSM/8. "Our location was a medium-wooded area with plenty of trees for antennas, most of which were put up with bow and arrow and light string to pull up rope and antenna wire." — Tri-County Radio Association, W2OM/2. "Movies were made on location to give favorable publicity. These were edited for later television distribution. Some showings have already been made on Eastern stations. A copy of this film is on file and available for amateur use." — Amateur Radio Club of Hollywood, W6BYP/6. "While at our FD location we had the Mayor of Jackson representing the city, the manager of the local Western Union office, the general secretary and the disaster chairman of the local Red Cross, and officials from the local railroads visit us; a list of the local members of the AEC and a list of the Tennessee Emergency Net were given to them. Cooperation with these officials was perfect and we feel assured that we will be called upon promptly in case of an emergency." — Amateur Radio Society of Union University, WAPA/4. "Field Day offered wonderful opportunity for operator training and leadership in organization." — Society of Amateur Radio Operators, W6AEX/6. "We gave the slow ops and the fast ops an opportunity to take part. This naturally cut down our point total, but it also gave all the gang an opportunity to take part, and that's important to our way of thinking." — Racine Megacycle Club Emergency Corps, W9UDU/9. "Although our score may not be much, valuable experience was gained by all who participated." — Mississippi Amateur Radio Club, W5VJ/5. "Our set-up might prove to be of interest. We tied in with a local National Guard outfit, the Headquarters Troop of the 102nd Cavalry, Reconnaissance Group, Mechanized, of Newark, N. J. Our club furnished the radio operators, radio equipment and food. The Headquarters Troop provided living and operating quarters including tables, chairs, cots and blankets and a field kitchen complete with cooks, KPs, and all that goes with meals in the field. The success of our venture clearly indicates that the ham fraternity would do well to include their National Guard units in planning for future contests and emergencies." — Bloomfield Radio Club, W2JC/8.

In concluding this report we wish to express our sincere thanks to club secretaries and others who sent to Headquarters the many interesting and complete reports of operations in the Twelfth ARRL Field Day.

The Thirteenth FD is scheduled in the ARRL Activities Calendar for June 18th and 19th. As in preparing for service in emergencies, advance planning will help to make your operations more successful. It isn't too early now to be thinking and doing something about your participation in the '49 Field Day. See you there! — J. M.

CLUB GROUPS

Scores are tabulated according to the number of transmitters operated simultaneously at each field station. The figures and letters following the club name indicate the number of contacts, the power or power inputs used, the number of participants at each station, and the final score. The "power classification" used in computing the score is indicated by the letters A, B or C after the number of QSOs shown. A indicates power up to and including 30 watts (multiplier of 3); B indicates power over 30, up to and including 100 watts (multiplier of 2); C indicates over 100 watts (multiplier of 1). More than one letter indicates that at different times powers inputs fell within different classifications.

One Transmitter

<table>
<thead>
<tr>
<th>Club Name</th>
<th>QSOs</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Final Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>W6BMP/5 East Texas Amateur Radio Club</td>
<td>152</td>
<td>B</td>
<td>15</td>
<td>129</td>
<td>1377</td>
</tr>
<tr>
<td>W1AZW/1 Flushing Radio Club</td>
<td>118</td>
<td>A</td>
<td>9</td>
<td>127</td>
<td>1377</td>
</tr>
<tr>
<td>W2EZSO/2 Lakeshore Amateur Radio Club</td>
<td>123</td>
<td>A</td>
<td>3</td>
<td>124</td>
<td>1377</td>
</tr>
<tr>
<td>W7MEQ/7 Blue Mountain Radio Club</td>
<td>91</td>
<td>A</td>
<td>6</td>
<td>122</td>
<td>1377</td>
</tr>
<tr>
<td>W7SQ/7 Salem Amateur Radio Club</td>
<td>245</td>
<td>O</td>
<td>10</td>
<td>129</td>
<td>1377</td>
</tr>
<tr>
<td>W7ED/7 Gallatin Amateur Radio Club</td>
<td>57</td>
<td>A</td>
<td>10</td>
<td>115</td>
<td>1377</td>
</tr>
<tr>
<td>W2WY/8 Sioux Falls Amateur Radio Club</td>
<td>188</td>
<td>B</td>
<td>112</td>
<td>1377</td>
<td></td>
</tr>
<tr>
<td>W7PL/7 Pendleton Amateur Radio Club</td>
<td>56</td>
<td>A</td>
<td>7</td>
<td>110</td>
<td>1377</td>
</tr>
<tr>
<td>W3QAA/3 Philadelphia Wireless Assn.</td>
<td>98</td>
<td>A</td>
<td>3</td>
<td>105</td>
<td>1377</td>
</tr>
<tr>
<td>W7DB/0 Delaware Amateur Radio Assn.</td>
<td>149</td>
<td>O</td>
<td>10</td>
<td>129</td>
<td>1377</td>
</tr>
<tr>
<td>W7ME2/7 Valley Radio Club</td>
<td>88</td>
<td>AB</td>
<td>13</td>
<td>93</td>
<td>1377</td>
</tr>
<tr>
<td>W1ADAM/1 Valois Amateur Radio Club</td>
<td>98</td>
<td>A</td>
<td>4</td>
<td>91</td>
<td>1377</td>
</tr>
<tr>
<td>W7SW3/8 Piqua Radio Club</td>
<td>149</td>
<td>B</td>
<td>4</td>
<td>91</td>
<td>1377</td>
</tr>
<tr>
<td>W7YOM/8 Marshfield Amateur Radio Assn.</td>
<td>99</td>
<td>A</td>
<td>11</td>
<td>82</td>
<td>1377</td>
</tr>
</tbody>
</table>

Operating W6ME/6 at Palos Verdes Hills, San Pedro, California, the United Radio Amateur Club placed fourth in the seven-transmitter club class. This view shows their 26-Mc. rotary, several of the tent operating positions and the trailer used as a commisary. Except for a 144-Mc. rig which ran from a 115-volt generator, all equipment was battery-powered.

February 1949
The Nassau Radio Club, K2AC/2, kept five transmitters on the air simultaneously, most of them set up in automobiles or trucks. Here's W2TVL operating the 30-meter c.w. set-up, a BC-696 and a Super Pro.

Three Transmitters Operated Simultaneously

WSTQ/8 Dayton Amateur Radio Assn.  627-  A-  8-  8544
WSTW/2 KBT Radio Club  641-  A-  26-  6548
WSM/3 Electric City Radio Club  477-  A-  10-  6372
W2UE/2 Radio Association of Western New York  434-  A-  22-  6197
W5HBA/5 Cleveland Brassounders Assn.  634-  A-  11-  5921
W5EST/5 Bartlesville Amateur Radio Assn.  231-  A-  24-  5039
W5FRY/3 Eskdale Radio Club  358-  A-  13-  5427
W3QV/3 York Road Radio Club  330-  A-  30-  5076

(Continued on page 110)
FRANCE

The R.E.F., to further celebrate the 25th anniversary of the first trans-Atlantic QSO, will award a commemorative certificate to each participant in the 15th ARRL DX contest who approaches the working conditions of those early days during the current contest. Contacts must be on 3.5-Mc. c.w., and should be between U.S.A./Canada and Europe/North Africa. Those interested in obtaining this certificate should send, prior to May 1, 1949, a suitable summary of the contacts which satisfy the above conditions to R.E.F., 6 Rue du Pont de Lodi, Paris 6°, France.

GERMANY

From a recent Airways and Air Communications Service bulletin we learn that licensing of German national amateurs has been approved by American and British authorities, and that the question is now in the lap of the German Economic Council. The AACS bulletin’s source says that about 800 German amateurs have qualified for their new “DL” calls and, if all goes well, they should be on the air before too long.

PERU

Political events and the institution of martial law forced amateurs in Peru to close down temporarily in September. Though martial law was still in effect on November 8th, OA hams were at that time allowed to resume their activities.

BELGIUM

The following frequency allocations became effective for Belgian amateurs on the first of January: 3510–3625 kc., 7020–7280 kc., 14,050–14,350 kc., 28–30 Mc., 144–146 Mc., 420–460 Mc., 1215–1300 Mc., 2300–2400 Mc., 5650–5850 Mc. and 10,000–10,500 Mc. Above 28 Mc., certain percentage tolerances are specified to insure that the boundaries of the band edges are not violated.

DECEMBER CALENDAR

The December issue of the I.A.R.U. Calendar reviews the affairs of the Union for the year 1948, and this review shows clearly the continuing growth of amateur radio throughout the world. Five new societies were admitted to membership in the I.A.R.U. during the year: Club de Radio Aficionados de Guatemala; Hong Kong Amateur Radio Transmitting Society; Islenzkr Radio Amatorar; Philippine Amateur Radio Association, and Radio Club Peruano.

To these new sister societies the Headquarters of the I.A.R.U., on behalf of the whole membership, extends its warmest welcome and its sincere wishes for continued growth and activity.

WAC AWARDS

The number of WAC certificates issued for a calendar year reached an all-time high in 1948, with a total of 1112 awards as compared with 827 the year before. Of that number, 395 were for work solely by radiotelephony.

As has been previously reported, the only special WAC endorsement now authorized is that for work exclusively on 50 Mc., and to date no such award has been made.

I.A.R.U. MEMBERSHIP

At the close of 1948 the following 38 societies were included in the membership of the I.A.R.U.: Associazione Radiotecnica Italiana; American Radio Relay League; A.R.R.L. (Canadian section); Burma Amateur Radio Society; Chinese (Continued on page 198)

JA2KG, ex-J2AHI, needs little introduction to the world’s amateur fraternity. Operated by Iris and Lloyd Colvin, this station has been prominent in DX operating and contests. Iris has the distinction of being the only licensed woman amateur in Japan, while Lloyd, in his spare (?) time, keeps an eye on the functioning of the JA QSL Bureau.

February 1949
BEAM ELEVATOR

Shown in Fig. 1 is the novel beam-elevating device used at W5DFU. All the hard work is done by a surplus winch unit that is bolted to a framework at the base of the antenna mast. The mast itself extends several feet into a hole in the ground, and is raised and lowered by causing the winch to pull up on a wire-rope cable that is fastened to the bottom of the mast. The wire rope rides on a roller bearing at the point where it goes down into the hole, and this bearing and the rope support the entire weight of the mast and whatever antennas are mounted on it. The mast is of plywood tubing, also a surplus "buy," and is held in a vertical position by additional bearings, in the form of collars, one at the ground level, the other near the top. The antenna system used is a 48-element 144-Mc. array, shown in the "World Above 50 Mc." section of this issue. — Warren J. Weldon, W5DFU.

ANOTHER TVI KINK

Here's a wrinkle that may help to reduce your TVI troubles. Take an ordinary piece of tin-foil, such as might be obtained from the wrapper of a pack of cigarettes, two or three inches wide. Wrap it around the feedline used with the TV set, making a collar that fits closely, yet which does not bind.

Now, starting at the antenna terminals, slide the tinfoil along the line (arrange with a friend to operate your rig while you make the adjustments at the TV set), and watch the interference pattern as you move it slowly along. At some fraction of a wavelength away from the set, the lumped L and C of the tinfoil "tank" will make a very effective trap for the interference without serious detriment to the TV signal. — R. P. Tesco, W2TVL.

[Editor's Note: While this kink may help to detune any parallel components (Paddon, "Parallel Standing Waves," QST, January, 1948) that may be traveling along the feedline, it is not to be assumed that this is a cure-all!]

VARIABLE INDUCTANCE FOR KEYING FILTERS

Here's a little stunt that may be old, but it does the job when a variable inductance is desired in your keying filter. In place of the usual iron-core choke, use the primary of a small 6.3-volt filament transformer as shown in Fig. 2. A variable resistance of about two hundred ohms is connected across the secondary. By varying the resistance across the secondary, a continuous variation of the inductance of the primary is possible. When the secondary is completely shorted, the clicks come through just as though no inductance is in the circuit. The resistance can then be increased until the keying characteristic is as soft or hard as desired. The condenser value varies, of course, depending on the amount of current being keyed, as mentioned in the Handbook. — J. A. Turner, W9LI.
The Publishers of QST assume no responsibility for statements made herein by correspondents.

DOWN TO EARTH

219 Forster Avenue, Elyria, Ohio

Editor, QST:

At any rate, Mr. Lon Warner has a point. Single sideband has been presented in a rather advanced technical manner, and his classes in radio no doubt would be read at the papers thus far published. But I believe that ARRL is not to blame. The papers presented were written by competent engineers and, naturally, were replete with advanced methods of presentation. But before long, somebody will describe a poor man's single-sideband rig, and everybody will be happy. I hope. You at ARRL represent a "cleaning house" for technical information supplied to you by members' papers. If simple stuff isn't expensive, and rather high-powered, but things are moving. From QRM were taken into consideration. V.h.f.-land everybody will be happy. I hope. You at ARRL advanced methods of presentation. But before long, some competent engineers and, naturally, were replete with such a contrivance that can help better our lot, let's show some appreciation for their efforts.

—D. H. Stone, W6BOY

MEMBERSHIP DUES

4713 Chester, Kinnear Street, Philadelphia, Pa.

Editor, QST:

I'm sorry but I have discontinued QST because of the price. I feel I cannot afford it just like I can't afford the present-day prices of ham gear. There are a couple of other radio magazines that still hold the same price. I realize that prices for publishing, etc., have gone up but my pay still remains the same. I think this is true of a great number of hams.

Quite a few in our club are not renewing or not going to renew when theirs run out for the same reason. When the price gets down to a reasonable one, then I'll be only too glad to join again.

—E. M. Welch, 2nd, WSN7H

PREPAREDNESS DEMONSTRATION

225 Baker Ave., Webster Groves 19, Mo.

Editor, QST:

Our Maplewood Chapter, Order of DeMolay, for boys, requested the Egyptian Radio Club to put on a ham radio program for them. The policy of the club has long been one of promoting good will for amateur radio with the lay public and has embarked upon an educational program for the purpose, so the invitation from the boys was welcomed.

The master control station was set up at the Masonic Temple in Maplewood, a suburb of St. Louis. It was explained that most of the equipment used had seen service before in several flood emergencies, and was always available when needed. The main transmitter was a 25-watt 'phone job set up to operate on 10 meters with a 500-ohm dipole strung up across the stage in the auditorium. At the same

(Continued on page 183)

February 1949
The ARRL "DX Operating Code." Designated as Operating Aid No. 5, the ARRL DX Operating Code is printed in full this month in "How's DX?" It consists of two parts, one for foreign amateurs and one for W/VE amateurs, and is aimed at discouraging the common ill-advised practices of amateurs interested in DX work. Operating Aid No. 5 is printed on two sides of a card of QSL size, with the W/VE code on one side and the foreign code on the other, and is available free upon request of any amateur.

The points covered in this code were arrived at after consulting a cross section of DX operating amateurs in this country and foreign societies abroad. It is aimed at doing the greatest good for the greatest number. Foreign distribution will be emphasized. It is hoped that it will be followed by both W/VE and foreign amateur stations, and that it will result in making DX more enjoyable for everybody. Post a copy at your operating position and refer to it frequently when you are working DX.

Useful New Meanings and Changes in International Q Code. As indicated in "Happenings" last month, some modifications and extensions of Q Code approved at ACy for international usage became available as of the first of this year. The new ARRL Handbook will show some new wording of familiar Q signals, mostly of a minor character, however. One or two much-used signals have been changed in more than a minor way. Note below two new meanings. Amateurs, of course, will continue to answer QRI? with 1:1-9 in RST-system definitions.

QRI How is the tone of my transmission? The tone of your transmission is . . . . [1. good; 2. variable; 3. bad].

QRX When will you call me again? I will call you again at . . . . hours [on . . . . kc.].

Four new signals in Q Code are noted to have meanings that could be used to great advantage in ham work. Write these down or clip them out and put them to work in your QSOs and net operations:

QSN Did you hear me [or . . . .] on . . . .?

QST I have been unable to break in on your transmission.

QTV Shall I stand guard for you on . . . . kc.?

QTX Will you keep your station open for further communication with me until further notice [or until . . . . hours]? I will keep my station open for further communication with you until further notice [or until . . . . hours].

28-Mc. Volunteers Wanted! All amateur operators who work ten-meter 'phone or c.w. will find it of interest to consider devoting some regular time to participation in a program to assist newcomers who are working for tickets to attain that goal. A list of club and individual stations that have been mimeographed and is available free upon request to any interested person on request. If you have a good station on "ten" wouldn't you like to take part and be listed in the next such compilation for QST? If so, notify ARRL by card or letter. Give your call, frequency, days of transmission through March and April, and indicate the speed ranges covered. The ARRL Training Aids section will be pleased to send you helpful suggestions and information calculated to assist in running any code-practice program if this is requested in indicating your tentative schedule. A strong ham radio constantly needs new amateurs who have the usual qualifications and know-how; do your part!

Best DX . . . . and Sportsmanship in ARRL's 15th DX Competition. The annual DX fray starts this month. See rules, January QST, and data on simplified optional reporting form in this issue. If more hams like the new method, we may standardize on that type of reporting form next year. It's up to you.

Believe it or not, how one operates in a sporting event such as ARRL contests is more important to the decent individual participant than what the score is. Most entrants are inherently true sportsmen. This is constantly shown in the honest requests ARRL is always receiving for advice and interpretation of rules and proposed methods of working. ARRL is delighted to write participants on points raised at any time. Of course, a few entrants have from time to time kidded themselves that outsmarting the rules or the other fellow, or stretching rules to meet personal whim, or getting careless of rules or even going off frequency for personal benefit, is "the thing." There is automatic agreement of every participant in taking part in an ARRL contest that Contest Committee decisions and rulings are final, but regardless of this a few amateurs
seem to want to be radio lawyers and beat the game. Over the years a lot of disqualifications, reclassifications and interpretations on entries have been made, as facts from the fraternity at large required. In more cases, and in the final analysis, local amateur public opinion has put those who delude themselves on the spot. In the "SS," for example, we even have by letter a report of a visit one contestant paused to make to another's West Coast station during the contest. He found a man using "bright-orange" 450THs, who boasted that he would report as a 100-watt-level station! We pause to ask, "Who is kidding whom?" Not only the visitor but a majority of active hams in the local community certainly know where such a man fits, in their estimation.

If and when a larger number of amateurs is like that we shall (frankly) discontinue offering certifications and awards in the fields affected. In the meantime we call upon amateurs to show any such fellows up to their faces locally, to write them straight and to the point, with copies to the clubs the men belong to and to ARRL for information. Even where this has not been done, the data we receive show that when there are local cheaters they quickly are well-known, and the word quietly spread. How "tinsel" must any award or certification seem, if in a man's heart he knows he didn't compete fairly and squarely for the goal! Let us assure you, however, there are really fewer such men than alibis and talk might make you believe.

Please follow the spirit and letter of the contest rules. Make your operating also in accordance with the new DX Operating Code. Watch frequency and keep in the officially-designated amateur bands. Avoid parasites, clicks, chirps and poor notes; doing so will avoid FCC trouble and reports that, as usual, will disqualify. In conclusion, luck and DX in the 15th International DX Competition. Have a good time, and let's make it a sporting proposition all the way.

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FIRST STORM OF SEASON PARALYZES MIDWEST COMMUNICATIONS

Amateurs between the Mississippi and the Rockies "turned to" with a vengeance between November 18th and 21st when an unseasonably-early blizzard destroyed wire lines throughout large areas of South Dakota, Iowa, Nebraska and Kansas. Hams manned portables at many towns, among them Sheldon, Rock Valley, Ireton and Milford, all in Iowa. Members of the several traffic and emergency nets throughout the area contributed to the successful handling of Red Cross, public-utility and railroad traffic and thus materially hastened the resumption of normal conditions. The liaison between the various nets and trunk lines was notably well above what it had been in many past emergencies of this nature, and thus virtually every amateur in the affected area was able to contribute materially to this fine demonstration of the ability of amateur radio to render a public service. The staccato crackle of high-speed c.w. circuits seemed to join with the precise diction of the 'phone traffic handlers in a symphony of unselfish and uncompensated devotion to duty.

The following amateur calls, while by no means a list of all participants, are indicative of the scope of the emergency: W4FWH; W5s GG, IZM, QT; W7s GCS, GTN; W8s CTC, PVB, RHZ, WXl, ZAW; W9s DAX, DFU, EGV, FGU, FRJ, GPS, GQS, KOW, MRY, WDK; W0s AA, AEH, APO, AHW, AID, ANU, BJJ, BQJ, CC, CQC, CUL, DCC, DCK, DDM, DHO, DK, DNX, DOP, DQW, DBE, EDN, EFT, ELH, ENV, EUN, EZU, FEE, PKB, FLM, FON, FP, FTE, FUU, GCT, GDC, GEP, HFT, HYR, ICV, IFR, IFX, IQY, IQZ, IXR, IYB, IYR, JAP, JDV, JDX, JED, JRR, KAA, KLC, KQX, KTV, KSS, KVD, LDW, LJF, LOU, LRY, MGV, MHC, MNN, MOM, MTS, MXC, NBC, NCV, NGM, NKK, OEV, OVS, OWP, PBX, PGX, PH1, PHR, PNN, PP, PUE, PZK, QDX, QXR, RHQ, RMK, RNF, RQQ, SQF, SQO, SRR, SWI, TGF, TXN, TXD, TTL, TXT, TYR, UDQ, UFL, UFP, UGD, UHC, UID, UMD, UQM, UVJ, VVU, WGP, WLM, WLY, YPN and YQR.

BRIEF

Talking about unification of the armed forces, KA1CF (USA), W4FVI/KX6 (USAAP), W3XFB/KG6 (USN) and KG6DO (USMC) recently had a four-way rag-chew and made plans to set up an "Interisland Rag-Chewers Club."

February 1949
WITH THE A.E.C.

When a bridge across the Wisconsin River near Spring Green, Wis., collapsed in early November, all telephone communications between Spring Green, a community of 1000 families, and the outside world were interrupted for several hours. W9s AMN, BKD, ESJ, HOW and KIZ kept the town "in touch" until normal facilities were restored. This is another example of the type of emergency which can hit your community. QRV?

Last year's Midwest blizzard emergency was the setting in which Indiana amateurs contributed directly to the saving of a life. A resident of Berne, Ind., suffering a sudden siege of hemor­rhages after returning to his home from a hospital in Fort Wayne, was unable to summon help, the landwires being out of service, until the town's telephone operator suggested the assistance of W9HAV, the only ham in Berne. W9HAV had fortunately equipped his station with emergency power, and, with the assistance of W9BKJ and W9CLF, medical attention was provided in time. Preparedness pays off when wires are down!

TRAFFIC TOPICS

The Oregon Traffic Net is now open for business at 7:30 P.M. PST, Monday through Friday. Connections are available with the Pioneer Net and other regional nets and trunk lines.

Some good operating under difficulty was done during the SS Contest. VE2ATR had a rush message for Hull, Que., regarding a seriously-ill person. With the assistance of VE2BB, the message was delivered and an answer obtained and delivered within one and a half hours. The family of the addressee at Hull obtained the information in time to make the trip to be at the bedside. The messages went through speedily, even with the large amount of QRM during the contest.

Traffic Outlet is now operating on a team basis. Each section represented has a team whose members assist by reporting into TO. The captain of each team takes the responsibility for having a station assigned to represent his section during each night of operation. It is suggested that other nets might try the team idea to insure coverage of specific localities.

28-MC. CODE-PRACTICE STATIONS

The following is a new list of amateur stations transmitting code practice on 28 Mc. and higher frequencies. This list supersedes all previous lists.

A handy mimeographed copy is available upon request:

W1LDD, Charles T. Fernandez, 81 Warren St., Roxbury 19, Mass., 144.026 Mc., Mon., Wed., Fri., 8:00 P.M. EST, until May, 1949, 5-10-15-20-30 w.p.m.

W1NEM, Hartford County Amateur Radio Assn., Hartford, Conn., 29,000 kc., Tues. & Thurs., 7-8 P.M. EST, A-2 & A-3.

W1PFQ, W. C. Loeffler, 181 Lowell, Methuen, Mass., 29.5 Mc., 8 P.M. EST, Monday.

W2NIB, A. F. Persichetty, 67 Hunton St., Dongan Hills, N. Y., 28.5 Mc., 7:30-8:30 P.M. EST, Mon., Wed., Thurs.

Andrew Jackson High School Amateur Radio Club (W2VRC, W2YHB, W2CYC), 116th Ave. & Francis Lewis Blvd., St. Albans 11, N. Y., 29.5 Mc., 2:00 P.M. EST, Monday thru Friday.

Radio Assn. of Western New York (various member stations), 28,000 kc., 9:00 P.M. EST, Mon., Wed., Fri.

W7FST, Charles W. DeRomer, Route 2, Box 358, Clearfield, Utah, 29,000 kc., 3:00-4:30 P.M. MST, daily except Saturday, Sunday & holidays, progressive speeds.

W3KOE, M. L. Silker, RDF 3, Drake Rd., Bedford, Ohio, 28,657.5 kc., Wed., Fri., 8:00-8:30 P.M. EST, 8-15 w.p.m.

W8FQB, A. R. Gaeth, RFD 3, Drake Rd., Bedford, Ohio, 28,657.5 kc., Wed., Fri., 8:00-8:30 P.M. EST, progressive speeds.

W9KQE, M. L. Silker, RDF 3, Drake Rd., Bedford, Ohio, 28,657.5 kc., Wed., Fri., 8:00-8:30 P.M. EST, 8-15 w.p.m.


W3RU, A. J. Biekerton, 414 Winnett Ave., Toronto 12, Ont., 28,240 kc., 7:30 P.M. EST, Monday.

Schedules of other stations sending code practice on 28 Mc. and higher are solicited. Complete information on sending such practice is available upon request. The above list will be supplemented on these pages from time to time.

During the annual celebration in honor of the late Ezra Meeker, pioneer and writer, who did much to "open" the Pacific Northwest, members of the Valley Radio Club of Puyallup, Washington, set up an emergency-powered station to handle traffic for the many celebrants on August 6th and 7th. Illustrated at the installation are (l. to r.) W7MCU, W7MPH, W7IVJ, W7YU, W7THI, W7KHL. Other participants in the demonstration of the amateur's ability to render public service were W7THZ, W7IJK, W7HMQ, W7LEC, W7MTX and W7CKT.
CODE PROFICIENCY PROGRAM

Effective during the month of February and continuing thereafter, W60WP’s Qualifying Run transmissions on 3590 and 7248 kc. will be sent approximately two weeks earlier each month than those of W1AW and W0TQD. The next qualifying run from W60WP only will be transmitted on February 4th at 1900 PST on the above frequencies. On Saturday, March 5th, W60WP will again transmit a qualifying run on the same frequencies and time. For additional dates, see the ARRL Activities Calendar elsewhere in this issue. These W60WP-only runs will have different text from the runs sent by W1AW and W0TQD, but copy will be handled in exactly the same way as the transmission from W1AW and W0TQD.

The next qualifying run from W1AW/W0TQD will be made on February 15th at 2200 EST. Identical texts will be sent simultaneously by automatic transmitters. Frequencies of transmission from W1AW will be 3555, 7215, 14,100, 28,060, 52,000 and 146,000 kc., from W0TQD 3544 kc.

Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the five speeds transmitted, 15 through 85 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m., you may try later for endorsement stickers.

Code-practice transmissions are made from W1AW each evening, Monday through Friday, at 10:00 P.M. EST. References to texts used on several of the transmissions are given below. These make it possible to check your copy. To get sending practice hook up your own key and buzzer and attempt to send in step with W1AW.

**MEET THE SCMs**

The occasion of the Midwest Division Convention provided the photo for our column this month. Shown above exchanging greetings at Wichita are, left, Alvin B. Unruh, W0A WP, retiring Kansas SCM, and Earl W. Johnston, W0ICV, his successor, who took office October 29th. Both are well-known Midwest Division amateurs.

“Abie” Unruh was SCM of Kansas from 1940 until his recent retirement. For the past year he has also been an assistant director of the division. A radio amateur since 1923, he held the call 9BIO until 1925, at which time he was assigned the call 9A WP. Until late 1945 he served as an electronic test engineer at Boeing-Wichita Airplane Co. Following this he worked as c.w. operator at KGPZ, the Wichita police. In April of 1948, he returned to Boeing, where he is now employed as supervisor of the electronic test group.

W0A WP operates both ‘phone and c.w. An ART-13 has been modified to serve as an exciter to drive any one of four final amplifiers running 300 to 500 watts. Ham interests center around rag-chewing, DX, and contest work. “Abie’s” operating achievements include WAC, WAS, RCC, and a 35-w.p.m. Code Proficiency Award. Also an old-timer, “Erl” Johnston, W0ICV, has been a ham since 1931. A graduate of Kansas University, he has been associated with the Topeka Police Dept. for many years. He now is chief of the radio division of the department. The ‘phone and c.w. transmitters in use testify to his design and construction engineering ability. Prior to his election as SCM, Earl was EC for Kansas Zone 3. In 1947 he accepted appointment as Kansas PAM. Since then he has organized an active and enthusiastic ‘phone net that is second to none. He was president of the Kaw Valley Radio Club in 1942 and is now its vice-president and treasurer.

The transmitters in use at W0ICV are as follows: HT-18 exciter-807-35T-p.p. 75Ts, modulated by 811s; HT-18-804-8005, modulated by .5514s; 6L6-807 with 6N7 modulator; 6F8-6L6-807, 6N7 modulator, for 28.5 Mc. mobile. The receiver is an NC-173 with an R-9er and a 6-10 Gonsett converter. For emergency work, the two 807 rigs and the 173 are powered by dynamotors. Antennas include a 75-meter doublet, a 66-foot end-fed wire, 14-Mc. folded twin triplex, and three-element beams for 6 and 10 meters.

As minor hobbies, “Erl” enjoys fishing, hunting, football and baseball.
HIGH 1948 "SS" SCORES

Another ARRL Sweepstakes has become part of amateur contest history; added to that history by the 15th SS were operating achievements and broken records galore! Competition was at its keenest ever and the bands from 3.5 through 28 Mc. abounded with stations busily engaged in SS exchanges. Contact totals in both the c.w. and 'phone portions of the contest were broken by wide margins, indicating that participation will probably set a new all-time high.

The leading claimed score in the c.w. section was submitted by Larry LeKashman, W2IOJ. Larry worked 1025 stations and all 72 League sections for a grand total of 183,690 points. W3BES placed a close second; Jerry topped his all-time high SS contact record. He used high power in this SS as an experiment in order to compare c.w. entrants, W6QEU, W1ATE and W6GZD, who claimed honors seem assured for W3DGM, who had 94.110 contacts, all sections worked. All figures are wide margins, indicating that participation will probably set a new all-time high.

On c.w. the only participants to claim all 72 sections worked, and sections worked. All figures are wide margins, indicating that participation will probably set a new all-time high.

The following listing shows score, stations worked, and sections worked. All figures are claimed by the contestants and are subject to further checking. Final results will appear in a later issue of QST.

<table>
<thead>
<tr>
<th>Call</th>
<th>Orig. Del. Rel.</th>
<th>Credit</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>W5GSZ</td>
<td>7</td>
<td>26</td>
<td>1298</td>
</tr>
<tr>
<td>W1HMM</td>
<td>15</td>
<td>8</td>
<td>1206</td>
</tr>
<tr>
<td>W7CTK</td>
<td>0</td>
<td>15</td>
<td>790</td>
</tr>
<tr>
<td>W6BLY*</td>
<td>5</td>
<td>40</td>
<td>672</td>
</tr>
<tr>
<td>W6CDC*</td>
<td>638</td>
<td>6</td>
<td>64</td>
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<tr>
<td>W6FDL</td>
<td>18</td>
<td>136</td>
<td>330</td>
</tr>
<tr>
<td>W7CZY</td>
<td>27</td>
<td>45</td>
<td>529</td>
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<tr>
<td>W6REB</td>
<td>18</td>
<td>26</td>
<td>542</td>
</tr>
<tr>
<td>W7ED</td>
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<td>23</td>
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</tr>
<tr>
<td>W2RUF</td>
<td>21</td>
<td>27</td>
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<td>5</td>
<td>22</td>
<td>502</td>
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<tr>
<td>W4WKC</td>
<td>11</td>
<td>8</td>
<td>458</td>
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<tr>
<td>W9DDE</td>
<td>17</td>
<td>133</td>
<td>220</td>
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The following made the BPL with over 100 "deliveries plus extra delivery credits":

<table>
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<th>Call</th>
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<th>Credit</th>
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<td>W1NJM</td>
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<tr>
<td>W1BDI</td>
<td>179</td>
<td>W3HNI</td>
<td>127</td>
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<tr>
<td>W1HII</td>
<td>133</td>
<td>KG6DI</td>
<td>125</td>
</tr>
</tbody>
</table>

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

* October Traffic.

BRASS POUNDERS LEAGUE

(November Traffic)

QST for
COUNTRIES-LIST CHANGES

Since the adoption of the ARRL Postwar Countries List, the official standard used in connection with the annual DX Competition and the DX Century Club, several changes have been reported in this department. We are pleased to announce the addition of two more countries to the list: Norfolk Island, VK9, and Vatican City, HV1. Make these changes on your list and watch the Operating News department for further changes and additions.

DX CENTURY CLUB AWARDS

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

HONOR ROLL

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</tr>
<tr>
<td>W3BES</td>
<td>197</td>
</tr>
<tr>
<td>W3BHA</td>
<td>191</td>
</tr>
<tr>
<td>G2PL</td>
<td>191</td>
</tr>
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</table>

NEW MEMBERS

<table>
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<tr>
<th>Callsign</th>
<th>Worked Countries</th>
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<td>G3DO</td>
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ELECTION NOTICE

(To all ARRL Members residing in the Sections listed below)

You are hereby notified that an election for Section Communications Manager is about to be held in your respective Sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the section concerned, in good standing, are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been a licensed amateur for at least two years and similarly a full member of the League for at least one continuous year immediately prior to his nomination.

Petitions must be in West Hartford, Conn., on or before noon on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, and station call of the candidate should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, with no time to return invalid petitions for additions, a petition may be found invalid by reason of expiring memberships, individual signers uncertain or ignorant of their membership status, etc.

The following nomination form is suggested:

Communications Manager, ARRL [Place and date]

Dear [Section Name]:

To all ARRL Members residing in the Section, I hereby nominate [Candidate Name] as candidate for Section Communications Manager for this Section for the next two-year term of office.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence the names of all eligible candidates. You are urged to take the initiative and file nominating petitions immediately. This is your opportunity to put the man of your choice in office.

--F. E. Handy, Communications Manager

Section Closing Date SOM Term Ends

Oregon Mar. 1, 1949 Raleigh A. Monkres Nov. 22, 1948
San Diego Mar. 1, 1949 Irvin L. Emig Dec. 15, 1948
Yukon Mar. 1, 1949 W. R. Williamson Mar. 17, 1949
Western Pennsylvania Mar. 1, 1949 Ernest J. Hinkle Mar. 17, 1949

ELECTION RESULTS

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

Alaska Charles M. Gray, K171Q Sept. 15, 1948
Sacramento Valley Ronald G. Martin, W6ZF Nov. 1, 1948
South Carolina Ted Ferguson, W4BQE/ANG Dec. 2, 1948

In the Eastern New York Section of the Hudson Division, Mr. Frank E. Fisher, W4BF/AST Dec. 15, 1948

In the Western Massachusetts Section of the New England Division, Mr. Premises B. Bailey, W1AZW, and Mr. H. M. Baier, W1NY, were nominated. Mr. Bailey received 55 votes and Mr. Baier received 79 votes. Mr. Bailey’s term of office began November 10, 1948.

In the Eastern New York Section of the Hudson Division, Mr. Fred Johnson, W2QOD, and Mr. Ward Alexander, W2NY, were nominated. Mr. Skinner received 119 votes and Mr. Alexander received 111 votes. Mr. Skinner’s term of office began November 30, 1948.

In the Saskatchewan Section of the Prairie Division, Mr. J. H. Goodridge, VE5DW, and Mr. Harold Horn, VE5HR, were nominated. Mr. Goodridge received 43 votes and Mr. Horn received 33 votes. Mr. Goodridge’s term of office began December 16, 1948.

February 1949
**Section Emergency Coordinators of the ARRL Emergency Corps**

The Section Emergency Coordinator is appointed by the SCM to take charge of the promotion of the ARRL Emergency Corps organization throughout the Section. He acts as the SCM’s executive in the furthering of provisions for emergency amateur radio communications in every community likely to suffer in case of a communications emergency. One of the duties of the SEC is to recommend the appointment of Emergency Coordinators for the various communities in his Section. Does your town have an ECP? If not, recommend the name of a likely prospective. The SEC invites your questions concerning the status of the AEC in your Section.

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<td>V. T. Kenney</td>
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<td>New Jersey</td>
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*Note: The table above represents the Section Emergency Coordinators of the ARRL Emergency Corps as of the information provided.*
VHF contest enthusiasts had their third opportunity in 1948 to match skill and equipment against others in their respective ARRL sections during the V.H.F. QSO Party of September 25th and 26th. Like the January V.H.F. SS and the May QSO Party, the September affair was one in which participants competed for section certificate awards. An award is being made to the top-scoring amateur in 28 of the 29 ARRL sections from which activity was reported.

The scoring system for this contest was the same as that used in the May party, thus there is a basis for comparing scores in the two activities. Jim Thayer, W1FZ, was the outstanding operator and topped the highest score made in the May party by making 120 contacts and a multiplier of 15 for a total of 2070 points. Operations were conducted on 50, 144 and 235 Mc. from the summit of Blue Job Mountain (antenna altitude of 1400 feet above sea level) at Farmington, N. H. In order to get W1FZ/1 on the air it was necessary to pack all equipment, including a 180-pound 500-watt gasoline-driven generator unit, about one-half mile up the mountain. Gear was set up in a fire lookout tower with a two-over-six rotary-beam combination mounted through a trap door in the roof; a five-element 220-Mc. beam was mounted out one windows. Input on 6 and 2 meters was about 75 watts, and 24 watts on 220 Mc. The rigs used an 829 on “2,” and an HY-75 oscillator provided a signal on “114,” W1DGV and Hervey Varney of Farmington assisted in setting up the gear.

Second-highest score was made by W1CTW, top man in the May party, Cal chalked up 1690 points from 106 contacts and a multiplier of 13. Scores in excess of 300 points were made by the following: W2NSD 1690, W2IQQ 1248, W1QXE 1196, W1HDQ 986, W1MHL 666, W1AQE 444, VE3AIB 426, W1QYV 405, W1BDF 390, WIJSM 384, W9OBW 364, W1QGH/1 348.

The contact totals of the previous two contests were topped by W2NSD, who had 146 QSOs, all on 144 Mc. Next in line with 50 or more QSOs: W1HDQ 17, W1FZ/1 15, W1CTW 13, W1QXO, W1RO and W2IQQ each used 50 and 144 Mc. and had multipliers of 13, 13 and 12 respectively. W2NSD’s multiplier of 10 deserves special mention as the highest accomplished through operation on one band.

We look forward to new v.h.f. score records in the Second Annual V.H.F. Sweepstakes which will have been held shortly before you receive this issue. Refer to “The World Above 50 Mc.” in March QST for the highlights of that competition. Also, mark your calendar to reserve the weekend of June 4th-5th for another v.h.f. contest.

**SCORES**

(Scores are grouped by divisions and sections. . . . The operator of the station first-listed in each section is winner for that section. . . . The number of contacts and the multiplier are given following the score. . . . Letters indicate band or bands used: A for 50, B for 144, C for 283, and D for 420 Mc.)

### ATLANTIC DIVISION

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(Continued on page 108)
Station Activities

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

ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, Jerry Mathis, WA3CQ is proud of his WAS membership. WA3CQ is also the president of the Philadelphia Stock Exchange and is interested in communications for prospective stock buyers. The office of the club is in the North East Radio Station Clubhouse at 1743 North 15th Street, Philadelphia.

WESTERN NEW YORK — SCM, Harding A. Clark, W2FGT — SEC: SJW, RM: FCQ. The New York Stock New York Speed Net is now operating at 9 p.m., on 3720 kc. Those interested in a New York Speed Net are invited to contact W2FGT or SMX.

MID-ATLANTIC STATES — SCM, Charles T. Monahan, W2AM, is proud of his WAS contacts on 28 Mc. AQN has appointed eight Assistant Secretary-Treasurers and Secretary-Treasurers for the 1947-48 season.

NORTHERN NEW JERSEY — SCM, Edward J. Harrington, W2AM — SEC: CMJ, RM: FQA. The New York Stock Exchange Radio Club has a new member, W2AM, who is interested in communications for prospective stock buyers. The office of the club is in the Northern New Jersey Stock Exchange Building at 111 Broad Street, Jersey City.

SOUTH NEW JERSEY — SCM, G. W. (Bill) Tunnell, W2OXX — The Hunterdon County Amateur Radio Association exhibited an amateur station (W2IMA) in a Flemington store window in observance of National Radio Week. A former trainer of the Merchantville Club reports that his club has obtained his W2IMF license. The New Jersey Radio Assn. will have a new group of officers by the time this goes to press. Suggestions — How about a past-president? New Jersey Radio Assn. has been worked by a past officer, thus permitting us to keep informed of the activities of those who have contributed so freely of their time for the advancement of ham radio. This is the month for the traffic spot this month. BEI is rebuilding power supplies. NF2F has new antenna 70 feet high. RHY is building a 500-watt rig on 28 Mc. 300 amateurs in Swing Shift Net.

Continued on page 78
For many years amateurs have been "winding their own" transmitter coils; fortunately, transmitter tank L/C ratios aren't too critical and the Handbook has carried a chart showing the proper value of tuning capacity to use on each band, so we have been able to obtain satisfactory results.

However, with the progress of the art, more and more accent is being placed on performance, safety, rapid band changing, etc. The transmitters in many amateur stations today, although home-made, have definitely commercial appearance and performance, and quite a number reflect the application of considerable thought and labor in an effort to extinguish the band-changing nuisance factor.

Until recently, the common approach to the problem of eliminating plug-in coils in a transmitter has been the use of a single tapped coil or a group of individual coils permanently mounted within the rig with selection being made by some sort of switching arrangement. Such systems afford the advantages of increased safety to the operator, no unused coils lying around the shack to trip over and less time and effort required in changing bands than when plug-in coils are used; but disadvantages also appear in the form of an additional control (the switch), increased length of R. F. paths, contact resistances, and lay-out difficulties.

The National MB-150 Multi-Band Tank provides the amateur with a new approach, for it does the job on all bands from 80 through 10 meters without plug-in coils or switches, requiring only that its dial be turned to the proper setting. The MB-150 is suitable for power inputs up to 150 watts, which is plenty for amateurs living in congested areas if BCI or TVI is to be avoided without going to a lot of trouble. For high power rigs, the MB-150 will find application in the driver plate and final grid circuits.

Many of us have employed the dodge of covering two adjacent bands with a single coil and condenser, with the lower frequency band being resonated near the tuning condenser's maximum capacity and the higher frequency band near the low capacity end of the condenser's range. This system, however, cannot be extended to cover 80 through 10 meters effectively.

The MB-150 combines two circuits that cover 80 through 40 and 20 through 10 meters, respectively, in such a way that one pair of input terminals and one pair of output terminals can be used. The effectiveness of each circuit is maintained, but as would be anticipated, the circuit is tuned to two frequencies at each setting of the dial. The design of this unit is such that the two resonant frequencies are not harmonically related at any dial setting in the amateur bands and there are no resonances outside the 3.5 to 30 mc. range. These design considerations assure that your transmitter will not have any spurious radiations due to resonances in the MB-150 unit. The usual problems of parasitic oscillation or oscillation due to improper neutralization may be encountered just as with a conventional coil and condenser arrangement. Now, if we can work out some method whereby the MB-150 will tune itself . . . ! * ? ! !

— Ralph S. Hawkins
ILLINOIS — SCM, Lloyd E. Hupkina, W6VJ — GLZ has been appointed Section Emergency Coordinator, and is newly-elected Alternate Director for the Central Division. EVJ visited the Chicago Mobile Radio Club and Chicago Area Radio Club Council meetings. He spoke to the Rock Island Club officers for the coming year: TLC, pres.; ZEN, vice-pres.; and NLI, secretary. The Midwest VHF Club held a hamfest at the Chicago Zoological Park, with C7Z the winner. BIR reports from Korea that he is working at III, A2 as third operator and is the only ham in that country. BIR’s QSOs are spread out over the entire band. DJV worked 552 stations in 63 sections on c.w. In CW, BQZ helped CWZ put a new contact on 144 Mc. BZU is now OES. QGQ is new EC, Central Division Director. Traffic: (Oct.) W9MUM 39.

NORTH DAKOTA — SCM, Paul M. Bessette, W5ECD — The Grand Forks and Fargo Club held a mixer in its famous joint meetings. Attending the get-together at Fargo were: CGH, JNF, YAV, UNG, RGT, GZD, TUF, KAD, HUO, BQZ, CAQ, OTJ, RNS, JVP, SHI, ENK, KZL, FST, YZV, ZNE, ANC, and PV8. Edmore is on the map with JIF’s 28-Mc. job. KBQ, now 6DPF, is working the world on 28-Mc. traffic when home. ESJ has the mobile rig completely finished. IQW has been reporting into both the ‘phone and code and theory class and an advanced theory class. SZL has a new rig and new house to put it in. CBM got his f.m. working. FBV is going to rebuild to the 500-watt P.A. He plans to attend the big HamCorps thing this spring! Traffic: SSW 105, GZD 55, KZL 50, ZCM 15, LHB 13.

DAKOTA DIVISION

ARKANSAS — SCM, Marshall Riggs, WJCEA — FA has new 25-watt 807 rig on 3.5 and 3.85 Mc. QLO is new call in the State running 28-Mc. and P.A. He is working 144-Mc. DX with three-element C.E. An old-timer, 28-Mc. BQG made the rounds of MSN members in Minne­nax. BBW has a band for each band from 3.5 to 144 Mc. GKO’s new rig should be ready in a week. AKB is working 3.85 Mc. BGY made the rounds of MSN members in Minne­pia. BBW has a band for each band from 3.5 to 144 Mc. GKO’s new rig should be ready in a week. AKB is working 3.85 Mc. BGY made the rounds of MSN members in Minne­nax. BBW has a band for each band from 3.5 to 144 Mc. GKO’s new rig should be ready in a week. AKB is working

CENTRAL DIVISION

MINNESOTA — SCM, Walter G. Haskeopp, WCWB — RITO is using Collins 32V-1 and is working 28-Mc. DX with three-element beam and new 3.85-Mc. ‘phone rig. AIK has BC-610E. YBM is going to rebuild his old 3.85-Mc. rig. The Kickapoo Radio Opera­como joined the Emergency Corps. FIW is the new call of ZC6UN, but still doesn’t believe it. PCZ is new local running converted HC-457 (slaves!) and operates on 7 Mc. with BC-459 on 7 Mc. JIC has been QRT because he’s going to Mexico. YBM has returned from visiting the A.M. job. BGY has new rig and new house to put it in. BQU is now OBS on 8.5 and 144-Mc. phone for the first time postwar. V7 0 if now is N8HJ. Traffic: W9LFK 150, ESJ 138, SHN 127, DNP 48, ANM 41, FST 44, CWZ 28, CBE 27, DZS 24, DJV 21, DKH 12.

WAUBUKA — SRC, Elmer A. Hupkina, WM4N, will join the Emergency Corps. FIW is the new call of ZC6UN, but still doesn’t believe it. PCZ is new local running converted HC-457 (slaves!) and operates on 7 Mc. with BC-459 on 7 Mc. JIC has been QRT because he’s going to Mexico. YBM has returned from visiting the A.M. job. BGY has new rig and new house to put it in. BQU is now OBS on 8.5 and 144-Mc. phone for the first time postwar. V7 0 if now is N8HJ. Traffic: W9LFK 150, ESJ 138, SHN 127, DNP 48, ANM 41, FST 44, CWZ 28, CBE 27, DZS 24, DJV 21, DKH 12.
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MICHIGAN — SCM, Joseph R. Bellan, Jr., W8SCW — SEC: G8H, RMA: G8J, NOE, PVB, and UVK. G8K has been appointed RM and is net manager of the 7 P.M. QIVL Net on Saturdays and holidays. TXC says the ‘phone net is rocking along nicely. KYP is an outlet for West Virginia and Ohio traffic. WVJF, in Hollywood, Fla., was worked by CDA and says hello to KYPers. The Owensboro Amateur Radio Society will hold its second annual midwinter ham reunion March 6th and 7th. For particulars contact JB. Traffic: WA6FPQ 136, BAZ 113, YPH 86, ALR 41, CDA 38, JCN 28, MXW 23, TIX 12, NVK 11, W614, HAY 4, HYN 3.

NEW YORK CITY AND LONG ISLAND — SCM, Frank J. Skinner, W2EQD — SEC: G8H, RMA: G8J, NOE, PVB, and UVK. G8K has been appointed RM and is net manager of the 7 P.M. QIVL Net on Mondays. TRN has a nice traffic total and just misses making the 8PL. Traffic: W8TRN 492, TRN 360, MDA 25, UEB 21, USN, RX, BI, MIZZ, NGE, HKU, and VT were all reported active in the SS. Others failed to report. Well, that closes this month’s edition of the W2EQD until next month’s update. We hope you have enjoyed this month’s edition of the W2EQD as much as we did ours. Remember, to stay informed, SUBSCRIBE to W2EQD today!
Your Chinese puzzle mystery is solved. Perfect for your ever-expanding requirements of audio-video equipment for your Home Entertainment Center or Amateur Shack. Four basic units: Reproducer Cabinet—designed especially for a Jensen 15-inch coaxial loudspeaker; Small Utility Cabinet— for tuner, amplifier, recorder, record-changer; Medium Utility Cabinet—for larger receiver, television set, or communications equipment; Record Cabinet—holding more than 200 records. With these units, thousands of combinations are possible. Beautiful cabinetry in cordovan or muted blonde mahogany.

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SEC. DO WE HAVE A VOLUNTEER IN THE GANG TO REPLACE HARD-
WORKING VIN? IN BOSTON, ACTIVITY ON 144 MC. SHOWS
HIGHER EFFICIENCY IN OPERATION REPORTED FOR THE SEVEN
REGULAR CONTACTS WITH WEEKLY DRILLS, KT7MB ON 75 MC.
QSO ON 144 AND 430 MC. RELATIVELY WITH GREAT SUCCESS. NVT
IS HEARD AFTER A LONG ABSENCE. OHE BUILT A NEW TELESET
AND FINDS MORE INTEREST IN IT THAN IN HIS EXISTING ONE.
ANN IS WORKING HARD TO BUILD UP HIS 144-MC. AEC NET, BUT
WITHOUT COOPERATION FROM THOSE IN HIS COMMUNITY FINDS
THE GOING DIFFICULT. ALL 144-MC. STATIONS IN SOUTHEASTERN
HERE TO HELP US. IT IS A GOOD AEC NET, JXP IS INSTALLING
GEAR IN HIS NEW CAR. IF IS MIGHTY WITH RTA ACTING ECS
ON 144 MC. FORCES IN A WHILE, W2BN, W2CI, AND Z2RT
WELCOME TO THE 144-MC. NET AS NEW MEMBERS. FIVE WEEKLY
DRILLS IN NOVEMBER SHOWED AN AVERAGE ATTENDANCE OF 17
STATIONS, OF WHICH HAPPY TO REPORT FOR THE AEC NET.

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FOR IMPEDANCE MATCHING

FOR TVH, TVL, BVL, LAV, and other small conductors

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(the plastic film dielectric capacitor)

Exact mechanical duplicates of JAN-C-25 oil-filled paper capacitors (CP 70 style)

In the interest of standardization and ease of replacement, this special line of PLASTICONS has been designed in the same large size containers as used for paper capacitors. This new line is superior to paper capacitors because:

- PLASTICONS are considerably lighter
- PLASTICONS will operate through a greater temperature range
- PLASTICONS have smaller capacitance/temperature coefficient
- PLASTICONS are lower in price
- PLASTICONS have a greater safety factor and longer life

NOTE: The standard line of PLASTICON CAPACITORS are smaller, even lighter and less expensive.

A catalog sheet of EXACT DUPLICATE PLASTICONS is available... write for your copy on your company letterhead.

Condenser Products Company

1375 North Branch Street

Chicago 22, Illinois
MEISSNER Signal Shifter Kit

$49.75

$99.50 Complete Assembled Unit

Double your fun with a MEISSNER Signal Shifter Kit... enjoy building it yourself and save half by doing so!

It's easy — it's fun. Complete, detailed, step by step instructions including schematic diagram, photos and pictorial shots make assembling a joy.

Everything — including cabinet and tubes, solder and wire — it's furnished! All you need is a pair of pliers, a small driver and a soldering iron. The only two difficult jobs are already done. The completed shielded coil turret assembly and band spread gear mechanism are already completely built up — ready for you to install.

FEATURES

• Band Switching — Six position shielded turret, 10, 11, 15, 20, 30, and 80 meter bands. Blank position for additional band.
• Single Tuning Control
• Self-Contained Power Supply
• Osc. or Amp-doubler Keying
• Magic Eye Tuning Indicator
• Output, Six Watts with 287 Gain
• Crystal Control on any Band
• Stability — Achieved by high quality components, efficient design
• Voltage Regulation
• Zero Temperature Coefficient Capacitors
• Turret Mounted Inductors
• Exclusive MEISSNER Stand-by Circuit

Amateurs! Here's your opportunity to own a high fidelity Signal Shifter at a real saving!

AMATEUR NET IN KIT FORM

For hobbyists who enjoy building their own equipment, the MEISSNER Signal Shifter Kit offers a unique opportunity to assemble your own high quality shifter. Featuring six positions for 10, 11, 15, 20, 30, and 80 meter bands, this kit includes all necessary components for a complete installation. Enjoy the fun and satisfaction of building your own equipment with MEISSNER's comprehensive instructions and high-quality components.

BUILD YOUR OWN-SAVE HALF

HUGE SAVINGS ON SELECTED MEISSNER PRODUCTS

MIDWEST DIVISION

IOWA — William G. Davis, W6JP — The North Iowa Emergency Net, operating on 28.9 Mc., held its initial meeting Nov. 9th. W5V is in charge, with W5GD, W5JF, W5PQ, W5QD, W5BQ, W5BA, W5DD, W5BE, W5FQ, W5DQ, W5IQ, W5VF, W5HER, W5CK, W5N, W5JU, and W5MJ on the first roll call. W5GG reported the club met on 20,200 kc. The Des Moines gang elected BQA, pres.; SQF, vice-pres.; AUL, treas.; GBA, secy.; and LDF, act. of arras. Our Director, DRA, DE, is on the Radio Club Dec. 8th. FP and PP addressed the Burlington Club Nov. 28th. The Nov. 19th roll call of the Iowa 76 Net was dedicated to YKN, who had returned to Kentucky from an eye operation at Iowa City. He received 96 messages of good wishes and cheer. The TLG now has a different NCS for each night of the week: AUL, WPA, QA, and TUI, and AUI, QVA, serving. QVA made a score of 82,351.2 in the SS. The north-west section of the Iowa 76 Net and TLG got a workout as a result of the storm of Nov. 16-17. E3F is back on with a pair of 815As. CYY gave a demonstration of ham radio at open house at school, The Council Bluffs Club had an attendance of 82 at its last get-together. PGW is adding on 815s to his VFO. The club received congratulations from WU on its handling of emergency traffic.

KANSAS — SGM, Earl N. Johnston, W6CV — The storm emergency in Western Kansas Nov. 18-21 was the main center of activity this week. The QSL Bureau received 813s to his VFO. The club received congratulations from WU on its handling of emergency traffic.

SIGNAL SHIFTER KIT, Part No. 10.1201... . .... $49.75

COMPLETE, LESS TUBES, AMATEUR NET... ........$19.95

SIGNAL SHIFTER KIT ••• enjoy building it yourself

ORDER AT YOUR DEALER TODAY!
The other day while talking to a fellow ham about the electrical qualifications and suitability of Mallory Capacitors, Volume Controls and Vibrators for amateur equipment, I mentioned that Mallory also made a line of replacement soldering iron tips.

"Soldering iron tips?" he exclaimed. "How on earth is the business of manufacturing Capacitors, Volume Controls and Vibrators even remotely connected with soldering iron tips?"

You know, when I stopped to think about it, his expression of amazement that Mallory was in the soldering iron tip business wasn't so unusual at that. It's a fact few people in radio realize, but a good share of the Mallory Company activity is, and has been for years, directed to the research and manufacture of metallurgical items such as electrical contacts, resistance welding electrodes and special alloys.

Actually, it was simple for Mallory to use the knowledge of skilled metallurgical engineers right in the laboratory to come up with a really good soldering iron tip that will last and last.

This Mallory tip has been engineered especially for the service intended. It is more than just a piece of copper cut to size and shape. It is made of an alloy whose properties combine hardness with good heat conductivity and "tinability." This means a high resistance to the formation of scale and as a result less filing to maintain a bright soldering surface. In addition the shank of the Mallory tip is heavily nickel-plated to reduce the possibility of "freezing" in the barrel of the iron.

The same metallurgical know-how that made possible the Mallory soldering iron tip is applied to all other Mallory products. In fact, Mallory focuses on every product large-scale research and production facilities in electronics, electrochemistry and metallurgy.

When you use Mallory parts, this unbeatable combination goes to work for you —to help your rig maintain its superior performance. So, always insist on Mallory.
station to NW. NKG is a new ham. AGS rebuilt final for 348W receiver, and a Windchargtil' to keep his batteries doublet during the blizzard. FPI has new Bud VF021. HGV, AXY is revamping 454s for the ham bands. LRD has JLD 37, FQB 27, OZC 25, SAI 24, YMU 22, KON 14, synchros sclsyna at the Hi Q Radio Club. KNI has new single switch control. AMQ has settled permanently in struggling with V.I. RDQ, a new ham in New Haven, is ex-KZ5AII. QAK is very ill in the hospital. JHN has composed his p.p. 810 rig. DBM gave a talk on T.V.I. in New Haven on Nov. 15. AO9 has rearranged his equipment for single switch control. AMQ has settled permanently in Lowell, Mass., where he bought a house with a 45-ft. pine tree in his yard. NEM, the station of HCARA, conducts code classes on 29 Mc. 7 to 8 P.M. Tures and Thurs. IKE is building a kilowatt rig. JTD is having trouble with the big rig. NISM is building a kilowatt rig. NEM is redesigning his 50-watt rig. NYC is a member of 28-Mc. Shore Line Net. OPS is building a receiver for 50 to 240 Mc. KMB schedules 7WJ on 7 Mc. VB visited HCARA. The Meriden Club is building equipment to get on CEN. JQD, JIR, APA, AH, AW, NIM, WD, LHE, and RFW renewed their appointments. FNS resigned as EC for Manchester and LMR is taking his place. Traffic: (Oct.) WIBDI 202, (Nov.) WlGMI 354, HNN 240, NIM 220, OIR 145, LKK 145, QFP 182, HYF 106, AW 82, BHI 33, DAY 71, BDI 53, EFH 51, IFE 50, ADW 22, CTT 32, KRU 32, CEC/1 18, SJ 5. LNI 8.

MAINE — SCM, F. Norman Davis, WlGKJ — SEC: LNI, RM: NXX, PAM. FBJ. New ORS: NGV, QIQ, and ROM. New OBS: ROM. Renewed ORS: CRP, DFC, and GMD. The FAPA supper was a complete success and many worthwhile prizes were taken home. AOS now has a 552 D-2 rig. BCL has a Class A ticket. RSB is on 3.85 and 14 Mc. fixed his Millen final. AGR won VEC has new NC-57 and visited ROQ.

NEW ENGLAND DIVISION

CONNECTICUT — SCM, Walter L. Glover, WlVB — The Connecticut Emergency Net (CEN) is proving very popular, with many stations showing interest. It meets at 7 P.M. Sat. and Sun. with hams on five of the order of the day. WV has resigned as SEC, but has accepted the appointment of PAM and hopes to line up a phone net or two. We regret to report the death of WR. 11F is busy rebuilding and experimenting. A net consisting of blind hams is in operation at 7 A.M. Sat. and Sun. Anyone interested is invited to join. APA has called a meeting for Dec. 12 right on DX. AH is now DXCC with 112 confirmed, and is awaiting delivery on 3.85 and 14 Mc. to complete his doublet antennas for quick band change. Traffic: WlBDI 181, HYR 102, FAM 95, TIF 85, LIO 80, EXP 50, FBS 46, EXD 49, JED 37, FQB 27, OZC 25, SAI 24, YMU 22, KON 14, IXL 8.

(Continued on page 81)
STANCOR'S ST-202-A TRANSMITTER

A compact, 100-125 watt CW transmitter operable on the 10, 11, 15, 20, 40 and 80 meter bands offering a high degree of flexibility through use of a novel band-switching exciter circuit, an efficient RF amplifier using plug-in coils, selection of six crystals frequencies and ease of adjustment. Adequate excitation on all bands is provided for the amplifier tube of which there is a choice among five triodes. Contains two separate power supplies. For radiotelephony, either amplitude or frequency modulator applicable.

Supplied as a kit with all constructional components, prefabricated wiring cables and detailed instruction manual.

AMATEUR NET PRICE in kit form, less accessories $92.80

STANCOR'S ST-203-A MOBILE TRANSMITTER

This small AM transmitter functions on the 10 and 11 meter bands either in a mobile installation or at a fixed location. A special mounting arrangement for the car makes it quickly removable for use elsewhere. Power applied from suitable AC or DC supply to suit mode of operation. Amplifier plate input with 500 volt supply—27.5 watts.

Other features—"Press-to-Talk" operation, two-channel crystal switching, and self-contained antenna changeover relay. Designed to work with accessories available at low cost. Chassis copper-plated for electrical efficiency and finished in durable silver-grey hammertone.

As a kit all constructional components are furnished along with prepared lead wires and comprehensive instruction manual.

AMATEUR NET PRICE in kit form, less accessories $44.70
Also available completely wired and tested, less accessories $58.90

SEE THESE STANCOR PRODUCTS AT YOUR DEALER OR WRITE DIRECT FOR DESCRIPTIVE LITERATURE

STANDARD TRANSFORMER CORPORATION
Electronic Division
3574 ELSTON AVENUE • CHICAGO 18, ILLINOIS
active on EMN and SSN and has a PE-103 generator run by battery and is fixing two b.o. rigs for 7 and 3.6 Mc. RCJ is new EC for the Metolius. On the test held last Sunday in November the JCs reported in: PLQ, FIK, SH, JSM, ER, MCR, QII, QNJ, and DW on 144 Mc., and BW, BL, H6R, BH, and ALP on 5.5 Mc. OOP reported a following on Newton emergency drill; BL, HLX, KVF, OMU, PAW, PX, ER, and NPA. RRH is at Harvard U. Old gave a talk on quad antennas and QC spoke on the functions of FCC at the South Shore Amateur Radio Club. LLY is going to Boston College and is active in the Club. The Brockton Radio Club held an auction and meeting. AKY was auctioneer for Eastern Mass. Club. The T-9 Radio Club held a Christmas party at MQR's QTH. BGW is swiveling his DXCC 6' tower; he worked a lot with 0-watt mobile rig on 28 Mc. OM1 made 33,000 points in the SS. The complete Club score was over 450,000. AVG worked QSOs Europeans on 3.5-Mc. e.w. QNJ has his antenna up for 14 Mc. MCR had 8 stations report in on emergency drill, DHX will be on as OBS. BB is fixing his windmill, and the windmill has been repaired. JBS is active on 144 Mc, in Rockland. ALP is building a converter for 144 Mc. and a rig using 036 832. It is with regret that we have to announce the death of BOB. The Framingham Radio Club held meetings on the 2nd and 4th Thursdays at the Civic League Bldg. New officers are PAD, pres.; QVQ, wvo.; XU4, secy.; QFD, treas.; MOJ, act. mgr. EQC gave a talk on one meeting on emergency nets. KLE has a new arrival at his QTH. MOJ has a t.v. receiver. JLY is moving to Natick. QAQ is on 14-Mc. c.w. FWS has made 502 on 28 Mc. AAL renewed his ONS/OPS appointment, and is on 7250 mc. most of the time. MEV is building a new rig. JBY has his 592 receiving now, and had to talk to him in French. Lo Nites on 144 Mc. are becoming quite popular in this section. EQC following in December Lo-Nite: HZM, BF, ANF, HIT, Ill, RCT, KYU, MCR, PM', and SH. TYU is building a new rig. JNY, in Denver, has just added his new OLS to the district. Traffic: (Oct.) WIDWO 10, MCR 5, MDU 4, (Nov.) W10MJ 151, JCK 138, TH 88, AQP 56, JYH 45, AAL 32, LM, QPB 50, CUS 40, QM 20, OMU 11, DWO 12, MDU 7, DIX 6, AAR 4, BRK 4, AGY 3, MCR 3.

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Now you can extend the dc range of your Sylvania Poly (Multi-Purpose) Meter to 10,000 volts! To convert your Poly to this high voltage class, merely replace your present low voltage probe with the new Sylvania DC Voltage Multiplier, and Poly ranges will be multiplied by 10!

The 1,000 vdc range setting will read 10,000 vdc full scale. The 300 vdc range setting will read 3,000 vdc full scale.


SYLVANIA ELECTRIC

Electronic Devices: Radio Tubes; Cathode Ray Tubes; Fluorescent Lamps, Fixtures, Wiring Devices; Light Bulbs; Photolamps
RHODE ISLAND — SCM, Roy B. Fuller, W1JGH—The Newport Emergency Net, according to reports received here, had a fine turnout of its drills recording on wire this past week over Rhode Island broadcasting stations for the benefit of broadcast listeners. This Net is showing real ABC activity and your SCM hopes to be able to report on other clubs in the near future. ARA held an open forum on T.V.I. at one of its November meetings. The Club also announces that code practice will be regular meetings.

The NAARO elected the following at its annual meeting: HILK, pres.; KJZ, vice-pres.; QBZ, secy.; NES, treas. The NAARO is active on 25,000 kc. Mondays at 8:00 P.M. on BTV still is our active relay station. LWA operated MJI during the SS. KKY was active during the SS. BFB, HILK, JIZ, KJZ, QM, QN, TVX, KHZ, QQX, OLW, QQ, FTA, JTK, MTA are active on 28 Mc. QBZ and OLJ are keeping the NAARO on 144 Mc. HRO is our newly-elected Alternate Director. Charter: W1PTY 4T.

VERMONT — SCM, Burris W. Dean, W1NLO — The UVM Chapter of the AIEEE was host to 1500 to Open House at the Electronics & AC Lab. of the E.E. Dept. LVW has moved to Oklahoma City, Okla., and his new call is 3BPQ. IQQ has moved to Newport, Del. QKZ now is in California. 1T, 1LC, PYO, and QQ are on 144 Mc. and work VE. FPA has moved and will be back on the air shortly. MUK has new shack in the basement. OHG is on 27- and 28-Mc. phone with Heising Modulation. QNM has 813 final on 38,3-Mc. phone, OHG and IQK have HF-10-20 converters. QIQ has a new 1800 to 2400-W, 1250B. Jiras is in the air with p.p. 807s on 3.5 and 7 Mc. Nampa: CMD, of KFXD, is now W7JWV. JPP has worked all over U.S.A., Canada, Mexico, and Midway. JPP is on all bands at new CAA station. Lens Point. FO has gone into Juneau on 14 Mc. but is not so good on 3.88 Mc. AW schedules northern BC at 7:30 P.M. on 3.88-Mc. phone. Moisture stopped DY's transformer. Send reports for QST by airmail the first of each month to Box 1237, Douglas.

IDAHO — SCM Alan K. Ross, W71WU — Pocatello: New Gem Net member is BKL, with table top VFO with Chapp oscillator and monochrome keying monitor. KDA is on with p.p. 807s on 3.5 and 7 Mc. JRO has applied for AEC full membership with SCR-654 and HT-10 rigs available for emergency use. Nampa is B in ETO. Twin Falls: QM has new operating position for VE. who has an old windmill tower for his 29-Mc. beam. HKJ has been working out in good shape with new 29-Mc. mobile rig. VE adopts is rebuilding his equipment from Nebraska. JPP has worked all over U.S.A., Canada, Mexico, and Midway with 10 watts and an SW-5 so he earned his graduation to an NC-100. VEQ is rebuilding his 104ES to FM-102. 27 Mc. MFC is awaiting delivery of a Collins 72A and 32VJ. Boise: New Gem State Radio Club officers are: GTN, pres.; JKO, sec.-treas. Write me of your activities during ARRL week. Traffic: (Sept.) W7GTN 206, (Oct.) W7GTN 78. (Nov.) W7DNZ 10. EMT 35, GTO 29, 1UVU 4.

OREGON — SCM, Raleigh A. Munkres, W7HAZ—Continued on page 86.

NORTHWESTERN DIVISION

ALASKA — SCM, Charles M. Gray, KL7IC — KL7IC, a chief engineer at KINY, is our new SCM. DB is acquiring a new 2Mc. 1650F1, Anchorage. He wishes to point out that the latter is not watching. GF has 450TL in Class B linear. The Juneau Radio Club is doing PB sending out QSIs. How about your envelope and cover charge? GF make 813 screen modulate but cannot build high-stability oscillator that will work. BA transferred to Seattle as instructor at WVD. AD transferred to Washington as bench of Loran station. BA sold his big rig to QW, who is in charge of transmitter at WX4. His little rig to QZ, now at Thane CAA. EPP is on as new CAA station. Lens Point. FO has gone into Juneau on 14 Mc. but is not so good on 3.88 Mc. AW schedules northern BC at 7:30 P.M. on 3.88-Mc. phone. Moisture stopped DY's transformer. Send reports for QST by airmail the first of each month to Box 1237, Douglas.

MONTANA — SCM, Fred Tintinger, W7EGN — LHZ, chief engineer at KINY, is our new SCM. DB is acquiring a new 2Mc. 1650F1, Anchorage. He wishes to point out that the latter is not watching. GF has 450TL in Class B linear. The Juneau Radio Club is doing PB sending out QSIs. How about your envelope and cover charge? GF make 813 screen modulate but cannot build high-stability oscillator that will work. BA transferred to Seattle as instructor at WVD. AD transferred to Washington as bench of Loran station. BA sold his big rig to QW, who is in charge of transmitter at WX4. His little rig to QZ, now at Thane CAA. EPP is on as new CAA station. Lens Point. FO has gone into Juneau on 14 Mc. but is not so good on 3.88 Mc. AW schedules northern BC at 7:30 P.M. on 3.88-Mc. phone. Moisture stopped DY's transformer. Send reports for QST by airmail the first of each month to Box 1237, Douglas.
How's your amateur I.Q.?  

*Interest Quotient

Check those items of the list below in which you are interested. Allow yourself one point for each item checked:

- Protection of amateur frequencies
- International DX contests
- Free individual technical information service
- Sweepstakes contests
- Development of new amateur techniques
- Receiving foreign QSLs
- Emergency preparedness
- Authoritative technical data
- Field Days
- FCC amateur regulations
- Operating awards (DXCC, WAS, WAC, etc.)
- Equipment construction data
- Traffic handling
- Representation of the amateur at world conferences
- Attending divisional conventions

How to rate yourself:

If your score is zero, better take a good look at your license—it probably expired long ago!

If your score is 1, write the following sentence on the blackboard 50 times: "The only difference between a rut and a grave is in the dimensions."

If your score is 2–3, maybe there’s hope for you after all. At least, there can be if you will resolve in 1949 to take advantage of more of the many services, such as those listed above, offered or provided by the American Radio Relay League.

If your score is 4–15, you’re undoubtedly already a member of ARRL—you couldn’t maintain such avid amateur interests without being a member of the League and using its services.

But no matter what your score—if you are not now a member, support amateur radio by joining ARRL and take an active part in League affairs.

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Compact, laboratory styled, cowhide case with tool and test lead compartment.

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PACIFIC DIVISION

QANTA CLARA VALLEY — SCM, Roy E. Pickham, 17 WAP — Asst. SCM, SCG, George Alexander, 6TBK — RM; CIS: OC, HC, EC; JB, TPZ, WJM worked in the last 58 Contests for the first time and enjoyed it very much. RFU has a new exchange between SCM and AEC. JB, TPZ, WJM worked in the last 58 Contests for the first time and enjoyed it very much.

SCM, Roy E. Pickham, 17 WAP — Asst. SCM, SCG, George Alexander, 6TBK — RM; CIS: OC, HC, EC; JB, TPZ, WJM worked in the last 58 Contests for the first time and enjoyed it very much.

PRECISION APPARATUS CO., INC.
Some of the Hams in the Chicago area have noticed that the R.F. choke in series with the final H.V. lead becomes very hot when operating the rig on ten meters. These chokes seem to operate satisfactorily on low frequency bands, but approach a series resonant condition at ten meters. The choke then develops heat due to the high R.F. current through the choke. This condition can be avoided by the use of Ohmite frequency-rated chokes mounted on banana plugs so the proper choke can be inserted in the H.V. lead. On the larger plug-in coils, these small chokes can be mounted on the ceramic plug bar and the correct choke then inserted in the circuit when the coils are changed. These chokes are available to cover all amateur bands from 3.5 to 460 megacycles. Ohmite Bulletin No. 133 provides complete information about these chokes.

Ohmite frequency-rated chokes have a high impedance at their recommended operating frequency. With this thought in mind, B.C.L. on those midget AC-DC receivers can be cured quite easily by the use of Ohmite chokes in the power leads and in the antenna lead. The ten-meter (Z-28) chokes are small enough to mount right in the receiver. Try this the next time the XYL complains that she can’t hear her favorite soap opera because your ten-meter signal jams the kitchen B.C. set.

Those Hams operating rigs with pi-network tank circuits couldn’t find a better choke for parallel feed than one of the Ohmite frequency-rated chokes. Shown are two typical circuits using pi-network tanks. Choose the choke suited to your operating frequency.

Write for Bulletin 137
“Ohmite Ham Hints”
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HALLCRAFTERS 10-INCH TELEVISION CHASSIS
COMPLETELY FACTORY WIRED
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A Collins 75A-1 rcvr plus a Collins 32V-1 xmtr is amateur radio's proudest team. In addition, they're perfectly matched in table-model size and appearance, so if you want to cure "Apparatus-Clutter", Collins has the perfect prescription!

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All bands, complete with 14 tubes, power supply and matching speaker.

COLLINS 32V-1 XMTR-$475

Covers 80, 40, 20, 15, 11 and 10 meters. 150 watts on CW and 120 watts on phone. A 20% down payment allows you to "Play while you pay".

The new MEISSNER SIGNAL SHIFTER KIT

The most versatile and stable means for dodging QRM on the crowded amateur bands, Turret-mounted coils cover six bands (10, 11, 15, 20, 40, and 80 meters) with a blank for one more when needed; and the whole shielded turret is all ready to install ... you need only pliers, screwdriver and soldering iron to complete a superlative ECO that duplicates the peak performance of the factory-built model. Complete kit includes tubes and power supply.

Amateur Net Price $49.75
Only $9.95 puts it in your shack!

HT-17 HALLICRAFTERS XMTR SALE!

(Still a few left for Early Birds)

Buy your HT-17 complete with 5 coils for 80-40-20-15-10 meter operation for $10 less than the regular price of HT-17 ALONE! Provides 10-20 watts of crystal controlled CW output on the amateur 3.5, 7, 14, 21 and 28 mc. bands. Originally over $60 with coils.

SALE PRICE $39.50

HT-17 ACCESSORY KIT: includes 80 and 40 (20, 15, 10) meter crystals, 100 ft. #14 antenna, CW key, 3 ft. zip cord connection, 2 antenna and 1 feed-thru insulators. COMPLETE KIT ONLY $7.50

(WITH 80 or 40 meter crystal, $4.75)

EASY RADIO SHACK TERMS ON NEW GEAR!

Deposit only 20% and take up to a year to pay the rest, on Collins, Hallicrafters, National, Hammarlund, RME, Millen, and other communications equipment. Write for prices and details of gear not advertised here. Immediate shipment on everything you need. C.O.D. orders filled promptly with 20% deposit.
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IN STOCK FOR IMMEDIATE DELIVERY!

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RECEIVERS
all complete with tubes and dynamotors.

BC 453 (190-550 kc.)  ... ONLY $15.95
BC 454 (3-6 mc.) ...ONLY $7.95
BC 455 (6-9.1 mc.) ...ONLY $7.95
EXTRA RCVR TUBE KIT:
includes 3 - 12SK7, 1 - 12K8, 1 - 12AA. 1 - 12SR7.
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complete with tubes.

BC 458 (5.3-7 mc.) ...ONLY $7.95
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includes 2 - 1625, 1 - 1626.
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includes 1625, VR150, 12J5
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BC 450 (with three 207-inch remote control flexible ex-
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ONLY $1.95

A RARE BUY in VHF GEAR
SCR-522 XMTR-RCVR $33.95

The ideal set for 100-156 mc work . . . receiver is 10-tube superhet with 3- microvolt sensitivity . . . 7-tube, 15-watt xmt. Used, but very clean. With full set of tubes. Price only $33.95.
Spare 832's for SCR-522 . . . $2.65 each

PE-103 DYNAMOTOR BRAND NEW—only $5.95
(less base)
Here's your opportunity to get one of these popular units at a rock-bottom price. Operates from 6 or 12 volts d-c; delivers 160 mils at 500 volts d-c.

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(Wish we could tell you who made 'em!) All Alinco-S, with 3-4 ohm voice coil impedance.
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activity in the South Carolina 3.5-Mc. Net. MRJ has Class A, BJF has completed a new portable emergency transmitter and receiver. KEJ had an amateur radio booth at the Greenwood County Fair. MJS likes his new BC-600. DPF gives the following report on South Carolina: 3.85-Mc. 'Phone Net, FNQ, WNO, WMF, FM, CE, KMK, KXX, LCL. The Net meets at 03:30 P.M. Sundays on 3010 kc. Our SFC, ANK, reports that the Simulated Emergency Test was a big success. ESYT reports the following novel new station, 7MB, BJE; Chester, BH; Rock Hill, MYM; Charleston, BAT; Florence, MGY. The Charleston test was the best yet. MGY is not电源 EG. The following traffic stations: ANK, KEJ, MRI, and NNC. If you have traffic pass it along to them. LJJ is active in the South Carolina Net. With this report I complete my 20th year as your SCM. My contact with you boys has been very pleasant and I have enjoyed working with you. It's a pleasure to be a part of such a splendid group. Traffic: WA4ANK 235, MJR 43, KEI 35, CXE 23, BJF 15.

VIRGINIA — SCM, Victor C. Clark, WA4KFC — Heartiest congratulations to IA and ZA on their elections as Director and Alternate Director. Virginia turned out for the SS in fine style, ASY, CC, FF, IA, JFF, KFC, KPT, JO, JQ, LAF, JQ, LHI, LUE, MOJ, MW, NNN, NJV, OHH, SU, and VE are known to have scores of over 50,000 points. IWO made 53,000 points on 'phone. LQQ and KYC are moving across the Potomac. LQQ moved and found himself one block from NNN and next door to KII KVM gets out FT with low-power 14-Mc. Slate, New York: JKE, JII, ITA. New EC: AKN, IQ, JPC, JAR, JU, and KAY. FW is DXing on 3.85-Mc. 'phone, NNN, SU, and KFC worked ZC8FM on 3.5 Mc. Completing 3.5-Mc. WAC for the latter two. NNN is looking for a South American BZE is alternately rebuiding and chasing 3.5-Me. DX. JQW took Clipes C over after finding 100 stations in ham radio. Millard finds time for a 7-Mc. QRM with his ten-watt, BZE reports that the 28-Me. band in Richmond is kept alive by LLI, KCM, BSM, DRT, NAK, HAM, IWW, and others. YZ, doing the work of three men, found time fire up on 7 Mc. WT's rebuilding KNZ is not so active in traffic nets, finds time to work CN, FA, G, and KWL may be found working on 29,360 kc. GBF, who is looking for a South American! BZE

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28-Mc, 'phone. BCN has new mast up, a 50-foot. He also took his Class B exam, SGG is ill but has found time to build a Lo, Lo. 24-Mc. rig. Any hams who live in Colorado Air National Guard, please contact QDC. The CAP is looking for communications men. Contact QYT for details. A new 24-Mc. rig is being built by GAA, a new ham, has new operator, new home, and new beam. SBG is thinking of bullet-proof shack for protection from irate BCLs. The Florida RDF Club (AAROD) meets the 3rd Wednesday of each month. All interested in radio are invited to attend. Traffic: W4IC 95, L75 66, BCN 59, OWP 22, SGG 2.

ALABAMA — SCM, Dr. Arthur W. Woods, W4UJW — A well-organized QSO contest is underway in the recently reorganized Tri States Radio Club of Dothan. The Montgomery gang enjoyed a picnic attended by ATF, ECF, IVY, EW, AIP, DPX, LRE, MFA, MNK, and MII. YJB and JYK have a Stalins curve on 14 Mc. XDA's 6-Mc. beam is only 18 feet above sea level. He is only 5000 feet or so. He will revert to 60VD. FPX is back on now. ODQ sets January as the deadline for getting on the air with homebuilt rig. GFB is looking for DX 144-Mc. contacts. ECF operated from Montgomery, 2ESC, formerly of University, returned to visit EBZ and AKP, 1PZG (ex-4GOS, your former SCM) is now with the State Dept. OKY, OLC, and JYK are new call in Montgomery. eyeballs, work 60 countries on 14-Mc. phone since Feb. 1st. ELX is on 3.5 Mc. If luck of space keeps you off 3.5 Mc. and participation in the emergency nets, an antenna made by wrapping as many turns as possible around a long bamboo pole will be effective if fed with Zerp feeders and worked against counterpoise or ground. (Ask W 4ANK.) Traffic: W4GWJ 51, JYB 26, KIX 25, 1MK 16, 1JAM 12, FZN 9, CYL 6.

EASTERN FLORIDA — SCM, John W. Hollister, jr. W4PFWZ — DQW, JEP, KJ, and MGW now are OPS. MGW has been appointed EC. Help! C.w. traffic outlets are needed in Jacksonville, St. Petersburg, and West Palm Beach on 3.5 or 7 Mc. Write AYV or JKL. Listen on 7290 kc. at 7 and 3675 kc. at 7:30. This is the traffic season, get in it! Speed is not essential, dependability counts! A terrific bargain. Audio-Development brand new. ONLY $3.50. A far away 24Gs for more power. MS has turned football coach. MSX is back home from tour overseas. LRX reports are needed. 'Join a net., 3675 kc. at 7 and 3675 kc. at 7:30. This is the traffic season, get in it! Please send reports, fellows. Note to ECs: If the Florida Emergency Manual needs revision now, the time to start. Traffic: WPX, JYJ, KQ, JEP, JAP, 1MK, 1JAM, 107, AAR 58, MNT 48, GHP 32, HWA 15, AYV 14, DES 12, DQW 12, KJ 6, BT 3, BXL 3.

WESTERN FLORIDA — SCM, Luther M. Holt, W4DAO. — MEN is building a new home, MUX added a pair 21Gs for more power. MS has turned football coach. EOR, QK, W4ISO, and CNK visited Pensacola. BFD bought coils for Class A bands. BGI built nubs 7.5-watt mobile. DXZ took the commercial exam. MTG built 385-Mc. phones, plans to build rig as SAA. JPA and DAO built new homes. LRC built 430-Mc. oscillator. MSX is back home from tour overseas. LRX bought new 172-Mc. rig. DLO wants schedules with western Florida stations. ACB made a trip to Washington. GAA works 28-Mc. 'phone. TL is heard on 7 Mc. BKQ built quad antenna. PARC is receiving requests for membership from

(Continued on page 98)
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I O S ANGELSC—SCM, Vincent J. Haggerty, W610X — AEC activities: Our SEC, UXN, reports progress in organizational work, especially in the Los Angeles area. New ECCS are ESF, GYT, and RKG. EC PTR reports the following members of his AEC group had a 72-hour work-out in conjunction with the Los Angeles Section. The meeting was held at WYR, Nov. 4th; QJQ, RMW, VOY, W1D, NFE, CAF, CFI, OHM, TSN, HWN, TVK, ESK, and XAT. Twice monthly this group meets monthly and is interested in AEC Net setup. GA3 and DRE are the section's top traffic men this month. Ed says he made the APL on delivery first of the month. CE is a new traffic man in the Santa Barbara area and submitted a fine traffic report. ZMZ sent in his traffic report by phone. AM and JBO have been working together on antennas. Heavy winds blew down a transmission line for MU. ZOL radio. MU and JBO have been working together on beams; ZQV is a member of the WA2L Club was held at the QTR of WQK with discussion of the immediate vicinity brings visions of potential T.V.I. DGA got his QTH worked for BUK and he states a newly-surfaced t.v. antenna in immediate vicinity brings visions of potential T.V.I.

(Continued on page 100)
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- 2.8 to 11 mmf, 3.5 to 27 mmf, 4.6 to 51 mmf

Spacing .030" and .080"

Silent Bearings

Silent operation on the highest frequencies is assured with a split sleeve tension bearing that also prevents capacity fluctuation. Tension is constant - contact positive.

JOHNSON also makes Type L Variables in Single, Dual and Butterfly types in many different models. All are ceramic soldered. There is nothing to work loose causing stator wobble and fluctuations in capacities.

Write for New JOHNSON Type L Variable Catalog Today!

EASY TO LEARN CODE

It is easy and pleasant to learn or increase speed the modern way — with an Instructograph Code Teacher. Excellent for the beginner or advanced student. A quick, practical and dependable method. Available tapes from beginning's alphabet to typical messages on all subjects. Speed range 5 to 40 WPM. Always ready, no QRM, beats having someone send to you.

ENDORSED BY THOUSANDS!

The Instructograph Code Teacher literally takes the place of an operator-instructor and enables any learner and master-code without further assistance. Thousands of successful operators have "acquired the code" with the Instructograph System. Write today for full particulars and convenient rental plans.

INSTRUCTOGRAPH COMPANY
4749 SHERIDAN ROAD, CHICAGO 46, ILLINOIS
Sensational Newark Scoop!  
TREMENDOUS REDUCTIONS ON

Brand New
HALLICRAFTERS  
TELEVISION RECEIVERS

Save $50
Model T-54, Famous 7" Table Model in grey metal cabinet. Complete with all tubes (7" picture tube installed) ... ready to operate!

Regularly $189.50
REduced TO
$139.50

Another Smashing Value! Newark’s New De Luxe ALL CHANNEL TV ANTIENNA—Far superior in construction and performance to anything in its price range. Folded dipole with reflexion 66 plus high quality tube installed) ... ready to operate!

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REduced TO
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MAIL ORDER DIVISIONS: 242 West 55th St., N.Y. 19 and 323 West Madison Street, Chicago 6, Illinois

MAIL ORDER DIVISIONS: 3 GREAT STORES! Upwart at 115 West 43rd Street and Downtown at 212 Fulton Street in NEW YORK 323 West Madison Street in the heart of CHICAGO

SEND FOR OUR NEW 148 PAGE CATALOG

NEWARK RADI0 & TELEVISION

TERRIFIC TV BUY!

Tech-Master 630TK 10" Kit

Complete with 29 RCA Tubes, less 10BP4 Kinescope.

$168.50

This is exact copy of famous RCA 630TS Television set. Contains efficient RCA front end 12-channel tuners—completely finished and aligned. Can substitute 12" or 15" tube for 10BP4 if desired. Dual controls for picture and FM sound, switch for hortis And vert. control. Kit supplied complete with 29 RCA matched tubes, and RCA schematic and service manual, but less wire, socket, and mg. screws. Shpg. wgt. 56 lbs.

Shpg. wgt. 85 lbs.
Your Cost
$168.50

Multi-Filament Transformer

An ideal filament supply for most medium power transmitters. Filament transformer No. S-877 (above) provides basis of swell power supply. Tapped primary 105/125 VAC. 8 separate secondary windings, all CT as follows: Three at 6.4V at 2.6Amps, and 24V bia. Hum level is 94 db below 100 volts. Termi

Newark Oil Filled Condensers

These new Newark Oil Condensers are exactly the thing for the power supply in your rig. Conservatively rated. Rectangular can-Glass Insula-

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Complete with 29 RCA Tubes, less 10BP4 Kinescope.

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High Voltage, High Current Plate Transformer

Swell for a medium power phone or CW Xmt. Delivers 125V volts AC, each side of CT at 500 ma. Heavy construction designed for continuous operation from 105 to 125 V AC. Heavy screw terminals, superfor.

Newark Oil Filled Condensers

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HALLICRAFTERS  
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This is exact copy of famous RCA 630TS Televis-

High Voltage, High Current Plate Transformer

Swell for a medium power phone or CW Xmt. Delivers 125V volts AC, each side of CT at 500 ma. Heavy construction designed for continuous operation from 105 to 125 V AC. Heavy screw terminals, superfo.
Enjoy High-fidelity
RADIO RECEPTION WITH THE
Browning FM or FM-AM Tuner

Performance to satisfy the man who knows radio... provable by both instrument and listening tests... is yours with Browning Tuners.

Model RJ-20 gives you high-fidelity reception on both FM and AM. Armstrong FM circuit gives maximum noise reduction with response to 15,000 cycles • separate RF and IF systems for FM and AM • variable bandwidth IF • two audio stages give 20 db bass or treble boost • 6AL7, variable bandwidth IF • two audio stages give 20 db bass or treble boost • 6AL7, high-fidelity output to your audio system. You can pre-judge performance of both tuners from the curves in Data Sheet H-93. Write now for your copy.

✓ Check with Browning
AMATEUR FREQUENCY METER MJ-9

Reads directly on 7 bands from 3.5 to 148 mc.
Accuracy 0.05% at all frequencies.
A stable VFO with output voltages comparable to a crystal; lets you work band edges.

Stable — compact — large easy-reading dial — all controls on front panel — low power consumption at 110-120 volts a-c-d-c.

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104
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R.F. Section a complete 150 watt XMTR—Provisions for ECO—Automatic Bias on Final & Buffer—Voltage regulated Oscillator and Buffer—Class B Speech modulator—150 Watt input from 10 thru the 80 meter band—complete with tubes and meters including 1 set of coils—Specially crated for safe shipment.

KIT FORM WIRED

WRITE FOR COMPLETE DETAILS

$279.00 $299.00

WRITE FOR COMPLETE DETAILS

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E-Z PAYMENTS

WRL offers the lowest E-Z Payment Plan in the country. Any responsible person with a steady job can buy on time from Leo. No red tape—no delays! Financing our own paper saves you money!

LIBERAL TRADE-INS

Leo offers more—use your present equipment as a trade-in. Tell me what equipment you have—what equipment you want—let's trade.

PERSONAL SERVICE

WRL is the World's Most Personalized Radio Supply House for the amateur. Getting acquainted with Leo will help you get on the air faster and for less money.

GIANT RADIO REFERENCE MAP

Just right for your control room wall. Approximately 28" x 42". Contains time zones, amateur zones, leading shortwave stations, monitoring stations. 25c

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Unconditionally guaranteed 275 Watts phone and CW. An advanced design XMTR giving efficient performance on 10 - 11 - 15 - 20 - 40 and 80 meter bands. Ready to go—$379.45

Wired $399.45

Save Money On Reconditioned Equipment—Write For Our Big List!

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COUNCIL BLUFFS, IOWA

Please send me:

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☐ 150 Watt Globe Champion Info.

☐ New Catalog

☐ 275 Watt Globe King Info.

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World Radio Laboratories

COUNCIL BLUFFS, IOWA

EVERYTHING IN RADIO INCORPORATED
**JOHNSON Type L Variables**

**CERAMIC SOLDERED FOR STABILITY-STRENGTH**

**SINGLE TYPE**

Available in Six Models:

- 2.8 to 11 mmf, 3.5 to 27 mmf, 4.6 to 51 mmf
- 5.7 to 75 mmf, 6.8 to 99 mmf, 11.6 to 202 mmf

Spacing .030" and .040"

**New Bright Alloy Plating**

In addition, the JOHNSON Type L Variables feature a new bright alloy plating that is extremely corrosion resistant, even under extreme climatic conditions. JOHNSON also makes Type L Variables in Dual, Differential and Butterfly types in many different models.

All are ceramic soldered. There is nothing to work loose causing stator wobble and fluctuations in capacities.

Write for New JOHNSON Type L Variable Catalog Today!

---

**September V.H.F. QSO Party**

**NEW ENGLAND DIVISION**

- Connecticut: W1BDI 8-4-2-AB
- W1HTQ 986-54-17-ABC

- Maine: W1EIO 120-15-8-AB

- Massachusetts: W1CTW1690-106-13-ABC

- W1M1H/1:
  - 1* 600-111-6-B
  - W1AQE 444-74-6-B
  - W1BD8 390-65-9-B
  - W1Q8H/1 348-58-6-B
  - W1SS/AT 250-85-6-B
  - W1CBF 240-48-13-B
  - W1MUD 220-55-4-B
  - W1LIT/1 195-36-5-B
  - W1MCR 200-50-4-B
  - W1KCT 128-32-4-B
  - W1Q8I 124-31-4-B
  - W1CTR/1 108-36-3-B
  - A1ALP 10-10-1-B
  - W1BB 12-4-2-B

- W. Massachusetts: W1Q8E 1196-92-13-AB
  - W1QYV 405-41-11-BD
  - W1S3M 384-64-6-B
  - W1RO 244-22-13-AB

- New Hampshire: W1FZ/1 2070-130-15-ARC

- Rhode Island: W1QBZ 42-21-2-B

**NORTHEASTERN DIVISION**

- Oregon: WTDIS 14-7-2-B

- Washington: W1AXS 5-5-1-B

- W1FY/7* 5-5-1-B

**PACIFIC DIVISION**

- Santa Clara Valley: W6BZS 110-22-5-B
  - W6YHL 48-16-3-B

- East Bay: W6ZHU 54-18-3-B
  - W6AF 42-14-3-B

- San Francisco: W6HUR 1-1-1-A

**ROANOKE**

- Virginia: W4FA 60-15-4-AB
  - W4MD 28-14-2-B
  - W4KYY 16-8-2-B

**SOUTHEASTERN DIVISION**

- Western Florida: W4C0N/1 1-1-1-B

**SOUTHWESTERN DIVISION**

- Los Angeles: W6HZ 198-48-3-BC

**CANADA**

- Ontario: VE3AID 425-71-6-AB
  - VE3ASE 295-55-5-ABC
  - VE3BQN 260-48-5-ABC
  - VE3AG 208-52-4-AB
  - VE3AXM 497-47-4-AB
  - VE3BOU 114-38-3-AB
  - VE3KMI 108-27-4-AB
  - VE3BKA* 34-17-2-B
  - VE3ANT 05-36-2-B
  - VE3TI 38-19-2-B
  - VE3P6 36-18-2-B
  - VE3H3 224-55-4-AB
  - VE3TY* 32-16-2-B

**Navy Day**

(Continued from page 89)


- Eighth Naval District: W4M0B, W4M0B, W5MMN, W5QTV, W5TVL, W5W5B, W5W5B, W5H8J, W5KMM, W5QTV, W5LV, W5LRI, W5L7D, W5M6E.

HALLICRAFTERS AT LOW PRICES

Harrison offers these famous models at substantial savings!

S-40A Popular with all hams—8 tubes plus rectifier. $40 EC to 43 MC. RF stage on all bands. $99.75. Was $150.00.

S-50. Same as above except for 115V AC-DC operation. Was $100.00.

SX-42 Hallcrafters finest communication receiver. $40 EC to 100 MC. AM and FM, high fidelity only. 14 tubes plus rectifier. Was $295.00. $279.00.

SX-62 SWL version of the SX-42. Beautiful appearance. Was $289.00. $269.50.

R-42 Speaker for use with SX-42 or SX-62. Was $38.50. Now $34.50.

Ask for complete Hallcrafters catalog.

SIGNAL SHIFTER

Build this new Model EX yourself and save 50%. A clink for a beginner to assemble in about 3 hours. Complete kit (Yes, even wire and solder!) with pre-assembled coils for 10-11, 15, 20, 30, and 80, power supply, etc. Get yours today! $49.75

Factory Wired and Tested

NFM PHASE MODULATOR

Fits right in the Shifter cabinet. Completely wired—$12.00 less tubes Kit of tubes, $3.00

Electro-Voice

Speech Clipper

Ride thru the QRM and QRM! Clips tops and bottoms from frequencies which rise above a pre-set amplitude, allowing higher audio level at 100% modulation—provides higher speech intelligibility! Very simple to connect and use with any rig! Model 1000 Speech Clipper $14.41

NEW JOHNSON HAM INDUCTORS

Match your coil to tube and line to line for zero highest transmitter efficiency—lowest loss. Use the Johnson plug-in links to pop up your rig—don’t plan a new rig without them! Complete stock for immediate shipment—order now! (Write for complete Ham Inductor booklet)

NEW RME VHF 2-11

Gives super-hot performance on 2-8-10-11 meters:

- Double conversion for high image rejection and maximum selectivity!
- 11 tubes plus rectifier and voltage regulator!
- Receives AM-NFM-CW—efficient noise limited!
- Complete—built-in speaker and power supply!

Two-tone SM cabinet—115V 60 cycle AC operation—ready to operate. Carrier Level 8 Meter for 2-11 $146.00 $14.00

WINTER GOT YOUR BATTERY DOWN?

Fully charged batteries last longer! Use a Blitz charger to insure easy winter starting—FB to build up the battery after a heavy mobile sked. Long life, trouble-free selenium rectifiers—for 115V AC operation.

Model S-2 Charges at 2 amps $6.25

Model S-6 Charges at 6 amps $10.87

Model S-12 Charges at 12 amps $15.37

GON-SET "3-30" CONVERTER

A brand new mobile converter that features continuous tuning from 3 to 30 MC! Same size as the '10-11'—plenty of bandspread—four tubes Harrison Has It—In Stock. Model "3-30" $39.95!
Don't Lose those Good QSO's While Turning Your Beam by Hand

MUNGER

Electro-Beam ROTATOR

Hold those rare DX contacts right through QRM by peaking up your own and received signals in a few seconds. Ruggedly built. Powerful reversible motor. 115V—60 cycles. Swings your beam at 1 r.p.m.

Priced at only

$69.50

Complete

Illustrated Bulletin on Request

Time Payment Plan

Illustrated Bulletin on Request

Time Payment Plan

(Continued from page 41)

than gain. To recover a db. or two, an r.f. choke may be placed in series with this resistor, or the grid may be by-passed and run to a positive voltage source (i.e., 0.1 megohm to B-plus, 1700 ohms to ground), permitting a higher value of cathode resistance for rated space current. The other hint is that, in case more compensation is needed, N-1400 condensers are now available permitting larger amounts of compensation (which may be desirable downstairs in the coil trays) without exceeding total minimum-capacity requirements.

(Continued from page 45)

tating devices. And not the least of its advantages is that it doesn’t take an hour to find out who is on the band! Not many horizontals are being taken down (they were great stuff when the band was open) but the verticals are coming back. W90BW, secretary of the Midwest V.I.F. Club, only “v.h.f.-only” club in that area, writes that constant effort is being made to extend interest in v.h.f. activities. The club made a trip to Aurora, Ill., on December 2nd, for a joint meeting with the Fox River Radio League, and is planning other similar joint meetings in the near future. Clubs interested in promoting such meetings should get in touch with Melvin Mendelsohn, W90BW, 4644 W. Adams St., Chicago.
BOB HENRY HAS IT IN STOCK AND OFFERS YOU A BETTER DEAL!

Henry Radio stores in Butler, Missouri and 11240 West Olympic Blvd., Los Angeles, California have complete stocks of amateur, FM, Television, Short Wave, Communications, Recording, and other radio equipment. I promise you lowest prices, complete stocks, quick delivery, easy terms, generous trade-ins. I promise that you will be satisfied on every detail. Write, wire, phone or visit either store today.

A FEW OF THE ITEMS I STOCK ARE:

<table>
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<th>Item</th>
<th>Price</th>
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<tr>
<td>Collins 75A</td>
<td>$375.00</td>
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<td>Collins 32V</td>
<td>475.00</td>
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<td>RME HF-152A</td>
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<td>RME DB22A</td>
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<td>Hammarlund HG129X</td>
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<tr>
<td>Gon-Set 10-11 converter</td>
<td>39.95</td>
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<tr>
<td>Stancor ST-205-A</td>
<td>44.70</td>
</tr>
<tr>
<td>Hallicrafter Cyclomaster</td>
<td>169.50</td>
</tr>
</tbody>
</table>

Some prices slightly higher on the west coast.

LOW PRICES
I guarantee to sell to you as cheap as you can buy anywhere.

COMPLETE STOCKS
Hallicrafters, National, Hammarlund, Collins, Millen, RME, Meissner, Meck, Gordon, Amphenol-Mims, RCA, Vibroplex, Sonar, all other amateur receivers, transmitters, beams, parts, etc. If it is amateur or communications equipment—I can supply it.

QUICK DELIVERY
Mail, phone, or wire your order. Shipment at once.

EASY TERMS
I have the world's best time sale plan because I finance the terms myself. I save you time and money. I cooperate with you. Write for details.

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Other jobbers say I allow too much. Tell me what you have to trade and what you want.

TEN DAY FREE TRIAL
Try any receiver ten days, return it for full refund if not satisfied.

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I service everything I sell free for 90 days. At a reasonable price after 90 days.

FREE TECHNICAL ADVICE
and personal attention and help on your inquiries and problems.
Cuts any size larger square or angular hole

For Transformers, I.F.'s, Plugs, Binding Post Strips, Sockets, Etc.

Banished forever is hand hack sawing or filing of holes for hard to mount parts. Sizes to meet every need.

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<tr>
<th>SQUARE</th>
<th>ROUND</th>
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<tr>
<td>Sizes</td>
<td>$2.95</td>
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Buy it at your favorite distributor

Field Day Results

(Continued from page 581)

W3KLH/3 - Mon-Vough Amateur Transmitter Assn. 193 A. 18- 4437
W2WUX/2 - Utra Amateur Radio Club 122 A. 10- 4248
W8ODJ/8 - The Breaker Shortwave Radio Assn. 395 A. 20- 3789
W3NIF/3 - Schuykill Amateur Radio Club 378 A. 8- 3645
W9UDU/9 - Racine Megacycle Club Emergency Corps 374 A. 15- 3890
W8I/6 - Kokomo Radio Club 306 AB-15- 3429
W5HTK/5 - End Amateur Radio Club 215 AB-13- 3409
W9ADD/0 - Black Hills Amateur Radio Club 340 A. 19- 3375
W8BHQ/8 - Toledo Radio Club 444 AB- 2336
W7HAZ/7 - Baker Amateur Radio Club 217 A. 3- 3381
W8PF/8 - Greater Cincinnati Amateur Radio Assn. 355 AB-10- 3285
W1QOA/1 - Bridgeport Radio Amateur Club 336 A. 15- 3219
W8TM/3 - Capitol Key and Mike Club 331 A. 10- 3201
W8N5W/3 - Capitol Suburban Radio Club 320 A. 17- 3122
W1KEA/1 - Suburban Amateur Radio Club 356 AB-13- 2935
W4HIO/4 - Charleston Amateur Radio Club 445 B. 12- 2920
W1OKA/1 - Pittsfield Radio Club 250 AB-18- 2767
W3ILA/8 - Oentify Section of Delta Radio Club 293 AB- 9- 2907
W7WKO/7 - Mt. Baker Radio Club 197 A- 5- 2992
VE11P0/1 - Halifax Amateur Radio Club 253 A. 7- 2788
VE1 -
W1INY/1 - Hampden County Radio Club 257 A. 12- 2385
W8HLO/0 - Red River Amateur Radio 246 A. - 2314
W7FX/7 - Scallop Amateur Radio Club 140 AB-10- 2193
W8KIQ/0 - Burlington Radio Club 294 A. 11- 2133
W2RL/2 - South Jersey Radio Assn. 215 A- 10- 2035
W4FA/4 - Amateur Radio Society of Union University 147 A- 16- 2023
W3OAJ/8 - Mercer County Radio Assn. 235 A. 10- 2025
W1MHL/1 - Waltham Amateur Radio Assn. 270 AB- 8- 2254
W9UW/6 - Santa Clara County Amateur Radio Assn. 140 A. - 2105
W8ROX/9 - Mid-Island Amateur Radio Club 188 A. 7- 2105
W7TLRA/7 - Utah Amateur Radio Club 125 A- 10- 1925
W2TWQ/2 - Ridgewood Radio Club 208 A. - 1905
K6HCW/9 - Homolou Amateur Radio Club 197 ABC-13- 1834
W3QIF/3 - Horsehoe Radio Club of Altoona, Pa. 271 B- 7- 1776
W8FV/0 - Fort Amateur Radio Club 170 A. 5- 1794
W8CNO/0 - Boso Robles Radio Club 93 A. 6- 1712
W2F7/2 - Mid-Island Radio Club 296 A. 50- 1719
W8BM2/8 - Fort Steuben Radio Club 186 A. 22- 1701
W7CMX/7 - Olympia Radio Club 30 A. 9- 1674
VE6 - Southern Alberta Amateur Radio Club 177 AB- 9- 1473
W8CTO/8 - Seloto Valley Amateur Radio Club 146 A. 6- 1377
W8ZT/0 - Desatur Signal Depot Radio Club 136 A- 4- 1221
W9HPG/0 - Chippewa Radio Traffic Assn. 121 A. 16- 1179
W4KEK/4 - Peninsula Amateur Radio Club 118 A- 14- 1152
W8JD/8 - Ohio Valley Amateur Radio Assn. 124 A- 8- 1116
W3V/3 - McKean Radio Club 127 AB-10- 1082
W5KXD/5 - Norman Amateur Radio Club 118 A- 13- 1082
W6NDU/5 - Texarkana Radio Amateur Club 146 B- 14- 1033
KH6GS/ - Maui Amateur Radio Club 98 B- 11- 892
K6O -
W5CPS/8 - Fort Smith Amateur Radio Club 97 A- 5- 763
W1IND/2 - Philadelphia Short Wave Club 71 A- 4- 564
W8NHB/3 - Capitol City Radio Club 80 A. 7- 520
W3OB/3 - Reading Radio Club 77 AB- 29- 511
W7KEK/7 - Snake River Keys and Mikes 52 AB- 9- 407
W8DQ/7 - Southeast Amateur Radio Club 163 B. 3- 450
W4BQ/4 - Smokey Mountain Amateur Radio Club 44 A- 17- 395
W9OQ/0 - Am-Tel Amateur Radio Society 37 A- 5- 333
W8URD/8 - Case Institute of Technology Radio Club 45 A- 8- 213
W5GCM/5 - Larkfield-Pt. Sill Amateur Radio Club 11 AB- 6- 194

(Continued on page 118)
ITEMS YOU MAY BE LOOKING FOR

Multiple Contact Telephone Type Relay
No. 882-2 windings 125 ohms, 49c.
No. 881-Single 12,500 ohms, 49c.

BIAS TRANSFORMER TYPE KS8779
Completely shielded, Insulator Terminals. Primary: 115 Volts 60 cycle 500 ma.
Secondary: 180 V. 20 ma., 300 V. 9 ma., 6.3 V. (6) amps. C.T. $1.95

TRANSFORMERS
POWER P-3165—Pri. 117 V. Secs.; 350-350 V. rms. @ 200 ma. DC., 6.3 V. @ 4 amp. 6.3 V. @ 7 amp. 5 V. @ 2 amp. 5 V. @ 3 amp. $8.67
P-3159—Pri. 117 V. Secs.; 365-360 V. rms. @ 250 ma. DC., 6.3 V. @ 6 amp. 6.3 V. @ 8 amp. 5 V. @ 2 amp. 5 V. @ 3 amp. $12.05
P-3166—Pri. 117 V. Secs.; 400-400 V. rms. @ 300 ma. DC., 12.6 V. @ 10 amp. C.T., 5 V. @ 15 amp. 5.1 V. @ 15 amp. 4.5 V. @ 15 amp. $14.55
HIGH VOLTAGE P-3170—Pri. 117 V. Secs.; 1750 V. rms. @ 2 ma. DC., 6.3 V. @ 9 amp. tapped at 2.5 V. 5 V. @ 2 amp. 2.5 V. 5 V. tapped at 3 amp. $5.14
P-3171—Pri. 117 V. Secs.; 2500 V. rms. @ 500 ma. DC., 6.3 V. 3 amp. tapped at 2.5 V. 5 V. @ 3 amp. 2.5 V. @ 3 amp. $6.76
VERTICAL OUTPUT A-3035—Turns ratio pri. to sec. 10:1, unshielded type A. $3.09
VERTICAL OUTPUT A-3000—Turns ratio pri. to sec. 1:4.2, unshielded type A. $1.18
A-4000—Turns ratio pri. to sec. 1:4.2, shielded type J. $1.62
HORIZONTAL BLOCKING OSC. P-3169—Pri. 117 V. Secs.; 2500 V. rms. 500 ma. DC., 6.3 V. 3 amp. tapped at 2.5 V. $12.05
FILTER CHOKE C-2991—2 henries 1156. 1.0 KVA $19.00
C-2992—2 henries @ 200 ma. DC. 50 ohms $1.62
C-2974—2 henries @ 200 ma. DC. 50 ohms $2.01

GREENLEE PUNCHES—
Will cut up to 1/4" thick metal.
1/8" $2.00
5/32" $2.19
1/4" $2.33
3/32" $2.99
11/16" $3.23
80 watts, P-61 $4.80
150 watts, P-62 $6.30
200 watts, P-63 $8.25
500 watts, P-64 $10.65
1000 watts, P-65 $20.25

METERS
100 amp—6 volt D.C., 3 inch scale, 4/5" square, Grey finish, supplied with 100 amp. shunt. Brand New. Each as illustrated $2.95
0-100 Ma. 2" Rd. McClintock $1.95
0-9 amp. R.F. 2" Round $2.45
5-0-5 amp. ch. & dis. 2" Rd. 69c

ALUMINUM CHASSIS—
Heavy Duty
7 x 7 x 2" $9.40
7 x 9 x 2" $10.06
5 x 10 x 3" $1.00
8 7/8" x 10 1/4" $1.75
7 x 11 x 2" $1.15
12 1/2" x 17 1/2" $1.88
10 x 17 x 3" $1.88

ALUMINUM PANELS
11/4" Thick Black Crackle Finish
7 x 7 3/4" $9.80
7 x 9 1/4" $10.56
5 x 10 1/4" $1.00
8 7/8" x 10 1/4" $1.75
7 x 11 3/4" $1.15
12 1/2" x 17 1/2" $1.88
10 x 17 x 3" $1.88

POWER TRANSFORMER
Primary 115 Volt 60 Cycles 5 Volts @ 3 Amps.
Secondary 2.5 V. @ .10 Amps.
435-0-435 Volts 2.5 V. @ 3 Amps.
At 250 ma. with 80 Volt Bias Tape
Dimensions 3 3/4"xW. 4 1/2"xH. Priced Right
Dimensions 6 3/4"xW. 4 1/2"xH. At–Each $5.88

OIL FILLED CONDENSERS
4 Mfd. 600 Volt D.C. Sprague $4.90
8 Mfd. 1000 Volt D.C. Tube $1.59
7.5 Mfd. 330 Volt A.C., 6.3 volts $8.90
2 Mfd. 10,000 Volt D.C., C.D. 237s $13.95
1 Mfd. 790 Volt, 25 VA. Dual ..M. 600 Volt, CD Type DYR $1.95

LYSCO TRANSFORMERS
Model 129-10 Meter Model 175-75 Meter Designed for mobile or fixed operation in the 10 or 75 meter phone band. Dimensions 5"x4"x3 1/4". Tube compliment 6AG7—oscillator, 6AG7—power amplifier, 6AG7—modulator. Power output 8 watts. An exceptional buy at $23.95

PLATE TRANSFORMERS
For Small Transmitters, DC Voltage Ratings are Approx. Values Obtained at Output of a 2 section Choke input Filter. Using Mercury Vapor Rectifier Tubes Pri. is for 115 V. 60cy.

ISOATION TRANSFORMERS
All 117 Volts to 117 Volts 60 Cy.
P-96, 50 watts ... $3.60 P-98, 100 watts ... $9.30
P-97, 80 watts ... $5.10 P-99, 250 watts ... $17.70

POWERSTAT VARIABLE TRANSFORMERS
Type 20: 115 V. Input, O-135 V. output @ 3.0 amps. 0.4 KVA $12.50
Price 116: mounted; 115 V. input, O-135 V. output @ 7.5 amps. 1.0 KVA $23.00
Type 116U: unmounted; 115 V. input, O-135 V. output @ 7.5 amps. 1.0 KVA $19.00
Type 1126: 115 V. input, O-135 V. output @ 15.0 amps. 2.0 KVA $46.00
Type 1126U: 230 V. output tapped at 115 V. O-270 V. output @ 9.0 amps 4.0 KVA $46.00
Type 1156: 115 V. input, O-135 V. output @ 45.0 amps. 6.1 KVA $116.00

CHOKES
SMOOTHING SWINGING PRICE EACH
TYPE Hy TYPE Hy MA Price
C-80 10 C-87 4–16 150 $3.09
C-81 10 C-88 4–16 200 $3.82
C–82 10 C-89 4–16 200 $5.29
C–83 8 C-90 3–14 300 $5.59

STANDARD STEEL CHASSIS
Black Crackle
4 x 4 x 2 67c
4 x 5 x 3 79c
4 x 6 x 3 86c
5 x 6 x 3 91c

STEEL CASES
4 x 4 x 2 67c
4 x 5 x 3 79c
4 x 6 x 3 86c
5 x 6 x 3 91c

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Cortlandt 7-6212
New York City
$129.75, 44' $149.75 50' IMMEDIATE DELIVERY $175.00, 61' $239.75.

28' $92.25, 33' $109.75, 39' the low prices for these quality lifetime towers:
on all 7 popular sizes. Note Base Equal Width 1/5 Width Height I/3 Width Width

EASY MONTHLY PAYMENTS
Up to 12 Months to Pay
All Vesto Towers are available on a special monthly payment plan which requires only 1/2 down. Write for free details.

shipped to your home knocked down, FOB Kansas City, Mo., 4th class freight. Prices subject to change...so order now! Send check or money order...or write for free information.

The VESTO Company
101 Main St., Parkville, Mo.

MM-2 MODULATION MONITOR

Only

$24.95

3" x 5" x 10"

. . . . SEE YOUR SIGNAL AS OTHERS HEAR YOUR SIGNAL

with this basic oscilloscope featuring calibrated modulation percentage scale, linear 60 cy sweep with return trace blanking, trace intensifier window, complete controls, reversible panel, rack mounting provisions and many other outstanding features. See the Md-n at your dealer or write Dept 2-9,

W4BX/4 Charlotte Amateur Radio Club 49-ABC- 3- 102

Four Transmitters Operated Simultaneously
W6ZA/9 Lake County Amateur Radio Club 665- A-19- 5985
W3ESP/3 Amateur Transmitters Assn. of Western Pa. 400- AB-25- 5156
W6ZCG/8 Reamfield Amateur Radio Club 545-ABC-14- 5067
W6CU/6 East Bay Radio Club 348- A-19- 4998
W4MK/8 Nashville Amateur Radio Club 481- AB-21- 4465
W6APU/9 Rock River Radio Club 349- A-10- 4284
W8VY/8 Kalamazoo Amateur Radio Club 357- A-12- 4229
W5CNG/5 Quissim Valley Radio Amateur Club 451- A- 4- 4104
W9DTU/9 Hamflesters Radio Club 418- A-12- 3987
W1LT/A/1 Worcester County Radio Assn. 462- A-15- 3851
W2QY/2 Niagara Radio Club, Inc. 446- AB-15- 3224
W8WXS/8 Carmars Radio Club 470- A-18- 3777
W9MVL/9 Johniet Amateur Radio Society 402- A-20- 3618
W2NYE/2 Livingston Amateur Radio Club Inc. 293- AB-21- 3251
W8TZO/B Sion City Amateur Radio Club 514- B-25- 3234
W9TUR/9 Galahsia Amateur Radio Assn. 488- AB- 3- 3108
W4MQN/4 Atlanta Radio Club, Inc. 497-ABC- 3037
Y5SCO/1 Mentopa Amateur Radio Club 221- A-11- 2981
W1KES/1 Manchester Radio Club (Conn.) 484- AB-12- 2973
W6EBB/9 Southwest Missouri Amateur Radio Club 310- AB-23- 2890
W7KMW/7 Tucson Radio Clubs 291- B-30- 3044
W1BT/1 Manchester Radio Club (N. E.) 293- A-12- 2772
W7ARA/7 Radio Club of Tacoma 188- A-16- 2741
W8UEB/9 Kansas Valley Amateur Radio Assn. 294- A- 6- 2646
W7YN/7 Nevada Amateur Radio Assn. 103- A- 9- 2512
W8M9/8 Maccord Club 258- B-13- 2467
W9OM/9 Electron Club of Chicago 191- A-12- 2366
W5SW/9 Chicago Suburban Radio Assn. 285- A- 6- 2322
V38X/7 Scarboros Amateur Radio Club 228- A-10- 2318
WSTAJ/8 Intersity Radio Club 214- ABC-12- 2327
W7KRL/7 Amateur Radio Assn. of Bremerton 182- A-12- 2292
W3GJY/3 Beaver Valley Amateur Radio Assn. 211- A- 5- 2214
W8EM/5 Delta Radio Club of New Orleans 322- B-14- 2106
W5WG/5 Louisianas Tech Radio Club 203- A-11- 2061
W3DNW/5 Meridian, Miss. Amateur Radio Club 346-ABC-11- 1833
WPOS/9 Elgin Amateur Radio Society 358- AO- 1972
W5JQ/5 Midwest City Radio Club 103- A- 4- 1891
W1HOB/1 Parkway Radio Assn. 358- A-15- 1074
W5WQ/9 Wheaton Community Radio Amateurs 145- AB-18- 1060
W8SHQ/9 Neosho Valley Amateur Radio Club 54- AB-14- 992
W4KJS/4 Key and Mike Club of Winston-Salem 127- AB- 9- 984
W7KRM/7 Southside Radio Club 70- AB-10- 891
W4AV/5 Mississippi Amateur Radio Club 107- AB-14- 870
W3EQT/9 Genes Amator Radio Assn. 119- B- 9- 795
W1FR/9 Bellingham Radio Club 274-ABC- 8- 618

(Continued on page 114)

### λ00 MORE SIGNALS PER DOLLAR From Money Invested in an Antenna Self Supporting STEEL TOWERS For Rotary Beams, FM, TV ATTRACTION—NO GUY WIRES! • 4-Post Construction for Greater Strength! • Galvanized steel—Will Last A Lifetime! • SAFE—Ladder to Top Platform • COMPLETE—Ready to Assemble • Easy to Erect or Move • Withstands Heaviest Winds 

(We will supply stress diagrams for your building inspector)

EASY TO WRITE TODAY FOR COMPLETE 

FREE INFORMATION AND PHOTOGRAPHS 

The VESTO Company 
101 Main St., Parkville, Mo.

Y3BJJ West Side Radio Club of Toronto 738- A-22- 7992
W4NE/6 Ventura County Amateur Radio Club 313- A-15- 6845
W9MD/9 Illinois Ham Club 491- A-22- 6831
W8SO/9 Milwaukee Radio Amateurs Club 448- A-45- 6318
W3HUG/8 Steel City Radio Club 530- A-22- 5065

112
All crystals have Army MC harmonic ratings but Sun encloses directions for deriving the correct fundamental frequency in kilocycles.

**CRYSTALS WITH A MILLION USES**

**Fractions Omitted**

<table>
<thead>
<tr>
<th>KIT</th>
<th>Item</th>
<th>Quantity</th>
<th>Price</th>
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<tbody>
<tr>
<td>1</td>
<td>Asstd Mica Condensers-Unmarked</td>
<td>100</td>
<td>.50</td>
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<tr>
<td>2</td>
<td>Asstd Resistors-1/2 W-1 W</td>
<td>100</td>
<td>1.00</td>
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<tr>
<td>3</td>
<td>Asstd Condensers-Tubular Bypass</td>
<td>100</td>
<td>1.00</td>
</tr>
<tr>
<td>4</td>
<td>Asstd Potentiometers-- with or without switch.</td>
<td>25</td>
<td>2.00</td>
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<tr>
<td>5</td>
<td>Asstd Condensers-Electrolytic</td>
<td>25</td>
<td>1.00</td>
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<tr>
<td>6</td>
<td>Asstd Ballast Tubes-Line Ballasts</td>
<td>100</td>
<td>1.00</td>
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<tr>
<td>7</td>
<td>Octal Socket—Water.</td>
<td>25</td>
<td>1.00</td>
</tr>
<tr>
<td>8</td>
<td>Octal Socket—Plastic with Flange.</td>
<td>25</td>
<td>1.00</td>
</tr>
</tbody>
</table>

**MAGNETIC HEADPHONES**

Brand new SC 4000 ohm Magnetic phones with 6 cord and standard phone plugs are adjustable to size A—$14.50

**ANTENNAS**

(A) Small four-section telescopic aerial ideal for portable receivers, transceivers or test equipment. 99c

(B) 22" tapered high frequency aerial covering 130 to 200 MC. Ideal for mobile or fixed station use. 2.69
Premax Telescoping Adjustable Tubular Metal Antennas have been widely used in amateur, military and commercial fields for a long period of years and have shown exceptionally efficient, dependable performance under the most severe climatic and shock conditions. They are available in steel, aluminum and monel in various lengths from 6' 1" to 35' 8" extended heights. Suitable mountings and insulators are also available.

Send for Bulletin

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Premax Vertical Antennas

In Monel...

In Steel...

In Aluminum

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Now... ALL these popular Astatic microphones are available in models with CERAMIC ELEMENTS

CONNEAUT CRYSTAL OR CERAMIC MICROPHONE
• The ultimate in streamlined, bright chrome finish, shown with Type "S" Off-On Switch.

VELVET VOICE CRYSTAL, DYNAMIC OR CERAMIC MICROPHONE
• Sparkling beauties in gold-finished case and handle, with dark brown, detachable base for convertibility to desk stand, floor stand, hand use.

CARDINAL, CRYSTAL, DYNAMIC OR CERAMIC MICROPHONE
• A major new accomplishment in terms of quality performance at modest cost, has die-cast case in high gloss chrome finish, compact to fit the hand, rests in streamlined case (as shown) or lies flat on felt-covered back.

T-3 CRYSTAL OR CERAMIC MICROPHONE
• An all-time Astatic favorite, still as modern in design as ever. A sparkling beauty in bright chrome, with lift head. Available with Type S On-Off Switch.

D-104 CRYSTAL OR CERAMIC MICROPHONE
• First practical crystal microphone developed, with few changes still the top favorite of amateurs.

ATTENTION • ALL HAMS AND SWL'S

• ALL-ALUMINUM
• FULLY ADJUSTABLE
• PERMANENT
• STRONG AND RIGID

AVAILABLE NOW!

<table>
<thead>
<tr>
<th>Beam</th>
<th>Description</th>
<th>Price</th>
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<tbody>
<tr>
<td>3E6</td>
<td>3 Element, 6 Meter</td>
<td>$27.60</td>
</tr>
<tr>
<td>4E6</td>
<td>4 Element, 6 Meter</td>
<td>$33.35</td>
</tr>
<tr>
<td>4E6 Jr</td>
<td>4 Element, 6 Meter</td>
<td>$33.35</td>
</tr>
<tr>
<td>3E10</td>
<td>3 Element, 10 Meter</td>
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<td>4E10</td>
<td>4 Element, 10 Meter</td>
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<td>3E10 Jr</td>
<td>4 Element, 10 Meter</td>
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<tr>
<td>5E20</td>
<td>2 Element, 20 Meter incl. T Match</td>
<td>$47.95</td>
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<td>3E20T</td>
<td>3 Element, 20 Meter incl. T Match</td>
<td>$47.95</td>
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<tr>
<td>4E10-20T</td>
<td>4 Element, 20 Meter Stacked with 2 T Matches</td>
<td>$64.95</td>
</tr>
<tr>
<td>6E10-20T</td>
<td>6 Element, 10 and 3 Element 20 Meter Stacked with 2 T Matches</td>
<td>$74.95</td>
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<tr>
<td>6E10-20T</td>
<td>3 Element 10 and 3 Element 20 Meter Stacked with 2 T Matches</td>
<td>$74.95</td>
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<tr>
<td>6E10</td>
<td>Two Element 10 Meter Stacked with 2 T Matches</td>
<td>$69.95</td>
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<tr>
<td>3E10-2E20T</td>
<td>3 Element 10 and 2 Element 20 Meter Stacked with 2 T Matches</td>
<td>$84.90</td>
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<tr>
<td>Folded Dipole 3E6 and 10 meter beams</td>
<td>$6.90 extra</td>
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<tr>
<td>Folded Dipole 4E6 and 20 meter beams</td>
<td>$6.90 extra</td>
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<tr>
<td>Folded Dipole 3E10 and 10 meter beams</td>
<td>$6.90 extra</td>
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<tr>
<td>Folded Dipole 4E10 and 20 meter beams</td>
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</tr>
<tr>
<td>Folded Dipole 5E20 and 30 meter beams</td>
<td>$6.90 extra</td>
<td></td>
</tr>
</tbody>
</table>

Write to Dept. U 29 for details
ALUMINUM CALL PLATES

• Your call cast in aluminum with black background.
• and polished 1½" letters. Plate size 2½ by 6½", 3 styles: P for panel mounting, L for car license and D for desk use. $1.75 each. Postpaid.
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Buy only the genuine, light-weight TRYLON Steel Ladder Tower. Easily adapted to same basic design of the TRYLON Vertical Radiators.

- Designed and engineered for 100 mph wind load.
- All steel parts hot dip galvanized after fabrication to rigid army and navy specifications.
- Easy-to-climb ladder on all towers.
- Prefabricated guys with factory assembled compression sleeves each and every bolt.
- Easy to install on small ground area.

60′ TYPE 1245 TRYLON STEEL LADDER TOWER
Shipped completely knocked down with 2 sets of 3 prebent gussets, 5 carabiners, top, fitting and ton plate. Piping Weight 420 lbs.

Towers and Antenna Division
WIND TURBINE COMPANY
West Chester, Pennsylvania

W2GSA/2 Jersey Shore Amateur Radio Assn.
W6SD/6 San Fernando Valley Radio Club
VESBNG Hamilton Amateur Radio Club
WZTH/9 York Radio Club
W5MOI El Paso Radio Club

Stern Ladders Operated Simultaneously:
W2OM/2 Tri-County Radio Assn.
W9IT/9 Northwest Amateur Radio Club
W6CFZ Ingleswood Amateur Radio Club
W1CH/8 San Francisco Radio Club
W9ORI/6 North Bay Amateur Radio Assn.
W4VOP/8 San Diego Amateur Radio Club
W2GIZ/2 Union County Amateur Radio Assn.
W5JN/6 Sacramento Amateur Radio Club
W2TBS/6 Suffolk County Radio Clubs
W6RYY/9 Port Wayne Radio Club

Nine Transmitters Operated Simultaneously:
W8BIA/8 Mountaineer Amateur Radio Assn.

Ten Transmitters Operated Simultaneously:
W8GAL/6 Mid Cities Amateur Radio Club
W8NWO/9 Palomar Radio Club

A.R.R.L. EMERGENCY CORPS GROUPS
One Transmitter:
W3AXT/3 Conesigga Glass Arm and Elbow Bonding Society
W8VVL/8 Queen City Emergency Net

Two Transmitters Operated Simultaneously:
W9ESJ/9 Milwaukee County A.E.C.

NONCLUB GROUPS
The scores of nonclub groups consisting of three or more participants that operated one or more transmitters are listed below. The figures and letters following the call indicate, in the same manner as explained under "Club Groups," the number of QSOs, power or powers used, number of operators and final score.

One Transmitter:
W1BDI/1 2-18- A-7-3785
W8KVS/8 170- A-3-2415
W8LEV/8 143- A-4-2688
W1HT/1 136- A-6-2174
W2KRV/5 121- A-5-1971
W4FCU/4 184- A-6-1809
W7MY/7 136- A-7-1835
W4MOJ/4 261- AB-6-1815
W5CHI 135- AB-4-1773
W6UDB/8 184- A-3-1655
W4ELO/4 142- A-2-1503
W2PGS/2 84- A-7-1472
W2WFTU/2 107- A-4-1445
W6FEN/6 86- A-6-1391
W2LR/2 120- A-6-1161
W2TF/2 68- A-5-1121
W5ECR/5 81- H-6-864
W6NID/8 44- A-3-822
W6FYV/VE2 96- B-7-846
W6CUE/0 68- B-9-837
W4AHK 42- A-4-770
W5NMR/5 130- C-8- 894
W1NKM/1 71- B-4-576
W5ELZ/1 80- B-5-570
W5EF/9 68- B-4-564
W9PNI/5 164- A-5- 854
W6YNO/8 117- AC-4- 372
W3KYR/3 27- A-5- 365
W4FLW/4 35- B-4- 348
W4NAY/4 26- A-3- 350
W4WTV/8 10- A-4- 346
W4ACB/4 29- C-4- 87

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Specialists in High-Frequency Antennas
63 NEEDHAM ST., NEWTON HIGHLANDS 61, MASSACHUSETTS

WORKSHOP
10 over 20 Stacked Array with Rotator and Indicator

This combination is the last word in amateur antenna equipment:
- High Gain
- Light Weight
- Rugged Construction
- Aluminum Alloy Elements
- New Model Rotator with Solenoid Brake
- Matches Directly to 72 Ohm Line

THE WORKSHOP ASSOCIATES, Inc.
ALL BRAND NEW IN ORIGINAL FACTORY PACKAGE

TRANSMITTER
KLYSTRONS $97.50
1SE..... $2.95
47A..... $9.80
VT-25A 9.. $2.49
VT-158A 4.. $9.75
211 9.. $9.75
388A 9.. $9.75
GL434A 7.. $9.75
446A (2C60) 7.49
724B 9.. $9.75
W403 9.. $9.75
708A 9.. $2.00
715A 9.. $9.75
801 9.. $9.75
804 9.. $9.75
807 9.. $9.75
829A 9.. $4.50
841 9.. $9.75
1625 9.. $9.75
1626 9.. $9.75
1629 9.. $9.75
7193 9.. $9.75
717A 9.. $9.75
5AP1 9.. $2.95
4BP1 9.. $2.95
SPECIAL: 5CPI-S1 Cathode Ray Tube with Allimeter Markings $1.80
MINIMUM ORDER $2.00

TERMS—Cash with order or 20% deposit, Balance C.O.D.

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from EXCITER TO FINAL

For efficiency and flexibility from exciter to final it’s Barker & Williamson every time.
And Central Radio carries the complete line in all power ratings from 6 to 80 meters.
If you haven’t a B & W catalog, tell us the application and we’ll rush out the proper coil—whether it be end, center or swinging link model.
Central Radio also carries B & W Swinging Link Assemblies, Band Hoppers, 5 Band Turrets—and a complete line of ham equipment.
Order by mail and get exactly what you want—promptly—from Central Radio.

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1 W1QJM and W1QAK opns.
“Converts All War Surplus d-c Receivers and Transmitters, etc., into a-c use.” No rewiring necessary—
installed in a few minutes—units available for any rating—a few popular model sets easily adapted to

Instant Warm Up—No Tubes—Cool Operation
Low Cost — No Maintenance

Free Installation Diagram Sent With Each Purchase
R.P.S. Power Conversion Units Are Available For Any Voltage And Amperage Rating.

IMPORTANT—HOW TO ORDER—The input rating of your dynamotor must not exceed d-c
output rating of the rectifier. For example, dynamotor series DMIDX-12 v. 2 amps.—requires

ALL NEW
FULL WAVE VICKERS SELENIUM RECTIFIERS

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NOTE A: All transformers have 3 extra tappings—for example: 20, 19, 18, 17 volts and 38, 37, 36, 35 volts

All prices F.O.B. Los Angeles (California purchasers add 2¼% sales tax). Include 25% with order—balance on

Can you . . . ?

WRITE A GOOD LETTER—know the technical answers (or where to find them)—and actively love
Ham Radio enough to want to become Sales Correspondent for one of the best Amateur supply
houses?

If so, write today, giving full background, salary
desired, etc.

OPPORTUNITY
P. O. Box 949, Church Street,
New York City S, New York

P.S.: We also need a good counter sales­
man, a stock man and a shipping clerk.
NOW Send better, faster, easier than ever before!

Super Deluxe VIBROPLEX
Reg. Trade Mark: Vibroplex, Lightning Bug, Bug

SUPER-SPEED CONTROL MAIN SPRING
PATENTED JEWEL MOVEMENT
24-K GOLD-PLATED BASE TOP

$27.50

Here's the latest word in sending ease and enjoyment. With this amazing New Vibroplex you can send better, faster and easier than ever before. Design any hand or any style of sending. Smooth and easy in action. No strain. Uniform signals from 10 wpm to 40 wpm and beyond. Ultra modern thumb paddles. Extra large die-cut contacts. Non-slip rubber feet. Acclaimed world's greatest BUG. Now ready for immediate delivery. Order yours today! See how smooth and easy sending can be.

W7GHT/7 30- A- 608
W7OPP/7 5- A- 608
V8IDQ/VE1 15- A- 594
W1DCD/1 19- A- 594
W4JZV/4 44- A- 594
W9FPD/8 20- A- 587
W6PDD/6 41- B- 554
W8NYX/3 41- A- 554
W6JY/5 40- A- 540
W4JZV/4 60- B- 480
W4MDD/4 144- C- 432
W6ANP/5 32- A- 432
W7GOF/7 21- A- 425
W7OWZ/7 31- A- 419
W7OJZ/8 141- A- 414
W7HDF/7 20- B- 405
W8E8R/8 28- A- 378
W2BNJ/2 26- A- 351
W4TVU/7 16- A- 324
VE4DQ/VE4 9- A- 279
W9HJR/9 20- A- 270
W1EWF/1 26- A- 269
W4ETN/4 28- A- 262
W7LNM/7 18- A- 246
W3NMA/3 17- A- 230
W1PFF/1 16- A- 216
W4NRA/8 9- A- 189
W70Z/8 19- A- 171
W1NWM/4 12- A- 162
W3MET/3 12- A- 162
W4B1W/4 18- A- 158
W7CA/6 21- B- 126
W1EMG/1 9- A- 122
W8MOH/8 8- A- 108
W8E8G/8 32- A- 108
W6JLF/1 26- A- 105
W1BJP/1 38- A- 104
W7HPV/1 16- B- 90
W1QGL/1 6- A- 81
W6WJN/6 4- A- 81
W1CA/6 3- A- 74
W2FBY/2 21- B- 42
W4GQR/4 3- A- 41

V.H.F. - ONLY PARTICIPANTS

One Transmitter

W3KRF/3 31- A- 756
W1NWH/1 W1MEP 22- A- 297
W9ZDJ/9 W9CQH 25- A- 252
W6XJ/8 4- A- 162
VE3TF/VE3 10- A- 30
W5HE/1 2- A- 27

Three Transmitters Operated Simultaneously

W9CQH/9 W9CQH 168- A- 2288

Four ops.

HOME-STATE SCORING

9DUA .100 9WUUG .22 9W4AP .7
W1MUW .100 9W4UV .21 9W2Y .6
VE3BBE .84 VE3APK .20 9WGMZ .6
W6NXY .69 9W2FY .20 9W2Y .5
W4YUE .74 9W4BF .25 9W2Y .5
W9HDT .67 9W5Y .20 9W6CH .7
W6MPJ .62 9W8T .20 9W7Y .5
W6WNL .60 9W8G .20 9W8K .5
W6DZ .58 9W5X .16 9W6CH .4
W3HTK .56 9W3N .16 9W6CH .4
W8H5K .56 9W3N .16 9W6CH .4
W8DAE .51 9W3N .16 9W1RO .4
W4LCF .49 9W1BV .14 9W6AH .4
W7XTC .43 9W2OUT .14 9W6AH .3
W7TVE .39 9W5WB .20 9W6AH .3
W9NII .39 9W6RR .13 9W8GR .3
VE3ADE .35 9W8QN .13 9Y1CU .2
W3GIX .35 9W8GF .12 9W1E .2
W2KEW .32 9W5W .11 9W1E .2
W9VOD .32 9W2CG .11 9W3MR .2
W1MD .30 9W6J .11 9W4QX .1
W8ON .26 9W8W .11 9W1F .1
W9RPZ .25 9W5Q .10 9W2O .1
W2WGL .23 9W1RZ .7

* Four ops.
Amateurs—the new Alliance Tenna-Rotor will rotate most antennas from 50 m. c. upwards. Tenna-Rotor is a "beaming" device to give you positive control of rotation—select the exact spot for "peaked" reception! Operates in any weather—is quick and easy to install—consists of a fully enclosed, electrically driven rotor, connected to plastic control box which plugs into any 110 volt, 60-cycle house circuit. A simple two-way selector switch rotates your antenna clockwise or counter-clockwise through 360° and stops it at any desired point on the compass. Rotor unit resists corrosion.

Ask your dealer for Tenna-Rotor

Amateurs—the new Alliance Tenna-Rotor will rotate most antennas from 50 m. c. upwards. Tenna-Rotor is a "beaming" device to give you positive control of rotation—select the exact spot for "peaked" reception! Operates in any weather—is quick and easy to install—consists of a fully enclosed, electrically driven rotor, connected to plastic control box which plugs into any 110 volt, 60-cycle house circuit. A simple two-way selector switch rotates your antenna clockwise or counter-clockwise through 360° and stops it at any desired point on the compass. Rotor unit resists corrosion.

Ask your dealer for Tenna-Rotor

COMPLETE RADIO TRAINING!
Prepare now to accept a responsible position in Commercial Radio. New developments will demand technicians with thorough basic training, plus a knowledge of new techniques discovered during the war. Training open to high school graduates, or those with high school equivalency. Courses 6 to 18 months duration in RADIO AND ELECTRONICS, Approved Veteran training in Radio. Write for Particulars.

WANTED
Teletypewriters complete, components or parts. Any quantity and condition.
Box 138, QST

"It's KENYON Transformers For My Rig Because They Always Put Out!"

- Hams everywhere specify KENYON "T" Line Transformers! Manufactured under rigid standards, all KENYON transformers are constructed of the finest grades of material plus the skill and long experience of a highly trained competent operating staff.
- All KENYON transformers are checked progressively in the course of manufacture and are laboratory-tested upon completion to insure satisfaction. Yes, KENYON "T" Line Transformers meet the most exacting requirements of critical purchasers. For skillful engineering, progressive design and sound construction—Specify KENYON for top performance in your rig!

KENYON TRANSFORMER CO., Inc. 840 BARRY STREET NEW YORK, U. S. A.
Designed to meet hams' demands for greater transmitting ease, the revolutionary National MB-150 Multi-Band Tank Circuit tunes all amateur bands from 80 to 10 meters with a single 180° rotation of the capacitor! No coils to change! 150-watt input for push-pull or balanced single-ended operation. Link coil matches impedances up to 600 ohms. Rugged split-stator capacitor rated at 1500 volts peak.

$18.75

Amateur Net

*Reprints of an article in the March 1948 issue of QST describing a simple 150-watt transmitter using the MB-150 will be mailed upon request. Write to Dept. 194.

I.A.R.U. News

(Continued from page 69)

Amateur Radio League; Československí Amatéři Vysílači; Club de Radio Aficionados de Guatemala; Experimentierende Deutsche Radiomäler; Hong Kong Amateur Radio Transmitting Society; Islenskir Radio Amatörur; Irish Radio Transmitters Society; Liga de Amadores Brasileiros de Radio Emissão; Liga Colombiana de Radio Aficionados; Liga Mexicana de Radio Experimentadores; Newfoundland Amateur Radio Association; Nederlandsch-Indische Vereniging voor Internationaal Radio-Amateurisme; Norsk Radio Relæ Liga; New Zealand Association of Radio Transmitters; Osterreichischer Verband für Funkamateur; Philippine Amateur Radio Association; Radio Club Argentino; Radio Club de Chile; Radio Club de Cuba; Radio Club Paragua"; Radio Club Peru; Radio Club Uruguayo; Radio Club Venezolano; Reseau des Emiteurs Français; Red de Emisores Portugueses; Revue Luxembourgaise des Amateurs d'On de Courtes; Radio Society of Great Britain; South African Radio League; Suomen Radio-Amatöörien; Sveriges Sändaremäleri; Unión Belga des Amateurs-Emiteurs; Union Schweiz Kurzwellen Amateurs; Vereniging voor Experimenteel Radio Onderzoek in Nederland; Wireless Institute of Australiia.

Correspondence

(Continued from page 61)

Under conditions of simulated disaster, messages were handled from the City Hall, Fire and Police Departments by 2-meter link to the Masonic Temple, from whence the mobile units were dispatched to strategic locations. These demonstrations were explained step-by-step to the audience in order to show them how life and property can be protected through amateur radio within minutes of the time that regular communications fail. All equipment was set up and functioning within a period of twenty minutes. The actual demonstration continued for an hour and was well received by those in attendance. The Egyptian Radio Club station call W9AU was used, portable &. Members taking part in the demonstration were W9EY, W9NXT, W9YRX, W9DJG, W9QDF, ex-W9NBA—Roy E. Eder

The Little Slugger

(Continued from page 17)

connection, WAC on narrow-band f.m. had been worked through the week-end QRM. If you don't think this is a good trick try it the next time you rebuild. In using this exciter to drive existing finals don't forget to reduce biases to Class B and take the other precautions outlined earlier in QST.1 And bear in mind that after your rig is de-loused so far as harmonics go it may still be necessary to trap your fundamental out of near-by TV sets.

SWITCH TO SAFETY!
HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in their pursuit of the art.

(2) No responsibility by any character will be accepted; nor can any special type of ethical requirement, such as the registration of all radiat letters he would which would tend to make an advertisement repulsive to radio amateurs be secured.

(3) The Ham Ad rate is $0.06 per word, except as noted in particular advertisements.

(4) Remittance in full must accompany copy. No cash or check discount or agency commission will be allowed.

(5) This is the 25th of the second month preceding publication date.

(6) A special rate of 7¢ per word will apply to advertising which in our judgment is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League, or his wife.

(7) Because error is more easily avoided, it is requested that all printed material be double checked for special equipment, if by a member of the American Radio Relay League, a maximum reduction of 10¢ per word may be made in advertising by him taking the 7¢ rate.

(8) No advertiser may use more than 100 words in any one issue nor more than one ad in one issue.

Having made no investigation of the advertisers in the classified columns, we are unable to vouch for their integrity or for the grade or character of the products or services advertised.

QUARTZ — Direct imports from Brazil of best quality pure quartz suitable for making piezo-electric crystals. Diamond Drill Electric Co., 1727 8th St., N.W., Washington, D.C.

QSLs, 100. $1.50. Cover for samples. Griffith, W8PSW, 1042 Pine Heights Ave., Baltimore 29, Md.


QSLs, Samples. Albro, W4HJD, Box 122, High Point, N. C.

ERSG: Deluxe crystal finishing kits containing holders, quartz samples, blank labels, soldering wire, complete instructions, $2.00 each postpaid. Formerly sold $15.00. Veeco Company, Parkville, Md.

QSLs Quality cards priced right. Samples, Ferris, W4WUT, 1780 Fairview Ave., Cleveland, Ohio.

SUBSCRIPTIONS, Radio publications a specialty. Earl Mead, 123 Walton Ave., Manchester, N.H.

QSLs, QSLs, QSLs! Always a fair price, Dauphinnee, W1KMP, Box 319, Cambridge, Mass.

WANTED: For Sale: 1--1956 25-watt transmitter, Skybuddy receiver, many accessories. 2--New or used 616, 6BE6 modulator, $100.00 each. W4BIQJ, 201 E. 102nd St., Chicago, Ill.


WANTED: RCA AR-88 receiver and ARC-5 VHFE receiver. Also ARC-5 or Dynacomp. State price, condition. W210N, Paul Brown, 3245 Lansdowne Ave., St. Louis 9, Mo.

ART-11, $100.00. Want QSTs prior to 1924. Quote price and conditions. Monty Wickham, 4809 Ferncliff, Seattle, Wash.

SWLL, for sale, complete. $150.00. W2BNF, 158 Riverside Road, New Orleans, La.


WANTED: New and used transmitters, receivers, parts. 10 meter 300-watt beacon, 40 meter transmitter. $100.00. LEILA, W8LJZ, 7029 48th St., N.W., Washington, D.C.

FOR SALE: RCA AR-88 receiver, $90.00. W8OWD, 1045 West 66th St., Minneapolis, Minn.

WANTED: RCA AR-88 receiver and ARC-5 VHFE receiver. Also ARC-5 or Dynacomp. State price, condition. W210N, Paul Brown, 3245 Lansdowne Ave., St. Louis 9, Mo.

ART-11, $100.00. Want QSTs prior to 1924. Quote price and conditions. Monty Wickham, 4809 Ferncliff, Seattle, Wash.

SWLL, for sale, complete. $150.00. W2BNF, 158 Riverside Road, New Orleans, La.


HARMING: New and used transmitters, receivers, parts. 10 meter 300-watt beacon, 40 meter transmitter. $100.00. LEILA, W8LJZ, 7029 48th St., N.W., Washington, D.C.
MONEY! That’s what I need, and that’s why I’m reluctantly offering for auction or for sale:

COLLINS ART-13 converted for A.C. operation including D.C. supply; R.M.E.-45 with Cal-O-Matic dial. Best offer accepted. WSCB, Clyde, Ohio.


HIGHEST bidder takes back issues to 1935 of QST and Electronics. Write for complete list. C. L. Johnson, 1863 30th Ave., N.W., Washington, D.C.

COLLINS 50X complete, $10.50 cash; National NC-300, Silver Microscope, S/C Labs 5-element beam motor mechanism assembly, $95.00; Hallcrafters S-904, 50 watt Federal receiver DX Type 59. PCBs, service parts, manuals, on request. Baldwin phones, spark key, hand-mike (25 years), detector. W2TG, Bellport, N.Y., Box 31.

FTK-2402 is now WIXXV, W. E. Bradford, KSST, Sulphur Springs, Texas. All duplicating equipment complete except for month of February. Also have the following: September 1946, 1000 watts, 940 to 1100 kc. W8PGG. July 1920, February 1921, November 1925, R. H. Bradley, W6E, 601 W. Broadway, Seattle, Wash.

WANTED: Electro-Matic 140/40 HP synchronous motor. WETH, Moraga, Cali.

SURPLUS: Deluxe crystal finishing kits containing holders, quartz blocs, alpha resistors, etc. Made by NBC in 1940. $18.50 postpaid. Formerly sold for $85. Vesto Company, Parkville, Mo.

QL6, SWL's, George Beal, E., WSOXX, Pl. Smith, Arkansas.

EX-KF24 is now WIXY, W. E. Bradford, KSST, Sulphur Springs, Texas. All duplicating equipment complete except for month of February. Also have the following: September 1946, 1000 watts, 940 to 1100 kc. W8PGG. July 1920, February 1921, November 1925, R. H. Bradley, W6E, 601 W. Broadway, Seattle, Wash.

WANTED: Teletype 140/40 HP synchronous motor. WETH, Moraga, Cali.

NEW YORK City Ham:
- Sells: 200-watt f0ne/transmitter TZ40s, final stage, $95.00; A. L. McNealus, W2VPK, Jamaica, New York, Phone JA 3-1086.
- QSLa. "The finest interest. Samples, 2106 South Sixteenth Avenue, St. Louis, Mo.
- MICRO-COMMENTS: Phase shift networks. Write for specifications. WSKVE, 1311 Ash Avenue, N.W., Washington, D.C.

ATTENTION all hams! Read "Practical Wireless", Britain’s foremost magazine for hams! You will find the latest in ideas and views on latest developments and ideas in radio-television fields. Exclusive articles on Britain’s radio amateurs – you cannot afford to miss! For one year’s subscription (12 issues mailed directly to your address from London) send only $2.00 to George Newnes, Ltd., Dept. 30, 53 New Oxford Street, N.W. 1, London, England.

BARGAINS: New and reconditioned Collins, National, Hallcrafters, Hammarlund, MM1, Miscellaneous, Sonotone, others; transmitters, receivers, equipment of all kinds and types. Send $5.00 minimum. Include description and price. C. L. Johnson, 1863 Madison Ave., Oswego, Oregon.

Attention all hams! Read "Practical Wireless", Britain’s foremost magazine for hams! You will find the latest in ideas and views on latest developments and ideas in radio-television fields. Exclusive articles on Britain’s radio amateurs – you cannot afford to miss! For one year’s subscription (12 issues mailed directly to your address from London) send only $2.00 to George Newnes, Ltd., Dept. 30, 53 New Oxford Street, N.W. 1, London, England.

PERSONALIZED book marks. Call letters or name and address. Samples with prices sent. Miss Amanda Martin, Box 1123, Rochester 3, N.Y.

FOR SALE: 10-meter Gon-Set converter. W3HD, J1 North Grant, Waynesboro, Penna.

FOR SALE: Two BC510s for all-band operation. Separately adjustable input. Transmitters are complete ready to go, except for ten-meter filter. $45.00. R. E. Parman, 297 Main St., Toms River, N. J.


FOR SALE: 1000 watts input. Transmitters are complete ready to go, except for ten-meter filter. $45.00. R. E. Parman, 297 Main St., Toms River, N. J.

WANTED: National QST, starting 1926. Inquiries welcome. W9DW.


FOR SALE: WRZ, Wyoming at Walnut St., El Paso, Texas.


FOR SALE: BC6-P10 modulation transformer. $20.00; 12-inch Supreme os­

-SELL: 296, $25.00 modulation transformer. $20.00; 2-inch Supreme os­

-SELL: BC6-P10 modulation transformer. $20.00; 12-inch Supreme os­

FOR SALE: First money order takes $38, $75.00, like new, Carad 3- way portable, $25.00; Richard Bruce, 117 W. 3rd St., Los Angeles, Calif.

FOR SALE: National 500-watt modulator with 2032’s and Multi-Match, $3.00. Emerson disc recorder (new). $65.00; GE super self-charging portable, $50.00. Emerson disc recorder (new). $65.00; Philco 1942-48 Ford radio, $50.00; Philco 1942-48 Ford radio, $50.00. Emerson disc recorder (new). $65.00; Philco 1942-48 Ford radio, $50.00; Philco 1942-48 Ford radio, $50.00.

FOR SALE: Trail key, hand-mike (25 years), detector. W2TG, Bellport, N.Y., Box 31.

FOR SALE: National 500-watt modulator with 2032’s and Multi-Match, $3.00. Emerson disc recorder (new). $65.00; GE super self-charging portable, $50.00. Emerson disc recorder (new). $65.00; Philco 1942-48 Ford radio, $50.00; Philco 1942-48 Ford radio, $50.00. Emerson disc recorder (new). $65.00; Philco 1942-48 Ford radio, $50.00; Philco 1942-48 Ford radio, $50.00.

FOR SALE: Trail key, hand-mike (25 years), detector. W2TG, Bellport, N.Y., Box 31.
Harvey Wells Receiver AR-3-A
A 5 tube superhet with 1 stage of R. F. designed for Aircraft, but with many Ham applications. Operates from dry batteries. Freq. range, 155 Kc. to 405 Kc. and 400 Kc. to 1550 Kc. in two bands. Has fixed freq. position at 328 Kc. for lower reception and 1020 Kc. filter for range and voice reception. Ideal for use with a mobile or portable receiver. Operates from 6 volts D. C. battery. Completely self contained including power supply. Push to talk operation. Brand new and at a bargain price. Complete with tubes, instruction manual. Stock No. 4-F-7. Model AR-3-A. Shpg. Wt. 13% lbs. Reg. price $72.50. Our Price ONLY $24.95 DEL.

Harvey Wells Transmitter AT-3-B
A crystal controlled transmitter designed for aircraft, but easily adapted to Ham applications with slight modifications. Operates from 6 Volts D. C. 10-12 watts R. F. output. Crystal freq. 3105 Kc. Completely self contained including power supply. Brand new and at a price that is right. Complete with tubes, battery, connecting cable and instruction manual. Stock No. 4-F-4. Model AT-3-B. Shpg. Wt. 14% lbs. Reg. Price $74.95. Our Price ONLY $24.95 DEL.

Harvey Wells Transceiver ATR-3
This unit is a combination transmitter and receiver of the same general description as the AT-3-B transmitter and the AR-3-A receiver. The receiver utilizes 6 volt tubes for use on 6 volts D. C. and vibrator pack operation. Completely self contained. An ideal setup for Ham portable or mobile operation by modifying circuit. Brand new and at a price that can’t be passed up. 705 Final Circuit, AT-3-B transmitter and ATR-3 receiver of the same general description as the AT-3-B. Complete with tubes, AT-3-B transmitter and ATR-3 receiver of the same general description as the AT-3-B. Complete with tubes, 6 Volts D. C. vibrator power supply, connecting cables and instruction manual. Stock No. 4-F-3. Model ATR-3. Shpg. Wt. 17 lbs. Reg. Price $159.95. Our Price ONLY $49.95 DEL.

FOR THE AMATEUR’S LIBRARY
POST-WAR COMMUNICATIONS RECEIVER MANUAL
NOW! An invaluable addition to your Amateur Radio Library. Provides a complete, detailed technical analysis of more than 50 of the most popular communications receivers now on the market. Serves as a guide for purchasers of communications sets, enables you to service your own receiver. This book has been compiled from actual examination of each unit. 264 pages; profusely illustrated; durably bound, 8½ x 11". Order CR-1. FAMOUS $500 PHOTOFACT TELEVISION COURSE
Written for the amateur, experimenter and service technician. This book takes advantage of your present knowledge of radio and electronic circuits, and by simple comparison, explanation and analogy, it shows you the operation of television receiver circuits so that you can easily understand them. Authoritative text, profusely illustrated, includes valuable new data never before available. Over 200 pages; sturdy binding; 8½ x 11" Order TV-2. 10 DAYS EXAMINATION—BUY THESE BOOKS NOW Send your check for these books. You may return them within ten days for full refund if you are not entirely pleased ... We pay the postage.

HOWARD W. SAMS & CO., INC.
2922 E. Washington St., Indianapolis 7, Ind.
PLUGS and SOCKETS for 300 OHM LINE

The new Millen No. 37412 Designed for Application plug is an inexpensive, compact, and efficient polyethylene unit for use with the 300 ohm ribbon type polyethylene transmission lines. Fits into standard Millen No. 33102 (crystal) socket. Pin spacing ½", diameter .095". Ideal for many amateur, laboratory, commercial communication and television applications.

JAMES MILLEN MFG. CO., INC.
MAIN OFFICE AND FACTORY
MALDEN MASSACHUSETTS
THE 4-65A is the smallest of the radiation cooled Eimac tetrodes. Its ability to produce relatively high power at all frequencies up to 200-Mc. and over a wide voltage range offers considerable advantage to the end user. For instance the same tubes may be used in the final stage of an operator's mobile and fixed station. Two tubes, in the mobile unit operating on 600 plate volts will handle 150 watts input, while two other 4-65A’s in the fixed station will provide a half kilowatt output on 3000 volts.

THE 4-125A is the mainstay of present day communication. These highly dependable tetrodes have been proven in years of service and thousands of applications. Two tubes are capable of handling 1000 watts input (in class-C telegraphy or FM telephony) with less than 5 watts of grid driving power. In AM service two tubes high-level modulated will provide 600 watts output. For AM broadcast they carry an FCC rating of 125 watts per tube.

THE 4X150A is highly versatile and extremely small (2½ inches high). It is an external anode tetrode capable of operating above 950-Mc. As much as 140 watts of useful output can be obtained at 500-Mc. Below 165-Mc. the output can be increased to 195 watts. It is ideally suited as a wide-band amplifier for television and for harmonic or conventional RF amplification.

THE 4X500A is a top tube for high power at high frequencies and is especially suited to TV and FM. It is a small external anode tetrode, rated at 500 watts of plate dissipation. The low driving power requirement presents obvious advantages to the equipment designer. Two tubes in a push-pull or parallel circuit provide over 1½ kw of useful output power with less than 25 watts of driving power at 108-Mc.

THE 4-250A is a power tetrode with a plate dissipation rating of 250 watts and stability characteristics familiar to the 4-125A. Rugged compact construction together with low plate-grid capacitance, allows simplification of the associated circuits and the driver stage. As audio amplifiers, 2 tubes will provide 500 watts power output with zero drive.

FOR COMPLETE DATA ON ANY EIMAC TUBE TYPE WRITE TO:

EITEL - MccULLOUGH, INC.
210 San Mateo Ave., San Bruno, California

Export Agents: Fraser & Hansen, 301 Clay St., San Francisco, California
Make Your Hobby Into a GOOD PAYING JOB

Do you know over 50% of Broadcast Station Engineers started as hams? You can become a Broadcast Engineer easily — if you hold an FCC 1st class Commercial operator’s license. Many other new jobs now open to FCC Commercial license holders. I can train you to pass your FCC Commercial License Exams in a few short weeks. My time-proven plan can help put you, too, on the road to success. I’ll send you the entire story free of charge. Mail coupon for full information today.

Edw. H. Guilford, Vice-President

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Get Your FCC COMMERCIAL RADIO OPERATOR LICENSE in a Few Short Weeks

It’s EASY if you use CIRE Simplified Training and Coaching AT HOME in SPARE TIME

Thousands of new jobs are opening up — FM, Television, Mobile Communication Systems. These are only a few of the radio fields which require Licensed radio technicians and operators. Get your license without delay. Let Cleveland Institute prepare you to pass FCC License examinations, and hold the jobs which a license entitles you to, with CIRE streamlined, post-war methods of coaching and training.

Look what Broadcast Engineers Earn
(Average Pay Reported by FCC Nationwide Survey)

<table>
<thead>
<tr>
<th>Position</th>
<th>Big Stations</th>
<th>Little Stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmitter Engineer</td>
<td>$4800</td>
<td>$3000</td>
</tr>
<tr>
<td>Studio Engineer</td>
<td>$5000</td>
<td>$4300</td>
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<tr>
<td>Chief Engineer</td>
<td>$7700</td>
<td>$4300</td>
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</tbody>
</table>

CLEVELAND INSTITUTE OF RADIO ELECTRONICS
Desk QT-2 4900 Euclid Building, Cleveland 3, Ohio

I want to know how I can get my FCC ticket in a few short weeks by training at home in spare time. Send me your FREE booklet “Money Making FCC License Information.” as well as a sample FCC-type exam and free booklet, “How to Pass FCC License Examinations” (does not cover exams for Amateur License).

Name: ____________________________________________
Address: __________________________________________
City: ___________________ State: _________________

☑ Veterans check for enrollment information under G.I. Bill

NO OBLIGATION — NO SALESMEN

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1. TELLS OF THOUSANDS OF BRAND-NEW, BETTER-PAYING RADIO JOBS NOW OPEN TO FCC LICENSE HOLDERS.
2. TELLS HOW YOU WILL BENEFIT BY HOLDING AN FCC COMMERCIAL LICENSE.
3. TELLS HOW YOU CAN GET YOUR FCC COMMERCIAL RADIO OPERATOR LICENSE IN A FEW SHORT WEEKS—EASILY AND QUICKLY, BY USING CIRE SIMPLIFIED TRAINING AND COACHING AT HOME IN YOUR SPARE TIME.
4. TELLS OF HUNDREDS OF OUR SUCCESSFUL STUDENTS WHO NOW HAVE LICENSES AND NEW, BETTER-PAYING JOBS.
5. TELLS HOW WE PREPARE YOU TO PASS THE NEW FCC COMMERCIAL LICENSE EXAMINATIONS, WHICH NOW INCLUDE FM AND TELEVISION.
6. TELLS HOW WE GUARANTEE TO TRAIN AND COACH YOU UNTIL YOU GET YOUR LICENSE.
7. TELLS HOW WE HELP YOU TO GET A BETTER-PAYING LICENSED JOB, WITH OUR FREE AND EXCLUSIVE SERVICE, WHICH PREPARES YOUR EMPLOYMENT APPLICATION FOR MAILING TO HUNDREDS OF EMPLOYERS, INCLUDING FM, AM AND TELEVISION BROADCAST STATIONS, RADIO MANUFACTURERS, POLICE RADIO STATIONS, AND RADIO-EQUIPPED TAXI, BUS AND PUBLIC UTILITY COMPANIES.

APPROVED FOR VETERAN TRAINING UNDER “G.I. BILL OF RIGHTS”
ON THE NEW

NATIONAL NC-173

Calibrated electrical bandspread for 6 10-11, 20, 40 and 80 meter amateur bands!
Automatic noise limiter effective on both phone and CW, with adjustable threshold!
Highly flexible crystal filter provides 6 steps of selectivity!
S-meter for both phone and CW!
New temperature compensation and voltage regulation assure exceptional stability!
Accessory socket for NFM-73 adaptor!
Trimmer control permits panel adjustment of RF stage!
Tone control. Phono input jack also provided.

$189.50

(minus speaker) Also available in rack model at same price. Prices slightly higher west of the Rockies.

NFM-73 adaptor makes the NC-173 a real NFM receiver! Instant selection of AM or NFM from front panel.

$17.95
Your choice of RCA beam tubes for transmitter service

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Approx. grid drive (watts)</th>
<th>Max. d-c plate input (watts)</th>
<th>Max. d-c plate volts</th>
<th>Max. freq. at Max. ratings (Mc)</th>
<th>Amateur net price</th>
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<tbody>
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<td>750</td>
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<td>36</td>
<td>750</td>
<td>200</td>
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</tr>
</tbody>
</table>

NOTE: Class C telegraphy (ICAS) ratings are shown except for 832-A which are CCS.

It's incredible how little excitation it takes to drive RCA beam power tubes to full plate input. Receivers do it easily. In addition to power gains of 90 to 100 or more, these transmitting huskies deliver more output at lower plate voltage than any other tubes of similar ratings.

In addition to the advantages of fewer stages, simplified control, and a less expensive power supply, RCA beam power tubes seldom require stabilization in well-designed "all band" circuits. When difficulties may arise, permanent stabilization is simply achieved by neutralization or degeneration at sacrifice in efficiency.

To get all the performance and life you pay for ... buy RCA beam power tubes. Your local RCA tube supplier has them in stock.

SCOOP OF THE YEAR ON TVI... John L. Reinartz, W3RB, discloses simple circuit for curing TVI in Nov-Dec issue of "Ham Tips." Your local RCA tube supplier has a copy waiting for you.