

Panoramic SPECTRUM ANALYZER

QST

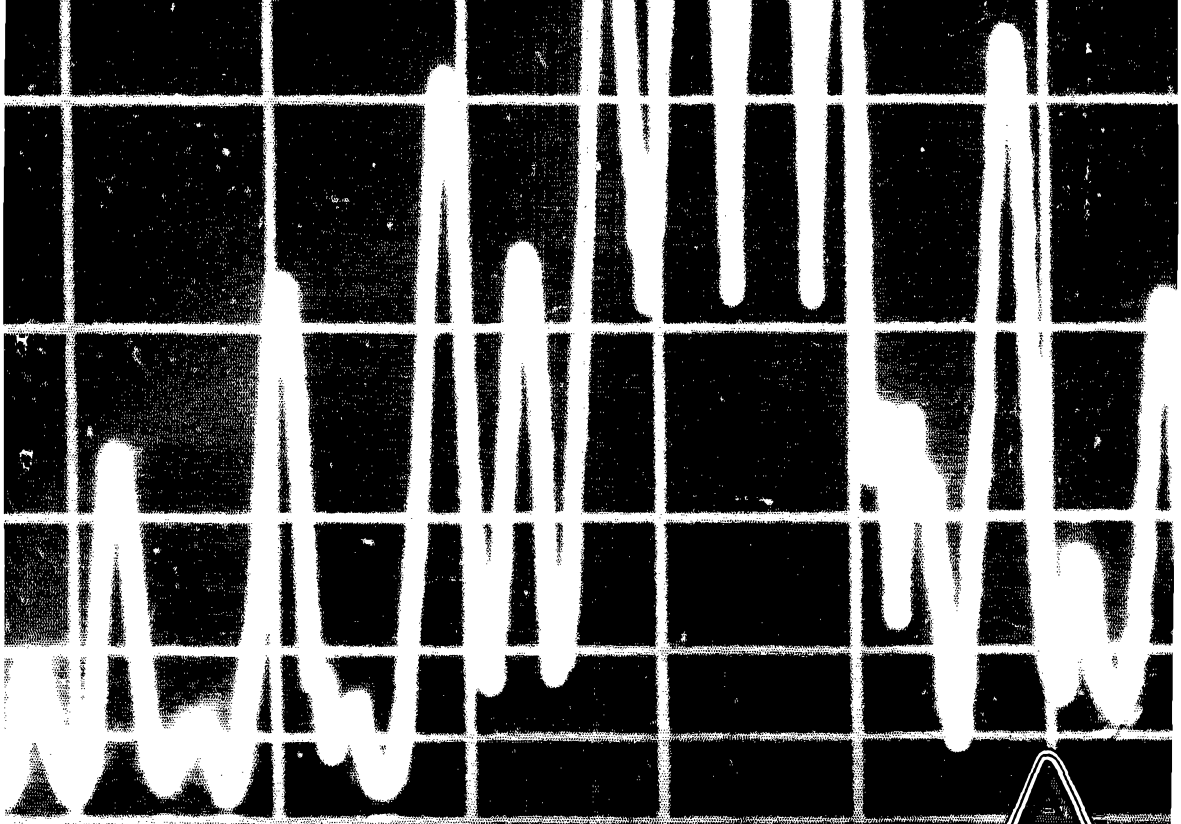
MODEL SB-12

November 1966

60 Cents

devoted entirely to

amateur radio



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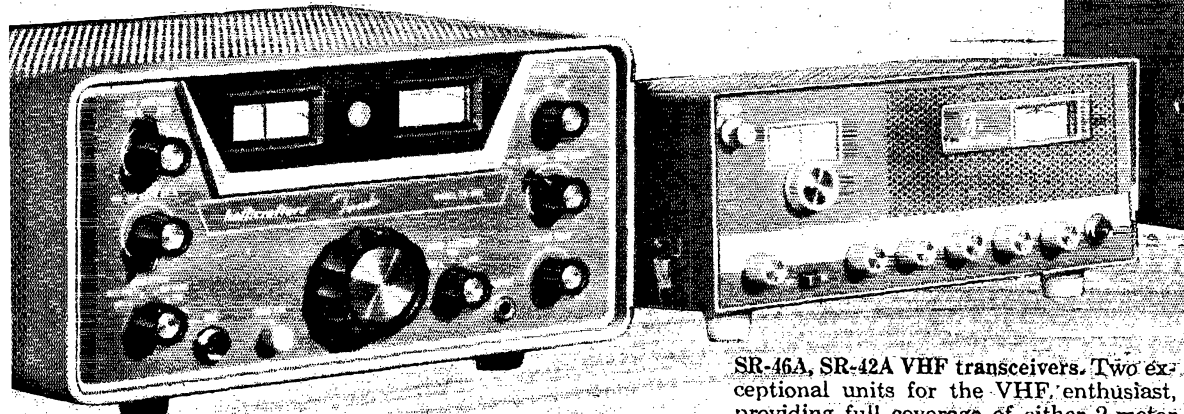


Here too!



SX-146 receiver. Amateur receiver of advanced design employing a single conversion signal path and pre-mixed oscillator chain for unprecedented frequency stability and adjacent channel-rejection.

HT-46 transmitter. Hallicrafters' great "new breed" transmitter—a five-band twin-brother for the SX-146 that works independently or may be interconnected for transceiving. 180 watts PEP (SSB).



SR-500 "Tornado" transceiver. 500 watts PEP (SSB) of unharnessed power in a high-performance, tri-band transceiver featuring Receiver Incremental Tuning and Built-in AALC for maximum talk-power.

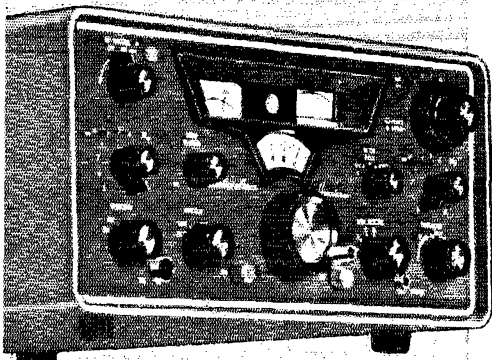
SR-46A, SR-42A VHF transceivers. Two exceptional units for the VHF enthusiast, providing full coverage of either 2-meter or 6-meter band, but with double the usual bandwidth, through use of dual tuning ranges. Bye, bye TV and FM "birdies".

Quality through

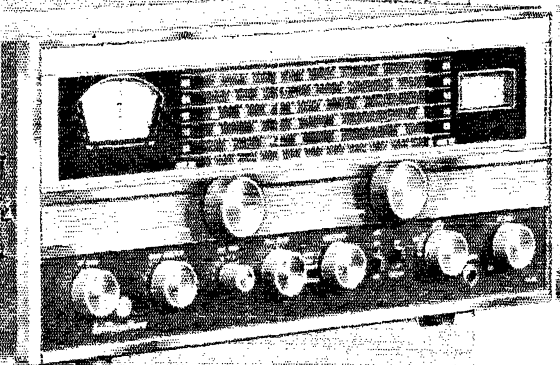
—and here tomorrow

Before you invest in your next piece of amateur equipment, think what that statement means to you:

For nearly four decades, Hallicrafters has continuously offered radio amateurs at every level of skill and involvement the *only complete line of quality equipment* to serve *all* their needs. We expect to make a similar statement 40 years from now. Here's how you benefit from such dedicated continuity:



SR-2000 "Hurricane" transceiver. Brute force at work for you—2000 watts PEP (SSB) for the enormous, effortless signal you've been wanting. Five-band convenience, Hallicrafters' finest.



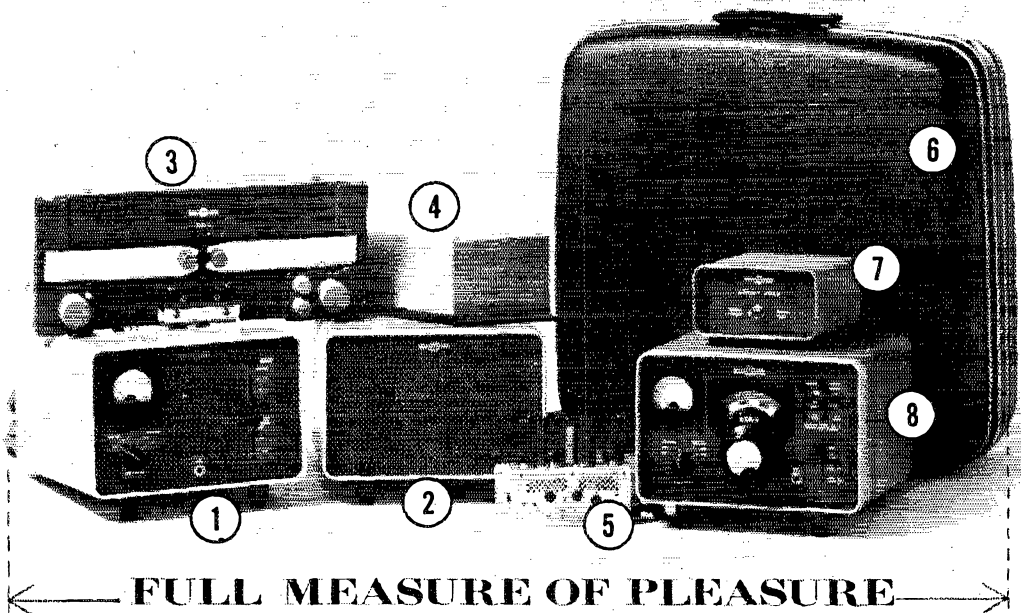
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1. Unequalled total design experience behind the product you buy. Hallicrafters has engineered over 150 important "firsts" in the industry — far more than any other manufacturer.
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In one compact unit that matches other Collins amateur equipment, the 516F-2 AC Power Supply (2) furnishes all the necessary voltages for the Collins 32S-3 Transmitter or KWM-2 Transceiver.

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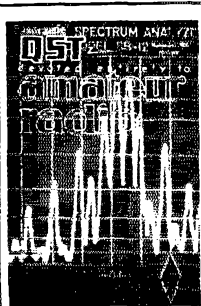
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OUR COVER
What is it? It's a panoramic spectrum photo of highspeed on-off keying of a buffer stage which didn't buff well enough to prevent slight f.m. of the oscillator. More info in the keying article on page 11.

QST

NOVEMBER 1966

VOLUME 1 NUMBER 11

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SBE



SMALL PAIR BEATS A FULL HOUSE

One particular pair, SB-34 sideband transceiver/exciter and SB2-LA gallon linear amplifier—are small enough to beat a full house. Or, for that matter, any no-room-for-passengers KW mobile installation.

Proof. Photograph shows SB-34 and SB2-LA together as a complete 1KW, 4-band sideband station (including receiver of course) beating a full house handily. The two units placed end-to-end occupy less than 2 linear feet—just over 1 foot in depth, less than 6 inches high!

But SBE didn't set out to produce a miniature transceiver at the expense of undue component crowding—transistors and diodes aided by advanced bilateral circuits did it with room to spare.

SB-34 specifically, is advanced equipment—predominantly solid-state—in pace with the trend toward elimination of all tubes in a host of electronic gear. The SB-34 SSB transceiver costs only 395.00 (with 12V DC and 117V AC built-in power supply) and uses 23 transistors, 18 diodes, a zener, a varactor—and only 3 tubes!

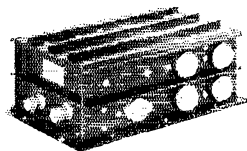
Highlights: SB-34: 4-bands: 3775-4025 kc, 7050-7300 kc, 14.1-14.35 mc, 21.2-21.45 mc.
• 135W p.e.p. input (slightly lower on 15) • Built-in dual 117V AC/12V DC supply (negative ground) • Collins mechanical filter • Panel selectable USB-LSB • 11¼"W, 10"D, 5"H. Weight: 19 lbs.

SB2-LA: 80-40-20-15 meters • Input SSB: 1KW p.e.p. AM: 300W. CW-FM-FSK: 400W,
• Built-in 117V AC power supply • 12"W, 12½"D, 5¾"H. Weight: 40 lbs.

MODEL SB3-DCP INVERTER

Heavy-duty transistorized inverter for mobile operation of SB2-LA linear amplifier at 1KW input. Input 12-15V DC, negative ground. Output @ 13.5V DC input, 150 volts AC peak square wave at 250 cycles. 6"W, 12"D, 3¾"H. Weight: 17 lbs.

Write for new brochure describing SBE line.



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Model 14AVQ for 40 thru 10 meters

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VERSATILE MODEL 18V for 80 thru 10 meters. Highly efficient, budget priced vertical with simple feedpoint adjustment to any band. Model 18V...**\$16.95 Net**



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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. ARRL Field Organization station appointments are available in areas shown to qualified League members. General or Conditional Class licenses or higher may be appointed OES, OES, OPS, OO and OHS. Technicians may be appointed OES, OBS or V.H.F. P.A.M. Novices may be appointed OES. SCMs desire application leadership posts of SEC, EC, RM and PAM where vacancies exist.

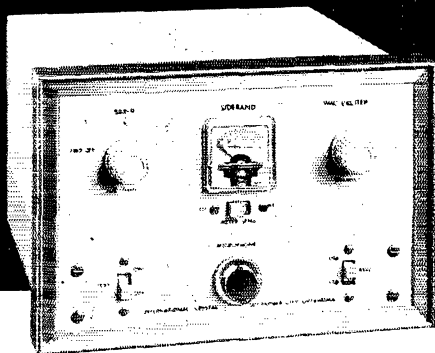
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NEW from International

SINGLE SIDEBAND 9mc EXCITER-DRIVER 50-54mc MIXER-AMPLIFIER

The SBX-9 Exciter-Driver and the SBA-50 Mixer-Amplifier provide the perfect combination for 50-54mc SSB operation. Performance, versatility and reliability are incorporated into this new SSB pair. A tremendous value at a low price!



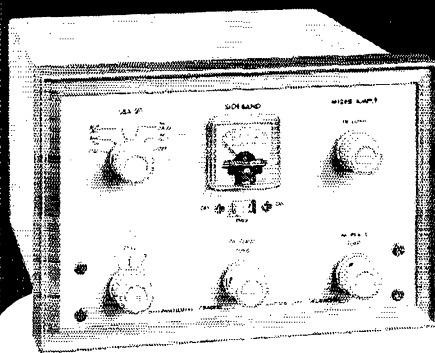
Model SBX-9

SPECIFICATIONS:

Exciter-Driver 9mc

- Tubes:** 6BH6 Oscillator
12AX7 Audio
7360 Bal Modulator
6BA6 RF Amplifier
- Filter:** Four crystal half lattice
Carrier Suppression 45db min.
Unwanted SB Atten. 40db min.
- Output:** Provides voltage drive for mixer such as SBA-50
- Controls:** Carrier Balance
Microphone Gain
Test Switch
USB-LSB Switch
- Metering:** RF output for balance adjust. Two sensitivity ranges available with front panel switch.
- Misc:** Relay included for push-to-talk operation. Crystals for upper and lower sideband included.
Requires high impedance microphone.
For operation on 117 vac 60 cycle power.
\$125.00

Order direct from
International Crystal Mfg. Co.



Model SBA-50

SPECIFICATIONS:

Mixer-Amplifier 50-54mc

- Tubes:** 6U8A Oscillator-Mixer
12B7A Amplifier
6360 Linear power amplifier
- Drive:** Requires 9mc sideband signal from SBX-9
- Output:** SSB single tone 10 watts
- Controls:** On-Off Power
PA Grid Tune
PA Plate Tune
PA Load Tune
Metering Switch
- Metering:** Oscillator
9mc Drive
Buffer Grid
PA Grid
RF Out
- Crystals:** Three positions, uses 3rd overtone 41-45mc range.
Crystal frequency = final frequency — 9mc
- Misc:** Accessory socket provided for connecting keying circuit to SBX-9. Comes with three crystals. Specify frequency when ordering.
For operation on 117 vac 60 cycle power.
\$145.00



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

"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.

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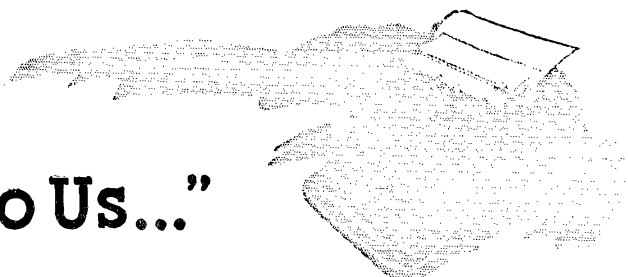
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"It Seems to Us..."



FUROR

"All us hams will be re-examined by FCC before the end of the year or lose our licenses."

"Yeah, and the way I heard it, the exams will be 35 w.p.m. and commercial first phone theory."

"I have a friend at FCC who says it didn't come from them. It must be those nuts in Newington who are lousing things up."

An Associated Press despatch from Washington in late September set a portion of amateur radio on its individual and collective ear — almost entirely through misinterpretation, jumping at conclusions, and spreading of rumors until they seemed like fact.

Oddly enough, the story was nothing new, but merely a newspaperman's attempt to summarize the three-year developments in the field of incentive licensing — all earlier reported in *QST* and elsewhere. There was no new action on the part of FCC or ARRL, nor was it (as rumored) an official release by either.

The story was by-lined by Stephen M. Aug, a ham (W3DEF) and AP staffer in Washington. His sole purpose was to provide background for the general public. He had prepared it some weeks earlier for routine release! He was more amazed than we at the ham furor.

Admittedly, a story on ham regulation intended for the public would be written differently from one for amateur consumption. This, plus some tabloid-type choices for local headlines ("Hams Face FCC Crackdown") may have contributed to the confusion. And a few hams, delighted to have a new subject to kick around, followed their usual pattern of automatically blaming the League for everything — especially before anyone bothered to find out if the gossip and rumors were true.

In his story, Steve did fail to differentiate clearly, at least for amateurs, between the League proposals and those of FCC. One amateur interpretation was that the League had suddenly proposed "re-examination of most amateurs" — of course wholly untrue. The projected fee figure ("The proposal could cost the ham operators about \$1 million"), attained by computing 250,000 hams at \$4 each, is pure speculation without any practical basis. Incidentally, worth mention here is the fact that within the five-year cycle of license tenure, the amateur radio service already pays considerably more than a million bucks

in application fees. *QST* has earlier pointed this out in reporting ARRL's strenuous — but unsuccessful — opposition to the fee concept.

Under the pending FCC proposals, if and when adopted, no amateur will be required to undergo re-examination. The League has never proposed such reexamination (although some members have urged it). ARRL did ask, originally three years ago, for reinstatement of the former licensing structure, with operating privileges commensurate with class of license, which provided more incentive for advancement of an amateur's technical knowledge. Other petitions to the same end, from clubs and individuals, were filed — some before and some after ARRL's. FCC combined ideas from various petitions and announced them in March, 1965 (see pages 9 and 44, May 1965 *QST*) as proposed rules. Under present FCC proposals, broadly speaking, half of each of the 80-, 40-, 20- and 15-meter voice bands eventually would be available only to the new First and Amateur Extra Class licenses; the other halves would remain as at present. The lowest 50 kc. of the c.w. segment of each named band would eventually be available only to the Extra Class; the rest would remain as at present.

League directors at their 1965 meeting, by then with the background of even more thousands of expressions of opinion from members and non-members alike, found most of the proposals acceptable. But they did continue to disagree with FCC on one major point by expressing heavy support for granting the proposed new First Class license automatically to present Advanced holders.

There has been no formal action since that time, by either FCC or ARRL.

It may be a compliment to ARRL's stature when some hams — particularly non-members — automatically assume that *anything* involving amateur radio regulation is instigated or accomplished by the League. But it is no compliment to the reliability of amateur radio when the rumors and misinformation fly thick and fast, with many people willing to believe whatever they've heard on the air, no matter what the source, and when the objective seems to be gossip with little regard for accuracy. As hams we can take satisfaction only in knowing that it was a very small percentage of our number who went off base and stimulated the confusion.

QST

League Lines . . .

"Amateur Radio: An International Resource for Technological, Economic and Sociological Development" is the appropriately-lengthy title of an exhaustive report by Stanford Research Institute on trends, characteristics and impacts of amateur radio. The job, just completed, was done under contract with ARRL, as an independent appraisal of the performance and current status of our fraternity. The object is a comprehensive document to be distributed as background for telecommunications officials of VE/W and other countries, especially those responsible for frequency allocations and management.

In the same field, further League efforts to inform other government authorities on the value of the amateur service, largely through IARU, are continuing. Hq. staffer WIIKE discussed the matter with society and government officials in Cyprus, Greece, Israel, Lebanon and Syria; General Counsel W3PS extended a vacation trip to include Japan and Hong Kong. IKE also participated in a two-week ITU frequency-management seminar at Geneva, attended by allocations officials of a number of foreign countries--largely in the "new and developing" category.

Ready for the annual Sweepstakes? Only some 2,000 hams each year file logs with Hq., but anyone listening to the bands can tell a lot more actually take part. To avoid the rest of us fanatics, we recommend contest-haters stick to c.w. the November 12th weekend, and phone the following weekend. And maybe someone can soon beat champ W4KFC--the Roanoke Division chose him as their next director, which might keep him too busy to get on the air.

Other director elections are in process. There's still plenty of time to return your ballot--but do it now! Further info on page 84.

Last we heard of a ham organization started up New Hampshire way, the new (as of October 1965) secretary had quit, finding his ethics and those of the founder did not coincide. Now, a National Association of Radio Amateurs with an Atlanta postbox is sending out flyers soliciting membership (\$25). "Growing every day at an unbelievable rate," the pamphlet says--which seems odd since we can't find anyone in Atlanta who ever heard of the outfit, and no names or calls are given. Here we go again?

The International Radio Communications Exhibition, an excellent show staged annually by the Radio Society of Great Britain (p. 92, October QST) will be officially opened in London October 26 by H.R.H. Prince Philip, the Duke of Edinburgh, who is the patron of RSGB. President Denniston, W0NWX, expects to attend on behalf of ARRL/IARU.

Booster lapel pins are already on their way to the first successful participants in HamQuest 67. With the autumn upsurge of club activity, make sure your group helps strengthen amateur radio by increasing both club and League membership.

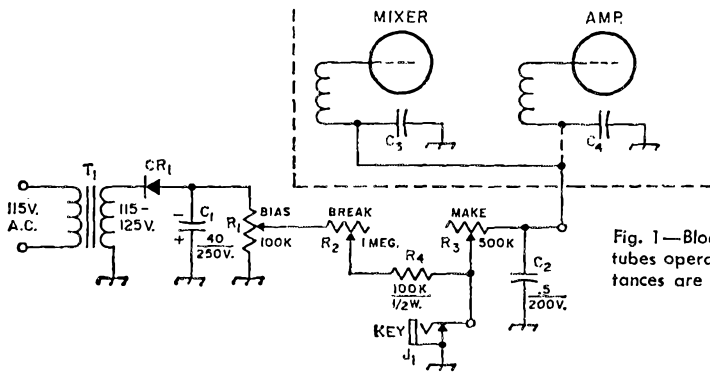


Fig. 1—Blocked-grid keying circuit for small tubes operated without grid current. Capacitances are in $\mu\text{f.}$; resistances are in ohms (K = 1000).

- C₁—Electrolytic.
- C₂—Paper; value depends somewhat on number of stages keyed, and may be as low as 0.1 $\mu\text{f.}$ for keying only the mixer and following Class A amp.
- C₃, C₄—R.f. bypasses normally in transmitter.

- CR₁—Silicon, 400 p.i.v.; current rating not important.
- J₁—Closed-circuit jack.
- R₁, R₂, R₃—Linear controls.
- R₄—Current-limiting resistor.
- T₁—"Booster" transformer, 115-125 volts at 15 ma.

All three controls, R_1 , R_2 and R_3 , affect the shaping, and they are not independent in their effects. Adjustment of R_3 changes the charging time constant and thus influences break as well as make. Adjusting R_2 does not affect the make time constant, since only R_3 is in the circuit when the key is closed. However, changing the bias voltage by means of R_1 affects the shaping on both make and break.

Tube Characteristics

Fortunately or unfortunately, the keying waveshape is not determined by the time constants in the grid-block system alone: it is affected by almost every transmitter adjustment. Fortunately, because the tube characteristics contribute some useful attributes to the waveshape: unfortunately, because it is practically impossible to make any adjustment, tuning or otherwise, without affecting the keying.

Considering the keyed stage itself, Fig. 2 shows a hypothetical curve of r.f. output voltage amplitude plotted against the instantaneous value of keying bias. It is assumed that the stage will have the usual Class A cathode bias when the keying bias is zero. The curve would be typical for a tube having a variable- μ or "remote-control" characteristic. The r.f. excitation ordinarily would be adjusted so that the tube is driven just to the grid current point, but not actually into the grid-current region.

Superimposed on this characteristic is the shaping performed by the RC circuits in the blocked-grid keying system. The blocking-bias voltage will vary with time about as shown in Fig. 3. On make, Fig. 3A, the capacitor is initially charged to the full blocking bias, and when terminals A-B are shorted by the key the bias approaches zero while the capacitor discharges through the resistor. Two initial values of bias are shown, -75 and -50 volts. On break, Fig. 3B, the now-discharged capacitor is recharged through the resistor and the voltage across it approaches the bias-supply value.

Combining Figs. 2 and 3 gives the make and break keying shapes shown in Fig. 4, A being for a blocking bias of -50 volts and B for a bias of -75 volts. Because of the tailing characteristic of Fig. 2 the output amplitude does not rise rapidly at the instant the key is closed, but for a brief period changes rather slowly. This is helpful, since the transition from zero to finite output is smooth, a condition that reduces the initial click. (Compare this with the abrupt rise in the actual bias voltage, Fig. 3A, which is a more cliky way to start the pulse.)

At the break end of the character the increase in negative voltage across the capacitor, Fig. 3B, is at first rapid and then becomes slower. Combined with Fig. 2 this results in a very rapid decrease in output if the break time constant is the same as on make, as shown by the dashed curve following break in Fig. 4A. A considerably longer time constant must be used if there is to be less click on break than on make. The solid curve shows the effect of increasing the break time constant so that the decay time is approximately the same as the rise time.

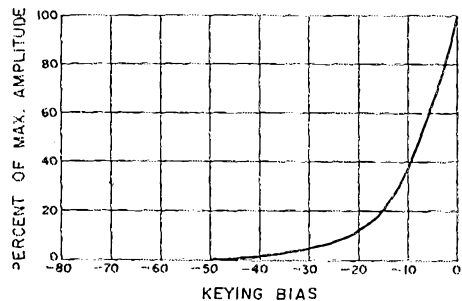


Fig. 2—The output amplitude from an amplifier does not rise linearly with decreasing values of instantaneous keying bias, but at first increases slowly and then more rapidly. This is a typical curve for a small tube having variable- μ characteristics. The initially flat portion of the curve adds needed shaping at the beginning of the make characteristic.

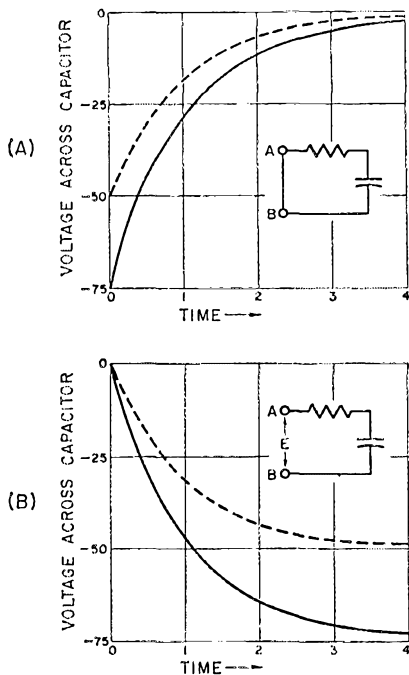


Fig. 3—Voltage rise and decay across the capacitor in an RC circuit, for two values, 50 and 75 volts, of bias-supply voltage.

When a blocking bias well beyond that required to cut off the output is used (Fig. 4B) part of the change in instantaneous keying bias (Fig. 3A) has no effect, since there will be no output until the cut-off point is passed. The beginning of the character is delayed, but only slightly because the voltage is changing rapidly at first. However, the output amplitude is controlled by a slower part of the time-constant curve, which makes the initial transition from zero to finite output more slow. This can be seen by comparing the two curves for make. On the other hand, the break side is made sharper, because the bias rises more rapidly when the charging is from a higher-voltage source. This can be seen by comparing the solid break curve in Fig. 4B with the cut-off curve in A, both having been drawn for the same break time constant.

When the following amplifier is keyed along with the mixer the overall keying waveshape is affected, in addition, by the instantaneous-keying-bias vs. output-amplitude characteristic of the amplifier. In general, both make and break are sharpened, so the RC time constants must be lengthened to restore the same rise and decay times that were obtained when keying the mixer alone.

Following Stages

Preserving the keying waveshape established in the mixer, or in the mixer and the immediately-subsequent amplifier, requires that every amplifier following the keyed stages must be linear —

exactly the same requirement as for s.s.b. transmission. This means, of course, that the final-amplifier grid drive and loading must be adjusted to be the same on every frequency on which the transmitter is used. In other words, an s.s.b.-type transmitter is called for.

Since a nonlinear stage such as a Class-C amplifier or a frequency multiplier will modify the keying waveshape, the necessity for linear amplification after keying would at first glance wash out any possibility of using a conversion v.f.o. to drive a transmitter using frequency multipliers. This is true, if an attempt is made to use the same shaping adjustment on all bands. However, a keying waveform does not have to be preserved during amplification, as a voice waveform does in s.s.b. If the end result out of the final stage has proper shaping, that is all that matters. Such shaping can be done, for a price. The cost is the effort that must be spent in readjusting the keying-circuit constants on each band, which also means that the keying must be checked each time the transmitter is shifted to another band. The operating conditions in all stages following the keying also must be carefully chosen.

Fig. 5 illustrates how this can work out. The keyed signal was taken from the conversion v.f.o. discussed in another article,³ using the blocked-grid keying circuit of Fig. 1 with the keying bias applied simultaneously to the mixer and amplifier. The v.f.o. output was on 3.5 Mc. The remainder of the transmitter consisted of three stages, the first a buffer/doubler/quadrupler, the second a straight amplifier, doubler or tripler as required, and the final stage (a pair of 6146s) a straight amplifier on all bands. Cathode bias on the two low-power stages kept the plate dissipation within tube ratings with no drive, and the final stage had a combination of cathode bias and screen clamp for the same purpose. This biasing arrangement allowed all tubes to

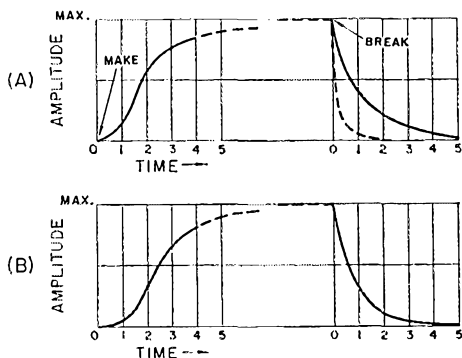
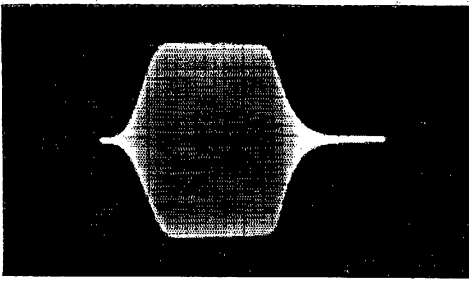
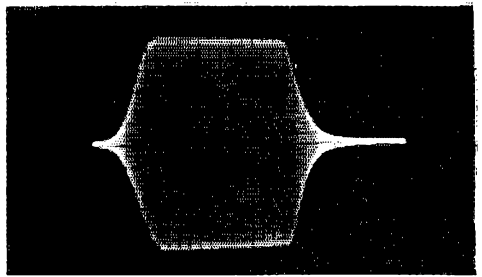


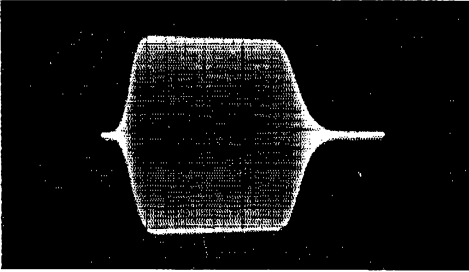
Fig. 4—Combining Figs. 2 and 3 leads to the actual shaping of the keyed character. A—initial bias-supply voltage — 50 volts; B—initial bias-supply voltage — 75 volts. Dashed break curve in A is for the same keying time constant on make and break; the solid curve is for a longer break time constant giving approximately the same decay time (90 per cent to 10 per cent of maximum amplitude) as rise time.



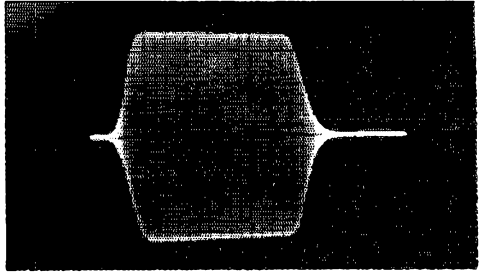
3.5
Mc.



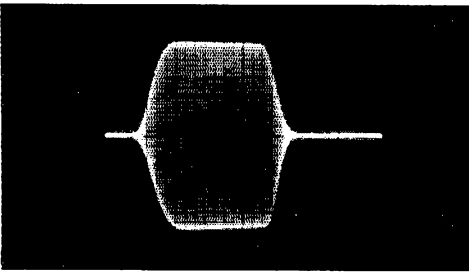
7
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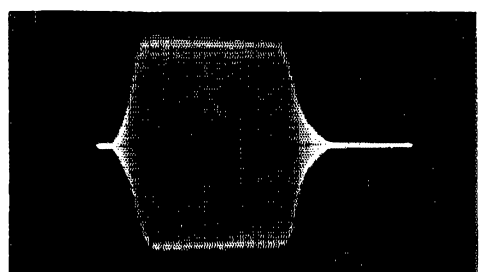
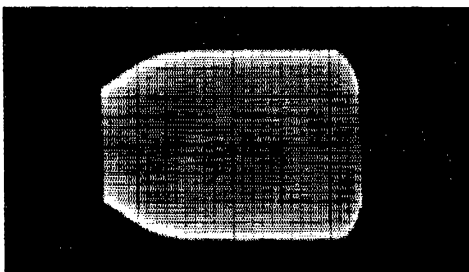
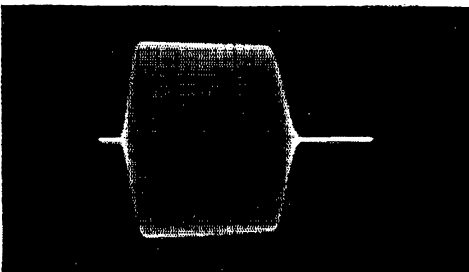
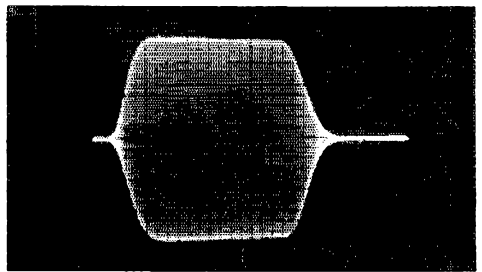
14
Mc.



21
Mc.



28
Mc.



amplify immediately when the shaped v.f.o. signal began—an essential feature.

The left-hand column in Fig. 5 shows the keying waveshapes on the five bands when the shaping originally was adjusted on 3.5 Mc. and then left alone on changing bands. The normal tuning, loading and drive adjustments were made so the final-amplifier grid and plate currents were the same on all frequencies. On 7 Mc. the dots became somewhat longer but retained good shaping, and on 21 Mc. the make shape became sharper. The dots on 14 Mc. were shortened a good deal, and on 28 Mc. they were lengthened to the extent that the end of one ran into the beginning of the next. This was with high-speed (48 bauds) keying using an electronic keyer set for equal on-off times. With a straight key at slow speeds these effects would be less noticeable, except perhaps on 28 Mc., where the break would be quite soft.

The right-hand column shows what can be done simply by changing the bias control, R_1 in Fig. 1, without touching either R_2 or R_3 . Where the dots are too light, less bias should be used, and vice versa. Careful listening with all five of these patterns showed no click, although there is some variation in rise and decay time. So it is possible to key through following frequency multipliers and amplifiers while maintaining clickless keying, even though it is not possible to retain exactly the same keying waveform on all bands.

A frequency multiplier following a keyed stage ordinarily will tend to speed up the rise and decay times, since its output is more sensitive to excitation voltage than is the case with a straight amplifier. However, this may be altered, in a given transmitter setup, by the drive settings necessary for getting the required multiplier output. The 28-Mc. pattern at the lower left in Fig. 5 is actually softened instead of sharpened, and the dots are much longer. The reason for this is that the v.f.o. keying had to be quite soft in order to produce the patterns shown for the other bands where drive requirements and tube response were different: when the v.f.o. output was increased for equal 28 Mc. drive, the soft v.f.o. keying took over. There is obviously no general rule to be applied—other than to adjust the keying for each band.

Break-in

Just because low-level keying is used, real break-in operation does not follow as a matter of course. With either multiplier- or s.s.b.-type circuit design the keyed stage has to be followed by amplifier stages that take plate current with the key open. So long as plate current flows these stages will generate noise which can interfere

Fig. 5—Keying waveforms obtained in an experimental setup in which the keyed low-level stages were followed by three nonlinear stages, including frequency multipliers for the higher-frequency bands. Left-hand column, no adjustments made after shaping was set as shown on 3.5 Mc. Right-hand column, effect of bias-voltage adjustment under same conditions.

with reception. The noise has to be eliminated before break-in is possible.

This question becomes more acute when there is added to it the problem of how to use the same antenna for transmitting and receiving. We have found, for example, that a final stage by itself will not generate enough noise to matter when separate sending and receiving antennas are used, but this may not be true when the final stage and receiver are coupled together through a tube t.r. switch.⁴ But even when separate antennas are used it is generally impracticable to let every stage remain in operating condition while the key is open. The reason is that the relatively-small amount of noise generated in the earliest non-keyed stage is amplified through the rest of the transmitter, and enough is radiated by the transmitting antenna to make weak-signal reception practically impossible around the nominal transmitting frequency.

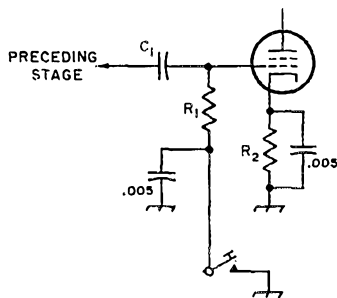


Fig. 6—This circuit can be used for keying the transmitter driver stage for eliminating key-up noise. The key shown above is identical with the key in Fig. 1; this wiring is simply in parallel with the shaping circuit across the key terminals. The make time constant is negligible, allowing the make shaping to be done in an earlier keyed stage. Break time constant is controlled by the shaping adjustments.

In the test setup which produced the pictures in Fig. 5 the noise was overcome by keying the driver for the final stage along with the v.f.o. It was quite simple to do this by means of the circuit shown in Fig. 6. The tube, a receiving-type power pentode, has a cathode resistor, R_2 , which with the key closed develops enough bias to hold the plate current within the plate-dissipation rating without drive. The principal operating bias is obtained from grid rectification and R_1 . The tube is instantly ready for drive when the key is closed, so the make shaping can be done in an earlier stage. When the key is opened, the keying bias during break rises to the final value at the grid of the tube just as it does in the other keyed stage or stages. Thus the tube continues to operate until the break shaping is over. Note, however, that this speeds up the decay of output during break, so the keying time constant must be adjusted to compensate.

(Continued on page 166)

⁴ An alternative to the tube t.r. switch is a keyed antenna relay, which requires a high-speed relay capable of carrying (but not breaking) the antenna or transmission-line current.

“Unetched” Circuit Boards

For Experimental Transistor Layouts

TRANSISTORS and the miniaturized components developed to go with them fit so neatly into etched circuit boards that it seems a shame to use any other method of assembly. But actual etching of copper-clad board is a somewhat messy process and not one that lends itself too well to experimental layouts — you guess right the first time or else!

“Perfboard,” an insulating board punched with holes for leads at regular intervals, is an acceptable substitute for trying out new circuits, but has the disadvantage that the holes are rarely in the exact spots where you’d like to have them. Also, the plug terminals, although convenient, have to be kept on hand in ample quantity. And the final result is in general much more bulky than the same circuit thoughtfully laid out on an etched board.

The scheme described here has most of the advantages of etching, at least for the less-complicated circuits, is easily adapted for post-layout changes, will take plenty of resoldering without burning off the connections, and uses easy-to-get low-cost materials. Also, it takes no special skill.

Like the etched-circuit board, it uses a thin phenolic base with copper foil for connections. The base can be any phenolic about a sixteenth of an inch thick; that shown in the photographs is ordinary kitchen-counter Formica. You should be able to get good-sized scraps of it for almost nothing from any local outfit that does this kind of household work. It’s easy to cut it into pieces of the desired size with a hacksaw, and the edges can be smoothed with a file.

The big difference between this method and etching is that the copper foil is simply cut into strips to form the connections, instead of etching away the unneeded copper. A further — and important — difference is that the component leads do not go *through* the connection strips, as they do in most etched circuits. The strips are laid *alongside* the holes through which the leads go. It is impracticable to drill holes through thin copper and get a neat job, as we discovered after trying it. Fig. 1 shows before-and-after-wiring views of a small board which, when completely wired, looked like Fig. 2 on top. After pushing the leads through the board they were bent over to make contact with the strips, clipped to size, and soldered in place.

Copper foil can be found in hobby shops, where it is sold for embossing. A square foot cost the writer fifty cents at a local store. It is about five mils thick — just right for ease of handling, and sufficiently strong to stand frequent resoldering. Cut into strips about $\frac{3}{16}$ inch wide, a square foot of foil will supply enough material for as many circuits as even a busy experimenter will construct in a long period.

The holes in these boards were made with drills that are available almost anywhere in inexhaustible supply — $\frac{3}{16}$ -inch brads with the heads clipped off. Regular drills of the same diameter are not only hard to find in the average hardware store but have the bad habit of snapping in two just when the job is getting under way. Although the brads may not do quite as clean a job, the rough edges they leave can easily be cleaned up with sandpaper after all the holes have been drilled.

We have been unable to find any adhesive that will stand the heat of soldering, so different tactics have to be used to hold the strips in place during construction. Fortunately, it is no problem. The strips can be held down by small pieces of Scotch tape placed at strategic points where none of the holes will be covered. The tape doesn’t seem to mind the heat at all, and can easily be pulled off after the job is complete. Nevertheless, it is somewhat helpful to cement the strips to the board before any soldering is done, merely to hold them in the proper positions be-

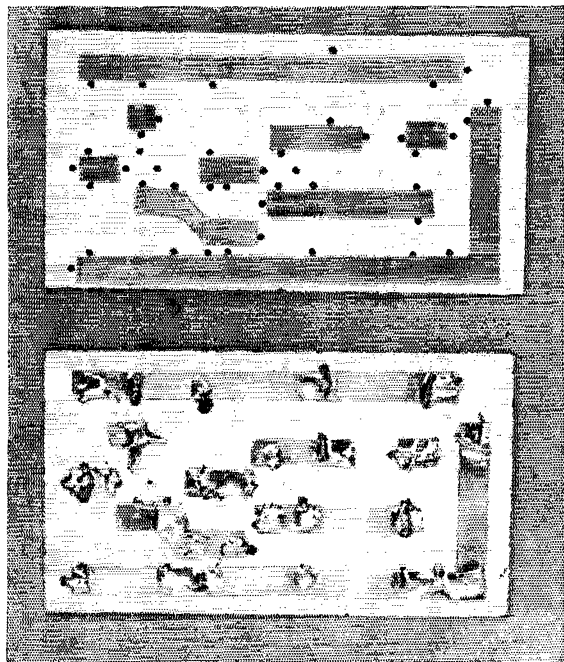


Fig. 1—Circuit boards before and after wiring. Copper-foil strips are laid alongside the holes through which the leads from components go. Changes in direction can be made by using overlapping strips or by folding at the appropriate angle. Component leads are bent over the strips and soldered, anchoring the part and the strip at the same time.

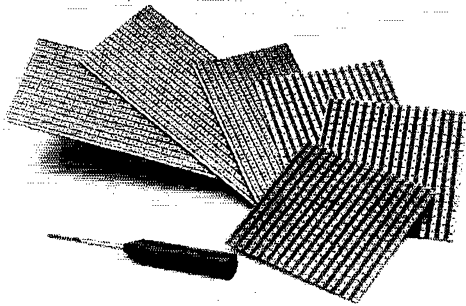
fore the Scotch tape is applied. Duco Cement does very well for this. The boards shown in Fig. 1 were cemented this way. However, at the first touch of the soldering iron the cement in that area simply vaporizes, so the tape is quite essential. The cement does keep the strips flat before taping, and has sufficient holding power so that the strips can be brightened with steel wool before beginning the wiring.

Laying out a circuit by this method takes just about as much thought as laying out an etched circuit, so nothing is saved in that respect. In fact, if for any reason the final circuit is to be etched, you've practically made yourself an etching layout. However, the circuit can be modified by altering the strips where necessary, and if for some reason the value of a component needs changing you can unsolder the old one and put in a new one without damaging the wiring. Just remember to use the Scotch tape each time, particularly if the resoldering is to be done on a short strip. — *W1DF*

• New Apparatus

Ami-Tron Toroid Kit

THE Ami-Tron r.f. toroid kit should be of interest to hams desirous of making their own toroid coils. Two powdered-iron cores are included in the kit, one having a 0.68 inch o.d., the other a 0.50 inch o.d. The larger core is to be used in the 3- to 30-Mc. range and the smaller from 10 to 60 Mc. Also included in the kit is a quantity of enamel wire for winding the toroids, plus a sheet containing detailed instructions and ideas for using the cores. The kit is in the \$2.00 price class and it is available from Ami-Tron Associates, 12033 Otsego Street, North Hollywood, California. — *W1ICP*

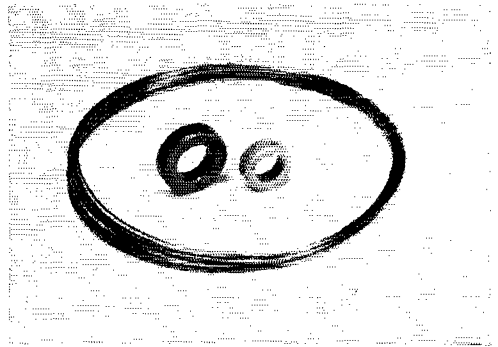


Vero Breadboard Kit

As shown in the photograph, the Vero model BK-6 breadboard kit consists of six prepunched copper-clad boards, known as Veroboards, and a spot-face cutter. An instruction sheet is also included. Veroboard is manufactured from 0.062-inch thick synthetic resin bonded paper laminate, to which are bonded 0.0015-inch thick strips of copper.



Fig. 2—Top view of the wired board shown in Fig. 1. Terminals for external connections are small loops of tinned hook-up wire with the free ends twisted and screwed through holes in the board for soldering to strips underneath. Transistor sockets have long-enough prongs to be treated in the same way as other component leads.



These strips run the full length of the board and are 0.1 inch wide; they are spaced 0.05 inch apart on three of the boards and 0.1 inch apart on the others. Three of the Veroboards are identical in size, 3.3 inches wide by 3.5 inches long. The remaining three boards are 2.5 inches wide and have lengths of 4, 5.9 and 6.9 inches.

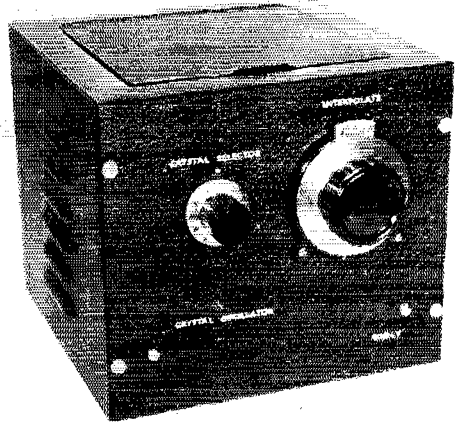
It's easy to use a Veroboard, since it isn't necessary to employ push-in terminals or an etching solution. Components are laid out on the unclad side of the board and are usually positioned across the rows of copper strips and not parallel to them. Part leads are inserted through the prepunched holes and soldered to the copper strips with a low-wattage soldering iron. The strips serve as connecting wires between the various components. A single strip can be used in more than one part of a circuit by breaking the strip with the spot-face cutter. This is accomplished by inserting the tip of the cutter in one of the prepunched holes and turning the tool several times while applying a slight amount of pressure. A circular piece of copper will be removed, severing the strip.

The model BK-6 kit is in the \$6.00 price class and is available from Vero Electronics Inc., 48 Allen Boulevard, Farmingdale, New York. — *W1YDS*

Building a Simple Crystal V.F.O.

BY FRANK W. NOBLE,* W3QLV

This neatly-packaged 40-meter VFO provides a source of frequency control whose stability approaches that of a crystal oscillator. W3QLV shows how a minimum number of parts can be put to use in a practical circuit. This basic design can be followed when building a similar unit for 80 or 20 meters. The v.h.f. man should find this circuit useful when building an 8- or 12-Mc. VFO.



THE crystal frequency synthesizer combines the extreme stability of the crystal oscillator with the continuous variability of the ordinary v.f.o., hence would seem to be almost ideal for the master oscillator in amateur transmitters. One major obstacle is the complexity of the circuits. The other is cost.

Many stations are operated in narrow segments of one or two bands. This type of operation does not require a wide-band synthesizer, but does require continuous variability within a narrow band. Such a requirement is met economically by the simple crystal v.f.o. to be described. In any case, whether a simple crystal v.f.o. or a sophisticated synthesizer is used, the cost will be lowered if the number of crystals can be reduced. This leads to an analysis of the problem of "pulling" crystal oscillators with an eye to maximizing the deviation.

Some Considerations

The author discovered that the circuit capacitances used in common crystal oscillators are much too large to achieve maximum deviation using either the FT-243 or the HC-6/U crystal. The latter unit has the higher capacitance and is therefore preferred. The problem can be solved either by designing an oscillator having exceptionally low minimum shunt capacitance, or by persuading the crystal makers to produce special units having larger capacitance. Until that happy day arrives, the former alternative must be pursued.

In order to keep the minimum capacitance down, it is necessary to eliminate the crystal selector switch. The oscillator shown in Fig. 1 (but without the switch) has a minimum capacitance which must be less than the crystal socket capacitance plus the minimum capacitance of one section of the split-stator capacitor, C_1 , and the input capacitance of the tube. The maxi-

imum capacitance will be only somewhat less than the crystal socket capacitance plus half the maximum capacitance of one section of C_1 . The optimum value of crystal capacitance for this circuit (without a crystal switch) is about 12.4 pf., whereas the capacitance of HC-6/U crystals is about 7 pf. The deviation calculated for the HC-6/U crystals comes out to be 7.63 kc., a figure which has been verified experimentally. This is about 95 per cent of the deviation obtainable from a crystal having the optimum capacitance, so not much is to be gained by the use of special crystals in this circuit.

It should be possible to mount the crystals in an insulated turret so as to facilitate frequency changing without adding to the shunt capacitance. This arrangement would produce deviations of 7 kc., so that a turret using standard 30-degree indexing would carry 12 crystals, covering a range of 84 kc. on 40 meters.¹ The machining problem was considered too formidable for most constructors, so it was decided to use a standard switch and sacrifice some of the range.

The author selected a small 12-position 2-deck rotary switch and soldered the crystal sockets directly to the switch terminals. The switch was then mounted on an insulating bracket so as to minimize the shunt capacitance. The resulting deviation is a little over 5 kc. on 40 meters.² In this model, 10 crystals are used to achieve a range of 50 kc. adjacent to the lower band edge.

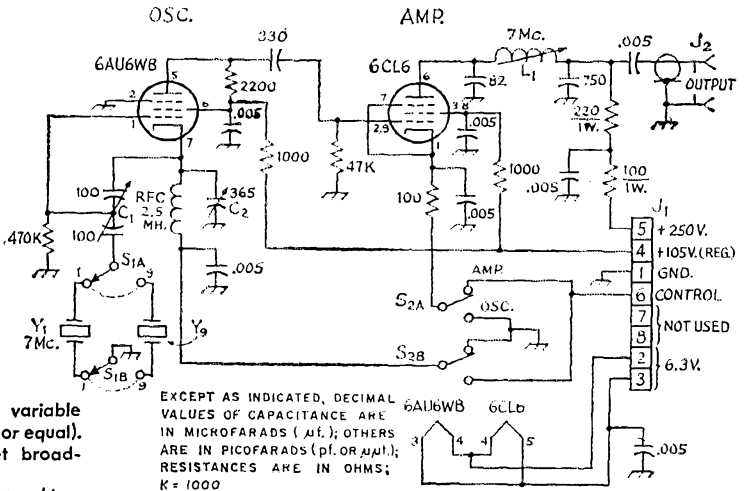
A typical calibration curve is shown in Fig. 2. The linearity could be improved by the use of "mid-line" plates, but the available capacitors having this plate shape have a larger minimum capacitance and a smaller capacitance ratio, both of which will reduce the range.

¹ A turret switch of this design is available on special order from Mr. Howard Chapman, 519 Yale Ave., Baltimore, Maryland 21229.

² The crystals are type HC-6/U and are designed to work into a 32-pf. circuit. (Available from Texas Crystals, 1000 Crystal Drive, Fort Myers, Florida.)

* 10004 Belhaven Road, Bethesda, Maryland 20034.

Fig. 1—Circuit of the crystal v.f.o. Fixed capacitors are disk ceramic. Resistors are 1/2-watt composition unless otherwise noted.



- C₁—100-pf.-per-section dual variable (Hammarlund HFD-100 or equal).
- C₂—365-pf. variable (midget broadcast type suitable).
- J₁—8-pin male chassis connector (Amphenol 86-CP8 mounted in Amphenol 61-61 shell).
- J₂—Coax connector (SO-239 type).
- L₁—18 turns No. 22 enam. wire close-wound on 1/16-inch diam. slug-tuned form (approx. 5 uh. min. inductance).

EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μf.); OTHERS ARE IN PICOFARADS (pf. OR μμf.); RESISTANCES ARE IN OHMS; K = 1000

- S₁—Epoxy rotary, 2 sections, 2 poles, 12 positions, 10 positions used. IRC T315 used. (Also, see text.)
- S₂—D.p.d.t. toggle switch.
- Y₁-Y₉, incl.—7-Mc. crystals selected for desired frequency of operation (in HC-6/U holders; see text).

The Circuit

In addition to producing very low minimum capacitance, the split-stator capacitor adjusts the circuit gain upward as its capacitance is decreased. This increase in gain tends to keep the oscillation amplitude constant as the capacitor is rotated.

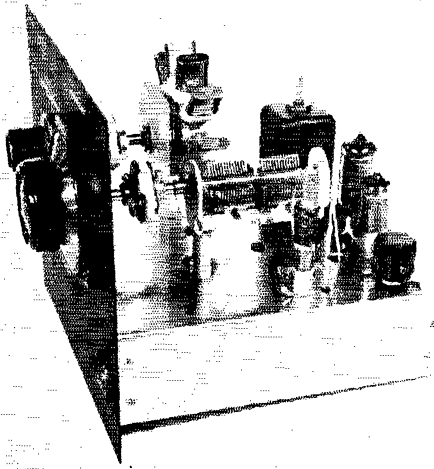
The 6CL6 is a power amplifier and its tank circuit affords a fair match to 50-ohm coaxial cable. The output is quite uniform at 3 r.m.s.

volts over the full 50-kc. range when directly feeding a 47-ohm resistor. Provision is made for keying either the oscillator or the amplifier by selecting the position of S₂.

The mechanical construction should be clear from inspection of the photographs and their captions. The unit is housed in a 7 × 8 × 8-inch cabinet (Bud C-973).

Testing

After the wiring is completed, connect an r.f.



Top-chassis view of the VXO. C₁ is in the foreground. L₁ is mounted inside the shield can at the far right of the chassis. The crystal-selector switch is located on the far side of the chassis. Both C₁ and S₁ are mounted on insulating material. The knob for C₂ is at the lower right of the chassis.



Bottom side of the VXO chassis. The keying switch, S₂, is in the upper right corner of the chassis. C₂ is in the upper left corner.

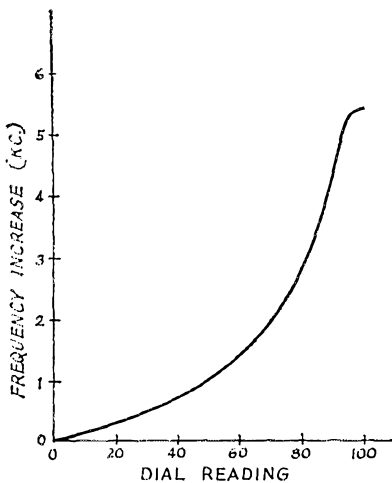


Fig. 2—A curve showing the typical change in frequency in kilocycles as C_1 is tuned through its range. The curve is for the circuit of Fig. 1.

voltmeter, having a 10-volt peak scale, to the output fitting, and terminate the output with a 47-ohm resistor. (Such a circuit is shown in Fig. 3.) Set capacitor C_1 to mid-range, adjust C_2 to maximum capacitance, then apply power. Next, tune the coil slug of L_1 for maximum r.f. output, which should be about 4 volts peak. Now, the tuning of C_1 through its range should not affect the output voltage appreciably. If the oscillator quits, decrease the capacitance of C_2 somewhat until the oscillator will "stay in business" across the full range. If this fails, try another tube.

Operation

This unit is intended to be used as a replacement for a conventional v.f.o. The power requirements are 6.3 volts at 1 amp., 105 volts regulated at 10 milliamperes, and 250 volts at 25 milliamperes. The v.f.o. output should drive the crystal oscillator or v.f.o. input of any transmitter by

simply terminating the far end of the connecting cable with a 47-ohm resistor and using an appropriate connector to mate with the connector on the transmitter. If more voltage is desired, the resistor can be removed and the coil slug of L_1 readjusted for resonance. This should give about 10 volts peak. If still more drive is needed, a pi network or a resonant transformer may be used at the transmitter end of the cable.

The keying switch, S_2 (Fig. 1), routes the cathode lead of either the oscillator or the amplifier stage of the VXO to Pin 6 of J_1 . Remote control of the unit is made possible by shorting, externally, between Pins 1 and 6 of J_1 . S_2 permits keying either the oscillator or the amplifier stage of the VXO at the operator's option.

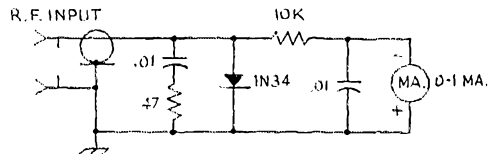


Fig. 3—Circuit of a dummy load and r.f. voltmeter that would serve as a test unit for the VXO. Both 0.01 capacitors are in μ f. and are disk ceramic. Resistance is in ohms ($K = 1000$). Resistors are $\frac{1}{2}$ -watt composition.

Performance

The frequency stability of this oscillator has been checked while using the CMC 800A Frequency Counter with 802A and S31A plug-in units. The drift observed from a dead-cold start was plus 16 c.p.s. for the first hour, followed by about minus 2 c.p.s. per hour for the next six hours. Then it settled down. The drift does not change appreciably from these figures for any combination of crystal and capacitor positions.

The author has used this unit side by side with a wide-band frequency synthesizer. Where it can be used, the simple VXO is preferred because it is more stable and has absolutely no spurious output.

QST

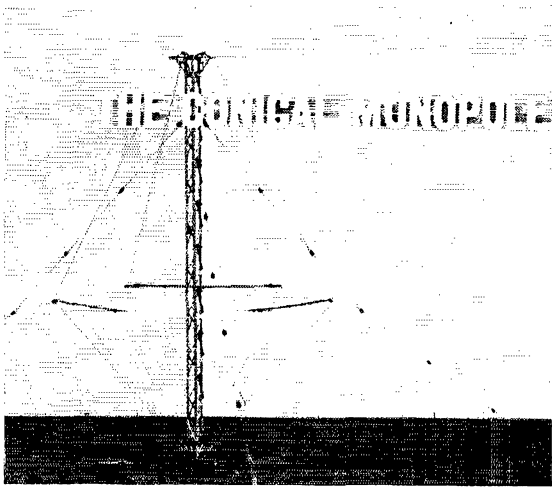


Slow-Scan TV Communications With Antarctica

Slow-scan TV pictures will be coming up from Antarctica on the ham bands during the next year to help provide better contact between the men and their families. If the FCC grants a special temporary authorization to a number of U. S. stations that have requested it, the slow-scan communication will be two-way.

Lt. Cdr. Henry Ferrero, who heads the U. S. Antarctica communications activities, is supervising the integration of a slow-scan camera and monitor, built by WA0NLQ, into the McMurdo Sound station, KC4USV. The equipment may also be taken to some of the remote camps at times. If all goes well, the Antarctica setup should be operational sometime in November.

The Seattle, Indianapolis, and Denver areas will be covered by W7FEN, K7YZZ, W7ZXM, W9NTP, W9TCT, K9UZW, W9EUD, and WA0NLQ, but there is a real need for additional stations, particularly near the larger cities. The Antarctic winter starts in March, so there is some time to make preparations before the long night arrives. Even "receiving only" slow-scan capability would permit families here to see the men who winter over. Hams interested in participating themselves, or perhaps in working with a local DX enthusiast, may send a S.A.S.E. to Cop Macdonald, WA0NLQ, 5596 Old Stage Road, Boulder, Colorado 80302 for the latest information on FCC action, frequencies, times, etc. WA0NLQ is also acting as liaison with the FCC in handling requests for additional stations for temporary slow-scan operating permission.



ANTENNA

Four-to-One Frequency Coverage with a Vertical

Commercial version of the conical monopole used by the U. S. Navy and other government services.

BY E. W. PAPPENFUS,* WB6LOH

It is important to concentrate your transmitter power into the proper beam if you wish to deliver the best signal to the other fellow's receiving antenna. This has logically led to the popularity of the Yagi beam antenna on the higher-frequency amateur bands. A beam antenna for the 80-meter band should have a 140-foot reflector and a 77-foot boom on a 250-foot tower. This makes the beam antenna impractical for the 80-meter band, and even for 40-meter operation a full-size Yagi is a forbidding structure to the neighbor's narrow-minded view — even a well-trained XYL might view such a monster beam with alarm. There is no easy solution to the need for a good DX antenna at low frequency, but the conical monopole antenna may be of interest to the more eager radio amateur as a more practical solution. The conical monopole antenna is a base-fed vertical antenna that has an omni-directional pattern in azimuth but with an elevation (vertical plane) pattern that keeps most of the energy down close to the horizon, where it belongs for long-distance transmission. This is important as will be shown in the follow-

* Granger Associates, 1601 California Ave., Palo Alto, Calif.

News releases on the new WWV mention the use of "conical monopole" antennas, and the same antenna has been seen at many military installations. While the antenna is possibly a bit "rich" for the blood of most hams, it is still interesting to know how it is constructed. The antenna was developed and is sold by Granger Associates.

ing table, giving the one-hop distances for an assumed radio ray at various angles above the horizon.

Distance (Statute Miles)	Elevation Angle (Degrees)
100	75
200	60
300	49
400	40
600	28
1000	16
1500	8
2000	3

The above distances are based upon an assumed height of the virtual reflection point in the ionosphere at 180 miles. It is evident from the table that it is important to concentrate the radiated energy from the transmitter at low angles. Even when two-hop transmission paths are assumed, the maximum of the elevation plane beam should be held down "near the deck." For a path between New York and London, it is desirable to radiate most of the energy below 8 degrees for a good two-hop path. The *Handbook*¹ shows that both horizontal dipoles and beams should be about one wavelength above ground for low-angle radiation, and even with this height, the maximum radiation is at 15 degrees with essentially zero right along the earth. The above discussion of vertical plane patterns shows why a vertical antenna may frequently out-perform a horizontal beam antenna. Another important consideration of Yagi and dipole antennas is their very narrow-band characteristic. It is usually hard to cover even one amateur band effectively without high v.s.w.r. using these antennas.

¹ *The Radio Amateur's Handbook*, 42nd edition, Fig. 14-1

How would you like a good low-angle antenna that would cover not just one, but three bands and that is only about 0.17 wavelength high? The conical monopole is such an antenna. It is big compared with a dipole but then it is unfair to compare a sailboat with an ocean liner, since the performance is much improved with the big one. The conical monopole antenna consists of two hexagonal cones joined at the bases. The lower cone, including an impedance-matching stub to improve the impedance over the operating frequency range, is fed from the 50-ohm transmission line. To simplify construction, the cones are simulated with wire elements to form a cage. In commercial versions, the central tower, supporting the cages, is a metal tower connected to ground, but the antenna described here uses a telephone pole with six wires running down the pole connecting to the ground system. A pole is used because no guying is needed and an old pole may be easier to find than a metal tower. Thus, the antenna is at d.c. ground and this protects the station from lightning damage.

Fig. 1 shows the overall dimensions for a conical monopole antenna that will cover the 80-, 40-, and 20-meter bands with a v.s.w.r. of less than 2.5 to 1. Unfortunately, the best impedance match to 50 ohms is in the range of 10 to 12 Mc., which is of no interest to the ham. The base of the cones is 31 feet across the diagonal. The antenna is supported by a telephone pole about 48 feet long (five feet of it in the ground) so no guying is needed. A guyed metal tower or wood 4 × 4 could be used if desired. The top cone is made up of 12 wires, 2 at each corner. The bottom cone has 3 additional wires added to each face of the cone to better simulate a solid cone. The sectional view of Fig. 1 shows the outside wires, two of the six radial wires *a*, grounding stubs *b*, and pole wires *c*. The radial wires and grounding shunt wires make up a shorting stub connected across the transmission line that feeds the outside cage at the bottom of the lower cone. A ground radial system consisting of 60 ground radials 62 feet long connects to the sheath of the transmission line, to the six matching stub down-leads and the six wires running down the pole.

A small flat-top (see Fig. 2) at the top of the upper cone is supported by 2 × 4s screwed to the pole with lag screws. A galvanized steel 16-gauge plate at the top stabilizes the top hat and provides an easy termination for the cage wires and the pole wires. All antenna wire is 10-gauge soft copper or Copperweld wire. The Copperweld wire is hard to bend and keep straight, but it is much stronger than copper and the cost is much less. A staple can be used to fasten the two cage wires to each of the spokes, preferably on top near the end of each spoke so the peripheral wire *d* can be soldered to the two cage wires at each spoke. The top-hat assembly should be done on the ground before the pole is erected. However, climbing lugs on the pole will permit assembly and soldering in the air, if desired. A propane torch is very handy for soldering the wire.

The central spoke assembly supports the widest part of the antenna at a height of 17 feet 3 inches above the ground. Select straight and clear 16-foot 2 × 4s for the spokes. These are cut off to extend 15 feet 6 inches from the center of the pole. Gate hinges fastened to the under sides of the spokes and to the pole with wood screws support the spokes at the center; the outer ends are held up by the upper cage wires. Cage wires spread to four inches apart at the end of the spokes where they are soldered to the peri-

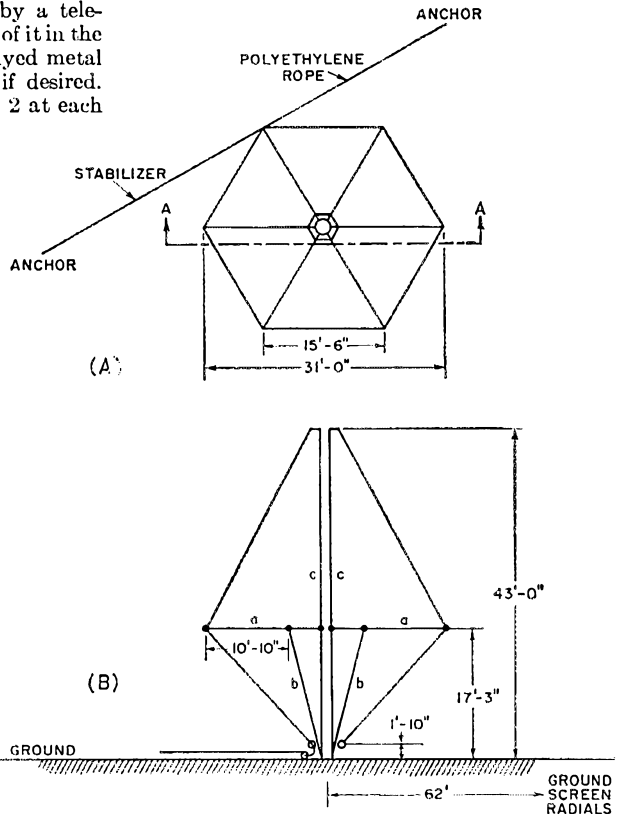
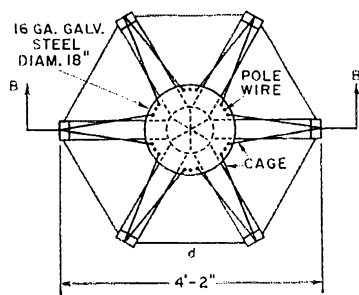
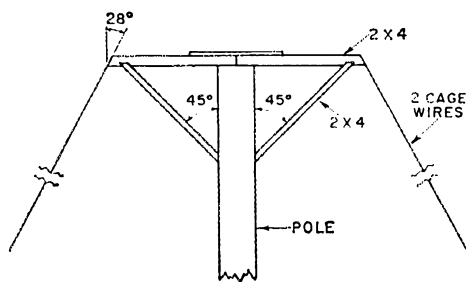


Fig. 1—(A) Top view of the conical monopole antenna for 3.5 through 14 Mc. (B) Side view of conical monopole at section A-A. Note that grounding stubs, *b*, connect to short radial wires, *a*. Wires *c* run up the sides of the supporting pole.



(A)



(B)

Fig. 2—(A) Top view of the antenna top hat. The steel plate is held to the 2 X 4 spokes by wood screws.
(B) Side view through section B-B.

pheral wire. A copper plate is cut as shown in the detail of Fig. 3 to hold the cage and peripheral wires. The copper plate is cut out of sheet copper with tabs similar to the kind found on solder lugs. These tabs are bent over the cage wires and soldered in place. The plate is fastened to the spoke and then the peripheral wire is soldered in place. It should have some slack so that when the lower cage wires are soldered in place, there will not be excessive tension on the peripheral wire and the spokes. In addition, spoke wires (*a* in Fig. 1) must be soldered to the peripheral wire and to the pole wires at the pole. The stub wires (*b* in Fig. 1) should also be soldered in place. At the conclusion of all of the soldering and screw-fastening to the spokes, the top cone should be nicely aligned and tensioned. If it is not symmetrical at this time, it should be adjusted. This would also be a good time to check the dimensions—an accuracy of \pm one inch should be suffi-

cient. The three additional wires on each face of the bottom cone are soldered to the peripheral wire spaced equally from spokes.

At the bottom of the lower cone (Fig. 4) six one-inch diameter copper pipes with ends flattened form a ring to which the 30 wires of the lower cone are attached. Heating the tube ends will make it easier to flatten and bend them. Bronze bolts $3/8$ inch in diameter are ideal for holding the lower ring together. Before bolting the ring together, fasten the insulators to the ring using loops of wire going around the bronze bolts and placed between the flattened sections of the pipe. Similar loops of wire connect the insulators to the turnbuckles and $1/4$ -inch hooks screwed to the pole complete the tensioning arrangement at the base of the antenna. It might be simpler to drill all of the holes after the pipes are bolted together. Now is the last chance to adjust the tension of the wires so it is important to carefully position the feed ring by blocking it up from the ground and carefully tightening the turnbuckles. The wires are then fed through the holes in the copper pipes, wrapped back around the pipe and twisted back on themselves preparatory to soldering. The blocks are then removed and the turnbuckles are tightened to make the whole structure rigid. If all wire lengths are okay, solder the wires to the feed ring. Two one-inch copper straps connect from the feedline to the feed ring. Both ends of the strap are carefully soldered to make good electrical connections to the coax and to feed ring, respectively. If solid coaxial cable is used, the end must be carefully wrapped with electrical tape to prevent the entry of moisture.

Two guy lines of polyethylene (water-ski rope) stabilize the antenna and keep it from twisting (see Fig. 1.).

About 4200 feet of wire is used in the ground system. Luckily, it does not have to be copper. Galvanized No. 10 steel wire is almost as efficient and much cheaper to use. If desired, the ground wires can be laid along the surface rather than being buried. If burial is desired, a small

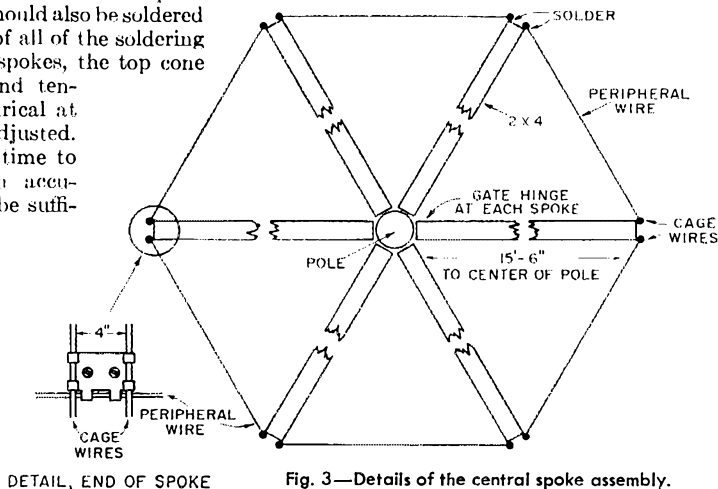


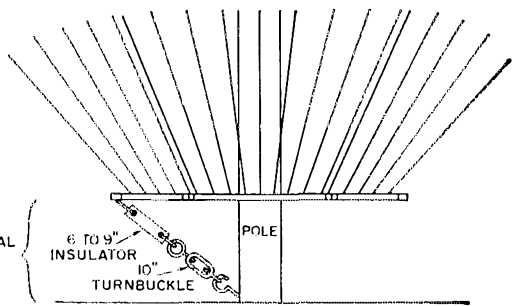
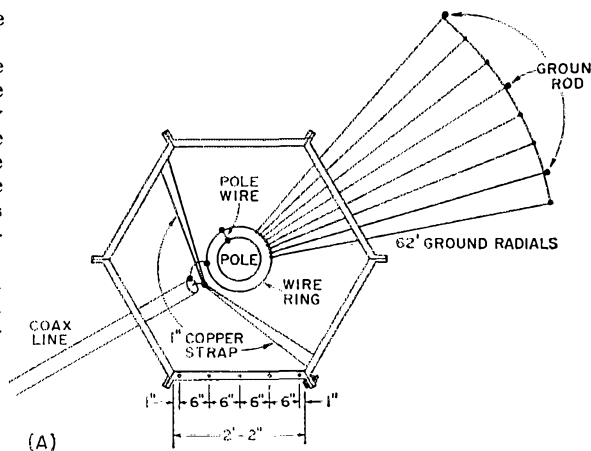
Fig. 3—Details of the central spoke assembly.

garden plow will reduce the amount of coolie labor.

Each ground radial is stretched out from the pole and anchored to a temporary stake. The grass and underbrush should be cleared away so the wire will be flat on the ground. It can be held down with large staples driven into the ground which will hold the ground wire in place until the growth of vegetation binds the wires in place. Five foot by 3/8 inch diameter galvanized rods are driven into the ground at the end of every third radial where the radial is soldered or clamped to the rod. A circular wire ties all of the ground rods and remaining radials together as shown in Fig. 4.

After all of that work, what do you have? The performance can best be shown in the elevation plane patterns given in Fig. 5. The dotted curves are typical for average soil conditions. The specified ground screen will improve the patterns by about 1 db. at low angles. It is easy to see how effectively the antenna concentrates energy at low angles for long one-hop paths. It is not very effective for 100 miles but for this local work, any old horizontal antenna is adequate, and v.h.f. is a better answer. The radiation pattern is not too good on the 20-meter band where radiation is too high above the horizon, but the 40-meter pattern is almost as good as on 80.

If it is desired to use this antenna for 40-, 20-, and 10-meter operation, then all dimensions should be multiplied by 0.543. However, a horizontal beam is usually a better choice. Only a few amateurs will have the space and the ambition for building this antenna, but for those who do, it will greatly improve communication.



(A)

(B)

Fig. 4—Top and side views of the bottom feed ring. For clarity, not all of the pole wires and grounding details are shown.

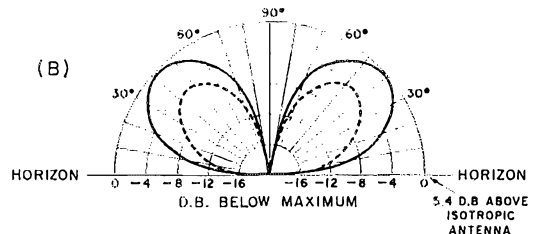
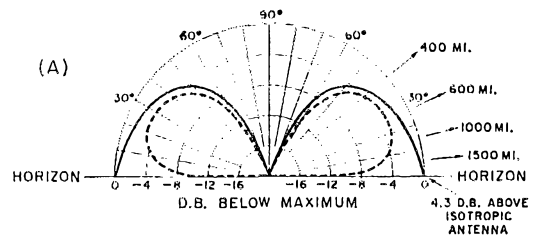
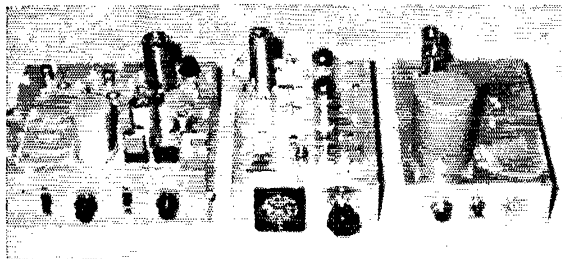


Fig. 5—Radiation pattern for (A) 80 meters and (B) 20 meters. Solid patterns are for conical monopole over perfectly conducting ground; dashed, for average soil.

Parts List of Major Items

- 1 48-foot pole
- 4200 ft. No. 10 galvanized wire
- 900 ft. No. 10 copper or Copperweld wire
- 6 10-inch turnbuckles
- 6 3/8 inch bronze bolts and nuts
- 6 insulators, 6 to 9 inches long
- 15 ft. one-inch copper pipe
- 6 screw hooks, 1/4 x 6 inches
- 2 copper straps, 1 x 26 inches
- 3 2 x 4s, 5 feet long
- 6 2 x 4s, 16 feet long
- 1 polyethylene rope, as needed
- 6 gate hinges
- 1 16-gauge galvanized steel, 18-inch diameter
- 20 galvanized or copper-plated ground rods, 5-foot long

A Transverter for 144 Mc.



The author's 144-Mc. transverter is made up of three units, the 144-Mc. converter (left), transmitting unit (center), and power supply (right).

Simple System for Use with 14- or 28-Mc. Transceivers

BY ARTHUR R. ASHLEY,* W4EXS

THE increased use of s.s.b. on 144 Mc., as well as the trend toward transceiver operation on this band, prompted the author to construct a heterodyne-type transverter that would provide 144-Mc. transceiver operation when used with a conventional transceiver operating at 14 Mc.

The receiving problem is easily solved by using a 144-Mc. converter to 14 Mc. There are several such converters on the market. Other 144-Mc. converters, manufactured or homemade, can be adapted to the purpose by a suitable change of frequency in the local-oscillator and mixer-output circuits.

For transmitting, it was reasoned that if the local-oscillator signal from the converter and the 14-Mc. output from the transceiver were combined in a mixer, mixer output would automatically fall at the same frequency in the 144-Mc. band as the frequency of reception, and transceiver operation would be accomplished.

Circuit

The circuit of the transverter that evolved is shown in Fig. 1. That portion shown within the dashed lines is the slightly-modified circuit of the local crystal oscillator/frequency multiplier in the Tecraft Criterion converter that the

* 1621 Woodman Drive, McLean, Virginia 22101.

This arrangement, based on a standard 144-Mc. converter, provides transceiver operation at 144 Mc. with an output of about 10 watts when used with any 14- or 28-Mc. transceiver. Power output may be increased by the addition of a linear amplifier.

author used. (Original component designations are circled in the diagram.) The remainder of Fig. 1 shows the circuitry added for transmitting. On receive, the complete converter is used in conventional manner, the antenna feeding 144-Mc. signals to the converter, and the converter feeding 14-Mc. signals to the station transceiver. On transmit, the signal from the converter oscillator/multiplier (130 Mc.) is amplified in a screen-neutralized Class A stage using a 6AH6, and then inductively coupled to a 6360 mixer. Here it is combined with the 14-Mc. output signal from the station transceiver (cathode injection) to produce mixer output at 144 Mc. Carbon resistors R_1 and R_2 provide a finite load for the transceiver. The mixer drives an AB₁ 6360 output stage which feeds about 10 watts p.e.p. to the antenna, or to a linear amplifier if higher power is desired. This stage is similar to the one described by W1HDQ in an earlier article.¹ A 200-volt Zener diode provides regulation of the screen voltage of the output stage. Fixed bias for the mixer and output stages is provided by a 22.5-volt dry battery. Since neither of these stages draws grid current, the useful life of even a small battery, such as the RCA VS-705 used by the author, should be practically shelf life.

The metering system provides a means of checking the plate current in each of the three transmitting stages. The meter shunts specified provide full-scale readings of 100 ma. for the 6360 stages and 10 ma. for the 6AH6, when a 1-ma. meter is used.

The change-over relay, K_1 , operates from the plate supply for the transmitter stages through a series resistor. (In the author's arrangement, the relay is mounted on the power-supply chassis, with cables making the necessary interchassis

¹ Tilton, "Heterodyne Exciter for 144 Mc.," *QST*, August, 1964.

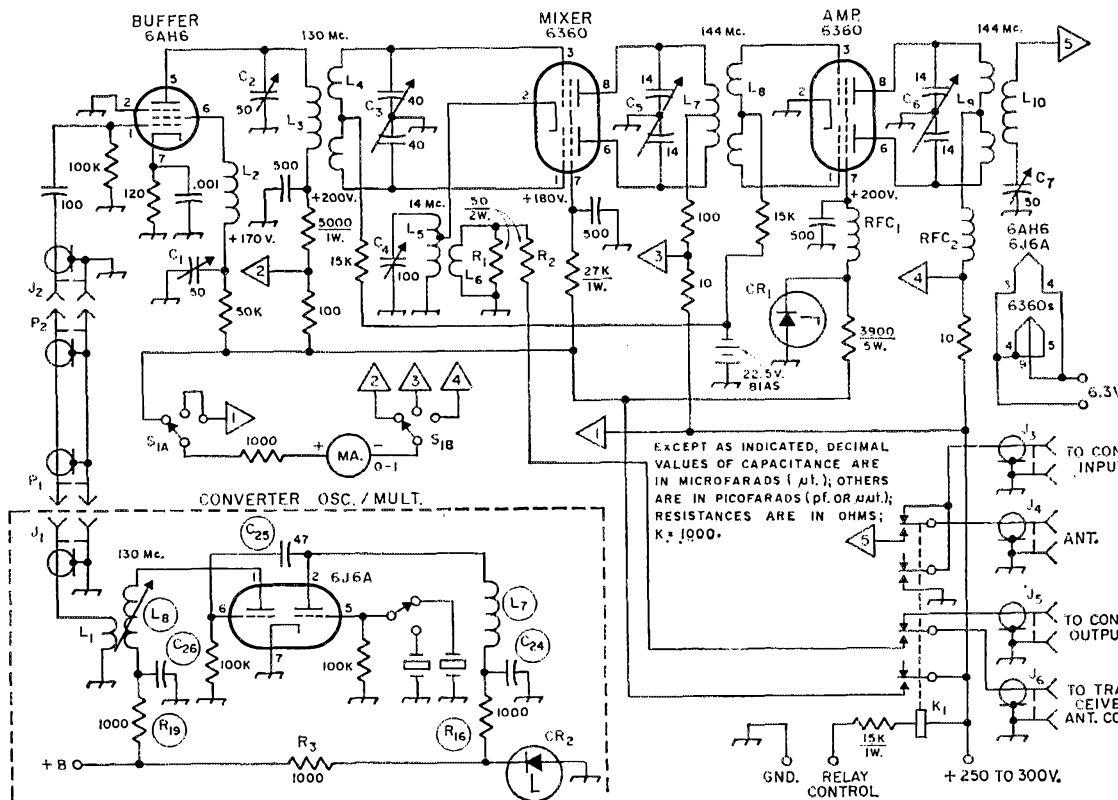


Fig. 1—Transverter circuitry. The portion shown within the dashed lines is the oscillator/multiplier circuit of the author's Tecraft Criterion 144-Mc. converter after modification. J_1 , L_1 , CR_2 , and R_3 have been added. Other components are the original and bear the original identifying labels (circled).
 In the author's construction, the changeover relay K_1 is on a third chassis, with cabled connections to the transverter. Fixed capacitors of decimal value are disk ceramic; others are silver mica or NPO ceramic. Resistors are 1/2-watt, unless indicated otherwise.

- C_1 , C_2 —Air trimmer (Hammarlund MAPC-50-B).
- C_3 —Butterfly variable (Hammarlund BFC-38).
- C_4 —Air trimmer (Hammarlund APC-100-B).
- C_5 , C_6 —Butterfly variable (Hammarlund BFC-12).
- C_7 —Air trimmer (Hammarlund MAPC-50).
- CR_1 —200-volt 10-watt Zener diode (Motorola 1N3015).
- CR_2 —100-volt 1-watt Zener diode (Motorola 1N3044B) or four 27-volt units in series. See text.
- J_1 , J_2 —Miniature chassis-mounting coaxial receptacle.
- J_3 , J_4 , J_5 , J_6 —Chassis-mounting coaxial receptacle.
- K_1 —Four-pole double-throw relay, 10,000-ohm coil (Potter & Brumfield GP).
- L_1 —2 turns No. 20, close-wound 1/16 inch away from bottom end of multiplier coil (L_8) in converter (see text).
- L_2 —5 turns No. 14, 1/4-inch diam., turns spaced wire diam.
- L_3 —2 turns No. 14, 1/2-inch diam., spaced wire diam.
- L_4 —1/2 turns No. 14, each side of L_3 , 1/2-inch diam., 3/16-inch space between turns, 1/2-inch space between sections.

- L_5 —10 turns No. 20, 1-inch diam., 16 turns per inch, center-tapped (B & W 3015 Miniductor).
- L_6 —3 turns same as L_5 , no center tap. Note: See text for construction of L_5 - L_6 .
- L_7 —5 turns No. 14, 1/2-inch diam., turns spaced slightly less than wire diameter, center-tapped.
- L_8 —2 turns No. 14 each side of L_7 , 1/2-inch diam., 3/16 inch between turns, 1/2 inch between sections.
- L_9 —2 turns same as L_8 each side of L_{10} , 3/8 inch between sections.
- L_{10} —2 turns No. 14, 1/2-inch diam., turns spaced 1/2 wire diam.
- P_1 , P_2 —Miniature coaxial plug.
- R_1 , R_2 —Carbon resistor.
- R_3 —See text.
- RFC_1 , RFC_2 —1-megohm 1/2-watt resistor close-wound full with No. 28 wire.
- S_1 —Single-section double-pole three-position rotary switch (Mallory-Grigsby 1315L).

connections.) The relay is actuated by the transceiver control relay (from the "ground-on-transmit" terminals). On receive, the antenna is connected to the converter input, the converter output is connected to the transceiver input, screen voltage is removed from the 6360s, and both screen and plate voltage from the 6AH6.

On transmit, the antenna is shifted to the output of the 6360 amplifier, transceiver output is connected to the transmitting stages, and the input of the converter is shorted to ground. The combination provides excellent transceive operation when used with the author's KWM-1.

Converter Modification

The Tecraft converter has a built-in power supply with provision for a standby control in the center-tap lead of the power transformer. Since in transceive operation the oscillator/multiplier is used for both transmitting and receiving, it must run continuously, so the center tap was wired permanently to ground.

Link winding L_1 was added to couple the 130-Mc. signal out to the transmitter section. The link connections are brought out through a length of miniature coaxial cable to a miniature connector mounted on the top side of the converter chassis. Ample space for this connector was found between the antenna-connector fitting and the spare crystal socket, Λ_2 , on the chassis of the Criterion.

Preliminary checks showed that a change of only two or three volts in the supply voltage caused an oscillator frequency change of as much as 50 cycles. Since better stability was desired for s.s.b. operation, a simple regulator, consisting of a Zener diode (CR_2) and dropping resistor (R_3), was added to stabilize the oscillator plate voltage. This modification resulted in a noticeable improvement in receiver as well as transmitter stability.

Some care is necessary in selecting a Zener diode with a proper Zener-voltage (V_Z) rating. This voltage should, of course be as close as possible to the original oscillator plate voltage found in the converter to be used. However, a Zener diode requires a source voltage slightly higher (approximately 15 to 20 per cent) than the voltage at which it stabilizes. Thus a diode with a V_Z rating slightly less than the oscillator plate voltage should be selected unless it is possible to raise the supply voltage proportionately. In some cases there may be series resistance between the power supply and oscillator plate that can be reduced to increase the voltage to the Zener. The series resistance R_3 and/or any other resistance in series to the power supply, should be adjusted so that the Zener diode current is about half its maximum rating with the oscillator in operation. This maximum current can be determined by dividing the power rating of the Zener in watts by the rated V_Z .

Transmitting-Stage Construction

Components of the transmitting section were assembled on a $5 \times 7 \times 2$ -inch aluminum chassis. This size represents just about the smallest that will accommodate the components; some constructors may prefer to use a somewhat larger size. The components are arranged approximately according to the diagram, with the coils and tuning capacitors mounted underneath, the latter with their shafts extending through the top of the chassis for convenient adjustment with a screwdriver. The 6AH6 buffer tube is mounted at the left rear of the chassis. The screen neutralizing capacitor for this stage is mounted on the left-hand side of the chassis, close to the 6AH6 socket, with its shaft protruding. Two r.f. connectors located behind the 6AH6 provide con-

nections for 130-Mc. input from the converter and 144-Mc. output from the transmitting amplifier. The 6360s are mounted slightly off the chassis center line. An octal socket for power connections, and a BNC connector for 14-Mc. input from the transceiver are mounted at the rear of the chassis. The meter and meter switch are mounted in the apron at the front end.

R.f. leads should be kept as short as possible, and the input and output circuits of each stage should be reasonably well isolated. I used a baffle shield between the input and output tank circuits of the output amplifier.

The v.h.f. coils are self-supporting and, in most cases, can be soldered directly to the terminals of the associated tuning capacitor. L_5 and L_6 are made from one piece of Miniductor, removing two turns to provide a space between the two sections. The unbound turns may be used as connecting leads.

A system of cables for interchassis connections permits easy disconnection of the converter for use with a separate receiver if independent receiver and transmitter operation, rather than transceive operation, is desired.

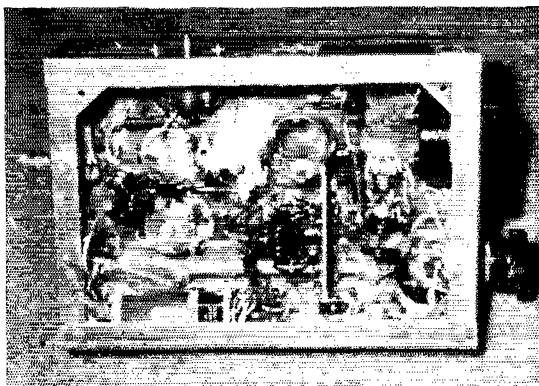
Adjustment

The adjustment procedure consists principally of tuning the various circuits to resonance at the proper frequencies, and making sure that no transmitting stage draws grid current. Resonance is most easily determined by the use of a grid-dip meter. The various circuits can be adjusted initially before applying power and retrimmed later as necessary, using the g.d.o. as an indicating wavemeter. Grid current can be detected by connecting a vacuum-tube voltmeter across the grid resistor of each stage. Any meter deflection indicates grid current.

The addition of the coupling link L_1 should not alter the tuning of the converter-multiplier circuit significantly. However, it might be well to check this by connecting the v.t.v.m. across R_{19} and adjusting the slug of L_3 for minimum reading (or for maximum wavemeter indication).

The 6AH6 neutralizing circuit should be resonated at 130 Mc. The adjustment is not critical and may be preset. This stage normally draws about 12 ma. After the dropping resistors, the screen and plate voltages should be approximately 170 and 200 volts, respectively.

The mixer stage requires careful adjustment. In addition to the desired response at 144 Mc., spurious responses may be found in the mixer output circuit at the difference frequency of 116 Mc., the local-oscillator frequency of 130 Mc., and at 158 Mc., the latter being a combination of 130 Mc. and the second harmonic (2S Mc.) of the 14-Mc. transceiver output. Great care must be used to make sure that the mixer output circuit, and the final-amplifier tank circuit are tuned accurately to 144 Mc. The coupling between L_3 and L_4 should be fairly loose. Care must also be taken to avoid over-driving the mixer cathodes by the 14-Mc. signal from the transceiver. This can be checked on a scope.



Bottom view of the transverter transmitting section.

Flattening of voice peaks in the pattern indicates excessive drive. A transceiver output of only two to five watts, most of which is dissipated in the R_1 - R_2 network, is required for optimum mixer operation. On s.s.b., the level can be adjusted by means of the microphone gain control. With no drive, normal plate current is about 20 ma., increasing to about 35 ma. with drive. Screen voltage should be about 180 volts.

The output tank circuit may be adjusted initially to 144 Mc., as indicated by the g.d.o. However, some retuning will be necessary when the antenna is coupled and loading is adjusted. The loading should be adjusted for best linearity. In the author's case, optimum loading occurs when the coupling and tuning is adjusted for a plate current of 80 ma. on peaks. Idling current is 20 to 30 ma.

All stages should be checked for stability. There should be no tendency toward self-oscillation when either the 6J6 or the crystal in the converter is removed. All plate currents should drop to their normal static biased levels. In the au-

thor's case, it was not necessary to neutralize the final amplifier. If instability should be found, it should be possible to correct the condition by soldering a spaghetti-covered wire about $\frac{3}{4}$ inch long to the tube-socket grid terminal of each section, forming the wire toward the plate terminal of the same section.

Using the KWM-1, or a similar transceiver, for the 14-Mc. injection source will limit operation to approximately 144.0 to 144.4 Mc. Since most s.s.b. and c.w. activity will be found below 144.1 Mc. at the present time, this should be no serious handicap. The range may be increased by providing additional crystals for the s.s.b. exciter, and the use of a 43.666-Mc. crystal in the converter will further extend the range.

Transceiver injection at 28 Mc., rather than at 14 Mc., may be used. The author used 14-Mc. injection principally because the converter used was designed for 14-Mc. output. It was also considered that many transceivers in use today do not cover the 28-Mc. band. If 28 Mc. is used, the converter local-oscillator output will be at 116, rather than 130 Mc., and C_1L_2 , C_2L_3 and C_3L_4 must be tuned to this frequency. These circuits have sufficient latitude in adjustment to cover 116 as well as 130 Mc. C_4L_5 must be tuned to 28 Mc. This will require a reduction in L_5 to 4 turns.

This relatively small exciter unit has performed exceptionally well, with reports as to its quality and effectiveness being particularly gratifying. Using a five-element Yagi array, mounted 30 feet above ground, and fed with 100 feet of RG-8/U (insertion loss about 5.5 db.), stations have been contacted in West Virginia, Delaware, Pennsylvania and New Jersey on s.s.b. It should perhaps be pointed out that the ground elevation at W4EXS is only 260 feet above sea level, and the QTH is not considered to be a favorable v.h.f. location, as the surrounding terrain averages 350 to 400 feet. QST

Canadian Ham History

"December 12, 1901 — a date that was to mark the beginning of a new era in the world of communication — a date we could accept as the beginning of amateur radio, for on this date Marconi, a young man of 27 years, literally took the world by storm by completing the first transatlantic signals by wireless. The place was called Signal Hill and was an old barracks building just outside St. John's, Newfoundland."

"This could well be the opening paragraph of the history of amateur radio in Canada. Research for a book was initiated a year ago by the Saskatoon Amateur Radio Club. It is a big job — yes, an immense job — but one that will be appreciated by hams of today and tomorrow. There are many still active who can recall those early days or who have had information passed on to them. Many clubs have a wealth of information in their files. Canada will be celebrating her Centennial Year in 1967, a

year when all Canadians will be conscious of historical developments. There is no better time to bring to the citizens of Canada the story of amateur radio.

To date the club has received photographs, copies of licenses, ham club lists, historical developments, etc., as well as many interesting stories and anecdotes. Folks from Newfoundland to British Columbia have helped. But much more is needed. The success of the project will depend on assistance from hams everywhere. The club's main purpose will be to act as a central point for receiving material. The individual amateurs and clubs contributing will be the book's authors and credits will be duly noted. The mailing address for further information or contributions is: Saskatoon ARC, Historical Research Department, Box 751, Saskatoon, Sask. QST

• *Beginner and Novice*

Use A Monitor!

How To Acquire A Better Fist

BY LEWIS G. McCOY,* WIICP

All of us in amateur radio must learn the code. If you're going to learn it, why not do it right? One way of improving your sending (and receiving) is by using a monitor. Here is a simple one that will do the job.

NEWCOMERS to amateur radio may not be aware of many of the League's services, particularly to hams just getting started. For example, W1AW, the Hq. club station, transmits code practice daily¹. Listening to code practice on the air will help the newcomer to improve his code speed. Additionally, sending practice will help speed up the student's responses. When a Novice receives his license and gets on the air, the contacts he makes will also help a great deal in improving code speed.

Many amateurs who operate c.w. use their receivers to monitor their own sending. However, this isn't always possible for a Novice to do simply because his contacts may not be on the same frequency that he is transmitting on. If he adjusts his receiver to listen to his own "fist" he may not be able to find the station he is in contact with when it comes time to listen. What is needed is a monitor that is independent of the receiver. That's what this article is about — a code monitor that works in conjunction with your sending but is independent of your receiver.

* Beginner and Novice Editor

¹ The W1AW operating schedule is given each month in the Operating News section of *QST*. A complete schedule plus other code-learning aids will be sent free on request. Please send business size, stamped self-addressed envelope and direct your request to the attention of the Communications Dept.

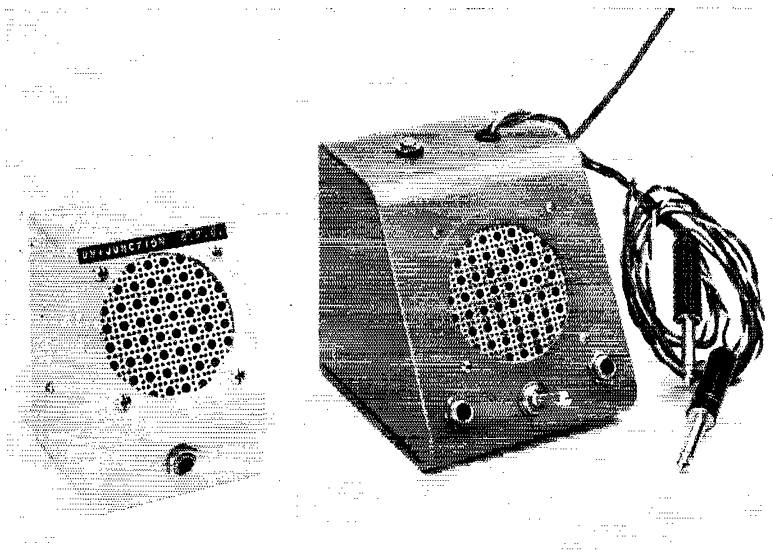
Don't misunderstand, this device does not monitor the characteristics of the actual signal coming from your transmitter. What it does do is show you how you are forming the code characters. All of us want to be proud of our sending, and a monitor is a "must" for developing good sending habits. A little later we'll tell you about a trick to improve your ability.

Code Practice Oscillator

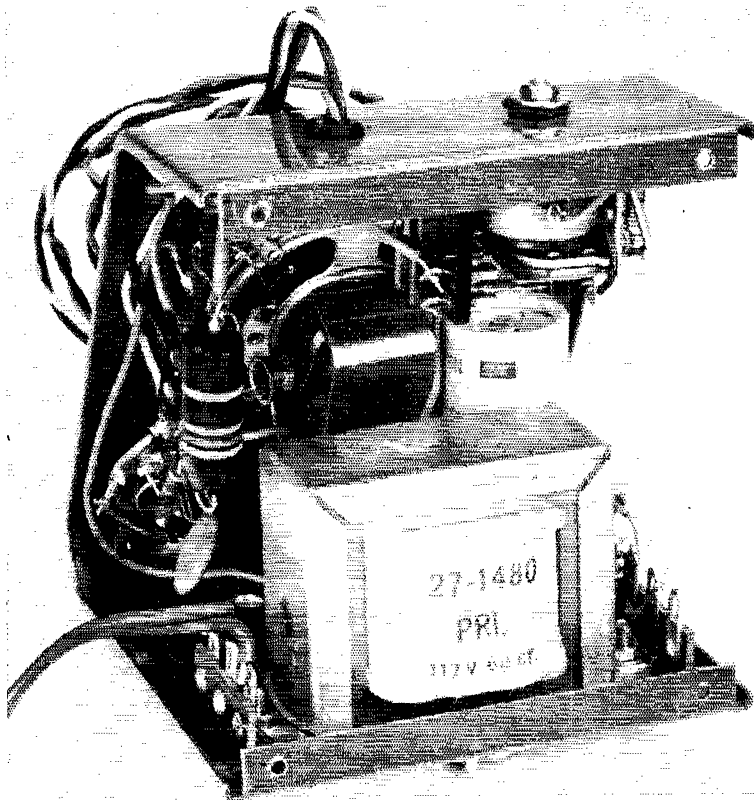
Fig. 1 is the circuit of a simple code-practice oscillator. While this is not the monitor, many readers will be interested in a simple code-practice device. With the parts in hand, the code practice oscillator can be built in an hour or so.

The transistor used in the oscillator is a unijunction type. One advantage of the unijunction oscillator over many of the transistor code-practice oscillators that are on the market is that keying is done in a relatively high-impedance point in the circuit. With other types of transistor oscillators, if the contacts of the key being used have any appreciable resistance, even a few ohms, the tone from the oscillator is not "clean." In this circuit, however, this is not a problem.

The type transistor specified in Fig. 1 is a husky unit, and with the 30 volts supplied by the two batteries the volume is adequate even for large



Here are the code-practice oscillator and the monitor. With exception of the batteries, nearly all of the components in the practice oscillator can be used in the monitor.



The keying relay is mounted in the upper right corner. The power-supply filter components are at the right. On the left are the oscillator parts.

code practice groups, such as those conducted by radio clubs.

The Monitor

Fig. 2 shows the circuit of the monitor. In coming up with a practical monitor, a couple of

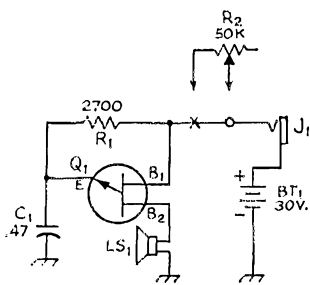


Fig. 1—Circuit diagram of the code practice oscillator.

BT₁—30-volt battery; two 15-volt hearing-aid batteries in series.

C₁—0.47 μ f., paper.

J₁—Open-circuit jack.

LS₁—2-inch, 8-ohm speaker (Lafayette 99C6036).

Q₁—Unijunction transistor (Motorola HEP-308, G.E. 2N2160, G.E. 2N2646).

R₁—2700 ohms, 1/2 watt. For higher tone, 2200 ohms; for lower tone, 3300 ohms.

R₂—50,000-ohm 1/2-watt control.

important points must be taken into consideration. Will headphones or a speaker be used? If headphones, how can they be switched from the receiver to the monitor when going to transmit from receive, or vice versa? How do you key both a monitor and a transmitter with the same key? A study of Fig. 2 will show how these points are taken care of.

If it were possible to buy or make a key with an extra set of contacts it would be easy to key more than one device at a time. However, such items can't be found. An alternate is to use the key to operate a relay which in turn will key the transmitter and monitor at the same time. That is what we do in this unit. K₁ is a double-pole, single-throw relay operated by the station key or bug.

The key is plugged into J₂, and when the key is closed, K₁ is energized. K_{1A} turns on the transmitter and K_{1B} applies operating voltage to the monitor oscillator. Batteries are used to run the code-practice oscillator, but because more current is required to operate the relay a small a.c. supply is incorporated into the monitor. This consists of T₁, a 24-volt, 1-amp. transformer, and the filter network of CR₁, C₂, R₂ and R₃. K₁ is a 24-volt a.c. relay. D.c. voltage out of the filter is approximately 30 volts.

Getting back to the operation of the unit, K₁ is used to key the monitor and the rig. If

Variable-Voltage

D.C. Power Supply

The author, W2FEN, shows how to build a low-cost d.c. power supply that delivers up to 31.5 volts at 10 amperes. A discarded TV-set power transformer is rewound and serves as the heart of the unit.

BY C. RAY WAGNER,* W2FEN

DESIRING a high-current voltage-variable d.c. power supply for operating war-surplus equipment, or for use as a battery charger, several methods for securing variable-voltage output were considered. I finally decided on the circuit of Fig. 1. It affords a.c. line isolation, is comparable in flexibility to a variable auto-transformer, is easy to construct, and is inexpensive.

Since the kind of transformer I wanted was not listed in the catalogs, it required that I either build a transformer or rewind an old one. A discarded TV transformer was on hand and its core size and weight seemed to indicate that it would have a capacity of about 240 watts. This suited my needs because I desired 24 volts (maximum) at 10 amperes. I decided to rebuild the TV transformer, adding six new secondary windings in place of the original secondaries. Fortunately, the primary winding was next to the core—a prerequisite. The new windings, when selected by six s.p.d.t. toggle switches, provide outputs from 0.5 to 31.5 volts in 0.5-volt steps.

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Transformer Modification

The first step is to apply normal line voltage to the transformer's primary and note the output voltage of the filament windings so that the turns-per-volt can be determined.¹

Rather than unstack the transformer core (the laminations were glued together) I *carefully* cut through the old secondary windings with a hacksaw, being cautious not to cut into the primary winding. Next, the number of turns on the secondary windings (filament only) were counted as the wire was removed, providing the desired information on the number of turns-per-volt. With the wire and insulation removed, the core stack and primary winding are all that are left. The open space (window) that remains allows ample room through which the new secondaries can be threaded.

New Windings

For those interested in securing only 6 and 12 volts of d.c. output, the 16-volt winding (Fig. 1) can be omitted. Do not eliminate the 0.5-volt

¹ Complete data on transformer selection, rewinding, and turns-per-volt calculation is given in McCoy's article, "Tailor-Made Volts" *QST*, February, 1964. — Editor.

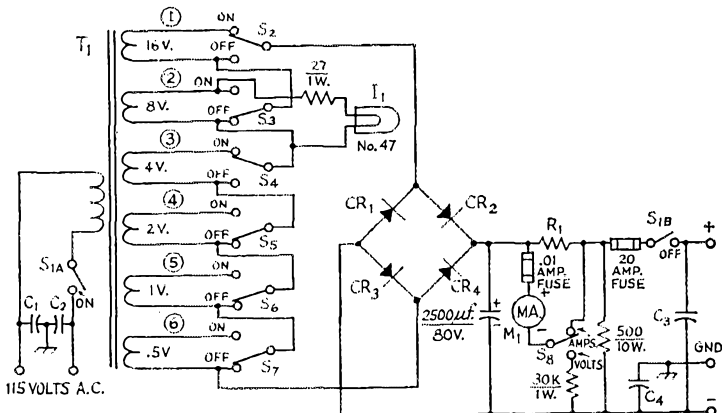


Fig. 1—Schematic diagram of W2FEN's power supply. Resistance is in ohms (K = 1000). The polarized capacitor is electrolytic. Others are mica.

C₁—C₄, incl.—0.0047- μ f. 600-volt mica or disk ceramic.
CR₁—CR₄, incl.—Silicon diode, 25-amp. 50-p.r.v. type.
(Mount on heat sink.)

I₁—6.3-volt lamp.

M₁—0-1-ma. meter.

R₁—Meter shunt (see text).

S₁—D.p.s.t. toggle switch.

S₂—S₇, incl.—S.p.d.t. toggle switch (10 amp. contacts or better).

S₈—S.p.d.t. toggle.

T₁—Rebuilt TV set power transformer (see text).

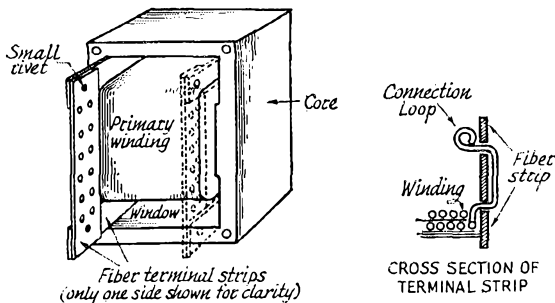


Fig. 2—Details of fiberboard end terminals used for anchor points to hold ends of each secondary winding. Dimensions will depend on transformer used.

winding as it gives a degree of voltage control that is highly desirable.

After preparing the fiberboard terminals shown in Fig. 2, the winding can begin. I wound my new secondaries with parallel lengths of No. 15 wire (equal in circular mils, when paralleled, to a single No. 12 wire). By using two No. 15 wires the bending and winding process is easier because of greater flexibility of the wire. By allowing a minimum of 600 circular mils per ampere, the paralleled No. 15 wires have a capacity of 10.8 amperes. The wire was secured from a local motor rewinding shop and is a cotton-covered enameled magnet type.

Windings No. 3, 4, 5, and 6 are put on first. Be sure to do the job neatly as it pays off in the end, assuring ample space for all 6 windings. The ends of each winding are threaded through the holes in the fiber terminal board, as shown in Fig. 2, then bent into a small loop with long-nose pliers. A wooden wedge was used by the author to keep the windings in place at the start and finish. The wedge was forced into place in the "window."

After the first layer of wire is in place, a layer of glass cloth tape (Scotch Braided Electrical Tape No. 27) can be added. This will give a firm base upon which to place the next winding and will offer additional insulation between windings. Next, add winding 2, then winding 1. The number of turns used for each of the windings will depend on the transformer you use and its number of turns per volt.

Power-Supply Construction

The switches, S_2 through S_7 (Fig. 1), must carry heavy current and should be selected on that basis. The contacts should have a minimum rating of 10 amperes, the heavier the better. A d.p.d.t. switch can be parallel-connected to provide twice the current rating of one section.

The rectifier and filter system is of standard design and is shown in Fig. 1. The meter, M_1 , does double duty as a voltmeter (0-30 volts) and as an ammeter (0-12 amperes). The meter shunt, R_1 , will have to be wound to match the meter used and can be made from several inches of No. 18 copper wire. The resistance of the

meter-protection fuse (0.01-amp. unit) will have to be taken into account when calculating R_1 because the meter and fuse will be in series.

Operation

To operate the power supply, the switches (S_2 through S_7) are turned on and off, progressively, until the desired voltage or current is indicated on the meter. To get 11.5 volts, for example, merely place switches S_7 , S_6 , S_5 , and S_2 in the on position. Generally, the load placed on the supply will require a trial-and-error method of switching to arrive at the desired d.c. voltage.

QST

"Little Black Box"

BY MAX P. VANDER HORCK,* WAGHUW

A little black box of jewels and rocks,
with lanterns that flicker and glow,

Makes lighter the gloom in my little back
room, where often I hasten to go.

An anthem it peals of whistles and squeals
and of voices so ghostly and queer

That you'd never deary, should you chance
to pass by, what a brotherhood fore-
gathers here!

Each separate tone has a soul of its own:
each voice is the voice of a friend,

United through space in this gathering-place
at the radiant rainbow's end.

Reverberant sounds ride the wave that re-
bounds like the waves of the sea, from
afar,

Reporting the doings, the comings and goings
of brothers, wherever they are.

A curious band, spread over the land,
yet joined from equator to poles,

Disperses the gloom in each little back room
by this magic communion of souls.

I could part with a lot of the things that I've
got, but I'll carry my love to the tomb

Of that little black box and the joys it un-
locks when I enter that little back room!

QST

*6350 Wunderlin Avenue, San Diego, Calif. 92114.

A Review of Transmission Lines as Circuit Elements

BY WILFRED JENSBY,* WA6BQO

MANY amateurs active on the v.h.f. bands enjoy building their own equipment. The r.f. circuits often consist of hardware or plumbing which involves considerable metal work. Cut-and-try methods involve much more time and expense than at the lower frequencies.

I will review some of the design details involved in high-frequency circuit construction, so that most of the cut-and-try work can be done on paper.

Transmission-line sections are used as circuit elements at v.h.f. because of their desirable impedance properties. Lines that are used for such purposes are usually open-circuited or short-circuited at the receiving end, and do not serve to actually transmit energy. The term "transmission line" is used for purposes of clarity.

Equivalent Circuits

If we consider only what appears at the input terminals, a short-circuited quarter-wavelength line and a parallel-resonant circuit, of coil and capacitor, have these characteristics in common: both present extremely high impedance at one particular frequency; with both, the impedance at resonance is resistive and the impedance drops rapidly if the frequency varies slightly from resonance. Both will carry direct current freely while effectively blocking the frequency to which they are resonant.

* 3878 Melody Lane, Santa Clara, California.

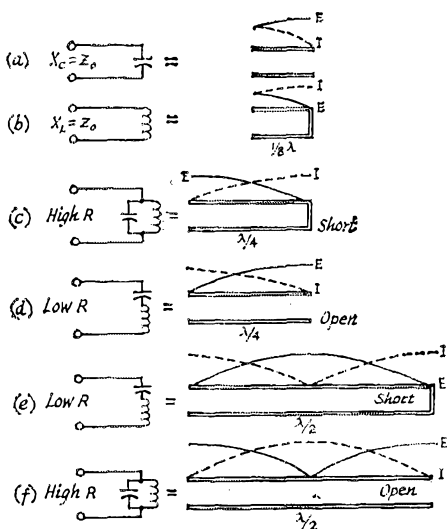


Fig. 1—Table of equivalent circuits using resonant lines. Voltage and current relationships are illustrated for open and shorted line.

An inherent difference is that the transmission line displays similar resonance at all odd multiples of its lowest resonant frequency; and has the inverse resonance characteristics of a shorted half-wavelength line at the even multiples.

An open-circuited quarter-wavelength line is similar to a series-resonant circuit of coil and capacitor. It has extremely low impedance at the resonant frequency, is resistive at resonance while being inductive above and capacitive below this frequency. It blocks direct current while freely passing the resonant-frequency r.f. energy. Like a short-circuited line (but unlike a circuit of lumped constants), its characteristics tend to repeat at odd multiples of the lowest resonant frequency, whereas at even multiples the inverse characteristics appear.

An open-circuited half-wavelength line is similar to a short-circuited quarter-wavelength line in that both have the same Q and are thus equally selective in a resonant circuit. However, at radio frequencies other than the desired resonant frequency (such as half and double the fundamental resonant frequency), the open and short-circuited lines have quite different characteristics. This may be important in connection with harmonics.

With a quarter-wave line, the closest resonant frequencies to the fundamental occur at odd multiples such as 3, 5 and 7 times the fundamental frequency. With a half-wave line, they occur at multiples of 2, 3 and 4 times the fundamental. A quarter-wave resonant line, therefore, gives greater separation of the higher-resonant frequencies from the fundamental.

Parallel Lines

Parallel lines are most often used with push-pull circuits, in either quarter-wave or half-wave configuration. With half-wavelength lines, the B plus is connected at the electrical center of the lines, and often a coil, resonant at a lower frequency, is placed here to give multiband operation.

Parallel lines are relatively easy to construct. Their electrical length may be readily changed with short-circuiting bars, and when they are used with appropriate types of tubes, the connections between lines and tube terminals can be short and direct. Furthermore, these connections and the portions of the tube leads inside the envelope become parts of the resonant-line system. For very high frequencies, the tube leads may constitute the principal part of this system but are largely inaccessible for purposes of power-output coupling. In some cases, the portion of

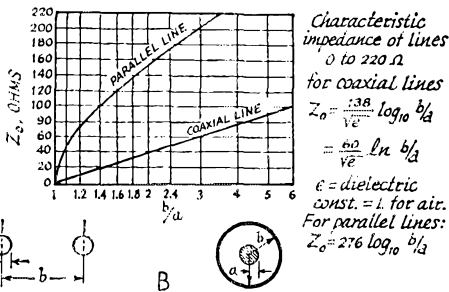
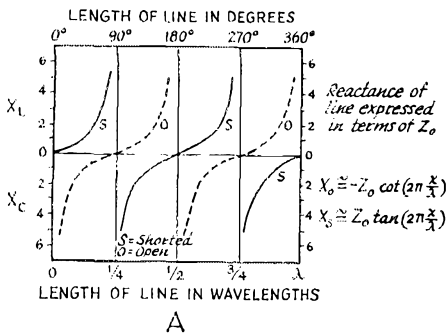


Fig. 2—Chart showing reactance of lines, expressed in terms of Z_0 , is illustrated at A. At B, a chart showing the characteristic impedance of lines from 0-220 ohms.

the circuit from which power is to be coupled may be operated at a multiple length of the shortest possible line; e.g., three-quarter rather than one-quarter wavelength.

Since open parallel lines radiate electromagnetic energy when excited, it is necessary to shield these lines for optimum performance. The parts, such as sides and covers, of the metal boxes used as the shield should be well bonded together, either with screws or by contact fingers. This is because electromagnetic shielding depends on the flow of induced currents in the metal of the shield. For the same reason, the shield should be constructed from material of high conductivity. For ultra-high frequencies, silver plating is desirable.

Several methods of tuning are available. An adjustable short-circuiting strap can be used, which must make good electrical contact. If the line is also short-circuited at the end by a large disk of copper or other good conducting material, it will be more effective. A butterfly capacitor, or a parallel-plate capacitor, may be placed anywhere along the line the tuning effect becoming less pronounced as the capacitor is located nearer the shorted end of the line.

The characteristic impedance of parallel conductors may be calculated as follows:

$$Z_0 \approx 276 \log_{10} \frac{b}{a}$$

where b is the center-to-center spacing of the conductor and a is the radius of the conductors. This relationship is shown in Fig. 2.

For two-wire lines, minimum attenuation theoretically will occur when $b/a = 2.7$. However, when proximity effect is included, the optimum b/a ratio is about 4. The b/a ratio to give maximum impedance to a short-circuited quarter-wavelength 2-wire line is about 8.0.

Coaxial Lines

When the various characteristics (Fig. 4) of a coaxial transmission line are considered, such as attenuation, resonant impedance, breakdown voltage, and power-carrying capacity, an optimum ratio of $b/a = 3.6$ is found to exist, where b is the inner radius of the outer conductor, and a is the outer radius of the inner conductor. Minimum attenuation occurs at this value, which also corresponds to a characteristic impedance of 77 ohms for a line with air dielectric. This is an important reason for the widespread practical use of lines with approximately this impedance.

Physically, if the inner conductor is smaller than the optimum size, its resistance is higher and loss is increased. If the inner conductor is larger than optimum, the increased capacitance lowers the value of Z and hence more current is required to transmit a certain amount of power, with the result that loss is again increased.

However, a line designed for minimum attenuation is not best for all purposes. A line may be designed to transmit maximum power. The limiting factor is electric field strength at the surface of the inner conductor; if a critical value of field strength (about 30,000 volts per centimeter) is exceeded, corona or sparking results. The optimum value of b/a for maximum power transmission is 1.65, and the corresponding characteristic impedance is 30 ohms.

When a line is designed to act as a resonant circuit, other values of b/a may be preferred. For

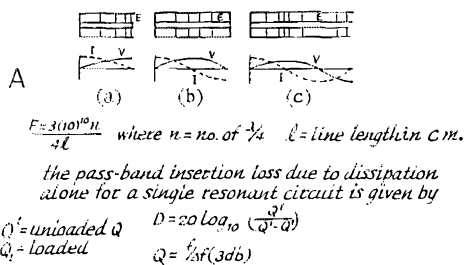


Fig. 3—Approximate voltage and current distribution in one-quarter wavelength (A), one-half wavelength (B), and three-quarter wavelength (C) resonant coaxial lines. The field strength, E , is also shown. At B, an illustration of magnetic and electrical coupling to coaxial cavity circuits.

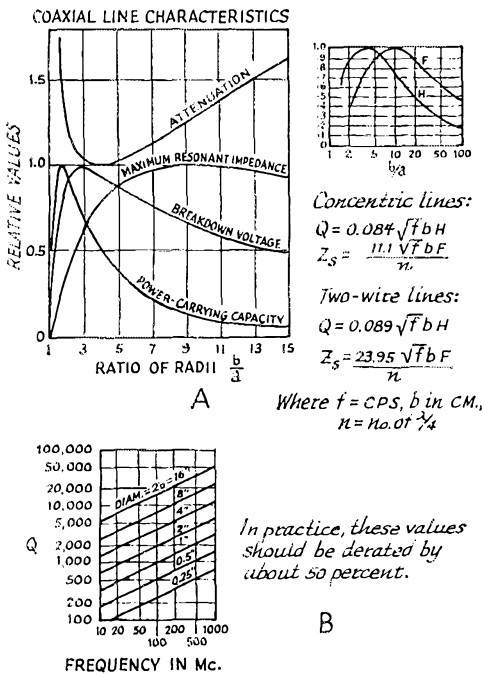


Fig. 4—Graphic representations of coaxial line characteristics are shown at A. At B, a chart showing Q in connection with element diameters and frequency, for concentric lines based on $b/a = 3.6$, using copper lines and air dielectric.

a short-circuited resonant coaxial line to have maximum impedance, b/a should be 9.2, corresponding to Z_0 equals 133 ohms for an air-insulated line. For an open-circuited resonant line to have minimum impedance, the inner conductor of the coaxial line should be as large as possible, requiring Z_0 to approach zero.

Coaxial-Line Oscillators and Amplifiers

The adoption of conventional oscillator and amplifier circuits to u.h.f. use is facilitated by the use of coaxial lines as circuit elements. The high inherent Q of concentric lines as resonant circuits, the very low radiation, and the possibility of isolation of the circuits, contribute to successful design. The lighthouse tube is designed especially for such circuits. The cylindrical, or dish construction, is carried through from the external terminal of the tube to the active part of the tube elements. A high degree of circuit isolation is thus possible, and coupling between circuits is reduced to a minimum.

The grounded-grid circuit is often used for oscillators and amplifiers at u.h.f. and is particularly advantageous in amplifier operation. The feedback or coupling capacitance between output and input circuits is the plate-cathode capacitance, which is reduced to a minimum in most tubes suitable for coaxial circuit use. Thus, regeneration through interelectrode feedback is materially reduced by grid shielding.

The similarity between the grid-separation-type oscillator and amplifier circuits is consider-

able. The conversion of an oscillator to an amplifier consists primarily of removing the external feedback system, the addition of a source of driving energy, and retuning. The plate-circuit loaded Q will influence both the frequency stability and modulated bandwidth of an oscillator and, for a given loaded resonant impedance, will depend on line dimensions, tube capacitance, and the operating mode.

Loaded-Q Consideration

Whereas in the ideal case, the expression for the input impedance of the coaxial line is frequently treated as a pure reactance, it should not be forgotten that the line is actually a circuit element with distributed constants, both inductive and capacitive. While the inductive reactance of a short-circuited line less than 90 degrees in length may be used to tune out a terminating capacitive reactance, the total capacitance in the resonant circuit is materially increased by that which is distributed in the line.

The distributed capacitance of a coaxial line is a function of the characteristic impedance. This is of importance where high operating Q must be considered for its limitation on the modulated bandwidth or, in the case of an oscillator, for its influence on frequency stability. A given input reactance might be obtained with a short high-characteristic-impedance line or a long low-characteristic-impedance line. The resonant circuit Q of the short line when shunt-loaded with a given resistance will be lower than that of the longer line if the electrical length of the lines is less than 90 degrees. The extra storage of energy in the low-impedance line will increase its operating Q over that of the high-impedance line. Where physical dimensions are concerned, low and high might be considered to be about 20 and 90 ohms, respectively.

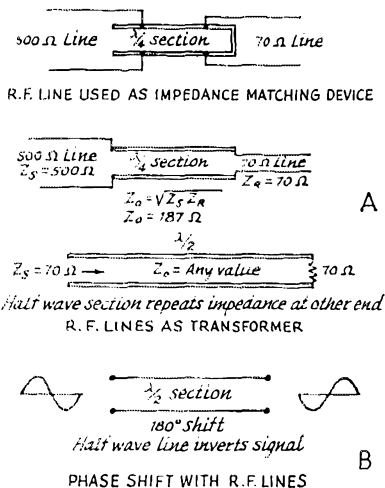


Fig. 5—Illustrations of various applications for parallel line sections as discussed in the text, at A. Phase-shift characteristics for line sections are shown at B.

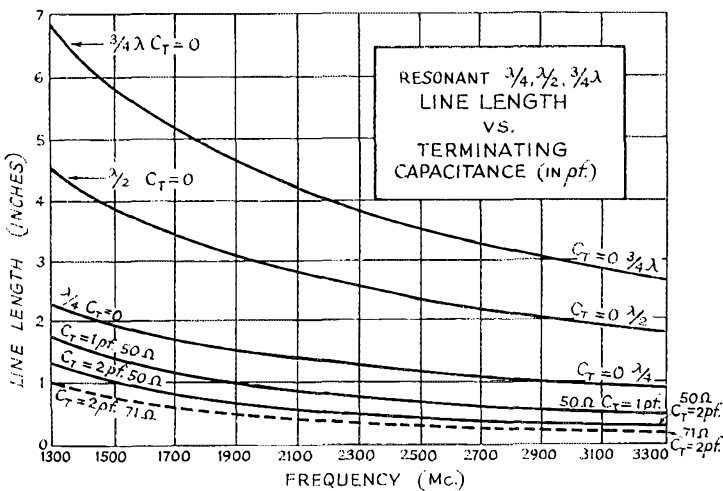
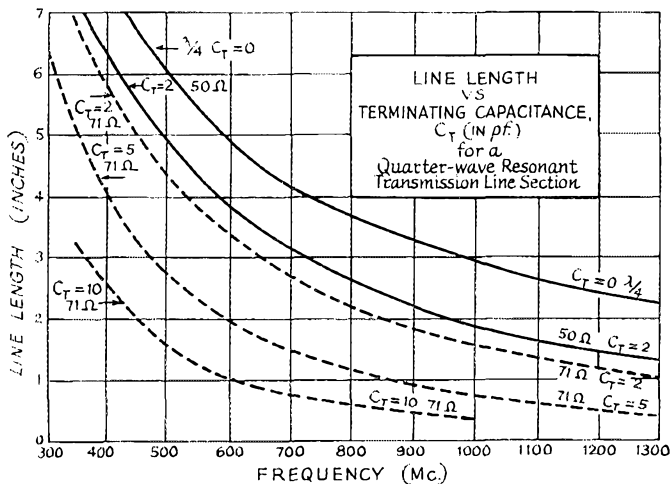


Fig. 6—Nomograph for determining physical lengths of lines at various frequencies with relation to terminating capacitance.

Limitations on Tuning Range

A practical limitation on the low-frequency range of a coaxial oscillator or amplifier is the actual physical length of the line elements, which rapidly increases as the frequency is lowered. This can be appreciated when the actual physical quarter-wavelength is considered at low frequencies, for the resonant lines approach this length quite closely as the reactance of a fixed terminating capacitance increases with the decrease in frequency.

When over-all physical length is an important consideration, it is helpful to remember that a given terminating capacitance may be resonated, with a fixed-maximum length of line, to a lower frequency with a line of higher characteristic impedance.

Physical dimensions also influence the practicable upper-frequency limit of coaxial lines as resonant circuit elements. This results from the

ability of cavities of large radial electrical dimensions to support interfering waveguide and spurious coaxial-resonance modes. The principal interfering higher-order coaxial-resonance mode is the TE mode, which can exist only at wavelengths less than the cutoff value given by:

$$\lambda_c \approx \pi(a + b)$$

where a is the radius of the inner conductor, and b the radius of the outer conductor. In any event, this TE mode should not interfere if the resonant-circuit line lengths are less than 90 degrees.

Coaxial Filters

Preselectors, or bandpass filters, are often made using quarter-wave or three-quarter-wave coaxial resonators. These can be nearly identical to coaxial v.h.f. amplifiers except that they are passive circuits. A preselector is a device used to pass discrete bands of frequencies within a

limited operating range, while rejecting signals at frequencies outside its passband. It can be very useful in suppressing transmitter harmonics and in reducing receiver overloading due to strong signals outside the amateur v.h.f. bands.

When designing a filter, it is necessary to know the minimum passband attenuation and bandwidth desired. If it is made tunable, then the filter can be adjusted for minimum loss at any particular frequency. Nearly all the characteristics of a coaxial filter can be related to Q_U and Q_L , where Q_U is the unloaded Q of the filter, and Q_L is the loaded Q of the filter. The unloaded Q of a cavity depends on the frequency and the impedance and size of the cavity. The theoretical Q_U of a coaxial cavity can be obtained from the equation

$$Q_U = 0.084 \sqrt{f b H}$$

where b is in centimeters, f is in c.p.s. and H a factor related to b/a as shown in Fig. 4, at A. The Q of resonant coaxial lines of optimum proportions ($b/a = 3.6$) is shown in Fig. 4, at B. Usually, these values must be derated from 10 to 50 per cent because of lower conductivity than predicted, contact resistance between movable and fixed parts of a cavity, capacitive loading effects of coupling elements and end plates, and other unavoidable imperfections.

Losses in coaxial filters are of two kinds — mismatch and dissipation. If the filter is simply inserted in a 50- or 70-ohm line, a good match can be obtained if the input and output loops have the same size and shape and are located at points of equal intensity. Usually, the effect of self-inductance of the coupling loops is merely to shift the resonant frequency slightly.

Dissipation (or resistive) loss is an important factor in narrow-band filters because of the relatively high values of Q_L required for narrow passbands.

The passband insertion loss, due to dissipation alone, for a single resonant circuit is given by

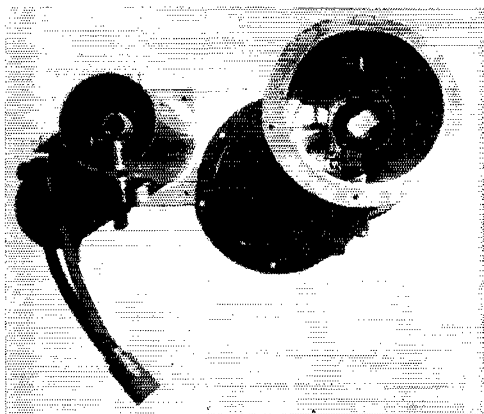
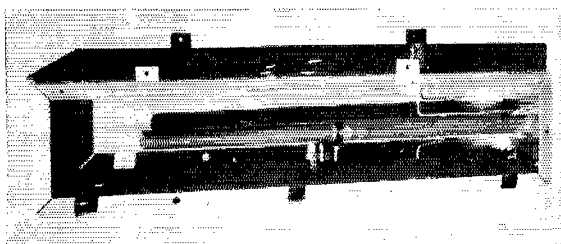


Fig. 7—A photo of a typical 432-Mc. amplifier coaxial cavity (left), and a 432-Mc. coaxial filter, with crystal diode detector added, is shown at the right.



A v.h.f. coaxial filter showing input and output coupling lines. The tuning capacitor is tapped down on the resonant element.

$$A = 20 \log_{10} \left[\frac{1}{1 - \frac{Q_L}{Q_U}} \right] \text{ or}$$

$$A = 20 \log_{10} \frac{Q_U}{Q_U - Q_L}$$

where A is the dissipative loss in db. To have an insertion loss of less than 1 db., Q_U must equal $10 Q_L$.

The Q of a resonant circuit may also be defined as the ratio of the mean passband frequency to the 3-db. bandwidth (f/f or

$$Q_L = \frac{f'}{f}$$

Since selectivity and insertion loss are directly related to Q_L , both functions can be adjusted for any particular need by making the coupling variable (such as rotatable loops).

If two or more cavities are used in series to increase the selectivity, they should be spaced an electrical one-quarter wavelength from center to center.

The position of the loops, with respect to the center conductor of the cavity, also has an effect on Q_L . The closer the coupling the lower the Q_L and the greater the bandwidth.

In practice, a certain amount of electrical coupling will be combined with the magnetic coupling of the loop, depending on the size of the loop.

As an example, a coaxial filter for two meters might be designed to cover the entire band of 4 megacycles. Thus,

$$\Delta f = 4 \text{ Mc.}, f = 146 \text{ Mc.}, \text{ and } Q_L = \frac{146}{4} = 36.5.$$

To keep the insertion loss A below 1 db., Q_U should be 365. From Fig. 4B, a coaxial cavity of $\frac{1}{2}$ -inch outer diameter has a theoretical Q of about 600. Usually, more selectivity than this is desired, and a previous article listed typical cavity dimensions for the various v.h.f. bands.¹

A filter such as this can be made tunable either by changing the length of the inner conductor or

¹"The World Above 50 Mc.," *QST*, February, 1961.

by capacitive loading. The latter is generally less difficult to accomplish.

Additional Considerations

The best method in constructing transmitters, converters or filters using resonant line elements is to follow the ideas in articles in the handbooks and magazines. A typical circuit for parallel-line construction is the 2-meter transmitter described in *QST*.² A coaxial-line amplifier for 2 meters is described in an earlier issue of *QST*.³

An important consideration, when constructing similar equipment, is to determine the length of the quarter-wave section of transmission line. The equation used to solve this problem is

$$d = \frac{c}{nf} \frac{\tan^{-1} \frac{1}{2\pi f C_T Z_0}}{360}$$

where d = quarter-wave resonant length in inches.

c = velocity of propagation in a vacuum (1.18×10^{10} inches/sec.).

n = index of refraction of the dielectric medium
= 1 for air.

f = operating frequency in cycles/second.

C_T = Terminating capacity in farads.

Z_0 = Characteristic impedance in ohms and \tan^{-1} is in degrees.

This equation is illustrated graphically in Fig. 6, relating line length to terminating capacity for various frequencies. For these curves, $Z = 71$ ohms and $n = 1$.

These curves may be used for resonant lines having a characteristic impedance other than 71 ohms by using the conversion

$$C_0 = \frac{C_T Z_0'}{71}$$

where C_0 is the terminating capacitance normalized with respect to the 71-ohm impedance.

To use this chart, determine the total minimum capacitance across the end of the line, including tube or tubes and tuning capacitor. Find the length of the line at the highest frequency used. Remember, the line can be lengthened electrically, or lowered in frequency by adding capacitance, but it can only be shorted electrically by cutting it off.

Construction Notes

The ideal way to build a coax-line amplifier or coaxial filter would be to use copper or brass tubing, silver plated on the conducting surfaces, and with all joints soldered. However, satisfactory results can be obtained with less effort. As an example, a coaxial filter for use on 6 and 2 meters was constructed, using a $3 \times 4 \times 17$ -

² "A High-Efficiency 2-Meter Kilowatt," *QST*, February, 1960.

³ Edinger, "A 4X250B Amplifier for 144 Mc.," *QST*, October, 1956.

inch aluminum chassis box and a $13\frac{1}{2}$ -inch length of $\frac{5}{8}$ -inch copper tubing. If 1-inch diameter tubing is used, a length of 14.12 inches should be about right. A $2\frac{3}{4} \times 3\frac{3}{4}$ -inch plate was soldered to one end of the tubing and mounted in the box. Input and output connectors were mounted on opposite sides and about 4 inches up from the base. Wire loops, the shape of an L, were spaced about $\frac{1}{8}$ inch from the center conductor. A 3-30-pf. capacitor was connected halfway up the line. This provided enough capacitance to tune the line to resonance at 6 meters. The filter was tried on each band, with a power output of about 40 watts, into a wattmeter and 50-ohm load. The insertion loss was approximately 1 db. at center frequency. Spurious emissions and harmonics outside the

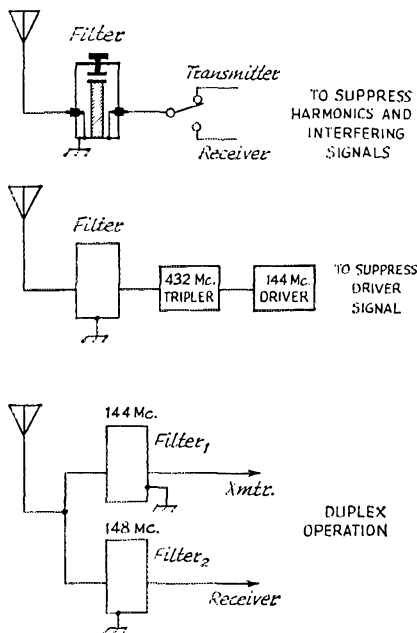
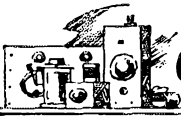


Fig. 8—A block diagram illustrating three typical applications for coaxial filters.

bands should be suppressed by 40 to 50 db. Birdies and interference from TV and f.m. stations should also be similarly suppressed. When using a multiband antenna on 6 and 2, a filter such as this should help to prevent 6-meter third-harmonic energy from being radiated by the 2-meter section. QST

References

- VHF Techniques*, Vols. 1 and 2.
- Radio Engineering Handbook*, Terman.
- Radar Circuit Analysis*, USAF.
- "Lighthouse Tubes," General Electric ETX-110.
- Moreno, *Microwave Transmission Design Data*, Dover Publications, Inc., New York, N. Y.
- "Narrow Band Pre-selectors," Microlab Catalog No. 11A.
- Penfield, "Design of Quarter-Wave Resonant Lines," *Electrical Design News*, June, 1959.



A One-Watt Rig for 40 Meters

Transistorized C.W. Transmitter

BY F. L. DWIGHT,* K6JBV

HAVING built a number of transistorized transmitters whose circuits were taken from various radio publications, I concluded that many of them were either too expensive, unnecessarily complicated, or too critical to adjust. This rig is not complicated and is quite inexpensive. The transmitter has a clean c.w. note and the tuning is not critical.

The power output is approximately one watt where a 45-volt battery is used. Although this may seem like a small amount of signal to work with, plenty of DX is possible if a good antenna system is used. Because it operates from a dry battery, it is an ideal transmitter for portable operation. The circuit can easily be assembled in a 1½ × 2 × 4-inch Mini-box, offering even more appeal to the portable operator.

50- or 75-ohm load in the author's station. If desired, C_4 can be replaced by a 3-section broadcast variable (365 pf. per section) whose total capacitance with all three sections in parallel would be about 1100 pf. Then a 680-pf. mica capacitor can be wired in parallel with the broadcast variable, providing ample total capacitance for matching into low-impedance loads. The variable capacitor would provide some adjustment for those who prefer a loading control.

The total collector current of the rig is monitored by I_1 , a No. 47 pilot lamp. The bulb glows faintly at a current of 50 ma. A 100-ma. meter can be used in place of the pilot lamp if the builder wishes.

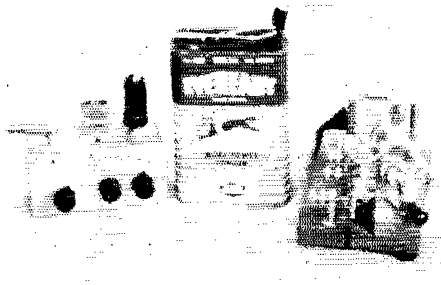
Building the Transmitter

Because so few parts are used in this circuit, layout is uncomplicated and is pretty much up to the builder. It is important that all connections be well soldered. Make all leads short and direct. Keep L_1 and L_3 as far apart as possible. Try to mount them at right angles to one another so as to discourage mutual coupling between stages.

The transistors have TO-5 cases. Standard TO-5 heat sinks are available at low cost and should be used to prevent the transistors from overheating. The cases of the transistors are common to their collectors, so care should be taken to prevent the heat sinks from touching other parts of the circuit.

Tune-Up

Place a 100-ma. meter in series with the battery lead to the transmitter. With a No. 47 lamp cou-



K6JBV's portable 40-meter QRP rig. The transmitter is at the left.

The Circuit

The oscillator, Q_1 (Fig. 1), is similar to a vacuum-tube Pierce oscillator. Output from the oscillator is fed to the emitter of Q_2 through coupling link L_2 . Drive to the p.a. stage is regulated by adjusting R_1 , which increases or decreases the collector current of Q_1 .

A pi network is used in the collector circuit of Q_2 . The circuit is tuned to resonance by C_3 . A fixed capacitor, C_4 , is used at the output of the tank circuit. This valve gave a good match to

The QRP enthusiast should get a kick out of this short-term solid-state project. The transistors are low-cost units, as are the rest of the parts used in the little rig. This dry-battery-operated transmitter can offer hours of challenging fun if you enjoy your DXing the hard way.

* 9027 8th Ave., Inglewood, California 90305.

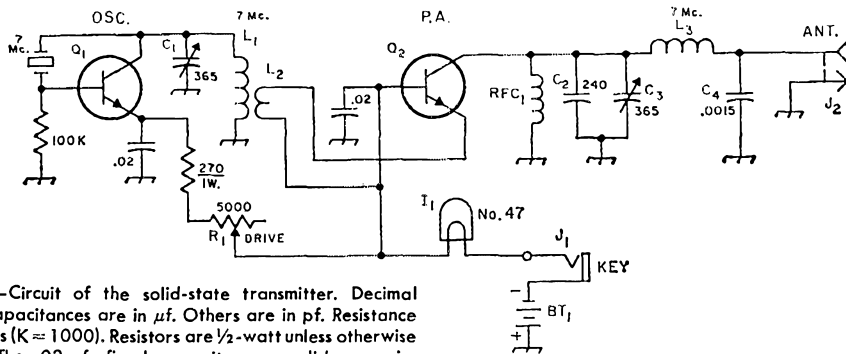


Fig. 1—Circuit of the solid-state transmitter. Decimal value capacitances are in μf . Others are in pf. Resistance is in ohms ($K = 1000$). Resistors are $\frac{1}{2}$ -watt unless otherwise noted. The $.02\text{-}\mu\text{f}$. fixed capacitors are disk ceramic.

Bt1—45-volt battery (Eveready 482 or Burgess M30 suitable).

C_1, C_3 —365-pf. miniature variable.

C_2 —240-pf. mica.

C_4 —1500-pf. mica (see text).

I_1 —No. 47 lamp or equal.

J_1 —Open-circuit key jack.

J_2 —Antenna jack (RCA phono connector suitable).

L_1 —17 turns No. 24 enam. wire, $\frac{1}{2}$ -inch dia., space-

wound one wire diameter (or 17 turns of B&W 3004 Miniductor stock).

L_2 —3 turns No. 24 insulated wire over cold end of L_1 .

L_3 —11 turns No. 22 enam. wire, $\frac{1}{2}$ -inch dia., space-wound one wire diameter (or 11 turns of B&W 3004 Miniductor stock.)

Q_1, Q_2 —2N697 or similar.

R_1 —5000-ohm, 2-watt linear-taper control.

RFC1—1-mh, 100-ma. choke.

nected to J_2 , for use as a dummy load, close the key and adjust R_1 for a meter reading of 50 milliamperes. Next, adjust C_1 and C_3 for maximum brilliance of the dummy-load bulb. At this power level the dummy should light to normal brilliance, indicating roughly one watt of output.

While monitoring the c.w. signal from the transmitter, adjust C_1 for the best-sounding note. Depending upon the crystal used, the best point may be at resonance, or perhaps slightly to one side of resonance. The drive control, R_1 , can be used to vary the power input. Lowering the power level will give longer battery life.

Operation

With an antenna connected to the transmitter, C_1 and C_3 should be tuned for maximum output as observed on an s.w.r. bridge, field-strength meter, or receiver S meter. R_1 should be adjusted for a maximum total current of 50 milliamperes. The key should not be held down for periods in excess of 30 seconds so that the transistors will not become overheated.

Performance

About a dozen hams in the Los Angeles area have built this rig, and experienced no difficulty. One of the fellows has already worked 20 states with his transmitter.

Operating the rig at reduced battery voltage (22.5 volts) resulted in good performance at slightly reduced output, on the order of $\frac{1}{2}$ watt. The drive control, R_1 , can be used to reduce the power input if really low-power operation is desired.

The circuit should be capable of good performance on 160 and 80 meters by making appropriate changes in the inductance at L_1, L_2 , and L_3 . Also, it should be possible to operate on 20 meters by using a 7-Mc. crystal and doubling in the output stage, Q_2 . I have not tried using these transistors at 10 or 15 meters, but I suspect that the efficiency would be rather low.

The little transmitter is easy to build, easy to operate, and is inexpensive. If you are a QRP enthusiast, try this one.

QST

Strays

Two British radio amateurs recently completed a tour throughout the Eastern United States visiting American amateurs in several cities. In Birmingham, Alabama, the pair even received the key to the city. (The visitors are from Birmingham, England!) Shown here are Fred Dodson, G3NYA (l.), William Lathrop, Jr., W4PR, and Jim Barnes, G3KVH (r.) in W4PR's shack.

The department of Army is looking for an experimentally-minded ham interested in antennas and propagation, who is also a botanist. If this fits you and you are interested, contact Colonel Seven A. Bach, W4RWU, Life Sciences Division, Army Research Office, 3045 Columbia Pike, Arlington, Virginia.





Recent Equipment



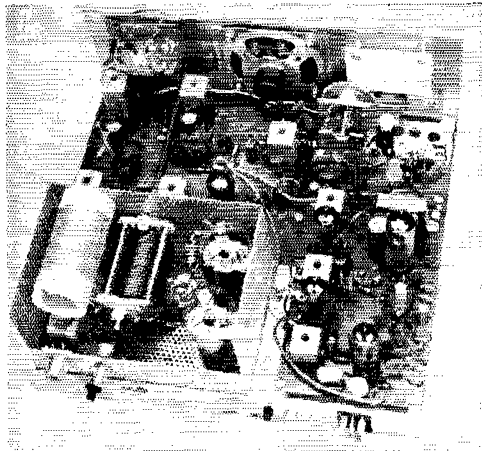
To acquaint you with the technical features of current amateur gear.

WRL Duo-Bander 84

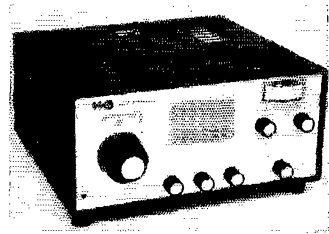
WITH the 75- and 40-meter s.s.b. enthusiast in mind, World Radio Labs has announced the availability of a new and compact transceiver, the Duo-Bander 84. Operating at up to 300 watts p.e.p. input, the transceiver can be used for either fixed-station or mobile operation by connecting it to the appropriate power supply.

The Duo-Bander 84 employs a transistor/vacuum-tube hybrid circuit which contributes to the compactness of the package. A total of nine transistors are used in the unit, seven of which are in active circuits. The remaining two transistors are used as Zener diode regulators. Nine vacuum tubes comprise the remainder of the stages in the transceiver.

In a move to reduce the complexity of the circuit, W.R.L. has dispensed with some of the "extras" found in most similar units. The Duo-Bander is intended for s.s.b.-only operation; there is no provision for a.m. or c.w. The set tunes from 3800 to 4000 kc. on 75 meters, and 40-meter coverage extends from 7100 to 7300 kc. It offers lower-sideband only, and the manufacturer has not included VOX or a.l.c. circuitry. The elimination of these circuit extras no doubt accounts for the lower-than-usual price for a factory-wired unit of this variety.



Circuit boards are used throughout the transceiver, except for the p.a. section of the chassis (lower left of photo). The v.f.o. is located at the upper right of the photo. The carrier generator and i.f. strip are visible along the right and rear portions of the chassis.



A Look at the Circuit

The block diagram of Fig. 1 shows the path of the signal as it travels from one part of the circuit to another. During transmit, a high-impedance microphone is connected to the circuit at Q_3 . The amplified audio from Q_3 is fed into Q_4 , a phase splitter, and then applied to the balanced modulator which consists of Q_6 and Q_7 . The balanced modulator is transistorized, rather than being of the more common diode species. The circuit is shown in Fig. 2.

After the audio signal is combined in the balanced modulator with the 5.55-Mc. carrier energy from V_1 , the resultant d.s.b. suppressed-carrier signal is routed through the 5.55-Mc. crystal filter where the unwanted sideband (upper) is filtered out. Because there is some insertion loss in the filter, the signal is amplified by V_3 before being fed to V_5 , the transmitting mixer. A 1.55- to 1.75-Mc. v.f.o. signal is generated by Q_1 , and is isolated from the transmitting and receiving mixer stages, V_5 and V_7 , by the buffer-stage transistor, Q_2 . This signal is combined with the 5.55-Mc. s.s.b. energy at V_5 to produce a sum frequency of 7100 to 7300 kc. for 40-meter operation, or a difference frequency of 3800 to 4000 kc. during operation on 75 meters. This s.s.b. signal is amplified by the driver tube, V_6 , and is then raised to the full-power level by the p.a. stage, V_8 - V_9 . The pi-section output tank has fixed loading at the output end for use with 50-ohm non-reactive loads. An r.f. sampling diode, CR_2 , rectifies a small portion of the output signal and supplies d.c. voltage to the panel meter for tune-up purposes.

Bandpass tank circuits are used at the input and output of the driver stage, thus eliminating any need for panel-mounted tuning controls for that part of the circuit. The Duo-Bander 84 does not provide for upper-sideband operation.

In the receive mode, the incoming signal is routed through relay K_1 from the antenna jack to the input of V_6 , which performs as an r.f. amplifier stage. (During transmit, V_6 is the driver stage for the transmitter.) Because the

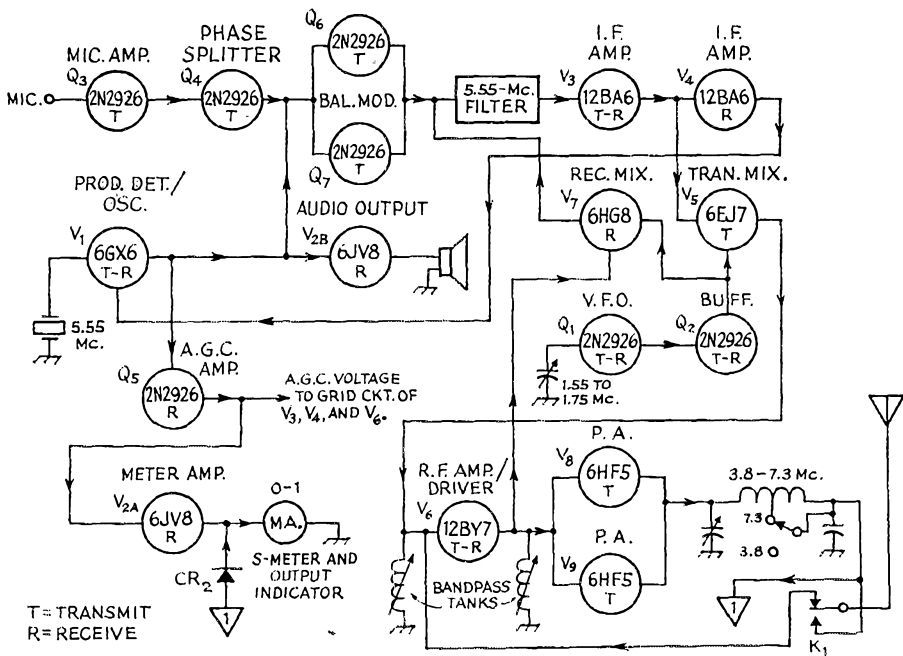


Fig. 1—Block diagram of the transceiver. Arrows indicate direction of signal travel.

grid and plate tanks for V_8 are of the bandpass type, no tuning is necessary to peak the receiver when moving from one part of the band to another. The signal from one part of the band to the receiving mixer, V_7 , where it is heterodyned with the 1.55 to 1.75-Mc. v.f.o. to produce an i.f. of 5.55 Mc. The i.f. signal is passed through the crystal filter which establishes the selectivity of the i.f. channel and removes the unwanted side-

band (upper). Amplification of the i.f. signal is carried out by V_3 and V_4 before the signal reaches the product detector, V_1 . The 5.55-Mc. carrier generator (part of V_1) acts as the h.f.o. during receiving. The audio signal from the product detector is amplified to speaker volume by V_{2B} , one half of a 6JV8.

An a.g.c. amplifier stage, Q_5 , supplies control voltage to the grids of V_3 , V_4 , and V_6 . The

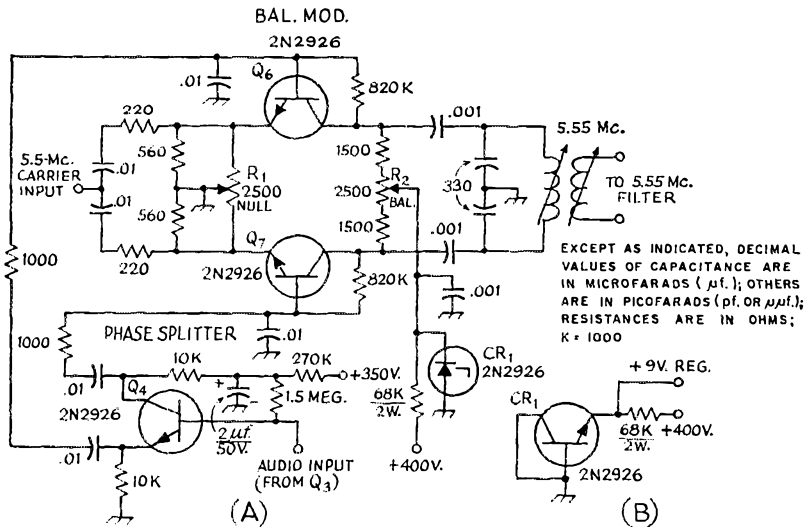
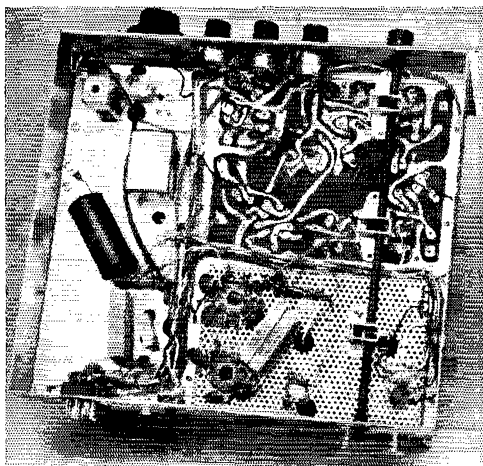


Fig. 2—At A, the schematic diagram of the balanced modulator. Q_4 has been included to show how the audio is coupled into the balanced modulator. At B, the actual configuration of CR_1 , showing how it is connected for Zener-diode service.



Although most of the components are above the chassis this bottom view of the Duo-Bander shows the bandswitch assembly, which is a mechanical innovation. The switch assembly, which uses three slide switches that are ganged together by a long $\frac{1}{4}$ -inch diameter shaft, is located along the right side of the chassis. The sideband filter is at the upper left, just ahead of the dark-colored electrolytic capacitor.

a.g.c. voltage from Q_5 is used, also, to operate the S-meter amplifier tube, V_{2A} . As is the case during transmit, the difference frequency is used for 75-meter operation and the sum frequency is used for 40-meter operation.

An interesting application of transistors can be seen by looking at insert B, in Fig. 2. CR_1 is actually a silicon transistor and is connected as shown to serve as a Zener diode. A conventional symbol is used at A, in Fig. 1, to show the function of CR_1 . Another 2N2926 is used in the same fashion to regulate the supply voltage to the v.f.o. stage. A check on the voltage at those two points indicated that the Zener action of the transistors provided 9-volt regulation.

Physical Features

The front panel has a minimum of controls, hence there is plenty of finger room when tuning

the transceiver. A two-speed dial drive is used for the main tuning control and was quite stiff on the model we tested. The stiffness could be an advantage during mobile operation, keeping the transceiver on frequency when traveling over rough roads. The dial plate is calibrated in 2-ke. increments on both bands.

Other panel controls include MIKE GAIN, METER SENS. (used for keeping the meter off full-scale during transmit), NULL, BANDSWITCH (push in for 40 meters, pull out for 75 meters), P.A. TUNE, and AUDIO GAIN for receiving. The panel is finished in two colors, light gray and light blue. The outer cabinet is black.

Operation

The Duo-Bander is designed to operate from either of two power supplies; the A.C. 384 for 115-volt a.c. use and the D.C. 384 for 12-volt d.c. operation. Both power supplies are available from the manufacturer.

Tests made with a spectrum analyzer in the ARRL lab indicate that the third- and fifth-order products are at acceptable levels for ham-band operation. Additional tests showed that the carrier suppression was within the range stated by the manufacturer. The receiver sensitivity was more than adequate for normal operation on 75 and 40 meters. — *WICER*

World Radio Labs Duo-Bander 84

Height: 5 inches.

Width: $11\frac{1}{4}$ inches.

Depth: 10 inches.

Weight: $10\frac{3}{4}$ pounds.

Power Requirements: 300 volts d.c. at

400 ma., 325-375 volts d.c. at 200 ma.,

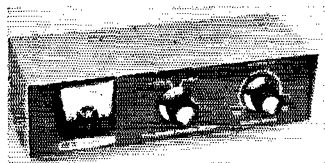
— 100 volts d.c. at 30 ma., 12 volts

d.c. at 200 ma., and 12 volts a.c. or

d.c. at 5 amperes.

Price Class: \$160. less accessories.

Manufacturer: World Radio Laboratories, Council Bluffs, Iowa.

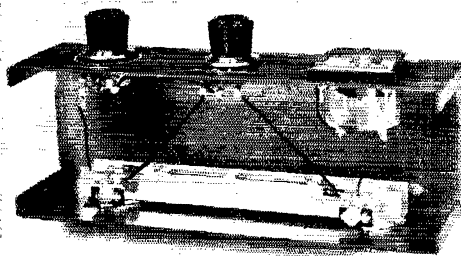


The Heath HM-15 Reflected-Power Meter

An old friend in a new suit has been recently introduced by the Heath Company in the form of the HM-15 s.w.r. bridge. Not too unlike its predecessor in circuit design, the HM-15 differs markedly from the early Model AM-2 as far as packaging is concerned. The HM-15 is built in a low-silhouette case which is finished in a two-tone green decor. With this change in

theme, the new unit is appearance-compatible with the SB-series equipment.

The HM-15 is designed to operate from 160 through 6 meters. Through the proper choice of terminating resistors for the pickup lines, the bridge can be used with either 50- or 75-ohm coaxial lines. The resistors for both impedances are furnished with the kit. The power rating of



Bottom view of the Heath HM-15 S.W.R. Bridge.

the unit is 2000 watts, p.e.p.

A check on assembly time indicates that it took the writer approximately one hour and 20 minutes to do the job, start to finish. The step-by-step instructions are clearly written and by following the specifications for lead lengths and placement of critical wiring, no cut-and-try techniques were required to get the bridge working properly after it was assembled. The pictorial diagrams clearly illustrate the proper placement of critical leads.

The instruction manual contains an interesting discussion on the use of s.w.r. bridges and points out some of the pitfalls encountered by less-experienced users. Also, charts have been printed in the manual which show line loss in decibels when compared to s.w.r. A chart which shows the normal attenuation of popular types of coax cable per 100 feet has also been included. The meter face is calibrated to read reflected power in percentage, up to 25 percent. A second scale is calibrated in terms of s.w.r. up to 3:1.

The manufacturer states that full-scale deflection of the 100- μ a. meter (forward position) will occur on 6 meters with two or three watts of power. The full-scale reading on 75 meters should occur with 70 watts. Lab tests showed that 60 watts would cause full-scale readings on 75 meters, indicating the relative accuracy of the manufacturer's specifications. — *WTCER*

Heath HM-15 S.W.R. Bridge

Height: 2⁹/₁₆ inches.

Width: 9¹/₃₂ inches.

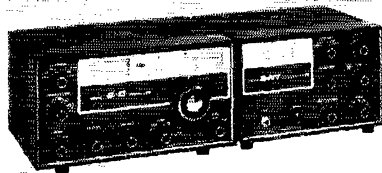
Depth: 3⁵/₈ inches.

Weight: 1¹/₂ pounds.

Price Class: \$15.00.

Manufacturer: The Heath Company,
Benton Harbor, Michigan.

Next Month



Drake 2-C Receiver

• New Apparatus

Johnson Insulated Terminals

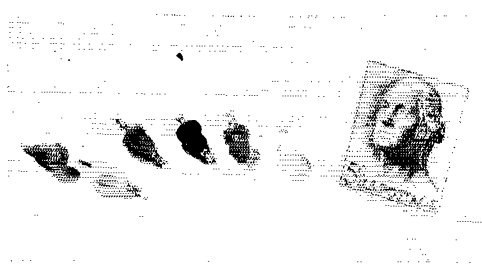
A NEW line of inexpensive miniature components has recently been introduced by the E. F. Johnson Company of Waseca, Minnesota. As shown in the photograph, there are six basic items available in the series: single-turret standoffs, double-turret standoffs, single-turret feedthroughs, double-turret feedthroughs, tip plugs and mating tip jacks. Designated "Rib-Loc" insulated terminals, these miniature components stay put once installed. "Rib-Loc" terminals do not have smooth bodies, which is the usual case; instead they have round bodies covered with regularly spaced projections or ribs which help considerably in preventing the terminals from turning in their mounting holes.

"Rib-Loc" components employ low-loss polamide insulation in conjunction with brass silver-plated terminals. All components in the line have plastic bodies of the same identical size and shape; as a result, both the tip jack and the tip plug can be mounted in a metal plate or used as external connectors. A No. 29 countersunk hole is required

for each terminal to be mounted. The components can be installed by simply pressing them into position with an appropriate insertion tool, such as a hollow shaft, held in the chuck of a drill press that has the power turned off.

"Rib-Loc" insulated terminals are made in six colors: white, red, black, green, yellow and blue. The price varies with type, but all components in the series are available for less than 10 cents each.

— *WVDS*



Technical Correspondence

NOISE LOCATOR

Technical Editor, *QST*:

With reference to the recent discussion in *QST* on electrical noise and interference, we in Seattle are quite fortunate in having an outstanding noise-detection facility operated by the local utility, Seattle City Light. It consists of a panel truck on which is mounted a rotating v.h.f. Yagi and a Karr 124 direction-finding loop, and contains a Jerrold TV-band signal-strength meter and Hallicrafters S-36A for use with the Yagi and a Hammarlund HQ-100 for use with the loop. In addition, the truck carries two portable transistor receivers (one shielded except for the antenna), a battery-operated Sony u.h.f.-v.h.f. TV set, a 17-inch Motorola TV set (line operated) and various other equipment.

The truck is operated full time by two communications electricians of City Light, Jim Stanard, ex-W7ANP and ex-Navy radio operator, and Stuart Nelson, W7GPD. Jim did an excellent tracking job on a noise source of non-utility origin several houses away from this QTH.

Any utilities or persons interested in details of this excellent operation may write Mr. Jim Stanard, Seattle City Light, 1015 3rd Ave., Seattle, Washington. — Robert B. Piater, W7CRR.

ACTIVE FILTER FOR RTTY

Technical Editor, *QST*:

While assembling components to build the RTTY terminal unit described recently by K8DKC,¹ I became concerned with the possibility of eliminating the 350-henry choke used in the low-pass filter (I couldn't find one in my junk box!). Mr. Derwin King, W5LUU, called to my attention a method of filter synthesis utilizing simple RC networks and a voltage feedback loop,² from which the attached circuit, Fig. 1, resulted. The active filter has 3-pole Butterworth transfer characteristics; cutoff frequency is 28 c.p.s., and is based upon these constants and relationships:

$$k = 0.90$$

$$\frac{C_2}{C_3} = 7.50$$

$$T_1 = \sqrt{T_2 T_3} = \frac{1}{2\pi f_c}$$

where $T_1 = R_1 C_1$

$$T_2 = R_2 C_2$$

$$T_3 = R_3 C_3$$

¹ Hoff, "The Mainline TT/L F.S.K. Demodulator," *QST*, August 1965.

² Sallen and Key, "A Practical Method of Designing RC Active Filters," *IRE Transactions - Circuit Theory*, Vol. CT-2, March 1955, p. 74.

Fig. 1—Active low-pass filter for the Mainline TT/L RTTY demodulator. Capacitances are in μf ; resistances are in ohms (K-1000).

Note: Values given for R_1 , R_2 and R_3 are calculated for exact values given for C_1 , C_2 and C_3 . For commercial-tolerance capacitors, 1-megohm resistors may be close enough for satisfactory operation.

C_1 , C_2 , C_3 —Mylar.

R_1 —1.130 megohm, $\frac{1}{2}$ watt.

R_2 —0.964 megohm, $\frac{1}{2}$ watt.

R_3 —1.115 megohm, $\frac{1}{2}$ watt.

R_4 , R_5 —Linear control.

With the values indicated, it may be directly substituted for the passive filter circuit in the Mainline TT/L unit. Since the tubes are still operated as cathode followers, as in the original circuit, the desirable low output impedance and long-term stability are retained. Potentiometer R_4 in the cathode circuit of V_{1B} should be adjusted for the optimum feedback ratio $k = 0.9$; this may be conveniently accomplished by applying a nominal 6.3 volts a.c. from the heater supply directly to the grid of V_{1B} and comparing this voltage with that on the potentiometer arm.

The 1000-ohm potentiometer, R_4 , at V_{1A} is set as in the original design; with no audio signal to the detectors adjust R_4 so that the cathode voltage is zero at V_{1B} . I included a small test point for this purpose. — Rob Rhodes, W6SDH/AF6SDH, 13271 S. Jerome St., Garden Grove, California 92641.

VOLTAGE REGULATORS

Technical Editor, *QST*:

In "Technical Correspondence" in the July 1966 issue, ("Alternator Power Supply"), W0IUQ/W7BOU comments: "Once the battery is fully charged after starting the engine, the regulator can cut out and interrupt the power . . ."

The regulator (relay) does not "cut out" unless it is defective, which, unfortunately, a large portion are. Regulators often "cut in"—i.e., the voltage relay contacts stick closed—for periods ranging from seconds to hours, causing the electrical system voltage (battery and generator) to reach excessive and damaging values—8 volts on 6-volt systems and 16 volts on 12-volt systems.

I am sure that many mobilers have experienced unexplained loss of transistor power-supply components which really were the result of momentary over-voltage in the car's power system, the real culprit being those rather poor \$3 voltage regulators.

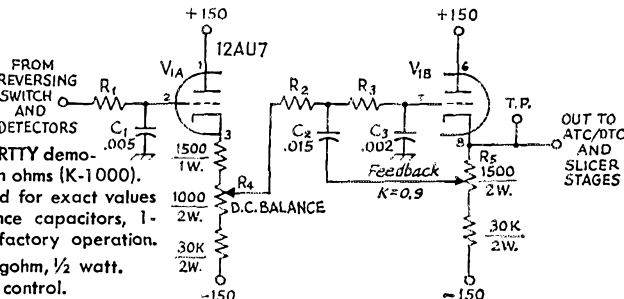
My experience is that relay-type regulators operate reliably for about six months of normal driving. Then watch out! — John C. Huffman, W4IRE, 2400 Hoyt St., Winston-Salem, N. C. 27103.

VERTICAL FOR 80-40

Technical Editor, *QST*:

Over a ham career spanning some 31 years, the writer has developed definite notions concerning what works and what doesn't. One of these regards vertical antennas as "good guys" and horizontals as the "black hat" crowd. Numerous experiments conducted over the years, particularly during the past two, have served to confirm this notion.

The antenna system (Fig. 2) to be described fills the gap that the owner of a tri-bander beam is acutely aware of—namely, what to do about 40 and 80 meters. Armchair operation is a "must" in order to be in keeping with existing automatically-altered



antenna systems. The writer spent two winters sloshing through mud, sleet, snow and rain in order to change loading-coil tap positions at the base of a vertical antenna. Frequently, operation was continued on a "dead as a dodo" band rather than run the gauntlet again.

The advantages of a vertical radiator for the two bands considered are not too obvious at first glance. However, the 80-meter case is the most outstanding and has resulted in the following observations:

1) Greatly increased signal-strength reports during daylight hours — frequently S9 at distances up to 400-500 miles (200 watts nominal).

2) Increased signal strength with a noticeable lack of fading at night over extended distances.

3) Lack of directional effect.

4) Simple design resulting in a bandwidth of 300 kc. without coils, capacitors, or gimmicks of any description. The v.s.w.r. is below 2:1 over the range of 300 kc.

5) Small physical size and low-cost construction plus one-man-and-a-boy-type installation.

The 40-meter case is almost identical but with the exception that the v.s.w.r. vs. bandwidth is even better, not rising above 1.5:1 across entire band.

What are the disadvantages? As anyone knows who peruses antenna theory, a really good ground system is a primary requirement. In the course of experimentation, all work was referenced to an initial ground system consisting of an 8-foot copper-clad steel rod driven flush with the soil surface. Impedance stabilization did not occur until three additional radials, each 25 feet in length, were connected to the ground rod. Stabilization is defined as that condition which does not exhibit changes in the v.s.w.r. at resonance nor in field-strength readings with variations in soil moisture content caused by artificial means or normal seasonal fluctuations. Seven 25-foot radials were eventually installed. However, improvement over the original three radials has not been discernible.

A 10- or 12-inch butcher knife easily slices into sod that has been heavily soaked by rain or, in emergency cases, with a garden hose. The radials can simply be unrolled into the cuts in the soil and imbedded. By running a forked rod along the wire, it is unrolled into the slot.

Now for the general outline of the antenna system:

Vertical antennas are available from various supply houses (such as WRL) for about \$15, and the addition of two 10-foot lengths of electricians' steel conduit results in a lightweight towering structure. The trick is to use the base insulator (and its associated mount) followed by a 10-foot length of 1-inch conduit which is followed by a similar length of 3/4-inch conduit and topped off with the upper 12 feet of the original aluminum antenna tubing. The left-over section can be saved for some other project. Various schemes such as hose clamps, saw slots, and sheetmetal screws can be employed for fastening the sections together.

The 80-meter antenna is mounted alongside the basic 40-meter tubing structure and consists of No. 14 copper house wire strung through insulated TV line standoff insulators designed to be fastened to pipes or rods.

Both antennas are parallel connected at the common feed point just above the base insulator. The 80-meter wire had best be cut 6 feet too long initially and the free end trimmed as required in

1 Usual precautions regarding harmonic radiation should be considered as with any antenna system capable of multiresonant operation.

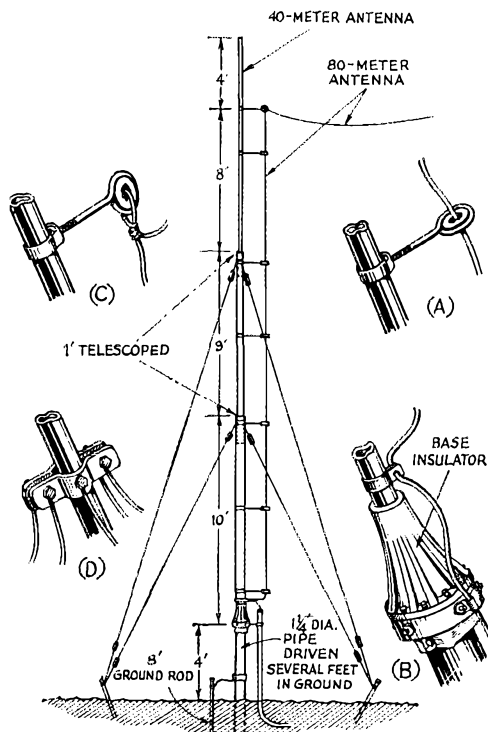


Fig. 2—Sketch of W9WQI's 80-40 vertical. The 4-foot elevation of the insulator above ground has no particular significance. Coaxial cable outer shield is connected to the metal base mounting ring. Guy wires must be insulated within a few inches of the antenna tubing. Wrap guy wires around the pole just above section joints.

- (A) Method of using standoff insulators.
- (B) Arrangement of antenna and feed-line connections.
- (C) Topmost standoff.
- (D) Method for attaching as many as five radials to a single ground clamp.

Note: Adjust length of aluminum top section of antenna prior to final fastening, to allow an overall length (measured from top of base insulator) of 31 feet 10 inches. Resonant frequency of the 80-meter antenna depends on the height of the free end of the flattop portion above ground.

order to establish resonance at about 3650 kc. (if you are a c.w. man). Interaction between the two antennas is slight.

The 80-meter arrangement requires that some sort of support — tree, building, existing mast or pole — be available as an anchor point for the free end of the flattop portion. The topmost portion of the tubing structure is not designed to carry a substantial side thrust, therefore the flattop should be allowed to sag considerably to minimize side loading.

It is the author's opinion that the rather spectacular results, as compared with the usual low-mounted horizontal antenna on 80 meters, can be accounted for by remembering that the angle of radiation becomes higher as a horizontal antenna is brought nearer the ground. The result is radiation lost to useful angles especially during daylight hours. This simple duo-band quarter-wavelength vertical with its somewhat reduced efficiency puts the energy into low-angle radiation day or night.

William G. Heilman, W9WQI, 826 Busch Road, Glen Ellyn, Illinois.



Hints and Kinks

For the Experimenter



U.H.F. TUNED LINES WITH PISTON TRIMMERS

THE 432-Mc. preamplifier by WHDQ in *QST* for February, 1966, pages 36 and 37, uses tuned lines with piston trimmers. The lines in this instance are 1/4-inch copper tubing, drilled out to fit over the ends of the trimmers. A simpler arrangement is possible if you have 1/4-inch thin-wall brass tubing, as this material slides over the end of the piston trimmer without drilling.

Some piston trimmers have the metal sleeve extending down close to the chassis, in which case the full range of capacitance variation brings the screw very close to the point where the trimmer will fall off. This condition can be corrected by filing or grinding away part of the metal sleeve at the mounting end. The minimum capacitance is thus lowered markedly, and the danger of the trimmer coming apart is reduced. This corrective step is most needed with the higher-capacitance trimmers, as the smaller values already have an appreciable length of ceramic below the metal sleeve. — *Frank Greene, K51QL*

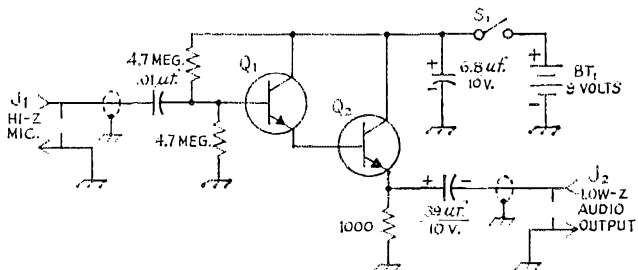
TRANSISTORIZED IMPEDANCE TRANSFORMER

THE circuit shown in Fig. 1 is a solid-state impedance-matching transformer which will allow a high-impedance microphone to be used with a transceiver having low-impedance audio input, such as the Sideband Engineers' SB-34. Basically the "transformer" is a Darlington configuration emitter-follower using high-gain transistors. Input impedance is greater than one megohm and the circuit has a voltage gain of one. The unit can be built in any shielded enclosure such as a small Minibox. Current drain is only 3 ma., making it practical to use a self-contained battery. The connectors shown in the diagram are for illustrative purposes only; in actuality, they should be chosen to match existing cable fittings.

— *McL Ladisky, WB6FDR/WA2ABD*

Fig. 1—Circuit diagram of microphone impedance step-down transformer. All resistors are 1/2 watt. The parts shown were used because they were on hand; component values in this circuit are not critical.

J₁, J₂—Phono jacks.
Q₁, Q₂—2N930 or 2N2484.
S₁—S.p.s.t. switch.



AUTO LICENSE PLATES

AMATEURS can preserve the appearance of their call-sign automobile license plates by spraying both sides with a coat of Krylon clear plastic. This is especially useful in those states where the original plate(s) must last several years, with only smaller numeral tags being issued yearly. In Florida only one plate is required, on the rear of the vehicle, and the color combinations of the plates are changed annually. However, the same colors are repeated every 3 or 4 years, so I save my old plates and utilize them on the front of the car when that particular matching color combination comes up again. This helps to identify you to other amateur mobiles you may meet on the road.

— *Ken Stewart, W4SMK*

QUICK CONNECTOR

A SIMPLE, low-resistance, high-strength temporary connection may be had by using a solderless connector or "wire nut", such as the Ideal No. 73B. These connectors are available from most hardware stores and are normally used to fasten wires together in appliances and lamp fixtures. Two or three wires, 14 through 22 gauge, may be connected together by simply holding the wire ends flush and parallel and twisting on the wire nut. The connection can be broken quickly if desired by untwisting the connector.

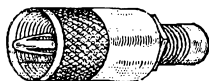
— *Terry Welch, K8ZBI/8*

EMERGENCY ALIGNMENT TOOL

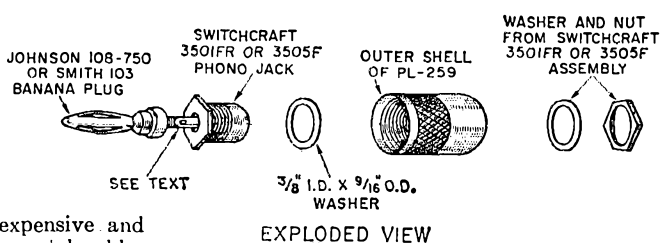
AN emergency tuning wand can be made from a small scrap of thin brass or aluminum and a short length of polystyrene rod. Heat the metal stock with a soldering gun or blowtorch and push it into one end of the plastic shaft with a pair of pliers.

— *Jeffrey L. Blake, K5U5S*

Fig. 2—W3LOE's u.h.f. series to phono jack adapter. Before attaching the plug to an SO-239 receptacle, loosen the nut which is part of the phono jack assembly so that the PL-259 outer shell will be free to turn. Once the adapter is installed, tighten the nut before removing the adapter.



COMPLETED ADAPTER PLUG



ADAPTER PLUG

PHONO plugs and jacks are inexpensive and convenient to use with small coaxial cables such as RG-58/U and RG-59/U in receiving and low-power transmitting applications. R.f. insulated versions of this hardware are available for use at high frequencies. As a result, most modern receivers are equipped with phono jacks as antenna input terminals. Unfortunately, no coaxial antenna relays we know of use phono jacks; most employ u.h.f. receptacles. The usual result is the rather ungainly combination of a phono plug at one end of the receiver cable and a u.h.f. plug with a reducing adapter (UG-175/U or UG-176/U) at the other end. In addition the quick-disconnect feature of the phono-type hardware is lost.

A useful adapter for converting a u.h.f. series receptacle (SO-239 or equivalent) to a phono jack can be made from a Switchcraft type 3501FR or 3505F (r.f. insulated) phono jack, a banana plug (Johnson type 108-750 or Smith type 103), a $\frac{3}{8}$ -inch i.d. \times $\frac{9}{16}$ -inch o.d. washer and the outer shell of a PL-259 plug as shown in Fig. 2. Anyone who has done much experimenting with antennas and high power will have one or two defunct PL-259 plugs around — there is a limit to how high a s.w.r. they will stand without arcing!

The stud of the banana plug is cut so that it can be inserted far enough into the rear end of the phono jack for the shoulder of the plug just to touch the end of the terminal lug, yet leaving enough room inside the jack for a phono plug to be inserted from the front without interference. The stud and lug should be wrapped with several turns of tinned hookup wire for reinforcement and then soldered together. Bolting the combination banana plug and phono jack to the outer shell of the PL-259 completes the assembly. — R. C. Cheek, W3LOE

USING AN OVERLOAD RELAY WITH AN ELECTRONICALLY REGULATED SUPPLY

I WANTED to protect my final by using a screen-grid overload relay in series with a regulated screen supply (1965 Handbook, page 333, Fig.

Fig. 3—Diagram showing modifications to Handbook screen supply. K_1 is screen-grid overload relay. C_5 is removed from original circuit and C_2 is increased in value

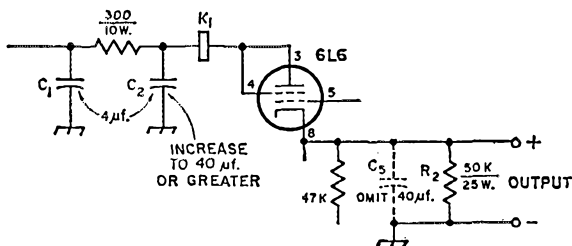
12-24). However, inserting the relay destroyed the regulation by introducing resistance into the screen circuit. After considerable cut and try, I found that the overload relay could be placed between the output of the filter and Pins 3 and 4 of the 6L6 as shown in Fig. 3. When using the relay in this position, C_5 must be omitted or the relay will kick out every time C_5 charges. Also, the capacitance of C_2 should be made as large as practical. These modifications result in excellent regulation plus overload protection. — Loren G. Windom, W8GZ

USING OLD COAX

COAXIAL cables that are old and exhibit high r.f. losses can be put to good use in the ham shack. By slitting the vinyl outer covering lengthwise with a razor blade, the covering can be removed without damaging the remainder of the cable. The copper braid is easily separated from the rest of the coax and makes excellent grounding strap. The inner conductor and polyethylene insulation of RG-8/U and RG-11/U make high-tension cables which will handle several thousand volts. RG-58/U and RG-59/U have insulated conductors that are also usable as high-voltage cables. — Dan Tomcik, K8ZQE

RUBBER FEET

RUBBER feet can be made by cutting out the rubber buttons from women's discarded garters and cementing the buttons to small cabinets and other pieces of equipment where needed. — Ray Maccio, W1SBI



STATION DESIGN FOR DX

Part III — (a) Station Configuration and (b) Receiver Topics

BY PAUL D. ROCKWELL,* W3AFM

THE equipment and layout at an amateur station are important factors in its overall performance. Hundreds of different configurations are giving good results. Table II summarizes the set-ups of a sampling of DX stations with outstanding contest achievements, based on returns from a questionnaire earlier this year.

Several items are worthy of note. Median antenna height is 74 feet and median boom length is 36 feet. Of the antennas, 96% are Yagis; 4% are quads. There is a preponderance of Eimac tubes and a preference for 4-1000s in the finals. The tabulation gives a good approximation of what sort of equipment complement it takes to be top dog in W/K-land.

Not shown, but evident on the questionnaire responses, is that less than 10% of the DXCC stations have electronic break-in at present. Only 20% use preamplifiers, and all of these 20% have antennas below the median height.

The configuration at W3AFM, plus a few planned improvements not yet in place, is shown

* 5800 Hillburne Way, Chevy Chase, Md., 20015.

in Fig. 8. Note particularly (a) the use of a second receiver for spotting, and (b) the T/R bypass. The set-up for multiple-band or multiple-operator application needs more than shown here, if it is to do the best possible job. Most of the big, contest-successful stations use separate finals and separate antennas for each band. If they use multiple operators, they provide two or more operating positions. In areas where DX-tip nets exist, such as the LIDXA 2-meter link, an appropriate standby receiver is a must.

Receiver Preamplification, Preselectivity and Matching

There is a line of reasoning which says that on DX bands, like 20 meters, any good modern receiver has sufficient noise figure to operate effectively without pregain. With respect to sideband operation, this may be true. However, it has repeatedly been observed not to be true, even with receivers of very good repute, on c.w. Apparently the use of sharp-selectivity i.f. filters, accompanied by the use of a nearby notching filter for further narrowing of receiver noise band-

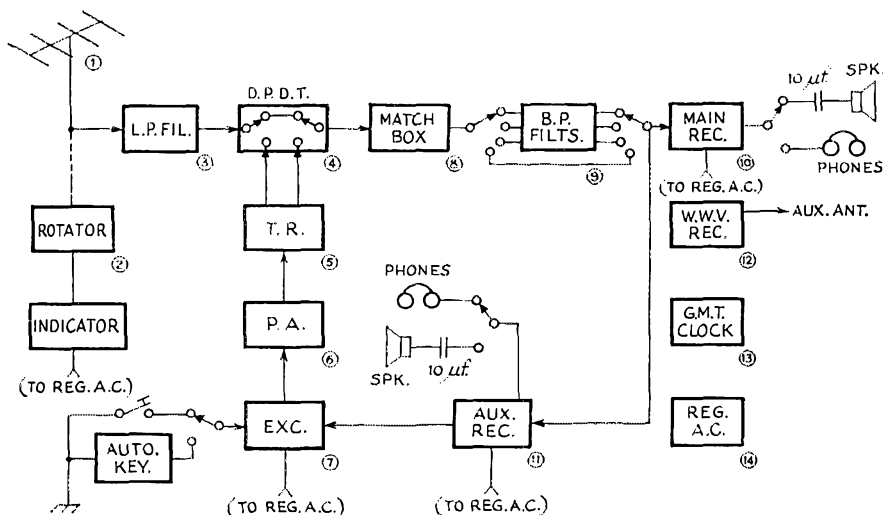


Fig. 8—1. Ant., Yagi. As long a boom and as high as possible (W3AFM: 203C up 45 feet); 2. Rotator: heavy duty, with brake; 3. Low-pass filter, kw. rating; 4. D.p.d.t. coaxial transfer switch, 110 v.a.c. (DK-2-60B); Coil paralleled with tx h.v. "on" control line; 5. Transmit/receive electronic switch (B & W 381); 6. Power amplifier, 1-kw. input, biased to cutoff. (Pair of 250THs); 7. Exciter, with provision for transceiver operation with item 11 v.f.o. homemade; 8. Match-box: Johnson 250-30-3; and preamplifier; 9. Bandpass filters, set of 3 covering 14,000-14,105 kc. not installed. Would make preamplifier necessary; 10. Main receiver. Calibration accuracy, ± 0.5 kc. 14,000-04,100. Selectivity: 2 & 0.5 kc. (75A-4). 11. Auxiliary receiver tuned to the station in QSO with DX, for spotting. (75S-3B); 12. WWV receiver. On 5, 10 or 15 Mc. Most anything. W3AFM uses a BC-453 with homemade xtl converter; 13. Digital 24-hour GMT clock. (Tymeter Numechron); 14. A.c. line-voltage regulator.

TABLE II

Equipment Complements of High DXCC Stations (20 meter ants only)

DXCC	Ant. Ht. (ft.)	Foregnal. (ft.)	Boom (ft.)	P.A. Tubes	Exciter	Receiver	Dual Rec.	
W1JYH	341	60	—	17	4x811	32S1/310B	75S-1	—
W1BIH	340	50	level	20	2x813	BW LPA	NC-303	—
W1FH	342	80	—	18	2x4-400	32S1	75A4	75A2
W1GKK	342	65	—	24	2x813	Ranger	NC-303	—
W2BOK	331	40	level	40	5x572B	32S1	75S1	—
W2FZY	325	50	—	26	2x4-400	100V	2B	2B
W2JT	336	70	-50	36	4-1000	—	75A4	—
W2PCJ	329	78	level	20	2x4-400	SSB-100F	75A2A	No
W2SAW	330	65	—	16	4-1000	GSB-100	75A4	—
W3AFM	310	45	+30	24	2x250TH	Homemade	75A4	75S3B
W3ECR	—	80	-70	8	2x4-400	RV-3	R-4	RV-3
W3GAU	340	80	—	24	4x811	32S1	75A4	—
W3GHD	342	52	—	36	2x4-125	(GSB-100)	75S3	2B
W3KT	344	62	—	24	2x4-400	—	75A4	Yes
K3OKX	—	65	-300	36	4-1000	Homemade	75A4	75A4
K3UPG	338	70	—	36	2x5-500	32S3	75A4	—
W3WGH	329	54	-1100	18	4-1000	DX-100	75A4	—
W4DQH	339	100	level	54	4-1000	TR-4	TR-4	75A2
W4QCW	333	60	level	55	2x4-400	T-4X	R-4	75A2
W5KC	338	54	—	20	2x6580	T-4	R-4	—
W5UX	330	80	—	22	4CX250B	KWS-1	75A4	—
W5VA	280	100	-30	46	4CX1000	2x32S3s	75S3B	75S3B
W6CUQ	340	65	level	24	4-1000	GSB-100	75A4	—
K6EVR	332	76	level	46	4-1000	32S3	75S3	—
W6YY	338	80	level	48	4CX1000	32S3s	Racal-17	Dual LO
W8BRA	"All"	65	-20	20	2x304TL	100V	75S3	HRO
W8EWS	342	65	+30	36	4CX1000	32S3	75S3	51S-1
W8JIN	340	65	level	17	2x813	310H/GSB-100	75A4	—
W8MPW	332	60	—	26	2x3-400Z	32S3	75S3B	75A4
W8PQQ	336	60	-360	36	4-1000	HT-32	75A4	SP600
W0AIW	339	80	-200	30	4CX1000	310B	75A4	75S3
W0DU	339	55	-50	18	4-1000	32S3	75S3	—

width and reduction of interference, results in an insertion loss which is more than the receiver can handle. Also, the 20-meter background noise is a random quantity. For some percentage of time, however small, a noise figure as low as 2 db. may permit reception of signals not readable through an n.f. of 10 db. A 10-db. n.f. is typical for many receivers. In any event, a pregain of 20 db., with n.f. of 2 db. has proven advantageous on numerous occasions. Convenient means should be provided for switching the preamplification out during periods when its use aggravates cross-modulation problems to an extent offsetting its advantages.

Particularly in urban areas the subject of preselectivity is often undertreated in station design. In the first place, the use of a low-pass filter between receiver input and antenna may result in a very useful suppression of monkey-chatter due to near-by television stations, or TV receiver local oscillator radiations. Such inter-modulation products were sufficient seriously to degrade W3AFM's DX capability. The customary transmitter low-pass filter may of course serve both receive and transmit purposes.

Insertion loss of a good low-pass filter is only a fraction of a db. at 20 meters. However, a KW Match-box can serve this and other functions, as described below.

Crystal filters at 14 Mc. can pass 30-ke. bandwidths with attenuations less than 6 db., and reject bandwidths exceeding 80 ke. by more than 80 db. Figure 9 shows results measured by C-F networks.¹⁸ Manufacturers of such filters have not catered directly to the amateur market because of high engineering costs.

Helical resonators¹⁹ invite application. Operating Q s of the order of 1000 can be obtained in moderate volumes. That is, in about four cubic feet, using this design technique, it is possible to construct a tunable preselector having, say 14-ke. nose bandwidth at 14 Mc.

Urban operating conditions, made less than pleasurable by receiver overload from nearby signals, can be greatly improved by attention to preselectivity. Even clean signals, in a radius

¹⁸ Meyer, "Front-End Crystal Filters for Amateur Radio Use, *Interadio* (annual publication of the International Amateur Radio Club, Geneva) 1965, p. 60.

¹⁹ McAlpine and Schildknecht, *Electronics*, Aug. 12, 1960, p. 110.

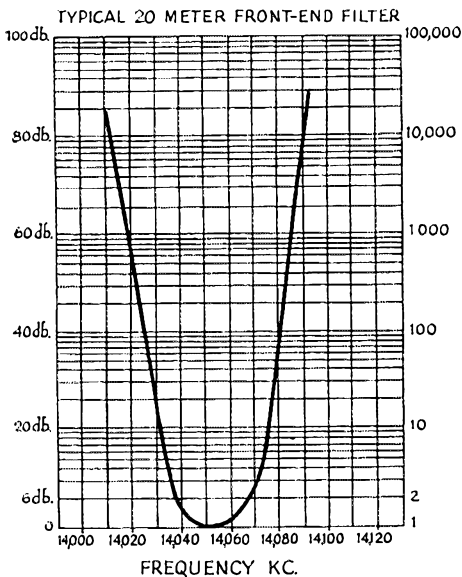


Fig. 9—The results measured by crystal front-end filter networks.

of a couple of miles, and offset more than 50 kc. in frequency, can hurt DX reception. Modern techniques can reduce the trouble-radius from a couple of miles to a couple of city blocks.

Receiver matching to the antenna has been known to yield as much as 6-db. improvement in signal-to-noise ratio. Even if the antenna is matched 1:1 at the feeder connection, there can be (and often is) a serious mismatch to down-coming energy at the receiver input-terminals. Energy reflected from this point to a matched antenna never comes back—it is re-radiated. This may account, in certain situations, for a part of the effectiveness of low-noise-figure pregain.²⁰ Some amateurs prefer to use a low-loss matching network at the receiver terminals, omitting preamplification.²¹ This is effective if (a) the receiver happens to need it, and (b) the matching network is extremely low-loss. An enclosure no smaller than one cubic foot, and large, high Q coils should be used. Construction as for transmitting use²² may do.

²⁰ For very-low-noise receivers, the input is customarily mismatched to optimize noise figure. See *Vacuum Tube Amplifiers*, Valley and Wallman, McGraw-Hill, 1948, or "Low-Noise Amplifier," Wallman *et al.*, *IRE*, 1948, p. 700. The arguments for control of input coupling are still valid.

²¹ From W6AM: "The hams hereabouts find a Johnson KW Matchbox placed conveniently next to the receiver for receiving-only improves s/n. The 275-watt Matchbox doesn't work as well. Four attempts at making smaller receiver-type Matchboxes failed to equal the Johnson. Apparently the large shielded box and large silver-plated coil do the job better than anything smaller. The receiver tap is moved from the 300-ohm position to the transmit 72-ohm position. This KW Matchbox has proved far more satisfactory than preamplifiers for a number of local DX hams."

²² McCoy, "A Completely Flexible Transmatch for One Watt to 1000," *QST*, June 1964, p. 39; and "A Versatile Transmatch," *QST*, July 1965, p. 58.

A.f. Selectivity

In c.w. work there is no need to pass audio frequencies outside the band 300-800 c.p.s. As sharp a roll-off as practical is recommended. A simple expedient is to put an oil capacitor in series with the loudspeaker voice-coil. The loudspeaker at W3AFM seems to resonate around 800 c.p.s. with 10 mf. in series. For earphones, a pair of old ones with natural resonance (Weco CW 49003) are employed.²³ Five-inch trumpets aren't bad.

I.f. Selectivity

For routine c.w. operation, a 500-c.p.s. mechanical filter is ideal. For special situations, 2-kc. and 200-c.p.s. filters should be available. The 2-kc. filter is used for wobbly signals, and sometimes for net standby. The 200-c.p.s. crystal-lattice filter is for QRM situations and "digging in." The 200- and 500-c.p.s. filters are used, in the end, about half the time each. Use of the 2-kc. filter is almost negligible, and it could be done without.

On both the 75A4 and 75S3B receivers, it has been observed that readability of threshold c.w. signals is improved by use of the "Rejection Tuning" notch filter, accompanied, of course, by careful optimization of b.f.o. frequency. Careful adjustments of these two controls can bring in a signal otherwise unreadable. The notch-filter, in this sense, is not being used in its intended purpose of rejecting an interfering carrier. Rather, it shades the channel noise-response and improves both s/n ratio and signal readability. This is true both on 200- and 500-c.p.s. filters.

Filters of 100-c.p.s. bandwidth, 455-kc. center-frequency, are now available. The 8-crystal, $\frac{1}{2}$ -db, Tschebycheff (i.e., $\frac{1}{2}$ -db ripple) response filter has attractive characteristics but seems impractical at present because (a) it is not in production; so costs are high (b) few, if any, receivers have sufficient interstage shielding to take advantage of the skirt-selectivity of such filters, and (c) questions of nose shape and ultimately-useful narrowness are not yet clearly established. It is feasible to make 455-kc. crystal-lattice filters with 10-c.p.s. bandwidth and steep skirt-selectivity, for example—but the practical usefulness is very doubtful. Keying pulses are rounded, making them difficult to copy at bandwidths approaching F, where F is equivalent frequency of the shortest keying pulse. For manual telegraphy, F (c.p.s.) = $w.p.m.$ is a useful approximation. From this, 20 c.p.s. would be near the ultimate. Drift of distant-end and local oscillators, ease of tuning, and psycho-otological factors indicate this is too narrow for practical application.

W4KFC finds, with a 75A2 receiver, he gets best results with tandem use of a 500-cycle mechanical filter and a single-crystal filter-stage (No. 1 position on the 75A2).

For c.w. operation only, a recommended com-

²³ See also W6EUM, 73, July 1962, p. 58.

bination is to build in a 500-cycle filter i.f. stage, then precede this with a stage having options for narrower selectivities. For example, insert a 500-c.p.s. mechanical filter between 1st and 2nd i.f. stages and a 200-c.p.s. filter between the mixer and 1st i.f. stage. Thus the limitations of interstage shielding are improved from, say, 50 db. to 100 db. with respect to skirt rejection.

Receiver Dynamic Range

The exploitation of i.f. and a.f. selectivity advantages (as opposed to pre-receiver r.f. selectivity) is seriously inhibited by dynamic-range limitations in all present-day receiver designs. There is no use building in 100-db. rejection to outband signals, if, as is often the case, a few of them can get together and drop cross-products only 40 db. down squarely in the passband. Present-day station-design provisions are (a) pre-selectivity (b) pre-gain gain-control, usually by simply switching the preamplifier in/out, and (c) use of 7360 or equivalent mixers. Naturally, one uses as little r.f. gain as possible during interference conditions, and the receiver must have a separate r.f. gain control for this adjustment.

The 75A4 Receiver

Some DXers of proven good judgment hold that the 75A4, suitably modified, is the best receiver ever made. The simplest modifications are:

- (1) Remove i.f. shunt resistors R46 and R29
- (2) Remove a.f. feedback resistors R71 and R109. Substitute 820K for R109.

More complicated steps are:

- (3) Install 7360 mixers per *QST*, July, 1964, p. 18.
- (4) Install 6GM6 or 6EH7 stage with appropriate cathode and a.g.c. arrangements.

Reported results are: 12-db. improvement in sensitivity, better dynamic range (less nearby-signal overload problem), and less hum.

Some experienced 75A4 modifiers (W2JT, K3OKX and W2VCZ) prefer a 12AT7 first mixer (presumably per *73 Magazine*, Oct. 1961, p. 32) and 6EA8 second mixer (presumably per *CQ*, June, 1960, p. 81, which is for the earlier 6USA). The 7360 modification is complicated.

Serial numbers of 4200 and over are prized by 75A4 connoisseurs. These are the latest production version, and include the very-worthwhile vernier tuning knob. They may be recognized instantly by the lettering, upper right-hand corner of the front panel, NOISE LIMITER and AM CW-SSB all being on the same horizontal line.

A difficulty that occasionally occurs with aging 75A4s is p.t.o. instability. It is characterized by a lurch of one to five kc. This is especially noticeable because, when good, the receivers are paragons of frequency stability. Some steps to correct PTOs:

- (1) New 6BA6s, V-14 & V-15; 0A2, V-18; and 5Y3, V-17.
- (2) Replace C205, 51 pf. This can be done without removing p.t.o.
- (3) Loosen p.t.o. mounting screws. Manually wiggle to relieve stresses. Retighten softly.
- (4) Lubricate p.t.o. front bearing.
- (5) Wring out 8 holes, 1 inch diameter, on the bottom cover plate under p.t.o. to ventilate. Replace 5Y3 with silicon plug-in.
- (6) Replace the padder, and (especially) the temperature compensators.

If it reaches the point of Step (6), it's worth their fee (currently \$46.00) to send the 70E24 back to Collins Cedar Rapids for turn-around. They have a temperature-cycling and calibration jig. QST

(Part IV of this series will appear in an early issue.)

Strays

WWV TO QSL "FIRST-DAY" RECEPTION

Want a gold-bordered QSL card showing the new WWV at Fort Collins, Colorado? Then be on deck when the changeover from the old station to the new takes place at 0000 GMT on December 1, 1966. Send your own QSL card to David H. Andrews, Chief, Frequency-Time Broadcast Services Section, Radio Standards Physics Division, National Bureau of Standards, Boulder, Colorado 80302, reporting the time of reception and quoting the new WWV voice announcement. To qualify for the WWV "First Day" card you must quote the announcement correctly and your card must be postmarked before midnight December 2, 1966, local time. WWV's QSL will have stamped on it the date and time of your reception of the signals. The three amateurs showing earliest reception time

will receive, in addition, a framed 11 by 14-inch color photograph of the scene appearing on the QSL card.

Feedback

In the article, "The Simple Super-9," by W4GEB on page 22 of August 1966 *QST*, 13th line from the bottom of the first column, the term R_1 should read L_1 .

— . . . —

Hotshot c.w. operators won't need to be told that we goofed in our space lengths in the tabulation on page 12 of the October issue. According to page 17 of *Learning the Radiotelegraph Code*, the additional space between letters is *two* code elements and the additional space between words is *six* code elements.

Amateur Radio from An Air Cushion Vehicle

"Talking on Air"

BY A. G. (SLIM) RUSSELL,* W2AIX

A FIRST in amateur radio circles was accomplished in June 1966 at the Buffalo Harbor on Lake Erie, N. Y. when contacts were made from an SK-5 "Jet Skimmer" operated by Textron's Bell Aerosystems Company.

For the uninitiated, the "Jet Skimmer" is a relatively new craft, about 40 feet long and 22 feet wide, powered by a GE LM-100 marine gas-turbine engine turning a variable-pitch propeller and a seven-foot lift fan. The craft rides $4\frac{1}{2}$ feet above the surface of the earth, water or snow on a 40-pound per-square-foot cushion of air, at speeds up to 65 knots.

The "Jet Skimmer" normally carries 25 passengers and one operator and is currently engaged in scheduled commercial operations carrying passengers between the Oakland and San Francisco Airports

* Bell Aerosystems Co., P.O. Box 1, Buffalo, N. Y.



Slim Russell, W2AIX, operating aboard the Jet Skimmer.



The air cushion vehicle rides about $4\frac{1}{2}$ feet above the surface of the earth. W2AIX is perplexed as to how to sign . . . mobile, marine mobile, or aeronautical mobile.

and downtown San Francisco. Three other Bell SK-5s are being operated by the U. S. Navy in South Viet Nam.

For the purpose of conducting the first air-cushion vehicle amateur operations, Capt. A. G. (Slim) Russell, USN (Ret.), W2AIX, Bell Aerosystems' Chief Engineer for Flight Test and Operations, borrowed an SB-34 transceiver and a Waters mobile whip antenna from Bob Johnson, W2WVC. Bob and Slim installed the SB-34 in a "Jet Skimmer" and a contact was quickly established on 20-meter s.s.b. with an old timer in the amateur ranks, Stu Farmer, W2NW. Other contacts followed in this unique "first."

W2WVC/M, Bob Johnson, Buffalo
WA2TXN/M, Ross, Island Park, L. I.
W2WCH, Hank, Cheektowaga, N. Y.
WA2KPL/M, Otto, East Bronx, N. Y.
W5MYA/M, Mike, Kingsville, Tex.
K1NQH/MM, Dan, U.S.S. Purdy off Newport
W9KYE, Ben, Milwaukee, Wisconsin
K1RVU, Max, S.E. Conn.
W2ELL, and VE3BFG, Larry, Buffalo
WB2DJD, Nino, N. Jersey

When it was decided to go air cushion vehicle (ACV) mobile, a quick call was made to the local FCC Field Engineer, John Reiser, W2BLR, requesting information as to the type of mobile designation which should be used in this case. (It took ten minutes of John's valuable time to describe the "Jet Skimmer" and his first comment was "Well, I never —.") The solution to the problem of proper mobile designation will probably take further analysis at the Washington level, but for the immediate purpose Mr. Reiser decided that "Mobile" should be used over roads, "Marine Mobile" over water and "Aeronautical Mobile" over airports! Perhaps future calls will end with "Air Cushion Mobile."

We hope that many more opportunities will be available for "Jet Skimmer" contacts in the near future. Unique QSL cards with a photograph of the "Jet Skimmer" will be sent to all contacts. QST

The Amateur Balance

BY WILLIAM S. GRENFELL,* W4GF

AMATEUR radio operators and stations have been legally recognized and licensed as such for almost 54 years now. During that time the art of radiocommunications has developed from a scratchy exchange of radiotelegraph messages over a few miles to the transmission of pictures to earth from millions of miles in outer space.

What has become of the radio amateur during this period?

Equipment-wise, he has progressed from a simple detector and spark transmitter to double super-heterodyne receivers and fancy multistage multi-purpose transmitters. From simple telegraphy, his technique now includes teleprinter, single sideband telephony, picture and television image transmission. In the beginning equipment was almost entirely homemade because there wasn't anything ready-made available. Now almost anything can be put together from a great variety of available parts or may be bought ready to operate, depending upon the amateur's inclination and pocketbook.

In numbers, the amateur has grown from some 1300 licensed stations and 1400 operators in mid-1913 to more than 257,000 operators and 270,000 stations licensed today. Six different classes of operators and four types of stations are authorized. Over 65 different call sign prefixes are assigned to United States amateur stations.

In the beginning the amateur did well just to establish communication with another nearby amateur; to be able to relay a message between cities was a major accomplishment. Now, in addition to building and experimenting with many techniques and types of equipment, an almost unlimited variety of operational activity is available such as chasing DX, ragchewing, traffic handling, civil defense and other emergency planning and communications, satellite construction and communication, and so forth — just to name a few.

So what am I leading up to? It is this: *I believe the radio amateur never had it so good as he has it today.* Right away in your mind you begin to ask questions like: What about all the crowding in the phone bands and how about those lids who start testing or calling right on top of a QSO or some rare DX?

All right, let's take a look at some possible so-called solutions to the crowding problem. For the sake of discussion let's agree that the crowding is on the high-frequency bands during the evenings and the weekends and that it is at its worst in the phone sub-bands. One approach would be to thin the ranks on the high frequencies by disqualifying a big batch of licensees or by taking away their privilege to operate below 50 megacycles. I can just imagine the indignant letters the have-nots would send to their congressman about having their "right" to full amateur privileges taken away from them.

By the way, if you believe that fiction that you have a right to use the radio spectrum, just read the conditions printed on the back side of your amateur license. If you still have some doubts, take a look at Section 301 of the Communications Act of 1934

*Chief, Rules and Legal Branch, Amateur & Citizens Radio Division, FCC.

which is the congressional authority under which the FCC operates. It says in part that ". . . no such license shall be construed to create any right, beyond the terms, conditions, and periods of the license." In other words, even though you have qualified for an amateur license, possession of that license does not give you any right to operate as you please during the license period, nor do you have an inalienable right to renew that license at the end of the license period.

To get back to the crowding problem, suppose you could somehow over-night cut the number of amateurs in half. Would the interference in the 80-meter band be only half as bad on Friday or Saturday nights? Of course not! Likewise, if the size of the phone band was doubled would the phone band interference be only half as bad? Again, of course not! There would probably just be twice as many phone stations on the band during the busy hours.

If you assume each c.w. QSO requires 200 cycles bandwidth and each phone QSO requires 2,000 cycles bandwidth, doubling the size of the 80-meter phone band would increase the number of possible phone QSOs from 100 to 200 and reduce the number of possible c.w. QSOs from 1500 to 500. Thus, doubling the size of the phone band would reduce the total number of QSOs the band would support from 1600 to 700. I am sure you all will understand that the foregoing are artificial assumptions for the purpose of illustrating a point and do not necessarily represent my view of the conditions or possibilities in the 80-meter band. Of course, my point is that increasing the size of the phone sub-bands won't make any noticeable reduction in phone band interference and such a procedure has the fault of reducing the total number of amateurs which can use the band at any given time.

You will note I used a phone bandwidth figure of 2000 cycles which, though it may be optimistically narrow, indicates single sideband emission. Single sideband is the best way in sight for increasing the usefulness of the phone bands. It won't come tomorrow, probably not next year, but surely some time in the foreseeable future we will have to come to the exclusive use of single sideband in the high-frequency phone sub-bands. When that day comes, we will have to face a problem. We will have to come up with some simple way for the average amateur to measure his carrier and unwanted sideband suppression. Why measure it, you ask? As soon as there is an exclusive allocation for single sideband, enforcement becomes a problem and then some yardstick by which both the amateurs and the Commission's monitoring staff can measure what

The Roanoke Division Convention at Natural Bridge, Va., provided another opportunity for an FCC message appraising the amateur radio service. W4GF's address to the assembly is straight from the shoulder.

is considered to be adequate carrier and sideband suppression will be necessary.

The way I see it, there is no magic answer to the crowded-band interference problem. Improvements in equipment and operation will help some. But the amateur who expects to be able to operate on the band and the frequency and at the time of his choice without suffering any interference at all is just out of touch with reality.

This may lead you to the question of the total number of licensed amateurs — is it growing fast enough or is it growing too fast? In cold numbers, the amateurs have grown rather steadily over the years without any spectacular speed-ups or slow-downs, with exception of the discontinuities caused by the two World Wars.

The numbers do indicate what *appears* to be a slackening in the growth of the total licensee figure during the past year or so. I am not certain, but I do believe that this is due to the fact that for the past two years we have been using electronic processing of amateur license applications and that the machine totals are much more accurate than the former totals which depended upon estimates of the number of licensees which expired without renewal.

The real concern should be with the question of the value of the licensees we now have and whether the goal of the future should be quantity or quality.

What do we have now? We have 4541 Extra Class licensees, 3973 of them got their licenses by examination, 899 in the past 11 months. There are 38,684 Advanced Class licensees. Not one of them has passed an examination since 1952. The special examination they took more than 13 years ago has long since been incorporated in the General Class examination. A year ago the number of Advanced Class licensees had dropped about 7% in the 13-year period since the last new license was issued in 1952. In the past 11 months the drop has been 3% — why I don't know.

The General Class licensee total is 105,173. I estimate that 54,000 or 51% of them took the examination and got their licenses since 1952. The Conditional Class numbers 39,648. The growth of this class has stopped since the rules were amended a year ago to require residence at least 175 miles from an examining point to be eligible. In fact, the number of licenses has dropped 1792 in the past 11 months.

Let me summarize the preceding statistics and try to make a point you might otherwise miss. Of the total of 148,398 Extra, Advanced and General Class licensees — those which some time during their amateur career have taken an examination supervised by government examiners — only 57,917 have taken an examination since December 31, 1952. Over 90,000 haven't taken an examination in the past 13 years. Their technical qualifications and knowledge of the regulations are an unknown factor.

How many of them have a working station and use it? If they do have a station in operation, how many of them know how their receivers and transmitters work or can fix their gear if something goes wrong? Or, do they just plug it in and push the buttons and send it back to the factory when it quits?

I hear a lot these days about the old timers, particularly the Advanced Class, being the backbone and the guiding light of the radio amateurs. Does age guarantee quality? Not by a jug-full! The quality of wine depends upon the season in which the grapes grew — not on how long ago they were grown. Likewise, the wisdom of the amateur de-

pends upon his thirst for knowledge and his ability to learn from experience rather than just how long ago it was that he got his first license. And speaking of grapes, I am sorry to say some of the sourest grapes in the amateur vineyard are old timers — a couple of them that come to my mind have two-letter calls!

In studying Docket 15928, I was disappointed that a sizable minority of the total number of individual comments filed objected to having to make any further effort to maintain full operating privileges. I got the impression that once they managed to pass an examination they wanted to forget anything they learned and have the privilege of operating an amateur station for the rest of their lives in ignorant bliss. When I think of this group among the amateurs — a minority yes, but apparently a sizable number — I wonder if we shouldn't propose a new class for this bunch: the "Mediocre Class."

Do you get the impression from the foregoing that may be the Commission has a poor opinion of the radio amateurs? Far from it! Let me assure you there are many plus factors in the amateurs favor of which the Commission is aware. There are many licensees who are ever improving their knowledge of radio-electronics and are performing many creditable communications services in the public interest.

I think the amateur service is now at a balance or "dead-center" condition. I think the petition requesting a form of incentive licensing is a tip of the scales in the right direction. I cannot at this time predict the nature of the rules which will result from the incentive licensing Docket 15928.

While the Commission is charged with "Encouragement and improvement of the Amateur Radio Service through rules which provide for advancing skills in both the communication and technical phases of the art," regulatory encouragement is only a part of the package. Furthermore, no matter how unquestionably desirable or necessary may be the need for attention and action on the part of the Commission, its discharge of its responsibilities is often hampered by an inadequate budget.

So, my message to you tonight is: Don't just depend upon the government to do it by regulation, but tip the balance of the scales to the plus side of center for the Amateur Radio Service and keep it there!

QST—

Fifty Years of ARRL

A bound 152-page reprint of the gold-edged historical articles which appeared in the 1964 issues of QST is available from the ARRL for one dollar postpaid. Titled *Fifty Years of ARRL*, the book covers the highlights of ARRL and amateur radio history during the fifty years from 1914 to 1964, and will make a companion piece to the classic *200 Meters and Down*, a reprint of which is also available from the ARRL for one dollar.

Some QST Abbreviations used in Text and Drawings

- A., a., amp. — amperes
a.c. — alternating current
a.f. — audio frequency
a.g.c. — automatic gain control
a.m. — amplitude modulation
amp. — amplifier
ant. — antenna
AREC — Amateur Radio Emergency Corps
ARPSC — Amateur Radio Public Service Corps
aux. — auxiliary
a.v.c. — automatic volume control
bal. — balanced
BC — broadcast
BCI — broadcast interference
B.L. — broadcast listener
b.f.o. — beat-frequency oscillator
BPL — Brass Pounders League
cath. — cathode
c.d. — civil defense
c.d. — Civil Defense (agency)
CD — Communication Dept. (ARRL)
c.f.m. — cubic feet per minute
ckt. — circuit
coax — coaxial cable or connector
conv. — converter
CP — code proficiency
c.p.s. — cycles per second
c.t. — center tap
c.w. — continuous wave (radiotelegraphy)
cy. — cycles
db. — decibel(s)
db.m. — db. above 1 milliwatt
d.c. — direct current
d.p.d.t. — double-pole, double-throw
d.p.s.t. — double-pole, single-throw
d.s.b. — double sideband
DX — distance
DXCC — DX Century Club
EC — Emergency Coordinator
el. — element
e.m.f. — electromotive force
enam. — enameled
fax — facsimile
FCC — Federal Communications Commission
FD — Field Day
fil. — filament
f.m. — frequency modulation
freq. — frequency
Gc. — gigacycle
gnd. — ground
h., hy. — henry(s)
h.f. — high frequency
htr. — heater
h.v. — high voltage
i.f. — intermediate frequency
K — thousand
kc. — kilocycles
kw. — kilowatt(s)
l.f. — low frequency
l.u.f. — lowest usable frequency
l.v. — low voltage
m. — meters
ma. — milliamperes
max. — maximum
Mc. — megacycles
m.f. — medium frequency
mh. — millihenrys
mic., mike — microphone
mix. — mixer
m.u.f. — maximum usable frequency
mv. — millivolts
n.f.m. — narrow-band frequency modulation
NTS — National Traffic System
o.d. — outside diameter
OES — Official Experimental Station
OO — Official Observer
OPS — Official Phone Station
ORS — Official Relay Station
osc. — oscillator
OVS — Official V.H.F. Station
PAM — Phone Activities Manager
p.e.p. — peak envelope power
pf. — picofarads (micromicrofarads)
p.p. — push-pull
pri. — primary
pwr. — power
RACES — Radio Amateur Civil Emergency Service
revr., rec. — receiver
rect. — rectifier
reg. — regulated, regulation
r.f. — radio frequency
r.f.c. — radio-frequency choke
RM — Route Manager
RO — Radio Officer (civil defense)
RST — Readability-Strength-Tone
RTTY — radioteletype
s.a.s.e. — self-addressed stamped envelope
SCM — Section Communications Manager
SEC — Section Emergency Coordinator
sec. — secondary
sig. — signal
s.p.d.t. — single-pole, double-throw
s.p.s.t. — single-pole, single-throw
SS — Sweepstakes
s.s.b. — single sideband
s.w.l. — short-wave listener
s.w.r. — standing-wave ratio
t. — turns
temp. — temperature
t.p.i. — turns per inch
t.r. — transmit-receive
t.r.f. — tuned radio frequency
TV — television
TVI — television interference
u.h.f. — ultra-high frequency
v.f.o. — variable-frequency oscillator
v.h.f. — very-high frequency
v.o.m. — volt-ohm-milliammeter
VOX — voice-operated break-in
v.t.v.m. — vacuum tube voltmeter
VXO — variable crystal oscillator
WAC — Worked All Continents
WAS — Worked All States
w.p.m. — words per minute
xtal. — crystal
 μ f., μ h. — microfarads, microhenrys

97.73—or Bust!

In Two Parts—Part II*

BY DAVID A. LIEN,** WA6YMY, ex-W4PAI, W0ZSR

60-Cycle Hum

SIXTY-cycle hum normally enters the “pipeline” in one of three places. It can sneak into a low-level audio grid circuit via a broken microphone-cable shield. The shield usually loses continuity either at the connector or at the mike end of the cable. A second source is heater-cathode leakage in any of the transmitter’s tubes, especially those tubes in the low-level stages of the r.f. and a.f. chains. The guilty tube will usually show a low resistance between these elements on a tube tester. If the resistance is too high to make a showing, but low enough to introduce hum, judicious tube pulling and perhaps substitution will corner the bad one. A “sleeper” here is the loss of ground on one side of the parallel filament string. It is far out, but has happened.

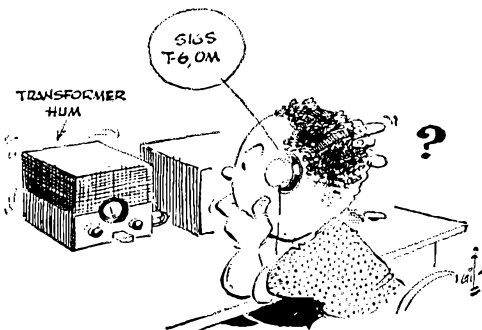
120-Cycle Hum

Despite its singular source, 120-cycle hum is the most common. The 120-cycle ripple which makes itself known as a higher-pitched hum than that previously described, comes from full wave rectification of the 60-cycle line frequency from the high-voltage winding of the power transformer. If the ripple-filtering network following the rectifier is not functioning properly, the 120-cycle ripple amplitude becomes high enough to find its way into the signal chain via the plates and screens of the tubes to which it supplies B+.

Far and away the most common failure in the filtering network is deterioration of the electrolytic capacitors. They are easily checked by bridging with fresh capacitors. Another possible cause of trouble is breakdown of insulation between windings in the filter choke, reducing its effectiveness. If a resistor is used in place of the choke, check its value. Also check the bleeder resistor.

* Part I appeared in Oct. QST, p. 52.

** 7866 Airline Ave., Los Angeles 90045, Cal.



Another source of hum is electrical equipment running in the shack.

Another source of hum at various multiples of 60 cycles is electrical equipment such as transformers, blower motors and electric heaters running in the shack. If the audio hum level is high, the microphone may pick it up and feed it through the transmitter and out over the air. In this and the broken microphone shield case, hum will be controlled by the audio gain control, thus identification of the source is not difficult.

Frequency Modulation of A.M. or S.S.B.

The root causes for f.m. of an a.m. or s.s.b. signal are very similar to the causes of a chirping c.w. signal. Unwanted frequency modulation is a change of oscillator frequency in step with the audio amplitude pattern. Normally this is caused by a “feedback” of variations in the power-supply voltage to the oscillator because of poor voltage regulation. When the modulator in a.m. or the final amplifier in s.s.b. draws more plate current, the power-supply voltage falls, and if the oscillator tube is weak, or the VR tubes not functioning properly (or not being used), the oscillator frequency may change.

It is easy to confirm f.m. of an a.m. signal by using the receiver b.f.o. Turn on the b.f.o. and adjust it for a low-frequency beat note on the incoming carrier. Modulate the transmitter and check whether the frequency of this beat note changes. Then tune the b.f.o. to the other side of the incoming carrier, just as is done in checking for chirp. The slightest f.m. is readily detected and, as with all the tests herein described, even an inexpensive receiver with only modest stability can be used successfully. F.m. is the short-term frequency change which follows the audio pattern, not any longer-term drift the receiver or transmitter may exhibit.

In the case of s.s.b. it is harder to spot f.m. except as a strangely distorted signal, hard to tune in. It is never really satisfactorily tuned in, because the receiver b.f.o. does not shift frequency in step with the f.m. on the signal. The way to check your exciter for f.m. is to unbalance the modulator just enough to allow a little carrier to sneak through. Set the receiver b.f.o. so that you can hear a beat note, and handle as with the a.m. signal described above. If f.m. is present — and it is far more common in mobile rigs, both s.s.b. and a.m., than is suspected — it will be readily detected.

The cure for f.m. is substantially the same as for c.w. chirp, so pursue the suggestions offered under that section. In addition, a.m. overmodulation and s.s.b. flat-topping can indirectly cause f.m. Overdriving of the modulator or linear amplifier, causing the power-supply voltage to fall below that for which it was designed to operate, can cause the voltage at

the oscillator to fall despite a satisfactory condition of all tubes and other components.

The use of 120-volt wiring smaller than that required, with resultant poor line-voltage regulation, can also cause poor power-supply regulation, in turn causing chirp and f.m. This often shows up even with seemingly adequate wiring when running a full gallon, especially when that gallon is run off 120 instead of 240 volts. Wiring that's too small in mobile installations gives the same effect.

One known case of s.s.b. f.m. was an unstable conversion oscillator, caused by the circuit being mistuned. Note the similarity to the case of chirp due to mistuning described earlier.

A.M. Overmodulation

A.m. overmodulation, like s.s.b. flat-topping, can be the secondary cause of all sorts of nasty problems. It is a simple statement of electronic common sense to say that no amateur should run a transmitter (especially a phone transmitter) without having provision for continuous monitoring of his signal. Although this doctrine of common sense is continually aired, not enough amateurs put forth the little extra time and expense needed to keep themselves out of more expensive and frustrating problems. A simple but completely satisfactory scope can be made from the ARRL *Handbook* schematic. Special ham monitoring scopes and conventional servicing scopes are now available at prices so low that it becomes insignificant compared to the overall cost of the station. No number of meters in a phone rig, and no setting of the microphone gain control at a certain "magic" spot, come anywhere near being as satisfactory as a scope. Meters cannot follow the voice peaks (it is the peaks that do the damage) but a scope can.

Several other factors confuse the overmodulation situation. One is caused by the plethora of construction articles on audio compressors, and peak limiters which have given some amateurs a false sense of security. One commonly hears, "I can't overmodulate, I'm using a limiter." No more false words were ever spoken. Compressors, limiters, and the like do only one thing: they raise the ratio of average to peak power, thus increasing the amount of talkpower that is transmitted. Unless set up *with a scope, for each band, at each power level*, they can in no way guarantee against overmodulation. An amateur *with a limiter but no scope* is just as "blind," in terms of knowing what he is sending out over the air, as a ham *without a limiter and scope*. As one who has used professional-quality compressors on commercial broadcast transmitters let me assure you that with even the very best equipment available it is easy to overmodulate. The same holds for a.l.c. circuits.

Another group of hams basking in the sunshine of false security are those using home-brew a.m. rigs which use the modified Heising type modulation. Heising modulation seems to be making some sort of comeback, perhaps because of the extensive use it is seeing in Citizens Band rigs.

The book says that Heising modulation is incapable of modulating a final amplifier even 100% unless the voltage on the plate of the amplifier is lower than the voltage on the plate of the modulator. Since in normal use a dropping resistor is used between the modulator plate and amplifier plate, the voltage condition for higher modulation does exist. In addition, the recent Heising rigs I've noticed are often very "Mickey Mouse" type affairs, with parts substitutions and circuit liberties taken which demonstrate a lack of understanding of how the circuit works. There can be no security in this situation.

A third group of hams has obtained scopes, or constructed overmodulation indicators for a.m. rigs from magazine articles, but have not taken the trouble to learn how to use them. Just because one purchases an airplane does not mean that he knows how to fly it. Possession of a scope does not mean the owner knows how to hook it up correctly, or interpret what it says.

A high percentage of overmodulation complaints are the result of improper operation of the transmitter. There are, however, a number of things that can go wrong to cause a transmitter to overmodulate more easily. As in other transmitter problems, tube deterioration plays a large role. It's a good idea to go through the entire transmitter periodically and check all the tubes. Nearly all of them could be contributors to conditions which make overmodulation occur under operating conditions which previously gave no problems.

Some modulators, particularly those using fixed bias, have a final audio bias balance control to cause the "push" tube to exactly balance the "pull" tube, at any given time. This control should be adjusted so that with *good* modulator tubes, the same amount of resting plate current flows through them both.

Although a scope can be easily hooked to most receivers in order to monitor incoming signals, it is better to scope monitor your transmitter output directly. This hookup has the advantage that the signal doesn't have to go through any frequency conversions before monitoring, and as such the setup will be more sensitive to parasitics which may be outside the normal receiver pass-band. The scope is also helpful when monitoring your c.w. signal, particularly when looking for key clicks. Conditions like relay contact bounce, which causes key clicks, would be nearly impossible to pin down without a scope. Running a phone transmitter without a scope is like walking a tightrope with a blindfold. It can be done, but takes a lot of caution and experience—the experience being obtained *before* being blindfolded.

S.S.B. Flat-topping

Suffice it to say, most flat-topping is caused by improper operation of the rig. The two principal causes of flat-topping are running the a.f. gain control too high and not loading the linear stages heavily enough. The last stage of your exciter is a linear amplifier, and as such must be treated

in much the same manner as an "afterburner."

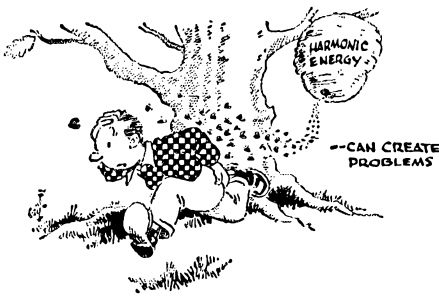
Because of the inherent simplicity of a linear amplifier, there is little that can go wrong with components that has not already been discussed. Scope monitoring is vital, but so is proper interpretation of what it says. S.s.b. signals so distorted as to be nearly unintelligible are heard on the air, with the operator proclaiming loudly that his scope shows that everything is working fine (including the audio compressor). It is revealing to observe how often the hams who protest the loudest about their "clean" signals, and take great offense at an unfavorable OO report, are those who (it turns out) have had to unlist their telephone numbers because of the continual rash of TVI complaints, have had their coax cut by antagonized neighbors, are under FCC-imposed quiet hours, and so on down the list. "Methinks they protest too much."

Another potential source of "apparent flat-topping" is trouble in the antenna or feed line. If the antenna insulators are very dirty, or wet, or if the feed line is old and the dielectric deteriorated, r.f. arcing may occur when the breakdown level is reached. As the power level increases, the possibility that this can occur also increases. The way to determine whether the trouble is inside or outside the shack is to hook on the dummy load and observe whether the flat-topping persists.

R.f. output voltmeters, r.f. ammeters, a.l.c. meters, plate-current meters, grid current meters, and other such indicators are poor seconds to the oscilloscope when it comes to tuning, loading and monitoring a linear amplifier properly. September 1965 *QST* had several good articles dealing with these problems, and directions to follow for a proper scope hookup. In *Single Sideband for the Radio Amateur* and other amateur literature information abounds. All one has to do is to take advantage of the opportunity.

Off-Frequency Operation

Off-frequency operation can be caused by a number of things, most of them relating to improper techniques. The Novice is often guilty of tuning his transmitter to the wrong harmonic of the crystal he is using. For example: if, when attempting to operate on 15 meters by using the third harmonic of a 40-meter rock the opera-



The novice is often guilty of tuning his transmitter to the wrong harmonic.



Birdies are readily recognized when monitoring with the b.f.o. on.

tor dips the final on the second harmonic instead, the signal will be radiated in the 20-meter band. Or, if a station wishing to operate 80-meter c.w. with a 3.74-Mc. rock dips the final on the second harmonic instead of the fundamental frequency, the transmitter pours out r.f. at 7.48 Mc., not even in an amateur band. This phenomenon is so common that some OOs claim to have "heard all states" between 7.4 and 7.5 Mc. Others report out-of-band ham signals QRMIing each other so badly they can't make positive identification so that a card can be sent.

Another cause of out of band (or sub-band) operation is a receiver (or transmitter, or both) out of calibration. It is not enough just to have a 100-kc. secondary frequency standard in the shack. It must be regularly checked against WWV or WWVH. If you try to set your calibrator against WWV when it is modulating its carrier with the 440-c.p.s. or 600-c.p.s. standard tones, you may zero beat a sideband instead of the carrier, and thus cause your receiver to be off enough to cause real trouble at the band edges. For ham-band only receivers, it is a simple matter to make up a little WWV converter for use when calibrating the standard.

Some out-of-band transmissions are the result of genuine technical problems. It sometimes occurs that transmitters do not "spot" and transmit on the same frequency. A quick check with your receiver will identify this problem. It is most likely to occur where conditions of undesired f.m. and chirp also exist.

The radiation of harmonics from a properly adjusted transmitter is best solved by a low-pass filter or transmatch, or both.

Spurious Signals

"Birdies" around a carrier are readily recognized when monitoring with the b.f.o. on. They are usually found under conditions of unstable carrier frequency, even without modulation or keying. The solution to "birdies" and "raw carrier" can sometimes require a little digging, but typical sources are a bad oscillator or VR tube, leaking electrolytics in the power supply, or a faulty resistor or capacitor in the immediate oscillator circuit.

Transmitter Trouble Check List

<i>Problem</i>	<i>First Places to Look for Trouble</i>
Chirp	Bad oscillator, VR or rectifier tube. Improperly tuned transmitter. Open bleeder resistor. Open or weak filter capacitors. Faulty crystal. Loose screws on sockets, terminals, etc. Line voltage wiring too small.
Birdies, raw carrier	Bad oscillator or VR tube. Incorrectly tuned transmitter. High leakage in electrolytic capacitors. Bad component in oscillator circuit. Poor mechanical stability around oscillator.
Key clicks	Dirty key or relay contacts. Improper pulse shape. Relay contact bounce.
60 c.p.s. hum	Broken microphone cable shield. Tube heater/cathode leakage. Noisy transformer or motor in shack. Loose ground connection inside transmitter. Dynamic microphone too close to transformer.
120 c.p.s. hum	Open or weak filter capacitors. Shorted choke or filter resistor. Decreased value in bleeder resistor. Loose internal ground connection.
S.s.b. flattopping	Microphone gain set too high. Exciter or/aud amplifier tuned wrong. R.f. breakdown inside or outside transmitter. Weak tubes in amplifier or exciter. Faulty component in power supplies.
A.m. overmodulation	Microphone gain set too high. Weak tube in r.f. chain. Unbalanced modulator tubes. Improperly tuned transmitter.
F.m. of a.m. or s.s.b. signal	Bad oscillator, VR or rectifier tube. Improperly tuned transmitter Open bleeder resistor. Weak electrolytic filter capacitors. Line voltage wiring too small. Overmodulation or flattopping.
Profanity, music, 10-minute identification, illegal identification, deliberate interference, etc.	The operator.

Overmodulation and flat-topping can put spurious signals at the most unlikely parts of the spectrum, and not just in other ham bands. While it has become quite fashionable to insist piously that TVI is the result of faulty TV receivers, the fact remains that a lot of TVI is caused by careless operation and faulty transmitters. We all suffer for the stubbornness of those who refuse to put their houses in order.

Log Keeping

We all know that when the hamming gets hectic, the log-keeping sometimes gets a little

sloppy. If you receive a card from an OO that indicates you were calling CQ on a certain band at a certain time, and upon checking your log it shows that you were not calling CQ then, ask yourself honestly "how accurately do I really keep the log?" Or, if you were on the air about that time, and the card indicates you were in QSO with a call not in your log, ask yourself "could this call be one of those in the roundtable that I didn't log since I didn't talk to him much?" In other words, don't use a carelessly-kept log as an excuse for not taking action.

(Continued on page 64)

Some Notes on Acquiring the Code

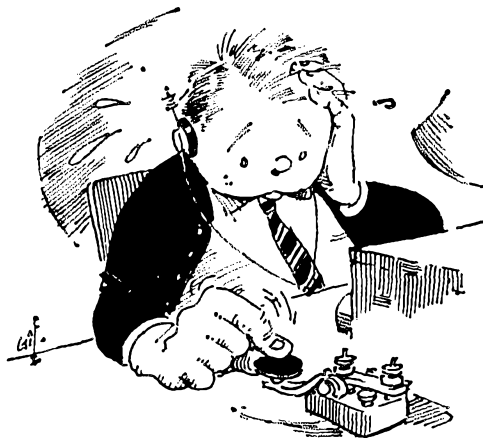
As a confirmed phone man who recently passed the 20 w.p.m. Extra-Class code test, I believe anyone who has the desire can reach this level and higher without too much difficulty. The technique is practice of course, but the utilization of a few gimmicks will aid in your pursuit. Consider my own experience, for example.

If the FCC examinations did not require a code demonstration, quite frankly, I would not have acquired it — and thereby missed out on one of the most enjoyable facets of amateur radio. The creation of the Novice class a few years back provided the stepping stone into the wonderful world of amateur radio for me. Even the 5-w.p.m. Novice requirement was not so easy for me to assimilate as it is for most people I have observed.

My original Novice station consisted of an old uncalibrated receiver, a dipole, a homebrew 6AG7-6L6 rig that produced a few watts, and a couple of crystals. The Novice band was only 25 kc. wide then, slightly wider than the receiver selectivity. It is amazing the number of contacts that were made in that jungle of QRM; and even more amazing were ones that were completed. It did impress upon me the communication potential that exists with an operator possessing code ability.

After a few months' operation, and when some additional c.w. skill had been acquired, the wide open spaces available to higher class licensed amateurs didn't appear so insurmountable as before. A series of three trips to the FCC reached a glorious conclusion when I finally put the required 65-consecutive characters on the sheet of paper. "Now for the phone bands!" I cried, and proceeded to acquire more power, v.f.o., modulator, etc. From that point, until the discussion on incentive licensing opened recently, c.w. operation was very limited.

When it became apparent that the possibility existed of modification to the amateur frequency assignments with incentives for achieving higher



THE INVENTOR OF THE HAND KEY APPARENTLY DID NOT HAVE ME IN MIND WHEN HE DEVELOPED THE DOGGONE THING.

BY JOHN B. JOHNSTON,* K3BNS

classes of licenses, I was prompted to muse that my own DXCC new country rate (all on phone) was becoming sluggish and maybe c.w. had something to offer. So I started to spend some time on the 40-meter band near the Novice segment, working the slower sending stations. The inventor of the hand key apparently did not have me in mind when he developed the doggone thing. Occasionally, I undertook to see if my skill on the bug had improved to the point to where the number of dots for a given letter came out not worse than one dot. A better bug improved things a little, but not as much as the electronic keyer I built from the *Handbook*. The first time I tried it, I knew I had it made. The self-completing dots and dashes made up for that little something obviously missing in my coordination. Soon notes started appearing on QSL cards, "FB fist OM."

Gradually, with the aid of W1AW practice sessions I began to develop some proficiency and to find c.w. operation more enjoyable, and phone operation a little dull and relatively unchallenging. A complete new dimension had opened to me and I developed a certain pride in my accomplishment. The Extra ticket soon followed.

The first recommendation for increasing your c.w. ability is that you establish a definite program to follow, comprised of practice and actual operation, based on the time you have available. Pick a date, say 3 to 6 months from today, and set up a rigid schedule. Even if you don't feel ready when the time arrives, you will have developed an appreciation of what your program has accomplished, your specific weaknesses to concentrate upon, and a better feel for a revised program.

The second recommendation is to utilize a tape recorder, preferably a two-speed model. The W1AW code-practice transmissions are the key to the entire process, however. At 7:30 most evenings, W1AW puts a good signal in here on 80 meters, with a half-hour practice run at 10, 13,

* 11 Fieldstone Road, Levittown, Pennsylvania 19056

and 15 w.p.m. When you can do pretty well at these speeds, record it at slow speed with a low tone and play it back on the high speed.

At 8:00 p.m. WIAW sends the bulletins for about a half-hour at 18 w.p.m. While this is good practice, each bulletin is repeated for a few nights and there is nothing like old code practice material to instill a false feeling of having achieved a higher-speed level. For this reason, limited material such as recorded text should only be used as supplemental to the fresh material. Remember, when you hear the FCC examination tape, it will be for the first time.

Do not print your copy unless you can print rapidly. I was surprised to learn many hams pass the 13-w.p.m. test with block printing. Use script, if that is the fastest way you write. Make small letters and try not to move your pencil very far from the paper. Writing at 20 w.p.m. is fairly fast, so even if you have to temporarily backtrack a few w.p.m. to acquire this small skill, it will pay off.

The Monday, Wednesday, and Friday 9:30 code sessions are excellent. These practice sessions are sent at 15 to 35 w.p.m. in 5 w.p.m. increments. Try to follow as far as you can. By the time you're ready, you should be getting most of the 25 w.p.m. down on paper. The League code book says the average speed at which the individual letters turn into a blur is about 28 w.p.m. It must depend upon certain factors which vary with the occasion, since some nights I can copy the 30 w.p.m. while other nights it is beyond me and I can only pick out a few short words.

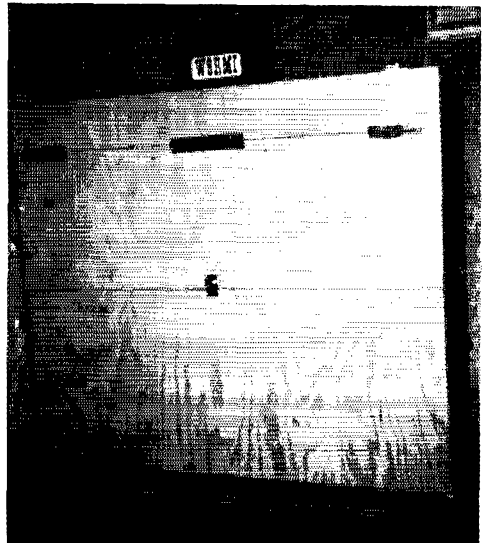
Once-a-month, WIAW offers a Qualifying Run which is about as close to the FCC test conditions

as you can get without actually taking it for real. The material is fresh and if you fail to copy a full-minute correctly, you have to wait a month for another chance. Participate in these qualifying runs and send your copy in to the ARRL. In addition to the practice, the possession of the certificate and the seals mark definite progress milestones that will add to your confidence. You'll need all of this you can muster when the examiner turns on that test machine.

Don't neglect your operating. If you don't operate c.w. now, once you have acquired a little proficiency, become active. At first just listen and copy a few QSOs to get the hang of it, then choose your operating frequency with care and avoid the low end of the band; the DX operators have enough QRM now. Be careful not to interfere with an operating network. I recommend trying around 7.1 to 7.15 Mc. on 40 meters for a starter, and as your skill increases, move down the band. Listen around until you hear a station calling CQ at about the speed you can copy with ease and give him a call. When you call CQ, call at a speed you want the answering stations to use. If they go too fast, do not hesitate to QRS.

You will be very proud when you have acquired the c.w. skill. In addition to learning to jot down letters and numbers in a correct sequence from a jumble of dots and dashes, additional operating proficiency will be gained which can be applied to any mode. DX is more abundant on c.w., since many operators have only this mode economically available to them. More important to many of us, however, it is a nostalgic link with the fascinating history of communications by electrical means. **QST**

Strays



W9RMI's shack-in-a-box! When it is necessary to operate portable or on field day, simply unplug the antenna lead and power plug and carry the station away. If the XYL objects to the sight of radio equipment when company comes, simply close the box lid.

Announcing the 33rd ARRL Sweepstakes

CONTEST PERIODS

Starts		Ends
Saturday, Nov. 12 2100 GMT	PHONE	Monday, Nov. 14 0300 GMT
Saturday, Nov. 19 2100 GMT	C.W.	Monday, Nov. 21 0300 GMT

Rules

1) *Eligibility:* The contest is open to all radio amateurs in (or officially attached to) sections listed on page 6 of this issue of *QST*.

2) *Time:* All contacts must be made during the contest period indicated elsewhere in this announcement and between amateurs in (or officially attached to) the 74 sections. Yukon-N.W.T. (VE8) counts as a separate multiplier, for a possible total of 75 multipliers. Time spent in listening counts as operating time. No more than 24 hours of operation are permitted during the 30-hour period. "Off" periods may not be less than one half-hour at a time.

3) *QSO:* Contacts must include certain information sent in the form of a standard message preamble, as shown in the example. C.w. stations work only c.w. stations and phone stations only other phones. Valid points can be scored by contacting stations not working in the contest, upon acceptance of your preamble and/or receipt of a preamble.

4) *Scoring:* Each preamble sent and acknowledged counts one point. Each preamble received counts one point. Only two points can be earned by contacting any one station, regardless of the frequency band. The total number of ARRL sections (plus VE8) (see p. 6) worked during the contest is the "section multiplier." It is not necessary for preambles to be sent both ways before a contact may count, but one must be received, or sent and acknowledged, before credit is claimed for either point(s) or multiplier. Apply a "power multiplier" of 1.25 to c.w. entries and 1.5 to phone entries if the d.c. input to the transmitter output stage is 150 watts or less at all times during contest operation.

The final score equals the total "points" \times the "sections multiplier" \times the "power multiplier."

5) *Reporting:* Follow the sample shown in reporting contest results. Printed contest forms will be sent free on request. Indicate starting and ending times and dates for each period on the air. All Sweepstakes reports become the property of ARRL and none can be returned.

There are no objections to one's obtaining assistance from logging, "spotting" or relief operators, but their use places the entrant in the multiple-operator class, and it must be so reported.

A single-operator station is one manned by an individual amateur who receives no assistance from other persons during the contest periods. He may not have assistance in any manner in keeping the station log and records, or in spotting stations during a contest period. The operation of two or more transmitters simultaneously is not allowed. Contest reports must be postmarked no later than December 15, 1966, to insure eligibility for *QST* listing and awards.

A transmitter used to contact one or more stations may not subsequently be used under any other call during the contest period (with the exception of family stations where more than one call is assigned to one location by FCC/DOT).

6) *Awards:* Certificates will be awarded to the highest c.w. scorer and to the highest phone scorer in each ARRL section. A certificate will also be awarded to the highest

As summer wanes, the thoughts of the contest-minded just naturally dwell on that Fall contest calendar highlight, the annual ARRL Sweepstakes.

This year the same format will hold, having proved successful in 1965. Note please that no more than 24 hours of operation (listening counts in this) are permitted during the 30-hour period. Time-out periods may not be less than one-half hour at a time.

The exchange, a simulated message preamble, uses the year of your first license as the **check** and the month and day (not year) of birth as the message **date**. Remember to send this information as it refers to you, the operator, whether you operate your own or another station.

Awards? Handsome certificates to all section leaders and club qualifiers, both modes. Novice and Technicians may be eligible for awards also; see contest rule 6. The ARRL Affiliated Club with the highest aggregate score will be awarded a handsome engraved coco-bolo gavel.

This year, the competition for the gavel and club certificate awards will be limited to ARRL Affiliated Clubs and groups awaiting final approval on their affiliation. No aggregate score will be shown unless a group so qualifies and unless a letter is received from a club officer listing the members participating and their claimed scores, broken down by mode.

Log forms and Operating Aid No. 6 (to avoid duplicating QSOs) are now ready. Get your request off to the ARRL Communications Department, 225 Main Street, Newington, Connecticut 06111. Logs must be postmarked by Dec. 15, 1966 to be eligible.

QRY SS?

EXPLANATION OF "SS" CONTEST EXCHANGES

	Nr	Precedence	Call	CK	Place	Time	Date
<i>Exchanges</i>	Consecutive Serial Number	Routine	Send your own call	CK (Last two digits of year first licensed)	Your ARRL section	Send GMT time of transmitting	Send month and day of birth (not year)
<i>Sample</i>	NR 1	R	W4OMW	24	NC	2101	MARCH 30

1966 FIELD DAY RESULTS



The most typical of all FD sites for 1966 was this scene of the Wis-III VHF ARC, **W9VZ/9**. The group topped the 9th call area in the six-transmitter class with close to 14,000 points.

COMPILED BY ELLEN WHITE, *W1YYM

FIELD Day 1966, June 25-26, wound up the 1965-1966 operating season in a great big way. Statistically, 1339 entries were reported, which adds up to 3266 stations and approximately 13,600 participants, a lot of activity by any standards! The most popular category was the two-transmitter class although most rigs and participants were reported in the three-transmitter group. Averaging out the Class-A entries we find a "typical" figure of 13.6 participants manning $2\frac{7}{8}$ rigs (which makes an intriguing mental picture!)

This year the "Spirit of Field Day Bonus" added an extra fillip by stimulating publicity, traffic-handling accuracy and complete independence-of-mains operation. Never before have such reams of clippings, etc. been received with the FD entries! Headlines all over the U. S. and Canada proclaimed the Field Day: "*Radio Hams Take National Readiness Test*," "*Local Ham Radio Buffs Test Emergency Gear*," "*Ham Radio Operators Plan Rehearsal For Emergencies*," "*Ham Radios Hum as Groups Compete in National Alert*," "*Radio Club Trains For Emergencies*," "*Public Invited to See Ham Radio Operators at Work*," "*Hams Rough it in Radio-Thon -- Name of the Game is Contact*," "*Radio Hams Test Capability to Work in Power Black-out*." A well-done goes to all responsible for the superb public relations job accomplished this past June — *F. B. O.M.s!*

Many groups failed to receive credit for their message origination. Reasons? Well, in general they included lack of message precedence, incorrect or absence of check, so handling data and just plain absence of the message which was supposed to have been attached to the FD entry!

Field Day 1967, the fourth weekend in June, is a half-year away, none too soon to make plans to thwart Murphy, top your previous QSO figure, have a club meeting on message handling procedures, plan antennas and set-ups for 1967, organize newspaper, radio and TV publicity committees, etc. After all, there's nothing like an ARRL Field Day!

SOAPBOX

"Now that W8CEA/8 has had their fun, we'll stop playing and go to work." — *W1TX/1*. "The bugs carried the operators away." — *K9WMM/9*. "Three people just can't man three rigs for 24 hours." — *W4IXL/4*. "Our beach site attracted quite a bit of attention. Unfortunately, our attention was distracted by a group of girls having a beach party one hundred yards away." — *K5JCC/5*. "Uncomplainingly we put up with attacks of mosquitos, ants and also sand in the equipment, but when 10 out of 11 of us got poison ivy, we vowed never to return here." — *W9IRT/9*. "We're probably the only club that had to retrieve their logs from the top of palm trees with a bucket truck." — *W4AQC/N/4*. "Lots of comments on our call and plan to use it again next year." — *G3TYL/W9*. "The Wantagh's best FD with good weather, good conditions, comfortable operating positions and enthusiastic operators." — *W2AZV/2*. "Started with 6 rigs and ended up with 1." — *W44RP/4*. "15 meters was a big surprise." — *W480VU/8*. "The Orange Section took much explanation." — *K6GCS/6*. "The effort to put RTTY on the air from a FD location and the sacrifice in scoring was

* Asst. Communications Mgr., ARRL

great, but we feel the ability to put on a truly emergency setup was worth the effort." — *W191GQ/9*. "A poor tractor driver knocked down the two-meter beam." — *W19QPT/9*. "Who do you have to know to get a photo in QST?" — *W13GCO/3*. (Just be active, and submit good sharp interesting photos of the operation. — *ED*.) "This year we planned everything: equipment, spares, food, first aid — everything. We made individual lists, master lists, crosscheck lists, and overall lists. By golly, we got to the top of Mt. Walker with all the equipment food and miscellany. HOWEVER, we forgot one of the operators!" — *W7RGL/7*. "Quite a few visitors, including the sheriff at about midnight Saturday. No problem, he was just curious as to what kind of folks were up at that time of night." — *W8BAE/8*. "Club members taped and paid for a three minute nationwide ABC radio publicity spot at 1015 EDST on June 25." — *W4HFF/4*. "On other occasions we have had wild goats, flies, lizards and scorpions. This year we attracted a rattlesnake." — *K6LDA/6*. "A masterpiece in optimizing the contact/effort ration. (No it wasn't one QSO)." — *W2EUP/2*. "As usual, the kids drank all the pop." — *W8TFZ/8*. "Everything went up the mountain by Gondola." — *VE7ACS/7*. "Our hilltop location overlooked a residential district. A woman thought our lights and generator were a UFO. Naturally, a visit by the police followed." — *W8SVM/6*. "What happened to all the c.w. operators?" — *W8OHN/8*. "Six-meter band openings were the best in a long time." — *W45CCU/5*. "Not a living soul pestered us, we were across the road from a cemetery." — *K9LEO/9*. "We had 200 more points with 4 less operators, three less rigs and one more antenna." — *W5LJY/5*. "That G3/W9 was a real surprise." — *K9VHF/9*. "If anyone has figured out a tent air conditioner that doesn't use any power and is very efficient, please let us know." — *W6C1I/6*. "Everything worked but the stand-by rig." — *W4WVJ/4*. "The six-meter band opening was the best since the 1960 VHF Contest." — *W2ATT/2*. "Generator frequency a bit off and found the 80/40 meter station clock 65 minutes off by Sunday a.m." — *W1MV/1*. "When both generators were shut down the silence was deafening." — *W8VYL/8*. "Our sixth and final year as WA2TPV. Next year the memorial call W2KUU will be used." — *WA2TPV/2*.

SCORES

Class A stations are clubs and groups in the field with more than 2 operators. Scores are tabulated according to the number of transmitters operated simultaneously at each station. The figures and letters following each call indicate the number of valid contacts, the 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 150 watts (multiplier of 2); C indicates over 150 watts (multiplier of 1).

One Transmitter					
W9AQW/9	(nonclub group)	1087-	A- 5-	9783	
WB2HJC/2	Chelsea ARC	901-	A- 4-	8609	
K5CJL/5	Caprock AR Soc.	731-	A- 7-	6379	
W7OTV/7	Tualatin Valley ARC	726-	A-12-	6534	
W7TRA/7	Urbah ARC	902-	AB-16-	5954	
W42M/4	Mt-South AR Assn.	902-	B- 5-	5912	
W3FAN/3	Reynolds-Itapp plus one Santa Clara County RACES Group	844-	A- 5-	5796	
W4CQI/4	Beaches AR Soc.	809-	B-15-	5361	
K9CVA/9	(nonclub group)	893-	B- 3-	5358	
W8ETK/5	Elida ARC	788-	B-21-	5238	
W8ZA/8	Tusco RC	502-	A-14-	5018	
W7NPU/7	Ogden ARC	809-	AB-25-	4994	
K2IBP/2	Pebble Beachers	701-	AB- 5-	4904	
K9KGA/9	Wauwatosa ARC	729-	B- 7-	4874	
K6LDA/6	Crescent Bay Emergency Net	454-	A-12-	4586	
W8TFZ/8	Aviation RC of North American Aviation, Columbus Division	665-	AB-16-	4577	
K5SYD/5	Bayshore ARC	713-	AB- 8-	4536	
W9EJ/9	Society Radio Operators	666-	B-26-	4496	
K9CFC/9	Evergreen Park H. S. RC	440-	AB- 6-	4442	
W3EPT/3	Hopkins ARC	438-	A- 5-	4442	

1967 FIELD DAY

JUNE 24-25

W5AC/5	Memorial Student Center ARC, Texas A & M Univ.	706-	B- 5-	4236
VE1JV/1	Pictou County AIC	410-	A-11-	4190
W4ZA/4	Richmond ARC	407-	A-10-	4163
K9LCO/VOI	Argentia ARC	607-	B- 5-	4142
K2GW/2	Hudson Wireless Assn. (nonclub group)	457-	A- 5-	4113
K5JCO/5	Viking Needle Banders (nonclub group)	151-	A- 3-	4059
W1YDX/9	Mae West Ham Club	577-	AB- 6-	3983
W4ORP/6	Univ. of Michigan ARC	576-	B- 3-	3956
K0KAQ/9	Canton ARC	570-	B- 7-	3930
W8UM/8	Chippewa ARC "B Group"	568-	B- 5-	3908
W8RTR/8	Key City Wide ARC (nonclub group)	375-	A-100-	3875
W8BAA/8	Antioch DX Soc	424-	AB-28-	3861
W4RFPX/8	Red River Valley ARC	630-	B- 6-	3834
W8THC/8	Alken ARC	158-	AB- 4-	3783
W42JYW/2	The Wascon Invaders	541-	B- 4-	3746
W2EUP/2	Oswego County AR Assn.	622-	AB- 5-	3744
VE7ACS/7	Turtle River ARC (nonclub group)	409-	B-15-	3558
W2RMT/2	Honeywell ARC (nonclub group)	593-	B- 8-	3516
K6JTB/6	Limna Area ARC (nonclub group)	586-	B- 8-	3516
W0ILO/0	Newton AR Assn.	485-	B- 8-	3410
K4JTY/4	Arrowhead RA (SSB LP Group)	477-	B-20-	3362
W0EMA/0	Canfield AR Assn. The Tube & Shutter Co.	370-	A- 4-	3330
W2AAP/2	Lafayette ARC	546-	B- 3-	3276
K0ZZK/0	Twin Rivers ARC	454-	B-21-	3224
K6AAW/6	Calaveras County RACES Group	453-	B- 9-	3218
W40NLF/0	Nevada County ARC	300-	A-12-	3200
K9UKM/9	Milwaukee RAC	450-	B- 8-	3200
W5ADL/5	Central Iowa ARC	458-	AB-12-	3117
W8EQ/8	North Suburban Wireless Assn. & North Star HI-Banders	431-	B- 7-	3086
K8ZAT/8	Kirkwood H. S. ARC	432-	B- 6-	3078
W0NWX/0	Morse Confederacy	428-	B- 6-	3068
W0IEF/0	Delta RC (nonclub group)	284-	A- 6-	3056
W1VB/1	Butte ARC	419-	B- 4-	3014
W0CVJ/6	Freighton H. S. RC	419-	B- 6-	3014
W5LDL/5	Altshelb ARC	417-	B-11-	3002
K5EYU/5	St. Cloud ARC	375-	AB-15-	2993
W6PNY/6	Southport ARC	411-	B- 9-	2966
K6ASU/6	Arrowhead RA (c.w. group)	410-	B- 3-	2960
W9HRM/9	Penacook ARC	401-	B-10-	2936
K8ZAF/8	Maline Township Teenage Ham Radio Ops.	481-	B- 4-	2904
W0BFSQ/0	Boulder H. S. ARC	397-	B- 3-	2892
W0IRO/0	Pittsford ARC	294-	A- 4-	2843
K0AZV/0	Butte H. S. RC	386-	B- 6-	2816
W3AG/3	Convaly RC	469-	B- 6-	2811
K4WWQ/5	Elmac Gang	328-	AB- 9-	2786
K9GFD/9	Mason County RC	380-	B- 8-	2780
K2NO/3	Southern Minn. AR Soc.	378-	B- 6-	2768
W3NNL/3	Penacook ARC	373-	B- 8-	2738
W40KZL/0	Northville AR Soc.	265-	AB-11-	2729
W3ZSJ/0	Brantling Hill RC	367-	B- 4-	2702
W3SV/0	Tri-State ARC	345-	B- 6-	2700
W49HCG/9	St. Louis Falls ARC	449-	B-10-	2694
K0ZXE/0	Maui ARC	365-	B- 5-	2690
W4UC/4	Kalamazoo ARC (nonclub group)	425-	AB-10-	2643
W9TRJ/9	Blaine Falls ARC	438-	B- 5-	2628
W40LHL/0	Blaine Falls ARC	350-	B- 7-	2600
W10SS/1	Blaine Falls ARC	345-	B- 4-	2570
W7FO/7	Northville AR Soc.	326-	A- 3-	2534
K20ID/2	Brantling Hill RC	380-	A-15-	2520
W6U8/6	Tri-State ARC	336-	B- 8-	2516
W6UF/6	St. Louis Falls ARC	666-	C-16-	2498
K8DXE/8	Blaine Falls ARC	416-	B-22-	2496
K0LUZ/0	Maui ARC	329-	B-15-	2474
VE2BOW/2	Kalamazoo ARC (nonclub group)	210-	A-16-	2471
K6GJ/6	Blaine Falls ARC	378-	B- 3-	2468
W2TIO/2	Blaine Falls ARC	320-	B- 3-	2420
W0DDN/0	O. R. L. Mobilizers	315-	B- 5-	2390
W0ZYW/0	R. P. #1, RC of St. Louis	391-	B- 8-	2376
KH6RS/KH6	(nonclub group)	379-	B- 6-	2274
W8VY/8	(nonclub group)			
K9VM/9	(nonclub group)			
W4ATM/5	(nonclub group)			
W1CF/1	(nonclub group)			
W0WJ/0	(nonclub group)			
W0FFN/0	(nonclub group)			



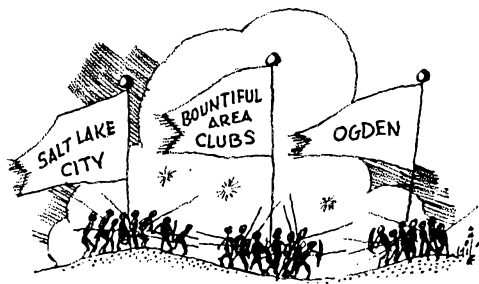
"Mr. Ham Radio" W1BDI helped key W1TX/1, the Connecticut Wireless Assn., to top 2-A in the first call area.

Class-A Call-Area Leaders

(Calls in bold-face type represent over-all class leaders)

1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12A	17A
W1V7/1	W1TX/1	W1SEA/1	W1WHF/1	K1MUJ/1	W1BCG/1	W1MVY/1	W1COJ/1	W1HPM/1	.....	W1NY/1	.....	.....
W1RHJ/2	W1BHF/2	K2BR/2	K2VSS/2	K2MQW/2	K3AA/2	.....	W2OYH/2	W2LL/2	.....	W3RCN/3	.....	.....
W3FAN/3	W3ATR/3	W3LUW/3	W3ISE/3	W3GC/3	W3SK/3	K3SBI/3	.....	.....	.....	.....	.....	.....
W1CQQ/4	W1ACN/4	W1DL/4	W1SKH/4	W1VJ/4	W1FR/4	K1DP/4	.....	W1HFH/4	.....	.....	.....	.....
K5CJL/5	K5JK/5	W5KH/5	K5TYP/5	W5ALB/5	W5C/5	W5DP/5	.....	W5ANR/5	.....	.....	.....	.....
W6VZT/6	W6GEO/6	W6HS/6	W6WRX/6	K6HWO/K6H	K6SYU/6	K6BAG/6	W6LJ/6	W6UW/6	W6PAI/6	W6DE/7	K8BTI/8	.....
W70TV/7	K7XU/7	W7NCW/7	W7IO/7	W7RGL/7	W7BB/7	.....	.....	.....	.....	.....	.....	.....
W8ZA/8	W8CEA/8	W8VVL/8	W8FY/8	W8ET/8	W8HLD/8	W8KAJ/8	.....	W8KGG/8	.....	.....	.....	.....
W9AQW/9	K9WMM/9	W9BFD/9	W9GWL/9	K9XU/9	W9VZ/9	W9FLP/9	.....	W9FQ/9	W9YB/9	.....	.....	.....
K0CVA/0	K0QMH/0	W0DK/0	W0WVY/0	W0FAO/0	W0KQI/0	.....	.....	.....	.....	.....	.....	.....
VE1JV/1	VE1FO/1	VE2ARV/7	VE3RC/3	VE3RSQ/3	VE3DC/3	VE3NAR/3	VE3LL/3	VE3OW/3	VE3VM/3	W2RJ/2	.....	.....

W4RMBX/8	Hillsdale ARC.....	295-	B-7-	2270
W4RNC/8	(nonclub group).....	213-	A-3-	2187
VE6QE/6	Central Alberta Radio League.....	281-	B-6-	2186
W0REA/0	Ramsey County ARCC (nonclub group).....	278-	B-8-	2168
W7CWS/7	Shy-Wy RC.....	359-	B-6-	2154
K7AYF/7	.....	274-	B-9-	2144
VE2WE/2	Montreal Field Day Assn.	284-	AB-4-	2126
W49MI/0	(nonclub group).....	354-	B-3-	2124
W0QPN/0	Huron ARC.....	268-	B-15-	2108
VE4AA/4	Winnipeg DX Club.....	695-	C-9-	2085
W7ED/7	Gallatin ARC.....	261-	B-14-	2084
W3PRC/3	(nonclub group).....	263-	B-8-	2078
W4TFZ/4	Abemarie ARC.....	258-	AB-8-	2072
W0A1Q/0	Dour County ARC.....	345-	B-	2070
K0JKS/0	Falls City ARC.....	521-	C-11-	2063
K41WT/4	Dade County ARPSOC.....	170-	A-3-	2030
K0SOQ/0	Hastings ARC.....	241-	AB-15-	1982
W42PB/2	Mount St. Michael ARC.....	328-	B-5-	1968
W7CAL/7	Papago Canyon IAX Club.....	325-	B-3-	1950
W8OMY/8	(nonclub group).....	233-	AB-3-	1901
W7YN/7	Nevada AR Assn.	230-	B-6-	1880
W0BXO/0	Radio Research Club.....	229-	B-12-	1871
W3EPT/3	North Dorchester RC.....	227-	B-	1862
W47CY/4	Basin ARC.....	224-	B-7-	1841
W40GI/0	Boystown AR Soc.....	232-	B-14-	1832
W0AJA/0	Coon Valley ARC.....	218-	B-5-	1808
W4PED/4	North Augusta-Bevelere RC.....	215-	B-11-	1790
W1DDD/1	Blackstone Valley ARC.....	287-	B-6-	1722
W0ZSA/0	Winona ARC.....	256-	B-5-	1716
K8EOY/8	(nonclub group).....	165-	AB-4-	1712
W82VPY/2	Chemung County ARCC Assn.	131-	A-17-	1679
K8OYM/0	Mid-Missouri ARC.....	185-	AB-10-	1676
W9JL/9	Nesmah-Metasha ARC.....	192-	B-9-	1652
VE7AS/7	Chilliwach ARC.....	190-	B-9-	1640
K7QAV/7	Coronado Trail ARC.....	189-	B-4-	1634
VE4C/4	AR League of Manitoba (nonclub group).....	187-	B-11-	1622
W47CSU/7	RC.....	179-	A-5-	1611
W4SEN/4	Johnston County CD.....	178-	B-10-	1568
W47FQE/7	Woodland ARC.....	171-	B-10-	1526



UTAH CLUBS BATTLE IT OUT FOR 1A FD HONORS

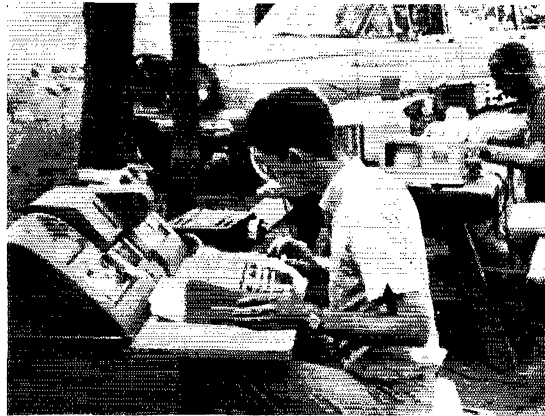
K6KX/6	North Shores ARC.....	166-	AB-6-	1505
W86TD/6	Douglas Aircraft Group RC.....	162-	B-7-	1472
K2HOI/2	Plainview ARC.....	162-	A-10-	1458
W49ETL/9	(nonclub group).....	146-	AB-3-	1451
K7WTP/7	Tacoma AR Soc.....	146-	AB-9-	1379
W48QFV/8	Amateur Voice of Columbus RC.....	152-	A-4-	1368
W43ANL/3	Upper Darby H. S. ARC.....	94-	A-6-	1346
K8AIR/8	MARS Communicators (nonclub group).....	194-	B-	1164
W86FTM/6	Bonter County ARC.....	191-	B-4-	1146
W7DA/7	MARS VHF Net EBNY 13.....	203-	C-8-	1109
W0CKP/0	Minneapolis RC.....	66-	A-4-	1094
W40UF/0	IMA RC.....	175-	B-10-	1050
K5DYD/5	(nonclub group).....	159-	B-5-	1020
W9LIT/9	Tri State AR Soc.....	170-	B-4-	954
W50CY/5	Six Meter Club of Dallas.....	155-	B-30-	930
W9HFD/9	Valley VHF Club.....	152-	B-	912
W45MAC/5	(nonclub group).....	100-	A-17-	900
W2LCA/2	North Country RC.....	144-	B-3-	861
W4NCG/4	(nonclub group).....	162-	BC-2-	840
W9DPE/9	Dunlap RC.....	139-	AB-3-	840
K4JLA/4	Spartanburg ARC.....	137-	B-4-	810
K4FOW/4	Lanierland AR Soc.....	388-	B-9-	776
K9FBF/0	Millard ARC.....	372-	B-5-	744
W42FYV/2	Port Chester CD Committee.....	121-	B-4-	726
W1VSR/1	(nonclub group).....	120-	B-5-	720
WN0OAD/0	(nonclub group).....	70-	A-2-	630
W49PYE/9	QQQ ARC.....	20-	B-3-	620
W42SPM/2	Ozark ARC.....	102-	B-5-	612
W4PL/4	Chattanooga Old Timers RC.....	32-	BC-5-	608
W84AMY/4	(nonclub group).....	302-	B-6-	604
W85ADR/6	(nonclub group).....	99-	B-7-	594
W82RLO/2	Fair Lawn ARC.....	70-	AB-8-	561
K4TYT/4	Hampton Roads RC.....	60-	A-2-	540
W8KVT/8	St. Joseph H. S. RC.....	532-	C-6-	532
VO1CF/01	Lake Head ARC.....	85-	B-	516
W82TBR/2	(nonclub group).....	84-	B-3-	504
W48LBZ/8	Aviation RC Group B.....	81-	B-6-	504
VE3RX/3	(nonclub group).....	84-	B-8-	384
W3EIK/3	Ivridge ARC.....	379-	C-5-	379
W9ANT/9	Fortwick H. S. Alumni RC.....	183-	B-8-	366
W40WLK/0	(nonclub group).....	59-	B-3-	384
W0LJL/0	(nonclub group).....	59-	B-3-	384
W40XL/4	Kinston AR Soc.....	161-	AC-3-	330
WN68VM/6	Thousand Oaks H. S. ARC.....	327-	C-8-	327
K3DNT/3	Ponono ARC.....	50-	B-6-	300
VE7ANK/7	Cowhean Valley RC.....	37-	B-12-	222
W450YG/5	(nonclub group).....	99-	C-4-	288
W490BP/9	(nonclub group).....	29-	B-3-	174
W47AAL/7	Cochise IAC.....	29-	B-3-	58
WN0NHL/0	(nonclub group).....	5-	B-3-	30
W8CEA/8	Miami Valley AR Connecticut Wireless Assn.	1800-	AB-17-13,098	
W1TX/1	(nonclub group).....	1760-	AB-19-12,518	
K9WMM/9	Beacon RA.....	1337-	A-5-12,015	
W3ATR/3	Joel Herbsman AR Foundation.....	1258-	A-13-11,322	
W82HFU/2	.....	950-	A-7-9,050	

Two Transmitters Operated Simultaneously



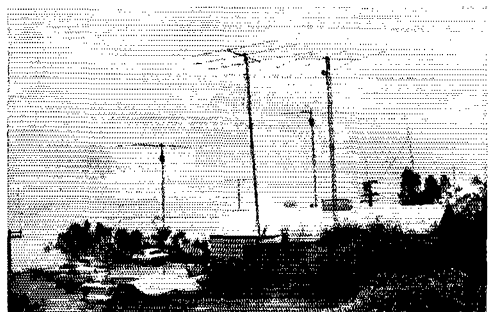
The West Side RC of Toronto, **VE3JJ/3**, goes out for FD in a big way, manning 8 transmitters under very hot field conditions (over 90 in the shade and about 100 in the tent). **VE3CUY** is shown checking the progress of 40 s.s.b.

The log at **K2INO/3**, a non-club group in 1-A, was punched into IBM cards with an IBM 026 key punch right at the FD site. The cards were then processed by a 1401 computer at the Johns Hopkins University computing center. The program, written especially for this purpose, checked for duplicate contacts, calculated scores, and printed out final log copies both in chronological order and by band. Shown is **K0OVZ** operating the key punch while **WA2BUJ** mans the rig.



K6QMH/0	Montrose County ARC	937-	A-11-	8933
WA1QCN/4	North Florida AR Soc.	1432-	R-30-	8606
W1LJ/9	Lake County ARC	1033-	AB-15-	8309
W1NF/8	Mason AR Soc.	871-	A-17-	7511
W1AV/4	Fl. Myers ARC	1104-	B-14-	7124
W1YDD/4	Sarasota AR Assn.	1064-	AB-12-	7118
K7OUB/7	Clackamas AR Soc.	1146-	B-27-	6876
K7EFA/7	Yellowstone RC	1011-	B-30-	6566
W8COF/8	Kanawha RC	1300-	ARC-60-	6491
W8ZY/8	Archie Nat. Org.	881-	A-15-	6276
W8ROHN/8	North Ohio AR Soc.	858-	R-9-	6248
W8ALV/9	Waukegan VHF Soc.	770-	AB-	6210
K1ZKH/1	Hungry Hill R. Assn.	921-	AB-12-	6182
W7CO/7	Western Wash. DX Club	815-	AB-15-	6063
W1NYK/4	Blue Ridge R. Soc.	922-	B-11-	6032
W0VQ/8	Wilcox Electric ARC	828-	AB-12-	6002
W0YT/9	Badger AR Soc.	762-	AB-7-	5927
W8RHH/9	Ill.-Mo. RC	770-	AB-12-	5873
W8ALU/9	Radops ARC	989-	B-10-	5834
K3HUO/3	South Community Y.M.C.A. RC	970-	B-9-	5820
W9UDU/9	Racine Megacycle Club	968-	B-16-	5808
K9OLE/9	Martinsville Club	788-	AB-12-	5793
W8LRT/8	ARC of Ohio State Univ.	861-	AB-10-	5723
W8IDM/8	Westpark Radiops	846-	B-15-	5576
K9SNO/8	Waukegan AR Soc.	851-	B-15-	5432
W4KVK/4	Henderson ARC	822-	B-12-	5132
K5ZJK/5	(nonclub group)	986-	B-8-	5376
K3QBD/3	First state ARC	541-	A-12-	5369
W8AVI/9	Nicolet H. S. ARC	811-	B-4-	5366
W9ZZ/9	Portage County RA	796-	B-14-	5276
K5DRR/8	(nonclub group)	720-	AB-8-	5198
W1BFB/1	New England Wireless Museum Assn.	780-	AB-4-	5186
W4UWS/4	(nonclub group)	977-	BC-14-	5115
W8KEB/8	Sagittaw Valley AR Soc.	755-	AB-15-	5087
W3OC/3	Two Rivers ARC	757-	B-12-	5042
K4UWH/4	(nonclub group)	754-	B-5-	5039
W8BGE/0	North Valley ARC	732-	AB-5-	4912
VF1PQ/1	Hallfax ARC	728-	B-18-	4868
K8HVN/8	Kent RC	716-	B-20-	4856
K1TV/4	Central Conn. DX Assn.	709-	B-5-	4754
K7CBP/7	Klatskanie Basin AR Assn.	709-	B-18-	4754
W8TO/8	Fresno ARC	695-	AB-23-	4695
W8MNX/9	Rochester ARC	698-	B-20-	4688
W3WPX/7	Chesapeake ARC	589-	AB-14-	4599
W6CXW/6	Sam Niles' Boys	766-	B-15-	4596
W8DQU/9	W. J. Chat. RC	751-	AB-15-	4539
W3PSH/3	Keystone ARC	504-	A-8-	4536
K8AXU/0	Northwest St. Louis ARC	1043-	BC-10-	4527
W5PDO/5	Los Alamos ARC	752-	B-10-	4512
K2LSA/2	State Line RC of N.Y.	442-	A-20-	4478
W3QA/3	Friendship ARC	652-	AB-23-	4454
W0CIV/0	Fullerton RC	873-	BC-10-	4422
W2AZV/2	Wantaugh RC	455-	AB-23-	4403
K9RHH/9	Menominee Falls RC	675-	AB-16-	4359
K1ZIN/4	W8M-TV RAC	643-	B-4-	4358
W1APE/7	Seaside ARC	639-	B-15-	4334
W8BZN/9	J.M.O. VHF ARC	643-	AB-20-	4323
W2LZ/2	Walton R. Assn.	466-	AB-11-	4307
VE4BB/4	Winnipeg AR Assn.	901-	ABC-19-	4284
K2IYO/2	Salem County RC	419-	A-12-	4271
W8EWZ/9	Niobrara Valley RC	626-	B-22-	4250
K3AER/3	Lakeshore AR Assn.	590-	AB-6-	4250
W8EBE/0	Southwest Mo. ARC	607-	B-27-	4142
W8NS/5	Bartlesville ARC	663-	ABC-22-	4115
W4AZON/4	Onslow ARC	602-	B-10-	4112
W6KA/6	Pasadena RC	451-	A-15-	4086
W2MO/2	Livingston ARC	560-	AB-6-	4083
W9QQQ/9	Rockland sparta Tomah ARC	597-	B-5-	4082
W1HEB/1	Middlesex ARC	621-	AB-12-	4071
W5ABD/5	Westside ARC	586-	B-12-	4016
W8EAU/9	Outagamie RC	506-	AB-10-	4016
W1SP/1	(nonclub group)	387-	A-3-	3983
W1AANZE/4	R.A. Transmitting Soc.	377-	B-12-	3962
K6JVN/0	Ornate Order of Blood-shot Eyeballs	560-	B-8-	3860
W8FIT/0	Albert Lea Spiderweb AR Assn.	642-	R-7-	3852
K8IEK/8	Port Huron AR Org.	375-	R-15-	3850
K9ENM/9	Communitor RC	575-	H-8-	3850
W8QBC/8	Oak Park ARC	573-	H-8-	3938
K2WV/2	(nonclub group)	621-	AB-6-	3792
K7SKW/7	Mount Baker ARC	548-	H-9-	3788
K9MMS/9	(nonclub group)	547-	H-8-	3782
K3LLE/3	Yale AR Soc.	474-	AB-6-	3770
W6GDD/0	Yolo County CD ARC	348-	AB-7-	3749
K4LZV/4	(nonclub group)	537-	B-7-	3722
W2SUS/2	South Amboy AR Assn.	408-	A-	3672

K9BGL/9	Belleville AR Founda- tion	437-	AB-5-	3699
W4HHO/4	Charleston ARC	611-	R-13-	3666
W8JZR/5	Edison H. S. RC	514-	AB-7-	3621
W2GLO/2	Levittown ARC	428-	AB-8-	3584
W8RLP/8	(nonclub group)	405-	AB-3-	3569
W5PFC/5	Jackson ARC	589-	B-10-	3534
K9BSL/9	Millie High Handbenders (nonclub group)	522-	AB-6-	3525
K4FEC/4	(nonclub group)	503-	H-	3518
W7KW/6	Aeronautical Radio Inc. Ozone AtCo	569-	AB-7-	3483
W5OAR/5		495-	B-15-	3476
W89NJN/9	Random RC	494-	AB-5-	3476
W5PFL/5	Greenwood ARC	495-	B-	3470
W21ANL/1	Delano ARC	434-	B-15-	3464
W6ZU/6	Red Bud ARC	561-	B-10-	3366
K8AIT/8	Annapolis Valley ARC (nonclub group)	558-	R-4-	3348
VE11M/1		557-	BC-6-	3332
W8BSS/7	Blue Grass ARC	550-	R-	3300
W44MBD/4	Lake AR Assn.	463-	H-	3298
W5TKY/4	Loyola Univ. ARC	462-	H-	3272
W8RFU/9	Handhoppers RC	462-	H-8-	3272
W9GFD/9	Prarie ARC	492-	AB-10-	3261
VO1CU/1	Soc. of Newfoundland RA	456-	B-17-	3251
W44NZ/4	Dalhousie RC	457-	B-5-	3242
W9HHA/9	Milwaukee School of Engineering ARC	450-	AB-7-	3227
W2JUG/2	Burlington AR Soc.	448-	AB-7-	3210
W9VMW/9	Cass County RC	535-	B-8-	3210
W8BML/6	Mount Shasta ARC	450-	B-20-	3200
W5ZDN/5	Central Texas ARC	448-	B-18-	3188
VE3RM/3	Ottawa Valley Mobile RC	531-	B-10-	3186
W4O1ZO/0	Minnetonka H. S. ARC	526-	B-7-	3161
W82MFK/2	Lackawanna AR Assn.	519-	B-	3114
W9HFG/9	Chicago Radio Traffic Assn.	355-	AB-9-	3089
K4EOP/4	(nonclub group)	514-	B-5-	3084
W5FMO/5	(nonclub group)	403-	AB-12-	3083
W0TQD/0	Oregon Trail ARC	428-	B-4-	3068
K8UZV/8	Parma RC	511-	H-12-	3066
W8TV/8	(nonclub group)	425-	B-14-	3050
W8EKB/0	Johnson County RAC	418-	AB-12-	3023
K8CJU/9	R.A. Megacycle Soc.	408-	AB-8-	2996
W44XA/4	Knox RC	412-	AB-13-	2970
K9VHB/9	Ottawa RC	814-	C-8-	2940
VE1UB/1	CBC Halifax ARC	384-	AB-12-	2924
W0GXX/0	Lee's Summit RC	604-	BC-25-	2828
W40GH/0	Story County ARC	387-	B-12-	2798
K1NQG/1	Fid-illy ARC	376-	B-	2766
K2UAR/2	Empire AR Soc.	458-	B-8-	2748
W8AIP/5	Wheat Straw ARC	351-	AB-6-	2744
W01D/0	Iowa City ARC	652-	BC-12-	2738
K4AE/4	Tidewater ARC	456-	B-15-	2736
W5SSV/5	Fort Arthur ARC	407-	AB-20-	2718



California hams do things in a big way! Here the antenna setup for the Pacific RC, **K6BAG/6** tops for the seven-transmitter group with over 20,000 points. The 40-meter beam on a 40-ft. pole crashed twice before finally going up!



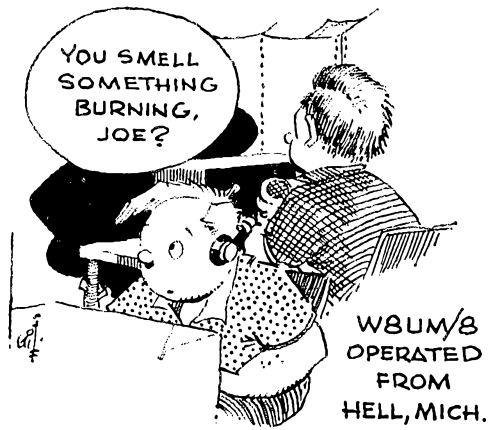
Here's the "Spirit of '66" as W7DIS and W7ADU do honors for the Tualatin Valley ARC, **W7OTV/7**, in the 1-transmitter class.

W80DJ/8	Buckeye Shortwave R Assn.	648-BC-8-2733
WA3FJV/3	North Poseo ARC (nonclub group)	372-B-6-2732
W2ATV5/2	Troy RC	365-B-8-2690
K5DDM/5	Richardson ARC	146-B-10-2676
W4AM/4	Frye ARC	145-B-10-2670
VE3AJ/3	Lakehead ARC	361-B-6-2666
W7NBR/7	Spokane ARC	436-B-4-2616
VE7BQ/7	West Kootenay ARC	347-B-11-2582
W72W/4F/2	Mid-County Net ARC	284-A-10-2556
W3FT/3	Baltimore ARC	337-B-15-2522
WA7PQD/7	Emerald AR Soc.	115-B-12-2500
K0ALC/0	ARC of Jackson County AR Transmitting Soc.	319-AB-7-2498
W4RCC/4	Permian Basin ARC	416-B-16-2496
W5NW/5	Lorain VET Club	652-C-2456
K8JWV/8	The Ontario Pithulms	282-AB-7-2447
VE7TOT/3	Estero RC	319-AB-8-2438
W6GQYK/6	Tri City ARC	321-B-2426
W3ABT/3	Univ. of Penn. ARC	401-B-7-2424
K2HPL/2	Cranford ARC	268-A-15-2412
K8HPR/8	Worthington H.S. ARC	241-AB-7-2383
W8AM/8	Coffee Dunkers of Detroit	397-B-8-2382
WA0KXB/0	Spencer AR Klub	308-B-7-2348
K5HTF/5	Carbide ARC	307-B-5-2342
WA0HAE/0	Sarna ARC	398-B-7-2288
VE3SAR/3	General Motors Institute RC	275-AB-16-2282
K8HPS/8	Steele County ARC	296-B-5-2276
WA0DGV/0	Chenango Valley AR Assn.	294-B-16-2264
W2RME/2	Ottawa ARC	376-B-12-2256
W0SQN/0	Cromwell AR Soc.	276-AB-10-2252
K1FNU/1	Reynolds ARC	263-AB-8-2252
W5JUR/5	Assn. RA de la Mauricie (nonclub group)	289-B-15-2234
VE2NO/2	Field Day Needle Benders ARC	321-AB-3-2232
W8LEJY/8	Meriden ARC	318-BC-8-2216
WB2AFU/2	Bell ARC	262-AB-15-2183
W1NRG/1		278-B-15-2168
WA0KSS/0		



With the first light of dawn on June 26, operators of the Penn Wireless Assn., **W3SK/3** (6-transmitters) encamped at the farm of K3BRR, observed two horses in the meadow on the site where only one horse had been the previous evening. Appropriately the new colt was named "Field Day."

VE1DP/4	5th Flon ARC	276-B-3-2156
VE2UN/2	ARC of McGill Univ.	407-AB-12-2148
W7TGA/7	Capital City ARC	323-BC-15-2142
W1ECP/1	Southern AR Assn.	352-B-12-2112
G3TYL/W9	Hoosier Lakes RC	362-AB-8-2090
WB4DAV/4	Central Virginia ARC	351-B-8-2054
W8GDN/8	Greater Area RC	258-B-9-2018
W1HHR/1	Exploit Posts 64 & 811 (nonclub group)	240-AB-12-2015
K6UIZ/6	Grand Island AR Soc.	242-AB-4-2015
W0CUE/0	(nonclub group)	212-AB-15-2005
K3KTE/3	De La Salle H.S. ARC	326-AB-4-1983
K9LEO/9	Black River Valley ARC	327-B-3-1962
W2RAM/2	Grete ARC	230-BC-6-1934
K0JOO/0	(nonclub group)	638-C-6-1914
K7GAH/7	U.S. Bureau of Mines ARC	231-B-9-1909
K3RZX/3	The 287 Bullshooters	417-B-6-1902
W0DTE/0	Apple Ridge ARC	315-B-8-1890
VE7AW/7	Western Electric ARC	311-B-1866
K9AVO/9	Indian Hill and Modler H.S. RC	309-B-8-1851
WA8OVT/8	Cocoonino County ARC	322-B-4-1841
WA7EUT/7	North Fork RC	193-AB-7-1802
VE2DN/2	Pb. AR Assn.	257-B-12-1802
W40KUH/0	American RC of El Cajon	203-AB-7-1776
W6BGS/6	(nonclub group)	140-A-4-1760
K8TQM/8	6 Up ARC of Burlington	140-A-6-1760
WA2TPV/2	Buckeye Racehewers RC	163-AB-24-1751
W8RB/8	Upper Dublin ARC	181-AB-7-1742
K3FWN/3	Marquette-Memorial ARC	204-B-4-1721
W8PLF/8	Western Electric Co Montgomery shops ARC	183-AR-10-1727
WA9DNZ/9	Regina AR Assn.	287-B-6-1722
VE5NN/5	Eastern Sultok RC	256-B-10-1716
K2BC/2	Jamestown ARC	199-B-8-1694
W0FX/0		



W8UM/8
OPERATED
FROM
HELL, MICH.

WA0HXW/0	Pleasant Valley H.S. RC	199-B-10-1691
VE7AWJ/7	Powell River ARC	192-B-8-1677
W8VHY/8	(nonclub group)	423-BC-6-1677
VE2BIV/2	(nonclub group)	181-AC-6-1670
W82PTL/2	Tecumseh ARC	257-AB-5-1650
VE3TCD/3	St. Thomas ARC	212-AB-8-1602
VE1HL/1	Keith Rogers Memorial RC	166-AB-15-1589
W8DEP/5	Robert E. Lee ARC	140-AB-8-1517
W7AC/7	Williamette Valley DX C	505-C-5-1515
VE1AQ/1	Moneton Area ARC	250-B-18-1510
W9ABST/9	(nonclub group)	245-B-4-1470
K9HHD/9	Elkhart Red Cross ARC	160-B-7-1460
WB2NXX/2	Ele-tronic Bulldogs RC	157-B-5-1412
W62YK/2	(nonclub group)	151-AB-6-1436
W6KII/6	Dunsmuir ARC	311-C-6-1433
W7TD/7	Apple City RC	153-B-6-1418
K3SZM/3	Dover Dist. 6 & 2 ARC	135-A-6-1395
W9AXD/9	Rockford AR Assn.	238-BC-7-1388
K1ZXN/1	Down East RC	148-BC-3-1382
VE6VE/6	(nonclub group)	213-BC-7-1382
W0RGG/0	Pioneer RC	225-B-12-1350
W45CCH/5	Walton ARC	43-B-4-1347
W8PZD/8	Berea RC	209-B-8-1254
W9AMCB/9	(nonclub group)	205-B-6-1230
WA2HRR/2	(nonclub group)	170-AB-6-1227
W0TWU/0	McPherson ARC	202-B-4-1212
W488MJ/8	Lapeer County AR Assn.	168-AB-15-1176
W3ZRQ/3	EPa. Wireless Emitters Assn.	272-AB-5-1157
W0AZR/0	Ashton Area ARC	330-BC-22-1148
W8WNA/8	Chippewa ARC "A Group"	65-B-27-1110
W8SQMZ/9	Crystal Crokers AR Soc.	76-AB-10-1076
K9STN/9	Crane AR Soc.	176-B-7-1056
W4AOAE/0	(nonclub group)	176-B-3-1056
K9CJB/9	Pleo Rams	91-B-1016
VE8KIP/2	(nonclub group)	162-AB-5-1026
W6GJW/2	Cherish ARC	600-BC-1006
W4ARPL/4	Huguenot H.S. ARC	83-B-8-998

W5ERC/5	Kinesville RC.....	156-	AB-	-	948
W7AJX/7	Trotter AR Assn.....	160-	BC-	5-	933
W8VPV/8	Cuyahoga Falls RC.....	118-	AB-(8-		930
W6SG/6	Marlin ARC.....	149-	B-	-	894
W4WSB/4	Ancient City ARC.....	145-	B-	5-	870
K9LVL/9	Miami County RC.....	102-	AB-	8-	852
W8CIA/8	Louisville ARC.....	142-	B-10-		852
K2TRS/2	Chango Valley RR S. ARC.....	119-	AB-	4-	810
K4HBV/4	Talladega RC.....	214-ABC-	7-		697
W82PMB/2	Arthur L. Johnson Re- gional H. S. ARC.....	75-	AB-	4-	645
K8WBL/9	Xavier Univ. RC.....	97-	AB-	5-	621
K8PHO/8	Marylms RC.....	80-	AB-	6-	613
W8QLS/8	Delaware County AR Assn.....	98-	B-	9-	588
WA8TGM/8	Youngstown Univ. ARC (nonclub group).....	185-	B-	5-	586
W9CJ8/9	(nonclub group).....	87-	B-	3-	510
VE36NK/3	Westminster H. S. ARC	210-	AB-	3-	502
W86JLV/6	Midland ARC.....	13-	AC-	4-	333
W5QGG/5	Teletype Employees AR Soc.....	51-	B-	5-	324
W9COW/9	Mound AR Assn.....	101-	AB-	5-	319
W8DYY/8	Wassuk Range RC.....	36-	B-	6-	216
WA7DLA/7					

Three Transmitters Operated Simultaneously

W3LUW/3	Germanatown RC. Senior Group.....	1626-	A-12-15,139		
W5KHB/5	Old Natchez ARC.....	1803-	AB-15-14,850		
W4LDE/4	Louisville's Active Ra- dio Operators.....	1756-	AB-12-12,104		
W0DK/0	Boulder ARC.....	(270-	A-20-11,430		
K3QR/3	Harrisburg DX Soc.....	1146-	A-17-10,814		
K3MTK/3	Germanatown RC.....	1152-	AB-20-9592		
W5CCKP/5	Irving ARC.....	1436-	AB-15-9435		
VE7ARV/7	Vallou AR Assn.....	1445-	AB-35-9324		
W6HS/6	Crescenta Valley RC.....	1097-	AB-18-9161		
W1SEA/1	Open Air Operators C.....	1265-	AB-10-9071		
W9BFO/9	South Eastern Illinois Ham Soc.....	1639-	BC-18-8867		
K2BR/2	Southern Counties AR Assn.....	911-	A-20-8699		
W1TRC/4	Kingsport ARC.....	1381-	B-29-8606		
K2TBN/2	Lockport AR Assn.....	1059-	AB-20-8429		
W8VVL/8	Queen City Emergency Net.....	1297-	AB-35-8396		
W3OK/3	Delaware-1-ehigh ARC.....	1110-	AB-21-8252		
W6PML/6	United RAC.....	1134-	AB-15-7885		
VE7BJR/7	Burnaby ARC.....	847-	A-25-7623		
W9RJA/9	Ozaukee RC.....	1166-	B-24-7496		
W5GZG/5	Dallas Test Meter Net.....	1122-	AB-16-7265		
W9YW/9	Rho Pissill AR Assn.....	1032-	AB-12-7221		
W2HOI2	Order of Boiled Owls of N.Y.....	1118-	B-	7208	
WA9HRE/9	Argonne RC.....	1076-	AB 20	7169	
W4UWA/3	Brassounders AR Fra- ternity.....	782-	AB-	3-7121	
W9LM/9	Northwest ARC.....	964-	AB-16-	7106	
W5EC/5	Dallas ARC.....	1100-	A-35-	7100	
W4WV/4	Tri-Town RAC.....	1035-	AB-29-	7079	
W4ABK/4	Kentucklana RC.....	1035-	B-24-	6710	
W4FVY/4	Andous RC.....	1020-	B-	6620	
K4OXL/4	Limestone ARC.....	1016-	B-11-	6606	
K9YHL/9	Lawnside Chicago Boys Club AR Assn.....	1002-	B-14-	6512	
K6QH/6	South Bay AR Soc.....	960-	AB-15-	6440	
VE3CCR/3	ARC of Cooksville.....	889-	AB-12-	6386	
W0TCF/0	Independent AR Field Day C of Linn County	977-	B-14-	6362	
W8ZHO/8	Muskogon Area AR Council.....	1306-ABC-	17-	6285	
K6GGS/6	Citrus Belt ARC.....	635-	A-30-	6215	
KZ5AX/KZ5	USAF Southern Com- mand MARS Club.....	1063-	BC-12-	6134	
W1AQ/1	Associated RA of So. New England.....	929-	B-17-	6129	
W12PNU/2	Larchfield ARC.....	919-	AB-	6065	
VE2ARC/2	Montreal ARC.....	925-	B-14-	6050	
W8MF/8	Cathoun ARC.....	859-	AB-15-	5999	
K2GQ/2	Irvington RAC.....	996-	B-35-	5976	
W6NJ/6	Past Whittier RC.....	822-	AB-	5906	
K4GGC/4	Humbolt ARC.....	899-	B-11-	5894	
W6LS/6	Looked Employees Recreation ARC.....	738-ABC-	-	5891	
K4CPO/4	Nashville ARC.....	890-	B-14-	5840	
W9REG/9	Tippacogue AR Assn.....	926-	AB-15-	5835	
VE3UOT/3	Hart House ARC.....	647-	A-12-	5823	
W0ERJ/0	Stony City AR Assn.....	885-	B-15-	5810	
K4CG/4	U.S. Coast Guard ARC.....	867-	B-15-	5702	
W9MJL/9	Vermillion County AR Assn.....	950-	B-25-	5700	
VE0NQ/6	Calgary AR Assn.....	863-	B-27-	5678	
W488T/8	Newark AR Assn.....	835-	AB-10-	5645	
W4NGS/4	Columbus AR.....	924-	B-20-	5564	
WA8QIP/8	Greater Pontiac VEF Soc.....	834-	B-16-	5504	
W0BRN/0	Three Rivers ARC.....	813-	B-12-	5378	
W0EQI/0	Ak Sar Ben RC.....	813-	B-30-	5378	
K8SCM/8	Oh-Ky-In VHF AR Soc. San Diego Bird Watch- ing Party Pooling & Chasing Soc.....	731-	AB-10-	5276	
W6CAL/6					
W8SOE/0	Wlehita ARC.....	789-	AB-7-	5258	
WSQK/8	AR Soc. of Calhoun County.....	874-	B-37-	5244	
W9NSA/9	Chain of Lakes ARC.....	785-	B-17-	5210	
W0LBY/0	Charles E. Newton ARC	778-	B-	5168	
K4HYB/4	Charles E. Newton ARC	759-	AB-50-	5148	
W9JNL/9	Bloomington ARC.....	910-ABC-	11-	5054	
W86NDU/6	Marina ARC.....	605-	AB-18-	4994	
W48NTU/8	Marina ARC.....	823-	AB-10-	4977	
WA8PLZ/8	Division Area ARC.....	782-	AB-	4932	
W49IGF/9	Miamisburg Wireless Assn.....	790-	AB-15-	4908	
W49PCB/9	Tipton Co. ARC.....	681-	AB-11-	4859	
W49LQ/9	Worth Township ARC.....	728-ABC-	9-	4791	
	Indianapolis Red Cross RC.....	712-	B-8-	4772	

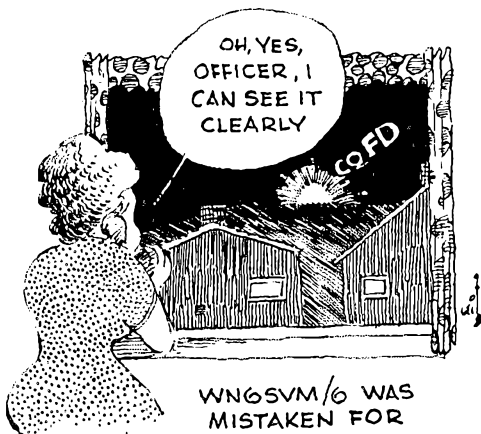


Off to a bad start for the Fresno ARC, **W6TO/6**, as the 20-meter beam collapses. The crew manned two setups scoring 4695 points.

K58KF/5	Gulf Area Young Ladies AR Klub.....	678-	AB-8-	4766	
W5QAY/5	Oklahoma Central VHF C.....	652-	AB-15-	4709	
K2FRO/2	IBM Club AR Assn.....	699-	AB-18-	4703	
W7NCW/7	Lower Columbia AR Assn.....	770-	B-15-	4620	
W4AB/4	Broward ARC.....	1118-	BC-18-	4573	
W3RQZ/3	Philmont Mobile RC.....	635-	AB-20-	4559	
W4ANL/4	(nonclub group).....	733-	AB-	3-4491	
W0JY/0	Prairie Dog ARC.....	882-	BC-10-	4439	
KZ5CZ/KZ5	Canal Zone AR Assn.....	560-	AB-	4388	
W20RY/2	Rome RC.....	669-	AB-21-	4359	
W0MG/0	Northeast Iowa AR Assn.....	634-	B-19-	4304	
W9CZII/9	Winslow AR Soc.....	631-	B-7-	4286	
K6CUC/6	El Segundo CD R Group.....	600-	AB-9-	4259	
K4HUF/4	Washington County CD Network.....	624-	B-10-	4211	
W7DP/7	Walla Walla Valley RAC.....	618-	AB-19-	4217	
VE3HVC/3	Humber Valley ARC.....	416-	A-15-	4180	
K2QDP/2	Woodbridge RC.....	545-	AB-25-	4187	
K0TSM/0	Goshen ARC.....	615-	B-12-	4172	
K0LDP/0	Lincoln ARC.....	589-	AB-18-	4115	
VE3GBN/3	Grey Bruce ARC.....	503-	AB-	6-4046	
W7PXL/7	Valley RC of Eugene, Oregon.....	667-	B-	4002	
K5QHD/5	Garland ARC.....	579-	B-15-	3988	
W43CCP/3	Artley RC.....	500-	AB-13-	3939	
W0CBL/0	Northeast Missouri ARC.....	572-	B-12-	3932	
W6FBK/6	Humboldt ARC.....	561-	B-8-	3866	



The Ill-Mo RC, **WA9HHH/9**, operating in 2-A, experienced generator troubles just prior to the start. On the left, **WA0LFX** seems to be asking **WA9KGX** and **WA9HHH**, "Now what are we going to do?"



WNGSVM/6 WAS MISTAKEN FOR A UFO

K4MAC/4	Panama City ARC	500-	B-20-	3860
K5VO/75	Lawton Ft. Hill ARC	648-	B-14-	3842
W8CJN/6	Palomar RC	356-	B-15-	3836
W3AD/3	Lancaster R. Tr. Assn. - ing Soc.	524-	AB-14-	3809
K0ZKN/9	Midwest ARC	517-	B-12-	3782
W8CJN/8	Kettering ARC	511-	AB-9-	3770
W3CDI/3	Baltimore Police Dept. - Insulate ARC	428-	B-9-	3756
W8VA/8	Tri-State AR Assn. (non- club group)	619-	B-30-	3711
W6BYA/0	Zoro Beaters ARC (non- club group)	617-	B-5-	3702
W6898/6	Zero Beaters ARC (non- club group)	586-	BC-5-	3673
W5PTK/5	Teche ARC	60-	B-5-	3630
K2YCL/2	Edison RC	511-	B-8-	3626
K2YNT/2	Edison RC	487-	AB-10-	3614
W61UJ/0	Menchen "V" RC (non- club group)	511-	B-12-	3568
W0VZG/0	Menchen "V" RC (non- club group)	501-	B-8-	3554
W8IRM/8	Pilot Knob ARC	531-	AB-15-	3549
W8BTK/0	Motor City RC	481-	AB-10-	3504
K4TEB/4	Black Hills ARC	199-	B-35-	3494
W3AAV/3	Lynchburg ARC	480-	AB-	3482
K4KAZ/4	West Branch AR Assn. - Atlanta Soc. of Teenage Radio Ops.	448-	AB-13-	3471
W4NVU/4	Dade RC	492-	B-12-	3452
ENOW/8	Metropolitan Hagehew- ers C.	571-	B-20-	3436
K2PTZ/2	North Jersey DX Chas- ing Assn. & Woodbridge Town- ship AR Transmitting Soc.	358-	AB-13-	3422
		523-	AB-10-	3405



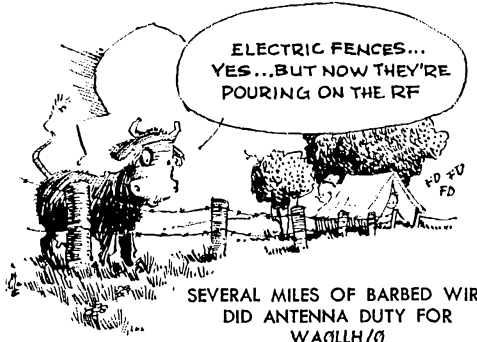
K2ETE, Club President of the Trylon RC W2MVS/2, stuck to the letter of the law of the "Spirit of FD Bonus" and did indeed run everything on emergency power, including his razor. The group entered the two-transmitter class scoring 2690 points.

W3PGA/3	Aero ARC	182-	B-0-	3402
W8CWL/8	Six Meter Cleveland	378-	A-21-	3102
K0LDN/0	Greater Nevada	480-	B-18-	3380
W4UJAZ/4	Illinois ARC			
	Mullenberg Co. AR Soc.	475-	B-6-	3355
W70SQ/7	Bountiful ARC	160-	AB-8-	3353
W49BW/0	Notre Dame H. S. RC	112-	AB-18-	3321
W40JX/0	Winnipeg ARC	547-	B-15-	3282
W5EA/5	Saskatoon ARC	511-	B-15-	3208
W45NRS/5	Curry County ARC	628-	AB-6-	3258
W49HT/9	6 & Two Ham Club	471-	AB-17-	3210
W80WO/8	Steubenville Area ARC	435-	AB-31-	3185
K9VHF/9	Fishers H. S. ARC	398-	AB-7-	3077
W0GCH/0	Pikes Peak R.C.	506-	B-20-	3036
KZ5AA/KZ5	U.S. Army MARS Sta- tion	501-	B-8-	3024
VE7IP/7	East Kootenay ARC	110-	B-13-	2969
W6AEX/6	Soc. of AR Operators	193-	B-21-	2958
K5DRF/5	Bavou City VHF RC	498-	B-35-	2916
K6KXD/6	club group	417-	AB-3-	2910
W46FTM/6	(non-club group)	476-	B-6-	2859
K8DYB/8	Northern Panhandle ARC	387-	B-12-	2822
K8LZJ/8	(non-club group)	464-	B-13-	2781
W1ASZ/1	Univ. of New Hamp- shire ARC	380-	B-10-	2780
W491AK/9	N-A-B-A-GE RC	370-	B-6-	2720
W00SC/0	H-PAK	377-	B-13-	2702
W5JTY/5	Port Lyautey ARC	105-	BC-5-	2717
WB6OLD/6	West Valley Reg Chew- ers Assn.	244-	AB-7-	2681
W0ZRT/0	Bismarck Area R Club	438-	AB-10-	2638
W18YE/1	Newport County RC	316-	B-25-	2539
W1BXA/1	West Hartford ARC	243-	AB-7-	2528
K9EAM/9	Green Bay Mike & Key C	420-	B-14-	2520
W7NTO/7	Lewis County ARC	221-	A-10-	2499
W7JTR/7	Northwest Washington 7s	329-	B-8-	2471
W43AOP/3	Exile R Post 328	269-	AB-7-	2470
W19PBZ/9	Plk H. S. RC	338-	ABC-5-	2411
K3BFO/3	Jerrison County AR (non-club group)	206-	AB-11-	2375
K1EVD/1	(non-club group)	208-	AB-5-	2370
W7LA/7	Twin City RC	523-	ABC-14-	2311
W1UJF/1	Marlboro AR Assn.	257-	AB-6-	2312
K9RFL/9	Lombard ARC	321-	AB-6-	2310
K1EDS/4	Redmond ARC	382-	B-	2291
W8RGO/8	Barnet & Willoughby ARC	503-	BC-12-	2165
W2AVD/2	Westrex Communica- tions Club	361-	B-16-	2166
K2YBN/2	Ranococas Valley AR Assn.	229-	AB-5-	2153
K3QBQ/3	Portland Club	332-	AB-8-	2140
K9FHQ/9	Clinton County VHF RC	356-	B-17-	2134
W49LHU/9	DeWitt County ARC	251-	AB-14-	2034
K6CBP/6	Sierra foothills ARC	326-	AB-9-	2001
W420W/4	Chesapeake ARC	303-	BC-3-	1938
W40HOU/0	Blue Valley ARC	348-	B-18-	1988
K8TTW/8	Oshimo ARC	238-	AB-9-	1985
W84ANP/4	McGill ARC	657-	C-6-	1971
K9ZLB/9	Marshall County ARC	243-	B-10-	1958
W9MEP/9	Sterling-Rockfalls Ar C	310-	ABC-	1930
W8YDK/8	Millford ARC	251-	AB-11-	1929
K3LEF/3	Mahoney Valley Brass Pounders Club	231-	AB-8-	1919
W6YBE/6	Burlingame RC	181-	BC-	1913
K9ONA/9	Six Meter Club of Chi- cago	160-	AB-14-	1901
K7LZF/7	Hollgate RC	333-	B-5-	1898
W3PNL/3	Souderton Area Elec- tronics Research Assn. (non-club group)	222-	AB-8-	1883
W9CAV/9	St. Petersburg ARC	231-	B-9-	1886
W4GAC/4	St. Petersburg ARC	214-	AB-10-	1824
KL7WAF/KL7	Wildwood ARC	400-	BC-6-	1778
W9BUC/9	Eau Claire ARC	425-	C-18-	1775
W8ERB/8	Champaign County ARC	366-	BC-	1694
VE7FY/7	Royal City AR Assn.	271-	AB-10-	1685
K2HJY/2	Medford Wireless Assn. (non-club group)	251-	ABC-8-	1663
W8FGI/8	(non-club group)	272-	AB-3-	1641
W0AIM/0	Tri-State AR Soc.	158-	AB-6-	1628
W82PXW/2	(non-club group)	188-	B-3-	1628
W0KY/0	(non-club group)	270-	B-9-	1620
K9IXS/9	Elkhart H. S. ARC	178-	AB-8-	1601
WB6HJM/6	Lodi ARC	219-	AB-6-	1596
K1JMR/1	Norwood ARC	172-	AB-6-	1580
K2BFR/2	Auburn AR Assn.	236-	AB-10-	1503
K2PWE/2	Princeton YMCA Sr. RC	216-	AB-11-	1494
W4VMT/4	Biscayne ARC	209-	AB-	1467
W8AEG/8	Grafton Co. ARC	240-	B-	1410
WB2THQ/2	Audubon RC	164-	AB-6-	1398
K7HJM/7	Polk County ARC	193-	AB-4-	1308
VE7TJ/7	Victoria-Shorn Wave C	214-	AB-	1284
W9DUK/9	Delaware AR Assn.	204-	B-25-	1224
W0PNU/0	North Hill ARC	97-	AR-12-	1191
K7UER/7	Portland Roses	106-	B-	1136
W2CWW/2	Staten Island AR Assn.	511-	AB-10-	1106
W3HZW/3	Kent County ARC	170-	AB-6-	1015
W9AA/9	Hamfesters RC	275-	AC-8-	1089
W1LN/1	Danvers AR Assn. & C.D.	70-	AB-9-	1034
VE3BNK/3	Roulin RC	172-	B-6-	1032
W2WCR/2	Amateur VHF Institute of New York	88-	B-8-	1028
WB28SZ/2	(non-club group)	250-	AB-5-	1021
W9DQA/9	Wisconsin Rapids ARC	442-	ABC-10-	993
W3EXW/3	Etna RC	118-	AB-10-	945
KL7DG/KL7	Northland ARC	67-	AB-7-	941
W32KIZ/2	Endrott, Endwell ARC	152-	B-4-	912
W5WEI/5	Tappa Ke	67-	B-9-	902
W49RFQ/9	Cooney RC	320-	BC-6-	845

WA6HJ/9	Hector Area RC.	418-	B-7-	836
W4HAW/4	West Palm Beach ARC	164-	BC-11-	732
K8LUC/4	Evendale AR Soc.	341-	AB-	723
W0HVL/0	Flint Hills ARC.	201-	C-15-	603
K7LYY/7	Flathead Valley ARC.	206-	C-6-	618
K1IPB/1	Capeway RC-Hingham RC.	89-	AB-	567
WSPQ/8	Integrity RC.	205-	AB-	418
W2BMW/2	Tu-Boro RC.	126-	B-9-	252
K4VXF/4	ARC of Greer.	110-	B-5-	220

Four Transmitters Operated Simultaneously

KOVSS/2	Seven-Bleven ARC.	1613-	A-25-	14,517
WAFY/8	Van Wert ARC.	1498-	A-25-	13,982
W3ISE/3	Soc. for the Preservation of Key Chicks, splat- ter and TVI.	1536-	AB-	9-12,500
WA6WRX/6	(nonclub group)	1325-	A-11-	12,425
W4SKH/4	Oak Ridge R Operator's Club.	1607-	AB-22-	12,251
K3SSC/3	Delmont RC.	1488-	AB-18-	10,343
K8EMV/8	Southeast ARC.	1485-	AB-40-	10,337
K5TYP/5	Keeler ARC.	1447-	AB-20-	10,184
W1WHF/1	Hamden AR Assn.	1448-	AB-20-	9,554
W1OC/1	Concord Brasspounders Histol ARC.	913-	A-10-	8717
K4LLW/4	Columbus AR Assn.	1309-	AB-35-	7,911
WRTD/8	Reading RC.	1314-	B-40-	7,884
W3BN/3	Pt. Worth Kiloevye C.	1202-	B-25-	7,737
W5NGL/5	New Providence ARC.	1189-	B-20-	7,634
WA5PDX/5	Caravan Club of Louisiana.	790-	A-15-	7,610
VE3RC/3	Ottawa ARC.	1179-	B-33-	7,574
W7IO/7	Arizona ARC.	1179-	B-25-	7,574
W5OK/5	Tulsa Council of RC.	1125-	B-40-	7,250
W5BHR/4	Greenville Mike & Key Club.	1090-	B-15-	7,040
WA9GWL/9	Flint Creek ARC.	1008-	AB-12-	6,950
W9AB/9	Michigan ARC.	992-	AB-54-	6,914
K6NCG/6	Treasure Island RC.	748-	A-15-	6,732
W8MAA/8	Central Michigan ARC.	1275-	ABC-20-	6,714
W43EW/3	Montgomery ARC.	806-	AB-	6,576
VE3HB/3	Natick AR Soc.	673-	A-	6,557
W2GLQ/2	Oakville ARC.	834-	AB-25-	6,399
WB2DXL/2	Westchester FD Club.	783-	AB-	9-6,251



W90FR/9	Joliet AR Soc.	1226-	ABC-18-	6146
VE3NSR/3	North Shore RC.	945-	AB-21-	5943
K60MS/6	Ipswich RC.	841-	AB-1-	5901
K2GE/2	Raritan Bay RC.	895-	ABC-22-	5891
W6PW/6	San Francisco RC.	856-	AB-6-	5858
W860FH/6	North Bay AR Assn.	926-	AB-54-	5820
W7AW/7	West Seattle ARC.	642-	A-7-	5778
W8A0IR/8	Colina ARC.	638-	A-12-	5742
W6WYV/6	Bellevue ARC.	853-	B-18-	5618
W4BFM/4	Decatur ARC.	838-	B-19-	5528
W3KT/3	Warminster ARC.	763-	AB-25-	5417
VE3DRT/3	Skywilde ARC.	797-	AB-22-	5373
K9AOM/9	Allison ARC.	754-	AB-30-	5195
W6OTX/6	Palo Alto AR Assn.	725-	AB-20-	5174
W6VLD/6	Douglas Spare Systems Center ARC.	594-	AB-14-	5132
W6LUC/6	Santa Barbara ARC.	824-	AB-15-	5088
W9SCF/9	Michigan City ARC.	705-	AB-12-	5088
W48FYN/8	Redford Township ARC.	676-	AB-10-	5057
W86NRK/6	(nonclub group)	837-	B-7-	5022
W86GUG/6	Silverado AR Soc.	651-	AB-12-	4955
W4SRX/4	Eglin AR Soc.	816-	AB-10-	4950
W2FWG/2	Telephone ARC of Manhattan.	738-	B-18-	4928
K2JD/2	Rocheater AR Assn.	537-	B-7-	4922
W88RV/5	Beaver Valley RC.	790-	AB-9-	4911
W0BXR/0	Davenport RAC.	732-	B-20-	4892
W3EQ/3	Hav-rford Township Emergency Radio Net.	909-	BC-13-	4598
K7NWS/7	Boeing Employees' AR Soc.	668-	ABC-20-	4409
W9EAL/9	Lake County Illinois RACES.	807-	BC-7-	4320
VE25TR/5	Univ. of Sask. ARC.	720-	B-	4320
W7CWY/7	General Electric AR Soc.	697-	AB-16-	4278
W2QYV/2	Niagara Radio Club.	510-	ABC-15-	4256
K1BKE/1	Contoncook Valley RC.	410-	A-5-	4190
W9DUA/9	Saugamon Valley RC.	609-	B-17-	4164
W9FBZ/9	NAFI ARC.	859-	BC-20-	4148
WA0LVAI/0	Hamsters VHF/UHF Club.	542-	AB-20-	4001
W3CWC/3	Antietam Radio Assn.	534-	AB-12-	3992



The Beaver Valley Amateur Radio Assn., W3SGJ/3, operated 6-A. One of the operators, W3SIK, literally got sick when Murphy struck again!

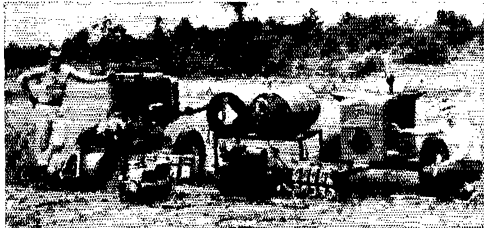
W1PUO/1	Univ. of Massachusetts ARC.	654-	R-9-	3024
WA2OH/2	Apple Pie Hill ARC.	531-	B-9-	3066
W0NHN/8	Stu Rockafellow AR Soc.	482-	AB-12-	3536
W6AE/6	Oroville AR Soc.	507-	B-14-	3542
W8RNC/8	Springfield AR Soc.	459-	AB-23-	3527
W2HCS/2	Albany AR Assn.	585-	AC-	3457
W8HHF/8	Toledo Mobile RC.	534-	AB-7-	3423
W8RL/8	(nonclub group)	549-	AB-9-	3303
W7SBC/7	Bainbridge Island ARC	409-	AB-8-	3164
WA0DHJ/0	O'Brien County AR Assn.	530-	ABC-7-	3098
W8OX8/8	Lake Geauga ARC.	505-	B-12-	3030
W2BXX/2	Polytechnic Institute of Brooklyn RC.	436-	AB-11-	2895
KL7GI/KL7	Juneau ARC.	390-	B-14-	2840
K4NUM/3	Pottstown ARC.	420-	ABC-12-	2643
W8OHR/8	Detroit Metropolitan RC.	363-	AB-5-	2631
W9QYN/9	Elk Grove ARC.	438-	B-8-	2628
K8FDD/8	DESO MARS.	438-	R-15-	2628
W4COY/4	Tri-County RC.	338-	B-10-	2528
K6H/6	North Hills RC.	405-	AB-12-	2496
W8PCQ/8	Marion VHF High Banders ARC.	331-	B-8-	2486
WA9QL/9	Marion County ARC.	609-	BC-15-	2483
W4MOE/4	Runcorn County ARC	388-	AB-10-	2346
W6LIE/6	Kern County RC.	291-	AB-15-	2285
W49SKH/9	Forest View RC.	228-	AB-15-	2252
W4RJG/8	Clinton County ARC.	249-	AB-7-	2204
VO1AT/1	ARC of Newfoundland.	278-	B-20-	2183
K8QK/8	Lancaster & Fairfield Co. ARC.	461-	ABC-10-	2115
W2MBC/2	Cherry Hill H. S. West ARC.	323-	AB-9-	2100
W48MTX/8	Monroe County Radio Communications Assn.	258-	B-8-	2048
K9TUX/9	Blissard ARC.	389-	ABC-	1886
KL7FFK/KL7	Sitka ARC.	400-	ABC-28-	1866
W3VAP/3	Ablington ARC.	306-	AB-14-	1863
W8MOP/8	East River RC.	889-	BC-	1537
W8SA/9	North Shore ARC.	167-	B-5-	1502
W8VVB/8	(nonclub group)	163-	A-3-	1467
W4P0L/0	East Central Minne- sota RC.	237-	ABC-8-	1434



It takes quite a cook to keep a ten-transmitter group functioning! Here's W7AZI doing the honors for W7DK/7, the Radio Club of Tacoma scoring almost 2300 FD exchanges.



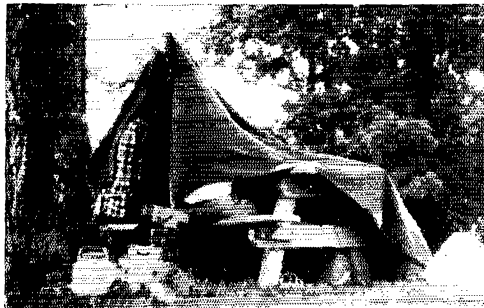
The 80-meter c.w. station of the Grumman ARC, **WA2LQO/2**, used the skills of (standing L-R) K2UAT and WB2EJU and (seated L-R) WB2MPL and K2IYK. The club went all out in the six-transmitter class for better than 13-K.



The Muskegon Area AR Council, **W8ZHO/8**, operated the 3-transmitter group with power to spare. This power compound (WA8GUK on the left and WA8DNM on the right) included a six, three, two and a half and one kilowatt generator; plus 80 gallons of fuel.



Here's a replay of events at **WA8SYN/8**, the Redford Township ARC (Class 4-A) as W8WZB pulled over the 75-meter antenna, just 15 minutes after it had been set up. Sounds like a typical FD!



The Sangamon Valley RC signing **W9DUA/9** 4 transmitters at the Illinois State Fairgrounds. The fellows at the 20 meter c.w. position were obviously ill-prepared for rain!

W3ZTC/3	Fort Venango Mike & Key Club	134-ABC-6-	1370
W10RS/1	Stratford ARC	331-ABC-12-	1284
W6UCR/6	Monterey Bay RC	403-AC-5-	1275
W1GLA/1	Framingham RC	103-AB-6-	1265
W188/1	Bedford RC	96-AB-8-	1199
W1BKQ/1	Williamable RC	171-AB-12-	1059
W3FQR/3	Dixie-Hobby Dash-Hounds	421-AB-12-	910
W8LKY/8	Tri-County R Assn	96-AB-8-	714
K2KHB/2	Brighton H. S. ARC	280-B-9-	560
K4YTZ/4	Rock Hill ARC	398-ABC-20-	441
WA9QFT/9	(nonclub group)	49-AB-5-	339

Six Transmitters Operated Simultaneously

K2AIQW/2	Five Towns RC	2108-AB-42-	16,712
WA3GCO/3	R. F. Hill ARC	1152-A-33-	10,368
W3TYU/3	Wm. Pen RC	1584-AB-10-	10,236
KH6W0/KH6	Honolulu RC	1621-B-28-	10,226
W3BTM/3	North Penn ARC	1388-AB-30-	9902
VE3BSQ/3	Bellevue & District ARC	1396-BC-13-	9473
W4WVJ/4	Loudon County ARC	1438-AB-10-	9349
W2YKQ/2	Lake Success RC	1193-AB-21-	9109
K1MUJ/1	Eastern Connecticut Amateur Assn.	1201-AB-20-	8558
W4CA/4	Ronnoke Valley RG	1271-AB-22-	8303
W6ZE/6	Orange County ARC	1075-AB-21-	7823
W1QV/1	Tri City ARC	1210-B-30-	7780
K3HKK/3	Nitany ARC	1011-AB-	7661
WA5ALB/5	Angels Roost Mountain ARC	1180-B-20-	7580
W6JJP/6	Tamplius ARC	1035-AB-29-	6983
W7RGL/7	AR Communication Service	1002-AB-6-	6767
W2ADK/2	Bergen AR Assn.	834-AB-19-	6618
W2EF/2	Genesee RA	978-AB-22-	6458
W6TJ/6	Riverside County AR Assn.	1063-AB-12-	6425
K9GXT/9	St. Clair ARC	893-AB-	6092
W6ZAW/6	Edgewood AR Soc.	685-AR-20-	5796
W44BB/4	RAC of Knoxville	805-AB-50-	5727
W3CS/3	Mohessen ARC	833-B-23-	5504
K0SL/9	Lafayette ARC	820-B-5-	5430
W7FHV/7	Clallam County ARC	815-B-16-	5390
W1AQE/1	Chelmsford AR Assn.	843-AB-14-	5256
W2FEX/2	AR Assn. of the Toluwasdas	702-B-32-	5252
W6AB/6	Seattle ARC	781-B-11-	5216
VE3ZM/3	Guelph RC	739-AB-	5171
K6HY/6	Palisades ARC	918-ABC-11-	4911
K6FB/6	Hewlett-Packard ARC	718-AB-12-	4847
W6OT/6	Oakland RC	674-AB-12-	4826
W0FO/0	Kansas City VHF Club	782-ABC-15-	4737
W6AK/8	Sawtooth ARC	775-ABC-26-	4652
W3VV/3	McKean County ARC	646-AB-13-	4523
W8GET/8	Lorain County AR Assn	634-B-15-	4304
K4BFT/5	Huntsville ARC	597-AB-18-	4279
K2U8A/2	K2USA ARC	451-AB-9-	4253
W81D/8	Seneca RC	603-AB-27-	4193
K6EAG/6	Howard ARC	771-ABC-	4113
W2BYN/2	Matawan, N. J. CD	518-AB-14-	4058
VE3PRC/3	RACES	536-AB-22-	3901
WA9EZX/9	Greater Beloit Area IAC	545-AB-18-	3899
W2ATT/2	New York RC	503-AB-12-	3779
W8ADR/8	Miligan Six Meter C.	498-AB-10-	3686
W4CUE/4	Birmingham ARC	527-B-12-	3662
W6BXN/6	Turlock ARC	795-ABC-20-	3569
W9BTD/6	Stim Valley RC	504-ABC-17-	3290
W9BXR/9	Montgomery County ARC	770-ARC-10-	3083
W1SGZ/1	AREC of Norwalk	423-AB-11-	3077
WA9JYL/9	Greenwood ARC	405-B-15-	2930
VE7HR/7	Point Grey ARC	441-BC-10-	2783
WB2QBP/2	American Red Cross Emergency RC	431-AB-18-	2733
W1MY/1	Northern Connecticut ARC	332-AB-	2630
W8VTD/8	Warren AR Assn.	404-AB-10-	2196
K2ER/2	Kessler Institute ARC	274-AB-7-	2258
W8HM/8	Trinity City AR Assn.	588-RC-1-	2180
WA1DD/1	Whisman ARC	270-AB-16-	2055
W4VTA/4	Confederate Signal Corps	326-AB-12-	2049
W7PR/7	Eagle Rock RC	289-B-9-	1734
WA3AKJ/3	(nonclub group)	72-AB-	477

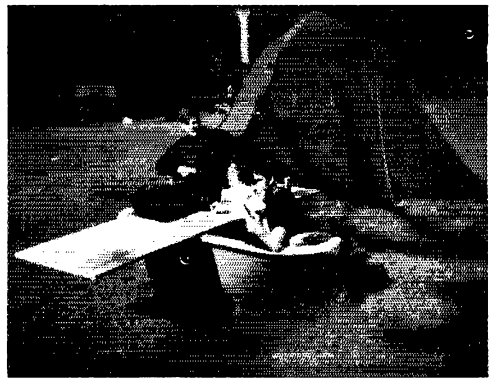
Six Transmitters Operated Simultaneously

W8HLD/8	Catalpa AR Soc.	2618-B-38-	16,218
K2AA/2	South Jersey R Assn.	2075-AB-40-	15,903
W9VZ/9	Wis-III VHF ARC	1957-AB-30-	13,754
WAZQ/2	Grumman ARC	1668-AB-	13,355
K2AB/2	Schenectady AR Assn.	1830-B-17-	11,480
W3SK/3	Penn Wireless Assn.	1323-AB-22-	9812
W8ACW/8	Genesee County RC	1505-AB-	9779
W5SC/5	San Antonio RC	1470-AB-30-	9707
K3BK/3	Southern Chester County ARC	1459-AB-45-	9431
VE3DC/3	Hamilton ARC	1272-AB-21-	8491
WASUCB/8	Monongalia Wireless Assn.	1232-AB-21-	7892
K2TRV/2	Union County AR Assn.	1231-AB-23-	7497
W98W/9	Chicago Suburban Radio Assn.	1053-AB-26-	6987
K6NYU/6	Anabeln AR Assn.	1022-B-40-	6740
VE3CRW/3	Clinton ARC	1013-B-25-	6578
W4BFB/4	Ateckleburg AR Soc.	972-AB-11-	6418
W0KQU/0	Central Kansas RC	871-AB-25-	6323
W6CX/6	Mount Diablo ARC	878-AB-35-	6303
W8TQE/8	Adrian ARC	958-ABC-43-	6023
WA6GYL/6	Cal Poly AR Assn.	743-AB-30-	5998
W4DOC/4	Atlanta RC	1058-RC-35-	5580
W20W/2	Binghamton AR Assn.	1010-ABC-21-	5565
K3GTN/3	Andrews AFB MARS	519-B-21-	5144

W6MLK/6	High Frequency Amateur Mobile Soc.....	770- AB- 6- 5376
K6LIR/9	St. Louis ARC.....	580-ABC-15- 4742
W7BB/7	Lake Washington ARC.....	835-ABC-14- 4349
W8BAE/8	Crawford ARC.....	788-ABC-25- 4233
K2UHD/2	Rockaway ARC.....	765- AC-35- 3927
W9MVZ/9	York HI RC.....	609- AB-23- 3918
K8VOA/8	Copper County RA Assn.....	487- AB- 7- 3431
W6BWK/6	Delta ARC.....	528-ABC-15- 3377
K9IZT/9	Lakeshore ARC.....	538-ABC-20- 3168
W1BCG/1	Shoreline ARC.....	401- AB- 8- 3020
VE3BA/3	Brantford ARC.....	386-ABC-25- 2960
K2PCQ/2	Northern Chautauqua ARC.....	479- BC-14- 2768
K4KON/4	Ole Virginia Hams RC.....	435- AB-10- 2724
W4PAY/4	Northern Virginia RC.....	615-ABC- 9- 2681
K6BJ/6	Santa Cruz County ARC.....	570-ABC-15- 2562
W3SGJ/3	Beaver Valley AR Assn.....	637-ABC-18- 2511

Seven Transmitters Operated Simultaneously

K6BAG/6	Pacific RC.....	3139- AB-16-20-157
W6ULL/6	Fullerton RC.....	1679- AB-23-12-184
VE3NAR/3	Nortown ARC.....	1339- A-25-12,051
W1AKAJ/8	Van Buren ARC.....	1410- AB-18- 9419
W1MV/1	Massasoit AR Assn.....	1283- AB-22- 8783
K4DPZ/4	Galvesville AR Soc.....	1309- AB-30- 8582
VE3KCD/3	Kitchener Waterloo ARC.....	1344-ABC- - 8200



The Minnetonka H. S. ARC, **WA0IZO/0**, had good clean signals. **WA0IFJ** claims this one of their two positions was very comfortable.



YOU DON'T WORK A PAIR LIKE THAT EVERY DAY

W5DPA/5	Houston ARC.....	1226- AB-50- 8125
K6QEZ/6	Ampex ARC.....	1161- AB-19- 7931
VE3MR/3	Metro ARC.....	1050- AB-27- 7331
W9FLP/9	West Albia RC.....	939- B-15- 6134
K6AGF/6	Tri-County AR Assn.....	839-ABC-11- 3801
W6FO/8	Toledo RC.....	760- AB- - 5237
W4TNN/4	Clinton RC.....	696- AB- 9- 4755
W1FW/1	Merriamack Valley ARC.....	772- AB-14- 4725
W9CQ/9	Fox River Radio League.....	787- AB-12- 4614
K4DXO/4	Vienna Wireless Assn.....	638- AB-22- 1475
W6CUS/6	East Bay RC.....	647- AB-24- 4469
W4KFS/8	Opequon Radio Soc.....	515- B-15- 3590
K1YMZ/1	Central Vermont ARC.....	369-ABC-12- 2498
K3BSU/3	Metrolitan Erie VHF Soc.....	1246- BC-19- 1987

Eight Transmitters Operated Simultaneously

W2OYH/2	Morris RC.....	2042- AB-25-18-378
VE3JJ/3	Westside RC of Toronto Communications Club of New Rochelle.....	1682- AB-30-12-223
K2YJC/2	Sonoma County RA Assn.....	1576- AB-32-10,740
W6LEJ/6	San Fernando Valley RC.....	1517- AB-26- 9977
W6ND/6	South County AR Soc.....	1483- AB-17- 9818
W6WVJ/6	Corona-Norco ARC.....	1256- AB-32- 8684
W8SDE/6	Thunder Bolt VHF Soc.....	808- AB-13- 7334
K2VAC/2	Pureville AR Assn.....	979- B-17- 5874
W1COJ/1	Suffolk County RC.....	738- B-30- 4428
W2TFJ/2		642- AB-30- 4427

Nine Transmitters Operated Simultaneously

W2LI/2	Tri County Radio Assn.....	2513- A-47-23-117
VE3OW/3	Windsor ARC.....	2529- AB-60-18,851
W9FQ/9	Wheaton Community RA.....	2870- AB-45-18,692
W9IKN/9	Elgin AR Soc.....	1587-ABC-30- 9644
W4HFH/4	Alexandria RC.....	1183- AB-45- 9212
W8UW/6	Santa Clara County AR Assn.....	1021- B- - 6123
W1HPM/1	Manchester RC.....	911- B-30- 5466
W5ANR/5	Fort Smith Area ARC.....	1143- BC-20- 5205
W8KGG/8	Huron Valley AR Assn.....	686- BC-12- 3476

Ten Transmitters Operated Simultaneously

VE3VM/3	Niagara Peninsula ARC.....	2502- AB-35-15,744
W7DK/7	Radio Club of Tacoma.....	2294- AB-52-15,343
VE3WE/3	Scarborough ARC.....	1896- AB-65-14,033
W6PMO/6	Associated RA of Long Beach.....	1958-ARC-60-11,306
W9YH/9	Twin City ARC.....	1238- AB-28- 7583

Eleven Transmitters Operated Simultaneously

W3RCN/3	Rock Creek AR Assn.....	2170- AB-41-13,690
W1NY/1	Hamden County AR Assn.....	1216- AB-28- 8741

Twelve Transmitters Operated Simultaneously

K8BYI/8	Southeastern Michigan AR Assn.....	853- AB-16- 7065
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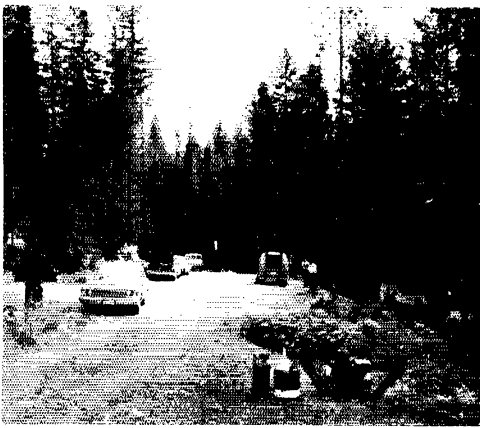
Seventeen Transmitters Operated Simultaneously

W2RJ/2	Englewood AR Assn.....	3073- AB-55-28,120
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(Continued on next page)

The Class B competition, one and two-man portables, is a popular class. **WB6ASQ/6** aided by **WB6NGE** ran two transmitters from this tent, while **K7YOF** and **OM K7GBZ** operated one 6-meter rig at Squaw Butte, Idaho.





This handsome forest area was the scene of 2-A FD operations of the West Kootenay ARC, VE7BQJ/7.

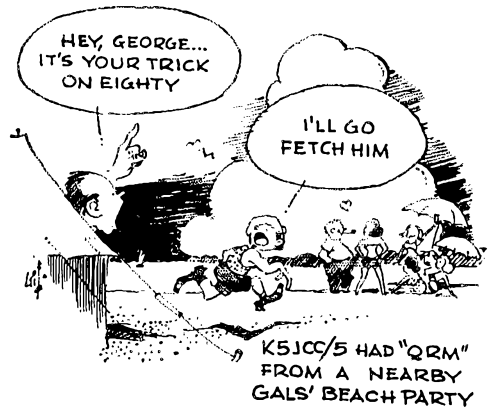
CLASS B

Grouped in this listing are the scores of portable stations manned by one or two operators. Where two persons participated, the call of the other operator (if known) is given below that of the amateur whose call was used. Figures following the calls indicate number of contacts, power and final score.

One Transmitter

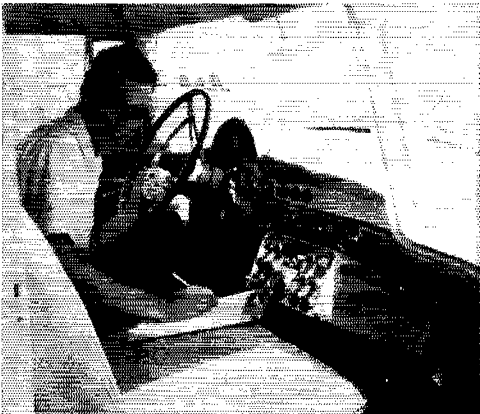
K3JIG/2	955-	A-12,893
W3DQG		
VE2ATV/2	1163-	B-7478
K3RFD/3	644-	B-6296
WA2JHE/2	120-	A-5670
WA2APT		
W6DJX/6	379-	A-5617
K6QMQ		
K9HWW/4	362-	A-5397
W3TTO		
W8TJQ/8	590-	A-5310
K8ALFO		
WA2DPT/2	379-	A-5117
K2BAM		
W83KTO/2	567-	A-5103
WB2PRF		
W7CFJ/7	465-	A-4685
K4VVE		
K4TTA/4	417-	A-4253
WA0AGM/0	690-	B-4140
WA0MYN		
WA3COJ/3	500-	A-4000
WA2LJA/2	831-	B-3604
WB6LFR/6	632-	B-3797
WB6PFA		
WA9LUD/9	499-	B-3488
WA9NGI		

W8WGR/8	187-AB-3480
WB1DAQ	
K8AJK/8	184- B-2904
WA8HIA	
VE3FOY/3	343- B-2558
W9ZMS/9	188- A-2538
W9ZMR	
WA5KUD/5	213- A-2417
WA5BOT	
WB2FGA/2 (2 oprs.)	265- A-2385
W3PWK/5	301- B-2306
VE2AQV/WB1	200- A-2300
K6AGA	
WB2TSW/1	298- B-2288
WB2TSV	
WB6RFX/6	198- A-2282
WB81RV	
K8AZE/8	368- B-2208
WA8NZH/1	
WA3RFQ/8	284- B-2204
W8KAP	
W8AZA/8	348- B-2088
WA8ADJ	
WA6MWA/6	346- B-2076
WA6KTS	
K0LJV/0	223- A-2007
K91PK	
K4TLY/4	330- B-1980

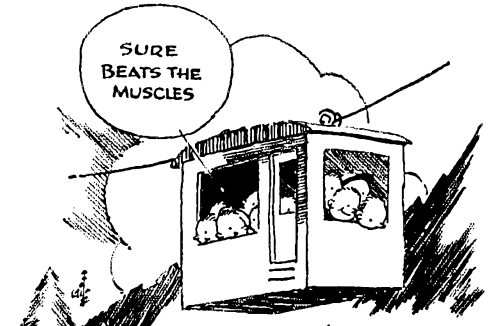


W9WRK/9	325-	B-1950
W9KDY		
K1UJR/1	315-	B-1890
K8BJJ		
W4HWK/4	154-	A-1886
K3SPX/3	138-	A-1836
WA3DFO		
K38QD/3	134-	A-1809
W3PMG		
WA9NIB/9	278-AB-1674	
WA9NOB		
WA4ZAZ/4	277-	B-1662
WA1VLQ		
WB2SZW/2	192-	B-1652
WB2PAR		
WA2YAF/2	190-	B-1640
WA2ZPB		
WA9MTZ/9	273-	B-1638
WA9MKX		
W5EXT/5	265-	B-1590
WB6AFS/6	132-	A-1550
WB6LCO		
W4YE/5	259-	B-1554
WA3EIN/5	165-	B-1490
WA9LGH/9	238-	B-1428
WA9HSS		
WA0MTAL/0	238-	B-1428
K4SFE/4	236-AB-1424	
K4WKI		
W4WYX/4	226-	B-1356
K6PO/6	100-	A-1350
WB6AIG		
WA9DAR/9	203-	B-1218
W9GJJ		
W6AEM/6	202-	B-1212
VE5IS/5	116-	B-1196
VE5GI		
K7WYV/7	115-	B-1190
WA7BDK		
WA8LJS/8	48-	A-1148
W8BLJ		
W0DEP/0	127-	A-1143
W0AWB		
K9VQR/9	66-	A-1094
WA9HCZ/7	196-	C-1088
K6ESI		
WB6MDN/6	193-	C-1079
WA8RIL/8	82-	B- 992
WN8THK		

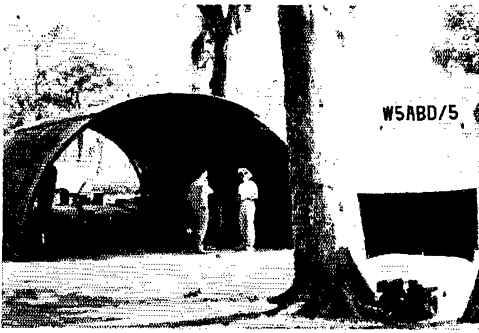
W1JAO/1	109-	A- 981
W1YUP		
W47CXD/7	160-	C- 980
K9KLE/9	160-	B- 960
WA0LJJ		
WA4TZE/4	151-	B- 906
W4BLVV/8	66-	A- 901
W3GCD/2	65-	A- 878
K3JIN/3	290-	C- 870
WA4JQ/4	63-	A- 851
WA4JAR		
K9QKA/9	109-	C- 827
K9OPR		
WB2MNF/2	54-	B- 824
WA6BAG/6	89-	A- 801
W8LXE/8	237-BC-	795
W8LYR		
K9DIM/9	131-	B- 786
K9DOL		
W2FSL/2	131-	B- 786
W2JDH		
W8CAH/8	130-	B- 780
WA8GHO		
K7YJM/7	129-	B- 771
K7YJO		
W4AP/4 (WA4s UXC MITG. oprs.)	124-	B- 744
K5SBR/5	82-	B- 738
K5HGB		
WA3BGN/3	81-	A- 729
WA3DXZ		
WB2NLU/2	25-	A- 725
W9N2VUK		
K7LXQ/7	53-	A- 716
W47CHI		
WN2VVT/2	21-	B- 614
W42N2		
VE8AKY/8	104-	B- 624
WB6JG/6	100-	B- 610
W44VZD/4	105-	B- 630
WA4DLQ		
K3OYT/3	96-	B- 576
WA3RFB/3	93-AB-	564
W93EQR		
K8HGT/8	63-	A- 567
W9JCK		
K6QHZ/6	41-	A- 554
W1HDQ/1	36-	A- 486
WA8VU/8	76-	B- 456
WA8ANI		



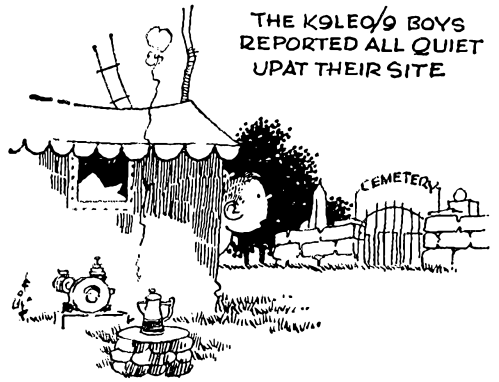
A typical Class-C station (completely self-contained mobile unit) as operated by WA0ATY/7, top mobile in the 7th call area.



THE VE7ACS/7 GANG MADE IT UP TO THE SITE WITH TWO 5-KW GENERATORS IN FAST AND FANCY FASHION....



The Westside ARC, **WSABD/5**, competed in the 2-transmitter class at Behrman Memorial Park in New Orleans. That's a 2-KW generator in the foreground.



VE1AEA/1	49- A- 441	<i>Two Transmitters</i>	
VE1AKM		WA4FAT/4	1064- A-9576
VE1EJ/1	32- A- 432	WA4EDY	
K3ZYT/3	208- B- 416	WA2UOO/2	834- A-8006
WA3BMX		WA2SRL	660- AB-5108
WB4HWK/4	208- B- 416	WB6AM/6	558- B-3348
WA1DOB/1	66- B- 396	WB6CWD	
WA3RCP/3	198- B- 396	WB6QP/6	451- B-2706
WA9RHA/9	44- A- 396	WB6NHF	
WN9RHN		W3WGM/3	349- B-2058
WA7CYP/7	63- B- 378	K3Q10	
WA7DRO		WA7C1K/7	355- B-2630
W9TRF/9	41- A- 369	WA7ASF	
W9UYB		WB6JKQ/6	466- B-2796
WA3DJL/3	33- A- 342	WA6RTJ	
WA1DSZ/1	103- C- 309	WB6SHO/6	355- AB-2457
K7YFF/7	51- B- 306	WB6LD/6	
W3INV/3	22- A- 297	WA3BZX/3	244- AB-2384
K7YOF/7	45- B- 270	WA3EOM	
K7GBZ		K7ZOU/7	278- B-2168
W7LNG/7	29- A- 261	WA7DPK	
W7KTG		WA9ORR/9	343- B-2058
K2ONA/2	35- B- 210	WB80YJ	212- A-1908
WN7FFU/7	32- B- 192	W26HG	
WN7EQX		K5TQC/5 (2 oprs.)	191- B-1646
WA4CNM/4	14- A- 189	W4MKG/4	283- AB-1605
WA4PFA		W4MJK	
WB2DLA/2	18- A- 162	WA0MFI/0	218- B-1308
WN8RUM/8	26- B- 156	WA0NUK	
WA6BAN/V8	17- B- 153	WB2JGD/2	194- B-1164
WA2FAR/2	16- A- 144	WB2PCA	
WA5NVI/5	70- B- 140	K3RKE/3	158- B- 948
WA1FJU/1	66- B- 132	WA3BNO/1	
WA1FGN		WA9CVS/9	44- A- 396
WB2AXW/3	42- A- 126	WA9LBJ	
WB2POL/2	8- A- 108	WB6ASQ/6	289- C- 877
WA8KEX/8	41- B- 82	WB6NGE	
WB2RML/2	39- B- 78	WN2UE/2	63- AB- 675
WA0L/0	5- A- 68	WB2VFX	
WA2BAH/1	19- A- 57	WA8DAY/8	87- AB- 669
WN5NT/5	16- A- 48	W38PVT	
WA7ETX/7	3- A- 27	WA3DAY/3	23- AB- 150
W2LPW/1	15- C- 15	WA3DBG	
		WN6SJI/6	19- B- 114
		WN6RSV	

CLUB AGGREGATE MOBILE SCORES

Radio Amateur Mobile Society (Calif.)	29,478
Argonne Radio Club (Ill.)	12,791
Palomar Radio Club (Calif.)	2,881
Mobile Amateur Radio Club of South Bend (Ind.)	2,334
Phil-Mont Mobile Radio Club (Pa.)	540
Hayward Radio Club (Calif.)	351
Evendale Amateur Radio Society (Ohio)	203
Suffolk County Radio Club (N. Y.)	153

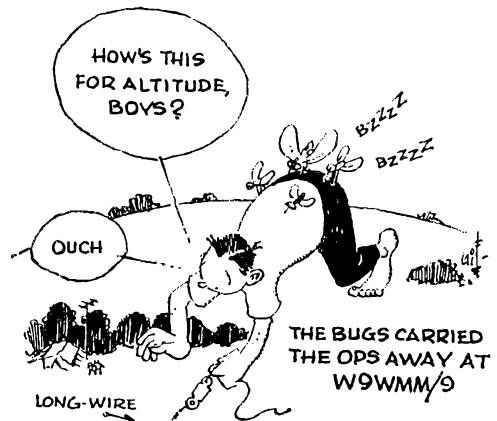
CLASS C

WA5OU/5	566- B-5660	W9HDD/9	27- B- 743
WA6THI/6	276- AB-3404	W6RLGO/6	79- B- 711
WA6QGT/6	336- AB-3345	W6EFM/6	78- B- 702
WA6ODQ/6 (2 oprs.)		WA9BXI/9	20- B- 680
WA6HGH/6	455- B-3230	WA9CFK/9	10- A- 635
W6QHP/6	256- AB-3224	WA7CAL/7	14- B- 626
K6DLU/6	236- A-3196	WA0BZ/0	14- B- 626
K6DLU/6	217- B-2723	W6NLO/6	15- A- 608
WB6DFO/6	200- A-2700	W9DJR/9	10- B- 600
WB6PZY/6	210- AB-2643	K9EFC/9	7- B- 583
WB6BLL/6	197- AB-2273	W18WX/1	41- A- 574
W6ROQ/6	201- B-2169	W9QVK/9	5- A- 568
WB6IAW/6	123- AB-1910	WA9BVI/9	5- AB- 550
WA6UNL/6	86- A-1711	W9I8S/9	61- B- 549
K9BSH/9	131- B-1679	K9PAL/9	3- A- 541
WB6PHQ/6	114- AB-1679	WA9KQI/9	3- A- 541
W6TEB/6	113- AB-1670	K3SPS/3	40- A- 540
K9YRN/9	129- B-1660	K1N1J/4	53- B- 477
WA0ATY/7	87- B-1283	K6GUQ/6	60- AB- 473
K9IEI/9	86- AB-1279	K7NET/6	31- B- 459
W9GOV/9	60- AB-1200	WA9MZ8/9	50- B- 450
K6VYV/6	70- B-1130	W1TRG/1	31- A- 419
W9AVL/9	36- A-1026	WB6GCI/6	30- A- 405
WA9LRC/9	52- B- 968	W9OZ/9	29- A- 392

(Continued on next page)



The Willimantic Radio Club, **W1BKC/1**, operated in the 4-transmitter class set up in a junkyard. That ten-meter beam didn't work too well on the VW wreck. The group considered applying for mobile credit but didn't think it would be allowed!





This was a banner year for FD press coverage in Tulsa. Shown is a reporter for the Tulsa Tribune interviewing WA5s BPS ODW and K5ZCJ for the Tulsa Council of Radio Clubs, W5OK/5, active in 4-A. A local TV station also did a 5-minute sound-on-film presentation.



The Sarasota Amateur Radio Association, operated W4YDD/4 in the two-transmitter category. This 100% Affiliated Club achieved excellent publicity and submitted the most complete report on their FD efforts. Operators shown are (L-4) W4YDD, WA4IZT, WA4WIP and W4TXE.

W9AXU/9.....28- A- 378	W9QVE/9.....8- A- 108
K9FAP 9.....27- A- 365	WB6IZF.....18-AR- 95
WRQL/8.....10- B- 360	WB2SPJ 2.....6- A- 81
W9LF/7.....39- B- 351	WA5LPR/7.....5- A- 68
K9NF/2 9.....21- A- 284	WA9HFT/9.....5- A- 68
WA5LC/5.....30- B- 270	WB2MBM/2.....7- B- 63
WRPNK/8.....19- A- 257	WB6PHP 6.....7- B- 63
WA9RTR 9.....18- A- 243	K2DEM/5.....6- B- 64
WB2DQP 8.....15- A- 203	W4IDJC/1.....6- B- 54
WN8TYE 8.....15- A- 203	K9AZV/9.....3- A- 54
K8YAA/5.....21- B- 189	W2KOY 2.....3- A- 41
K8YGL/6.....13- A- 176	W6KEK 6.....4- A- 36
W2GFF/2.....17- B- 153	W2WRW/2.....2- A- 27
WB8RTI 6.....17- B- 153	WB6KZN/6.....4- C- 18
W4BUQZ/6.....14- B- 126	WA8BZR/8.....1- B- 9
WA9ONY/9.....9- A- 122	

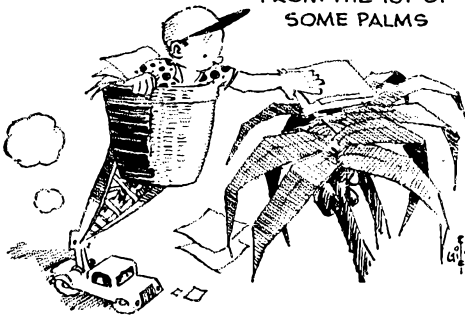
CLASS D

WRHH (11 oprs.. 6 xmtrs.) 1336. W4YOQ/4 (9 oprs.. 2 xmtrs.) 903. K3FLT (12 oprs.. 3 xmtrs.) 696. WB2EJZ (17 oprs.. 4 xmtrs.) 638. W3VPR (6 oprs.. 3 xmtrs.) 624. K5NCW (8 oprs.) 365. K6EAW (8 oprs.. 4 xmtrs.) 291. K2AXA/7 263. WA5EF (4 oprs.. 2 xmtrs.) W3PZC (3 oprs.. 3 xmtrs.) 121. K17FNL (2 oprs-) 111. W7MSI 37. WA9JXP (2 oprs.) 20.

CLASS E

WA0MOB (2 oprs.) 801. WRDDB 632. WA0APC 620. W1AEC (12 oprs.. 5 xmtrs.) 562. W1AW (4 oprs.) 537. KL7EFT (24 oprs.. 3 xmtrs.) 467. WA0KBZ (4 oprs.. 2 xmtrs.) 467. K7OWT (2 oprs.) 466. W5AW (6 oprs.. 2 xmtrs.) 367. WB2PNJ (3 oprs.) 310. K5LXZ 6. 289. K4NCP (3 oprs.. 2 xmtrs.) 271. W4TWB 270. WA8DNT 265. WA5KZR 261. K1HR 4 254. W7ZMD 248. WB8IQ (6 oprs.. 5 xmtrs.) 242. W6PIY (3 oprs.) 225. WA7BSG 209. WA4WTO 206. KIOTA 195. K17FEF/1 187. K3RDM 3 177. W0JUV 177. WB6FHH 173. WA6AIF (3 oprs.) 168. WA9IKP 164. WB2CSS/2 (14 oprs.. 2 xmtrs.) 160. W3MSR 150. WA6LKL 150. WA9OXI 147. W6ECC 134. W4ARS 133. EZ2TF (3 oprs.) 126. W0ALG 144. WA3DUM 142. WA4OD 115. WA8MAM 111. WA8QJK 111. K1ACL/5 109. WB2SOL 109. WA8MHP 108. WA9PIM 108. WA8RJ1 105. WB2VHT 2 (3 oprs.. 2 xmtrs.) 101. WA4CZM 99. W9JJXT 98. WA9OTD 98. K7TC/5 97. W6GEB 96. WA9WV 60. W2NEP 88. W4FE 87. K6YFZ 85. W9OC 81. W9JXN 80. WB2JHW 78. WARKME 73. W6LVI 72. WA5NOM 71. WB2UPY 71. WA6TV 64. WA8CFJ 64. VE7BLO (3 oprs.) 63. WB4AYD 63. WB6QM 60. WA0RJ 58. WB2PNT 57. W6PZ 57. W2UAL 56. WB6LTR 56. WA4QLP 51. WB6CL 51. WA8KA 50. W1BKA/1 47. VE3EQ 47. KH6ON 45. WB2PHH (2 oprs.) 45. WB2SCK 45. WA8UDG/4 45. W1CGD 64. WB6KVA 42. WA1BIO 40. WA8MCO 3. K1YLK 37. K5WME 37. W1HTE 36. W4KFC 35. WB2KZD 35. WB2NET 35. WA3AFI 34. W4WSF 33. WA5YX 33. WA6RWO/32. W7PCD 30. WB6QZ 28. WA3DVO 28. W60JW 26. WA6A0E 25. WA9PDI 25. W9NYE 25. W1BNB 24. WB2OTR 20. W9OYC (2 oprs.) 24. WB2EMJ 23. WB2WXA 23. K3VMI 21. WBKZL 20. WB2MMN 20. W99RHG 20. K9TON 19. K0BYK (6 oprs.. 2 xmtrs.) 18. W6FYW 18. W7UUU 18. K9UCR 17. K4HEA 10. WA3AMH 17. WA5MUF 16. WA9FGL 15. WA1FOJ 13. WB4FE 13. WA9FH 12. W2EAF 11. W5MSC 10. W2NH 8. WA3AKH 6. WA4V4/3 6. WB1HY 6. K4PUL 5. WB6HW 5. WA1EO 5. WA8UAV 5. WA9EZU 5. WB2WRH 4. WB6LFJ 4. WA8GV 3. WB2SPJ 3. W2WFFJ 3. K3ILC 2.

WA4QCN/A LOGS
HAD TO BE RETRIEVED
FROM THE TOP OF
SOME PALMS



Rebuilding the generator at 3 a.m. at W4PED/4, the North-Augusta-Belvedere Radio Club, scoring 1790 in 1-A.

Check Logs: W1AHP WA1EJF K1K1 WA2YLK WA3EXX W4JUK W4MMD W8FEM W8FWQ K8QGI W8TQK W8WRN VE1AE VO2XX/W1 LA1H.

IMPORTANT NOTICE

Changes of Address

Important postal changes in handling second-class mail matter are now in effect. Please advise us *direct* of any change of address. Four weeks notice is required to effect change of address. When notifying please give old as well as new address *and your zip code*. Your promptness will help you, the postal service and us. Thanks.

AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART,* VINJM

Why Be An EC?

SOME years ago we got up a form which received the label "Form 34" and was entitled "Application for Emergency Coordinator Appointment." One of the questions asked applicants was "Why do you want to become Emergency Coordinator?"

We have often wondered how applicants for EC appointment answered this question. Since the completed applications go to the SCM for his consideration, we at headquarters never see them.



Although these two prominent traffic handlers have spent many long hours on the air relaying traffic from east to west and back, this is the first time they have actually met. In case you don't recognize them, that's W6GYH in the foreground and W3CUL facing us. The location was the shack of W3CUL and W3VR.

Consequently, we were intrigued with a bit in a recent Western Penna. AREC bulletin put out by SEC K3KMO commenting specifically on some of the answers he received. They are quite revealing of the type of amateur applying for this appointment. Here are a few of them:

"We want an emergency program in our county." "I believe that I should do all that is possible to help my community in time of need." "To enable our county's amateurs to provide a useful service." "So that my services through amateur radio may be used to the best advantage." "To help make amateur radio a more useful function." "I feel that in this way I will be able to fulfill my obligation as a radio amateur to both the League and the public." "I believe this to be a worthwhile service for the community."

* National Emergency Coordinator

"But," says K3KMO, "the fellow whose answer really warmed my heart was the one who said simply, 'Somebody should be EC.' Obviously a little reluctant, perhaps not sure that he's the best man for the job, maybe not having enough time to do the job to the best of his ability. But *somebody* should be EC. Amen!"

Amen is right. In every group of amateurs, even a small one, there is always at least one who has the requisite leadership abilities, or at least some of them. But it appears that all too often the amateurs with the ability to do the job are too tied up in other pursuits to take it on. Everybody in the county nods solemnly when the question of the desirability of a public service program is brought up. Of course! But when it comes to *setting* it up, most of them are inclined to run and hide.

So we appreciate the amateur who says "Someone has to be EC" and sends in his application. He knows it's not an easy job, he doesn't really have time for it any more than you do, and Joe down the street would make a better EC. But if no one else will do it . . .

About the BPL

Apropos of nothing much in particular, we got to thinking the other day about the BPL. This is almost an amateur radio institution, originating in 1923 and appearing in every issue of *QST* since, except for the wartime issues. It has changed but slightly throughout the years, and the principle has remained the same throughout — handle a certain number of messages in a month's time and you make it, the special honor listing of master traffic handlers. We've changed the requirements, changed the counting method, changed the names of the categories, done everything but changed the name (tried this, but the traffic fraternity turned us down), but the BPL has still survived as the ultimate honor to be achieved by traffic men.

During recent years some fantastic traffic totals have been claimed. Some traffic men have even cocked a skeptical eyebrow at some of them. But the main direction of thought has been toward new concepts of credit for traffic work, away from number of handlings as a sole measure of traffic prowess and toward consideration of other modern traffic functions such as net controlling, liaison functions, organizational credits as distinguished from "lone wolf" efforts in endlessly batting out message after message. Arguments pro and con have waxed strong. Old time traffic men have raised their hands in horror at the thought of doing away with the BPL and have palled at the idea of giving credit to non-

message-handling functions. The younger, newer element has put on the pressure to consider the new functions in doling out traffic honors. It has been going on for some years, now, with no final decision really in sight.

How do we resolve a problem like this? Should RTTY relays, which in some require no operator skill, qualify for credits? Think of it: a RTTY station can relay traffic automatically, from reperforator to transmitter-distributor, while the operator merely looks on. This may be efficiency, but does it fit the BPL personal-credit concept? Isn't traffic-handling an operator skill? If so, shouldn't c.w. get more credit than phone or RTTY, because it requires more operating skill? Or should we encourage use of the more advanced techniques by giving the same or extra credits? How about the guy who spends an hour laboriously controlling a traffic net in which hundreds of messages are passed without handling one himself? Isn't he deserving of something? Why continue to honor mass production when we are trying to put stress on organizational efforts?

Then there is a faction which says sure these other things are important, but they can be credited without discontinuing something traditional and dear to the hearts of so many.

In June 1965 *QST* ("Up the Flagpole," p. 84) we proposed a point system to replace BPL. While perhaps a majority agreed with the principle, practically no one bought the specific proposals made. We still think the idea has merit and would like to see more thought given to it. At present the consensus seems to be "Let the BPL alone. Nothing wrong with the other ideas, but keep the BPL the way it is, we like it." Shall we attempt to proceed, then, on this basis? — WINJAM.

National Traffic System

What the average traffic man doesn't know about NTS would fill several books (or at least a couple of Public Service Manuals), but it has been gratifying, in recent months, to note that things are still picking up. For example, we seldom if ever come across, any more, traffic without a precedence or a check. Of all traffic handled, more of the dates are of recent vintage than previously. Procedure seems snappier, more businesslike, as though the net participants know exactly what they are doing. Adherence to system routings and procedures seems to be improving all the time; for example, more and more sections are conducting late session in order to get that traffic to delivery level just a little sooner. NTS interest at conventions and other ham gatherings is definitely on the upswing.

It's a great feeling and, as the old saw goes, nothing succeeds like success. The better we get, the more traffic men and other amateurs are going to want to flock to our banner, to be identified with us. This, if we are not careful, is apt to make us topheavy and reduce our efficiency. It is one of the dangers of success.

We happen to believe that the principal reason for NTS success so far has been its tightness, its rigidity, its adherence to a definite basic plan of organization and operation, with changes being made only after due consideration to the overall good of the system, not in response to pressure groups who would make changes for their own benefit. It isn't easy to maintain such standards. Through the years the system has been subjected to not just a little sneering from those who have felt left out or those sponsoring a non-NTS net to which they feel they owe their ordinary loyalty. We have survived it all because we have stuck to our guns.

But amidst all this self-praise, we would be remiss if we

did not also reflect on the many pitfalls we can easily experience to spoil or retard all that has been accomplished. Let's enumerate a few:

(1) *Personality conflicts.* Where a group of people are strongly dedicated there are bound to arise differences of opinion on methods of achieving a common objective. This is good, but when it gets to the point of insults and consequent defection, it is bad. So, while we need differences of opinion, we can do without quarrels. All we have to do to avoid them is to remember that while one person can start a quarrel, it takes at least two to make one.

(2) *Complacency.* When we start thinking we're so good that we can't be any better, that's when we start reversing the trend and get worse. We are a long, long way from perfect and will always have room for improvements.

(3) *Regimentation.* The dictionary says this means "rigid organization for the sake of regulation or control." This is exactly what we have in NTS; and yet, the definition implies rigidity in a military sense, which we do not have and don't want. When a group is forced to adopt certain procedures against its will, that's regimentation. When it does so of its own volition, this is called teamwork.

(4) *Lethargy.* This is similar to but not quite the same thing as complacency. It usually results from doing the same thing night after night and getting tired of it. The preventive for it is variety and continuing progressiveness.

(5) *Expedience.* The PSCM (that means Public Service Communications Manual, son) allows for "temporary expedients" to insure traffic movement, but adds that every effort should be made to return to normal operation. In the past there has been a marked tendency to make such temporary expedients become the regular thing, so that the original procedure is lost sight of. This can cause the breakdown of the system if it becomes too widespread.

(6) *Narrowness.* It is natural for a regular participant of, say, a Section net, to think of NTS in terms of that net. But he should remember that his Section net is a small part of a big machine, and that a thorough knowledge of the overall operation will greatly assist him in properly performing his own function. To avoid narrowness, get a copy of the PSCM and read up on the ARPC structure, especially NTS.

That's enough, for this time. Remember, our ultimate aim, after all, is to get the job done, and get it done so that it reflects credit on amateur radio — and that means getting it done well. A lot of give and take is required. One has to be prepared not only in equipment and operating ability, but mentally as well — prepared to have his ideas disputed, prepared to get little thanks for his best efforts, prepared to compromise. Mental attitude has a lot to do with success. How's yours? — WINJAM.

NATIONAL CALLING AND EMERGENCY FREQUENCIES (kc.)

FULL TIME		
3550	7100	50,550
3875	29,640	145,350
PART TIME		
7250	14,225	21,400
14,050	21,050	28,100

Fulltime frequencies are for use 24 hours per day but only for emergency and traffic calling purposes. No transmissions for any purpose (except calling for emergency help) the first five minutes of each hour.

Part time frequencies are for traffic calling and general amateur use except in an FCC-requested or FCC-declared emergency, at which times they become full time frequencies.

This is a voluntary amateur program, designed to show what we can do without FCC regulation. Its success will require us all to work together. Any amateur wishing to assist is invited to use ARRL notification cards to be sent to stations not observing the rules.



KØQNK, Ruth Vollrath, is another well-known traffic handler. In addition to her own traffic handling, Ruth is the Missouri RM and an EC for Saline County.

August report:

Net	Sessions	Traffic	Rate	Average	Representation (%)
1RN	.61	453	.283	7.4	92.0
2RN	.61	541	.760	8.9	98.3
3RN	.62	564	.400	9.1	99.5
4RN	.58	539	.364	9.6	87.7
RN5	.62	1360	.492	21.9	89.5
RN6	.62	2127	.932	34.3	100
RN7	.31	394	.444	12.7	65.9 ¹
8RN	.63	550	.326	8.7	94.8
9RN	.31	1020	1.196	32.9	100 ¹
TEN	.62	910	.819	14.6	66.4
ECN	.26	82	.163	3.2	58.1 ¹
TWN	.22	239	.443	10.9	43.6 ¹
EAN	.31	1720	1.181	55.5	96.2
CAN	.31	2034	1.250	65.6	100
PAN	.31	2144	1.341	69.2	72.0
Sections ²	2015	12,479		6.2	
TCC Eastern	112 ³	877			
TCC Central	93 ³	1480			
TCC Pacific	12 ³	1606			
Summary	2707	31,117	PAN 10.0	RN6/9RN/CAN 14.8	100
Records	1973	25,618	1.440	14.8	100

¹ Representation based on one or less sessions per day.

² Section/Local nets reporting (67): RISP (R.I.); NCSSB NCNL CN (N.C.); CPN (Conn.); MSN, M/JN (Minn.); SCN, SoCal16 (Cal.); BUN (Utah); GN, QFN, WFPN (Fla.); EMNN, WMN (Mass.); LAN (La.); Wolverine, Mich. 6; BN, OSSBN (Ohio); WPA, EPA, PTTN (Pa.); VN, VSN, VSBNE, VSBND (Va.); PTN (Maine); Alta, SSB; CHNN (Colo.); OZK (Ark.); PHD, MOTTN (Mo.); QIN, BEN (Ind.); NJN, NJ2, NJ6, NJPTN (N.J.); KTN (Ky.); TPN, TSSBN, TN, ETPN (Tenn.); GSN, GTN (Ga.); VTNH (Vt.-N.H.); AENB, AENH, AENR, AENP, AENT, AENO (Ala.); WSN (Wash.); NYS (N.Y.); OLZ (Okla.); Iowa 75; MDDS (Md.-Del.-D.C.); GBN (Ont.); NTTN (Tex.); WSBN (Wis.); OKS (Kans.); NLI, NLS, NLIVHF (N.Y.C.-L.I.).

³ TCC functions not counted as net sessions.

Well, another set of new records in the Traffic and Sessions department. The SET has come and gone, the Sweepstakes is just around the corner and the Christmas traffic rush will be here before you know it. We hope you have your copy of the new CD-3, ARRL Numbered Message Texts. If not, a message or post card to Hq will bring one on the double. There have been several changes, additions and deletions. So get your list of new texts before the Christmas rush.

W1EFW has lost several good men to higher education, and notes a case or two where long skip has started to rear its ugly head. 2RN got over the annual transition from vacation to school scheduling with a minimum of problems, comments WA2GQZ. Representation is still a problem, but Joe has hopes of improvement. K5IBZ comments on the fine meeting of RN5 members at the North Alabama Hamfest. One outcome of the meeting was improved liaison between the s.s.b. and c.w. nets in Alabama and the organization of a late section net. A drop in representation and

traffic are the two major problems RN7 had this month. K7JHA is under way with the change from summer to winter scheduling of NCSs and Area reps. WØLGG issued a TEN certificate to WAØNUK and comments that representation has been good from all sections except the Dakotas. K1WJD found time to issue another interesting news sheet in which he discusses representation from the Region to Area level. EAN certificates have been issued to: W2s THE WFL, K3MVO, W4s IRE LWZ NLC, W91YJG comments that if it hadn't been for the QRN and aurora, CAN's rate would have been even better. The increase in traffic was credited to fairs in Kentucky and Wisconsin. W6VNO notes that summer QRN has made it virtually impossible for the PAN crew to hear the TWN rep.

Subcontinental Corps: W3EML is on the lookout for any night owls who want the Station D slot. This one meets at 0530 GMT. W9JUK (that's W4ZJY's new call) has finally settled down at Richmond, Ind. W7DZX reports the loss of two of his top men, WB6JUH to Southeast Asia and WA6WNG to Silent Keys.

Area	Functions	% Successful	Traffic	Out-of-Net Traffic
Eastern	124	79.0	2141	877
Central	93	84.9	2947	1480
Pacific	124	79.8	3214	1606

Summary 341 80.9 8302 3963
 TCC Roster: Eastern Area (W3EML, Dir.)—W1s BGD EFW NJM, K1s TKS ZND, W2s GVH SEI, K2s KTK SSX, W3s BLV UPC W4s AEJ DXM OHK, W5s EML NEM, K6s FHR MVO, W7s DVT ZM, W8s CHT RYP, K8s KMQ MQE QKY YSO, WA8GYT, Central Area (W9JUK, Dir.)—W4OGG, WA4WWT, K4DZM, W5GHP, WA5JOL, W9s CXY DYJ JUK QQB VAY ZYK, WA9NFS, WØLXC, WAØs IAW MLE, KØs AEM GSY, Pacific Area (W7DZX, Dir.)—W6s BGT EOT HC IDY TYM VNO, WA6ROF, W6s HVA JUH, K6s AJU DYX, W7s DZX GMC.

Net reports:

Net	Sessions	Check-ins	Traffic
North America SSB	27	752	981
HBN	31	442	888
North American Barnyard	27	328	8
Mike Farad	37	449	553
20 Meter Interstate	23	432	1329

Diary of the AREC

On June 15, a tornado hit Enid, Okla., and a smaller twister struck Drummond, some 12 miles away. A severe rain storm struck the area and combined with the tornado, did over three million dollars worth of damage to the area.

The Oklahoma AREC Net was activated by K5MBK, with K5FPU the first Enid station to check in. W5MFX, also from Enid, later joined the net and acted as NCS. WA5VJ, Garfield Co., EC, activated the two meter net for the purpose of handling intra-area traffic. Others who were known to have participated were: WA5CHD, KØs CAY FZQ OXE.—WA5FVJ, EC Garfield Co., Okla.

Since last month, we have received additional information on amateur activity in Topeka, Kansas during the tornado that struck on June 8.

When a line of storm cells was spotted approaching Topeka, the weather bureau called the answering service which in turn calls the various hams to go to their appointed places so they can see any approaching funnels. KØPSD went to the base station located at the weather bureau. KØLAD was the first to spot the twister and he called KØPSD on 2-meters to tell him the funnel was on the ground and headed for Topeka. Tornado warning sirens were sounded, sending residents scurrying to their storm shelters and alerted additional hams to the pending disaster. WØKKR drove to Burnett's Mound located at the southwest edge of Topeka and as he was nearing the top, the twister barely missed him, as it slammed into a group of apartment houses. WØKKR witnessed houses exploding as the tornado tore into the apartment house complex. He radioed for police and ambulance services to be sent to the area immediately. By this time, the storm had descended into the city, crossing Washburn University's campus and heading towards the downtown area. During this time,

KØPDS stayed on the air, until an employee of the weather bureau ran in and told him the funnel was less than ¼ mile away. They both dove under some steel desks as the core of the tornado passed less than 200 yards from them. After the storm had passed, all mobiles that were out came back under the leadership of KØJMF, while WAØFZY (PAM), W's W1Z QJC WJB, KØTNC and WØNMC aided the Red Cross with communications throughout the night.

As word of the tornado spread, health and welfare traffic began to pour into Kansas and individual stations began handling and delivering the messages as best they could. The Kansas CW Traffic Net (QKS) started operating at 2100 CST with KØBXF (SCM) as NCB, followed by KØMIRI and W's FCO MLE. The net continued to operate until the wee hours of the next day. The Ham Butchers Net and Missouri Phone Nets also activated and aided the flow of traffic into and out of the disaster area.

Communication throughout the city had been completely disrupted and mobile units were pressed into operation. WØWVD at the Topeka Civil Defense Headquarters was on 2 meters and the hams with mobile equipment for that band continued operating through the night, handling communications wherever needed; later continuing under WØCET who acted as dispatcher for the Red Cross.

Unofficial figures show that nearly 13,000 messages were handled and several hundred amateurs participated in this operation.

When the USS *Wasp* became stranded in a fog while off the shore of Rhode Island, K1PJQ/Nantucket, Mass., was called upon to deliver some traffic. The ship had many navy dependents on board for the day and was taking them for a cruise to show them what sea-going life was like. It was expected that the *Wasp* would return to Boston the same day (Aug. 9), but when the fog rolled in, she became stranded. Over thirty health and welfare-type messages were relayed from WA5OTN on board the *Wasp* to K1PJQ who delivered them. K11KN also participated and delivered several messages. — K1PJQ.

When an 80-year-old woman strayed from a camp-site in Burlingame State Park near Westerly, R.I., on Aug. 10, a combined AREC/RACES operation was put into action to aid search parties. WIGOX set up a portable station at the State Park, W1FEQ (EC) acted as relay from his home station and WA1CEW was mobile, covering the search area. Over 400 volunteers formed the search party that scoured the 3500-acre park. After three days, the woman was found safe and no worse for her experience. — W1FEQ, EC *Charlestown, R.I.*

On Aug. 13, amateurs in Northeastern Nebraska were alerted to the strong possibility of severe flooding by the Loup River in the Loup and Platte River basins. Lancaster County EC, WAØEUM, reports that he was called by the weather bureau and asked if he had picked up any rainfall reports via amateur radio. He hadn't but immediately checked the Nebraska AREC Net frequency for any activity. Reports from KØULQ, KØVTD and KØEFV revealed flooding in Fullerton. A report from KØCWV at Genoa advised that the Loup Power District was flooding and being evacuated. Knowing this to be the only source of flood information the weather bureau had, WAØEUM decided to go to Columbus where he could get readings from a geological survey gauge. WØFIG was asked to go to Bartlett to get rainfall reports. The manager of the Lancaster County Red Cross called WAØEUM to say they were sending two mobile fueling units to the flood area. He wanted to know if the AREC could provide communications in case more supplies or help was needed. KØQVN volunteered to provide the necessary communication. WAØLOY acted as relay between the weather bureau and WAØEUM who was at the river and taking the necessary level readings. Later that afternoon and all through the night, WAØEUM, KØQVN, KØJFN and WØHQE stationed themselves on a bridge over the Loup River and took flood level readings. At first, the accuracy of the wire gauge hung from the bridge was questioned, but a check of a known accurate gauge proved the wire gauge readings were accurate and it wouldn't be necessary to wade or swim to check this other gauge. By 0930 CST the next morning, the water went down enough so the amateurs could leave the bridge.

WAØEMS was checking the Nebraska AREC Net when

it became evident that the weather bureau in Lincoln, Nebr., did not have the information it needed to predict new river crests. He called the Kansas City Weather Bureau and found they were doing the computations for the river states and had only sketchy information. Communication between the two bureaus was poor so WAØEMS offered to provide a link between the two bureaus. This hot line was beating the bureau's own communication link by some two hours. On Aug. 14, KØTCB, Clay Co., Mo., EC, relieved WAØEMS and continued the hot line circuit.

KØJFN, Fremont, Nebr., EC, checked into the AREC net on Aug. 13, and when he found out about the flood condition, began to get the ball rolling in his own area of jurisdiction. He alerted WAØHAL who started the local 2-meter net, WAØHBS who got in touch with the Navy MARS operators and left KØJFO in charge of the ham operation in Dodge County. From there, KØJFN drove to Columbus where he joined WAØEMS and company on the bridge to take river level readings.

The entire operation came off without a hitch. After the flood had receded, the amateurs continued to provide the necessary communication for the clean-up operation, Red Cross operation and any other agency requiring their service.

On the evening of Aug. 13, the California Highway Patrol office in Los Angeles called WØMLZ and asked if he could help them get a message to Alaska. They were trying to locate a man from Lynnwood to let him know his son was killed in an automobile accident and to have him contact patrol headquarters.

WØMLZ originated a Priority message, relaying it to WB6BBO at 0503z, Aug. 14. By 0514z, W7HMA had the message and at 0532z, it was in Anchorage. A service message was received stating that the Alaska Highway Patrol had the information and would contact the party who was reported to be at the McKinley National Park. — WØMLZ.

Whenever there is an emergency, AREC members usually jump right in and do the job. Such was the case in Orange County, California, when EC K6RCK received a request from the family of a man who was in urgent need of a rare type of blood. Although this wasn't the time for the regular meeting of the AREC net, K6RCK made several calls on the net frequency to which members responded. Within thirty minutes of the call, two quarts of the blood were located and taken to the hospital. — W6WRJ, SEC *Orange Section.*

On the afternoon of Aug. 14, an F100D jet, enroute from a base in New Mexico to California, developed trouble while flying high over the hot desert area of southern Nevada. The pilot advised the Nellis Air Force Base operations control that he was low on fuel and would attempt a landing at the Boulder City Airport. For some reason, he landed short of the runway in rugged, hot desert area without ejecting and was killed instantly. When the Nellis AFB mobile command post arrived at the crash site, the operator, WA7EMP, was unable to communicate directly with the base on the military frequencies so he called in the amateurs to assist in communications. Various types of messages were handled for the air force, Boulder City Police and Clark County Sheriff's Department. Communication to and from the crash site were handled Sunday afternoon through midnight and Monday morning until sunset when the clean-up operations were secured. Those amateurs known to have participated were: W7's BIF JE PBV PRM, W7's BEU CDS EMP EPZ ERR, K7PPE. — W7PBV, SCM *Nevada.*

On Aug. 13, a serious threat of flooding in Uvalde Co., Texas, brought KØs IUS FTN TRY and WA5LBY to an alert condition, but since no emergency developed and amateur communication was not required, the operation was secured.

August 17 was the second night in a row that an intense squall line swept across the Kansas City area. The PHD Net, under PAM/WAØFLL, was activated but only for a short time as the storm continued on its way and amateur communication was not required. — WØFLL, PAM *Missouri.*

On Apr. 30, the Orange County AREC, under EC K6LJA, furnished effective and reliable communications between the four locations housing the annual California Interscholastic Federation Tennis Playoffs. High school players from all points in southern California came to Orange Co., for this event. Without the amateurs providing the necessary communication, the tournament would have taken several weekends instead of one. Fifteen amateurs were known to have participated. — *W6WRJ, SEC Orange Section.*

From July 14 through 21, the Anne Arundle Amateur Radio Club (W3VPR) operated mobile to provide communication for the annual Brooklyn Park Fire Department fair.

The Cartierville Boating Club located in Montreal, Que., held its annual regatta on July 16, and AREC member, under the direction of EC VE2ANH, provided

communication. Although the operation was organized on short notice, it was quite successful.

Amateurs were placed on the three official boats and maintained contact with the judges' stand and relayed any information desired. After the twenty-five had been completed, the seven amateurs who participated were invited to the club's banquet. — *VE2ANH, EC Montreal and Laval, Que.*

Forty-four SEC reports were received for July, representing 18,122 AREC members. This is one more SEC report and 469 more AREC members. Those sections heard from are: Conn., E. Mass., N.Y.C.-L.I., N.N.J., S.N.J., W.N.Y., E. Pa., W. Pa., Del., Ala., E. Fla., Ga., Ky., N.C., Tenn., W. Fla., Ark., Miss., N. Mex., Okla., S. Tex., E. Bay, Los A., Orange, San Dic., S.F., S.V., Mont., Nev., Utah, Wash., Wyo., Mich., Ohio, Colo., Kans., Mo., Nebr., Que., Ont., Man., Sask., Alta., B.C.

QST



November 1941

... K. B. Warner, in a lengthy editorial, summarizes what has been going on with the Army, etc. in the way of preparing for a National emergency, which comes ever closer. Nothing has been done involving the matter of enlisting the co-operation of amateurs and the League has decided to make their own plans. We all know now what happened to those plans!

... The new miniature tubes of the 9000 series inspire By Goodman, W1JPE (now W1DX) to design and make two u.h.f. receivers. The details are interesting and the construction shows an advanced type of thinking. There is a full discussion on the merits of self quenched and separately quenched detectors in super-regenerative rigs.

... A continuously rotatable beam antenna using a novel coupling unit is described by Ellery J. Plotts, W9WJP. The coupling uses a pair of slip rings, contact with which is made by loupes of tinned-copper braid sliding in grooves turned in the rings. Hints on matching, etc. are given.

... Glenn Roof, W8OPG has designed a crush-proof portable for use in army camps. This one works well and is said to take a free fall, in a foot locker, off the back of a six-foot high truck! The old barracks bag had its merits in that regard, I seem to remember.

... The electron-coupled oscillator is further explored by E. O. Seiler, W8PK who uses a low-C tank circuit.

... The U.S. Civil Service Commission is looking for a large number of qualified persons for a variety of jobs, mostly connected with the defense effort. The Army and Navy are also looking for personnel to work in England on radio location work. Sounds attractive for adventuresome hams. Free technical schooling is offered by the U.S. Office of Education to qualified persons. It is all geared to the National Defense. You have to buy your own elbow, however. S. Gordon Taylor, W2JCR writes at length on S meters. He gives a list of current popular receivers and enumerates them as to whether they are flattering, or scotch.

... Nice picture of John Reinartz, ex-W1QP, who is shown as a Lt. Commander, USNR at his desk in Washington where he is in charge of continuing

relations between Naval Communications and amateurs. He is the licensee of W3USA, Arlington. ... The hurricane in Texas in September played havoc along the coast and Texas hams were all set for it. Traffic was handled for the Highway Department, State Police, Red Cross, Weather Bureau and Texas Defense guard.

— W1AN1

COMING A.R.R.L. CONVENTIONS

January 21-22, 1967 — Florida State, Miami

April 22-23, 1967 — New England Division, Swampscott, Massachusetts

June 30, July 1-2, 1967 — ARRL National, Montreal, Quebec



Illinois — The Chicago Suburban Radio Association will hold their annual banquet on Saturday, November 12.

Kansas — The State Line ARC will sponsor a Hamfest, November 6 at the Municipal Building in Anthony, Kansas. Free registration, covered-dish luncheon at noon. Bring your own table service, drinks furnished. There will be a swap table and an auction in the afternoon, so bring equipment that you would like to swap or sell. Ladies will play bingo during the auction.

Louisiana — The annual Lafayette Banquet will be held Saturday, December 3 at 7:00 P.M. on the campus of the University of Southwestern Louisiana. All area hams are invited and more information is available by contacting Club President Edward Miller, W5EXI, 612 Harding, Lafayette, Louisiana 70501.

Massachusetts — The New England DXCC Dinner will be Nov. 5, Charter House, Waltham, Mass. on Rt. 128 (Exit 48 and 48E.) For info and reservations write KIIMP.

New Mexico — The Albuquerque ARC will hold its annual banquet on November 19. Reservations must be in by November 12.

New York — The CCNR's 6th Annual Beef Dinner will be at the Davenport Club, November 26. Reservations to Henry Wymbs, WB2GMN, 100 Joyce Rd., Hartsdale; New York before November 15. Cost per person \$6.50. There will be entertainment along with the usual attractions.

New York — The Harmonic Hill Radio League of Mt. Kisco, New York will be holding their annual "Swap and sell" auction on Saturday, November 19. Auction starts at 2:00 P.M. at the Auto Auction building in Banksville, N.Y., located 4 miles north of Exit 31 of the Merritt Parkway on the Greenwich-Bedford Rd. Follow signs to Banksville. Bring your goodies to swap or sell. Refreshments will be available. For further information contact Jim Ferris, WA1DQL, Tel.: 203-661-8245.

Happenings of the Month

ELECTION RESULTS

In the current elections, four men were declared elected as directors and six as vice directors because they were the only eligible candidates for the office.

Philip E. Haller, W9HPG, director from the Central Division since 1963, was reelected. In the New England Division, **Robert York Chapman, W1QV**, will start his second term as director, as will Northwestern Division Director **Robert B. Thurston, W7PGY**.

In the Roanoke Division — where P. Lanier Anderson, W4MWII, the dean of the present board, declined to seek an eighth term — the new director will be **Victor C. Clark, W4KFC**, of Clifton, Virginia. Vic needs no introduction to contesters or DX chasers — he consistently places high on the list of top scores. He is a charter member of the Potomac Valley Radio Club and has served several terms as president, activities manager and secretary. He's been an assistant director of the division for the past eighteen years and was Section Communications Manager of Arizona in 1937-1938 and of Virginia, 1950-1951. Vic was the first holder of the Hiram Percy Maxim award in 1937, when he was W6KFC in Arizona. He's a charter member of the Virginia Net, and has served as communications director for Northern Virginia Civil Defense. Licensed since 1933, he's a former EC, presently ORS and a member of the ARFC and the A-1 Operator Club. Vic, who is 49 years old, is laboratory director of the U. S. Coast Guard Electronics Laboratory in Alexandria.

Vice Director **Stan Zak, K2SJO**, will start his second term in the Hudson Division. In New England, **Bigelow Green, W1EAE**, will continue as vice director for a fourth term. In the Northwestern Division, **R. Rex Roberts, W7CPY**, was reelected, adding on to ten years as vice

director, not to mention sixteen years as director! Col. **John H. Sampson, Jr., W7OCX**, won a fifth term as vice director of the Rocky Mountain Division. **Ray K. Bryan, W5UYQ**, vice director from the West Gulf Division since 1961, also was reelected.

The Roanoke Division has a new vice director, **L. Phil Wicker, W4ACY**. Phil, who is 58, makes his home in Greensboro, North Carolina and his living as president of Standard Theatre Supply Co. He's been an assistant director of the Roanoke division since 1954 and has served three terms as president of the Greensboro Radio Club. He's assistant emergency coordinator, assistant RACES radio officer and chairman of Greensboro Red Cross Communications. Phil is a life member of QCWA and of the Carolina VHF Society, and holds an OVS appointment in the ARRL field organization.

Harry J. Dannals, W2TUK, and **Christopher DiPasqua, WA2YQW**, are candidates for director in the Hudson Division. **Bois R. Council, K0ATZ** and **Carl L. Smith, W0BWJ** are on Rocky Mountain ballots for director. Southwestern Division voters will choose between two former directors, **John R. Griggs, W6KW**, and **Ray E. Meyers, W6MLZ**. In the West Gulf Division, **Dr. R. O. Best, W5QKF**, and **Dr. Fred E. Ellis, W5PTZ**, are candidates for director.

Central Division members are balloting for vice director, with **Edmond A. Metzger, W9PRN**, and **Sidonius M. Pokorny, W9NRP**, as candidates. **Thomas J. Cunningham, W6PIF** and **William G. Welsh, W6DDB**, are running for vice director from the Southwestern Division.

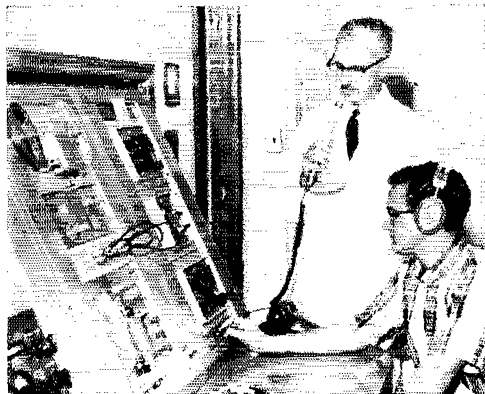
Ballots were sent to full members of record on September 20, and to be valid they must be returned to Hq. by noon, EST of November 21.

1967 NATIONAL CONVENTION

Next year the Canadian members of the League will play host to the rest of us for the first time — the 16th National ARRL Convention takes place in Montreal June 30, July 1 and July 2.

The convention headquarters will be the Hotel Bonaventure, so new it's not yet finished as this is written! Forums and talks on virtually every phase of amateur radio will be presented.

Project Med-Aid, an activity of the Duke Medical Center Amateur Radio Club, aims to make available to doctors and their patients in remote areas the accumulated knowledge of more than fifty medical doctors affiliated with the University. Here **Dr. E. Croft Long**, uses the mike of the club station **WB4BLK** under the watchful eye of **WASKJC**. The station monitors 14.25 Mc. from 9 A.M. to 5 P.M. E.S.T. daily.





Director Carl Smith WØBWJ presents the ARRL Cover Plaque for May 1966 to Frank A. Exum, WØGIL, whose article, "A Transistorless 300-Watt Mobile Power Supply" was adjudged best of the May issue by the ARRL directors. Co-author Irvin D. Johnson, KØHLZ also received a plaque but was not able to be present for the ceremony.

Special activities with a French Canadian flair will be presented by the Radio Amateur de Quebec, Incorporated, including an initiation into the mystic Royal Order of the Wouff Hong in French.

Advance registrations at \$4 can be obtained from Doug Shaw, VE2BSX, 7401 Mount Avenue, Montreal 16, Quebec. Hotel reservations at the Hotel Bonaventure are \$22 per room and at the Kennedy Apartment Hotel \$7.50 per person per day. The committee urges early registration since the Convention takes place at the height of the Montreal World's Fair, EXPO 67, celebrating Canada's 100th Anniversary.

WHAT BANDS AVAILABLE?

As of September 20, 1966, the following amateur bands and modes were available to holders of Conditional, General, Advanced and Extra Class FCC amateur licenses:

Frequencies are in megacycles.

A0 — unmodulated carrier	
A1 — c.w. telegraphy	
A2 — modulated c.w.	
A3 — a.m. radiotelephony	
A4 — facsimile	
A5 — television	
F0 — steady, unmodulated pure carrier	
F1 — frequency-shift telegraphy	
F2 — audio frequency-shift telegraphy	
F4 — F.m. facsimile	
F5 — F.m. television	
n.f.m. — narrow-band frequency or phase-modulated radiotelephony	
3,500-4,000	A1 ¹
3,500-3,800	F1
3,800-4,000	A3 and nfm ¹

¹ Except that 3900-4000 kc. is not available at Baker, Canton, Enderbury, Guam, Howland, Jarvis, Palmyra, American Samoa and Wake Islands.

7,000-7,300	A1
7,000-7,200	F1
7,200-7,300	A3 and nfm
14,000-14,350	A1
14,000-14,200	F1
14,200-14,350	A3 and nfm
21,000-21,450	A1
21,000-21,250	F1
21,250-21,450	A3 and nfm
28,000-29,700	A1
28,500-29,700	A3 and nfm
29,000-29,700	F1, F3
50-54	A1
50.1-54	A2, A3, A4, narrow F1, F2, F3
51-54	A0
52.5-54	F0, F1, F2, F3
144-148	A1
144-147.9	A0, A2, A3, A4, F0, F1, F2, F3
220-225	A0, A1, A2, A3, A4, F0, F1, F2, F3, F4
420-450 ²	A0, A1, A2, A3, A4, A5, F0, F1, F2, F3, F4, F5
1215-1300	A0, A1, A2, A3, A4, A5, F0, F1, F2, F3, F4, F5
2300-2450, 3300-3500, 5650-5925	A0, A1, A2, A3, A4, A5, pulse, F0, F1, F2, F3, F4, F5
10,000-10,500	A0, A1, A2, A3, A4, A5, F0, F1, F2, F3, F4, F5
21,000-22,000 and all above 40,000	A0, A1, A2, A3, A4, A5, pulse, F0, F1, F2, F3, F4, F5

160 Meter Band

In addition, portions of the 1800-2000 kc. band are available in each state, as shown in the table to follow.

(Continued on page 156)

² Plate input power must not exceed 50 watts in certain parts of Calif., Ariz., Nev., N. Mex., Texas, Miss., Ala. and Fla. Exceptions may be authorized after application to the FCC.

NOTE: The bands 220 through 10,500 Mc. are shared with the government radiopositioning service, the latter having priority.



Varoujan Karentz, W1YLB, whose article, "An S.S.B. Transmitter for Transceive Operation" was picked as best of the June issue by the Board, receives his cover plaque from Bigelow Green, W1EAE, vice director from the New England Division.

I.A.R.U. News



SWISS WIN ANTENNA CASE

A small village in Switzerland, near Thun, some time ago adopted a rule that amateurs and short-wave listeners wanting to erect an outdoor wire or beam antenna must first seek permission from the village and give full details, including submission of diagrams certified by engineers. Since aesthetic considerations were paramount, but the ordinance did not include television antennas, the *Union Schweiz. Kurzwellen-Amateure* decided to take the matter to court and won.

The Court said in part, "To apply such terms only to radio amateur aeriels is plainly arbitrary and violates the basic rights of equality of our citizens. . . ." If regulations concerning the construction of outdoor aeriels seem necessary, they must apply to every type of aerial, including, above all, TV aeriels! — *Extracted from a Region I Bulletin item by HB9GX.*

NEW NORWEGIAN CALLS

The *Norsk Radio Relae Liga* reports that the call signs for Svalbard and Bear Island will now begin with JW; for Jan Mayen with JX; and for Norwegian possessions in the Antarctic, 3Y. Formerly, standard LA calls were followed by /P and /G to indicate operation in the remote areas.

KOREAN EXAMINATION RESULTS

The *Korean Amateur Radio League, Inc.* reports that only 18 of 140 applicants for amateur li-

ceses passed the semi-annual exams in June, 12.8%. Of eight applicants for the first class license five passed, five of 25 seeking the second class were successful but only eight out of 107 prospective Novices made the grade. KARL will attempt to have the examination made easier. (More complete info on Korean licensing appeared in IARU News of *QST* for December 1965.)

EUROPEAN BAND PLAN

In Europe few countries make assignments as between c.w. and phone modes. Instead, since 1953 a voluntary sharing plan has been in effect. After revisions at the Region I Conference in Opatija, Yugoslavia in May the "European Band Plan" looks like this:

C.w. only. 3.5-3.6, 7.0-7.04, 14.0-14.1, 21.0-21.15 and 28.0-28.2 Mc.

C.w. and phone. 3.6-3.8, 7.04-7.1, 14.1-14.35, 21.15-21.45 and 28.2-29.7 Mc.,

RTTY will use frequencies around 14.09 Mc.

V.h.f. Band Plans

Separately, the V.H.F. Committee at Opatija produced a 2-meter plan whereby 144.0-144.15 Mc. is reserved for c.w., except that when a satellite or other translator is active, 144.1-144.15 Mc. may also be used for s.s.b. Any mode can be used from 144.15 to 145.85 Mc. The segment 145.85-145.95 Mc. is reserved for satellites and stratospheric translators, and 145.95-146.0 Mc. for beacons and special services.

A table of recommended frequencies for crystal-controlled transmitters above 2300 Mc. was also adopted: exciter 1150-1158 Mc.; 2300-2316 Mc.; 3450-3475 Mc.; 5750-5790 Mc.; 10,350-10,425 Mc. — *Courtesy, Region I Bulletin*

HAM GEAR INTO BRITAIN

Now that we have reciprocal operating agreements with a number of countries, the problem arises of how to get your amateur station into and out of the country you are visiting. Certainly, a fancy transceiver is something that a customs inspector doesn't ordinarily see in a tourist's baggage, and it does cause a bit of a flap at times. Thanks to G2BVN, president of the RSGB, we have copies of the applicable British regulations, known as Provisional Notice No. 12, a copy of which you can obtain from H. M. Customs and Excise, King's Beam House, Mark Lane, London, E.C.3.

Briefly, these are the pertinent instructions. You may bring in with you free of duty and purchase tax certain personal household and professional effects and tools of trade. The cou-



Antonio Pita, XE1CCP, chairman of the Union Interamericana de Radio Aficionados, Region II-IARU, and its treasurer, Noel B. Eaton, VE3 CJ, ARRL director from the Canadian Division, talk over regional affairs at IARU/ARRL headquarters.

ditions are that the articles must be owned personally by you or by someone else resident outside the United Kingdom, the articles must be imported in baggage, and the articles must be finally re-exported not later than 12 months after your first arrival with them. If the article is either a valuable one or if you intend to stay more than six months in the United Kingdom, the Customs officer may require payment of a deposit as security to cover the Customs charges. The deposit will be refunded provided that you and the article have finally left the United Kingdom within 12 months of your arrival.

It appears that generally the same policy prevails if you are to be resident for more than 12 months, except that in that case Provisional Notice No. 12 says nothing about a deposit being required and you can make arrangements to ship articles separately from your baggage.

Basically, all the Customs people want is a guarantee that any radio gear you bring into the country will be taken with you when you leave.

NOTES AND NEWS

We regret to report that Juan P. Foster, CO2WF, past president of the *Radio Club de Cuba*, passed away in May, 1966.

Some 200 radio amateurs provided long-distance and international radio services for emergency traffic during a strike of Peruvian Telephone Company employees in September.

The *New Zealand Amateur Radio Transmitters* observed the fortieth anniversary of its founding



W9HPG, ARRL Director from the Central Division, welcomes 9Y4AR and DL3UT to the 32nd annual hamfest of the Hamfesters Radio Club near Chicago.

on the 16th of August, 1966. One of the founders ZL2AZ, is still very active in the society, holding the position of overseas liaison officer. Hearty congratulations to NZART!

FLASH! THIRD PARTY WITH URUGUAY

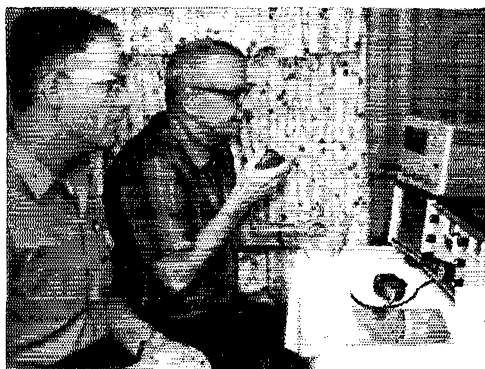
Just at deadline we received word that an exchange of notes between the U.S. and Uruguay providing for communications on behalf of third parties between amateur stations of the two nations has been ratified by the Uruguayan parliament and has thus gone into effect. September *QST*, page 79, has the full list.

QST

Strays



The photograph shows a Houston ARC project of training paraplegics at the Veteran's Hospital in Houston. Shown are WA5ELH (1.), Roy Hooten, and W5MFJ. Several others in the club, including president K5HXR, are active in this project. Happy ending to this story is that Roy Hooten passed his Novice test and is awaiting his call. The equipment shown was a gift from Busackers, a radio-supply house in Houston;



The Lafayette ARC (Louisiana) assisted in the 1966 American Cancer Society Mother's March by providing communications from a base station to about 20 mobiles. The operation went smoothly and, with the use of amateur radio, money was brought in quickly allowing for immediate auditing. Shown dispatching at the base station are WA5BIM (1.) and W5EXL.



Correspondence From Members-

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

SUSTAINING MEMBERSHIP

☐ . . . Despite some of the letters you have received on "freeloaders," I do not see how you, any more than we in The Association of the Bar of the City of New York, can deny a certain amount of service to non-members, indeed to some non-amateurs. Your image and indeed one of your strengths is the representation you have of an entire activity and you cannot, in my view, avoid some of the responsibilities of your advocacy.

I suggest a "sustaining membership" whereby members whose inclinations are so bent would voluntarily pay a dues figure set about one third again as great as the highest standard fee. These, in the experience of most associations, have been surprisingly productive.

A sweeping dues revision will without doubt bring a choice collection of outraged howls, particularly from that segment of the amateur population whose sense of obligation was never highly developed. I don't think, however, you need fear this, having gone through three howling processes of my own these past few years.

When the dust settles you have lost nothing by way of gross membership and you have gained the resources you need. It has been our experience that you gain in other ways, too. What has been the world's best bargain, taken for granted, becomes a worthwhile privilege which tends to impose some obligations. First-class travel must, in common knowledge, be at first-class rates — and the fact that such rates prevail tend to validate the belief that, in fact, you do represent something beyond other organizations. — *Art Charpentier, WB2KUN, New York*

VOICE OF THE BOOSTER

☐ Congratulations for the fine editorial in the September issue. The thoughts expressed are all too true. I am sure there are many members like myself who have remained silent while certain individuals made their back-biting, mud-slinging attacks on the League. Certainly none of us would tolerate this type of attack if it were made on us personally, and there is no reason why we should tolerate it as a group. I am thankful, though, that the League has refrained from replying in like kind even though the temptation to do so is great.

Keep up the good work. — *Ric Hadley, W1QFYG, Mt. Auburn, Iowa*

☐ I am glad to see you actively promoting ARRL both in the editorial page and through a more active membership drive. Please emphasize to some of the antagonists and neutrals that amateur radio needs more than a magazine. It needs an active organization promoting activities which justify amateur radio as a public service and which can represent our hobby in the legislative and administrative branches of our government.

You have done an excellent job in the past and will do so in the future. I know of no other organization which can do this. — *K. W. Cowen, W0ZQJ, Moorhead, Minn.*

☐ August *QST* was so good I couldn't pass up a moment to tell you about it. "Extra Hope" in the "Correspondence" column was encouraging. Many of the construction articles were buildable. What really inspired me to write, however, was the sheer genius in the last phrase of the third paragraph of "League Lines." I am certain that the unmentioned guilty magazine, and particularly its publisher, turned every color of the rainbow — including green — when that quip was spotted. How you manage to keep a sense of humor through the commentary to which you are subjected I'll never know, but the fact that you do makes me that much happier to keep on renewing my membership in ARRL. — *Myron J. Kaufman, K2GAT, Somerville, New Jersey.*

☐ I have been associated with amateur radio either directly or indirectly now for nearly twenty years. In all that time I have never had the chance to express my appreciation to the League for the profound influence it has had in heightening my enjoyment of amateur radio. Let me take this opportunity to do so. It was through ARRL publications that I first became acquainted with amateur radio. It was through such publications that I was able to maintain contact with it during periods of inactivity. I still rely upon them to keep me informed upon all the various aspects of amateur radio. I take deep satisfaction in knowing that the League is constantly working to enhance the capabilities of the amateur operator and to see that our responsibilities are efficiently discharged. It is a difficult job, being done well. Thank you. — *Joseph A. Staples, III, W5ASP, Houston, Texas.*

☐ A tip of my hat and a hearty "well done" to W4LQC for the sentiments he expressed in your editorial column of September *QST*.

I couldn't agree with him more, and the same for your comments following his letter, too.

I hope you receive many more endorsements of Jim's sentiments from us heretofore "all-too silent" boosters. 73 and GL. — *Everett J. Brill, WB2HTJ, Malverne, New York*

NOVICE ROUNDUP

☐ I think the Novice Roundup should be expanded to include Generals. A certificate should be issued to the General who works the most Novices during the contest from his section. I don't know what exact rules should be imposed on the Generals working the Novices, maybe lower power, but in any case the Generals in the contest could give the Novices some much needed states.

This decision should be the Novices', since it is their contest. Would Novices like some Generals in the contest? Write your views to the ARRL now for there is little time before the Round-up. — *Steve Lustgarten, W1QJES, Omaha, Nebraska*

HAM HOMES

☛ We read a lot about apartments being built for Senior Citizens throughout the country . . . Why not have an apartment building built for, and rented solely to, senior-citizen radio amateurs? It could have a large operating room equipped with the best in receivers, transceivers and transmitters, with another large room where those interested in such things could build or repair their own equipment.

A 24-hour sked could be worked out so that every tenant amateur would get his chance to operate.

All we need is someone with the know-how to set up a corporation, sell stock preferably to amateurs, and get a government loan. — *Lee Plickringer, W8PVX, Elyria, Ohio*

PEP UP THE CLUBS

☛ In reference to "League Lines" in September *QST*, I firmly believe that you are coming up with an excellent feature and a fresh approach toward the apathy in interest both in *QST* and the ARRL affiliated clubs. The word apathy suggest indifference and boredom. These two are entirely different as the indifference applies to the readers of *QST* while the boredom rests in its entirety with the clubs. . . . The boredom above mentioned comes over the club when it stagnates. The way to kill a club is to have one or two members hog all the conversation, or let the conversation settle down to common trivia.

Let's make clubs interesting and worthwhile. Limit the business to five minutes, no more. Remember every member is important and he should be given his share in the program, 30- or 40-minute programs such as talks or technical movies. Hear a new approach to theory by mathematics or physics instructors or club member.

One very simple feature that is a sure winner every time is to have every club member build some home-made gear; no kits allowed. This is real fun and down right interesting no matter how simple it is. It's the diversity of interests in ham radio that should be a binding factor. — *Robert A. Lundstrom, W9FUR, Sterling, Illinois*

TRY 160

☛ I think hams are missing a good bet when they continue to ignore the "top band." The average ham uses as an excuse the fact that he can't get up a 160-meter antenna, thinking that such an antenna must be a doublet 262 ft. long. Any length of wire, end-fed, even as short as 10 ft., can be used as an antenna on 160, if properly loaded, and using a good ground. Of course it is not efficient, but you can work stations with it. — *Bob Cabaugh, W2DTE, Bayside, New York*

RADIOMANSHIP

☛ The article page 103, September, '66 "Radiomanship" by Paul C. Amis, W7RGL, is the best article I have read in some time. I suggest that this article be read by every amateur. I am having the article enlarged to three times its size and will hang it in the shack for every one to read. — *Joseph J. Weber, WA6BBG, Oakland, California*

☛ A big hand to W7RGL! He has stated what I have felt all along but never been fully aware: that building equipment, experimenting, and understanding circuits are really off-shoots of the main

purpose of amateur radio, establishing and maintaining communications. There is something magical about this art. When I warm up the transmitter and hit the key I know that I am participating in the same craft that Marconi was the first to master. . . .

I still thrill to the thought that when I turn on my transmitter I have the privilege of establishing communications with another intelligent being perhaps thousands of miles away. That, in itself is the main reason for amateur radio, and that is enough reason to justify the continuation of the art no matter what happens to its other phases. — *John J. Stark, WB4ARD, St. Petersburg, Florida*

☛ Congratulations to W7RGL de "Radiomanship." For many years we have been hearing cries about the deterioration of amateur radio, but here is that one voice above the crowd who has found the common denominator which certainly pinpoints our goals as amateur radio operators.

I truly feel that every ham, Novice or Extra, should read this article, digest its purpose, and then feel 100% better that he or she is willing and able to exercise their personal "Radiomanship." — *Larry Robbins, W3CEI, Middletown, Pennsylvania*

LIFE SIZE QST

☛ Not all of us are young bucks with all that sharp eyesight. You should consider a larger physical size for *QST*, larger printing, and less cramming of the articles. — *Leon DeLancuville, W5RRO, Convent, Louisiana*

THE REASON WHY

☛ I appreciate your incentive for incentive licensing, although it should not have been found necessary to propose. Some of us obtained our General Class license with the aid of license manuals, code practice sessions and group study. We mistook the license for the privilege to further our efforts and to serve. We left our achievements on the test papers in FCC files.

Incentive licensing should be only a reminder that some of us are mistaking values — replacing service and science with enjoyment and amusement.

Any amateur who extends the best he has toward meriting a higher class license will find the effort and study the real reward, and a license with privileges to appreciate.

The status quo licensee whose defense is that regulation has given him his privileges may not enjoy the regulation that takes them away. Amateur radio will not note his absence as a loss. — *W. D. Mitchell, W0CCM, Minneapolis, Minnesota*

GIMMICKS & GADGETS

☛ Just a word to lend encouragement to your new department in *QST*, "Gimmicks and Gadgets." I think it is a real good deal. I hope you keep it up, and include same in every issue. . . . — *Everett V. Brant, ex-WSPQH, Detroit, Michigan*

☛ The brand new column that was introduced in July *QST* entitled "Gimmicks and Gadgets" is a very good idea and I will be looking forward to seeing it each month. I have always been interested in constructing such items. — *J. Schnipper, K3RFL, Philadelphia, Pennsylvania*

THE INVISIBLE TOWER AGAIN

☞ The excellent paper of W8HXC (April and August 1966) on the invisible tower constitutes a major advance in ham radio art toward that superlative and ultimate antenna installation I have been endlessly dreaming of since my first QSO on 40 m. in 1926.

The shadow problem can be easily dealt with by a well known basic principle: since the tower is invisible there is no objection to erect a second identical invisible tower, the spacing between them being accurately tuned to the sunlight wavelength to phase out their shadows.

This scheme has a distinctive advantage: when one of the tower goes down (advanced mathematical calculations show that the probability of both towers collapsing simultaneously is negligible), one is immediately warned by the appearance of the shadow of the remaining one, thus eliminating spending agonizing days to find out why the transmitter is heard by nobody and the receiver is dead.

But, there still remains just a little snag: Dogs! (They are mostly governed by smell rather than by sight).

I wonder if an invisible dog repellent is available at ham price. Anyhow, one can install, at an appropriate height, an invisible moisture detector, protected against normal rainfall, which would trigger a spray of fast-curing invisible paint on the outraging dog.

Now, some purists may argue that there would remain an ugly jet of liquid hanging from nothing in an empty space. No matter: any person noticing such an incredible scene, plus the shadow only of a fast fleeing dog (which necessitates that the spray should be tuned taking into account the Doppler effect) will be convinced that he is hallucinated and evidently shall never tell about it to anybody. — *L. Richard, ON4UF, Brussels, Belgium*

☞ I extend my compliments to W8HXC on his invisible tower. I do not have a tower; I have a dipole. I used a paint whose frequency was above the visible portion of the spectrum. It works fine; however, I can see it only when running away from it, which presents a problem when I must work on it.

I sometimes have trouble getting out. Could this be that the r.f. from my 15-watt transmitter can not see 70 ohms when it is going instead of coming?

Did you ever mix up a batch of the stuff on the run? I think your paint is great, but I still can't see it! — *William R. Eggelston, WN0OCU, St. Louis, Missouri*

☞ I would like to make a comment on the effect of Doppler shift on W8HXC's invisible paint.

No vehicle that anyone is likely to be riding in can travel fast enough to make Doppler shift noticeable to the human eye. Proof of this is apparent to anyone who has ridden in a fast car or plane. Colors do not seem to change as you pass an object. Any readers who were hesitant about using invisible paint due to worries about Doppler shift, may now paint in confidence. — *Frank Kaempel, WB2JKU, Nha Trang, Viet Nam*

STILL THE RELAY LEAGUE

☞ Reference W1BY's letter (page 132 August, '66 QST): surely the word "relay" is most applicable in this "modern day" of Oscar and other satellites. Leave the name alone. — *Jim Shaw, W6JQX, Orange, California*

☞ I wonder if W1BY, in suggesting changing the name of our organization to "American Amateur Radio League" (August QST), is aware that this is the name originally planned in 1914 by Hiram Percy Maxim. (See reproduction of letter of March 25, 1914, on page 72 of January, 1964, QST and on page 11 of "Fifty Years of ARRL.")

W1BY's suggestion has merit but let's give the credit to The Old Man. Perhaps that will make it more acceptable to some. — *Roy S. Williams, W6VON, La Mesa, California*

NOTHING IS NEW

☞ Note the "Home Hint" on page 90 of *Mechanics Illustrated* for Sept. '66, "Simple Pilot Light" — I saw it first in QST, April, 1943 under "Hints & Kinks" (page 46) by W9BPS.

"You'll find it in a League publication!" — *John Goegl, WA2LJK, Union, New Jersey*

DX IS IN CONTROL

☞ Apropos the letter written by WA9RQY (September QST Correspondence) may I suggest that the matter of DX pileups is a situation which can be handled by the DX stations themselves. . . .

I have seen it suggested in prior issues that DX stations listen to see from whence the DX is coming first and then use their beams and quads to try and work them. Why not encourage DX stations to make more use of directional CQs? In this way, everyone — including the DX operator himself — would have a far better opportunity to make the required 100 and, at the same time, it should go a long way toward eliminating the bedlam which is so commonplace, and which is likely to become increasingly commonplace in the next few years. — *L. A. Coward, VE3FGV, Trenton, Ontario*

OUR TEXTBOOKS

☞ You may be interested in knowing that I have required my students taking the undergraduate antennas course here at Georgia Institute of Technology to purchase and read your ARRL Antenna Handbook. It is very well written and presents a good practical view to complement their theoretical work. — *Russell P. Wharton, K4DXS, Atlanta, Georgia*

HELPERS ON 75

☞ For the better part of July, I was operating portable from Pennsylvania. During that time, I tried many times to work into Long Island from my QTH in the Poconoes. Due to several adverse factors, the job was rough. During all those weeks, I had the good fortune of being heard by several local and not-so-local 75-meter phone men. In almost every case, these hams went far out of their way to help me get through. I could cite about twenty different cases of the most courteous and generous assistance given to me in all my time on the air.

It occurs to me that if all our ham bands had men like those I met on 75, the spirit of amateur radio would be 100% better than it is now. In grateful appreciation for all that these gentlemen did for me, I would like to extend to them my deepest personal thanks, and let all the membership of ARRL know that there still exists on the air the true spirit of the radio amateur, personified by these men. — *Pete Alterman, WA2ONO, East Meadow, New York*

What Is Single-Sideband Telephony?

A Few Facts About the New 'Phone Technique

BY BYRON GOODMAN, WIDX

"It Seems to Us..."

SINGLE-SIDEBAND

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

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

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

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

S.s.b.c. will have many other virtues in its catalogue. Except for the final amplifier and perhaps the driver, all the gear can be at a very high level, using the great properties of Class B modulators and their big transformer and power supplies—and the space they now occupy. The final, no longer tube, driver prosecuted with amplifying the carrier, can have 10 power capabilities much more effectively used. Of equal interest is what will happen to receivers. There will no longer be any excuse for the manufacturer not building into them the considerable increase in selectivity that they could put there now but don't, and there will be a definite impetus to build receivers that possess excellent stability. While s.s.b.c. can be received on our ordinary receiver, a selectivity curve designed to accept only one speech sideband—something that we need for best results to chop off the chatter from undesired signals—will make a much more useful tool than we get today with a curve intended to straddle both sidebands, and music sidebands at that. Communication would be so very different!

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

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

The history-making single-sideband suppressed-carrier transmissions of W9YX and W2TQK have aroused considerable interest in the transmission and reception of these signals, and will they not all ultimately be made that most of us will be using the system within a few years. The nano describes the thing of course, but it doesn't tell all. Neither does this article, but it should give you a start toward understanding the stuff.



Fig. 1—The normal a.m. signal consists of a carrier and a pair of sidebands. The cross-hatched areas represent the former case of the sidebands.

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

At the receiver, the usual practice is to center the tuning curve in the bandpass of the receiver, and to use a receiver with a response curve capable of passing both sidebands. This is shown in Fig. 2, where the sketch of Fig. 1 has been superimposed on a typical selectivity curve of a receiver. However, it is not at all necessary to receive both sidebands, and this fact has been used by McLaughlin¹ to reduce heterodyne interference. A response curve of a receiver capable of receiving only one sideband is shown in Fig. 2 as a dotted line. Under such conditions, nothing is lost from the original signal, since one sideband is all that is required. As WIDM² applies puts it, "both sidebands are carrying the same thing."

¹ Amateur Technical Editor, QST, 1941.
² "Band," The QST, QST, December, 1942.
³ "Reply," "Eliminated-carrier Amplitude and Phase Modulation Reception," Proc. I.R.E., Sept., 1943.

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

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

The point that the carrier must be present in

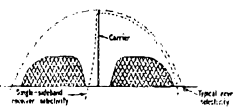


Fig. 2—In normal reception, the a.m. signal is centered in the selectivity characteristics of the receiver. However, if the receiver has considerable selectivity, as shown, the carrier, equally good reception is obtained by passing only one sideband through the receiver.

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

Carrier Suppression

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

January 1948

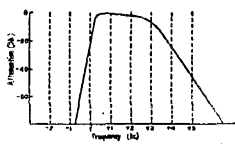


Fig. 3—The filter required for sideband elimination requires very rapid attenuation in a range of about 10 kc. The range of frequencies would be suitable for such work—the normal carrier frequency would be placed at f_c .

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

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

However, the same mathematics shows that if one sideband is received, the carrier can be reinserted in any phase and at any frequency. The frequency can be off by 10 or 20 cycles without impairing the quality too much. That's more like it. While 10 or 20 cycles seems like incredible stability be tolerated, since that's all we have in possibility at all and, in fact, receiver stability has been snaking up on us over the years without our realizing it. But more of that later.

Sideband Suppression

There are two classical methods of eliminating one sideband (this is a bridge-form that was invented by "Single-Sideband Engineer," Electronics, Nov., 1944.

consists simply of lopping off one sideband by using a very selective filter. This is the method used by the commercials. Another more delicate and subtle system requires an elaborate arrangement incorporating 30-degree phase shifts of carrier and audio signals. It has been used, but it isn't too easy.

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

Frequency Changing

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

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

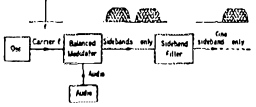


Fig. 4—The basic system for obtaining an s.s.b.c. signal. The carrier and audio frequencies are fed into a balanced modulator, where the sidebands are generated and the carrier is suppressed. The next big point we run across is that you reinsert the carrier through a filter that reinserts one sideband.

In the closing months of 1947 something revolutionary was creeping into the ham phone bands—the practicability of s.s.b. on amateur frequencies was being demonstrated by a few operators who were fired up by the technical possibilities. The news burst on the amateur world in the January 1948 issue of QST, to the tune of a forward-looking editorial and the three articles sampled here.

A listen on the h.f. phone bands today is ample vindication of the belief held by only a few in those days—that s.s.b. was bound eventually to prevail over other modulation methods by sheer force of technical superiority, not the least of its advantages being a major reduction in ORM.

QST for

Single-Sideband Operating Tests

Some Results—and Suggestions for Improving Reception

BY O. G. VILLARD, JR., * WQVY

The following notes are based on our own listening experience, plus reports received in over-the-air contacts. There is little that is quantitative in all that has been stated, but the impressions of careful observers may be relied on, it should be of interest.

Relative Power

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

The double-sideband transmitter at W4VX has a 7000-cycle total radiated bandwidth, whereas the s.s.c. transmitter has a 2500-cycle total radiated bandwidth. Both rigs use sharp cut-off low-pass filters. The s.s.c. transmitter at one point which obscures the comparison at W4VX, of course, is the audio-frequency response of the s.s.c. rig is 300-2500 cycles whereas that of the double-sideband rig is 100-2500 cycles. The speech sounds "crisper" on the s.s.c. rig. We hope to arrange matters so that both rigs have the same speech bandwidth, and will make further tests.

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

Tricks in Demodulating the Signal

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

* Trained, W4VX, Department of Electrical Engineering, Stanford University, Calif.

The most desirable arrangement is to use a separate signal-frequency oscillator. This allows the receiver to be tuned without upsetting the frequency of the reinjected carrier. It is then easy to adjust the receiver to accept the band occupied by the signal, with the aid of a variable-selectivity crystal filter. Maximizing the audio output, by varying the tuning alone, assures correct setting of the receiver passband, selectivity may then be increased to avoid sideband clipping is evident. Some of the oscillators that have been successfully used to demodulate the s.s.c. signal include the HC-221- or LM-8-type frequency meter, several variac VFO's, and even a regenerative preselector set into weak oscillation! The harmonics of a separate oscillator can be of some use.

The strength of the locally-injected carrier is not especially critical. Too little voltage causes the speech to sound distorted. Too much causes the receiver to block up or become unresponsive. However, the receiver a.v.c. may be switched on when a separate oscillator is used, and this will prevent blocking although the available gain may thereby be reduced. For greatest flexibility, the oscillator injection should probably be adjustable. Incidentally, some receivers, particularly the HQ-124, seem not to have very much b.f.o. voltage injected into the i.f. amplifier. Greater coupling here might help.

Stability Considerations

Virtually all receivers will drift while warming up after being thrown from "stand-by" to "on." It is therefore desirable to leave the receiver on during transmission and reception, if the b.f.o. is used for demodulation. A continuously-operating separate oscillator renders this procedure unnecessary. Moreover, receivers with voltage regulation of the local oscillator will shift frequency enough, when the line voltage changes by a minute amount, to throw the reinjected carrier off frequency when the b.f.o. is used for demodulation. One amateur had to retune every time his wife switched a light on and off upstairs! Note that the AT-308 and the new HRO do have voltage regulation of the local oscillator, and are consequently more stable with respect to line-voltage changes.

We have found that unless the receiver or the external oscillator is inherently stable, it will be necessary to retune from time to time to keep the reinjected carrier on the "nose" anyway. The Collins 75A receiver seems to get away from this problem very nicely, but it is possible to maintain absolute zero beat even on 10 meters with 80-meter crystals, for considerable periods of time.

On the evening of September 21, 1947, the 75-meter "phone band" was the scene of a contest which will have historical significance at the beginning of a revolution in amateur radiotelephony, for this was the first "serious" work with single-sideband suppressed-carrier transmission. Since then the transmissions of W4VX have been made the opportunity to try out the technique of receiving single-sideband signals—signals that sound like nothing human which detected by ordinary methods. This article summarizes the reactions of these operators who have contacted W4VX and offer explanations, and suggest improved methods for receiving s.s.c. transmissions. W4VX will continue to be on the 14-Mc. band as regularly as possible, so keep an ear out for the transmissions.

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

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

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

QST for

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

Suppression of Carrier

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

Using Receiver B.T.O.

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

Appearance on Panadapter

Several amateurs have looked at the s.s.c. signals on the Hallcrafters panoramic adapter, and have reported that the s.s.c. signals are about 4% as broad as our conventional signal, whereas the latter is normally about 10% as broad. This is probably attributable to the poor resolution of the panoramic adapter, although on this point we haven't much experience as we haven't tried a panoramic adapter. At any rate the panoramic adapter owner unanimously concluded that the s.s.c. was somewhat narrower!

Performance with DX

We have had only three real DX contacts, not having time to try very carefully, but the performance on these was what one would expect. In all cases they got in U.S. Actually, the 20-

A Single-Sideband Transmitter for Amateur Operation

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

BY ARTHUR H. NICHOLS, * W7QK

Here is a down-to-earth description of the equipment used to generate the 14-Mc. single-sideband suppressed-carrier signal at W7QK. While a few of the circuits and components may be new to you, you will find that the only real requirement to getting started on s.s.c. is a surplus set of vacuum tubes and a few other items. The rig was built by five operators, from scratch, and with the previous experience, and is a superb example of the really progressive amateur's spirit and ability!

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

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

Special Details

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

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

The first two objectives are obtained by using a balanced modulator and an adequate filter system. Linear operation is obtained by using a linear amplifier whose variable-frequency response is as flat as possible. Spurious frequencies are minimized by using balanced modulators for all frequency conversions, with particular attention to the local-oscillator signal that might leak through. The use of crystal-controlled oscillators for the high-frequency stages, running continuously, results in excellent frequency stability. The low-frequency oscillator (9 kc.) is

The s.s.c. exciter at W7QK was built on four separate chassis from the bottom up. They contain the power supply, the oscillator, the balanced modulator, and the third modulator and output amplifier.



January 1948

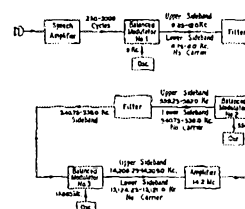


Fig. 1—A block diagram of the W7QK s.s.c. transmitter. Two frequency conversions are required after the original single sideband is obtained at 9 kc.

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

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

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

Selected IN-34-type crystals might also be used in this application, or the Stevens V-208 "variator" unit, which is made up of four selected crystals, could be substituted.

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

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

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

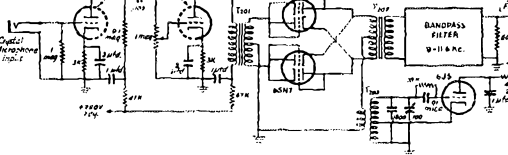


Fig. 2—The power amplifier, first balanced modulator, and sideband filter of the s.s.c. system of W7QK. Resistors are 100-ohm resistors in all cases unless otherwise noted.

- 1m—Single plate to 300-ohm coil, center-tapped (Thorlabs 55A15).
- 2m—Balanced line-coupler, special line test.
- 3m—Push-pull plates to drive coil, with iron core removed.

January 1948

The World Above 50 Mc.

1215-1300

1300-2450

2350-2500

5650-5925

10,000-10,500

21,000-22,000

50,000-?

CONDUCTED BY SAM HARRIS,* W1FZJ

Aurora

A good example of how fast the sunspots are coming back can be found in the increased auroral activity reports received this fall. The September 3 opening not only bowled them over stateside but took Europe by storm as well. Reports via GIBCDF indicate widespread auroral activity on both 70 Mc. and 144 Mc. through the evening of the 3rd and morning of the 4th. The 70-Mc. band, though limited to a few areas which have the allocation, showed the highest activity in years. 144 Mc., an international allocation, opened from Ireland east to Russia and south to central Italy. It looks like the right time for some enterprising east coaster to make a determined effort to catch someone like EI2W with an auroral sked on 144 Mc. Or maybe one of those high-power, big-beam DLs would be a good bet. One thing is sure! Some of the best auroral openings are just around the corner. You can't work anything rare on the low end of the band through all the QRM. A sked with a new state or country using a predetermined frequency up the band is the surest way to make auroraing pay off with something new.

Speaking of schedules, we are presently set up in Arecibo, Puerto Rico to monitor 70.260, 220.1 and 432.1 Mc. on a 24-hour basis. The 70.260 antenna is aimed toward Dublin, Ireland and is intended to catch any openings which might occur in the next few years. Bandpass on this channel is 8 kc. centered on 70.260. Any signal stronger than the ambient background noise triggers a tape recorder and an alarm system. Answering, if any, will be on 50 Mc.

The 220.1 and the 432.1-Mc. monitors are using antennas aimed stateside. Bandwidths are 10-kc. predetection with 1 second after detection integration. C.w. sent at a rate not in excess of 1 w.p.m. will be automatically recorded. Recorders are on 24 hours a day, 7 days a week. All that is needed are a few dedicated slow-c.w. transmitters on the state-side end and lots of patience to catch an opening.

Reporter of the Month

A VHFer is a VHFer is a VHFer! If ever there was a born VHFer, W1OOP surely qualifies. For countless years a letter with "HHC" in the upper left-hand corner has assured another interesting v.h.f. tidbit. This month we hit the jackpot with three of them.

Number 1, quote: "The VHF QSO Party of September 10/11 was pretty much of a bust as far as 432 and 220 were concerned around New

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England. The weather map tells the story, beautiful-clear weather with no water vapor within a thousand miles. W2PEZ was "portable-one" on the Pack but didn't do anything earthshaking. They were running a fair amount of power and moderate-sized beams on two and six, but 432 was pretty low power and only 32 elements. Output power on 432 was less than five watts, measured. I stopped up on Sunday afternoon and showed them which way to point for Greylock, when they were trying to work K1UGQ/1 on 1215. (They made it.) I worked only 220 and 432. Got Quebec and western New York only on



Rick Cruickshank, WA4LTS, operating the two-meter station for the Greenville, V.H.F. Society during the June contest.

432, Connecticut only on 220, E. Mass, W. Mass, N.H., and R.I. were pretty sick on both bands. Heard K2CBA and W3ARW only for a short time each, no N.Y.C. or N.J. signals at all. My 220 setup was 250 watts out and 10 elements, 432 was 150 watts and 96 elements. A11-RG17A feeder (90 feet) to the 432-Mc. beam."

Number 2, quote concerned a 432-Mc. converter, transistorized of course. "The 432 converter I sent you a diagram of was used with some success by WA1DCI operating for contest purposes as W1CB/1 and is all right without pre-selection at his house. My place I get two-times-channel-7 plus one-times-channel-5 to give crud all over the band. I threw this together in a hurry but it seems to work pretty good. It uses transistor types that are available. Noise figure is better than 5 db., good enough for a low-power station to use." We have run off a

220- and 420-Mc. STANDINGS

220 Mc		420 Mc	
W1BU	14	5	600
W1BDQ	12	5	450
W1AJR	12	4	480
K1JLX	11	4	615
K1UGQ	9	3	400
K2CBA	16	7	660
W2AOC	15	5	530
W2REU	12	5	450
W2DZA	12	5	410
W2NTY	12	5	300
K2DZM	12	5	400
W2LWT	12	4	400
K2RTB	12	4	400
K2ITQ	11	5	265
K2ISA	11	4	300
K2ITP	10	5	265
K2AXQ	9	3	240
K2JWT	8	3	214
K2UUR	6	3	210
W4ZBAH	6	3	200
K2DIG	4	3	140
W3PEY	11	5	350
W3RUE	10	5	480
K3IUV	10	3	310
W3LCC	10	3	300
W3JYL	8	4	295
W3JZI	4	3	250
W4TLC	5	1	315
K4QIF	4	2	500
W5AJG	3	2	1050
K7ICW	4	2	250
W7AGO	2	1	160
K8AXU	11	5	1050
W8PT	11	5	660
W9JCS	6	2	340
VE3BPR	3	3	300
420 Mc.			
W1BU	13	3	390
W1AJR	12	4	410
W1OOP	10	3	360
W1UHE	10	4	430
W1HDQ	10	3	250
W1GWJ	10	3	230
K1JLX	9	3	230
W2BLV	13	5	460
K2DZM	10	4	390
W2OTA	10	4	300
K2CBA	9	7	220
W2VCG	9	4	280
W2EGZ	9	4	260
K2UUR	9	3	280
K2ACQ	8	5	525
W42HQE	8	4	280
K2HQL	8	4	250
W7FLA	7	4	500
W4ZBUS	7	3	130
K2YCO	6	5	500
W2YPM	6	3	300
W42DTZ	6	3	200
W42TOV	5	3	140
K2GGA	4	4	383
W3MMV	11	5	410
W3RUE	10	5	470
K3CLK	9	4	—
W3PEY	8	5	296
K3IUV	8	3	310
W38ZD	5	4	300
W3UJG	4	2	350
W4HHK	9	4	550
K4SUM	7	4	368
W4GJO	6	3	1000
W4TLV	6	2	500
W44BYR	6	2	420
W4GOO	6	2	415
W4RFR	5	2	685
W4HTV	4	2	590
K4QIF	4	1	285
W5RCI	16	5	725
W5AJG	7	3	1010
W58WV	7	3	525
W58WV	7	3	525
W5ML	5	1	350
W5UKQ	3	2	500
W6GDO	2	2	493
W6EZA	1	1	280
K6CTG	1	1	180
K7ICW	3	2	165
W8PT	11	7	600
W8YIO	11	6	580
W8TXY	9	5	580
W8FY	9	5	470
W8FWF	8	4	150
K8REG	6	4	275
W8JLQ	6	3	275
W8RQI	6	3	270
K8AXU	5	3	660
W9HUV	9	6	460
K9AAJ	9	5	425
K9UIF	9	5	390
W9GAB	9	4	608
W9AAG	8	4	525
W9NBT	7	3	310
W9OJL	6	3	330
W0IDY	0	5	560
K0ITF	0	2	158
VE3A1B	5	4	450
VE3BQN	5	4	447
VE3BPR	4	4	600

The figures after each call refer to states, call area and mileage of best DX.

the New York area and Northern New Jersey, up to 200 miles!

Radiation of subharmonics also should not be overlooked. The 432-Mc. operator who triples from 144 may put out a potent signal on the driver frequency if he is not careful. This is in the ham band, if he is between 432 and 444 Mc., but subharmonics from other frequencies in the 420-Mc. band are "out of bounds."

The solution to the problem is essentially the same in either case: shielding of the transmitter, filtering of power leads, and, if necessary, the installation of a coaxial-tank or cavity filter in the antenna line. Suitable filter designs are shown in *QST* for October, 1964, and in the ARRL V.H.F. Manual. Used in the antenna line before the changeover relay such filters may pay dividends in reduced receiver spurious responses, as well.

Moonbounce Schedules Continued

VK3ATN and K6MYC had bad luck on the September schedules. Ray modified his rhombic in an effort to prove his calculations. He proved them but lost enough gain in the process so that his own echoes were barely detectable. Mike lost power in his transmitter and was only able to run something less than 150 watts. W1BU lost their preamplifier just before sked time and only discovered it when they were unable to hear themselves. K1KKP had a malfunction in his 60-foot helix system and heard nothing but shot noise.

November and December sked times are listed below.

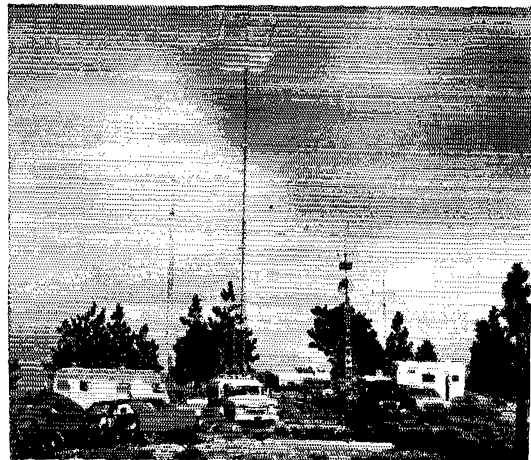
November		December	
Date	Time (GMT)	Date	Time (GMT)
1	1223	2	1407
5	1611	25	0805
28	1017	29	1157

hundred copies of Hank's circuit and will gladly put one each in any s.a.s.e. received at P.O. Box 1738, Arecibo, Puerto Rico. After you get the circuit a similar envelope to Birds Hill Ave., Needham, Mass. will get Henry to answer all your questions. Maybe if enough guys write he will figure it is easier to do a whole article in the first place.

The third offering came via E.P.T. and concerned some harmonics that Henry feels he could get along without. Ed interpreted it as follows:

Checked Your Harmonics Lately?

TVI problems made us harmonic conscious in connection with h.f. transmitter design, as far back as the early 1950s, but we tend to forget that v.h.f. stations may radiate harmonics, too. In working on 432 Mc. in a 2-meter area we may find that third harmonics of 2-meter stations can be heard at considerable distances. W1OOP, Needham, Mass., reports that during the evening of Aug. 29, when tropospheric propagation was good, he was hearing strong 432-Mc. signals from 144-Mc. stations as far away as



Antenna set up used during the June Contest by the Southern California V.H.F. Club, K6BPC/6. Left to right: 2-meter, 20-element cross polarized; 6 meter, 45-element beams. Axial Polarity side mount omni on tower below beams. 432 Mc., twin 8's over 220 Mc., Twins. 1296 Mc., helix over 1296 horn.

144 Mc. and Up

Anyone in Akron, Ohio or Pittsburgh, Pennsylvania interested in experimenting on 1215 Mc. 7 K3WPN is interested in receiving an answer to this question. Tom has designed a 10-foot parabolic dish for use with an APX-6 and will be taking the equipment with him to the University of Akron. Please get in touch with him at his home QTH if interested.

Among recent activities at K6HJL is the coaxial design of a low-power pole beacon for 144, 432 and 1296 Mc. This device will give approximately 100-db.m. signal 50-per cent modulated with a 1-kc. tone for purposes of testing receivers and antennas. The unit will be completely solid state and operational at all times. It is to be located at a site so it will be line of sight to most of the greater Barstow (Calif.) area. This will solve the problem of a weak-signal source and encourage u.h.f. activity in the area. Richard has also recently installed a 1296-Mc. discone antenna.

From Sun Valley, California K6UMV reports that he is checking out a 3-element series fed collinear antenna for 1296 Mc. to be used on the ARIES-OSCAR satellite. Don also tells us that local activity is on 1222 Mc. with about 8 regular check ins, and that activity in the Los Angeles area is also on 1222 Mc. at 7:30 p.m. week nights and Sunday.

"Would like to know of a good, active v.h.f. club in this area." So sez K1FFE of Holliston, Mass. The 432-Mc. rig at Ott's QTH is an Amperex H4A varactor tripler at 30-watts output and he has been able to run 70 watts into it at 144 Mc. without blowing it up. The converter uses RCA 2N3478's and works reasonably well. Antenna is a home-brew quad of 11-element yagis spaced at 2 wavelengths at 15 feet above ground. I sure would like to get some skeds going. It's your turn now, fellas! Get in touch with K1FFE! "With all the pains I've gone through to get a reasonable rig going on 432 Mc., the band has not been at all good to me yet. Pointing that pencil beamed 44 elements in search of a possible distant contact is, to say the least, a nightmare!

WB2RVE reports from New Jersey that he has completed 7-element yagi for 220 Mc. and an 11-element one for 432 and both should be back at 40 feet in a short time. Bob is still working on the police transceivers for 436-Mc. ATV and needs 5894's (cheap). K1YON 220-Mc. has his 11-element array up at 60 feet. At Richmond, Virginia, W4FJ has been listening to Washington D.C. stations on 432 Mc. and expects to have his transmitter in operation soon. In Glendale, Kentucky, W4HJQ is working on a 30-foot dish and new driver for the same band. Joe, K4SUM, tells of an opening on 432 Mc. from Virginia to New York during which W2BLV, K2DZM, W2JTI and W2AXU (running 2 watts out s.s.b.) were worked. No date though! Local group in the Alexandria area on 432 Mc. meets nightly at 9:00 p.m. and are looking for newcomers to the frequency.

Seems that in the El Paso area K5QPV is all set to go on 432 Mc. If someone just needed a signal, a contact or a bit of help and encouragement Hal is there willing, ready and waiting. Also in the works at K5QPV is a new and hopefully better mixer and local oscillator for the 432 converter.

W0PHD is back at work again on his 432-Mc. rig after a cross-band contact with W0BJV in South Dakota. Stan (W0BJV) was on 432 Mc. and W0PHD (Minnesota) on 144 Mc. Good luck, fellas.

More on west coast u.h.f. ATV from Tom O'Hara, W6ORG. "W6QUI in Harbor City called me to let me know about his big DX ATV contact with W6GTZ in Chula Vista, some 105 miles away, close to the Mexican border. The contact was first made with W6QUI running 100 watts with a 4X150 driven by his all solid-state driver. The picture was snow free with yagis at both ends. He then turned off the 4X150 and used his driver with 6-watts output. The picture at W6GTZ was only half snow. This again proves that high power is not needed for ATV DX. W6GTZ advises me that the ATV activity in the San Diego area is quite good with W6CMQ, W6GTZ, W6WCH, K6BTO, K6GOE, W6MGI and W6EXN all active. They use 145.5 Mc. for their calling frequency and the video centers around 436 and 1250 Mc. Sunday is their best activity night. K6KCY is designing a new transistor camera; W66JI is putting out good pictures since he got a new 16-element colinear (Bill's 2-meter frequency is 146.7); K6GOE has a camera completed and is working

on transmitter and receiver as is W6MGI and W6EXN." Thanks much, Tom! Keep the news coming!

A large percentage of our 144-Mc. reports this month have to do with the auroral sessions of August 29 and 30 and September 3 and 4. K1HTV, K1WH8 and K1WHT in Connecticut all caught both of these sessions and agree that although the first one was "good" the session of September 3/4 was the "best one yet." Rich (K1HTV) sez that the band opened (aurora) to 9 land about 5:45 p.m. on September 3 and stayed open until about 7:30 the following morning. First stations heard were W4YEB and W4KVI in Virginia both on s.s.b. Rich worked 13 of the 19 states heard and 4 of those he worked were new ones (West Virginia, Indiana, North Carolina and Wisconsin) bringing his two-meter total up to 30 states worked. W4VHIH was heard but not worked. Dave and Arn (K1WH8 and K1WHT) report that only W8WEN and K2YCO were heard via aurora on the 29th but many more heard the following day. However, "On September 3 a

2-METER STANDINGS

W1REZ	..32	8	1300	W5DFU	..29	9	1300
W1AZK	..29	8	1384	W5PZ	..28	8	1300
W1JSM	..28	8	1330	K5TQP	..26	7	1250
W1AJR	..25	7	1130	W5UGO	..25	7	1384
W1KCS	..21	7	1150	W5UKQ	..25	8	1150
W1NIEH	..21	6	1000	W5SWV	..20	5	960
W1NIN	..21	8	1200	W5LW	..17	6	700
W1HDQ	..22	6	1020	W5BEP	..16	10	1000
K1ABR	..20	6	1140	W5KPV	..15	5	1360
W1AFO	..19	6	920	W5VAX	..15	5	1010
K1CRQ	..19	6	800	W5EDZ	..8	5	1375
K1UGQ	..18	6	1250	W5YYO	..7	4	1330
K1AET	..17	6	875				
K1MTJ	..16	5	1225	W6W8O	..16	5	1300
K1OYB	..16	5	1225	W6NLZ	..12	5	1240
				K6HMS	..10	5	1240
W2NLY	..37	8	1300	W6DNG	..9	5	5250
W2CNY	..37	8	1360	W6KAP	..8	3	1300
W2QRI	..37	8	1320	W6GPO	..6	3	864
W2BLV	..35	8	1020	W6AJF	..6	3	800
K2GQI	..35	8	1365	W6MTU	..5	2	950
K2LMG	..32	9	1710				
W2AZL	..39	8	1050	W7JRG	..24	6	---
W7PJA	..26	8	1150	K7NII	..20	5	1275
W2QNH	..25	8	1200	K7ICW	..12	4	1246
W2AMJ	..25	5	960	W7LHL	..10	4	1170
W2ALR	..24	8	1100	K7ZIL	..8	5	1130
W2PZE	..23	7	1200				
W2LWI	..23	7	1050	W8PT	..41	9	1260
W2ZFGK	..22	7	1340	W8KAY	..39	9	1210
K3HLA	..22	8	1230	W8IFX	..39	8	1225
W2ESX	..21	6	750	W8SDJ	..37	8	1220
WB2FXB	..20	7	1025	W8YIO	..36	9	1250
W2UYH	..20	7	890	K8AXT	..34	9	1275
W2EMA	..19	6	1010	W8LOF	..34	8	1060
W2ZPMW	..18	6	1000	W8AVE	..33	9	1155
W2LTM	..17	7	730	K1CRQ	..31	9	850
W2YXS	..17	6	720	W8NOH	..31	8	1090
W2JAM	..17	6	670	W8DHF	..31	8	860
K2OEL	..16	6	1010	W8WNM	..25	8	900
W2ZCCO	..16	6	790				
K3CPA	..17	6	600				
K2JVT	..16	6	550	W9WOK	..42	9	1170
W2ZUDT	..16	5	550	K9UIF	..41	9	1150
				K9SGD	..37	9	1100
W3RUE	..34	8	1100	K9AAJ	..36	9	1200
W3GKP	..31	8	1108	W9WDD	..35	9	1300
W3TDE	..30	8	1125	W9AAG	..35	9	1050
W3BYF	..30	8	1125	W9GAB	..34	9	1075
W3LST	..22	6	800	W9OIL	..32	8	1090
W3LNA	..21	7	720	W9PHP	..28	8	820
K3OBH	..20	7	930	W9PPB	..28	8	820
W3NPT	..19	6	800	W9OJL	..27	9	910
K3CPA	..17	6	600	W9IFA	..27	6	1000
W3HHC	..16	6	550	W9CUX	..24	7	1000
W4HJQ	..39	9	1150	W0PFB	..43	9	1350
W4HHK	..38	9	1290	W0LPE	..33	9	1040
W4WNI	..35	9	1350	W0BNC	..25	7	1250
W4AIKJ	..34	8	1149	W0DQ	..27	8	1100
W4XLI	..34	8	954	W0MOX	..23	6	1150
K4XNC	..32	8	1355	W0IDY	..22	8	1050
K4QIF	..32	8	1000	W0IC	..22	7	1360
W4MNT	..31	8	1225	K0JTE	..21	6	940
W4EJ	..29	8	1050	W0JAS	..19	7	1130
W4RBR	..24	9	820	K0LPL	..19	9	750
W4WS	..23	7	1225	K0CER	..17	6	1225
W4TLY	..23	7	1000	K0EMO	..15	6	750
K4MBS	..22	7	1000				
W4RNU	..21	7	1090	KH6UK	..2	2	2540
W4OLK	..20	6	720				
K4YJY	..20	6	720	VE1CL	..5	5	800
W4LNG	..19	2	1090	VE3DL	..37	9	1300
K4VWH	..18	6	590	VE3AB	..29	8	1340
				VE3BR	..24	7	950
W5RCI	..39	9	1280	VE3BN	..23	7	1180
W5AJG	..34	9	1360	VE3AQ	..18	8	1300
W5PYZ	..33	9	1275	VE3HW	..17	7	1350
W5JWL	..33	7	1150	VE6HO	..1	1	915
W5UGO	..30	8	1384				
K5WXZ	..30	8	1225	OH1NL	..1	1	5250

The figures after each call refer to states, call area and mileage of best DX.

fantastic aurora took place providing results down south as far as the Carolinas. On two meters K1WHT worked W9BRN, W9PBP and K8UQA in addition to hearing W4VIII." These two fellas also report an excellent tropo inversion of September 1 and 2 when seven VE3's were worked and a couple of stations in Maine also. K1FJM reports from Massachusetts that he turned on his rig at 2200 GMT on September 3 to hear stations in Connecticut calling "CQ A." After turning his beam to the north he heard the biggest bunch of c.w. that he's heard since the June contest. About 2330 Pete heard WA4ISR (Virginia) and partial W9 calls plus W1AZK in New Hampshire. At 0122 Z, September 4, Pete made his only contact but it was with WN3EXS in Delaware, a new state. Several VEs and W's were also heard but no contacts.

A popular station during the September 3 auroral session was K1ABR in Rhode Island. He was the "first" for K2LGG, W8QOH, W8AEC, VE2BSH and VE2JO. Dick sez that with the exception of Maine, all the New England states, Quebec, New York, New Jersey, Pennsylvania, Delaware, Virginia, North and South Carolina, West Virginia, Ohio, Indiana, Illinois and Wisconsin were heard in Rhode Island. W8AEC in West Virginia was a new state for Dick but he missed out on WA9DOT in Wisconsin. He is already arranging m.s. skeds for the Draconids and Orionids to help seal the hole left by missing stations during the aurora. Projects at K1ABR include erection of a 60-foot tower with antennas for 144, 220 and 432 Mc., and completion of the 220 exciter and 300-watt final and 432 doubler. "Time is no problem right now, for I sit here leg in cast, surrounded by chassis, components and solder. Tower erections are for castless legs of course." Wha' happen, Dick? Bet you could do it if anyone could!

WA2CGK reports working two new states, Illinois and Wisconsin, on the morning of September 4, bringing his total up to 21 states on 144 Mc.

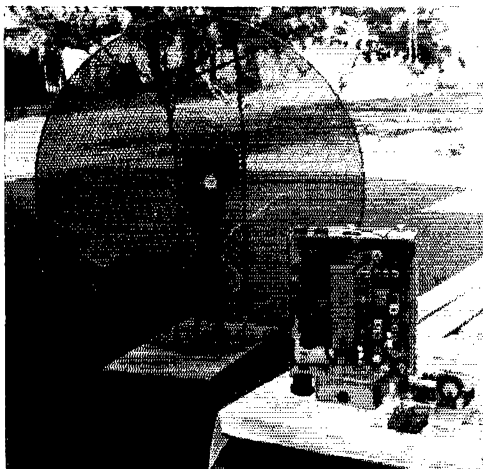
K2HLA, W2LWI and W2COT all report the auroral sessions. K2HLA sez "We have had more aurora openings in the past three months than we've had in the past three years. It's very encouraging! Best aurora in years occurred on September 3rd through the 4th, appears to have started about 1600 EST and continued until 0730 the next morning with QSOs going on all night long. I decided to get WA9DOT in Wisconsin on the landline and we set up a sked. (So you're the guilty party who arranged those Wisconsin contacts!) The QSO was made right away and from that time on WA9DOT was a very popular guy." This makes state number 23 for Dick. 8's, 9's and VE's were heard on August 30 via aurora by W2LWI and on September 3 Bob was one of the lucky ones to work WA9DOT in Wisconsin. Other states heard or worked at his QTH were Illinois, Indiana, Tennessee, Kentucky and South Carolina. He also reports good inversion on 144 Mc. on September 2 and September 10. W2AZL sez that September 3 and 4 produced contacts for him with Tennessee, Kentucky, Illinois, Indiana, Wisconsin, North Carolina, South Carolina and W5RCT in Mississippi. Carl also heard W5UGO in Oklahoma but signals faded out too quickly for a contact.

At Lemont, Pennsylvania, K3CFA "heard a bit of aurora on August 29, but the excellent aurora opening of September 3 netted me K1ABR in Rhode Island for state number 18 on 144 Mc." W3BDP in Delaware started hearing aurora on August 29 at about 2250 EDST but it was all gone by 2350. Sam heard W9BOZ, K1ED and worked K2YCO with 4A signals both ways.

A report from WA4LTS in South Carolina sez that the "aurora opening from 0015 to 0745 GMT on September 3 was fantastic for this far south. 144 Mc. brought in 4 call areas with 7 states. Signals were peaking S8 with all stations worked being at least a 5-5A report." Richmond, Virginia, was represented on the 29th by W4FJ who observes that the aurora was intermittent but very strong when in.

Probably the biggest news of all comes from W6GDO, Rio Linda, Cal. Jay worked Oregon and Washington stations via the aurora, and this is believed to be the first 2-meter auroral communication ever accomplished by a California station.

Now for a few more Perseids reports. From Connecticut we learn that K1WHS worked W0DQY 2-way s.s.b. on August 11 and W4WNH on the 12th. A close miss was scored with W0LER in Minnesota. K1WHT, running skeds during alternate hours, managed to work W4HJQ and W0WDD both contacts being 2-way s.s.b. K1WHT



Mountain-topping equipment used by W6HAB.

will be on for the Giacobinids, Leonids and part of the Quantarids but "will be making great sacrifices because he will have to skip a few days of school to make the Leonids."

A July 30 contact with W5UGO gave W4CKB state number 17 but the Perseids really did it for Bev. W1MEH (Connecticut) was state number 18; W8QOH (Ohio) was 19; K9UIF (Indiana) was 20; K1BKK (Vermont) was 21 and W2AZL (New Jersey) was number 22. W4LSQ in Alabama and W4VIII in South Carolina are almost nightly contacts on 144 for Bev in Lake Placid, Florida. He is looking for skeds and runs a kw, to a long yagi on 144.081.

W4WNH brought his two-meter total to 38 states when he worked W0NXF during the Perseids. Shelby would like it known that he will not be available for skeds until future notice. He is changing his QTH and has much tearing down and rebuilding to do. Ted, W4FJ, writes that he had several Perseids skeds set up but only Minnesota, W0LER, was worked. (State number 29.)

W5UGO/5 reports "Long hours of skeds gave me the results I wanted although some say it was a poor shower this year. By 1510 GMT on August 12 I had worked my last call area (W3BYF) after working my 9th (K6HMS) at 1036 GMT. Box score is now 36 states, 10 call areas. 1384 miles is farthest distance." Larry sez he may still finish the kw. for 144 Mc.

K6HMS had several skeds set up for the Perseids but was successful with just one of them, W5UGO in Oklahoma. Bill sez that the shower was a little discouraging out there in California but several contacts were made by others that culminated years of trying. Mexico, Washington and Nebraska (K5TQP, W7WVE and W0NXF) were new states for W6GDO during the shower and Jon's total now stands at 9 states on 144 Mc. (From California that's nothing to sneeze at!) K6HAA worked the Perseids from his new 6000-foot location. Sez it was like turning the receiver from "off to on," caused by the difference between 1300 feet (the old location) and 6000. Lanny had contacts with W0ENC, K5TQP and K5WXZ.

K1FFE writes to tell us that he is now the representative of Holliston (Mass.) on 144 and 432 Mc. Rig on 144 Mc. is a homebrew Heterodyne unit with 829B final running 50-watts p.e.p. on s.s.b., a.m. and c.w. Receiving end is an old homebrew-417A converter into a well modified 75A1. Antenna is a homebrew pair of 7-element yagis spaced 1.5 wavelengths at 15 feet above ground. In the past three months of operation Ott has worked 12 states in 5 call areas on 144. WB2QXA in New Jersey has worked six states on two meters using an indoor quad and about 5-watts output. One of the old timers on 144 Mc., W3KCA, writes that he has been on the band but not too active because of rebuilding. Charles is now on c.w. and a.m. at 144.088, 144.190 and 144.72 running 120-watts input. WB2VFX and WB2RVE both report good tropo conditions on 144 Mc. on August 20. Stations were heard from 1, 2, 3, 4, and 8 lands.

QST

YL news and Views

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

YL's are Where You Find Them

THE old Music Hall song: "You Pays Your Money And You Takes Your Choice," is a pretty good description of the Amateur Radio Service. The opportunities are so great and the modes so varied in our frequencies, that the operator in search of that YL who sat across from him at the Convention Banquet, may have quite a time finding the lady if he forgot to ask where she is usually found. His search might take him into the hustle and hurry of a CD Party, Sweepstakes, the DX Contest, or the many QSO Parties, because her delight may be the excitement of contest operation.

If not in a contest, he might find her involved in a relay of some mercy flight, or he may hear her just as she is securing her station to go to the airport to pick-up and deliver a shipment requested through the Eye Bank Net. Possibly, she will be a Net Control on an AREC or RACES drill. He might grab a brief contact, any night between schedules, as she moves from net to net in traffic. Or, just maybe she can be located as



Thelma Morgan, K2OEW.

The trail of the elusive YL may take him to the rarefied atmosphere of u.h.f. activity where she may be experimenting with propagation, or bouncing signals off the moon. And, it could be that while he is hunting her, she is monitoring the very low frequencies listening to "Whistlers."

It is likely she could be in the Novice band, giving a prospective General some code practice, or she might be all wrapped up in a casual chat with the Morse Club Net, so unless he recognizes her call, he won't find her in all the old "landline code."

Amateur Radio has no signs reading Tables for Ladies, and no Women's Auxiliary. YLs are found everywhere, on all bands. They are operating a.m., c.w., s.s.b., or pounding the RTTY keyboards, and when they aren't busy with their own particular interest of the many-sided amateur service, YLs may usually be found in one of the many Nets that are the on-the-air equivalent of the "second cup of coffee" chat, the meeting of the neighborhood social group, that, in many cases, stretches halfway around the world.

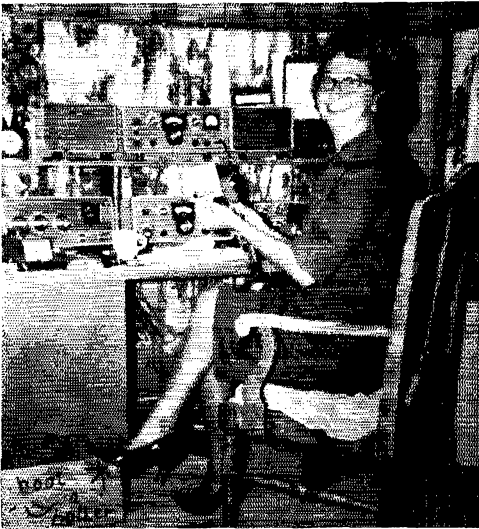
It will be possible to find a very special YL in one of the many amateur activities, as well as in the YL Nets and their particular interests. K1HJV, Jean Peacor, has retired from her post as YL Editor, *QST*, to attend to home responsibilities and the growing needs of her family. Her wonderful treatment of the feminine side of amateur radio cannot be equalled. We regretfully wish her a 73 from the *QST* Column, and look forward to finding her on the air.



Yolanda Weissappel, WA9CCP. Photo courtesy of W9QKE

she comes up for some air, and very badly needed relaxation, after she mailed her report as SCM to the Communications Manager of ARRL. And, there is also a very good chance he may have to hunt her outside the amateur bands where she is ears-deep in MARS operation.

*YL Editor, *QST*. Please send all news notes to WB6BBO's home address: 1036 East Boston St., Altadena, Calif. 91001



Marte Wessel, KØEPE, 1967 Vice President YLRL is active on any and all YL affairs. Her participation in AP and OM/YL is well known to all YLRL members. Marte says that in the 1967 YL/OM will find her on the sidelines with Pete, WØZYW, the OM doing the operating.

YLRL Election Results

The Young Ladies Radio League, established in 1939, is world-wide in membership, and the largest organization of licensed YL amateur radio operators. All YLs are invited to join. Membership applications may be obtained from any of the YLRL officers, or members.

The new officers for 1967

President, Edie McCracken, K1EKO
 Vice-President, Marte Wessel, KØEPE
 Secretary, Maxine Hanberry, WA6AOE
 Receiving Treasurer, Toni Chanman, K8PXX
 Disbursing Treasurer, Barbie Houston, K5Y1B
 District Chairmen

First District, Ruth Barber, K1HIF
 Second District, Janice Fontana, WB2JCE
 Third District, Elinor Wendland, K3TNL
 Fourth District, Dorothea Seavers, W4QB Y
 Fifth District, Doris Anderson, K5BNQ
 Sixth District, Madge Mason, WA6LWE
 Seventh District, Gwen Jackman, W7NOR
 Eighth District, Edith Best, WA8KMT
 Ninth District, Mildred Bovee, K9ZLB
 Tenth District, Cleo Brackett, KØJFO
 K1H6 District, No candidate

K17 District, No candidate
 VE District, Jan Burgess, VE3BII

Congratulations, and best wishes to all the officers for a very successful year.

First Illinois Radio Amateur of the Year

That "amateur radio exists because it qualifies as a Service," is exemplified by the activity of Yolanda Weissappel, WA9CCP, of Berwyn, Illinois, who was selected to receive the first Illinois Radio Amateur of the Year Award, by the Hamfesters Radio Club of Chicago, at their 32nd Annual Hamfest, on August 14, 1966, in Santa Fe Park, located near Chicago, Illinois.

Yolanda, known on the air as "YO," is active in both amateur radio traffic operation as Alternate Net Control of the North Central Phone Net, as well as Navy MARS. YO handled 13,366 messages during 1965, and is the only amateur operator in the state of Illinois to have earned BPL consecutively each month for the entire year.

She is active on all bands on c.w., tone, and RTTY, with the major part of her operating time devoted to handling traffic for servicemen and their families.

YO's OM is Karl, WA9CCQ, and there is a good chance of there being more YL operators because all four of their children are girls.

27th YLRL Anniversary Party

Phone:

Start November 2, 1966 1700 GMT (1200 EST)
 End, November 3, 1966 2300 GMT (1800 EST)

Rules will be found in detail in *QST*, September, 1966, page 88. If you just received your General class license, and missed the c.w. weekend, you still have time to get in this all-YL Contest and meet the gals. QST



Fine Turnout of the Minow Net.

Strays

Those who expressed interest in the Mylar guy line mentioned in the article, "Nonconductive Guys," by Bill Hamlin, *QST* May 1966, probably have found out that the line is not available in ham supply houses. The manufacturer sells directly to large industrial users. However, Bill now has a franchise to sell this material to hams by mail order and has the following material available:

Diam. (inches)	Test (pounds)	Price (dollars/10 feet)
$\frac{1}{8}$	450	1.00
$\frac{3}{16}$	900	1.60

$\frac{1}{4}$	1400	2.55
$\frac{5}{16}$	2100	3.65

Cable weave material is available as follows: $\frac{3}{16}$ inch, \$1.80 and $\frac{1}{2}$ inch, \$2.65. Thimbles for the ends are $\frac{3}{16}$ inch 22¢, $\frac{1}{4}$ inch 27¢, $\frac{5}{16}$ inch 38¢. Clamps (two used for each end) are $\frac{3}{16}$ inch 35¢, $\frac{1}{4}$ inch 40¢, $\frac{5}{16}$ inch 55¢. To keep cost to a minimum and assist ordering these are postage-paid prices. There are no clamps for $\frac{1}{8}$ -inch rope.

If interested, write Bill Hamlin, W6ENU, 1720 Kimberly Drive, Sunnyvale, California 94087.

EVENT ON FIVE METERS

BY LEONARD K. YERGER, JR.* W3BTQ, Ex-WA6SJH

SOMEbody will smile when they read this story. If they don't, I'll be surprised.

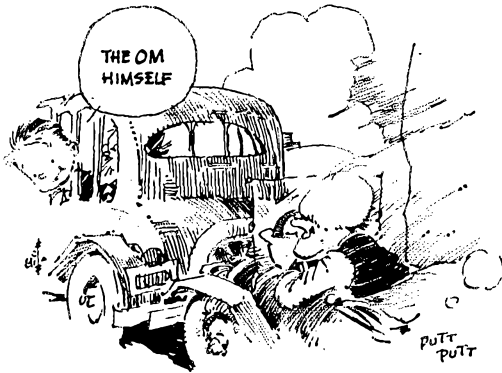
To begin, it was in August 1936. Larry, my Freshman English professor, and I were bound for Lunenburg, Vermont to spend a month on the lake. He had just finished teaching summer school, and I had finished a summer job repairing radios for a furniture store in Wilmington.

In some manner we had coaxed my 1930 yellow Chrysler Roadster as far as Springfield, or at least, as I think back, that's where I think we were. We had been driving through the rain all day.

I had a neat little five-meter transceiver mounted on the steering-wheel column. It had a type 30 and a 33 tube. The A-, B-, and C-battery box was in the trunk. The transceiver was built in a Super-Wasp shield can. I probably hadn't heard anyone since I left home.

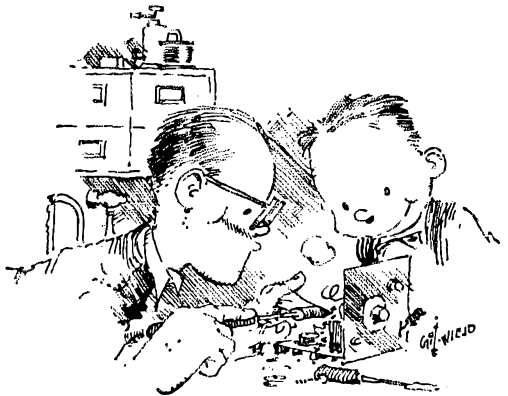
We pulled up on the top of a hill on the outskirts of Springfield and stopped. The rain was dripping through the roof. We were cold and didn't know where to go next. I called CQ and was pleased to hear a local W1 calling me. After some directions were received, I tried to start the car, but fate was against us. After grinding away on the starter, and coasting down the hill, I knew the driving for the day was over.

My W1 friend had signed, but someone else was calling me. "W3BTQ, this is WHDQ, can I help you?" The call sounds familiar, doesn't it?



Anyhow, in short order who should drive up beside me but the OM himself, WHDQ, and in about the smallest car I had ever seen. Maybe it was an

* 2620 Highland Rd., Apt. 132, Dallas, Texas.



Austin. To show you how one ham will help another, he pushed us all the way into town and into a garage. I'll bet he still remembers.

Well, the next day we headed for Hartford. Right outside of town I turned on the transceiver and smoke poured out. What a dilemma. I was bound to stay on the air, but it was Saturday afternoon, and help seemed far away. Where to find aid? The ARRL, of course.

I parked in front of the Headquarters and entered. All was quiet except for one young lady typing. I explained my problem and appealed, as an ARRL member, for assistance. She explained about being Saturday, but knew of one real active ham who would probably be around his shack, and directed us to the home of W1BDI. Off we went, with the enthusiasm and inconsideration of youth.

Ed Handy was indeed at home, and, as the secretary predicted, he was most sympathetic. The ailing transceiver was removed from the car and taken to the work bench in his radio room. F. E. H. quickly located the trouble. One of the wires to the microphone/output transformer was shorting to its case. Finding a replacement unit was out of the question, but with the aid of tin snips and a little tape we were back on the air and heading towards Vermont, and further adventures on Mt. Washington and in Quebec.

When I think back, I can't help but have a warm feeling. Sort of like having a fellow named Sarnoff push my car and another named Zworkin repair my television.

What does the ARRL mean to me? Is an answer necessary? QST

Strays

WB2RUI says a charter flight of 3-4 weeks in February, with a recognized U.S. air carrier, is in the planning stage — New York, Chicago, San Francisco, Honolulu, Christ Church (N.Z.) and Adelaide (Australia), with approximate cost for round-trip transportation only of \$750. Applicants must be members ARRL six months or longer. Register interest promptly with Dr. Robert Smirnow, 7 Pulaski Rd., East Northport, N. Y.

Stolen Equipment

The above heading should read stolen automobile: My Dodge Coronet 440, 6 cyl. golden beige with white trim and about 15,000 miles on it was stolen from my garage sometime before 6 a.m. Wednesday, September 7. The license plate is W3AXA, which should be easy to spot! Any information on this automobile should be sent to the Penna. State Police or me, W3AXA, Box 73, Jacobus, Penna., tel. 717-427-2137.



CONDUCTED BY ROD NEWKIRK, * W9BRD

How:

Jeeves answered the phone and scribbled in the log. (We keep a log, no doodles allowed, for each communications circuit at our place. This superbly useful habit is, from time to time, invaluable. Awards, you know.) A peek over his shoulder revealed the entry, "Schultz, Grommethead --- 2337." GMT, of course.

Not heard from that FB OM in some time, we seized the F1 and said, "5NN, Schultzie. How now?" Grommethead, an old c.w. hound, prefers to key an audio oscillator over the Bell. OM ON OVR he said. "Any hurry?" we asked. TRBL TRBL he said, hanging up. We donned our berets and headed for the house of Grommethead Schultz.

His ham shack was as interesting as ever. Tidier than usual, we noted, with a large new SWITCH TO SAFETY placard among DX QSLs on the wall. Schultz was one who would rather fight than switch, so we figured he must have fought a recent draw with some hot B-plus. H.v. wasn't his problem, though, as we soon learned.

The most striking feature of Grom's venerable installation was his transmitter, an historic homespun brute in a special niche on the rugged operating table under the window. Normally it was hooked to a pair of No. 12 Zepp feed wires. Schultz follows his 1947 *Handbook* carefully, so the feeders were precisely one half-wave long on 20, his favorite band, and as straight as an arrow. Unfortunately, the magnificent elm that serves as his near antenna mast leans slightly too far away on windy days. This has caused many a visitor to set down his refreshment abruptly and hurry from the premises when he perceived Schultz's rig, dubbed *Big Sender VII* for some symbolic reason, gently rising and falling several inches at the window end.

Horrified, we saw no transmitter. No feed line, either. Nothing but a brand new putty-stained window. "What happened, Grommethead?" He countered our question with a question. "You guys seen my rig? I've checked with all the other locals." Of course we hadn't, so he looked all the sadder. "Not that wild wind-storm last week --," we began. Schultz nodded grimly. "But those big door springs you installed to keep your feeders from breaking in the breezes --" He nodded dismally again. "They worked. Like all my great ideas, they really worked."

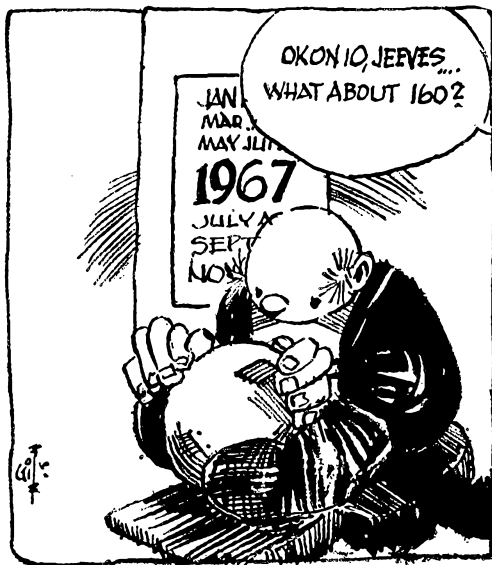
We gazed mournfully at the gaping vacancy on Schultz's operating table where only shredded keying leads remained. "You mean -- you mean this is --" We just couldn't bring ourselves to say it. 'Twas the end of an electric era, the

close of a wireless age, the passing of a majestic radio epoch. "Yes," groaned Grommethead, near tears. "The last of the *Big Senders*."

What:

Like those economic problems of prosperity we've been hearing about, increasing sunspot numbers seem to bring forth problems of propagational improvement. That ionospheric Hopperoo in late August could have ruined a whole DX contest of the single week end type. Even commercial megawattlers were hurting. We'll gladly accept a little bad with the good, though, as maximum usable frequencies continue to rise through our 21- and 28-Mc. ranges. While ten's getting to be quite the DX rage don't forget all about

160 where the DX game is still afoot, including imminent 160-meter Transatlantic and World-Wide DX Tests, a series of activities promulgated by WIBB and associates since 'way back in '32. Reminiscent of pioneering transatlantic crossings by Deloy, Schnell, Reinartz, Godley and others in 1921, the Tests will be held this 1966-67 season on the following Sunday mornings -- December 4th and 18th, January 1st and 15th, February 5th and 19th, 0500-0730 GMT. W/K/VEs are urged to call CQ DX TEST for the first five minutes of the hour, listen the next five minutes, call again during the third 5-minute period, etc., until contacts are made. WIBB urges, "Set your clocks accurately! Generally speaking, eastern U.S.A. stations will be found from 1800 to 1825 kc., and westerners from 1975 to 2000 kc. Most Europeans will use 1825-1830 kc., VKs like 1800-1860 kc., ZLs prefer 1875-1900, JAs are assigned 1907.5-1912.5 kc., and other DX usually clusters between 1800 and 1830 kc. Working DX on 160 is an extremely interesting challenge. Obstacles of QRN, broadcast harmonics, QRM, loran, QSB, etc., all require a topnotch station and careful operating techniques. Remember, these Tests are not meant to be contests." WIBB normally solicits frequent reports from Tests participants, analyzes them and turns out regular 160-meter postal bulletins during fall and winter months. Stew will be globetrotting this season, however, and requests no mail be sent to his Massachusetts address before February 1, 1967. If all goes well WIBB will keep his ear on low-band doings with a portable receiver wherever he may be. "Sure going to miss not being on for the first part of the 1966-67 season." -- G8PG, WIBB and many of the veterans on 160 think it's a great idea to give newcomers to this band a DX break. It is therefore recommended, at 0500-0730 GMT, January 8th and March 5th, that big-signal transatlantic W/K/VE regulars simmer



* 7882-B West Lawrence Ave., Chicago, Ill. 60656.



KV4CK basks in his sunny back yard after turning in the top Virgin Islands c.w. score in ARRL's 1966 International DX Competition. What a life—Randolph will still be sunning himself, transceiver and all, when nippy winter winds move in to chill shivering northerners. (Photo via W1YYM)

down and clear the deck for "first-timers." European and African first-timers will be given the same courtesy at their end on December 18th and February 5th. FCC-licensed amateurs brand new to 160 meters should ascertain what frequency segments and maximum power inputs prevail at their QTH. Privileges vary from state to state. Page 60, July '63 QST, gives a rundown, or check directly with FCC or ARRL HQ.

We were going to document recent 14-Mc. DX activity this trip but, with a packed agenda before us, we'd better proceed with our text. Next "How's" we'll shove off in the handiwagon again thanks to (20 phone) Ws 3HNK 4YOK, K1ZJA, WAs 5AER 8CGN 8MAS, WB2s LDX UHZ YVZ, VP7DJ; (20 c.w.) Ws 1AYK 1ONU 1ETV 3HNK 4YOK, Ks 1ZJA 5MHG/6 9UUY 0DEQ, WAs 1CYT 3JZ1/9 5EQA 8CGN 8PYL 9AQI, WBs 2LDX 2UHZ 2YVZ 61EX GOLD, 11ER; (15 phone) Ws 3HNK 4YOK 8MLX, K1ZJA, WAs 8CGN 9AQI, WB2LDX, VP7DJ; (15 c.w.) Ws 1ONU 3HNK 3JZ1/9, Ks 1ZJA 5MHG/6 9UUY, WAs 1EYF 5EQA 8GGN 9MQI, WBs 2LBJ 2LDX 2UHZ 61EX, WNs 4BVS 50SY 6SAZ 7FLR 8TYF; (40 c.w.) Ws 1AYK 3HNK, Ks 1ZJA 9UUY, WAs 8CGN 8MCQ 6JTB, WBs 2LDX 2UHZ 2YVZ 61EX, WNs 7FLR 9PQY; (40 phone) WB6OLD, W. P. Kilroy; (80 c.w.) W1SWX, WAs 8MCQ 9MQI; (75 phone) K1ZJA, Mr. Kilroy; (10 phone) WA2VFA, WB2LDX, VP7DJ; (10 c.w.) WA2VFA, WB2LDX, G3IDG and 11ER, plus other correspondents reporting before deadline. Jump aboard!

Where:

HEREABOUTS—VO2AW and W1CYT have great news for printers of Canadian QSLs. The former writes, "In 1967 Canada will celebrate her centennial year. That we may help publicize this, the Canadian government has authorized the use of special calls by Canadian amateurs for the period from January 1 to December 31, 1967, as follows: 3B1 for VO1, 3B2-VO2, 3C1-VE1, 3C2-VE2, 3C3-VE3, 3C5-VE5, 3C6-VE6, 3C7-VE7, 3C8-VE8, 3C8-VE8 and 3C9-VE9. Suffixes of present calls will remain the same, and use of these special prefixes will be at the discretion of each amateur. QSLs can be handled in the normal manner." From the well-edited DXer DX Club of Puerto Rico organ: "S.a.s.e. and GMT. . . . It is hard to believe that at this time and age there are still some so-called DXers who do not comply with this common sense request. S.a.s.e. means 'self-addressed stamped envelope' and should always be included with your request for a card from a QSL manager within your own postal system. For QSL managers in foreign countries, send s.a.e. and IRCs; that is, a self-addressed envelope plus the required number of International Reply Coupons (available at post offices for 15 cents each) which are traded for local stamps at any foreign country. One IRC will pay return postage by surface mail, and for airmail check the Postal Information section in a recent *Callbook* which shows the number of IRCs required for airmail return from each country. GMT means 'Greenwich Mean Time' and is standard throughout the world. You cannot expect a QSL manager (anyone, for that matter) to convert your local time to GMT in order to find your contact among thousands of log entries." W2API is advised, "PJ3CC is the call of the Coral Cliff Hotel, Curacao, Netherlands Antilles, W9TKV was guest operator of PJ3CC for a while but he does not handle its QSLs. . . . W3JZ1/9 is gathering data for his 'biggest of tips on how to avoid receiving QSLs despite repeated follow-ups, s.a.s.e.s., IRCs and bribes: 1001 hints for the guy who doesn't want his shack cluttered up with juicy confirmations." Shipboarder WA6WTD writes, "I have 2000 QSLs to send out for WA4NFS/KP1, now QRT. Would appreciate s.a.s.e. to the address in the roster to follow." LA1EE/p, PX1YR and 3A0EB QSLing commenced in August according to a W2GHE DX-pedit on of the Month newsletter. You may already know a lot about it, but we'll bet you can learn something from "How to Address Mail," excerpts from Chapter 1, Postal Manual, a pamphlet (POD Publication No. 28)

available at your U.S.P.O. branch. . . . The Fall 1966 *Callbook*, foreign edition, lists a fat batch of QSL managers on page 182, a new feature. On the same subject there's available a *QSL Managers and QTH Directory* from the press of W6GSV. Check with Ed for details. . . . WITS says the new first call area ARRL QSL Bureau really moves fast. . . . W0GNF, lately W0GNF/1, disclaims any QSL arrangements with DX stations. Receiving W0GNF's mail by mistake? . . . This month's "QSLers of the Month" are DL8KP, EA9EO, F5AH, FG7XT, FP8s BH CK DA, GD5ACH/W6KG, GI5AAU/W4PCE, HB9AHS, HK3s ASJ RQ, HP1AC, JA1ACA, KB6CZ, KG6NAA, KR6s CO MM, KN6s BQ ER, LA8FG/p, LU1ZC, LZ1DV, OH2BEM, OZ4H, PJ2ME, SL7AZ, SM8BYG, T2KR, VKs 5MQ 81A, VO1IHH, VP6PJ, WA1EAV/VP9, WP4CRF, ZC4BG, ZL3JO, Z8SL, 5N2AAF, 6Y5BB, 9G1FQ, 9G5HT, 9K2AD, 9VIMT and 9Y4VT, plus QSL tenders Ws 2CTN 2GHK 2YTH 4HKJ 4OPM 7VRO and WA2CBB, all nominated by "How's" correspondents Ws 1SWX 3JZ1/9 9OYZ, Ks 1AFC 1LMS 2BMI 8YSO, WAs 1CYT 6BSO/1 8GGN 8MAS 8MCQ 8MQI, WBs 2LDX 2UHZ 2UKP 2YVZ 61EX, WNs 8TYF 9PQY, VO2AW and VP7DJ for dandy discharge of QSL responsibilities. Any backs you'd like to pat hereby? *Help!* W1SWX wants leads on VP4DA, VS9s ASP JFT; W6EUF seeks scoop of VR3E, 9A12s FD GII, all '63 contacts; K9UYI needs nudging toward FG7XX, HR5LB, VK9PU '60, VP8CR, 5W1AZ, 9J2VB; and PY2BKO will settle for a lead on 3V8AE '54. Ideas? . . . Ks 1YPN 2MYR, WAs 9MQI 0MOR, WB6QQP and VE2BPY offer their services to DX stations requiring QSL agencies on our side of the ponds.

SOUTH AMERICA—"No logs lately from HK0QA," regrets QSL representative K9ECE. "I've sent word via HK0AI and have written HK0QA several times. No luck as yet but I expect to receive them eventually. He's quite busy with his business in San Andres." W8GIU has similar troubles with 9Y4VT's liaison, according to W. P. Kilroy. . . . From W100A: "VP1PV, now doing his own QSL work, appreciates s.a.s.e. Envelopes bearing U. S. postage are packaged for distribution from a central Stateside location. (Gad, Jeeves, this QSLing thing gets complicated.) I lost you at the last IRC, Boss. . . . Jeeves. . . . K3HTZ informs, "Ex-FY7YI is looking for old friends and can take care of anyone still needing his French Guiana QSLs. He now signs F5CP." . . . K2BYX promises 100-per-cent QSL response for his contacts as CE2QO, CE2QO/mm and K2BYX/mm aboard SS *Santa Isabel*. "S.a.s.e. would be appreciated as we spend very little time in New York on this run." . . . W8GGN understands that an unstable specimen put a spurious PY8XA on c.w. before Don and Herb tried their own keys on St. Peter & Paul. Guess we'll always have a few ickies around.

OCEANIA—VK1QL of Canberra Radio Society tells VERON's DX press that QSLs have rolled in for ninety unauthorized VK1 suffixes. There are only sixty-odd legit VK1s over there. . . . "We QSL 100-per-cent from KG6ALW," declares WA8PQF, "but only in answer to cards received. Postage must come out of our own pockets with an average of 3000 contacts monthly." . . . ZL2GS, distressed by poor QSL results from s.a.e.-with-IRCs mailings, now insists on their inclusion when his own cards are requested. Otherwise Eric swaps via bureau. ZL2GS commends W2CTN for his example of QSLing dependability and fair play. . . . Slow log shipments from FO8AG keep QSL aide K9ECE in the uncomfortable middle. Things are further complicated by someone's intermittent usurpation of Emile's call. . . . KH6FJL/6 is wrapping up his 160-country Hawaii QSL records at the address in the list to follow. "Still have several hundred cards left—s.a.s.e., please." . . . From gorgeous postage displayed on VK8HA's QSL envelope, W2JRL judges him to be a receptive collector. . . . W7WLL handles VR4LN cards, all right, but Don says you can forget about ungod VR4LN/1 and VR4LN/VR1.

EUROPE—Excepting a letter from the General Post Office, Radio Services Department, London, to WA1CYT concerning possible new prefixes for Guyana, the Maldives, Gambia and other newly independent, or soon-to-be independent countries: "No call sign series will be allocated to any independent country until it becomes a member of the International Telecommunication Union. The call signs of the series will then be formulated in accordance with Article 19 of the International Radio Regulations. At present none of the independent countries listed in your letter has become a member. Until such time as they do they will continue to use existing call signs which have been allocated to them as members of the Overseas Territories ensemble." . . . QSL tender WB6BSJ,

because of nonreceipt of logs, tells WA8GGN to try QSLing EA3OT direct GD5SF is vexed by recent illegal DX use of his call XYL WA4MIF does QSL chores at home for WA4FIJ's Valletta 9HIAS activities.

AFRICA—"I'll be QSL manager for ZS8L contacts made after October 4, 1966," announces W4BRE, pointing out that old Basutoland became independent Lesotho on that date Tuner W. P. Kilroy learns that VE1AED/SU of Gaza prefers QSLs to his home address, VE2BUJ/SU the contrary W6LDA says all CR7GF's FH8GF and /FR7G QSOs have been confirmed via bureaus where s.a.s.e.s were not supplied F9OE, REF general secretary, wants to make it clear that he can confirm FR7ZI/mm contacts only, not those of FR7ZD W4VPD has logs for CR7GF/FR7 action on Bassas da India, August 13th-15th. Enos will also probably do honors for Jose's subsequent stops at Europa, Farquhar, Desroches, et al Ex-CN8FF, now KZ5WR, discovers he's still being pursued for Morocco QSLs. "All contacts were given my Stateside call and address for QSL purposes, and all cards received were answered." Strays, no doubt; KZ5WR stands by for further inquiries VQ9EF, with an assist from WA9GSW, states that QSLs received via his W0BIG address began receiving attention early in September. Regarding mail direct to Mahe, Wes's British-style QSLs usually are too large for s.a.e., so envelopes may be omitted by petitioners. "Due to the volume of cards received, those unaccompanied by International Reply Coupons (three for air, one for sea mail) will be answered from the States next year." Ws 1BGD 5DZA and WA8GGN say ridiculous FB8VV, ST2BSD and 5U7XR are to be more pitied than scorned, 5U7AC claims 5U7AH and he is the only Niger actives WB2UKP finds you'll make a big hit by using out-of-the-ordinary U. S. commemoratives on your mail to philatelist EA9EO CT3AQ's liaison with QSL helper K9ECF bogged down recently. Don requests patience until he finds out the score and secures logs.

ASIA—VE4OX adds 9N1BG to his QSL managerial responsibilities, reminding us, "Self-addressed envelopes with postage are required because no cards are answered via bureaus." Canadian QSL agents can't use U. S. postage, you know, so include appropriate IRCs in lieu of VE stamps WA8GGN hears that WA6TFZ no longer is QSL rep for JA1CWP LIDXC's *DX Bulletin* says Ws 7VRO and 8ZCQ will respectively handle c.w. and s.b. MP1QBB QSLs for the mid-September Qatar visit of OD5s RZ and EE. Here's the latest batch of individual recommendations found in your "How's" mail sack. We caution that each item is necessarily neither complete, accurate nor "official."

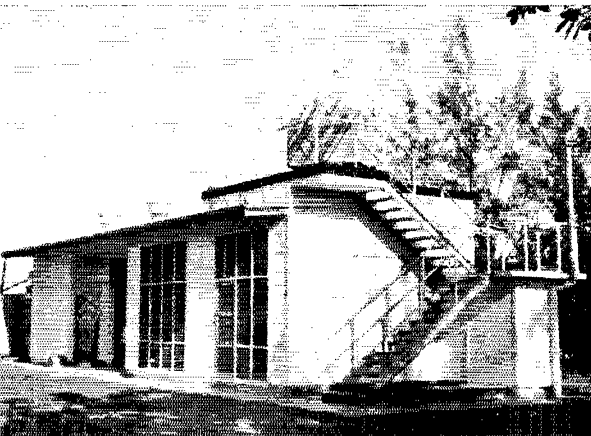
GE2QO (to K2BYX)
 CM2BL (to OK1GL via CAV)
 ex-CN8FF (to KZ5WR)
 CR7GF/FR7 (see preceding text)
 CT2AN (via CT1IW)
 CT2JJ (via W6LDA)
 CT3AS, Rua 1, Barrio das Virtudes, Funchal, Madeira
 EL9MB, P.O. Box 448, Monrovia, Liberia
 EP2RW (via W2CTN)
 F7CS (via VE4SK)
 F0AO/m (to OZ3DS)
 FB8YY (via REF)
 FH8GF-FR7G (via W6LDA; see preceding text)
 FP8BH (to W1PFA)

VR4CR expects to excite DX hunters from the Solomons for another two years. Arthur likes c.w. around 14,090 kc. with war-surplus gear and a Zepp skywire. When not busy being DX he performs as a radio and radar technician at Honiara. Real cool tropical layout. (Photos via VE2AYU)



YN3FP's 48,060 points, 356 QSOs, were good for the third-ranking Nicaraguan voice effort in the 1966 ARRL DX Contest. (Photo via W1YYM)

FP8CA (to K2OJD)
 FP8CK (to W2JAE)
 FP8GV (to W2GKZ)
 FP8DD (to W2R5W)
 FR7ZI/mm (via F9OE)
 ex-FY7I (to F5CP)
 GC2LU/p (to G2LU)
 GC3PLX (to G3PLX)
 GD3PXO/p (via G3TUF)
 HB0AAI (to HB9AAI)
 HIAUM/M1 (to HIAUM)
 IP1AA (to I1CSG)
 IS1SCB, A. Scotto, P.O. Box 25, Cagliari, Sardinia
 JA7CEK (via Ks 3FFJ or 6ARE)
 KIIMP/KC4/mm (via W4ECT)
 K3LZC/4X (via K3WEI)
 KA2LD (via W2CTN)
 KG6ALW-WA8POF/KG6, T-1 Divn., Naval Radio Stn.,
 Box 118, FPO, San Francisco, Calif., 96630
 KH6FJL/6, J. Fall, QM/1, USCG *Cape Higgon* (WPB-
 95302), 1911 Bayside Dr., Corona del Mar, Calif., 92625
 KX6EN (via W1MV)
 KZ5WR, R. Wilt (K8TPH), Box 5061, Cristobal, C. Z.,
 09584
 LZ2KKZ, Box 18, Varna, Bulgaria
 MP4QBB (see preceding text)
 ON8XE-ON8XE/LX (via VE4SK)
 OX3GE (to OZ9GE)
 OX5BO, CMR, Box 2120, APO, New York, N. Y., 09023
 OY3Y (to OZ3Y)
 PJ3CC (see preceding text)
 PX2MQ (to F2MIQ)



SM2XAA (via SM2SU)
 TF3EA (via VE4SK)
 T12EVA, P.O. Box 2817, San Jose, C. R.
 UO5AA, Kagul Radio Club, Kagul, Moldavian S.S.R., U.S.S.R.
 UR2KA-C, Box 387, Tallinn, Estonian S.S.R., U.S.S.R.
 VE2BUJ (via VE2NV)
 VP1BV, P.O. Box 643, Belize, Br. Honduras (see preceding text)
 VP2GS, Box 201, St. Georges, Grenada, W. I.
 VP6KL (via VE4OX)
 VP6PJ (via WB2UKP)
 YR4LN (via W7WLL; see preceding text)
 W4BC/DUI (via PARL)
 W7NE/8F1 (to W7FNE)
 W9WNY/HK6 (via W4ECD)
 W6CTA/8F4 (via W2CTN)
 WA4MFS/KP4, c/o D. Motschenbacher (WA6WTD), OR Divn., MISS Canberra (CAG-2), PPO, San Francisco, Calif. 94101
 WA5FCX/VO2, GBARC, Goose Bay AFB, Goose Bay, Labrador, Canada
 XW8BQ, c/o U.S. Embassy, APO, San Francisco, Calif. 96352
 XW8BS, B. Stewart, USAID/BPR, APO, San Francisco, Calif. 96352
 YA8RG (via DL4MB)
 YS1DHE, P.O. Box 1184, San Salvador, El Salvador
 YS1MCG, Box 329, San Salvador, El Salvador
 YV7AY, P.O. Box 512, Carupano, Sucre, Venezuela
 ZB2s AW AX, Yasme Foundation, P.O. Box 2025, Castro Valley, Calif.
 ZS8L (via W4BRE; see preceding text)
 3A01D (to F9KP)
 6O1PF (via W6MM)
 6W8DD, N. Lexall, Box 190, Dakar, Senegal
 9H1LW (to WA4FLJ)
 9JR8W-9JRBX, RST, Box 1505, Ndola, Zambia
 9X2MI, Box 1958, Lusaka, Zambia
 9M8DH (via R5GB)
 9N1BG (via VE4OX)
 9O5HJ (via ON4HG)
 9O5HT (to ON5HT)
 9O5QC, Box 2229, Bukavu, R. C.
 9O5SS, PO, New York, N. Y. 09662
 9X5AV, H. Verjus, P.O. Box 63, Cyangugu, Rwanda
 9X5MH (via DL1ZK)

Full credit for the preceding catalog goes to Ws 1CNU 100A 1SWX 1UED 1WPO 1YYM 2JBL 3GJR 3ZJ/9 4YOK 7UVR, Ks 1ZJA 2BMI 3HTZ 6UFT 8YSO 9UIY 9VFN, Was 1CYT 5EQ4 6BSO/1 8CGN 8MAS 8PYL 9MQI, Wbs 2QZE 2UKP 6IEK, WN9PQY, VP7DJ, W. P. Kilroy, C. Durnavich, DARC's *DX-MB* (DLs 1EP 3RK), DX Club of Puerto Rico *DXer* (KP4RK), Far East Auxiliary Radio League *News* (KA2LL), Florida DX Club *DX Report* (W4MVB), Japan DX Radio Club *Bulletin* (JA1DM), Long Island DX Association *DX Bulletin* (WB2HXD), Newark News Radio Club *Bulletin* (L. Waite, 39 Hannum St., Ballston Spa, N. Y.), North Eastern DX Association *DX Bulletin* (K1IMP), Northern California DX Club *DXer* (Box 608, Menlo Park, Calif. 94025) and VERON's *DXpress* (PA6s FX LOU TO VDV WWP). Keep it comin'!

Whence:

EUROPE — CCRC (Czechoslovakia) invites world-wide participation in its International OK DX Contest, a c.w.-only affair scheduled for 0000-2400 GMT the 13th of this month. Stations will exchange serials consisting of RST plus two digits representing the number of years the operator has been licensed as an amateur; e.g., 15903 if

licensed in '63. Work any country but your own at one point per contact for non-OK QSOs, three points for each contact with OKs, one hand-contact per station. For final score multiply this point total by the total number of prefixes worked — VE1 VE2 VE3, (G2 G3, OK1 OK2), for example, make seven. Monoband, multiband and multi-operator categories are available, a separate log for each band listing GMT, station, serials sent-received, points claimed and new prefix as worked, for each QSO. An accompanying summary sheet should include the declaration, "I hereby state that my station was operated in accordance with the rules of the contest as well as all regulations established for amateur radio in my country, and that my report is correct and true to the best of my belief." To be eligible for possible certificates of creditable performance, log entries, shipped to Central Radio Club, Post Box 63, Prague 1, Czechoslovakia, must be postmarked no later than December 31, 1969. Will we give those U.S.S.R. contest hawks some competition in this one? . . . From 9H1AS, known as WA4FFJ back home: "A license seems to be quite easy to come by in Malta although there is a bit of red tape. Application should be made to Mr. Joe Galea, Office of the Prime Minister, Auberge d'Aragon, Valletta. He will provide the necessary form. Cost is two pounds for station inspection plus two pounds for the license, plus a sixpence document stamp. This works out to about \$11.25. I've requested the U.S. embassy here to start formal groundwork toward true reciprocal licensing; embassy personnel and Mr. Galea seem quite amenable to working it out. By the way, 9H11 hams meet every Sunday at 1000 GMT on 21,150 kc. and welcome DX check-ins. Another Sunday net meets at 0000 on 3630 kc. — Net control is 9H1AM." . . . WA8PYL finds RAEM, Ernst Krenkl, often available on 14,026 kc. c.w. around 0300 GMT. Ernst inherited that unusual call from arctic icebreaker SS *Cheluskin* aboard which he performed heroic communications duties years ago . . . K3CUI notes that Russia's *Radio* magazine sponsors station UA3RDO on DX bands . . . European tidbits in K9UIY's log: F9AH is very large on our side with only 20 watts to a ground-plane . . . W6HUB operates from DJ8KT. . . SP6AZY's operator Hanka is a candidate for your YL DX collection. . . GB3WJ represented a Boy Scout jamboree in August . . . VE4SK finds VE4XQ signing ON8XE with the RCAF in Belgium . . . DXdom lost its dean of scribes with the recent passing of G5QB, long a staff member of Britain's *Short Wave Magazine*. . . G3IDG, anticipating 28-Mc. resurgence, recalls working 38 countries with 10 watts of crystal-controlled c.w. and an indoor dipole during the middle '50s. "Seems I had more fun in those days than I have today with my v.f.o. 55 watts — or is it just old age reminiscence?" Yep, ten is a ball for all. . . Took W1AYK ten years to work every Swedish call area, then only five hours to duplicate the feat. . . L1DXA has it that SV6WU's Dorsetness TR-3, 21,400 kc. 1800 GMT, has another year to go. Don says more Rhodes actives are due but Crete remains quiet.

ASIA — More reciprocity progress reported by K3LZC: "K3LZC/4X is now operating at Jerusalem. I received my license at the same time as WB2DZW/4X. So far we are the only Americans to be licensed under the reciprocal agreement. K3LZC/4X can be heard almost daily near 14,310 kc. with an NCX-3 and 3-element beam. WB2DZW/4X sometimes uses my gear. We worked about 70 countries in the first few weeks. Anyone planning to apply for Israeli operating privileges should write me for some useful hints, especially concerning the importing of gear. They can profit from the three long days I spent in Haifa getting my rig through customs." . . . W1CYT learns, "XW8s AX and AZ returned to Washington on leave, then left for Laos and Ghana, respectively." . . . "JAs are thick here on 40 c.w. after 0800 GMT," declares

CR7GF efforted rare Indian Ocean points this summer including FH8GF, at left, on FH8CD's Comoros premises. Jose's FR7G effort was terminated at 108 contacts when somebody accidentally piped 220 volts into the 120-volt Reunion mains. At right CR7GF visits with host FH8CD, possibly arranging for an early return. (Photos via W6LDA)



PAØDEC fearlessly teeters on his antenna-studded roof in Santpoort but we'd prefer a safety belt. Anyway, this eye-catching array accumulated 359 U.S. and Canadian contacts for second-high Holland phone score in this year's ARRL DX Test. (Photo via W1YYM)

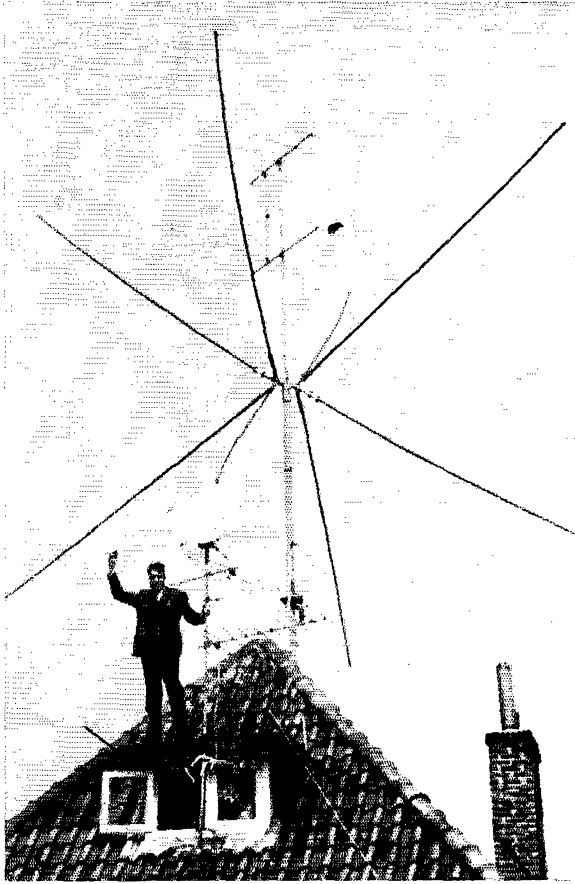
WB6OLD. "Most JAs must spend their time on 7- and 21-Mc. c.w." VU2JA enjoys his 20-meter skeds with W5VA. "Frank and I have had very few misses in nearly three years. His Monarch 5- and 6-element beams, 110 feet high over salt water, make friends all over the world." Asiagrams via literature of aforementioned clubs and groups: MP4MAW, 14,203 kc. at 0200 GMT, is expected to keep Muscat moving on c.w. and phone for a year or so. 9N1s BG and NIM display remote Nepal on 14,130 and 14,270 kc. at 1500 GMT or so. VS9ARV and friends hope to DXlibit VS9HRV on the Kuria Muras momentarily. XW8BS, using gear of departed XW8AZ, anticipates an 18-month USAID stay in Laos. Far East Auxiliary Radio League new or renewed memberships are held by KAs 2DM (W8ARB), 2DW (WA6FHB), 2HB (K7EYK), 2JC (K9JFV), 2LK (W6SLP), 2SA (W1BAF), 2ZK (K5OMD), 3CF (K4EIK), 7RF (WA7FCU), 9AB (W5GXY), Ws 3TQ and 6UWL.

AFRICA — Ah, this changing world. WA1CYT reminds us that old Bechuanaland, ZSE, became Botswana in September. Rand-McNally must be hoppin' On his Indian Ocean DXcursions CR7GF has been transmitting near 14,000, 14,110, 21,060 and 21,420 kc., tuning around 14,200 and 21,415 kc. when on sideband. Ws 4VPD and 6LDA indicate that more island goodies are in store. "Pleased to report more than 1500 U.S. QSOs," writes VQ9EF (W0BIG). "Some 500 different stations. Most are real gents, though some are not." Former ST2BSS, still in the Sudan, writes ARRL's W1BGD: "There are no legally licensed amateur stations here at present. I'm still trying to get the Boy Scout station back on the air but, with changes in government ministers, I haven't had much luck." S.w.I. Kilroy finds EA8AH looking for W/Ks almost every morning, 1230 GMT, on 20 sideband. W2GHK says that the new ZL Special beam of ZD9BE really cuts the 14-Mc. butter from Tristan, also that W4BPD is expected to renew Indian Ocean DXpeditionary activities by year's end. Meanwhile, according to Stu and W4VPD, Gus mails out his own DX news from South Carolina. 5N2s AAW and AAX claim credentials for early Dahomey DX doings. L1DXA data on French outposts: Crozet's winds dismantled FB8WW's skylooks temporarily. Kerqulen neighbor FB8XX, dismayed by single-sideband pile-ups, is turning to c.w. Adelle's FB8YY keeps a Swan 350 and ground-plane productive on 14,105 kc. at 0400 GMT.

OCEANIA — ZL2GX, contest and awards chief for NZART, writes W1VG of ARRL: "We were to visit the U.S.A. next year but the trip is postponed indefinitely. Just moved into our new house, bigger, better and brighter. ZL4CH returns from the Campbells to New Zealand after October to spend some time with us. ZL5AA will be back with us, too, so it will be 'fun and games' for all." WA0PQF/KG6 helps man KG6ALW on 20 phone almost daily at 0700-1300 GMT. "VR6TC's improved 15-meter signal often is S9 on the east coast," remarks KRYSO. "Tom hasn't forgotten how to handle the pile-ups and he still tries hard to please all callers before QRT or QSB time." FW8RC offers Wallis each Sunday at 0700 on 14,240 kc. ZK1AR is back at Aitutaki for another go at sideband and c.w. on 20 and 40 meters.

SOUTH AMERICA — Seagoing K2BYX writes aboard the Santa Isabel from Valparaiso, "Since there is no reciprocal agreement between Chile and the U.S. at this time it was necessary for me to get a Chileno license to become CE2QO. The written test and the one-year residency were waived when I presented a letter from the U.S. embassy vouching for me. In late August I was given approval by Direccion de Servicios Electricos Degas, Amunategui 58, Santiago, Chile." Fred may also have his OA and HC calls by now. "ZP5DH left Paraguay," reports VP7DJ. "Says it's for good." Club notes on the deep south: HC8s FN and JG push the Galapagos on 14 and 21 Mc. Easter's EA0AC pops up on 7001 or 14,013 kc. between 0430 and 0500 GMT. W1DHL relieved K1IMP on the NEDXA DX Bulletin staff while Herb teamed with W9WNV for summertime Caribbean capers. Don relaxed briefly with YV5 friends after Serrana Bank and Bajo Nuevo W9WNV/HK0 efforts in September, tantalizing pursuers with Malpelo and Clipperton possibilities.

HEREABOUTS — W8JIN, who was winning contests and tacking up fancy QSLs long before most of us collected our first "r.f. burns," comments, "The September column regarding 'specialists' was quite interesting. I've long regarded those accomplishments of W2QHII, W6ZZ, WA6IVM and others far more of an effort than the single-band DXCCs claimed by so many. Of perhaps no interest to anyone other than myself is my many years of chasing



DX on all bands, an activity that has now reached some sort of goalpost with a band/mode total of 2000-plus countries worked, 1915 of these confirmed. The breakdown per band looks like this: (c.w.) 28 countries on 160 meters, 145 on 80, 272 on 40, 343 on 20, 239 on 15, 152 on 10, 2 on v.h.f.; (phone) 1 on 160, 60 on 80, 135 on 40, 323 on 20, 204 on 15, 136 on 10 and 3 on v.h.f. Not included in these figures are 29 countries worked on radioteletype." With 28 Mc. back in the DX picture we'll know where to find Jim on week ends. From WA6WTD: "VP2AZ maintains a KWM-2, 30T-1 and triband beam for his own use and that of Antigua vacationers staying at his Beachcomber Inn." Denny also visited VP2LS with WA6UIK this summer for 2.5 kiloQSOs with 101 countries. "Didn't know what I was missing by not hitting 21 Mc. earlier from down here," exclaims VP71J. "Stations like TN8AA break me off the back of my beam. Ninety per cent of the stations I work on 15 tell me I'm their first VP7. Not too many of us active in the Bahamas, only about a dozen. VP7DD recently moved to Grand Bahama island." W8EFW, W8G0N and almost everybody else thought their receivers had conked out cold Sunday morning, August 28th, until other stations were heard complaining about atrocious conditions. That ionospheric collapse was severe but short: DX was rolling in again by mid-afternoon. Seems Old Sol won't give us more spots without an extra trick or two. "Think I qualify as a giant-killer, too," observes KRYSO, claiming 118/109 countries worked/confirmed with an Eico 720 and dipoles. "They surely come slow after 100, though." K9EFC does well with 316/310 on shoeless RX-1, HX-10 and 1X-100 units. His 60-ft.-high TA-33 spinner carries the ball. WB2UKP, another giant-killer, claims 100 countries in seven months with a little old exciter and inverted V. WB6QQI wants to swap U. S. ham literature for the overseas variety. Ex-XE1NIN now signs K8DIH/5, according to W. P. Kilroy. Amateurs with static locations have something to be thankful for. "I gave up long ago trying to subscribe to publications," laments airman W6GNF/4. "If the magazines don't get lost following me around they're ancient when they finally reach me." **QST**



Operating News



F. E. HANDY, WIBDI, Communications Mgr.
LILLIAN M. SALTER, WIZJE, Administrative Aide
GEORGE HART, WINJM, National Emergency Coordinator
ROBERT L. WHITE, WIWPO, DXCC Awards
ELLEN WHITE, WIYYM, Ass't. Communications Mgr.
GERALD PINARD, Club Training Aids
PETER CHAMALIAN, WIBGD, Communications Asst.

WIAW Winter Schedule. This month we're pleased to give you (in the usual box announcement elsewhere in these columns) the new fall-winter WIAW sked. All Official Bulletin (OBS) and Code Practice times are shown. One "extra" RTTY period is included; the *early* OBS Wednesday nights (Thurs. GMT) differs from other RTTY schedules in that the Bulletin is sent *first* with 170 cycle shift to aid in testing those new filters and converters. Then there's a repeat using 850 cycle shift. Footnote indicators show also the time we look especially for Novices etc. The new detailed sked (see box) is effective from the last Sunday in October when most of the nation changes back from Daylight to Standard Time.

QSL for QSL? ZL1HV has figured it out that W/Ks are slipping on their QSLing. He made 721 contacts in 2½ years. But his QSLs to each station brought only 256 QSLs. The *highest* percentages of return from our different call areas were from W7- W8- and W0-land, 45% and 46%. The *lowest* percentage returns were from W1s W4s and W6s, 28%, 32%, and 30%. Let's hope other DXers have had a better experience. We think it should be remembered that the QSL is the final courtesy of a QSO. 'Nuff sed?

ARRL's 33rd-Annual ARRL "SS"! U.S. and Canadian amateurs are invited once again to take part in this year's Sweepstakes. There's the session using phone (Nov. 12-14) and the following equally popular c.w. week-end (Nov. 19-21), for this year's SS operation. As K8IKO says, "There aren't any real losers in the SS." Scores of stations annually complete qualification for the Worked All States award during a Sweepstakes. The chance to give a full work out for antenna and station changes made since last time is unequalled. There's lots of operating fun in the SS and we believe this remains the top ARRL operating event in general popularity, judging from the individual entries.

Don't miss this one! Participation rules, including the way to get a "message bonus" for your know-how, remain just about the same as last year. Consult the rules on how to get this extra credit. Sending in your SS-message attached to your report will, this time, bring a round 1,000 points (to be added to your score by Hq. after review for perfect form, inclusion of handling data, check etc.) The club SS-competition will be limited this year, like the DX contest rules, to apply entirely to already affi-

liated amateur radio clubs or groups awaiting action on their Resolution of Affiliation. *CU in the SS.*

Information on "Starting a VHF Net." Last month we gave you a look at the handsome new *Official VHF Station certificate*. SCMs (addresses on page 6) welcome applications from truly active vhfers who subscribe to the objectives. These are much more forcefully portrayed in the new certifications, emphasizing such points as Net Participation, Exemplary Operating, Propagation Reporting and Public Service thru VHF. Besides the certificate recognition, OVS will get advance v.h.f. information from time to time, and ARRL'S quarterly CD bulletins. This month we want to tell you of some new information just put together dedicated to the establishment and operation of emergency and traffic-useful v.h.f. nets. This bulletin-92266, RE VHF NETS, was produced for VHF-PAMs who are Net Managers and Emergency Coordinators and RMs who are establishing, maintaining and expanding v.h.f. nets. It gives them something concrete to suggest and guides procedures in this specialized field of operating.

The special bulletin on v.h.f. netting was an enclosure with data sent SCMs and SECs in September to aid their organizing efforts. Subjects mentioned include (1) VHF net leadership (2) organizing v.h.f. nets (3) choice of net frequency, net controlling (4) how one takes part (5) certificate recognitions (6) the need — as a way around excessive interference, a provision for interconnecting stations in a city area in disaster and emergency situations, and as a way for the h.f. trafficker to beat mid-winter skip, in section netting! SCMs and SECs have been asked to ask us for such extra copies as desired for their VHF-PAM, RM and EC leadership appointees. As long as copies last we'll send them to others who may be interested, if they will send us a business size stamped self-addressed envelope.

SCMs Welcome Leadership-Appointment Applications and Recommendations. In addition to their desire to certify as "Official Station" those who may qualify as ORS, OPS or OVS, club recommendations and the inquiries from individuals who are qualified and can accept EC and VHF-PAM posts are earnestly solicited. The League's booklet, *Operating an Amateur Radio Station* sets down the functions for each appointive post. See your SCM's address

on page 6 and let's make the 1966-1967 operating season one of real progress in our netting and emergency organizing.

News of Some Section Meetings. Space doesn't permit using all reports, but we're selecting a few current tidbits that will be newsy. We hope in some cases applicable ideas can be applied in other areas and regions to the general betterment of ARRL operating organization.

North Carolina Plans Full County Coverage by E.C.'s. Barney Dodd, W4BNU, SCM-N.C. writes, "There are 100 counties in N.C. To have Emergency Coordinator leadership in a higher percentage of these we are suggesting, in all the local clubs in counties *not* having ECs, that the club, as a project, recommend or designate a member as a volunteer from the club membership, to assume the EC post for that county. Organization of an AREC/ARPSC group can follow."

Concordia, Kans. and Dodge City Meetings. "At the Section Meeting at Concordia we discussed Official Observer service and will have 4 or 5 new appointments of OOs. Also stressed was the need for more local v.h.f. nets. In the larger cities they will serve as the hub of a local communications plan. Then we'll have planned liaison 'tween the v.h.f. bands and lower frequency nets. — At Dodge City v.h.f. net activity was also discussed and a statewide plan of action in AREC will be forthcoming. Operating procedures were discussed and it was decided to start a Kansas Novice Net (QKN) to operate from Sun., Sept. 11 3735 Kc., 1600 CST. This weekly activity will serve as a traffic training net both for Novices and higher class operators."

— Bob Summers, K0BXF, SCM.

VHF Nets at High Level in Oklahoma. "The Bartlesville group have an active RACES program and have incorporated AREC in with it. Most of the members at our meeting with W5QMJ and the SCM were interested to receive the Official Station application forms . . . V.h.f. interest is still very high. More stations are getting on the v.h.f. each week. W5NML, the county EC has things well on the way to efficient organization. Of our twenty-three 145 Mc. units, five are already operational. This group is working to have a 2-meter repeater on 146.34-146.94 Mc. soon." — Dan Prater, K5CAY-SCM.

One-Times-One Call Recommended. "Through the years calling procedures have been discussed in these columns and the principle that "short calls with frequent breaks to listen" is invariably the best method is espoused in our operating booklet. Of course the broad policy must depend on tuning habits and patterns for work in the different v.h.f., and h.f. modes and band segments. But stick with that principle of short calls and even 1 x 1 and you can't go wrong. A letter from F8ZF reinforces our convictions. There's much to be said for short CQs and short calls! F8ZF writes us to urge the One-Times-One Call! He says, "Even a 3 x 3 call is not *always* observed! When used, I have not

found it as effective as the 1 x 1 call which I have used for the past 20 years, along with F8VJ and other top DX men. I got about a 10% increase in QSOs when I went to the 1 x 1 system. In working your stations it pays to send *your* call sign before QRM sets in. This again calling for the 1 x 1!"

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for Aug. Traffic:

Call	Orig.	Recd.	Rel.	Del.	Total
K6BPL	3193	4240	1065	175	11673
K0ONK	110	4682	3497	54	8343
W3CHL	305	1592	1531	29	3457
K6EPT	0	1290	1202	88	2580
K5TEK	7	1038	950	1	2034
W7BA	12	998	920	76	2006
W4AHJM	1842	45	2	15	1904
WB6QXY	27	753	690	55	1525
K6IOV	1	752	692	0	1445
W6BGM	3	718	686	32	1439
W6BBO	20	686	630	19	1355
W6WPF	73	628	576	52	1329
W9CCP	410	467	389	12	1278
K7TCY	20	628	569	49	1266
W6R8Y	112	604	393	116	1225
W0LGG	13	636	530	22	1201
W7DZX	12	620	543	10	1185
W1PEX	146	508	420	39	1108
W6VNO	21	521	471	1	1014
W6BGF	18	412	522	21	973
W5OBD	16	452	452	0	920
W8UPE	35	425	351	72	883
W3EML	45	457	365	4	869
W6YBV	5	417	377	45	844
K0GSY	24	553	250	0	827
W6TYM	19	402	391	8	820
K3MYB	25	395	345	19	784
W4SCK	13	343	358	9	723
W4MA	17	348	340	4	713
K9MIR	4	396	297	10	707
W4BAZ	76	378	220	15	689
W6MLF	4	324	316	17	661
W9DYG	73	316	260	10	659
W4AIAW	17	321	310	16	654
W4WUE	70	374	170	17	650
W6ADB	6	310	291	16	623
WB6JFO	42	300	225	50	617
W8LHJ	57	278	230	48	613
K9IVG	15	371	220	3	609
W4FAZ	31	273	212	61	577
W6GSA	109	240	238	2	589
WB2SLL	48	272	227	32	579
W9ZYK	7	280	261	20	568
K4HSB	7	281	278	1	567
W8ZJB	12	274	266	8	560
K1RBO	177	187	186	2	352
WA1DAG/9	11	266	182	84	546
WB6CRC	22	262	253	7	544
W8RYP	19	261	244	14	538
K6MDD	10	264	250	14	538
W2OE	139	229	146	24	538
W4WWT	8	257	244	2	509
WA6MLE	42	232	202	31	507
W3VR	56	231	217	3	507
W9CNY	3	310	177	16	506
W9QLW	15	251	230	1	500
WA4AGH	23	252	202	23	500
Late Reports:					
K7IFG (June)	3	312	290	14	619
WB2SLI (July)	11	253	217	53	564
W5OBD (July)	22	254	250	0	526
K9KZB (July)	31	243	232	11	517

More-Than-One-Operator Station

K6MCA	30	1451	1448	3	2932
K9MIR/9	10	1630	3	0	1633
K4CG	553	132	38	86	809
W0YC	10	249	162	94	515

BPL for 100 or more orientations—plus deltraces

W4BMC 308	WA8FSX 120	WA5NYY 103	
W4OQG 301	K7CTP 119	K1PGQ 101	
W6VZE 231	WA6OQM 115	W0DEF 100	
W4VYS 194	W4LLE 115	Late Report:	
W6TXJ 186	WA5QN 114	WB6EGS (July)	145
W4PQP 161	W3TN 113	WB8MPD (July)	131
WA3ATQ 150	WA8OGR 111	WB2FYI (July)	128
WA6EDN 127	W1TXL 111	WB2RBA (July)	116
W4TFL 122	WB2RBA 110	W2OE (July)	106
	W4RHA 107	K1PGQ (July)	100

More-Than-One-Operator Station

K1KBO 203	WA6VFM/6 164	Late Report:	
		K4CG (July)	284

BPL medallions (see Aug. 1954, p. 54) have been awarded to the following amateurs since last month's listing: K4KJD, WA5AIZ, WR8YP.

The BPL is open to all amateurs in the United States, Canada and U.S. Possessions who report to their SCM, a message total of 500 or a sum origination and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

Invitation to New Hams. Newly licensed amateurs who are on the air are invited to drop a card to their SCM so indicating and making their address known. They should tell what they are doing with the new call, and if their interest is in v.h.f. or h.f. netting and relaying work. W3QA, SCM-MDC, suggests the above in view of the slowness with which new calls appear in the callbook. SCMs would be happy to have information for *QST's* Station Activities and would be able to provide monthly-reporting cards and information on Station Appointments.

— F. E. H.

CODE PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW will be made Nov. 15 at 0230 GMT. Identical tests will be sent simultaneously by transmitters on c.w. listed frequencies. The next qualifying run from W6OWP only will be transmitted Nov. 3 at 0500 Greenwich Mean Time on 3590 and 7129 kc. **CAUTION!** Note that since the dates are given per Greenwich Mean Time, Code Proficiency Qualifying Runs in the United States and Canada actually fall on the evening previous to the date given. *Example:* In converting, 0230 GMT Nov. 15 becomes 2130 EST Nov. 14.

Any person can apply. Neither ARRL membership nor an amateur license is required. 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 six speeds trans-



DX CENTURY CLUB AWARDS



From August 1, through August 31, 1966 DXCC Certificates and Endorsements based on contacts with 100+ more countries have been issued by the ARRL Communications Department to the Amateurs listed below.

New Members

WB6LFR...224	PA0XPO...125	DL0ST...110	JA1FI...104	W2KJR...102	W1FTV...100
VE1AE...212	OK3SGA...124	VO1IB...109	OK1VU...104	WA9ECE...102	WA2HTU...100
WA2CLQ...160	W9SGI...124	W2NEP...109	WA9KVA...104	W9MRX...102	WA2WFE...100
K4TUA...147	OK1ADM...123	WA2UBC...107	WB6SHL...104	K3ZMH...101	WA2GHW...100
UB5ARTEK 145	W5ZVU...123	HB9AFI...106	F7CK...103	K6YUJ...101	WB2OLN...100
K8CER...139	W6HGU...122	UA6BY...106	OE8TS...103	K9GCE...101	WA4EPM...100
W9ZWH...137	LJ2EN...120	W28Z...106	CZ5CV...103	UR2IP...101	W6QFU...100
SM4CLU...135	W7AZG...118	WA6NYJ...105	WB2OZV...103	W2JLX...101	WA6SZV...100
DJ9K4...130	W1GBW...115	YO4KCA...105	W6KGP...103	K3SGE...100	W7AST...100
OK2PO...129	W1CNU...111	YO5LC...105	WB6IUE...103	K9GML...100	606BW...100
SM3YF...128	K2CWQ...110	HA5DJ...104	HA1SB...102	UA3BS...100	

Radiotelephone

K7GCM...279	JA6DOE...130	YV1II...116	W2QDY...104	YV1KZ...102	K3ANS...100
W1JWX...208	W9ZWH...126	IT1CFN...110	UA1ZF...103	F7CK...101	VE3BLD...100
UA9HA...157	YV5CIL...124	JA1RN...109	W9KGO...103	K9VLF...101	VE3EVT...100
XW8AX...139	WB6LFR...121	WA3BYS...108	AP2MT...102	CN8AQ...100	WB2OLN...100
XW8AZ...136	W9SGI...121	VE3BSR...105	D16JJ...102	HK3APC...100	WA4LSK...100
	K4ZCP...119	W8CEM...105	WA4MUB...102	K7DVK...100	

Endorsements

Endorsement listings through the 300 level are given in increments of 20, above the 300 level they are given in increments of 10. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

330	K7ADL	W3FLY	W6VVR	W6CUF	JA7OD	K8AEX	K1RQY
W3CGS	WB6HXD	W6AAO	WB6AKZ	W6NUT	K8LNL	K9KKU	K2AGU
	W3YXI	WA6MWG	WB6LFR	WB6ADY	KH6BIH	VE2TJ	K2UMM
320	W4VMS	WA6OET	W9WQQ	WB6LZT	LA9CE	W1DIT	K2VAC
G6XL	W6ABA	240	200	W7DQM	W1YRC	W2BAI	KP4JM
K8LSG	W6ISQ	DJ1VS	DJ4HR	WA2FJW	WA2PWI	W2DQS	K5VTA
VK2DI	W6UMI	EP3AM	EP3AM	WB2AMO	WB2PAM	WB2KTO	WB2HJW
W8AIIH	W8ARK	K1ZSI	K1ZSI	WB2FOV	WB2POH	WA3JLY	WB2POH
	ZL1KH	K3FGO	K4ZJF	W3AXW	W5HTY	W5GZR	WA4RPL
310	DL7EN	W6EUF	K6ALH	LA1H	W4FNS	W8ELE	W5ZLR
K7GCM	G6VQ	WA6HRS	K8ALH	SM5CAK	W4ORT	W8QBG	WA5LES
WA2OJD	11RB	220	KR6JZ	UW3DR	W4WHF	WA9VLV	WA6BBJ
W6WX	K8AJK	K1CDN	LA7H	VE3MZ	W9LKJ	120	W7JXX
	K8DYZ	W4ZCP	VE4MP	W1EOA	W1EQA	DL1NC	W8HFN
280	K8UKN	W4HKQ	W3URE	W1MRQ	W2FON	K1MBM	W7MVC
DJ9GD	WA2HUV	W6KEK	W4OEL	WB2FON	W9BGX	K1YPN	WA8HFN
K60LH	W2PXR		WA5CBE	W9BGX			WA9IBT

Radiotelephone

310	W5JWM	HK3AFB	K60HJ	W5LZZ	KE2WH	LJ6AL	WA5DAJ
ZP5CF	WB2EPT	VE3BTI	K9LKA	W5OPL	9G1DY	VE2TJ	W0JIM
	WB2HXD	W1RO	PY2CYK	W6ABA		W1FXD	
280	W9GMY	W6NCG	WA6MWG	140	CE5EP	W1MFM	120
ZP5ET			WA6OET	11YRK	CE4AJ	W1MRQ	K9BTU
11RB	240	200	W8JFD	K1ZSI	PSJA	W1VRK	KH6BIH
K6HZP	PY2PC	EP3AM		WA2OJD	K4GXO	W4WHF	SM5CAK
QA4KY	W1HLB	JA3UI	180	WA8OJI	K1RHL	WA4JLY	WB2FWE
VE2WV	W51PH	K4ZJF	VE3RO			W5HTY	WB2NIC
W4VMS	G3WW						WA8HFN

mitted, 10 through 35 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 is sent daily by WIAW at 0030 and 0230 GMT, simultaneously on all listed c.w. frequencies. At 0030 GMT Tuesday, Thursday and Saturday, speeds are 15 20 25 30 and 35 w.p.m.; on Monday, Wednesday, Friday and Sundays, speeds are 5 7½ 10 13 20 and 25 w.p.m. For practice purposes, the order of words in each line may be reversed during the 5 through 13 w.p.m. tests. At 0030 GMT daily, speeds are 10 13 and 15 w.p.m. The 0230-0320 GMT runs are omitted four times each year, on designated nights when Frequency Measuring Tests are made in this period. To permit improving your list by sending *in step with WIAW* (but not on the air!) and to allow checking strict accuracy of your copy on certain tapes note the GMT dates and texts to be sent in the 0230-0320 GMT practice on those dates:

- Date Subject of Practice Text from Sept. QST
 Nov. 2: *It Seems to Us*, p. 9
 Nov. 8: *An All-Made Amplifier for 2 Meters*, p. 11
 Nov. 11: *The Easy Bor*, p. 17
 Nov. 17: *V.F.O. Stability — Recap and Postscript*, p. 22
 Date Subject of Practice Text from *Understanding Amateur Radio*, First Edition
 Nov. 23: *A Closer Look at Circuits*, p. 55
 Nov. 28: *L.F. Transformers*, p. 56

ARRL ACTIVITIES CALENDAR

(Dates are shown in GMT)

- Nov. 3: CP Qualifying Run, W6OWP
 Nov. 12-14: SS Contest, phone
 Nov. 15: CP Qualifying Run, WIAW
 Nov. 19-21: SS Contest, c.w.
 Dec. 2: CP Qualifying Run, W6OWP
 Dec. 14: CP Qualifying Run, WIAW
 Jan. 5: CP Qualifying Run, W6OWP
 Jan. 7-8: V.H.F. Sweepstakes
 Jan. 14-15: CD Party (c.w.)
 Jan. 17: CP Qualifying Run, WIAW
 Jan. 21-22: CD Party (phone)
 Feb. 3: CP Qualifying Run, W6OWP

- Feb. 4-5: DX Competition (phone)
 Feb. 4-19: Novice Roundup
 Feb. 10: Frequency Measuring Test
 Feb. 15: CP Qualifying Run, WIAW
 Feb. 18-19: DX Competition (c.w.)
 Mar. 4-5: DX Competition (phone)
 Mar. 18-19: DX Competition (c.w.)
 June 10-11: V.H.F. QSO Party
 June 21-25: Field Day

OTHER ACTIVITIES

The following lists date, name, sponsor, and page reference of QST issue in which more details appear.

- Oct. 29-30: VU2/1S7 Contest, ARSI (p. 102, last issue).
 Oct. 29-31: Connecticut QSO Party, Candlewood AR Assn. (p. 124, last issue).
 Oct. 29-31: West Virginia QSO Party, Kanawha RC (p. 138, last issue).
 Oct. 29-31: Md.-D.C. QSO Party (p. 118, last issue).
 Nov. 2-3: YL/AP, YLRL (p. 88, September QST)
 Nov. 5-7: Delaware QSO Party, Delaware ARC (p. 117, last issue).
 Nov. 13: International OK DX Contest, CCRC (p. 104, this issue).
 Dec. 3-4: New England QSO Party, Connecticut Wireless Assn. (p. 126, this issue).
 Dec. 4, 18; Jan. 1, 13; Feb. 5, 19: 160 Meter Tests (p. 101, this issue).
 Dec. 10-11: Zero District QSO Party (next issue).
 Dec. 10-11: N.H. QSO Party, Nashua Mike and Key Club, (p. 130, this issue).
 Dec. 17-19: Ohio QSO Party (Upper Arlington RC), p. 113, this issue).

WIAW SCHEDULE, NOVEMBER 1966

The ARRL Maxin Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 3 p.m.-3 a.m. EST, Saturday 7 p.m.-2:30 a.m. EST and Sunday 3 p.m.-10:30 p.m. EST. The station address is 225 Main Street, Newington, Conn. about 7 miles south of Hartford. A map showing local street detail will be sent upon request. The station will be closed November 24, Thanksgiving Day.

GMT*	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000	RTTY OBS ^{3,7}	.....	.....
0030	Code Practice Daily ¹ 10-13 and 15 w.p.m.	.....	.....
0100	C.W. OBS ¹	C.W. OBS ¹	C.W. OBS ¹	C.W. OBS ¹	C.W. OBS ¹	C.W. OBS ¹
0120-0200 ⁴	7.080	3.555	7.080 ⁵	3.555 ⁵	7.080
0200	Phone OBS ²	Phone OBS ²	Phone OBS ²	Phone OBS ²	Phone OBS ²	Phone OBS ²
0205-0230 ⁴	3.945	50.7	145.6	1.82	3.945
0230	Code Practice Daily ¹ 15-35 w.p.m. TThSat., 5-25 w.p.m. MWFSun.	.....	.....
0330-0400 ⁴	3.555	7.080	1.805	7.080	3.555
0400	RTTY OBS ³	.....	RTTY OBS ³	RTTY OBS ³	RTTY OBS ³	RTTY OBS ³	RTTY OBS ³
0410-0430 ⁴	3.625	14.095	7.045	14.095	3.625
0430	Phone OBS ²	.....	Phone OBS ²	Phone OBS ²	Phone OBS ²	Phone OBS ²	Phone OBS ²
0435-0500 ⁴	7.255	3.945	7.255	3.945	7.255
0500	C.W. OBS ¹	.....	C.W. OBS ¹	C.W. OBS ¹	C.W. OBS ¹	C.W. OBS ¹	C.W. OBS ¹
0530-0600 ⁴	3.555 ⁵	7.080 ⁵	3.555	7.255	3.555
0600-0700	7.080	3.945	3.555	7.255	7.080
0700-0800	3.945	7.255	3.945	3.555	3.945
2000-2100	14.280	21/28 ⁵	14.095	21/28 ⁵	14.280	.....
2100-2200	14.100	14.280	14.100	14.280	14.100	.....
2300-2345	7.255	21/28 ⁵	21.1 ⁶	21/28 ⁵	7.255	.....

¹ C.W.OBS (bulletins, 18 w.p.m.) and code practice on 1.805, 3.555, 7.08, 14.1, 21.075, 50.7 and 145.6 Mc.

² Phone OBS (bulletins) on 1.82, 3.945, 7.255, 14.28, 21.41, 50.7 and 145.6 Mc.

³ RTTY OBS (bulletins) on 3.625, 7.045 and 14.095 Mc. 170/850 cycle shift optional in RTTY general operation.

⁴ Starting time approximate. Operating period follows conclusion of bulletin or code practice.

⁵ Operation will be on one of the following frequencies: 21.075, 21.1, 21.41, 28.08 or 28.7 Mc.

⁶ WIAW will listen in the novice segments for Novices on band indicated before looking for other contacts.

⁷ Bulletin sent with 170-cycle shift, repeated with 850-cycle shift.

Maintenance Staff: W1s Q1S WPR NPG. * Times/days in GMT. General operating frequencies approximate.

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

ATLANTIC DIVISION

DELAWARE—SCM, Roy A. Belair, W3IYE—SEC: K3NYG. RM: W3EEB.

Net	Freq.	Local Time	Day
DEPN	3905 kc.	1900	Sat.
DSMN	50.4 Mc.	2100	Tue.
Dover 6 & 2	50.4 Mc.	2000	Wed.
KCEN	3905 kc.	1300	Sun.

New appointments: WA3DUM as ORS. WA3FRC as Kent County EC. K3RBU is continuing his education at the University of Denver. WA3DUM worked 4 new countries and 2 new states in 3 days with a new 12AVS on 14 Mc. The First State ARC won the K3GKF Field Day trophy for the second consecutive year. WA3CRU has a new 2-meter rig. Traffic: W3EEB 182, K3NYG 4, WA3DUM 3, K3RBU 3, WA3DYG 2, W3IYE 1.

EASTERN PENNSYLVANIA—SCM, Allen R. Breiner, W3ZRQ—SEC: W3ELI. RMs: W3EML, K3VVG, W3CBH. PAMs: W3SAO, W3FGQ, EPA C.W. Net meets nightly on 3610 kc. at 2330Z and had QNI of 308 with QTC of 262. PTTN Training Net meets nightly on 3610 kc. at 2230Z and had QNI of 356 with QTC of 266. The EPA Emergency Phone and Traffic Net meets nightly on 3917 kc. at 2200Z and had QNI 650 with QTC 252. K3HHB is now EC for Dauphin County. W3CUL gave a talk on traffic to the Philmont ARC. W3EML took some time from traffic to work a few UA9s. W3VR has been QRL installing a new RTTY setup. K3MYS has been keeping Vietnam traffic skeds. K3YVG has been sneaking in a few chess games on 40 meters. W3MPX took his family on a camping trip and upon arriving found he had forgotten the sleep-bags. W3BSV is campaigning for new blood for the PTTN C.W. Traffic Training Net. All interested amateurs are welcome to join the net. A new call was issued to W1WFF, now in Sayre, Pa. It's W3DIIH but an OT. W3DIG, lives down the street. Coincidence? We welcome K3FCB to the traffickers. K3PWW spent a few days in Florida. New operators in Bradford County are WN3s EWQ, GGS, GEO, FXZ. WA3CFU added a new vertical. Gear at K3RIW includes SH-400 and SB-300. K3HTZ got a new final amplifier. K3TNL is now 3rd-district YLRL chairman. W3IKX moved to a new QTH. The following assisted in the Shenandoah Centennial Parade and emergency control for six days: WA3BEX, WA3-1DDI, WN3DPS, WN3EKKU, K3PME, K3HXS, K3IAC, K3KNO, W3KJJ, WA3EAP, W3ORJ, K3SYC, K3TRI, W3ZRQ, K3TRI, WA3DDK, K3ZXF, K3LEF and K3-3NRK. New club officers of the Mt. Airy V.H.F. Club are W3EIF, pres.; W3LHF, vice-pres.; W3MYF, treas.; W3SAO, secy. New General Class and active on the EPA Phone Net is WA3EMV. WA3AFI has a 2nd-class commercial license. WA3BSV is looking for a donation of a tall stool; his gear is on top of a 4-ft.-high table and he has to stand. WA2KAP spent a 4-day vacation in coal-crankin' country at your editors' QTH. ARL fifty-three to all. Traffic: W3CUL 347, W3EML 369, K3MYS 784, W3VIE 507, WA3CTP 322, WA3ATQ 230, K3MVO 215, W3FGQ 179, K3FSV 178, K3PIE 144, K3VVG 141, K3ZSK 122, W3FAF 117, W3CBH 91, W3ZRQ 89, W3VAP 71, WA3BTH 67, W3MPX 61, K3TNL 53, K3KNO 51, WA3AFI 48, W3KJJ 48, W3BSV 44, W3AXA 40, W3RV 39, W3AIB 35, W3OY 25, WA3CCC 27, K3WEU 25, W3AES 22, K3KTH 21, K3MDG 20, WA3BBI 14, WA3-6BU 13, W3ELI 13, W3BEP 11, K3PWW 11, K3VAJ 9, W3AIZ 6, K3FCB 5, W3AEMV 4, W3OML 4, W3BEP 2, W3BBLZ 3, WA3CKA 2, W3DIIH 2, W3ID 2, K3NZD 2, W3ABJQ 1.

MARYLAND-DISTRICT OF COLUMBIA—SCM,

Bruce Boyd, W3QA—SEC: W3CVE. RMs: K3JYZ, W3-PRC, W3UE, W3XNW. PAMs: W3JZY, K3LFD.

Net	Freq.	Time	Days	Sex.	QTC	Are.
MDD	3643	0000Z	Daily	31	803	25.5
MDDS	3643	0130Z	Daily	28	50	1.7
MRPN	3820	2200Z	M-W-F	22	108	4.9
MEPN	3820	1700Z	S-S			
MSTN	50150	0100Z	Daily	26	106	4.1

Note that MSTN is going again, largely because of the diligent work by K3URE and K3LFD. WA3CFK is elated at topping the 200 message mark. WN3ELA and W3WTW had a 2-meter AREC station at the Rockville Firemans' Carnival, obtaining fine publicity and a good volume of message traffic. WA3DWF, in Accident, keeps the gateway to Western Maryland open for MDDS. WA3EEQ expects that evening classes at the U. of Md. may slow down his MDD activity. W3MCG found good DX hunting in the WAE Contest. W3CBC found his DX on 2 meters, working 9 states in 2½ hours. W3JZY can be found on the 40-meter phone band these days. K3NCM had to settle for week-end hamfests instead of a vacation this summer. New: at K3LFD—a 6-meter 100-watt linear amplifier; at W3LBC—a Swan 350; at W3QA—an NCX-5 (but no antenna); at K3LLR—a preamplifier that brings in DX that couldn't be heard before; at W2NIY/3—an ORS appointment; at K3UXY—a vice-pres. job, er, position. *College bound:* WN3EOP, K3QDD and K3URZ. Each plans to be on the air from the college of his choice. Traffic: (Aug.) WA3CFK 270, W3TN 196, K3LFD 174, W3WTTW 137, K3JYZ 122, WN3-ELA/3, 97, WA3EEQ 96, K3FQF 65, WA3BTA 57, WA3-BNL 54, K3OAE 52, WA3CVM 48, W3PRC 42, WA3ELR 32, W3MCG 29, K3URE 23, W3ZNV 23, W3EOV 19, K3GZK 18, W3CBC 15, W3LBC 14, WA3CEK 10, K3-QDD 8, K3NCM 7, K3LLR 4, WA3DWF 2, WN3EOP 2. (July) WA3EEQ 32, WA3BYW 3, WA3DWF 1.

SOUTHERN NEW JERSEY—SCM, Edward G. Raser, W2ZI—SEC: W2BZJ. RM: WA2BLV. PAM and NJPN Net Mgr.: W2ZI. NJPN reports 31 sessions, QNI 519, traffic 170. A very comprehensive report was received from SEC W2BZJ, which shows progress is being made. W2IU participated in the 160-Meter QSO Party and came in second for S.N.J. WA2KAP has a new linear, with a real FB sig! WB2YCI and WB2TEN are newly-appointed ORSs. WB2MNM is a new station in Had-donfield, also a new NJPN member. W2GIW requests 2 months leave from NJN duties. WB2JFS is a new station in Colonge. WB2CYI, a new station in Cape May, requests OES appointment. Very nice OES reports were received from WB2RYE and WB2VFX. WB2SBD's gal friend was seriously hurt in an auto accident but is recovering. WA2UPC and his gal friend, WB2URD, paid this SCM a visit in August. W2CUC, ex-W3CUC, is a new station in Mt. Holly. W2LVV is the new EC for Gloucester Co. WN2UVB is a new station in Moores-town. The N.J. QSO Party held in August was a big success, by the sound of that "beehive" of signals trying to work Mercer County. Your SCM is in bed with an infected right leg at this writing. The Doc says no activity for some weeks to come! It's crimping my wings as I'm now "grounded." Traffic: (Aug.) WA2UPC 427, WA2BLV 147, WB2TEN 115, W2RG 58, W2YPZ 30, W2ZI 28, K2SHE 22, WB2MNM 20, WB2YCI 19, WA2-KAP 14, W2BZJ 13, WA2DVU 12, WB2SBD 6, W2EVR 3, W2IU 2, K2JJC 1. (July) W2RG 55, K2SHE 18, WB2-MRO 8, K2JJC 1.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2RUF. PAM: W2PVI. RMs: W2EZB and W2FEB. NYS C.W. Net meets on 3670 kc. at 1900. ESS on 3590 kc. at 1800. NYSPTEN on 3925 kc. at 2200 GMT. NYS C.D. on 3510.5 and 3993 kc. (s.s.b.) at 0900 Sun. and 3510 kc. at 1930 Wed. TCPN 2nd Call Area on 3970 kc. at 0045 and 2345 GMT. NYS County Net on 3510 kc. Sun. at 1000 and 2400 GMT on Mon. Congratulations to W2OE on making the BPL. K2KQC is appointed EC for Erie County. Endorsements: W2QHO, WB2FPG and W2FER as OASs; WA2UFI and K2KTK as OOs. K2PB as OES; K2PBU and K2QDT as OFSs. Our SEC, W2RUF, is starting a training net on c.w. Do you know how to handle emergency traffic? Experience shows that while many of us talk big, much valuable time is wasted on poor operating procedures. W2RUF has scheduled talks to the Chemung County

AREC, Jamestown and Cattaraugus. She's willing to travel to any group in the section to speak on emergency traffic-handling. However, she'd like to schedule them on a rational basis so that one trip would cover several groups on successive nights. Your SCM would appreciate copies of your regular club bulletins for a number of reasons: (a) Many new hams or prospective hams write me for information as to where they can get help and whom to contact. (b) I would like to give your group publicity in this column. (c) Many editors write for information relative to exchanging club papers. (d) Many times e.d., Red Cross and ECs are looking for active amateurs in various areas. At present there are a few areas with active clubs that we don't hear from. Unless your group is affiliated with ARRL or puts your SCM on the mailing list it becomes difficult to make contact. See page 6 this issue for my new address. K2-EQB/2 operated at the Erie County Fair. The Erie County Phone Net also had its picnic at the Fair. The RAGS Club exhibit was much improved this year at the N.Y. State Exposition. ATV demonstrations from W2HIL, K2JAN and WA2KIX were shown on large screen and traffic was handled on 2-meter f.m. via K2KTK and W2SEI. WB2NZA received a certificate of merit from NYSPTEN. Traffic: (Aug.) W2OE 538, W2SEI 277, W2RUF 192, K2SSX 169, W2GVH 102, WB2-RHJ 88, K2JBX 73, WB2GAL 71, WB2SIA 68, WB2TAG 64, K2DNN 63, K2RTO 63, WB2NA 49, WB2OMY 45, W2MTA 37, K2IMI 36, K2EQB 27, K2OFV 25, K2QDT 25, W2RQF 24, WB2OYE 23, WB2NZA 19, W2UFI 19, W2PNW 18, W2FEB 17, W2FCG 16, WB2PTA 2, K2RYH 1. (July) W2OE 369.

WESTERN PENNSYLVANIA—SCM, Robert E. Gawryla, W3NEM—SEC, K3KMO, PAM (v.h.f.): K3-VFI. RM: W3KUN, K3SOH, W3MFB, W3UHN. Traffic nets: WPA, 3585 kc. 0000 (GMT Mon. through Sun. and KSSN, 3585 kc. 2330 GMT. This column records with respect the passing of W3SR. The WPA/KSSN Traffic Nets had their annual business meeting/picnic combination at Clear Creek State Park with 20 members in attendance. K3NLL now has his permit for operation in Korea; he will use the call HL9US and will utilize 20 meters on week ends. K3FFJ is now QSL Manager for JATCEK. W3MFB has a new son-in-law—W0IHH. WA3BLW visited the Ottawa Amateur Radio Club Field Day site while he and the XYL were mobiling through Canada. WN3GBW is a newly-licensed Novice. Congratulations to Herb, who is blind. K3WFN has received the Western Electric Co. scholarship for the next year at the University of Akron. K3WFN is looking for someone to run tests on 1215 Mc. from the Akron, Ohio, or Pittsburgh, Pa., area. K3FFJ mobiled through New Jersey, New York and Pennsylvania while on vacation, using his new SR-160. Congratulations to W3ADUS, who received his WAS and WAC certificates. K3FFJ was host to W4BNE, who was formerly from this area and was in Chambersburg for a visit. This is my first section write-up and I take this opportunity to thank all those who helped me. I want to help all those who request help and a note to me will get us started. Many thanks to W3GJY for the splendid job he did serving us as SCM. Traffic: (Aug.) W3KUN 169, W3NEM 145, W3MFB 77, W4AKB 70, K3PYS 60, W3LOS 59, W4AKH 32, W3OEO 10, K3SOH 9, W3YA 9, K3KMO 5, W4BGE 4, W3LOD 4, W3GJY 3, K3AKR 2, W3UHN 2. (July) W3SMV 4.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—SEC: W9RYU. RM: WA9GUM, PAMs: W9VWJ, WA9-CCP and W9KLB (v.h.f.). Cook County EC: W9HPG. Net reports.

Net	Freq.	Times	Days	Tfc.
ILN	3760 kc.	0000Z	Daily	287
IEN	3940 kc.	1400Z	Sun.	No report
NCPN	3915 kc.	1300Z	Mon.-Sat.	141
NCPN	3915 kc.	1800Z	Mon.-Sat.	263
III PON	3925 kc.	1700 CDST	Mon.-Fri.	336
III PON	50.28 Mc.	2000 CDST	Mon. & Thurs.	No report
III PON	145.5 Mc.	2000 CDST	M-W-F	95
Chgo. TNT	145.35 Mc.	2100 CDST	Sun.-Fri.	No report

WA9PDI is the net control of the newly-formed Chicago TNT Area Traffic Net. K9UIY has a new Drake R-4A receiver to help him bring in DX this winter. He also received his A-1 Operator Club membership. WA9MLX has gone mobile with a Clegg 99er, WA9XR is now operating a TX-62 Ameco with VFO-621 on 6 and 2 meters. WA9GUM reports that the ILN is looking for QNI every night and those interested should check in. W9NPC is recovering in the hospital after a "head-on" auto crash. The Chicago Area Radio Club Council, Inc., is sponsoring a "Build It Yourself from Scratch" Contest. The prizes will be awarded at the National

Electronic Conference at McCormick Place. A new Novice heard was WN9SKU. WN9PQY is now WA9SXQ with an SB-400 and a TA-33 jr. W9BOD and K9BDJ are experimenting with ham TV on 440 Mc. for video and 2 meters for audio. WA9AFO, K9ZOO, K9EWW, W9BOD, K9BDJ and K9JYA have set up a teletype net. WN9RTB is now WA9RTB. W9DOB's new QTH is Lombard, Ill. WA9NZF and WN9RVU are playing weekly chess games on 145.350 Mc. The Ninth Regional Net had a traffic total of 1020 during August. W9BQL was nominated Ham of the Month by the Tri-Town Radio Amateurs Club, Inc. The Chicago Suburban Radio Association will hold its Annual Banquet Sat., Nov. 12, WA9CCP, Yo, was awarded the First Annual "Illinois Amateur of the Year" citation at the Hamfesters Picnic Aug. 15. K9PEN, WA9CCQ and W9MNL are the new officers of the CSRA. The Shawnee Amateur Radio Association held its Annual Picnic at the DuQuoin Fairgrounds Aug. 23. New appointments include W9LDU as EC of Lee County, WA9SEO as ORS and WA9QBM as OBS. WA9CCP and WA9CNV were recipients of the BPL award for August traffic. Traffic: (Aug.) WA9CCP 1278, WA9CNV 506, W9FVJ 279, WA9SEO 261, WA9-KPW 208, W9JXV 185, WA9GUM 163, K9CYZ 114, K9-AVQ 104, W9HOT 96, W9DQO 73, WA9FDI 67, W9NXG 64, W9ELL 57, K9RTE 55, WN9SPA 51, K9AUD 40, WN9RSN 39, WA9RLA 29, W9PRN 28, W9DUA/9 26, W9QET 23, W9IDY 20, K9HSH 19, W9UHD 16, W9LNQ 10, WA9AIRU 10, W9SMD 8, WA9QXT 5, WA9FIH 4. (July) K9KZB 517, WA9CNV 253, W9AXR 196, K9UIY 4.

INDIANA—SCM, Mrs. M. Roberta Kroulik, K9IVG—Asst. SCM: Ernest Nichols, W9YYX. SEC: K9WET.

Net	Freq.	Time	Aug. Tfc.	Mgr.
IFN	3910	1330Z Daily, 2300Z M-F	361	K9IVG
ISN	3910	0000Z Daily, 2130Z M-S	704	K9CRS
QIN	3658	0000Z Daily	193	W9HRY

K9EFY, mgr. of PON reports Aug. traffic of 30. WA9-IZR, mgr. of RFN, reports Aug. traffic of 56. W9QLW, RM of 9RN, reports Indiana was represented 100% in Aug. QIN Honor Roll: K9VBY 22, K9WVJ 21, K9HYV 20, W9HRY 19, WA9FDQ 18, WA9BWW 15, K9JDK 15, K9RLW 15. The Martinsville ARC is conducting code and theory classes at the high school with W9SMJ and K9PYI teaching theory. W9DDU teaching mathematics and WA9LTI teaching code. K9QQO is chief engineer of a new Educational TV station at Dyer. Congratulations to WA9SBY and WA9SCE on receiving their licenses. A big Hoosier welcome to W9JUK/W4ZJY, director of TCC Central. WA9HGL received WAC and WAS and built a kever. WA9AUM has a new SR-500 and WA9GKF has a new SB200. WA9CJR is building a receiver for 220 Mc. and WA9ABI built a transistorized variable voltage power supply. K9KFM has been trying out a vertical antenna! W9OG is rebuilding his antenna system. K9-LZN and Fran have a new hobby—motor bikes! Congratulations to K9CWG on his promotion. *Amateur radio exists because of the service it renders.* BPL certificates went to K9IVG, W9ZYK, WA9DAC/9, W9-QLW. Traffic: (Aug.) K9IVG 609, W9ZYK 568, WA1-DAG/9 546, W9QTF 500, K9YFG/9 335, W9HRY 296, W9JUK 240, WA9IZR 238, WA9FDQ 149, K9HYV 147, K9FZX 111, WA9CJR 100, W9CC 74, K9RWQ 70, K9-CRS 68, W9DKR 56, WA9OYI 53, W9UB 50, W9SNQ 49, WA9NGN 48, K9VHY 45, WA9KVP 36, WA9KAG 34, WA9AUM 33, WA9CHY 31, WA9QAH 29, WA9JHH 28, WA9GJZ 27, W9RTH 26, W9YYX 26, K9EFY 23, WA9-RBQ/9 22, K9ZLB 22, K9ILK 21, K9EOH 18, W9DGA 16, WA9LUG 16, WA9AXF 15, W9BZI 14, W9CLF 14, WA9BHG 13, K9BSL 11, WA9CFW 11, W9FWH 11, WA9BNX 10, W9EJW 10, K9FUJ 10, W9PMT 10, K9YXK 9, W9DZC 7, W9ABGI 6, W9BUB 6, W9GFS 6, W9RDP 5, K9GBR 5, K9QVT 4, WA9CYG 1. (July) W9BUQ 19, WA9CJR 15, W9BZI 9. (June) WA9CJR 5.

WISCONSIN—SCM, Kenneth A. Ebnetor, K9GSC—SEC: K9ZPP. RM: WA9MIO. PAMs: K9HJS, K9MIL and W9NRP.

Net	Freq.	Time	Days	Sess.	QNI	QTC	Mgr.
BEN	3685 kc.	1200Z	Mon.-Sat.	25	188	57	W9NRP
BEN	3985 kc.	1700Z	Daily	31	624	236	K9HJS
WSBN	3985 kc.	2215Z	Daily	31	1062	565	K9IMR
WIN	3662 kc.	0015Z	Daily				WA9MIO
SWRN	50.4 Mc.	0200Z	Mon.-Sat.				W9CIU

Net certificates went to K9JMP and WA9NDV for BEN. Renewed appointments: W9NRP as OPS and ORS; W9UFY, W9ULM, W9EWC, W9ZPV and W9VHA as ECs. K9IMR/9 originated 1630 messages from the Wisconsin State Fair. Operators were WA9PIX, WA9POV, WA9NVY, WA9DWZ, K9FWJ, K9DTC, WA9KRF, K9-ZPP, K8CKD, K9JYX, WA9EKU, K9OSK, W9ATK, W9JKT, W9ZBM, WA9IAT, K9ZYS, WA9MME, WA9-

DWH and K9IMR. Assisting outside of the fair were W9DYG, WA9CCP, WA9CNV, WA0JKT, W0LGG and many others. WA9SVA would like to hear from stations he worked as WN9NNU. W9RKP led the OO's with 12 notices in Aug. K9IMR, K9IMR/9 at the Wisconsin State Fair and W9DYG made the BPL in Aug. W9DYG reports that CAN has had 100% representation for two years. WA9VNY has a new HT-37. K9OSC has a new HQ-150 and 20A. Traffic: (Aug.) K9IMR/9 1033, K9IMR 707, W9DYG 659, W9KQB 371, WA9NPH 234, K9UTQ 176, W0SUF 168, W9CBE 143, W9NRP 116, W9RTP 105, WA9NFG 101, WA9NRY 99, K9GSC 93, WA9NDV 79, K9HJS 76, WA9QKP 75, W9AOW 59, K9FHI 59, W9AYK 54, WA9GJU 47, WA9KFL 23, W9HWQ 14, K9PKQ 13, K9FVN 12, W9HQT 12, WA9NRT 10, K9RCK 8, K9-LGU/9 7, W9OTL 6, K9OSC 1, K9ZMS 1. (July) W9IFS 15, W9HWQ 2.

DAKOTA DIVISION

MINNESOTA—SCM, Herman R. Kopischke, Jr., W0TCK—SEC: WA0IEF. RMS: W0ISJ, WA0EPX. PAMs: K0QB1, WA0JKT, W0HEN, WA0DWM. MSN meets daily on 3595 kc. at 0030Z. MJN meets M-S on 3595 kc. at 0100Z. Noon MSPN meets M-S on 3820 kc. at 1805Z and Sun. at 1500Z. Evening MSPN meets daily on 3820 kc. at 2400Z. MSTN meets M-F on 50.4 Mc. at 0430Z and Sat. at 0200Z. The PO Net meets Sun. on 2812 kc. at 1830Z. Appointments renewed: WA0DWM as MSTN PAM, W0HUU as EC, WA0IJJ as ORS and WA0IDB as OES. It is with deep regret we record the passing of Charles Bove, W0MXP, ARRL Vice-Director for the Dakota Division. Chuck served as Minnesota SCM from 1951 to 1957 and was Division Vice-Director from 1964 until the time of his death Aug. 22, 1968. He was active in both the Twin City radio clubs and will be long remembered by his many friends throughout the area. The Arrowhead ARC again operated from the annual Portoroma celebration in Duluth. The Mankato ARC operated at the Faribault Co. Fair at Blue Earth and the Blue Earth Co. Fair at Garden City, and the Marshall ARC operated from its local fair. The St. Paul ARC wound up the season with a display booth at the State Fair in St. Paul. Many amateurs enjoyed the picnics at Minneapolis and St. Cloud again this year. W0PHD replaced his Gonsert Twins with a Swan 240 in his mobile. K0RGO went mobile with an Eico 753. WA0FDY worked his 29th state on 2 meters. WA0LOB has been working 15 meters with a vertical dipole. WA6MOX/O, together with W0BUO and K0ZZR, are trying to get Minnetonka Village to permit amateur antennas up to 54-ft. high without a Conditional Use Permit. W0HUU rebuilt the v.f.o. in his Eico 753 to keep it on frequency. WA0IAW, W0YC and WA0EDN were awarded BPL certificates for Aug. traffic. Traffic: (Aug.) WA0IAW 654, W0YC 515, WA0JKT 426, WA0KQU 300, WA0EDN 139, WA0MMP 79, WA0EPX 77, WA0KFJ 56, WA0JPR 44, W0ISJ 42, K0ZRD 40, K0BQI 37, WA0DVH 35, WA0LOH 33, W0TCK 33, W0BUO 24, W0ATO 22, WA0MMY 21, K0ICG 14, WA0MJF 14, K0AQT/O 13, WA0LMK/O 13, W0KLG 11, K0IGZ 9, WA0LO 7, W0UMX 7, WA0EZQ 6, K0FLT 6, K0JWE/O 5, W0ENY 4, WA0DFT 3, W0SZJ 3. (July) WA0LOB 2.

NORTH DAKOTA—SCM, Harold L. Sheets, W0DM SEC: WA0AYL. K0SPH has been appointed as OBS. W0EFJ reports that his XYL, WA0MND, is confined to Mercy Hospital in Devils Lake. W0DAO has a new TR-4. W0TUF has a T433 Jr. ready to put up for the higher frequencies. W0IZA, of International Band Camp fame, has a new Swan 350. W0CGM returned home after a summer working in Bismarck. K0SPH, W0CAQ and W0RRW are working on an all-Fargo certificate for DX stations. K0SPH has been trying out that beam, resulting in a QSO with VR0TC on Pitcairn Island, on 15 meters. W0BII has moved to Grand Forks since the passing of his XYL. WA0OVT is a new call in Bismarck. K0QYD has been working in Fargo and WA0MSJ is the new activities mgr. of the club there. WN0PPK is the new call of the XYL of K0OVB, while up at Drayton we have another XYL, WA0OWD. She has a homebrew modulator working for her and operates low-power phone. W0BHT is one of the alternates for NCS for the RACES Net. WA0KSB reports that summer static has c.w. activities almost to a halt. W0EFJ has a new rotor for the beam. You fellows who have ARRL appointments, return your certificates for endorsement when they run out. I would like applications for OPS appointment. The N.D. Post Office Net reports for July, 21 stations, 62 check-ins, 19 traffic; for Aug., 20 stations, 78 check-ins and 17 traffic. N.D. RACES reports for July, 16 sessions, 267 check-ins 49 messages handled; for Aug., 20 sessions, 447 check-ins and 66 messages handled. Traffic: (Aug.) K0TTP 68, W0DM 8, WA0MSJ 8, WA0BIT 4. (July) WA0KSB 32.

SOUTH DAKOTA—SCM, Seward P. Holt, K0TXW—SEC: W0SCT. The Mitchell Amateur Radio Club promoted the So. Dak. Annual Picnic with outstanding success. W0SCT is on the air with a new electronic keyer. The So. Dak. C.W. Net report for Aug. indicates 34 QNI and 36 QTC in 14 sessions. K0VYY had perfect attendance. W0DJ0 and W0YVF were heard mobilizing to the ham meeting at Mellette. No report in this office as yet. Traffic: K0GSY 827, K0VYY 87, W0SCT 74, WA0LLG 41, W0DVB 9, WA0BIM 5, W0FJZ 5, W0TNO 5, W0BWM 4, W0ZAL 4, W0DJ0 2.

DELTA DIVISION

ARKANSAS—SCM, Don W. Whitney, K5GKN—SEC: WA5KTX. PAM: WA5GPO. RM: K5TYW. NMs: WA5IIS, WA5HNN, W5MJO. W5RIT reports that his unsuccessful bid for sheriff of Washington County has prompted him to spend more time in the ham shack. Congratulations to W50BD on making the BPL in July and August and congratulations to W5NND on making the BPL in August. K5AJ0, president of the Mississippi County Amateur Radio Association, says his club will hold code and theory classes for Novice and Tech. class licensees with emphasis on securing students who hold the Citizen Band license. W5MJO is the new EC for Marion County. Net reports for Aug.

Net	Freq.	Time	Days	Sess.	QTC	QNI	Net	Time
RN	2815 kc.	0001Z	Daily	?	?	?	?	?
AFN	3885 kc.	1200Z	Mon.-Sat.	27	30	926	2681	
OZK	3790 kc.	0100Z	Daily	29	54	138	295	
AFON	3825 kc.	2130Z	Mon.-Fri.	23	79	334	?	

Traffic: (Aug.) W50BD 920, W5NND 364, W5MJO 153, WA5KEF 84, W5CAF 41, K5TYW 4, W5KUD 2, K5-AKS 1. (July) W50BD 526.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—SEC: K5KQG. RM: W5CEZ. V.H.F. PAMs: W5UQR, WA5DXA.

Net	Freq.	Time	Days	QTC	QNI	Mor.
PON	3870	1300Z	Sun.	6	15	W5KC
LAN	3615	0030Z	Daily	383	9.6	WA5FNB
Delta 75	3900	1230Z	Sun			WA5EVU

The GNOARC held a barbecue and swim party at the home of WA5KIC. W5MIKI is now an OO. W5WAMU has returned to Lafayette. W5ZBC has returned from post-grad. study in Mo. W5GRB says WA5OET is a new General in St. Martinville. W5GHP has completed a Twoer for emergency work in the N.O. Area. The CLARC's new officers are W5AJY, pres.; WA5LWL, vice-pres.; WA5CRF, secy.-treas. W5AXU has returned from Colo. WA5ERC is leaving for Mo. and college. The Annual Lafayette Banquet will be held Sat., Dec. 3 in Lafayette. W5EXI is now Extra Class. W5CEZ reports participation and traffic have picked up since LAN changed its meeting time. I regret to report WA5MRI, W5DP and W5HRD as Silent Keys. WA5KXA and WA5JUN are moving to a new QTH. WA5ORV now has a beam on 10/15/20. WA5BYR and WA5KEC are back after summer travels. W5JYA will handle traffic from the USL club station this year. WA5HGX reports WA5-0XK now has an emergency generator. WA5LQZ is running an HT-32 and Drake 2B. W5KC was visited by W5GRU. W5ADE has a new Galaxy and 4-1000A linear. WA5FRU is working on a linear to help his keds to Alaska. WA5JOD is a newcomer to the Springhill area. K5WOD spent the summer on s.s.b. W55BUK and his XYL have returned from a trip to California. W5CEW visited the DX gang in Seattle. WA5EID has a new 34-ft. crank-up tower. WA5LKL reports the S.W. La. Area Emergency Net meets every Sun. at 2030Z on 3850 kc. W5BJG received his La. Section C.W. Net certificate. In an unusual cross-frequency relay system the Ozone Amateur Radio Club Six-Meter Emergency Net and the GNOAR 75-Meter Hurricane Net joined in a test drill during Aug. which W5PPT says was successful. Traffic: WA5KQN 463, W5GHP 271, W5CEZ 243, K5OKR 137, WA5NYY 103, W5MBC 78, W5PGT 73, WA5FNB 62, W5MXQ 51, W5RJJ 45, W5GRZ 45, W5AJY 36, W5KRX 33, WA5LGO/5 32, WA5LQZ 26, W5ZBC 8, WA5LHL 6, WA5HGX 5, W5KX 3, WA5EID 1, W5JYA 1.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—SEC: W5JDF. WA5EL has built a control panel incorporating speaker power switches, tape recorder and coax relay to dress up his Pneumaker and NC-190. WA5OKI and WA5FCP are doing a fine job with MSBN. WA2WBA/5, now in Columbus, is active on "Miss." Sorry to lose W5JJA to Mobile. W5JDF now is in Prentiss. WA5JVD, WA5IXC, W5ODV, W5RCI and W5CUU are active on 2 meters. Anyone interested in a teenage net, contact WA5NKX. K5SSZ is now in Cleveland run-

ning a new SB-300 and SB-400. Hope many of you worked K5MDX on "Operation Skytop." A new Novice in Natchez is WN5PXX, W5KHB has SB-100 and SB-200. WA5JTR still is helping our maritime mobiles. WA5HEC made DXCC with CE10A, 100-watt final, RA1E50RX and HB two-element quad. K5DZE and K5-JLX are moving. We are glad to have WA5JHX back. WA5OKI checks into six nets almost 100%. Over the years W5WJ has been one of the most faithful amateurs in the state, especially with traffic-handling. W5-KDM is running a Swan 350 for home rig and WRL duo-bander mobile. Check into our nets: Gulf Coast Sideband Net, 3925 kc. daily 1730 CST; Miss. Sideband Net, 3888 kc. daily 1815 CST; Miss. C.W. Net, 3647 kc. daily 1845 CST. Traffic: W5WJ 120, W5ODV/K5JCT 98, W5BW 63, WA5OKI 43, WA5JTB 21, W5EMM 15, WA5-ECL 10, WA5JWD 7, WA5CAM 3.

TENNESSEE—SCM, William A. Scott, W4UVP—SEC: K4RCT. P.A.Ms: WA4EWW, W4PFP. RM: K4-UWH.

Net	Freq.	Days	Time	Sess.	QNI	QTC
TN	3635	Daily	0100Z 0230Z	62	469	282
TPN	3980	M-Sat.	1245Z 1400Z	31	1168	269
TSSB	3980	Tue-Sun.	0030Z	27	1260	152
ETPN	3980	M-F	1140Z	23	392	58

Sorry to report W4DDL as a Silent Key. J.B. was active on 75 and pre-WV II was well known on 160 meters and in local clubs. W4SUI has taken leave of Oak Ridge for Auburn U. Jim will be missed by the OR Club. W4VRD, of OR, continues section foreign travel with a year's visit to G-Land. WA4GQM resumed net activities after the successful Delta Hamfest. W4HHK reports the Aug. sun noise of 4.7 db, the highest yet with dish. DXers take note, W4FLW has a new SB-200. W4UVP hopes to have a new SB-401 soon. K4RCT is looking for more ECs and K4UWH needs QNI and RN5 representatives for TN. Traffic: (Aug.) W4OGG 491, W4FX 446, WA5QE 238, W4PQP 236, K4UWH 213, W4RUW 121, WA4IBZ 118, WA4YEM 96, WA4YDT 78, W4MXF 73, W4UVP 67, WA4CKP 63, W4WBK 60, WA4YYP 57, W4-DY 54, W4CXY 48, WA4NUJ 46, K4UMW 46, K4OUK 40, W4TZB 28, W4PFP 27, K4COT 21, W44DBG 21, W4TZJ 21, WA4CKP 18, W4RMJ 17, WA4NEC 10, WA4-EWT 8, W4FLW 8, W4TYV 7, W4VTS 6, WA4CGK 5, WA4YYX 4, W4MQI 2. (July) W4FX 267. (June) W4FX 344.

GREAT LAKES DIVISION

KENTUCKY—SCM, Lawrence F. Jeffrey, WA4KFO—SEC: W4OYL. Appointments: WB4ACQ, W4NBZ, K4UMN as OPSs; K4HSB, WA4VUE, K4VDO, WA4-ZIR as ORSs; WA4BZS as EC. Endorsements: WA4-AUR, WA4ELG, K4JOP as OPSs; W4BAZ, K4QCQ, WA4TPB as ORSs; W4BAZ as OBS; WA4GMA, K4-JGB as ECs; W4JUI, W4NUQ, K4ZQR as OOs; K4-KZH as P.A.M.

Net	Freq.	Days	EST	Sess.	QNI	QTC	Mgr.
EMKPN	3960	M-F	0630	23	381	113	W4BEJ
MKPN	3960	Daily	0830	31	521	256	WA4KFO
KTN	3960	Daily	1900	31	917	586	WA4AGH
KYN/KSN	3600	Daily	1900/1700	47	344	1053	W4BAZ
KPON	3945	Sat.	1300	4	94	119	WA4AVV

Congratulations and thanks to WA4HJM for a job well done at the Kentucky State Fair. His efforts gave the section its highest traffic total ever achieved. The East-Kentucky ARS and the Bluegrass ARC both held FB hamfests in August. WA4GHQ had three weeks in Army school in Va. WB4AIN is in UELARC, whose station is WA4YGT. K4NQV is Gen. Mgr. of WLEBJ. K4YZU handles traffic direct to the Pacific Islands. K4HSB is back in Purdue. W4KKG is busy with the garden, etc. W4-YDO is in school at U.K. K4PFW reads OBs on v.h.f. in the Louisville area. Traffic: (Aug.) WA4HJM 1904, W4BAZ 689, WA4VUE 630, WA4UZ 577, K4HSB 567, WA4WWT 509, WA4AGH 500, WA4DYL 269, W4RCE 245, WB4AIN 203, K4NHY 175, K4YZU 175, WA4KFO 128, WA4GMA 93, W5NBZ 70, WA4AUR 69, K4MAN 53, W4KJP 28, WA4WQZ 27, WB4ACQ 25, K4HOE 23, WA4-YDO 20, W4CDA 15, W4GHQ 13, W4KKG 11, W4BTA 7, WA4BZS 4, K4TXJ 3. (July) K4HSB 82.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—Asst. SCM: K. E. Stecker, W8SS. SEC: K8GOU. RMs: W8ELW, K8QKY, W8EU, K8MIQ. P.A.Ms: W8CQU, K8LQA, K8JED. V.H.F. P.A.Ms: W8CVQ, W8YAN. Appointments: WA8AXF as EC. WA8MCQ as ORS. The Michigan Six Meter Club's officers are: K8JGF, pres.; W8PYM, vice-pres.; K8SPE, secy.; K8PCN, treas.; K8TCL, editor. W8VPC has an R4A and a T4X, but lost

his quad in a storm. WA8GCN is out of the USAF, where he operated K6GFAE on Guam. The SRARS (Plymouth) has a new emergency generator, says K8-SKZ and K8CGC. WA8EGA says, "43 isolated medical out-posts will be linked with Duke University via the kw station operated by Duke Medical Center ARC seven days a week." EC/RO W8UCG has a hot a.c. group and net going up in Muskegon. The U. P. gang put on a nice hamfest at Presque Isle Park. W8EMC now runs the U.P. Emergency Net and W8OQH runs the Evening Net. WA8CVH moved to Ann Arbor. The Van Buren County ARC ran a nice hamfest/picnic over Saugatuck way, same date as the U.P. Hamfest. W8AXN is home from the hospital after an operation and is recovering. WA8JKL is now a state police sergeant and is transferred to L'Anse Post. W8AHV is in the hospital after major surgery. We all hope you do OK, Paul. W8TAU has been in the U. of M. hospital for some time. Wish you luck. W8GJH has a new summer cottage call, W8-HUG. W8RTZ has been hospitalized after surgery. W8-RLT's transmission "blew up" on the Ohio turnpike. W8WNX got married Aug. 12. Congrats. WA8ORC made the BPL. K8LNE left for a year in Florida. W8IWF has the new S-Line and W8UM has a new 500-c.p.s. filter. W8SWF put up a new "inverted V." W8IBB is back from a west coast trip. WA8CXF's son had 20 stitches in his leg, and her OM, WA8CXG, cut a nerve in his hand. All are coming along OK now. WA8ORC is a new YL General with a TR-4. W8CRH has 200 volts on 75 and is building a 2-meter mixer. Traffic: (Aug.) K8NJW 293, K8KMQ 279, WA8OGR 242, K8LNE 185, WA8PII 134, W8ELW 102, K8QKY 90, W8IWF 89, WA8TAN 88, K8HLR 87, K8PBA 77, W8UM 72, WA8LXY 68, WA8-GTM 66, W8EU 63, W8OQK 61, WA8MCQ 58, W8IUC 55, W8RTN 54, WA8PIM 44, WA8LRC 43, W8FX 41, K8VDA 33, W8FWQ 30, WA8OER 29, W8TBP 25, WA8-CZJ 21, K8JED 20, WA8UD 14, W8BEZ 12, W8SWF 12, W8ZHB 12, WA8MVH 9, WA8PWF 9, K8VQV 7, W8DSE 6, W8AAM 2, WA8MAM 1. (July) WA8MQT 84, W8IUC 79, W8IWF 55, W8ELW 42, WA8IML 32, W8ZHB 13, K8-YEK 1.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM: J. C. Erickson, W8DAE. SEC: W8HNP. RMs: W8BZX, W8DAE and K8LGB. P.A.Ms: W8VZ and K8UBK. WA8-HFI reports WA8RNT is back on the air with a Tech. Class license and WA8SCC has his 3-band quad up 45 feet. WA8RFU reports K8AXK has a new Drake TR-4, WA8FKD and WA8BZR have a new TA-36 tri-bander, W8TUS is on s.s.b. with an SB-10 and WA8RXU has a 15-meter beam 500-watt linear. K8LXA reports the Ashtabula RC was granted use of two rooms, one for meetings and one for the station, has a new Swan 350 and has started code classes. K8HRS has a new beam, K8IMX is mobile with an HW-12, K8YYP has a new Swan 350, K8SCF has a 240 and K8RIF has a new Swan

OHIO QSO PARTY

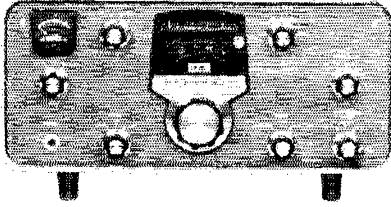
December 17-19, 1966

The Ohio QSO Party, sponsored by the Upper Arlington Radio Club, will take place as follows.

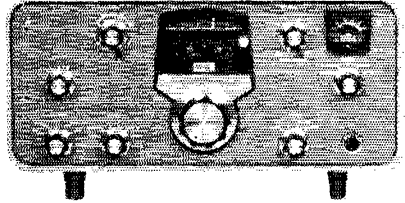
Rules: 1) The contest begins 2100 GMT Saturday December 17 and ends 0300, GMT Monday December 19. 2) Suggested frequencies are 3560 3940 (0030Z) 7060 7240 (1500 and 2100Z) 14060 14290 (1830Z) 21060 and 21390 (1830Z); Novices 3725 7125 and 21,125. 3) Each station may be worked twice per band, once on phone and once on c.w. 4) Call CQ Ohio and Ohio stations send *de Ohio*. 5) Ohio stations send QSO number, RS(T) and county. Out-of-state stations send QSO number, RS(T) and ARRL section or country. Ohio stations may work any station. Out-of-state stations may work only Ohio stations. 6) Awards go to first, second and third in Ohio and in the country and to first place in each ARRL section. 7) Ohio stations score 2 points for each out-of-state contact, 1 point for each Ohio contact. Out-of-state stations get one point for each contact and may only work Ohio stations. Total score for Ohio stations is the product of QSO points and ARRL sections (Ohio included) and countries (not including W/VE) worked. For others it is the product of QSO points and Ohio counties worked (88 total). 8) Log copies which include QSO number, station worked, date, time, band, mode and your call. Mail entries to Craig Nohl, WA8GYT, 2614 Brandon Road, Columbus, Ohio 43221. Entries must be postmarked by January 20, 1967. (Please include s.a.s.e. so results and awards can be mailed.)



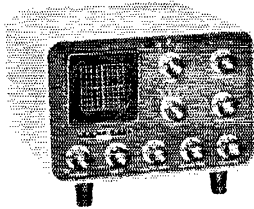
The World's Largest THE FAMOUS HEATHKIT® SB-SERIES



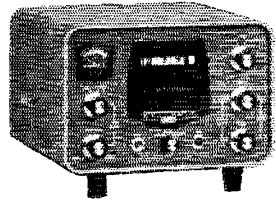
SB-301 Amateur Band Receiver ... SSB, AM, CW, and RTTY reception on 80 through 10 meters ± 15 MHz WWV reception. Tunes 6 & 2 meters with SBA-300-3 and SBA-300-4 plug-in converters.
Kit SB-301, 23 lbs. (less speaker) **\$260.00**



SB-401 Amateur Band SSB Transmitter ... 180 watts PEP SSB, 170 watts CW on 80 through 10 meters. Operates "Transceive" with SB-301 — requires SBA-401-1 crystal pack for independent operation.
Kit SB-401, 34 lbs. **\$285.00**
SBA-401-1 crystal pack, 1 lb. **\$29.95**



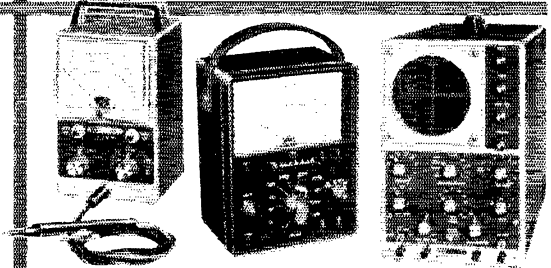
SB-610 Signal Monitor Scope ... operates with transmitters on 160 through 6 meters at power levels from 15 watts through 1 kw. Shows transmitted envelope. Operates with receiver IF's up to 6 MHz, showing received signal waveforms. Spots over modulation, etc.
Kit SB-610, 14 lbs. **\$69.95**



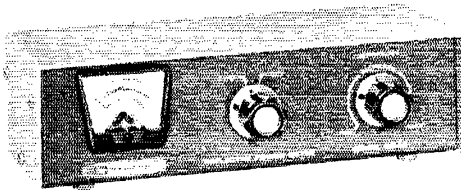
SB-630 Amateur Station Console ... including 24-hour clock, SWR meter, 10 minute timer with audio-visual signaling, and more. Styled to match your SB-Series station.
Kit SB-630, 9 lbs. **\$74.95**



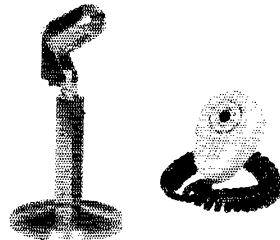
6 & 2 Meter Plug-In Converters For SB-301 ... 10 meter output — operate from front panel switch on SB-301. Better than 0.2 uv sensitivity for 6 db signal-plus-noise to noise ratio.
SBA-300-3 (6 meter), 2 lbs. **\$19.95**
SBA-300-4 (2 meter), 2 lbs. **\$19.95**



A Complete Line Of Test Instruments For The Amateur Radio Station. The IM-11 VTVM & RF probe, the IO-12 Oscilloscope, and the MM-1 Volt-Ohm-Milliammeter (shown here), and many more instruments are fully described in the 1967 Heathkit Catalog.



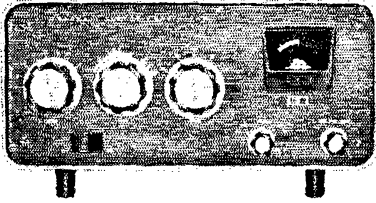
HM-15 Relative Power Meter ... indicates forward and reflected power and SWR. Band coverage is 160 through 6 meters. Handles peak power well over 1 kw. Wiring options permit operation with either 50 or 75 ohm transmission lines.
Kit HM-15, 3 lbs. **\$14.95**



Communications Microphones ... Heathkit recommended microphones feature "shaped response" for optimum clarity of voice communications.
HDP-21A Desk-top Microphone, 4 lbs. **\$29.40**
GH-12 Hand-held PTT mike, 2 lbs. **\$6.95**

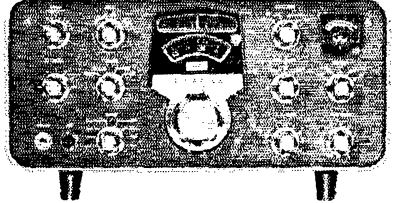
Selection Of Amateur Radio Equipment

THE ULTIMATE IN VALUE & PERFORMANCE



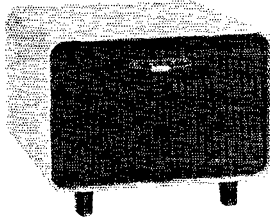
SB-200 KW SSB Linear Amplifier ... 1200 watts PEP input SSB, 1000 watts CW on 80 through 10 meters. Built-in antenna relay, SWR meter, and power supply. Can be driven by most popular SSB transmitters (100 watts nominal output).

Kit SB-200, 41 lbs. \$200.00



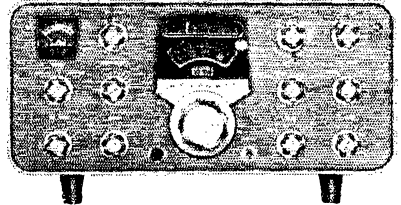
SB-100 80 Through 10 Meter SSB Transceiver ... 180 watts PEP SSB, 170 watts CW (the practical power level for fixed/mobile operation). Features USB/LSB on all bands, PTT & VOX, CW sidetone, and more. Unmatched engineering & design.

Kit SB-100, 23 lbs. \$360.00



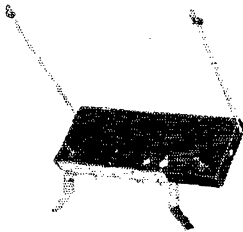
SB-600 Communications Speaker ... matches the Heathkit SB-Series line, and includes space for HP-23 fixed-station power supply. Features an 8 ohm 6" x 9" speaker with 300 to 3000 Hz response.

Kit SB-600, 5 lbs. \$17.95



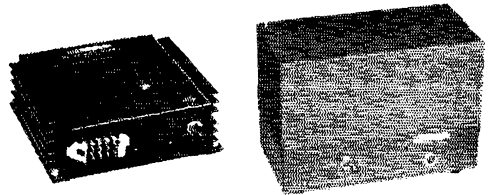
SB-110 6-Meter SSB Transceiver ... puts the famous Heath SB-Series on "6". 180 watts PEP input SSB ... 150 watts CW — with single-knob linear tuning, 1 kc dial calibration, and the ultimate in stability.

Kit SB-110, 23 lbs. \$320.00



SBA-101-1 SB-Series Mobile Mounting Bracket. Provides cantilever suspension for mobile installation of SB-110 or SB-100 transceiver. Allows quick-change from fixed station to mobile operation.

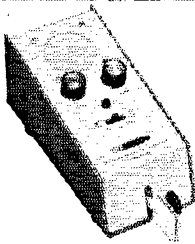
Kit SBA-100-1, 6 lbs. \$14.95



HP-13 Mobile & HP-23 Fixed Power Supplies ... For the "Single Banders" and SB-100 & SB-110. Provide all necessary operating voltages with excellent dynamic regulation.

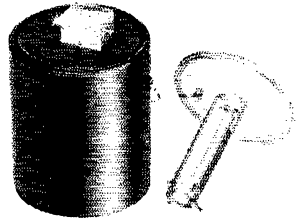
Kit HP-13, 7 lbs. \$59.95

Kit HP-23, 19 lbs. \$39.95



HD-10 All Solid-State Electronic Keyer ... no relays to stick, chatter, or punch holes in characters. 15 to 60 wpm with 10 to 20 wpm slow speed option. Built-in sidetone. Recommended for grid-block keying only; i.e., Heathkit SB-Series & DX-60A.

Kit HD-10, 6 lbs. \$39.95



HN-31 "Cantenna" Transmitter Dummy Load ... provides non reactive 50 ohm load to transmitters up to 1 kw. Better than 1.5:1 SWR for frequencies from 160 to 2 meters. Oil not included.

Kit HN-31, 3 lbs. \$9.95

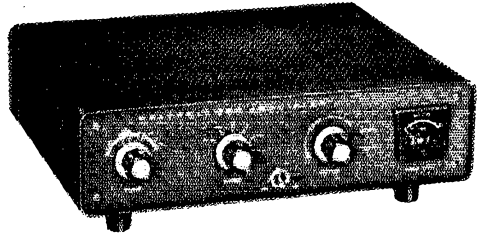


The World's Largest

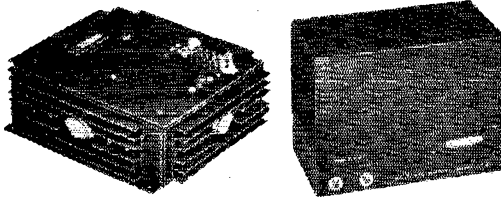
A WIDE ARRAY OF FIXED/MOBILE EQUIPMENT



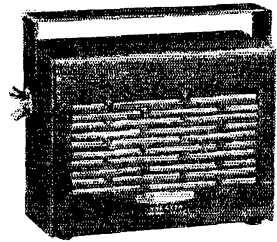
New! "Single-Bander" Transceivers . . . Provides 200 watts PEP SSB input on the band of your choice. Now with LSB or USB on 80, 40, or 20. Features AVC, ALC, & S-meter. New styling. Built-in PTT & VOX. 2 kHz dial calibration.
Kit HW-12A, 80-meter, 15 lbs. \$99.95
Kit HW-22A, 40-meter, 15 lbs. \$104.95
Kit HW-32A, 20-meter, 15 lbs. \$104.95



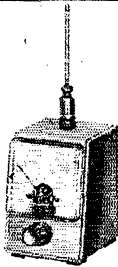
HA-14 "KW Kompact" KW SSB Linear Amplifier . . . 1000 watts PEP input SSB on 80 through 10 meters. Built-in SWR meter. Built-in antenna changeover relay. Pretuned broad-band input circuit that requires no tuning. Full provisions for control of "remotely" located fixed or mobile power supply.
Kit HA-14, 10 lbs. \$99.95



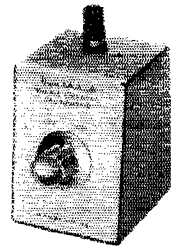
HP-14 Mobile & HP-24 Fixed Power Supplies . . . for the "KW Kompact". Provide all necessary operating voltages. HP-14 recommended for 12 v. alternator, negative ground cars only.
Kit HP-14, 10 lbs. \$89.95
Kit HP-24, 21 lbs. \$49.95



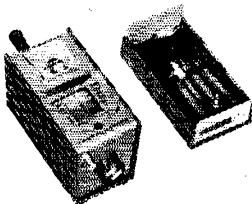
HS-24 Mobile Speaker . . . the 8 ohm speaker provides excellent communications response — features a husky steel cabinet & gimbal mounting bracket.
Kit HS-24, 4 lbs. \$7.00



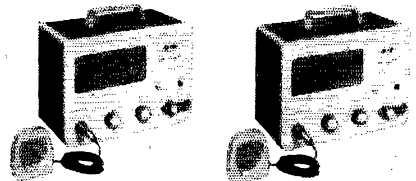
PM-2 RF Power Meter . . . indicates transmitter relative power by sampling RF field near transmitter antenna. Covers 100 kHz to 250 MHz. No power connections or battery required.
Kit PM-2, 2 lbs. \$12.95



HD-20 100 kHz Crystal Calibrator . . . features 100 kHz crystal with 0.005% tolerance for accurate calibrating signals every 100 kHz up to and beyond 54 MHz. Uses 9 volt battery (not included).
Kit HD-20, 1 lb. \$14.95



HM-10A Solid-State "Tunnel Dipper" . . . a solid-state version of the classic grid-dip meter. Features a tunnel diode oscillator. Covers 3 to 260 MHz. Uses an AA penlite cell (not included).
Kit HM-10A, 3 lbs. \$34.95



Benton Harbor Lunch Boxes — Complete Transceivers . . . for 6 and 2 meters. Feature crystal-controlled transmitters with 5-watt input and tunable super-regenerative receivers with RF stage. Built-in 115 VAC power supply and speaker. Mike included. Less crystal.
Kit HW-29A 6-meter, 9 lbs. \$44.95
Kit HW-30 2-meter, 9 lbs. \$44.95
Kit GP-11, Mobile Vibrator Power Supply, 6 lbs. . . \$16.88

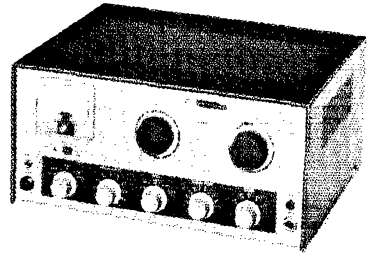
Selection Of Amateur Radio Equipment

AMATEUR GEAR TO OUTFIT THE BEGINNER



HR-10 Amateur Band Receiver ... tunes AM, CW, and SSB with sensitivity & selectivity comparable to "expensive" receivers. 80 through 10 meter coverage, crystal filter, & s-meter, plus provisions for a plug-in 100 kHz crystal calibrator.

Kit HR-10, 20 lbs. \$75.00
Kit HRA-10-1 100 kHz Calibrator, 1 lb. \$8.95



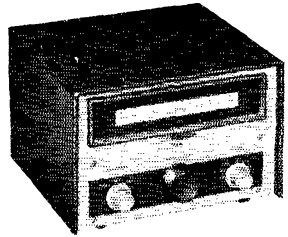
DX-60A Phone & CW Transmitter ... perfect for the novice, a favorite with old timers. 90 watts on 80 through 10 meters with crystal control ... operates at reduced power for novice class. Keys beautifully with HD-10.

Kit DX-60A, 24 lbs. \$79.95



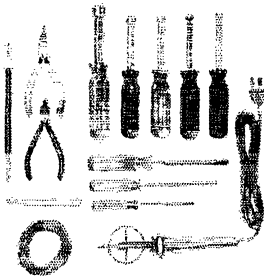
CO-1 Code Practice Oscillator & Key ... here's the best way to learn the radiotelegraph code ... assemble two CO-1's and practice with a friend. Switch selects internal speaker or light. Uses 2 "C" cells (not included) — complete with key.

Kit CO-1, 2 lbs. \$7.95

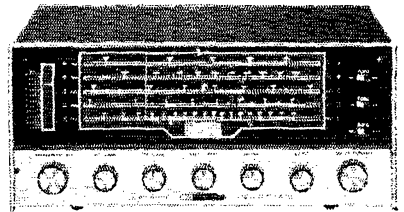


HG-10 VFO — Perfect For The DX-60A ... providing 80 through 10 meter VFO coverage. Provides 5 volts RMS signal — enough to drive most transmitters — and dial calibration 80 through 2 meters. Requires 108 volts DC @ 25 ma., & 6.3 VAC @ 0.75 amperes.

Kit HG-10, 12 lbs. \$34.95



All Essential Tools For Kit Building ... the new 1967 Heathkit Catalog includes tool sets with nut drivers, needlenose pliers, diagonal cutters, wire strippers, and soldering irons.



GR-54 General Coverage Receiver ... 5-bands covering 2 MHz to 30 MHz plus broadcast band & 180 kHz to 420 kHz navigation frequencies. A selective, stable receiver for AM, CW, & SSB reception. Excellent for the novice or beginner.

Kit GR-54, 25 lbs. \$84.95



FREE CATALOG

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SUB-MINIATURE SOLID STATE TV CAMERA

FOR CLOSED CIRCUIT OR AMATEUR TV

- Measures only 2 3/4" x 4" x 7" (excluding lens and connectors).
- Weighs only 3 1/2 lbs.
- Advanced circuitry utilizing 35 semi-conductors most of which are silicon.
- Resolution guaranteed to exceed best capabilities of standard 525 line TV receivers.
- Field-effect input circuit provides noise-free video. This is a VANGUARD exclusive.
- RF output 30,000 microvolts adjustable for channels 2-6.
- Video output 1.5 V p-p composite with standard negative sync.
- Viewable pictures obtainable from as low as 1 ft. candle of illumination to bright sunlight.
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- All parts guaranteed for 1 year (except for open filament on vidicon or breakage).

Dealer inquiries invited. Exclusive territories available to those qualified for CCTV service and installation.

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Dept. S-11

350. Inter-City RC's *IRC News Bulletin* informs us WA8RAF received his General Class license, W8EMK has a new SB-34, WN8UEAI, WN8UFEN, WN8UFJ, WN8UFL and WN8UGH received their Novice licenses, K8AKA has gone mobile with a Swan 350 and W8GXQ has an entirely new station with a Collins receiver, new Drake TR-4 and Henry 2 K, Toledo's *Ham Shark Gossip* says W8QUR and his XYL spent their vacation on the Groat Lakes, W8YDR spent a week in the hospital, W8LZU moved to Michigan, K8ZNC came in second for the 8th district in the YL-OM Contest, K8PMI is in Vietnam, the Mills Trophy Yacht Race was held with communications furnished by W8CYH, HSW, QUO, QUR, RZQ, ZNX, K8KYB, LFI, NBQ, OMB, YOO, ZAH, WA8LJU, JTB, MKY and OTB and the Toledo RC held a picnic, Warren ARA's *Q-Match* says W8PFD received his General Class license. The phone-cw, nets request outlets in the major cities and especially want outlets in Southeastern Ohio. The Buckeye Net (BN) meets daily on 3580 kc. at 7 P.M. EST. The Ohio Slow Net (OSN) meets on 3580 kc. at 6:30 p.m. EST. The Ohio Single Side Band Net meets daily on 3972.5 kc. at 11:30 A.M. and 7:45 P.M. EST. Former W8PMA is now W4CJV, WN8UAIJ is a new Novice in Aurora, K8RXD joined the Navy, K8QEW reports the Steubenville RC held a stag luncheon, K8ZDY has moved from W. Va. to Steubenville. Westpark Radiops' *The Radiops Log* reports WA8CHU is a Silent Key, Babcock Wilcox ARC held a Weiner and corn roast, South East ARC's *Ham-Fax* states the club held a family cook-out, Massillon ARC nominated its officers for the coming year. According to Mt. Vernon ARC's *KREEN Newsletter*, W8OUZ vacationed in Canada and the club held a cook-out, Lancaster & Fairfield County ARC's *The Rag Chever* tells us WA8LID has been in the hospital and WA8SFP is going to Okinawa as a civilian technician, Parma RC's *P.R.C. Bulletin* says the club held its annual picnic and W8EPP presented the film "Steel Spans the Chesapeake"! Springfield ARC's *The Q'er* informs us 415 attended its hamfest, W8OHU was appointed EC in August, W8LJH, W8RYP, W8UPH and WA8FSX made the BPL in August, W8FFW is well on the road to recovery from heart surgery, K8WVZ vacationed in California. There were 300 registered at the North East Ohio V.H.F. Group Hamfest with around 275 amateurs and they had 65 check-ins on 50 Mc, K8DHJ drove your SCM to the Warren Hamfest, where more than 2500 attended with 800 registered. The oldest amateur attending was W3-DJM, who is 70 years old and the youngest was WA8-TKW, 11 years old, K8BXT reports WN8UPR and WN8UPS are new Novices in Warren and W8WRP is operating RTTY from Newark.

Net	ONI	OTC	Percentage
Ohio SSB	1578	1122	19.7%

Traffic: W8UPH 883, W8LJH 613, W8RYP 538, WA8PMN 487, WA8FSX 450, W8CHT 244, WA8OCG 211, W8DAE 186, K8URK 144, K8LGA 130, W8TV 129, W8OHU 126, WA8BZX 112, WA8GYT 111, WA8BND 96, W8OCU 93, K8YSO 93, W8QZK 80, WA8LAM 79, K8VMI 75, W8NAI, 61, W8TLW 57, K8BYR 52, W8GOE 50, W8INZ 47, K8LGB 44, W8OE 40, K8BNL 30, WA8FKD 39, W8LZE 39, WA8NSL 32, K8DHF 20, W8LAG 20, WA8OV 14, WA8-PLJ 14, W8FFW 13, WA8MIO 12, W8ERD 11, WA8NTA 10, W8DGD 8, W8FGD 7, WA8KPN 6, K8RND 5, W8FRV 3, K8TVT 2, WA8QWN 1.

HUDSON DIVISION

EASTERN NEW YORK—SCM, George W. Trucey, W2EFU—SEC: W2KGC, RAM: WA2VYS, PAM: W2LJG. Section nets: NYS on 3670 kc. nightly at 2400 GMT; NYSPTEN on 3925 kc. nightly at 2300 GMT; ESS on 3590 kc. nightly at 2300 GMT. Endorsements: K2AJA as ORS and WA2OJD as OO, WA2UHZ received a certificate from NYS. The Schenectady Club held its summer picnic at Sauganda Reservoir Aug. 20, W82FVD an OPS, is attending Rensselaer Poly in Troy, N.Y. The *ESS Net Bulletin*, published by WA2VYS, reports W82UHQ is a new net member, WA2ZPD, WA2USG, W82DXL and W82HZY operated from a Connecticut mountain during the V.H.F. Party. After participating in Intruder Watch, ESS and NYS during the summer, W82UYD is attending Union College in Schenectady, WA2OJD reports a new three-element quad on a 60-ft. tower. Congrats. As a camp counselor, W82JYV prepared 30 fellow campers for their Novice exam, K2ARO, in Hyde Park, is operational on 432 Mc. and looking for contacts. Gus runs 85 watts on 2 meters to stacked eleven-element beams. He is building gear for 220 Mc. W82FXB reports 20 states and 1025 miles on 144 Mc. Also, WA2ZPD reports 10 states on 144 Mc. K2UTC sent out 36 Official Observer notices during August. K2-AJA attended the NLI Net Picnic. The Albany Club Picnic, well attended, was held at Thatcher Park.

SOLID STATE FREQUENCY CONVERTERS

WORLD'S LARGEST SELECTION OF STOCK FREQUENCIES

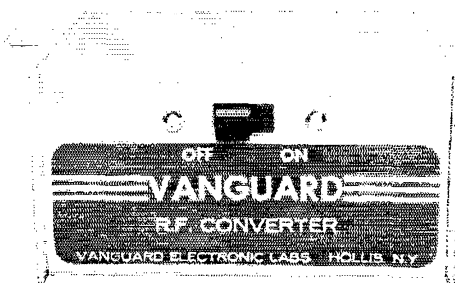
Available in the following frequencies from stock:

	Model	Input mc	Output mc
2M	301-D	144-148	50-54
	301-E1	144-145	.6-1.6
	301-E2	145-146	.6-1.6
	301-F	144-146	28-30
	301-Q	144-148	14-18
	301-R	144-148	7-11
	301-S	143.5-148.5	30-35
6M	301-B1	50-51	.6-1.6
	301-B2	51-52	.6-1.6
	301-C1	50-54	7-11
	301-C2	50-54	14-18
	301-J	50-52	28-30
20M	301-G	13.6-14.6	.6-1.6
CB	301-A1	26.5-27.5	.6-1.6
	301-A2	26.8-27.3	3.5-4.0
40M	301-K	7-8	.6-1.6
CHU WWV	301-L	3.35	1.0
	301-H	5.0	1.0
Int'l. Marine	301-I1	9-10	.6-1.6
	301-I2	15-16	.6-1.6
	301-M	2-3	.6-1.6
Aircraft	301-N1	118-119	.6-1.6
	301-N2	119-120	.6-1.6
	301-N3	120-121	.6-1.6
	301-N4	121-122	.6-1.6
	301-N5	122-123	.6-1.6
	301-N6	123-124	.6-1.6
Fire Police VHF Ma- rine etc.	301-P1	154-155	.6-1.6
	301-P2	155-156	.6-1.6
	301-P3	154-158	7-11
	301-P4	154-158	104-108
	301-P5	156.3-157.3	.6-1.6
Weather	301-W1	162.55	1.0
	301-W2	162.55	10.7
	301-W3	162.55	107.0

CUSTOM MADE 301-X Your choice of any one input and output frequency between .6 and 163 mc.

(4-6 weeks delivery on custom converters)

For prompt shipment please include postal money order or cashier's check. COD's must include 20% deposit. New York City residents add 5% sales tax. New York State residents add 2% sales tax.



ANY CONVERTER
NOW ONLY

\$16.95
ppd.

except 301-X, \$18.95 ppd.

The model 301 uses 3 of the very latest type epitaxial planar UHF transistors for unsurpassed gain and low noise at all frequencies. It can operate from 6 to 18 volts (positive or negative ground) without any significant change in gain or frequency. The circuit consists of a tuned R.F. amplifier, crystal controlled oscillator and a low noise mixer. More than 30 high quality parts carefully assembled and tested. Sensitivity is better than 1/2 micro-volt for a 6 db signal to noise ratio even at 160 mc.

- Enclosed in a sturdy 16 gauge, 3 1/8" x 2 3/8" x 1 3/4" aluminum case with mounting ears, transfer switch and two SO-239 (UHF) receptacles.
- 100% made in the U.S.A.
- 2 year guarantee on all parts including transistors!
- Free 24 hr. SPECIAL DELIVERY anywhere in the U.S.A. if you send a money order or cashier's check. With personal checks allow 2 weeks to clear the bank before shipment can be made. No shipments made on Saturdays, Sundays, holidays, and 2 weeks in August.

OPTIONAL ACCESSORIES:

9 volt battery eliminator with 110 volt cord. Only \$2.95 ppd.

R.F. cable adapters in 6", 12" or 18" lengths with PL-259 plug on one end (mates with converter). Other end your choice of Motorola male or female, RCA, BNC or PL-259. Price \$1.25 each postpaid cable with 2 plugs.

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CRAMPED FOR SPACE?

**NOW . . . MINIATURIZED.
QUALITY ANTENNAS FOR . . .**

- APARTMENTS
- SUBURBAN HOMES
- PORTABLE USE

Featuring heavy wall aluminum and stainless steel construction throughout



6-10-15-20 METERS

The time proved 8-24 4-Band antenna combines maximum efficiency and compact design to provide an excellent antenna where space is a factor. New end loading for maximum radiation efficiency. No center loading.

Oper. Freq.	6-10-15-20 Meters
Power Rating	600 Watts AM
Turn. Radius	7'
Total Weight	11 lbs.
Single Feed Line	52 ohm
SWR at Resonance	1.5 to 1.0 max.

**Model B-24
Net \$59.95**

MULTIBAND COAXIAL ANTENNA FOR 6-10-15-20 METERS

Needs no ground plane radials. Full electrical 1/2 wave on each band. Excellent quality construction. Mount with inexpensive TV Hardware.

Power Rating	600 Watts AM
Total Weight	6 lbs.
Height	12'
Single Feed Line	52 ohm
SWR at Resonance	1.5 to 1.0 max.

Model C4 Net \$34.95



40 plus 10 METERS

New end loading for maximum radiation efficiency. No center loading employed. Element length only 18.5' . . . boom 10'.

Oper. Freq.	40 and 10 Meters
Power Rating	1000 Watts AM
Single Feed Line	52 ohm coax.
SWR at Resonance	1.5 to 1.0 max.
Total Weight	22 lbs.

Model B 4010 Net \$79.50

RUGGED 6 METER BEAM

Rugged construction with no holes in elements or boom to weaken antenna. Heavy wall seamless aluminum and stainless steel throughout.

Power Rating	1000 Watts AM
SWR at Resonance	1.4 to 1.0 max.
Impedance	52 ohms
Longest Element	9'8"
Boom	12'



**Model B6M5
Net \$24.95 each
Two for \$44.50**

Write for Mini-Products' Miniaturized Antenna Catalog.

If there is no stocking distributor near you . . . order direct from factory. Free shipping to your QTH and we will prepay the costs in continental U.S.A.

DISTRIBUTORS WANTED IN KEY AREAS. Write for details to . . . Tom Venabie, K3JZJ, Sales Manager

Mini-Products, Inc.

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• LEADERS IN COMPACT ANTENNAS •

Traffic: WA2VYS 262, WB2JZY 164, K21VP 123, W2-THE 78, WA2HGB 71, WB2UHZ 61, W2BXP 30, K2SJK 29, W2PKY 19, WA2JVL 16, W2ANV 15, WA2WGS/2 11, WB2UYD 10, WA2ZPD 5, WA2OJD 4, WB2QYZ 4, WB2-UEQ 2.

NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—Asst. SCM: Fred J. Brunjes, K2DGL. SEC: K2QVN. Section nets:

NLI	3630 kc.	1915 Nightly	K2JFT-RM
VHF Net	145.8 Mc.	3000 TWTh	W2EW-PAM
VHF Net	146.25 Mc.	1900 F55M	W2EW-PAM
NYC	3942 kc.	1600 Daily	WB2DXM-PAM
NLS (Slo)	3630 kc.	1845 Nightly	WB2SLI-RM

NYC-LI AREC Nets: See Dec, 1965 column for skeds. BPL certificates were awarded to WB2RBA and WB2SLI this here month! WB2PPY, WB2UDD and WB2UHA were appointed OESS. Reliable Olde ORS K2DXV moved into the section from the Atlantic Division to take up ORS-type duties here. Our intrepid RM of NLS took a brief sojourn to VE-Land this summer! Retiree Olde ORS WAZUWA was awarded the NLI/NLS Spirit Award at the Annual NLI Barbecue this August. The award is given every six months to the operator best exemplifying ORS or OPS in the NYC-LI section. The award is made by the PAMs and RMs of the h.f. nets and any ORS or OPS winning it three times in a row gets to keep it. WB2DXM won it first but then he became PAM of NYCLIPN and PAMs and RMs are excluded as recipients of the award. The NLI Barbecue was quite a success with a significant number of the ARPSC coming out as well as a few from N.N.J. and E.N.Y. W2TUK, Hudson Division Director, spoke as did WIBGD who came all the way down from ARRL. Many thanks to WB2SLI and his folks who were the wonderful hosts to this shindig! K2UBG has an ARC-1 converted to 2 meters and a tower with a three-element 10-15-20-meter beam on it and a 2-meter beam atop that! WB2EUH is pounding away at the books out at old Notre Dame and will see the gang at the NLI Dinner in December. The Suffolk County RC license class is boasting 100% attendance and WB2-AGI, the first graduate, has come up with a General Class license! Gee, I forgot to tell ya, WB2RQF received a special award at the NLI Barbecue for his unique ability at traffic-handling on the V.H.F. Net. Who said Technicians can't handle traffic? Whoever it was clearly doesn't know of what he speaketh! Here is a young fellow of my own vintage that puteth that garbage to the lie. Under the tutelage of our revered Olde V.H.F. PAM, W2EW, he has become'th in but a few months a traffic-handlin' rascal! WB2AEK enjoyed handling traffic for the Canadian Centennial Commission Canoe Race from Montreal to N.Y.C. WA2PJJ has a new eleven-element Yagi up there on 2 meters. W2LGK says the Radio Old Timers Club meets at Alex's, 89th & Jamaica Ave., Woodhaven, the 1st Fri. of each month and dues are prohibited! T'was only a Sunday morning in exciting old New York and W2PF was calmly chatting with KH6EJR/MM on the USS *Repose* just off Hong Kong. Suddenly, the band sprung a leak and naught could be heard but W2KH and W2RSC from this same village. Lo, all three did hurl a Sabbath-type invective, or two, at their docile old receivers! Hey, WA2OEH and WB2ASR both have new SR-150's. WA9-FRW, who is cute for a girl, spent a day in N.Y.C. and WA2YKK showed her the town. Traffic: (Aug.) WB2SLI 579, WA2UWA 478, WB2DXM 268, WB2RBA 265, K2UBG 177, WB2NGZ 141, W2EW 111, WB2EUH 97, WB2AEK 73, WB2FAJ 69, W2GKZ 58, WB2RQF 57, WB2PTS 52, WA2LJS 32, W2DBQ 26, WB2MBU 26, WB2TNY 26, WB2NZL 18, WB2EAL 16, WA2QJU 10, WA2PJJ 8, WA2PMW 8, K2UFT 8, W2EC 7, W2LGK 4, W2PF 4, WB2SIZ 3, WB2UIV 3, WB2BKS 2, K2DGI 2, WB2AWX 1. (July) WB2SLI 564, WB2RBA 277, WB2-PYI 129.

NORTHERN NEW JERSEY—SCM, Edward F. Erickson, W2CVW—Asst. SCM: Louis J. Amoroso, W2-LQP. SEC: K2ZFI. Northern New Jersey section nets:

NJN	3695 kc.	7 p.m. Daily	WB2AEJ-RM
NJ Phone	3000 kc.	6 p.m. Ex. Sun.	W2PEV-PAM
NJ Phone	3000 kc.	9 p.m. Sun.	W2ZL-PAM
NJ 6	51,150 kc.	11 p.m. M-W-Sat.	K2VNL-PAM
NJ 2	146,700 kc.	10 p.m. Tue.-Sat.	K2VNL-PAM

Times shown are local in effect. AREC skeds and information available from K2ZFI. Congrats to new appointees: WB2SEZ and K8DIU/K2USA as ORSs; WB2-URD as OPS. WA2WHZ has returned to college in W8-Land. WA2UDT has gone to KR6-Land in the USAF. WB2KNS is stationed in JA6-Land in the U.S. Army, where he is forming a radio club. WB2WWH reports an active rag chewsers net on 21,350 kc. at 9:30

EIMAC

vapor-cooled high-linearity tetrode powers unique new 2000 watt PEP linear amplifier

The unique new linear amplifier shown here is powered by an EIMAC 4CV1500B tetrode. The ultimate in amateur equipment, this fine linear was designed by Jack Quinn, W6MJG, and uses the advanced concept of vapor-phase cooling for ultra-quiet operation. The amplifier runs cooler than most forced-air-cooled amplifiers, and because there is no extraneous noise from air blowers, your shack is quiet—ideal for receiving weak DX signals! On CW, the amplifier has an average input of 1 kW, with only 400 watts of plate dissipation at 60% efficiency.

High SSB performance of the amplifier is credited to the 4CV1500B's outstanding intermodulation distortion characteristics...better than -40 db third-order products at all drive power levels from zero to 2 kW PEP. The 4CV1500B—and its air-cooled brother, the 4CX1500B—are products of a four-year development study which included optimization of internal tube geometry by computer techniques. Because the tube has very low grid interception (typically less than 1.5 mA grid current) it is possible to drive the grid positive without adverse effects upon the distortion level of the driver. Both tubes are recommended for Class AB₂ linear amplifier service. For further information on advanced EIMAC power tubes, write Amateur Services Department or contact your nearest EIMAC distributor.

4CV1500B				
TYPICAL OPERATION (Frequencies below 30 MHz)				
DC Plate Voltage.....	2500	2750	2900	V
DC Screen Voltage.....	225	225	225	V
DC Grid Voltage.....	-34	-34	-34	V
Zero-Signal DC Plate Current..	300	300	300	mA
Single-Tone DC Plate Current...	720	710	755	mA
Two-Tone DC Plate Current....	530	555	542	mA
Driving Power.....	1.5	1.5	1.5	W
Useful Output Power.....	900	1100	1100	W
Intermodulation Distortion				
Products				
3rd Order.....	-38	-40	-43	db
5th Order.....	-47	-48	-47	db

We have a new brochure entitled "Linear Amplifier and Single Sideband Service." Write for your copy.

EIMAC

Division of Varian

San Carlos, California 94070



Ham QUEST '67



Centuries ago the knight in shining armor sallied forth on various quests—to find the Holy Grail, to rescue a maiden in distress, to slay the fiery dragon.

Today, the League and several hundred local radio clubs have started out on a quest, too, to reach out for the 100,000 or so amateurs who are not affiliated with a local club or the League. We need the added strength these amateurs will bring to our fraternity, and these amateurs need the services, fraternalism and idea exchange provided by ARRL and club membership.

If you're a club member, and your club is not already embarked on HamQuest 67, you should request a club promotion kit from HamQuest 67, ARRL, Newington, Conn. 06111. Individual members and the club alike can earn prizes as they add members to the club and the League rosters.

And if you're not a club member, why not make it a point to drop in at the next meeting and see for yourself what it has to offer?

QST and ARRL membership \$5, \$5.25 in Canada, \$6 elsewhere. Additional family members at the same U.S. or Canadian address, \$1.

THE AMERICAN RADIO RELAY LEAGUE, Inc.

NEWINGTON, CONNECTICUT 06111

P.M. local Wed. Frank also is having a ball in NJN and ESS. WB2IYO has an LM-14 frequency meter. WB2UFV has a total of 14 for DXCC and needs 3 cards for WANJ. WB2UW has returned to Buickell U. WB2GFY has returned across the Raritan to Rutgers. WB2BCS manages 2-meter K'TTY to Boston. WB2FIT has returned to the U. of Mich. WB2QZE put up a new 20-meter beam and worked 49 states and 25 countries. W2-KOG operates from his service station in Mountaintop with a "22-cr." WB2TFK took first place for N.J. in the Ga. QSO Party. WB2URD is studying chemistry at Rutgers. Managership of the Eastern Area Slow Speed Net, which meets on 3748 kc. at 6:00 P.M. local time daily, has changed from WB2EUI to WB2SLI. W2OFB has made a comeback to ham radio after 15 years and was shocked by band conditions and operating practices, especially on 40 meters. Joe, who works for an airline, spent the hiatus provided by the strike to construct a quad for 15 and 20, but now finds he can't lift it. WB2YUC, a transplanted Southern Belle, can be heard on 20 sideband from the tip of Sandy Hook. "Timmie" is ex-WA2CNK. WB2QXA has 8 states on 2 meters with an indoor quad and 5 watts. Two more FD messages arrived in the mail late, from WB2FIT/2 and W2FWG/2. WA2TEK nows runs his RTTY bulletins daily at 5 P.M. local time on 3625 kc. K2KDK has revised his OBS skeds to 145,320 kc., followed by 50,360 kc., Tue. at 7:35 P.M. local; 145,710 kc. at 7:35 P.M., Thurs. on m.c.w.; 50,400 kc. Fri. at 10:00 P.M. c.w. QO reports: (Aug.) W2TPJ-23, K2BEV-23. (July) K2BEV-20. (Apr. through Aug.) W2JAE-17. Happy Sweepstakes Contest and Turkey Day to all from your SCM and Staff! Traffic: (Aug.) WB2OHR 260, WB2AEJ 159, K2VNL 158, W2QNL 106, WB2VWH 71, WB2URD 54, W2CVW 39, W2PEV 35, WB2IYO 34, WB2SEZ 33, K2EQP 30, WB2-UPV 26, WB2UW 19, WA2TAF 19, WB2FIT 17, K2ZFI 17, K2KDK 14, K2USA 13, WA2TEK 12, WB2GFY 10, WA2WHZ 10, WB2BCS 9, WB2JWB 7, K2MFX 6, W2-DRY 5, WA2CCF 4, WB2FIT 2. (July) WB2TFK 18, WA2TEK 3. (June) WA2WHZ 19.

MIDWEST DIVISION

IOWA—Acting SCM, Verlin B. Rowley, KØBRE—SEC: KØBRE. By the time that you read this report, we hope you have completed your SET activity, but if you haven't, get busy—you have until Nov. 9. And get those reports into Headquarters and to the SEC. We had quite a bit of activity last year that we didn't get credit for simply because some of the reports were not made. Remember, the deadline for the report is Nov. 15. KØJSX is the new president of the Sioux City Amateur Radio Assn.

75 Meter		QNI	1139	QTC	219	Sessions 27
160 Meter	IEN (July)	QNI	596	QTC	6	Sessions 31
160 Meter	IEN (Aug.)	QNI	510	QTC	10	Sessions 31

Traffic: (Aug.) WØLGG 1201, WAØJUT 57, KØBRE 47, WAØJEG 41, KØTFT 36, WAØDYV 26, WØUSL 25, KØQKD 22, WØLJV 20, WAØAFY 15, WAØDAG 15, WAØIYH 15, KØTDO 13, KØEVC 12, KØKAQ 7, WØGQ 5, WAØKWH 5, WØBKR 4, WAØJOA 4, WØNGS 3. (July) KØTDO 10.

KANSAS—SCM, Robert M. Summers, KØBXF—SEC: KØEMB. RM: WAØJII. PAM: KØJHF. V.H.F. PAMs: WØHAJ. WAØKSK. The new Novice Net started Sun., Sept. 11 at 1600 CST on 3735 kc. Interested Novices, contact KØBXF giving call, QTH and crystal frequency closest to net frequency if you wish to be placed on the net roll call. The new V.H.F. Disaster Communications Plan is state-wide. A six-meter traffic network is being set up. Interested users, contact KØBXF or WAØKSK in Kansas City. WAØMLE is pushing a new Gonset linear at Manhattan and also has upped his DX to 60. OO WAØKZD, reports he has added an oscilloscope to round out his OO equipment. Renewed appointments: WAØCCW, KØJDD, KØLPE, KØVQC, KØGOZ, WØZGK as ECs; WAØJII as RM; WØHAJ as V.H.F. PAM; KØEIB as SEC; WØHAJ as OBS; WØHAJ as OES; WAØJII as ORS. New appointments: WØAVX, WAØKZD, KØBHM as OOS; WAØKSK as OES; WAØLLC as OPS; WØINH, KØMRI as ORS. OES WAØFII is looking for 2-meter skeds, c.w. 144,003, 144,078 or 145,082 Mc. He has a Drake T4 and R4A. WAØHMZ has finished a 4x150A amplifier for 2 meters. Zone AREC Net activity picked up in Aug.: Zone 10, QNI 28; Zone 11, QNI 103; Zone 13, QNI 66; Zone 15, QNI 24; 6-Meter Phone Net, QNI 21; C.W. Net, QNI 15. WØCWN is now in Junction City, back from the war. Traffic: WAØMLE 507, KØMRI 146, KØJMF 123, KØGZP 109, KØUVH 105, KØEMB 99, KØBXF 98, WAØJII 92, WAØLLC 60, WAØCCW 39, WØVRZ 36, WØAVX 34, WAØEMQ 32, KØJDD 19, WØINH 14, KØZZX 11, KØGII 10, KØKED 10, WØ-WFD 8, WØFDJ 5.

NEW CW MONITOR & CODE PRACTICE OSCILLATOR



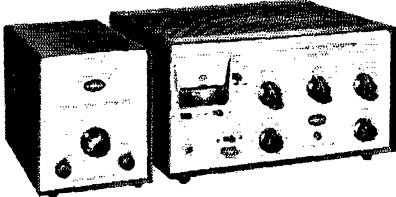
Model OM

Improve your CW sending

- MONITORS TRANSMITTER'S RF OUTPUT WITHOUT ANY CONNECTING WIRES
- TRANSISTORIZED
- BUILT-IN SPEAKER
- KIT OR WIRED
- LOW COST

Model OM is a combination code practice oscillator and C.W. monitor. It monitors the transmitter's RF output WITHOUT any connection to the transmitter. It may be used with any ham transmitter or transceiver. There is a tone control and headphone jack on the front panel. Model OM contains 2 transistors and 4 diodes. Size 6" x 3" x 2".

Model OMK.....KIT FORM	\$9.95
Model OM Wired and Tested	12.50
Model OCPK.....KIT.....Code Practice oscillator only (NO MONITOR).....	7.95
Model OCPW Wired.....Code Practice oscillator only (NO MONITOR).....	10.50



VFO-621

VFO for 6, 2 and 1 1/4 meters. Transistorized oscillator plus doubler, buffer and amplifier stages give highest stability and output. Built-in zener diode regulated power supply\$59.95

TX-62

6 and 2 meters, 75 watt phone and CW transmitter. Built-in solid state power supply. Broadbanded circuits make tuning easy. Uses inexpensive crystals or external VFO\$149.95

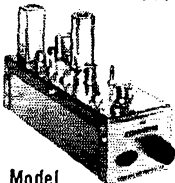
ALL BAND NUVISTOR PREAMP 6 THRU 160 METERS



MODEL PCL \$24.95

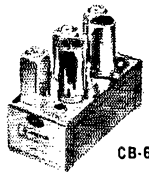
2 Nuvistors in cascode give noise figures of 1.5 to 3.4 db, depending on band. Weak signal performance, image and spurious rejection on all receivers are greatly improved. PCL's overall gain in excess of 20 db. Panel contains bandswitch, tuning capacitor and 3 position switch which puts unit into "OFF," "Standby" or "ON," and transfers antenna directly to receiver or through Preamp. Power required — 120 V. at 7 ma. and 6.3 V. at .27 A. can be taken from receiver or Ameco PS-1 supply. Size: 3"x5"x3"

NUVISTOR CONVERTERS FOR 50, 144 AND 220 MC. HIGH GAIN, LOW NOISE



Model CN

Has 3 Nuvistors (2 RF stages & mixer) and 6J6 osc. Available in any IF output and do NOT become obsolete as their IF is easily changed to match any receiver. Average gain — 45 db. Noise figure — 2.5 db, at 50 Mc., 3.0 db, at 144 Mc., 4.0 db. at 220 Mc. Power required 100-150V. at 30 ma., 6.3V. at .84A. See PS-1 Power Supply. Model CN-50W, CN-144W or CN-220W wired. (specify IF.) \$49.95. Model CN-50K, CN-144K or CN-220K in kit form. (specify IF.) \$34.95



CB-6

CB-6K — 6 meter kit, 6ES8-rf Amp., 6U8-mix./osc.\$19.95
 CB 6W — wired & tested\$27.50
 CB-2K — 2 meter kit, 6ES8 1st rf amp., 6U8 — 2nd rf amp/mix, 6J6 osc.\$23.95
 CB-2W — wired and tested, ...\$33.95
 Model PS-1 — Matching Power Supply — plugs directly into CB-6, CE-2 and CN units, PS-1K — Kit ...\$10.50
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CODE PRACTICE MATERIAL

Ameco has the most complete line of code records, code practice oscillators and keys. Code courses range from start to 18 W.P.M. and are on 33, 45, or 78 r.p.m. records. Model CPS oscillator has a 4" speaker and can be converted to a CW monitor.

Write for details on code courses and other ham gear.

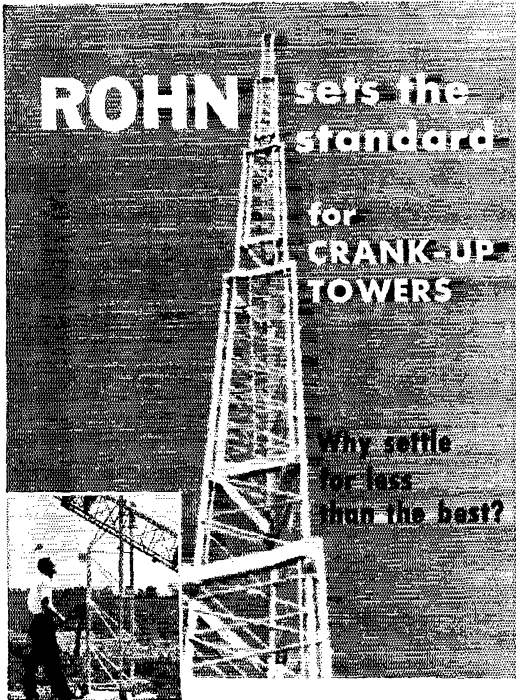
Ameco equipment at all leading ham distributors.

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ROHN sets the standard for CRANK-UP TOWERS

Why settle for less than the best?



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TWO CATEGORIES TO CHOOSE FROM

Standard Duty Guyed in Heights of 37 - 54 - 88 - 105 and 122 feet

Heavy Duty Self Supporting and Guyed in Heights of 37 - 54 feet (SS) 71 - 88 feet (guyed)

ROHN has these 6 IMPORTANT POINTS:

Ease of Operation—roller guides between sections assure easy, safe, friction-free raising and lowering. **Strength**—welded tubular steel sections overlap 3 feet at maximum height for extra sturdiness and strength. Unique ROHN raising procedure raises all sections together—uniformly with an equal section overlap at all heights! **Versatility**—designed to support the largest antennae with complete safety and assurance at any height desired! **Simple Installation**—install it yourself—use either flat base or special tilting base (illustrated above) depending on your needs. **Rated and Tested**—entire line engineered so you can get exactly the right size and properly rated tower for your antenna. The ROHN line of towers is complete. **Zinc Galvanized**—hot dipped galvanizing a standard—not an extra—with all ROHN towers! Prices start at less than \$100.

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"World's Largest EXCLUSIVE Manufacturer of Towers; designers, engineers, and installers of complete communication tower systems."

MISSOURI—SCM, Alfred E. Schwaneke, WØTPK —SEC: WØBUL, KØSBJ is a new OES. Appointments renewed: KØFPC, WØAKM and WØGQR as ECs; WØGBJ as ORS. The St. Louis ARC (KØLIR) will present its Ham of the Year Award at the Civil Defense Center in Chesterfield, Mo., Nov. 11 at 8 p.m. All are invited to attend. KØJPL is custodian of the St. Louis Bi-Centennial Award and KØLGZ is custodian of the KØAXU Award for working 5 members of the N.W. St. Louis ARC. WØAFKD is attending M.U. at Columbia and is traffic mgr. for WØZLN. WØDDGG is attending M.U. at Rolla. WØEDA is the new pres. of the Tri-State ARS. KØONK gave a demonstration of how she tunes her rig for the K.C. V.H.F. Society. Ruth also has a new electronic keyer (transistorized), a new 40-meter antenna and received a Public Service Award for her help in the S. Dak. blizzard in March '68. KØFPC is now mobile s.s.b. WØCHH visited W44LUJ, WØJEG, KØKAQ and WØJOA. WØELM has a quad up 66 feet. WØJHH received Neb. Centennial Cert. No. 66. WØJZK has a new TH3-Jr. beam. OO reports were received from KØYIP and KØGSV. Net reports:

Net	Freq.	Time	Days	Sess.	QNI	QTC	Mor.
MEN	3885	2300Z	M-W-F	14	175	13	WØBUL
MoSB	3953	2400Z	M-Sat.	27	598	245	KØTCB
MoPON	3810	2100Z	M-F	23	270	171	WØHVJ
MTTN	3940	2300Z	M-F	19	141	231	WØELM
MON	3580	0100Z	Daily	31	132	143	WØVYJ
QMO	3580	2200Z	Sun.	2	5	0	WØAFKD
MSN	3715	0300Z	Daily	31	42	0	KØONK
MNN	7063	1800Z	M-Sat.	26	50	16	WØODU
PHD	50.4	0130Z	Tues. (GMT)	5	80	2	WØFLL

Traffic: KØONK 5343, KØAEM 342, WØAFKD 291, KØYGR 148, WØHVJ 129, WØODU 88, KØICB 75, WØJHH 67, WØAFMD 63, WØOLYE 46, WØKKBZ 38, WØRTO 24, KØTCB 22, WØELM 19, KØJPS 18, WØEEE 16, KØENH 15, WØBUL 13, WØDDGG 12, WØKYB 12, WØGQR 10, WØTPK 9, KØYIP 8, WØCHH 6, WØGBJ 6, WØJLJ 5, WØFLL 3, KØFPC 2.

NEBRASKA—SCM, Frank Allen, WØGGP—SEC: KØJXN. Appointments: WØNUK as ORS, WØMOH as OPS. Net reports for Sept.: Nebr. Novice Net, WØNUK NCS, meets daily at 0100Z on 3748 kc., QNI 82, QTC 7. West Nebr. Net, WØNIK, QNI 435, QTC 27. Dead End Net, WØMGX, QNI 384, QTC 40. Nebr. Morning Phone Net, KØUWK, QNI 1013, QTC 51. Nebr. Storm Net, WØKGD, 0030Z sessions, QNI 1000, QTC 70. 0130Z session, QNI 725, QTC 53. Nebr. AREC Net, WØIRZ, QNI 164, QTC 1. Nebr. C.W. Net, WØGHZ, QNI 109, QTC 51. Beginning Oct. 1 an early session of NEB started at 0100Z. Nebr. Emergency Phone Net, WØGHZ, QNI 1596, QTC 107. Nebr. AREC C.W. Net (NAON), WØEEI, QNI 10. Nebr. amateurs excelled in emergency work during the flood situation in the eastern part of the state. Full cooperation between c.d., RACES, AREC, Red Cross and the Weather Bureau was realized. WØFZZ, program chairman of the Nebraska Amateur Radio Hall of Fame, is contacting Nebraska clubs with full information about the program. Contact him at North Platte for full details. Traffic: WØGHZ 389, WØONK 209, WØKQG 133, WØLOD 118, KØJFN 46, WØBOK 44, KØUWK 28, WØLLO 27, KØLXY 26, WØKIE 21, WØGGP 17, WØFQB 16, KØKQW 15, KØHNT 14, WØFJ 14, WØNTK 13, KØVTD 13, WØBY 10, WØRJA 10, WØGVJ 9, WØBFV 8, WØAES 6, KØDGW 6, WØAGK 4, WØJES 4, WØJO 4, WØLOY 4, WØEEI 3, WØVEA 2, WØHOP 1, WØIBL 1.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, John J. McNassar, WIGVT —SEC: WIPRT, RM; WIZFM, PAM; WIYBH. Net reports for Aug.:

Net	Freq.	Days	Time	Sess.	QNI	QTC
CN	3640	Daily	1845	31	285	317
CPN	3850	M-S	1800	31	398	135

CN high QNI: K1TKS, W1KAM, W1RFJ, CPN high QNI: WIGVT 30, W1LH 23, K1QQG 21, K1EIC, W1YBH 19, K1DGG, W1DEAL, K1QJZ 18 and W1FVU, W1GBA, K1LFW 17. SEC WIPRT is working to improve the Connecticut section Emergency Corps and would like your help. ECs are needed for Bridgeport, New Haven and Waterbury! Good luck to K1EYY, K1TKS, K1WKK, K1NTR and W1ZZK, who have returned to college. W1OBR and W1KAM are new members of the A-1 Operator Club. WTIC is represented on 2 meters via K1DZL, W1VTU, K1CBI and K1HTV, all using some home-brew equipment. W1BDI is on 2-meter a.r.s.k. RTTY, W1BLP and W1ULZ are active with

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Base Station Antenna



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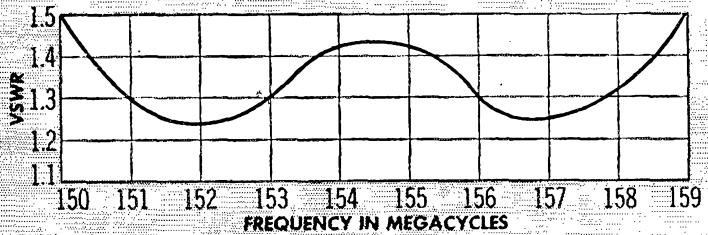
—to HIGHER performance!



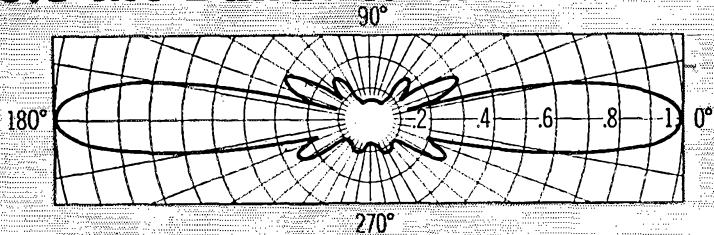
—SMOOTH OUT communication problems!



—to BETTER communication!



9.0 Mc Bandwidth!



This new CPC antenna has all the qualities of its predecessor, plus new features not now available in any antenna made for the land mobile services

CAT. No. 220-509 SUPER STATIONMASTER

is a second generation antenna growing out of 30,000 STATION-MASTERS and ten years of experience with this type array.

Because of its exceptional bandwidth, the SUPER STATION-MASTER is produced in three ranges which cover the VHF band, 150 to 159 Mc, 157 to 166 Mc, 165 to 174 Mc.

A 10 db—10 Mc wide version, CAT.No.455-509, is available to cover 450 to 470 Mc in two ranges.

Electrical Specifications

- Nominal input impedance . . . 50 ohms
- VSWR 1.5:1
- Bandwidth 9.0 MC
- Maximum power input . . . 500 Watts
- Flexible terminal extension . . 18" of RG 8A/U
- Terminations Type UHF female and Type N male
- Vertical beam width (½ power points) 18°
- Lightning protection . . Direct ground

Mechanical Specifications

- Radiating elements Copper
- Element housing material Fiberglass
- Element housing length 20'
- Support pipe 2¾" dia. 6061-T6 aluminum pipe
- Rated wind velocity 100 MPH
- Lateral thrust at rated wind . . . 79 lbs.
- Bending moment 1" below ground plane at rated wind . . . 521 ft. lbs.
- Weight 30 lbs.

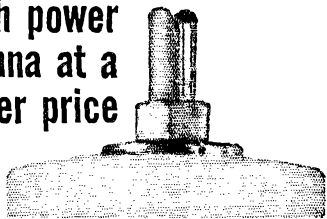
Communication Products Company
DIVISION OF
PHELPS DODGE ELECTRONIC PRODUCTS CORPORATION



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BIG-K

high power
antenna at a
low power price



Now ... BIG-K ... an improved Top-sider mobile antenna with one kilowatt p.e.p. coils.*

Compare these new low prices for a KW rated mobile antenna! Manufacturing costs have been lowered by quantity production, new techniques. Savings are passed along to the customer. BIG-K retains hinged column with fast release, positive lock-up—allows coil and top whip assembly to fold over. New ... lower in price ... better.

* (KW coils only—except for TW-160)



WMW-B
Fold-over mast and adjustable whip for KW coils. 93".
(Bumper mount)
13.50

WMW-D
Fold-over mast and adjustable whip for KW coils. 77".
(Deck mount.)
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TW-160
300 watt,
160 meter coil
5.80

KW-80, 1 KW
75 meter coil
13.50

KW-40, 1 KW
40 meter coil
8.95

KW-20, 1 KW
20 meter coil
6.95

KW-15, 1 KW
15 meter coil
6.25

KW-10, 1 KW
10 meter coil
4.45



RAYTHEON COMPANY

213 East Grand Avenue,
South San Francisco, California 94080

NEW ENGLAND QSO PARTY

December 4-5, 1966

sponsored by
The Connecticut Wireless Association

Times: 0000-0400 GMT December 4; 1300-1600 GMT December 4, 0000-0400 GMT December 5. The total time may be used.

Eligibility: All amateurs in the world are eligible and are invited to participate. Only single operator/single transmitter entries will be considered for awards. Portables and mobiles to "rare" counties are welcome and operation from more than one county by the same station is permissible. Stations within New England will work all other stations while stations outside New England will work only New England stations for contest credit.

Frequencies: 3520-3540; 3820-3840; 7020-7040; 7220-7240; 14060-14080; 14260-14280; 21060-21080; 21380-21400; 28020-28040; 28620-28640. Novices should try the bottom 10 kc. segment of each novice band.

Exchange: Call "CQ New England" on phone, "CQ NE" on c.w. The exchange will consist of the QSO number, RST, County (given by New England stations only) and state. New England stations may abbreviate the name of the county. An example of an exchange sent by W1EIA might be: "NR 1 589 HARTFORD (HTFD) CONN."

Scoring: One point per complete contact. Stations outside New England multiply QSO points times the number of different New England counties (67 maximum) and then again by the number of different New England states worked (6 maximum). For example, if K2UTV works 50 stations, 35 different counties and all 6 states, his score would be 50 x 35 x 6 = 10,500 points.

Stations in New England multiply QSO points times the number of different states and countries (according to ARRL DXCC rules) worked. Canada will count as one multiplier and KH6 and KL7 will count as states.

Awards: Certificates will be issued to the top score from each state/country, to the first and second place score in each New England county, to the top N.E. Novice and Technician score. CWA members are not eligible for awards.

Logs: Logs must show date and time (in GMT) of each contact, complete exchange information, call and address of the operator and final score calculations. If competing for special Novice or Technician awards, be sure to indicate this. Mark each new county or state as worked. Mail copy or carbon of log to: Connecticut Wireless Association, c/o Peter Chamalian, WIBGD, 111 Buena Vista Road, West Hartford, Connecticut, 06107. Logs must be post marked no later than January 11, 1967 to be eligible for awards.

GI traffic on the P.O. 2-Meter Net. K1AFC is using 6-meter RTTY. Director W1QV provides excellent communication with his N.E. Division membership letters. W1WHQ, president of the Conn. Council Clubs, invites active clubs to contact him for membership. The Eastern Conn. ARA outfitted a bus for mobile station operation. KILMS worked more than 100 countries using 100 watts or less and all with home-brew equipment! A fine DXpedition-of-the-month bulletin is available. Send a return stamped envelope to W2GHK. Traffic nets have lost many good operators who have returned to school or entered military service. Traffic operators and outlets are needed. Please check in! Many thanks for all the club and individual activity reports. Please keep them coming. Many appointments are available and monthly reports are required. All amateurs: Please support "HamQuest 67." Traffic: (Aug.) K1TKS 378, W1EFW 325, K1LMS 191, K1RQO 160, K1OQG 133, K1STM 131, K1PGQ 108, K1EIR 107, W1BGD 106, K1LFW 96, K1EY 83, K1EIC 64, W1KAM 56, W1GVT 47, W1BDI 43, W1FNFJ 34, W1BLP 33, W1QV 32, W1YBH 25, K1QPN 21, W1KUO 16, K1NTR 11, W1OBR 9, W1BNB 8, W1CUH 8, K1YGS 6, W1YB1 4. (July) K1RQO 111, K1PGQ 105, W1ZFM 30, W1APA 4.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—Please note that this section is made up of the following counties: Barnstable, Bristol, Dukes, Essex, Middlesex, Nantucket, Norfolk, Plymouth, Suffolk, W1CWV and W1QZO are Silent Keys. The EN2MN had 23 sessions, 147 QNIs, 158 traffic, W1FZP



BIG SOUND! SMALL INVESTMENT

MODEL 410 VFO—SWAN 350 TRANSCEIVER—117XC POWER SUPPLY—MARK I LINEAR

S Illustrated above is a complete Swan station for SSB, AM, AND CW. You can transmit and receive on all 5 bands with your 350 transceiver, and when used with the Mark I linear amplifier, you're at the legal power limit. Switch in the Model 410 outboard VFO and you're all set for separate transmit and receive operation. Yet this complete home station, with proven Swan performance, reliability, and craftsmanship is yours for substantially less than any other comparable equipment.

S **SWAN 350 TRANSCEIVER
5 BANDS—400 WATTS**

Setting new standards for the industry. Includes full coverage VFO . . . features crystal lattice filter with shape factor of 1.7 and ultimate rejection of better than 100db . . . providing excellent selectivity and superior audio quality. \$420

S **MODEL 410 FULL COVERAGE
EXTERNAL VFO**

Eight tuning ranges of 500 kc each. When used with the Model 22 dual VFO adaptor, the 410 provides separate transmit and receive frequency control. Model 22 Adaptor . . \$25 **MODEL 410 . . \$95**

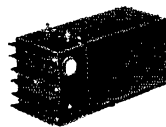
S **MODEL 117XC MATCHING
AC POWER SUPPLY**

Includes speaker and phone jack. \$95

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5 bands, 2000 watts PEP input. Uses two Eimac 3-400Z triodes. Built-in power supply. \$475
Tubes \$68 pr.

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MODEL 14-117 \$130



S **CRYSTAL CONTROLLED
MARS OSCILLATOR**
5 Channels, Model 405X,
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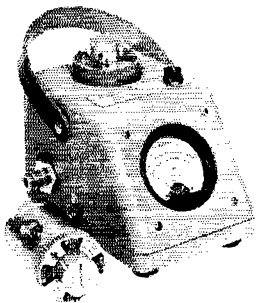


- PLUG IN VOX UNIT \$35.00
- CRYSTAL CALIBRATOR KIT \$19.50
- SIDEBAND SELECTOR KIT \$18.00

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Matches Loads to Lines with Unmatchable Ease

- * Monitor covers 2 to 1000 Mc
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Ability to work in four power ranges with each plug-in element gives Sierra's Model 164B In-Line Power Monitor unmatched versatility on a 50-ohm line. Power ratings reach from 1 to 5000 watts.

A single knob selects the measurement mode, incident or reflected. VSWR reads directly, without reference to charts. A simple screwdriver adjustment lets you calibrate each power range with factory precision while in the field. Sierra "Twist-Off" connectors (Types N, C, HN, UHF, and LC) fit the primary line for rapid changes.

Price in standard FMN configuration is \$95.00. Plug-in elements range from \$75.00 to \$125.00. For full information, mail coupon below to Sierra/Philco, 3885 Bohannon Drive, Menlo Park, California 94025.

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Please send complete information on Sierra Model 164B In-Line Power Monitor to:

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and K1FYT are moving to Foxboro. W1BNE moved to Texas. WA1GTB is ex-W1NXXN; his brother is WA2-ABO. K7ORT, ex-W1FVD, was back here on a trip. W1PEX, WA0GSA/1 and K1KBO made the BPL. The Mass. Bay Phone Net had 23 sessions, 153 QNIs, 48 traffic, reports WA1BYA. K1EYM is back on the air at a new QTH. WA1DJC is at St. Peter's Boys High School in Gloucester. The 8-Meter Crossband Net had 23 sessions, 289 QNIs, 11 traffic. W1NF has a Gonset 2 in the new car and built a complete 50-Mc. receiver in a lozenge box. W1PZ went to Field Day in Burlington, Vt. W1OFY is working on RTTY gear. K1DZG is going to VOI-Land. WA1FHJ built a 6-meter walkie-talkie. K1VYC is now a midshipman at Naval Academy and will be on at W3ADO. The Capeway RC met at K1DYU's. W1QFK was in Plymouth on vacation. W1AOG, our SEC, received reports from W1s LVK, STX, K1s PNB, DZG, WA1BZJ, WA1ETC is on 6-meter m.c.w. K1OKE has been NC for the 6-Meter Net and NMEC Chap. 4. W1HIL is working DX on 2 with low power and has 10 states. K0FQW now is in Africa. The QTC Traffic Net had 359 QNIs, 493 traffic, 30 hours, reports W6RVZ, chief op at K1KBO. W1AOG and W1DFS visited W1AW. The Massasoit ARA presented WA1CDQ with a Braille electric clock and electronic keyer. W1EAE, W1ALP and their XYLs attended our Novice Net Picnic in Townsend put on by K1PNB. K4GGI has W1MX on 2. K9AQP/1 is working out well on 6 during openings. W1FON who has been a ham for 46 years, says the MARS stations in Vietnam handled 6277 messages in June. Heard on 75: WA1CKJ, K1ZZY, W1IKI is on 10. WA1EUU is busy with club project, 432 moonbounce, also sending code practice for our Novice Net. K1PNB is c.d. director for Townsend. Appointments endorsed: W1PEX as OPS; W1s AKN, QMN, K1ICJ as ECs; W1AQV as OBS; K1VOK as ORS/OPS. W1EHX, an instructor at the Roxbury Y Radio School, will be on 6 and 2 from St. John's Rectory. New Novices: W1s GPJ, GPO, GPR, GPU, GPV, GPZ, GQA, GQC, GQD, GQH, GQX, GQZ, GQK, GQL, GRC, GRT, GRX, GSA, GSB, GSC, GSD, GSQ, GSR, GSV, GSW, WA1s GOV, GOW, GPC, EZE, GQO, CQQ, GQR, GQT, FMM, GXQ, GQY, GRH, GRI, GRJ, EYG, GRP, GRQ, GRE, ETN, FNM, FWP, GSF, GSG, GSH, GSI, PCV, GSJ, GSX, GTC, W1MFE, K1NOJ is now married and living in Braintree. W1DRS reports a N.E. Teen Net on 3880 kc. at 1930. K1s VKQ and ETT are on 75. The EMCWN, on 3660 kc., had 31 sessions, 181 QNIs, 118 traffic. WA1DEC/DED have a 50-ft. tower for 2 and 6. K1YUB is mobile on 6. W1BVP has a pair of 813s on 40 c.w. W1AAI is back in ZL-Land. K1AII is in Thailand. The T-9 Club met at W1MNX's. WA1CNO has a Public Service award for his part in the traffic net during the blackout. K1INO says there are about 12 Swan 350s in the New Bedford area. WA1CCM has a new QTH. K1BTF has a 4N2 on 6 with a five-element beam. K1FJM is going to Worcester Polytechnic Inst. Traffic: (Aug.) W1PEX 1108, WA0GSA/1 589, K1KBO 552, K1CLM 216, W1FMG 200, W1DOM 104, WA1EYV 150, W1FAE 78, WA1EYV 71, W1UR 56, WA1BYA 47, WA1DLT 43, K1VPJ 40, K1GKA 28, K1RCD 26, W1CTR 24, K1ETT 24, WA1ED 22, WA1EAT 16, W1AOG 14, K1BKG 12, K1ESG 11, W1SIV 11, K1YUB 10, K1EYM 9, WA1DEC 7, W1BVP 6, K1OKE 6, W1HIL 3, WA1DJC 2. (July) K1KBO 415, W1OJM 78.

MAINE—SCM, Herbert A. Davis, K1DYG—SEC; K1QIG. PAMs: K1WQI, K1ZVN, RM: K1TZH. Traffic nets: Sea Gull Net, Mon. through Sat. at 1700 to 1800 and 2000 to 2100 on 3940 kc.; Pine Tree Net, daily at 1900 and 3596 kc. c.w. Tribute to a Silent Key, K1OKB, who passed away recently. He was active on the bands and most of the nets and will be sadly missed by all who knew him along the way. K1OYB is in California working. K1RQE is running the station of K1OYB now. K1RSK is home from the Army and active. K1TYS is moving to Baileys Island. The PAWA moved to a new clubroom at 227 Spring St., and has the club station on the air. W1NND was portable at the Rockland Sea Food Festivals and handled a lot of traffic. WA1BXM also helped out there. An AREC meeting was held at Fort Knox with a good gathering. Also a meeting was held at K1WQI's, St. Albans, with a good gathering. W1GRG lost his home by fire. Traffic: W1GU 58, WA1DOW 41, K1WQI 33.

NEW HAMPSHIRE—SCM, Robert C. Mitchell, W1SWX/K1DSA—SEC; W1ALE/W1TNO. PAM: K1APQ. RM: W1DYE. The GSPN meets on 3842 kc. Mon. through Fri. at 2300Z and Sun. at 1330Z. The VTNH Net meets on 3685 kc. Mon. through Fri. at 2230Z. Endorsements: W1ALE, W1TA and K1AMZ as OBSs; W1BXM, W1DUB, W1CTW and W1IQD as OBSs; W1TFS and K1NBX as OBSs; K1BGI as ORS. K1IHK is now at Fort Gordon, Ga., and his call there is W4HBS. W7BGL is looking for N.H. on 160 meters. W1PFA and

ANTENNA BREAKTHROUGH

IN PERFORMANCE, VALUE, QUALITY, PRICE, AVAILABILITY

ALL-BAND VERTICALS

QUALITY MATERIAL

Brand new mill stock aluminum alloy tubing with Aluminite finish for protection against corrosion. Loading coils made by Barker & Williamson.

ALL-BAND OPERATION

Loading coil not required on 6, 10, 15 and 20 meters. For 40, 80, and 160 meters, loading coil taps are changed manually except if a wide-range pi-network output or an antenna tuner is used; in this case band changing can be done from the shack.

EASY ASSEMBLY

Less than two minutes is all you need to put your vertical together. No special tools or electronic equipment required. Full instructions given.

SIMPLE INSTALLATION

Goes almost anywhere. On the ground, on the roof, or outside your window.

AMAZING PERFORMANCE

Hundreds of reports of exceptional DX operation on both low and high power. You will work wonders with a Gotham vertical.

"All band vertical?" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, TI2FGS, W5KYJ, WIWOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MYV, K8HGY, K3UTL, W8OJC, WA2LVE, YS1MAM, WABATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, NE2I, KP4AOL, SM5BCK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!

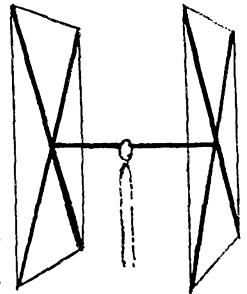
- V40 vertical for 40, 20, 15,
10, 6 meters.....\$14.95
- V80 vertical for 80, 75, 40,
20, 15, 10, 6 meters.....\$16.95
- V160 vertical for 160, 80, 75,
40, 20, 15, 10, 6 meters...\$18.95

HOW TO ORDER: SEND CHECK OR MONEY ORDER. WE SHIP IMMEDIATELY UPON RECEIPT OF ORDER BY RAILWAY EXPRESS, SHIPPING CHARGES COLLECT.

GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139

QUADS

NEW! NEW! NEW! CUBICAL QUAD ANTENNAS — these two element beams have a full wavelength driven element and a reflector; the gain is equal to that of a three element beam and the directivity appears to us to be exceptional!

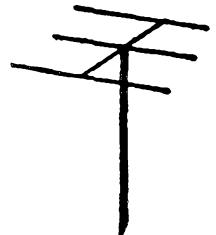


ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a fool-proof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you! Now check these startling prices — note that they are *much lower* than even the bamboo-type:

- TWENTY METER CUBICAL QUAD \$25.00
 - FIFTEEN METER CUBICAL QUAD . 24.00
 - 10-15-20 CUBICAL QUAD 35.00
 - 10-15 CUBICAL QUAD 30.00
 - 15-20 CUBICAL QUAD 32.00
- (all use single coax feedline)

BEAMS

Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new; full size (36' of tubing for each 20 meter element, for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; 3/8" and 1" aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.



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|---------|------------|-----------|-------------|
| 2 El 20 | \$16 | 4 El 15 | \$25* |
| 3 El 20 | 22* | 5 El 15 | 28* |
| 4 El 20 | 32* | 4 El 10 | 18 |
| 2 El 15 | 12 | 7 El 10 | 32* |
| 3 El 15 | 16 | 4 El 6 | 15 |
| | 8 El 6 | 28* | |
- *20' boom

You CAN ALSO WORK DX!

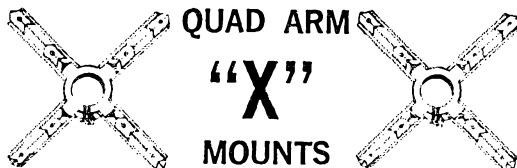
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FIBERGLASS QUAD ARMS

First time ever offered at this unbelievable price. More than 2 years in R. & D. These full length mandrel processed reinforced Fiberglass arms are practically indestructible in application. Cross arms are reinforced at base and wire intercept points. Give your Quad a professional look with high reliability.

13 ft. Long. These Quad Arms can be purchased separately at \$6.50 each.



These rigid die cast mounts are poured from a special aluminum alloy bullion with low deterioration and fatigue factor. 2 in. hub diameter. Special "V" angle will handle any diameter quad arm from 1 in. to 1 3/8 in. O.D. Comes complete with all necessary hardware.

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BOOM TO MAST "T" MOUNT

Die cast to true fit a 2 in. O.D. boom to a 1 1/2 in. O.D. steel mast such as popular T. V. mast. Complete with hardware.



Separately, \$4.95 each

COMPLETE KIT PRICE

CONTENTS

- 8 Fiberglass Arms
- 2 Quad Arm "X" Mounts
- 1 Boom to Mast "T" Mount

\$69.95

- 1 Instruction Manual

FOB Miami, Florida

Designs by W8FYR — W4WSM

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5101 N.W. 36 Avenue Miami, Florida 33142

SEVENTEENTH NEW HAMPSHIRE QSO PARTY

Dec. 10-11, 1966

The Nashua Mike and Key Club, W1TA, announce their sponsorship of the Seventeenth New Hampshire QSO Party, and cordially invite all interested radio amateurs to participate. Here are the details:

(1) Contest period: 0000 GMT to 0400 GMT and 1200 GMT to 1600 GMT Sunday, Dec. 11 and 0000 GMT to 0400 GMT Monday, Dec. 12. (EST time, 7-11 Sat. night, Sun. morning and Sun. night.)

(2) No power restrictions.

(3) Scoring: N. H. stations count 1 point for each N. H. contact, plus 2 points per outside contact; stations outside the state count 2 points per N. H. contact; both multiply by the number of counties worked (10 maximum).

(4) Engraved certificates will be issued to all participants reporting, with special endorsements for the highest-scoring stations, both in N. H. and outside, in the phone and c.w. categories. Single operator stations only are eligible for the special endorsements.

(5) The same station may be worked for additional credit on more than one band, phone or c.w. Bands will be 160 to 10 and suggested frequencies are 1815 3530 3842 7030 7220 14,100 14,250 21,100 21,350 28,100 and 28,800 kc.

(6) General call: "CQ NH" on c.w.; "CQ NH QSO Party on phone. N. H. stations are requested to sign *de W1-NH K*.

(7) Contact information required: Report and QTH (including county of N. H. stations) and number of QSO. Those operators participating in both the c.w. and phone categories must submit separate logs for each mode of operation. Each log shall be scored separately based on the number of contacts and counties worked in each mode. Logs and scores must be postmarked not later than Jan. 25, 1967, and should be mailed to the Nashua Mike and Key Club, P.O. Box 94, Nashua, New Hampshire.

(8) The WNH (Worked New Hampshire) certificates will be awarded to stations working all ten counties during this QSO Party, participating logs confirming. Detailed requirements for the WNH certificate, a standing award, may be obtained by writing the Concord Brasspounders, Box 339, Concord, N. H.

(9) The Granite State Award may likewise be obtained, details from the Nashua Mike and Key Club, Box 94, Nashua, N. H.

KINBN are chasing rare DX. W1ALE won the June V.H.F. Contest as a single operator and W1BPM won for multi-operator. W1DYE is going back to U.N.H. for graduate work. K1APQ reports 750 check-ins and 88 traffic for GSPN. K1UZZ reports 61 check-ins and 23 traffic for VTNNH. W1BXM has changed jobs. W1RCC is going on v.h.f. and u.h.f. K1VLX is having trouble burning out his antenna traps. I have just heard that W1CBB passed away a year ago. George was one of the more active appointees in N.H. W1CTW/W1IQD is installing new antennas at his farm in Goshen. W1AWZ/W1BX recently made headlines with the design of an antenna to track weather satellites. Don't forget the N.H. QSO Party Dec. 9 and 10 sponsored by the Nashua Mike and Key Club. Traffic: K1BGS 98, W1ALE 34, K1BGI 33, W1DYE 32, K1PQV 13, K1YSD 13, W1MHX 9, W1SWX 4.

RHODE ISLAND—SCM, John E. Johnson, K1AAV —**SEC**: W1YNE, PAM: W1TXL, RM: W1BTV, V.H.F. PAM: K1TPK, Endorsements: W1TXL or PAM, OPS and OBS: K1TPK as V.H.F. PAM and EC, R1SPN reports 31 sessions, 482 QNI, 77 traffic. The W1AQ Club of Rumford reports that W1BFB has been elected to membership. The club held its Annual Picnic Aug. 21 and it was so successful that another picnic was held for the members and families on Sept. 25. W1AICVZ will be attending Rensselaer Polytech. this fall. W1AIEEJ has been appointed Net Mgr. for the New England Teenage Net, which meets Tue., Wed. and Thurs. at 1900 local time on 3880 kc. Now that summer is over and we will start our fall activities it will be a good time to visit a radio club in your area. If you do not know where the clubs are located, contact the SCM, who will be glad to give the name and location to you. League appointments are available simply by applying

MOBILE SERVICE is the most demanding form of voice communications you use. Power and size limitations are extreme, putting an unusual premium on efficiency. The environment is tough, putting an accent on reliability. In the final analysis you will benefit fully from your mobile equipment only by paying strict attention to every detail of installation and operation.

Mobile service performance starts with the microphone—the first active element in the system—and there's no better way to start than with the new E-V Model 600E dynamic microphone. It is a little more costly than many microphones you can buy that "just work", and rightly so. For the E-V 600E is a lifetime investment in top-notch performance.

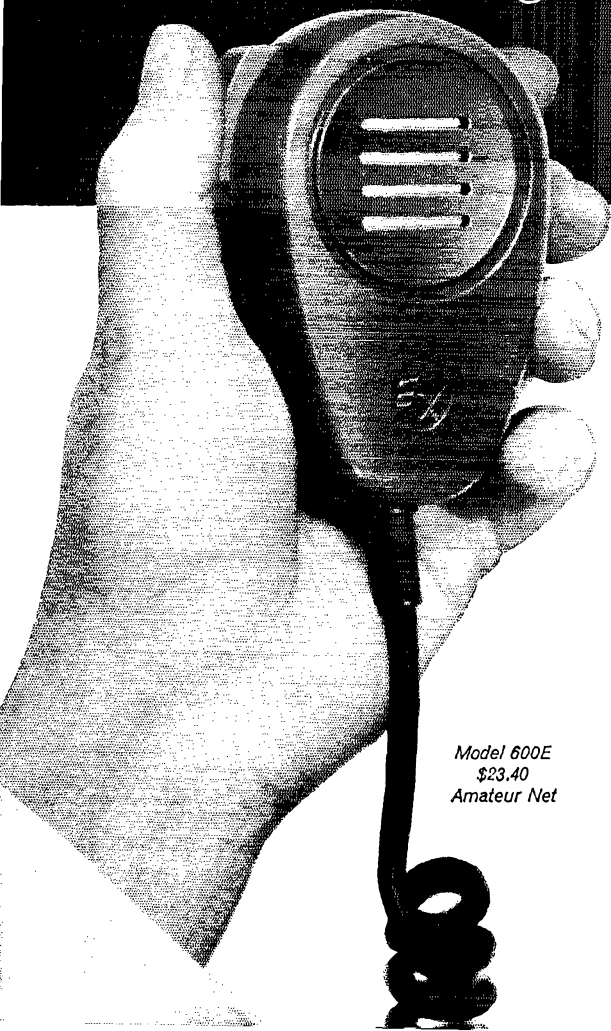
Look closely. The dynamic element of the 600E is the direct descendant of a long line of military microphones built to perform faithfully under battle conditions. This element was chosen for high intelligibility and its ability to withstand any environmental conditions. The proved ruggedness of the E-V Acoustalloy[®] diaphragm easily with-

stands ear-shattering sound pressures with no change in characteristics. But there is more to the 600E than ruggedness. Its sound quality has no equal. Here's why.

The frequency response of the 600E is ideally suited to SSB and critical AM transmission. You get highest intelligibility with any ALC circuit or frequency-shaping network in common use. That's been proved with on-the-air tests with every commercial SSB mobile transmitter and transceiver on the market today. Further, the high output level of the 600E will fully modulate even the "Scotch" input circuits sometimes found in mobile rigs. The 600E is available in 150-ohm or Hi-Z models.

Now pick up the 600E. It is shaped for comfort, with an easy-acting switch that gives you positive control, even when you are wearing heavy gloves. The case is molded of Cyclocac[®], a space-age plastic that absorbs a fantastic amount of abuse. The 600E never feels hot or cold to the touch, regardless of the climate. The shielded coiled cord has passed flexing tests that far ex-

There Is Nothing Tougher Than Mobile Service... Except Our New Model 600E!



Model 600E
\$23.40
Amateur Net

ceed normal life, while the switch has test-cycled on and off over a half-million times without a sign of failure. Even so, both cord and switch are designed for easy field service, if necessary.

The E-V 600E is built to outlast every other piece of mobile equipment you may use, while outperforming every other microphone on the market. It will probably be transferred from rig to rig as the one most useful communications tool you own. Actually, the 600E, like all E-V microphones, is guaranteed forever against defects in workmanship or materials. It must perform as stated, or your money back.

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W-51

FREE STANDING TOWER.

SUPPORTS 9 SQ. FT. OF ANTENNA.

Shown with internal Ham M rotator and 2" mast.

INCLUDES

- FREE: RIGID BASE MOUNT
- PRE-DRILLED TOP PLATE — For TB-2 thrust bearing.
- HIGH STRENGTH STEEL TUBING LEGS. Solid rod, "W" bracing.
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to the SCM. Traffic: W1TXL 435, W1BTY 60, W1WKQ 56, K1TPK 34, K1VVC 29, WAIEEJ 22, K1YEV 21.

VERMONT—SCM, E. Reginald Murray, K1MPN—SEC: W1VSA, RM: K1U2G. International Field Day was well attended this year. WAIDHK got the Swan 350. We all look forward to next year's event. Welcome to new hams WN1GRF (Swanton) and WN1GRW (Windsor). Congrats to new General WA1GRR in S. Burlington. It is with regret that we learn that VE2TA is a Silent Key, we'll miss him. Our former RM, W1-WFZ, is now W3D1H in the Pa. Net and traffic reports have been delayed this month, probably because of summer activities and vacations. We would appreciate your reports no later than the 5th of the month so we can meet our deadline. The 2-meter f.m. repeater on Mt. Mansfield has been in operation with excellent results. K1EQI, in Rutland, is active on 6 meters. Note the changed net time for the VTSB Net, 0 p.m. local time. Traffic: K1BQB 321, K1MPN 7, K1EQI 3.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BVR—SEC: K1IJU, C.W. RM: K1IJV. Our section is badly in need of local Emergency Coordinators and members of the Amateur Radio Emergency Corps (AREC). If you can possibly be active in this field, please drop a line to our Section Emergency Coordinator, K1IJU, C. Norman Peacor, 139 Cooley Street, Springfield. Every one of us should do something to justify our existence as amateurs! Robby, ex-W1ICW, is now WA3EQI with the Voice of America Engineering Operations in Washington, D.C. W1DWA received Berkshire County first place in the '65 Mass. QSO Party. W1ZPB says "School starts, Radio stops." C.W. Route Manager K1IJV reports the following for the West. Mass. C.W. Traffic Net (3580 kc. nightly at 7 p.m.): Total traffic 66 with the following in attendance (in order of activity): W1DWW, K1IJV, K1WZY, W1ZPB, K1SSH, W1BVR, WA1FNX, K1FJS, W1MNG, W1DWA, W1AJX. The Valley Amateur Radio Club of Springfield now meets the 2nd Fri. of each month at the Golden Agers Club building at the corner of Court Street and Broadway. The Hampden County Radio Assn. 10-Meter Net has changed frequency to 29.0 kc. Once again, let me stress our need for activity in our Emergency Corps (and I mean "activity"). Traffic: W1DWA 63, K1IJV 53, W1BVR 45, W1ZPB 25, W1DWW 2.

NORTHWESTERN DIVISION

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—Asst. SCM/SEC: Harry Roylance, W7RZY, V.H.F. PAM: K7IOA.

Montana S.S.B. Net	3910 kc.	1800 MST	M-F
Montana PON	3885 kc.	0815 MST	Sun.
Montana RACES	3996.15 kc.	0900 MST	Sun. 1 3rd
Missoula Area Emergency	3800 kc.	0900	Sun.

Endorsements: W7FIS and W7LBK as OOs. W7VNE won a prize in the homebrew contest at W1MU. Next year's hamfest at W1MU will be sponsored by the Wyoming group. W7CJN has a new preamplifier on 2 meters. K7OEG has a new 2-meter rig on the air also. The ARRL's HamQuest program has started in Montana. This is a drive to get new League members in the ARRL. If you are a League member try to get your ham buddy to join the League. Let's try to get Montana closer to the 100% in membership. If you are interested in starting an ARPSC Net in the state, please drop a line to your SEC, Box 621, Harlowton, Mon. Please send your SCM a letter with news of your club or station activities. Traffic: K7LDZ 175, K7DCH 14.

OREGON—SCM, Everett H. France, W7AJN—SEC: W7AJN, RM: W7ZFH. Station activity reports have been slow and decreasing, but will try to make a report on what we have on hand. K7ZRL, EC of Yamhill County, reports that the RACES group of that county attended a training course of night classes for two months in Radiology Fallout. At the end of the course each student was given a certificate indicating his ability to act in case of real emergency. EC W7DEM reports on the Grants Pass area. W7AHP has added a linear to his SB-34. W7CGW is on 2 with a 2er. W7-CKL and K7YEV have joined the 2-meter group. K7-DVK reports the V.H.F. Picnic at Fisherman's Bend Park was a success, and he got a lot of laughs with his stacked "Big Wheels" mobile. W7ZB, who has been on vacation and traveling on the road, sent in a batch of traffic reports. He now is using a TR3 in the car. A new traffic net has been organized, the Beaver State Net, 3825 kc., 12 noon and 6:30 p.m. daily. K7IFG, net manager, reports for Aug. sessions 57, total attendance 800, traffic 100, contacts 130. W7AZD, net manager for the AREC Net, reports sessions 30, 15 counties, total attendance 436, traffic 2, contacts 52. Traffic: (Aug.)

SS-1R



The New 701 Series SS-1R is Greater than Ever

The SS-1R, with its unique approach to receiver front-end design, has been called a major advance in HF receiver art. Continuing engineering improvements now incorporated in the 701 series make the SS-1R greater than ever. For example:

Sensitivity has been improved by 3 to 6 db. Typical production units measure $0.25 \mu\text{v}$ for 10 db S+N/N.

Sideband Stability is even better; USB and LSB BFO frequencies are now *crystal-controlled* while retaining variable BFO for CW.

Sideband Quality is clean and distortion-free over a tremendous range of signal strengths (from a microvolt to as much as a volt!). An improved product detector (employing a 6BY6) combined with an *i.f.* cathode-follower (now a 6AV6) to drive the a.g.c. circuits has increased the already large dynamic range of the SS-1R.

Reliability and Performance Stability have been improved through 1) redesign of a simpler, rugged dial-drum and display mechanism, 2) use of precision glass and ceramic piston trimmers in all critical circuits, and 3) an effective quality - assurance program throughout production and test.

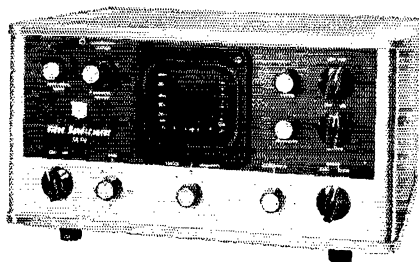
Plus: Crystals for full 10 meter coverage provided.

Improved super-durable sand-blasted finish for the rugged extruded cabinet.

Superior SS-1R Speaker quality.

SPECIAL FEATURES: Freedom from Cross Modulation and Overload • Extreme frequency precision with digital readout in kilocycles. Slow (10 KC per turn) manual tuning rate provides precise tuning of sideband signals • Motor Drive of tuning mechanism for fast traverse of band • 5.0, 2.5 and .35 KC Selectivity with 2:1 60/6 db skirt characteristic • Crystal Lattice Filters • Special Hi Q IF Circuits • Autocalibration of amateur bands to WWV • Choice of AM, USB, LSB or CW modes • Provision for use with the unique SS-1S Noise Silencer and with dramatic new SS-1V Video Bandscanner.

SS-1V, Video Bandscanner. This unique oscilloscope display unit, when used with the SS-1R shows all signals in the band in use, or any portion of the band can be expanded to full screen for detailed examination. Both linear and logarithmic displays are provided. A marker pip constantly shows the exact frequency to which the receiver is tuned. The sharp resolution of this unit permits observation and measurement of two AM sidebands displaced only 2.5 kc. from the carrier. Provision is made for transmitter monitoring or analysis.



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Use at 6 Amps for at least a safety factor of at least 200%. 50 PIV @ **40¢**; 100 PIV @ **60¢**; 150 PIV @ **70¢**; 200 PIV



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Secondary: 750 VCT @ 160 Ma. 5 V. @ 3 A. and 6.3 VCT @ 5 A. (\$16.00 list) Sale **\$4.40.**

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W7ZB 104, W7ZF 63, W7DEAL 13. (July) K7IWD 238, K7IFG 159, W7ZF 120, W7ZB 73, W47CIP 30, W7DEM 10. (June) K7IFG 619, W7ZB 70.

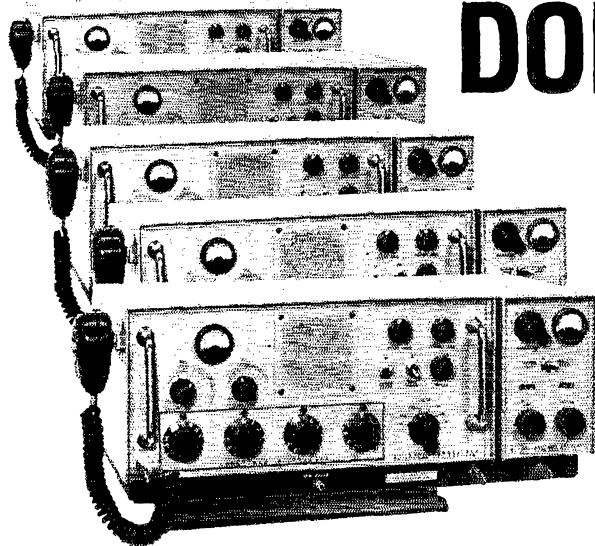
WASHINGTON—SCM, Everett B. Young, W7HMQ —SEC: W7UWT, RM: W7OEB, PAM: W7LEC, V.H.F. PAM: W7PGY. Section nets NTS:

WSN	2535	Daily	QNI 472	QTC 476	Seas. 31
NTN	3970	Daily	QNI 872	QTC 450	Seas. 31
WARTS	3970	Ex-800.	QNI 1054	QTC 336	Seas. 27
NSN	3700	0130Z	QNI 411	QTC 131	Seas. 29

W7BA, our top trafficker, is a golf nut. K7UMM and K7GKU now are Kentonites. TCC is in need of assistance. Please contact W7DZX W7PI asks for help for WSN from Spokane, Walla Walla, Vancouver and other cool spots. Most WSN operators are happy with the increased activities, but would ask that common courtesy be the guide to a better net. No carriers on frequency during the net, no activity on 3535 for a 5-minute period prior to net time, no silly or unrelated activity during the business session are the quality marks of all top-rated traffic nets. All WSN NCSs welcome all to drop in and get acquainted. New ARRL numbered radiograms now are available. W7ZIW now operates on WSN, NSN and NTN with 350 and 144VZ. W7ZDI is active on NTN, WARTS, WSN, NSN, CBN, ESN, BCEN and NWSBS. K7JHA says the Tech. Net is again going great and that RN7 now is filling out spaces for NCS and QNB stations. W7OEB reports a new station in the Richland area is K7MAS. New Novices in the Tri-City area are WN7ZFR, WN7ZFS, WN7GCV and WN7GCV, all grads of the Richland ARC code and theory school. W7MCW's home-brew phasing type s.s.h. is on the air with good reports and runs 50 watts. W7RXH is working the kinks out of the coaxial antenna. W7GYF, nabbed 9U1MT and 9M2LN. WA7CCD now is home in Ephrata. K7CHH, Tri-Cities area, is busy with bulletins and antennas. K7ZVA is busy with traffic from the Tacoma area. Participating radio amateurs in the mass climb of Mt. Adams included W7GZN, W7PQE, WA7BMW, W7PHG, K7RRR, W7KFM, K7SOZ, W7BAV and W7LCU. W7KZ, Olympia traffic outlet is busy remodeling the shack. Appointment renewals include W7OEB as RM and OO. New officers of the Mt. Baker ARC are WA7BZP, pres.; WA7BZO, vice-pres.; W7VET, secy.; WA7BAY, treas. K7ZVA got a full page in the Tacoma's *Loggers Bark*. Bob is ex-K5YGW, DL5CR, WA2WKT and HL9TH. Among amateurs taking part in traffic bank home for members of the Associated Public Service Communications Officers (APCO) Convention in Seattle were W7HMJ, W7CMX, WA7AKI, W7EVT, K7EXX, W7MYD, W7SBM, W7BQG, WA7-HDB, W7CJL, W7EOP, W7LCS, W7WHV and W7HMQ. We regret to report that W7HRU and W7REZ are Silent Keys. Traffic: (Aug.) W7BA 2006, K7CTCY 1266, W7DZX 1185, W7HMA 713, K7CTP 282, W7PI 209, W7BTB 199, W7ZIW 195, W7JEY 151, W7APS 121, W7DXI 76, K7JHA 75, W7HMQ 58, W7OEB 53, W7ACXD 34, W7MCW 32, K7VNB 22, W7AMC 15, W7AIB 13, W7GYF 13, W7RXH 13, W7XTX 10, K7ZVA 10, W7EYV 9. (July) K7JHA 129, K7YDZ 65, W7RXH 19, K7MGA 18.

PACIFIC DIVISION

EAST BAY—SCM, Richard Wilson, K6LRN—Appointees as of Sept. 1: V.H.F. PAM: WA6RRH, OESs: WA6RRH, WA6BYC, W6YKS, WB6SAL, OPSs: WA6-QZA, WA6PTU, ORSS: WA6FBS, W6IDY, WB6FHH, W6TYM, W6YKS, OOs: W6OJW, W6TYM, W6CRF, W6EY, K6LRN, WA6KLL, ORSS: WB6IBU, W6IDU, W6LGW, W6UB/W6NLEL, WA6RRH, WB6NUJ, EC: W6TYM. Station appointees are expected to report each month. The monthly report is the criterion of activity. Regular reports to the SCM are necessary as prerequisite to annual endorsement and renewal of your appointment. Appointment may be cancelled by the SCM when three consecutive reports are missed and evidence of regular work and reports must be submitted before reinstatement. It is with deep regret I report the death of Tim Chiland, WA6WNG/WB6CRC, in an auto accident near Dixon Aug. 30. Tim was active on NCM, RN6, PAN, TCC and held ORS and OPS appointments and was RM for this section. His loss is felt by all. WA6-FBS has his HW-12 mobile again and looks for QSOs around 3560. WB6FHH worked all continents with 40 watts and has a TU going with hopes for a Model 15 or 19 machine in the near future. W6OA reports that after 30 years of "exposure" his XYL finally "gave in" and is now WN6TZG. The MDARC held its annual picnic in Tilden Park near Berkeley. WN6TZR is a new call in the MDARC. The MDARC is having a membership drive. The club meets the 3rd Fri. of each month at 8 p.m. in the Red Cross Bldg. on Venacio Valley Rd. in Walnut Creek. Contact W6FAR or WA6PUF for more information on this fine club. If anyone is interested in



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from a nine foot whip to a 150 foot long wire. A remotely operated model of the coupler is available for fixed station operation. The RF-301 is designed for operation in any environment from the Tropics to the Arctic region and for communication ranges from close in to several thousand miles.

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- Frequency Range:** 2 to 15 Mc.
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- Weight:** 59 pounds.

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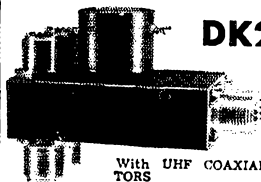
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With UHF COAXIAL CONN-CTORS



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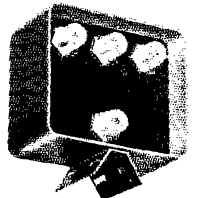
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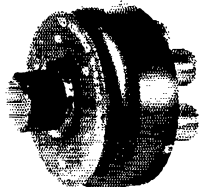
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the SEC job or any other appointment or know of anyone who is interested, drop me a line, 107 Cordova Way, Concord, CA 94520, or call 415-685-5225. The NCN meets nightly at 0300Z on 3.635 kc. WB6LFFJ, Suisun, is on 2 meters with a twoer and operated portable from Camp Kirkwood in the high Sierras but couldn't handle any traffic because of power failure. Traffic: (Aug.) W8TYM 820, WB6CRC 544, WB6FHJ 155, K6LRN 60, WA6FBS 24. (July) WB6FHH 185.

HAWAII—SCM, Lee K. Wical, KH6BZF—Asst. SCM/SEC: Ernie J. Kurlansky, KH6CCL. PAM: W6PAN/KH6. RM: To be announced. V.I.L.F. PAM: KH6EEM. Join a net today.

Net	Freq.	Time	Days
Friendly	7.290	2030Z	M-F
No Ka Oi	7.290	2330Z	Sat.
50th State	3.895	0500Z	Tue.-Sat.

KH6GG "Doc" Fred Lam Jr. coordinates the following:

RACES 40	7.225	1930Z	2 & 4 Sun.
RACES 10	28.700	1930Z	2 & 4 Sun.
RACES 6	50.252	1930Z	2 & 4 Sun.
RACES 2	147.000	1930Z	2 & 4 Sun.

KH6CXB assumed the presidency of the Honolulu ARC with the resignation of KH6FOW. KH6EEM is on 6-meter s.s.b. with a kilowatt to a six-element 24-ft. beam. W7GBL writes from P.O. Box 608, Kalispell, Mont. that he's looking for KH6 stations on 160 meters. WH6FST, from Paauie, was able to get over to a Honolulu ARC meeting. The same meeting was attended by W5YZL. Bill Christmas, at KH6EOQ, is the new QSL Mgr. for KJ6DB. W6PAN/KH6 reports his TA-33 Jr. is now up 60 feet. He needs a Rhode Island QSO for his WAS from KH6-Land and is DXCC 89/118. KH6DEM has left the islands and is now W8DGF at 379 Divet Drive, Willowick, Ohio. KH6COY will be back on the air with RATTY soon, he reports. KH6DXB has moved his QTH to Waipahu. WB6KJ and family made the rounds of their Hawaiian vacation at KH6BFF, KH6FC, KH6CPW, KH6BZF and KH6EIL. Bill Cameron is now associated with the Hawaiian Hills receiving station atop Pacific Hts. KH6JQ may be off to the Far East soon. W2LTE/KS6, with the Samoan Government Dept. of Education's ETV transmitter site, writes from Box 692, Pago Pago, Samoa, that he's establishing administrative information and guideposts for a civil defense organization in American Samoa. KH6AX recently overheard a QSO which resulted in an amazing 55-minute contact. Capt. Ed Burke Mucho, Capt. Gay Gimblin, KH6GBK, and S/Sgt. Skaggs, thanks to KH6AX, were able to talk with their XYs in Honolulu while flying their C-124 cargo ship, 9000 feet above the South China Sea near Viet Nam. Traffic: (Aug.) KH6AIG 170, KH6EOQ 34, KH6BZF 10, W6PAN/KH6 1. (July) KH6EOQ 28.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: W47BEU. I would like to thank all of you who have supported me and the ARRL during the past two years and hope we can continue to promote Nevada amateur radio activities for the benefit of all. W47CFS is doing a fine job with the Nevada Emergency Net on 3825 kc. at 1900 local time Mon. and Thurs. but still needs more Nevada check-ins. K7ICW has some new test gear and reports hearing nine different states during August on 2 meters. K7RKH has a new HB 432-Mc. rig. K7ZOK has a new Swan 250 on 6 meters. W47EPT has a new linear in the making. W7YDX is being heard regularly on 75 meters. W7JU gave up sailing for cycling. Here's to a speedy recovery. Ray, K7HRV is doing an FB job as NCS for the San Joaquin Valley Net. W7BIF has a new vertical antenna. W7RY is busy building 2-meter antennas from titanium tubing. W47EMP is to be congratulated on an FB job of communications while stationed at Nellis AFB. Traffic: K7OHX 27, K7HRV 12, W7PBV 4, W7YDX 3.

SACRAMENTO VALLEY—SCM, John F. Minke, III, WA6JDT.—SEC: WB6BWB. ECs: WB6AIXD, K6RHW, W6SMU, WA6TQJ. RM: W6LNZ. PAM: WA6YYK. ORSs: WB6HAW, W6LNZ, W6OFK. OPSs: WB6EAG, K6LKV, WB6N1AE, WA6TQJ. OBSs: W6AF, WB6PHQ, WA6SLU, WA6TQJ, WA6YYK. CO: W6ZJW. OESs: WA6CXB, WA6FWU, W6GDO, WB20VB6.

Net	Freq.	Time	Days	Mgr.
Yolo Co. CD	146.94 Mc.	0300Z	Wed.	WA6TQJ
SCEN	146.28 Mc.	0500Z	Wed.	WA6BWB
SVN	146.28 Mc.	0430Z	T-Su	WA6YYK
Nevada Co.	52.525 Mc.	1900Z	SSu	K6ASU
Tri-Co. Emer.	3815 kc.	1800Z	?	?
NCN	3835 kc.	0300Z	Daily	WB6HVA

The above nets are for winter schedules. Any additions or corrections would be appreciated. OES W6GDO has

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 of the

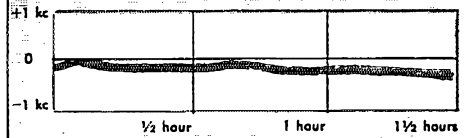
GALAXY V
 with that of its
 strongest Competitor!

Every Galaxy V that comes off our line goes through this exacting test! It amounts to a 90 minute "electrocardiogram" on VFO stability, the "heart" of any transceiver.

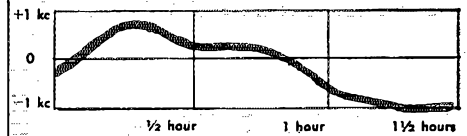
Every Galaxy's VFO stability must meet our exacting low-drift requirements! *The personal drift-chart of every Galaxy that comes off the line goes with the unit to its new owner.*

It's just one of many Galaxy requirements to insure the set's owner of the standard of performance we feel he is entitled to get! Others include *vibration testing* (a real torture test); *full power* (300 watt) *key down testing* over several hours; actual *on-the-air* contacts to assure superior audio quality; and a *final test of scope and sweep alignment of the filter.*

And speaking of filters—The super-selective filter in the Galaxy is no "Johnny-come-lately"! For over 2 years it has been the *most selective filter* in any Ham transceiver, and it still is! It is just 2.1 kc wide (-6 db points) and this, coupled with the shape factor of 1.8:1 means it is just 3.78 kc wide (at the -60 db points) *where the strong signals are!* THAT MEANS YOU HEAR LESS INTERFERENCE! Don't be MISLED! ...Shape Factor alone does not tell the story. A barn with a nice shape factor of 1:1 is still broad as a barn where the INTERFERENCE is!



This is the "heartbeat" of a Galaxy V picked at random from our assembly line! Note the minimum of drift in a 1 1/2 hr. test!



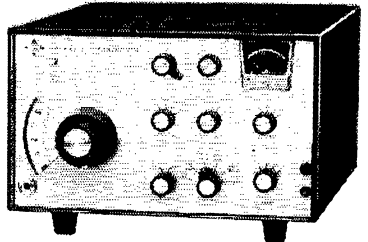
This is the "heartbeat" of a well-known competitive transceiver. (Also picked at random.) Note the excessive drift that occurred during the same 90 minute test period!

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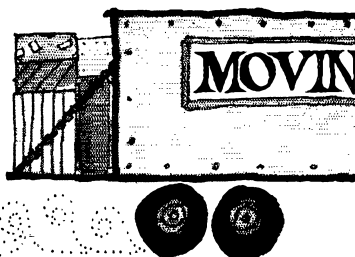
increased his 2-meter DX to 1325 miles with W0NXF in Nebraska. W6GDO is looking for S.V. section members capable of working 1296 Mc. WA6CXB has been busy converting an RT159B/URC-4 for 2 meters. WN6-TOA is now Sat. evening NCS for the Sacramento Valley Net. The SVN had 134 QNI and 17 QTC during Aug. WN6TOZ's OM is back on the air as WB6QMT. The RAMS, under the direction of President W6TEE, furnished communications for the Annual Colusa Boat Races on 75 and 2 meters. WB6MXD, in Del Norte Co., is going on 6 meters. WA6JDT finally got back on the air. Traffic: (Aug.) W6LNZ 191, WB6QZL 38, WN6TOZ 38, WB6MAE 36, W6OPK 19, WN6TOA 19, WB6BWB 13, WB6OYI 9, WB6EAG 6, WB6MXD 4, (July) WB6OYI 18, (June) WB6OYI 2.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD—SEC W6KZF reports an increase in the number of Form 7s received from the ECs but wants more. W6DZQ is busy building an s.s.b. exciter after completing a homebrew receiver. WA6MGG is pushing RTTY hard in Humboldt County with WB6DGU, WA6MKC and WA6-JYB also on the air with RTTY gear or will be on shortly. WB6NKS has been transferred from his recruiting duties in Eureka to Amarillo, Tex., by the Air Force. WA7BGZ/6 moved from the Pt. Arena Ioran station and will be attending school in New York. WA6IVM scored 5448 points in the All Asia Contest early in August. WB6OGF has put up a three-element 20-meter beam and is working a lot of Pacific DX. W6CYO has been keeping schedules with DU-Land while upping his DX total. A new ORS transferring in from Santa Clara Valley is W6JXK. K6TZN swapped gear via the Section Courier. A new QO in the Eureka area is WA6MGG. W6UDL and WA6IVM are conducting a class for the handicapped in San Francisco. W6KVO and W6WLV continue to be the big traffic men in the section. WA6-JUV scored well in the June V.H.F. Party, missing first place by only 890 points. The Marin Club held an auction in Oct. with W6KUP handling the selling as usual. The Sonoma County amateurs helped with communications at the Caledonian Games and provided coverage for the 30-kilometer race. Those participating were WB6JFM, WB6LHZ, WB6OC1, W6ARQ, WB6OBY, WB6KDF, WB6GKT, W6DVT, WB6OCY and W9CKV/6. The Marin Club again provided communications for the Dip-sea Race from Mill Valley to the Ocean. Those participating were W6IFO, K6BAQ, W6FYK, K6RRK, WB6DMP, K6OJO and W6HST. W6HSA gets out a bigger edition each month of the San Francisco Radio Club News. New General Class licenses in Marin are WB6NUO and WB6UDS; and WN6TKE is a new Novice in San Rafael. The San Francisco Radio Club is revising some of the rules for the S.F. Award. W6VYC was hospitalized with a heart condition at the Kaiser Hospital in San Francisco. Traffic: W6KVQ 486, W6-WLV 339, WB6WV 36, W6JXK 36, W6UDL 32, WA6IVM 17, WA6AUD 16, K6TJW 8, W6BIP 7, W6CYO 6, K6TZN 6, WB6DMP 5, WB6GVI 4, WA6MGG 3, WB6OGF 3, WB6KHI 2.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—Present appointees are WA6TZN, WA6HWA, W6ARE as ECs; WA6TZN, K6ROU, WA6VPN, WA6-DAU, WB6HVA, W6ADB, WA6SCE, WB6NCJ, WB6-MZU as ORSs; WB6JGJ as OBS. WA6BTE is working at WHEN-TV in N.Y. K6AXV has moved into a house trailer. WB6TNC is building up some c.w. equipment, a vanishing breed. K6EUY is back on 6 with a LaFayette rig and halo. WA6FUF is on 2 again with a pair of yagis. The Delta Radio Club was at WA6ZLP's cabin during the Sept. V.H.F. QSO Party. WN6NUM has passed the Technician Class license, and is waiting for his new call. He plans to operate on 2 meters. W6ADB made the BPL again, two months in a row. WA6VML has a new Swan 350. WB6KDQ has a new Drake R4A receiver. WA6NAM is the Radio Officer of San Andreas County. W6PNY is on 75 in Angel Camp. K6DNY is chasing DX using a TA33 beam. Anyone wishing to use WB6OPG, a 2-meter f.m. repeater, may do so, by sending a copy of your log every month to W6ARE. 145.62 is input, 146.7 is out. WB6PCQ won a Bandsparner antenna at the Flagstaff Arizona Hamfest. The new officers of the Tulare County Amateur Radio Club are W6UHN, pres.; K6VWV, vice-pres.; WB6NQO, secy.; WA6ZSB, activities. Traffic: W6ADB 623, WB6HVA 319, WB6PCQ 226, WA6SCE 200.

SANTA CLARA VALLEY—SCM, Jean A. Gmelin, W6ZRJ—Asst. SCM, Ed Turner, W6NVO, RM: W6-QMIO, WB6NXX is working NCN. PCN and trying for a little DX. W6AIT works NCN. W6YBV made the BPL for the first time. Lee is very active in NTS. WB6IZF operated portable while on a backpacking trip using about 5 watts. W6SAW is very busy with Navy MARS but finds time for QO and Intruder Watch operations. W6DEF made the BPL handling traffic for the Sun

... de ex-K2RMN



Losing a station call is very much like losing one's identity. And having to relinquish a "column" such as this one, is like turning in one's key or mike.

And so it is with me. I am moving from the Sylvania Electronic Components Group at Seneca Falls, N. Y., to the Sylvania Electronic Systems Division at Waltham, Mass. Fate has it, then, that I will be issued a K1 call, and the writing of this informal column will be taken over by other Hams in the Tube Division.

Under ordinary circumstances, I would have stolen off into the night without so much as a word about my leaving. But this column has been a labor of love, and the response to it, a most pleasant surprise.

When I started writing about this and that over three years ago, it never occurred to me that I would receive "fan mail." But that I have. So I simply can't go without expressing my thanks to the many Hams who took time out to write about what I had to say and how I said it. Apparently I was 599 without knowing it.

The best answer I have to this is my unbridled enthusiasm for Amateur Radio and some of the ingenious product advancements made here at Sylvania. To me, the two always went together and lent excitement to talking about them.

But it all adds up to one thing -- Amateur Radio is full of surprises. For instance, do you know of any other hobby, business, or profession with so many strange and unusual coincidences? It's downright mystical at times. Or do you know of any endeavor that can equal hamming for its different kinds of excitement, hour after hour? An old-timer who runs 30 watts on 40 CW told me recently that he sent a strictly local CQ one afternoon and the only answer he got was from a station in South Africa. And ten minutes later he was QSO with two old pals he'd lost sight of for years -- both in the same car, operating mobile. I mean, how much fun can you have?

And behind all of this wonderful stuff that dreams could be made of is the pure excitement of technical advancements. First the products, then the clever usage of these products by the Hams themselves. So, it is quite understandable that I can become enthusiastic over a Sylvania achievement in tube design when I think of what some Ham will manage to do with it that hasn't been done before.

Well, who but a Ham floats around with orbiting electrons over his head?

This is my sign-off, but you can bet your last Sylvania 6146-B that "the column" will always operate with you in mind. All of the people at Sylvania want it that way.

73,

Bob Lynch

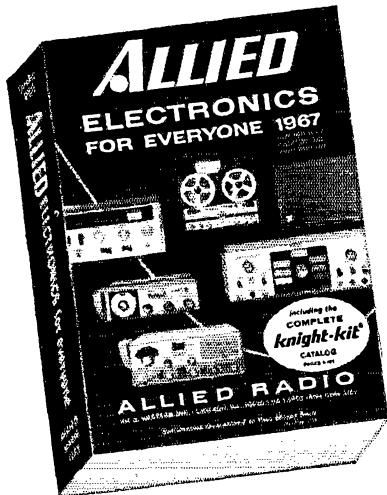
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Mateo County Fair, WA6OXE was his relay contact. WA8NYJ made DXCC. K6AKF is back on the air after a long absence. W6QMO is back on the air after a "vacation" in the hospital. Jeri sent message forms to all ORSs in the section. WA6CVU operates NTS but has spent much of the past month fixing up a new car. No mobile yet, though. W6ASH was vacationing and checked into SPECS from two different California locations. W6RSY made the BPL and still found time for a week's vacation. W6VZE made the BPL handling Fair traffic. Charlie is very active as EC for Burlingame. K8DYX is busy with OBS operations and is building a new final for 432 Mc. K6YKG is busy as NCS on NCN. W6HC has been spending some time at his beach house on the coast and works portable 2 meters. W6ZRJ traveled around Northern California visiting various NCN members during a week's vacation. W6OII works MTN. K6GK is active at W6UW and works NCN and PCN. W6AUC is now secretary of the Northern California Chapter of the QCWA. Russ also is active in the Lions and as an OO. W6VZT was featured speaker at the SCCARA meeting and gave a fine talk on antenna design. The August meeting of the PAARA featured a film, "The Day the Earth Shook." The Oscar Association meeting featured a report on several satellites under development. The Santa Cruz Club was busy planning a meeting that would feature an "electronics game for all." The August SCARS meeting featured a talk by W6CUB on transceivers. K8PJW, active EC for San Mateo, sent in a fine report on the San Mateo County Fair and the operations of the San Mateo Radio Club. The group did a fine job in manning the ham radio booth! Traffic: (Aug.) W6RSY 125, W6YBY 84, W6DEF 403, K8DYX 281, W6VZE 235, W6SAW 146, W6HC 63, W6NXX 51, WA6CVU 44, W6ZRJ 43, K6GK 35, W6AUC 33, W6ASH 18, K6YKG 10, W6QMO 12, W6OII 10, W6AIT 6, W6BZIF 1. (July) W6QMO 40.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4-BNU—Asst. SCM: Robert B. Corns, W4FDV. SEC: W4MFK. RMs: WA4ANH and K4CWZ. PAMs: W4AJT and WA4LWE. V.H.F. PAM: W4HJZ. WA4ZLK enjoys handling traffic. From K4SWN, speaking for the Davidson ARC: "The passing of H. J. 'Jack' Clodfelter, W4PZM, has been a severe blow to amateur radio. Through his efforts, the better part of a hundred hams received their licenses. Jack was the granddaddy of amateur radio in Davidson County. The hams here in the county and, for that matter, in the state owe a debt that can never be fathomed to the memory of this fine man." W4EVEN says, "Received A-1 Op certificate! Who's the joker?" WB4BGL won first place in N.C. in the Novice Roundup. W4VUW has just returned from VP7-Land.

Net	Freq.	Time	Days	QTC	Mgr.
NCN(E)	3573 kc.	2330Z	Daily	223	K4CWZ
NCN(L)	3573 kc.	0300Z	Daily	147	WA4ANH
THEN	3865 kc.	0930Z	Daily	120	K4ODX
SSBN	3938 kc.	0930Z	Daily	88	WA4LWE

Traffic: (Aug.) K4BUJ 236, W4EVN 226, W4LWZ 199, W4HJS 194, W4IRE 126, K4EOF 121, WB4BGL 102, K4-CWZ 81, W4OTE 56, W4CFN 39, K4HZP 38, K4EO 34, WA4VNV 31, WA4NUO 30, WA4ZLK 28, K4DJZ 21, W4-BNU 19, WA4ANH 16, WA4UVH 16, WA4VTY 16, WA4-KWC 14, W4AJT 9, WA4BPP 7, WA4ICU 6, K4TTN 6, K4VQD 6, W4ACY 5, K4CVJ 2, WA4GMB 2, K4ZKQ 2. (July) W6GXQ/4 64, W4UWS 30, WA4GMB 4. (June) W6GXQ/4 38.

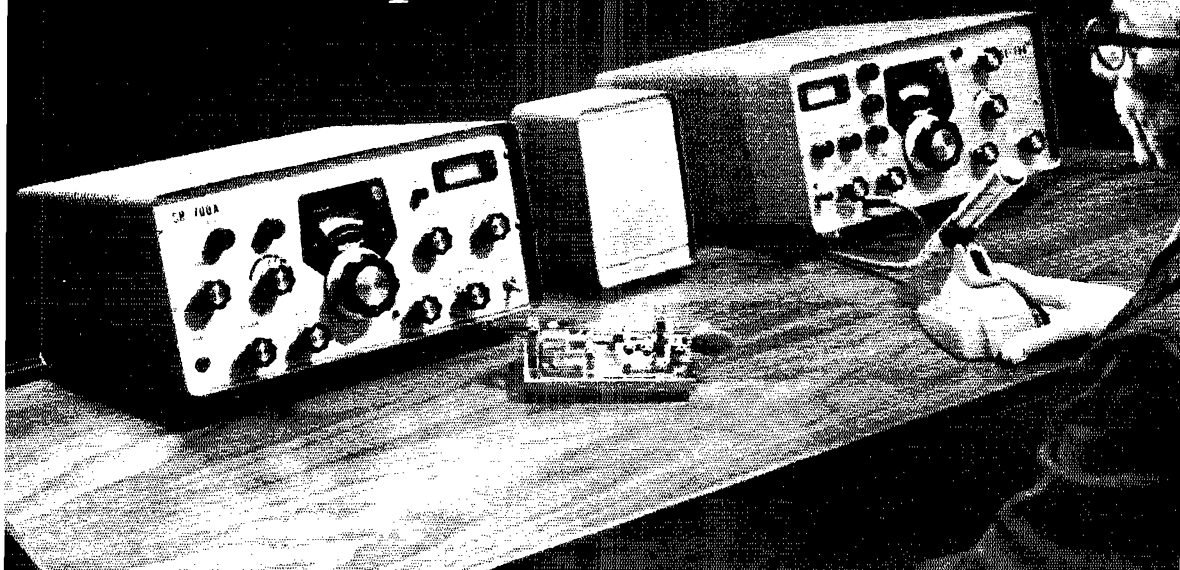
SOUTH CAROLINA—SCM, Clark M. Hubbard, K4-LNJ—SEC: WA4ECJ. Asst. SECs: W4WQM, WA4EFP. RM: K4LND. PAM: WA4RUB.

SCN	3795 kc.	Daily	0000Z/0300Z	
SCSSBN	3915 kc.	Daily	0000Z	Aug. Tfc. 182

SEC WA4ECJ conducted an excellent meeting at the Camden Ham Picnic. A very fruitful discussion was held. Those attending were K4WQA, WA4RUB, W4EGH, K4MID, W4HAIR, K4GGP, WB4CUF, WA4GAV, K4-OCU, WA4ZT, WA4EFP, K4WKI, K4VVE, K4TNT and WA4ECJ. Among the subjects discussed were the c.d., regular nets and MARS for perfect liaison; regular nets and c.d. to combine efforts during an emergency; 2 meters to be used as back up, since c.d. is well organized; county RACES officers to be appointed as ECs as required. K4MID and WA4RUB are now ECs. Endorsement of current ECs is needed. The C.W. Net needs members, as school has taken its toll of the younger NCS boys. W4NTO's OO reports indicate many violations and he is going for the Honor Roll. Traffic: W4PED 55, WA4UPP 47, W4WQM 42, K4OCU 38, WA4-QKQ 37, W4NTO 24, K4TNT 21, WA4NWT 21, W4JA 12, WA4LDM 7.



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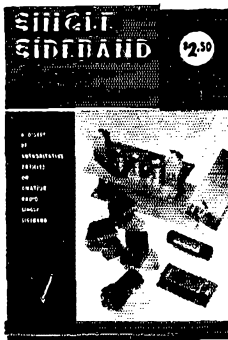
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VIRGINIA—SCM, H. J. Hopkins, W4SHJ—RMs: W4SHJ, W4EUL, K4LJK, PAM: W4OKN, K4CG is handling lots of traffic from servicemen overseas and making BPL in the process. W4QDY has accepted the EC appointment for Area 1. W4QWE returned a visit to W4SHJ and W4EUL; the latter two had visited him a month earlier. W4DVT has been elected a member-at-large of the Eastern Area NTS Staff now being formed. W44UNX is a new ORS and K4ASU a rejuvenated one. W4QDY, W4SHJ and W4EUL met with state civil defense officials and discussed RACES/ARPS implementation. K4LMB and K4ASU collaborated in planning SET exercises in the absence of a regular SEC. Members desiring to receive the *Virginia Ham* should contact W4EUL. The following is a list of net activities on a sectionwide basis:

2300	GMT	3935 ke.
2230		3680 ke.
0000		3680 ke.
0000		3835 ke.
0200		3935 ke.
0315		3680 ke.

All nets meet daily. Traffic: (Aug.) K4CG 809, W4RHA 216, W4SZT 205, W4DVT 187, W44UNX 139, W4EUL 124, W4BWF 106, K4ITY 87, W44YSE 85, W4NLC 84, K4FSS 83, W4URN 66, K4SDS 63, W4DAI 48, K4LMB 43, K4ASU 34, K4MLC 31, W4ATNS 29, K4KNP 28, W4OKN 25, W4FEY 20, W4ZM 20, W42UFI/4 19, W4JUL 17, W4ZAU 15, W4TE 12, W4KFC 11, W4ZMT 11, W4BMY 10, W4SHJ 8, W4MK 7, W4PTR 6, W4QDY 6, K4YEE 4, W4WG 3, W4KX 2, W4LK 2, K4MXF 2, W4BZE 1. (July) K4CG 331, K4SDS 22, W4FEY 9.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8SSA, RMs: K8TPF, W8LMF, PAMs: K8CHW, W8IYD, C.W. Net Mgr: W8HZA, Phone Net Mgr.: W8RQB. It is with regret I report the passing of W8AEZ, of Montgomery. W8HZA has assumed the Net Manager post for WYN, c.w. The net lost W8POS and W8KUW to school, picking up W8IMX and W8JFB. Congrats to W8BKK on his first editorial in Sept. *QST*. K8YQZ and K8VAI checked into the Weirton Area 2-Meter Net from Parkersburg. W8SUQX is active from Harpers Ferry. W8RQB reports the WYN Phone Net had 21 sessions, 509 stations, and 108 messages. WYN C.W. Net reports 20 sessions, 125 stations and 75 messages. W8JYR reports W8V, on 6 meters with a ten-element beam. W8EG, one of West Virginia's Ole Timers, still is active on 3.5 Mc. from Farmington. Hamquest 87 offers a challenge to all of us. Is your club participating? Traffic: K8TPF 121, W8CKX 79, W8HZA 61, K8BIT 54, W8QND 32, W8FOS 19, W8IMX 17, W8GUL 12, K8MQB 12, W8SSA 8, W8UCB/8 7, W8ANDY 3, K8VWV 4, K8QEV 3, W8QZO 3, W8RQB 3, K8WMIQ 3, W8ACEN 2, K8OQL 2, W8PWW 2, W8RHT 2, W8UHK 2, K8ZDY 2, W8AIN 1, W8ACR 1, K8CUZ 1, K8GEP 1, W8IMY 1, W8IAL 1, W8NLI 1, K8NNF 1, W8NOB 1, W8AQEC 1, W8VYI 1.

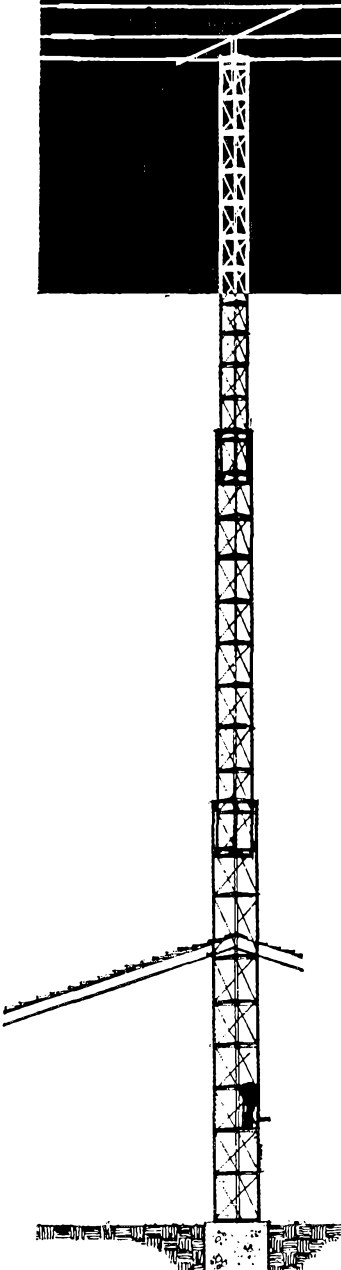
ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Donald Ray Crumpton, K0TTB—Asst. SCM, A. E. Hankinson, W0QNL, SEC: W0SIN. Reminder: This column was written by W0QNL the first week in Sept. In reporting forthcoming events for your group, remember the required lead time. Address cards and comments to W0QNL, 6642 South Pearl, Littleton, Colo. 80120. Pitch in and help with the membership drive. Beef up the section. Write W0QNL for details. Clubs in Arapahoe County, Boulder, Broomfield and the Hamsters in Denver are talking cooperative efforts, to eliminate duplication of effort and generally pull in the same direction. Participation from Colorado Springs, Pueblo and other clubs in the state is needed. W0FA still sends code practice nightly. Write W0QNL for skeds. W0HEP had smoke in the 8-meter gear so no OBS for awhile. The Colo. Wx Net held a 75th birthday party for K0DXF with approximately 100 attending. W0JEV, Canon City, reports the local AREC was on standby during the flood alerts. The Sweepstakes is approaching. Competitors are needed. Thanks to W0DCW, K0ZSQ, K0SPR, W0HEP and K0FDH for steady reports. Novices need help. Volunteers are needed to maintain contact with and assist new Novices in their areas. Write W0QNL for names. High Noon Net: QNT 491, QTC 94. Columbine Net (3989 ke.): QNI 1090, QTC 304. Traffic: K0FDH 45, W0DCW 35, W0HEP 16, K0ZSQ 14, K0SPR 12.

NEW MEXICO—SCM, Bill Farley, WA5FLG—SEC: K5HTT, PAM: WA5MCK. The Albuquerque Caravan Club did an excellent job of providing communications for the International Bicycle Races. WA5DUH made it on s.s.b. recently with a Marauder. Ole Cold Nose K5ONE is back home in the big city of Weed and ready to

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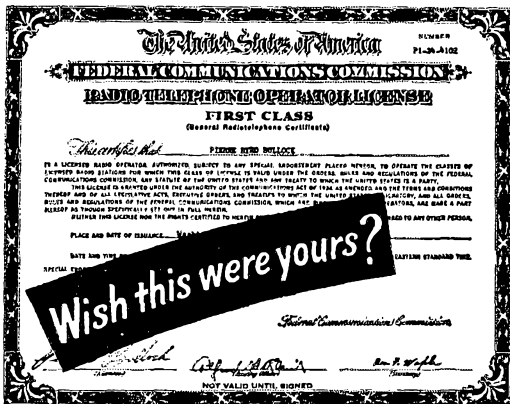
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handle traffic from there. Wayne is one of the regulars on both New Mexico nets and we are glad to have him back. W5ALL has begun the job of OBS and says he will do his best to keep us well informed. Everyone who is anyone in the v.h.f. spectrum met on Labor Day up in the cool pines of Cloudcroft and had a very nice get-together and picnic. The Albuquerque Amateur Radio Club will hold its Annual Banquet Nov. 19. Reservations must be in by Nov. 12. This could be a statewide ham-fest if everyone would turn out. Let's try to make this one. For information, write W5MHT, 1513 Elizabeth, N.E. If any club would like a complete listing of the new hams in its city, contact your SCM. Let's recruit these new fellows. WA5MCX reports the following for the New Mexico Roadrunner Traffic Net: 383 check-ins, 37 formal, 59 informal, 1 QST. Traffic: WA5DUE 112, K5VXJ 45, W5UBW 37, W5FLG 20, WA5MCX 18, W5DMG 15, K5ONE 12, K5HTS 7.

UTAH—SCM, Gerald F. Warner, W7VSS—SEC: W7-WKF. RM: W7OCX, Section nets:

BUN	Daily	7272 kc.	1030Z
UARN	Sat.-Sun.	2987.5 kc.	1500Z

Utah was well represented at the WIMU Hamfest at Mack's Inn, Idaho, this year. Everyone reported having a good time. W7OCX reports that band conditions are finally improving on BUN. W7RQT is building new 432-MC, equipment. K7HEN has a new TX62 transmitter on 2 meters. W7WQC installed a new tri-band quad and tower. K7ERR reports the new Utah-c.d. communication bus was operated and displayed at the Davis County Fair in Farmington. Please, fellows, send in your station activity reports the first of each month. Your reports of new equipment, traffic, happenings, etc., will make writing this column much easier. Traffic: W7OCX 112, W7VSS 6, K7ERR 5.

WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: W7YWE. RM: W7CFL. PAMs: W7TZK, K7SLM. OBSs: W7TZK, K7SLM, K7ZET, W7DZN. Nets: Pony Express, Sun. at 4830 on 3920; YO Mon., Wed., Fri. at 1830 on 3610; Jackalope, Mon. through Sat. at 1215 on 3920. K7MGM is back on his feet after a short stay in the hospital. W7AXX has accepted a job in Cheyenne. W7YSP is moving to a new job in Hawaii. New appointments: W7CFL is RM and K7TAQ as EC. Several of the hams assisted in the primary election returns. We may be asked to help in the general election returns, so you may be able to help. Monitor 3920 the night of the election. The Casper Club plans to start code and theory classes. W7DIO is out of the nursing home and now has an apartment with another lady in Casper. Traffic: K7SLM 10, K7POX 9, K7YPT 4, W7AEC 2, W7BFV 2, K7BTE 2, W7BYG 2, K7LOH 1.

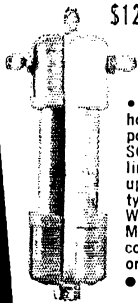
SOUTHEASTERN DIVISION

ALABAMA—SCM, William S. Crafts, K4KJD—Asst. SCM/SEC: William C. Gann, W4NML. RM: W4AEXA. PAM: K4WHW. W4AUXC is the new net manager for AEND. Good luck to W0HXB on his new assignment. The HARC is formulating plans to sponsor the distribution of surplus RTTY equipment in Ala. and Miss. The section c.w. net, AENB, now has a late session at 0400Z. Aug. net reports (times in GMT).

Net	Freq.	Time	Days	Sess.	Ave. T/c.	Ave. QNI
AENB	3575	0100	Daily	28	3.0	4.5
AEND	3525	2400	Daily	27	2.3	8.4
AENH	50.7	0200	Sun./Tue.	8	1.0	18.8
AENM	3965	0030	Daily	31	2.0	45.4
AENO	50.55	0155	T/T/Sat.	13	1.5	13.5
AENP	3955	1230	Mon.-Sat.	26	1.1	9.9
AENR	50.52	0115	Wed.-Fri.	9	0.0	14.4
AENT	3970	2230	Daily	31	1.5	5.6

Congrats to K4WHW on being high division scorer in the V.H.F. QSO Party. Sorry that I was unable to attend the North Ala. Hamfest. We are sorry to lose two good c.w. operators, W4APL and W4BMO. K4AAU has a new Galaxy and K4VLL a new TR-4. Traffic: W0HXB 337, W4AEXA 172, W4AVOP 141, W4AUXC 107, K4AOZ 96, K4BSK 68, K4WOP 55, W4USM 38, W4AEC 28, W4ADT 25, W4NML 18, W4AFYO 17, K4WHW 16, K4KJD 14, W4APZ 14, K4NUW 13, W4BLX 8, K4ADK 4, W4HON 4, W4AROP 4, W4AVUG 4, W4AWLD 4.

CANAL ZONE—SCM, Mrs. Lillian C. Smith, KZ5-5TT—Asst. SCM: Russell E. Oberholtzer, KZ5OB. SEC: KZ5MY. New KZ5s for the month of Aug.: Generals—KZ5AR, KZ5IQ (who is W4IYQ), KZ5JB, KZ5OW, KZ5TF. Technician—KZ5OK. Novice—KZ5DKN. The USAFSO MARS Club is working on a special certificate to be issued for assistance received during its annual Christmas operation for Canal Zone servicemen. Details in the next issue of QST. Canal Zone still needs volunteers to meet c.w. net schedules in the National



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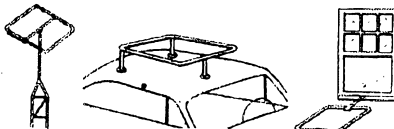


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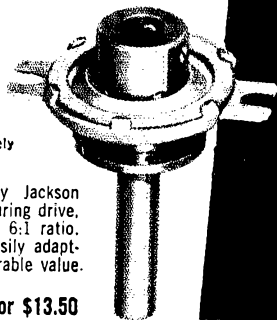


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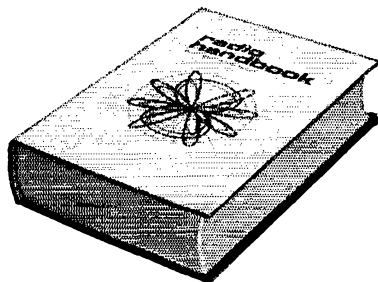
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Traffic System. KZ5EM vacationed in KV4-Land. KZ5-LM is moving to Margarita. Traffic: KZ5AG 60, KZ5JC 21, KZ5RW 21, KZ5FX 8.

EASTERN FLORIDA—SCM, Albert L. Hamel, K4-SJH—SEC: W4IYT, RM C.W.; W4LUV, RM RTTY: W4RWM, PAM S.S.B.; W4OGX. PAMs: W4SDR, W4-TUB, V.H.F. PAM: W4ABMC. We hit the news jackpot this month. Thanks, fellas. W4SMK passed the word that the new Ft. Myers Club call is W4LX. Looks like the new Novice net is doing okay. Note the Novice calls in the traffic listing. WB4CAP got his 3rd-class phone ticket. My solid reporter, W4BKC, tells me that W4UFY won a jet trip around the world for two in a contest conducted by a cooking oil company. K4MTP is happy with his new SBE-34 and working to get on RTTY. WA4NEV took the rig on vacation up Virginia way and worked some FB DX. So now we find out that K4YOQ, out Tampa way, has a jr. operator in the Marines at Da Nang, Viet Nam. He is WA4IKI. We missed three net reports this month—RATT, QFN and FAST. There still is no notable increase in the number of traffic reports received so I give up. You will hear no more from me on the subject. Traffic: (Aug.) WA4SCK 723, WA4BMC 358, WB4IW 260, WA4NEV 242, W4FPC 220, W4ILE 208, W4TUB 206, W44RQR 135, WA4DEL 119, WA4IJH 117, W44PDM 113, W4AB 107, W44FGH 102, W4SDR 101, W4LUV 100, W4EHW 98, W4AKB 78, W4FP 75, WA4YIH 75, K4BNE 71, K4RY 67, K4SJH 63, WB4AJV 60, W4VDC 50, W4DFU 47, W4BJD 46, WA4HHD 43, WB4BOM 41, K4DAX 41, K4LPS 40, K4ILB 37, W4OGX 37, K4COO 36, W44BGW 28, WA4IVE 28, W4NUH 23, WA4CIQ 26, WA4WEB 25, K4EYV 21, K4KDN 21, W4SMK 19, W4DVO 18, W4VPQ 18, K4YOQ 18, WN4-CBM 17, K4ENW 16, W4GDK 15, WA4OHO 15, K4MTP 14, WA4VOW 13, W4HFR 12, K4FGP 11, W4BKC 10, WN4DDO 10, W4TJM 10, WN4DHD 9, K4TQL 8, WB4-CAP 5, K4EBE 5, K4IEK 4. (July) K4YOQ 7, WN4DDO 2.

GEORGIA—SCM, Howard L. Schonher, W4RZL—Asst. SCM: James W. Parker, Sr., W4KGP. SEC: W4-DDY, RM: W4CZN. PAMs: K4PKK, WA4JSU, W4KR, WA4WDE, WB4BDG is the new net manager of GTN. Congratulations to W4CZN a new member of the A1 Operator Club. K4JBJ has been discharged from the service and will attend Southern Tech for a year to get his associate engineer degree in electronics. W4FQX has a quad and 40 doublet ready for the Sweepstakes. W4-HBS is waiting for new Drake twins. K4GHR is a new OPS. K4TXK acted as net manager for the CSC 2-Meter Net during the summer. W4GIS will resume.

Net	Freq.	Time	Sess.	QNI	QTC
GSSN	3975	0100 Dy	31	980	208
GSN	3595	0000 & 0300 Dy	62	436	248
JTN	3718	2200 Dy	30	209	52
G. Teen.	3855	1600 Sat, 2130 Wed.	9	54	34

Net
Cobb Co. AREC Net 145.8
NEGEN 52.250 1730 Sun.
CSC 2-Meter Net 145.350 Mon. 0105Z u.s.b. or a.m.
Georgia Cracker Mobile Net 3995 Sun. 1800Z
W4LRR is using stacked big wheels on 2, WA4BVD lost beams in a thunderstorm. Charlie plans to move to Cochran. Traffic: W4PIM 208, W44AV 186, W4CZN 184, W4FOE 184, WB4BDG 163, W4TFL 156, K4FLR 114, WA4AJY 86, WA4JSU 68, K4BAI 61, WA4WQU 60, WA4WDE 41, W4DDY 35, K4NFP 30, W3RZL 27, W4-FQX 17, W4HBS 17, WA4LLI 13, K4GHR 11, WA4JES 5, K4TXK 5, W4LRR 4, WA4BVD 2, W2TPV/4 1.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4MLE, PAM: WA4FLJ, RM: W4BVE. Section net reports:

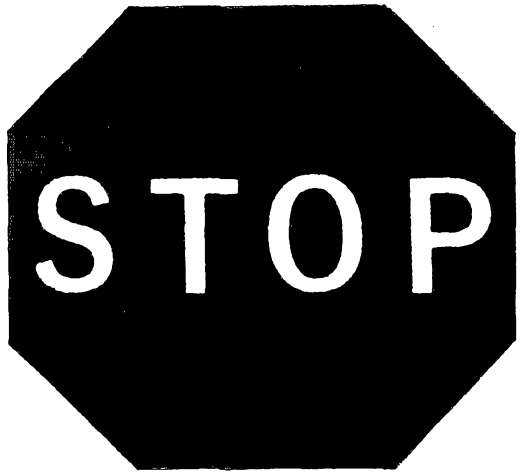
Net	Freq.	Time	Days	Sess.	QNI	QTC
WFPN	3950 kc.	2300Z	Daily	31	447	184
QFN	3651 kc.	2330/0300Z	"	62	—	—

Tallahassee: K4VRT now has an SB-400. He edits the TARC Newsletter. K4YPI is building an all-transistor rig. W4NJK is with FAA here. W4LQM transferred to the Pensacola FAA office. Quincy: The GENTS now has its own club call, WB4DGW. Marianna: WB4BGC and WB4DFM have joined W4KCA to put nearby Cypress on the ham map. Chipley: WN4BGR is newly-licensed. Port St. Joe: K4RZF is back on 75 meters after repairing antennas. WN4BRS is a new Novice. W4UPO is active on WFPN. W4MTH and W4ODV comprise a new OM/XYL team. Panama City: WA4ZGI is newly active with an SB-100. WA4FLJ has filed a petition with FCC to expand /MIM frequency authorization. Fort Walton/Eglin AFB: W4ZGS and W4RKH/m are on 2-meter f.m. Transmitter hunts are held in the Niceville area on 145.2, sponsored by the EARS. Pensacola: W4JPD has a new tower and beam. W4PAA keeps skeds with CG Cutter Schango to handle traffic. WA4JLY is



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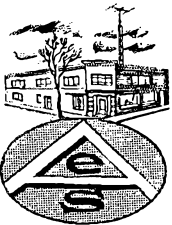
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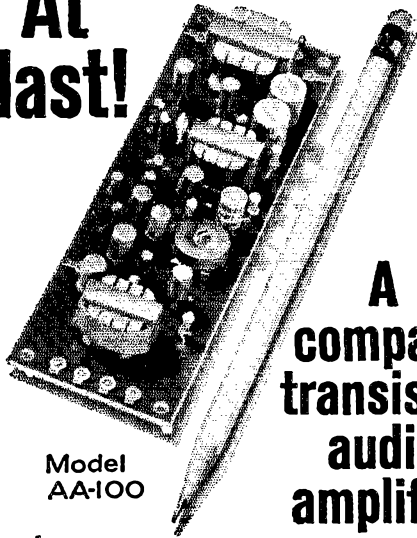
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active on all bands, 80-2 meters. Milton: K4NMZ replaced the quad with a triband beam, and added a second 2-meter beam above it. Traffic: (Aug.) K4BSS/4 210, K4NMZ 85, WA4EQQ 75, W4BVE 51, W4IKB 39, WA4FIJ 11. (July) K4BDF 184, K4NMZ 85, WA4FIJ 6.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Floyd C. Colyar, W7FKK—SEC: K7NTY, PAM: W7CAF, RM: K7NHL, W7WUB has an SR-160 and a Loudboomer Mark II with a 62-ft. tower and inverted "V" antenna. W5EQZ/7 is on with his new SB-100, SB-200 combo. W7CIC's home-brew four-element 20-meter beam is bringing him in fine reports. WN7GDQ is a new call in Phoenix. K7VOR reports that the FCC has assigned the call W7DAY to the 6-meter repeater. The repeater will receive on 51.0 Mc. and will transmit on 51.6 Mc. K7OBS is experimenting with phasing 2, 14VQs and reports a lot of success. W7CFJ is constructing a solid-state keyer. W7CVI, DL6UK and K7VXS received Armed Forces Day Awards for RTTY copy. WA7QXP has a new Halliçrater SX-42. WA7AR and W47EQC have new SB-100s. Traffic: K7NHL 170, W7FKK 18.

LOS ANGELES—SCM, H. G. Garman, W6BHG—Asst. SCM/SEC: W. R. Calkins, W1KUX/6 RMs: W6BHG, W6QAE, WB6BBO. PAMs: K6MDD, W6MLZ, W6ORS. BPLers in Aug.: K6EPT, K6IOV, K6MDD, W6MLF, W6WPF, W6TXJ, WA6VFM, WB6BBO, WB6QXY, all contributors to a very nice section total of 12405. July total was 11507. If everyone would please report, the Los Angeles section would have an *excellent total*. K6IOV is working RTTY. W6GYH's vacation came to an end; he covered 11,659 miles. WA6KVV is working 2-meter RTTY. WB6QMF has a new Eico 753 and all-band vertical antenna. W6HTV is building a 4-1000 linear. WA6WPX is experimenting with RTTY. W6MLZ is getting back in the groove, feeling better every day. WB6KIL is DXing. WB6TMC has a new 7-lb. 1-oz. daughter, born Aug. 7. W6PCP enjoyed his vacation portable 0 and is now back in the groove. W6NKR was transferred to Sacramento. K6UMV has resigned as president of the San Fernando Valley Radio Club, because of work load at Lockheed and college work. WB6AEL needs South Carolina for WAS. W6AM/M planned for November—South Sea Islands, Hong Kong, New Guinea, Australia and N.Z. WB6UD needs a new antenna system. W6QJW is active in the San Diego and Orange sections. K6EA is in Bemidji, Minn. W6LDA is now on RTTY, reports WA6GLD, So. Cal. DX Club pres., and WB6OON, Palisades Amateur Radio Club pres. W6LVQ never receives his *certificates*. WA6YKP is on vacation. We wish to correct an error under "Traffic" in Sept. QST. W6MZ/6 99 should have read W6BMZ/6 99. Our apologies, OM. *Support your section level nets:* The Eight Ball Net (EBN) Mon, through Sat, at 0230Z on 50,500 kc.; Southern California Six Net (SCS) daily at 0230Z and 2000Z on 50,400 kc.; the Southern California Net (SCN) daily at 0300Z on 3600 kc. Traffic: (Aug.) K6EPT 2580, WB6QXY 1525, K6IOV 1445, WB6BBO 1355, W6WPF 1329, W6MLF 661, K6MDD 538, W6QAE 316, W6TXJ 313, W6GYH 283, WA6KVV 263, W6FD 181, WA6KZI 181, WA6WKF 166, WA6VFM/6 164, WB6QMF 152, W6RTV 136, WB6QGM 107, K6ASK 87, W6RMZ/6 71, W6BHG 63, WA6WPF 63, WA6TWS 58, W6MLZ 52, WB6KGG 40, WB6KIL 37, K6LJ 37, WB6TMC 32, W6USY 20, W6PCP 19, W6DGH 18, K6CDW 13, WB6GXI 13, WB6GGL 12, WB6BBH 11, W6NKR 10, K6KA 9, WA6UCR 9, K6UMV 9, WB6AEL 7, W6HUJ 7, W6AM 4, WB6UD 4, W6QJW 3, W6CXK 1, W6DQX 1. (July) WB6OLD 121, WB6KVA 78, W6NKR 8, WA6UCR 8, K6UMV 4.

ORANGE—SCM, Roy R. Maxson, W6DEY—WA6QWI and K3LXB are keeping K6MICA on 20 of 24 hours daily. W6PQA is working nights so no traffic. Net Mgr. K6IME reports SCN Aug. traffic 823, check-ins 574. Asst. SCM W6JQB is getting a new HQ-170-V.H.F. W6FB visited W7ZN, W7NH, W6IC and W6CIN and is going to P.I. for several months, where he expects to visit DU1RT, DU1OR, etc. Fred was one of first hams in P.I. back in '47 and has been an ARRL member since Oct. 1921. John, of W6ZJR, is going to Viet Nam and says the station may close because of lack of a replacement. SoCalSix reports for Aug. traffic 640, sections 62, per Net Mgr. WB6JFO. WB6UDQ is a new Tech. in Yorba Linda, per WB6LCO. WB6PHO worked WB6RKN, Pedestrian Mobile, on 6. SEC W6WRJ is going on a 2-week vacation. WA6OQM made the BPL again and also got Siberia, Japan, Ecuador and Swedish MM off S.A. WA6ROF is back and now on regular skeds. WA6IDN got VK2, ZL2 YV1, PY0, JA2 and HK2. W6DEY/W6PJU attended the AREC Picnic in Balboa Park. Traffic: K6MICA 2932, WB6JFO 617, W6ZJB 560, WA6OQM 298, WA6ROF 255, K6IME 131, K6YVN/6 59, W6WRJ 33, WA6IDN 10, WB6OGG 1.



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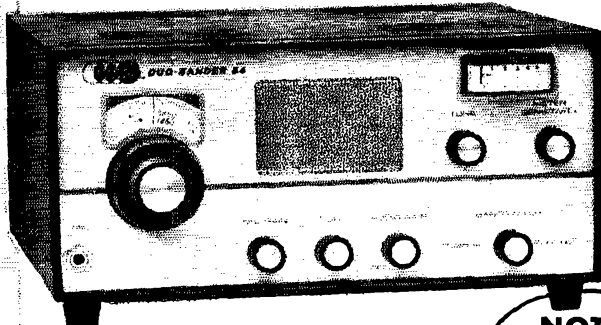
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SAN DIEGO—SCM, Don Stansiter W6LRU/W6VUI—W6QSB, OES, reports good 6-meter openings during mid-Aug. to the Texas and Oklahoma area. The SOBARS now meets each Thurs. and publishes a new monthly newsletter for members. W6BDW went back to work in Sept. after four weeks on the sick list. W6MXA is active on SCN and handles traffic for Imperial County. He has a new Eico 753. Both W6MPP and W6RGS made the BPL on originations plus deliveries during July while they operated portable at the Chula Vista Fiesta de la Luna. Two military stations in the area, W6IAB and W6YDK, who handled many thousands of messages in the past are no longer active on the amateur bands. The bulk of their traffic is being handled by W6BGF, K6BPI and W6GMM. The son of W6LKC and W6YZV, W6MSE, is attending Cal Poly College in Pomona. The daughter of W6RCD won a national jewelry design honor and took her parents to New York for her presentation recently. Father-and-son team W6CAE-W6PDD are busy on a Heath 5-band transceiver kit. The Sept. meeting of the San Diego DX Club was held at the home of W6RCD. Remember, Nov. is Sweepstakes month, c.w. and phone. Join the fun, earn your WAS in one week end. Traffic: (Aug.) K6BPI 11673, W6GMM 1439, W6YNQ 1014, W6BGF 973, W6JUH 160, W6ECP 144, W6BDW 52, W6MXA 35, W6RGS 4, (July) W6MPP 153, W6RGS 152, W6RBB 106, W6BDW 34, W6YME 8.

SANTA BARBARA—SCM, Cecil D. Hinson, W6OKN—SEC; W6NDP, RM: W7WST/6. The Simi Valley ARC reports the recent Pioneer Days message-handling exercise a complete success, so much so in fact that the city now provides quarters for the club e.d. station. The Ventura ARC has a club project of making available low-cost 2-meter t.m. units for members. The intended result could be a closer tie with various remote Ventura County communities. K6AAK has purchased a ham heaven at Bass Lake. A recent appointment in the Simi Valley is K6GV as EC.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. L. Harbin, W5BNG—Asst. SCM: E. C. Pool, W5NFO, SEC: W5PYI, PAM: W5BOO, RM: W5LR. Can you ride a good horse to death? W5DCH has been elected president of the Arlington RC. Bill did a fine job as chairman-president and general blunkie for the West Gulf Division Convention. Thanks to the Arlington ARC for a very fine convention. The Tri-City ARC has a new president, K5BAI, and reports much activity in all bands from 2 meters to the 75-meter band with check-ins to the eye bank and all the MARS nets and RACES. W5HCR has a new SR-160 transceiver. W5FBQ suggests that more hams start listening on the 10-meter band as it is open much of the time. Bob has a G-76 in his car and worked a TG9 on 10 meters. It is gratifying to know that some clubs ask the aid of the Deity in opening their club meetings as the Irving ARC does. This is commendable and I think all clubs should follow suit. May I express my thanks to the many who voted for me in the recent SCM election. I appreciate the confidence and support and I will try to be a better SCM than in the past. W5BNG is proud of his new telescoping tower with a three-element tri-band beam. Thanks for all the news. W5FIR is still making progress with the broken leg. Help him on Air Force MARS. Traffic: K5DBJ 241, W5LFD 138, K2GKK/5 39, W5PRN 14, K2EUI/5 5, W5LR 5, W5MSG 2.

OKLAHOMA—SCM, Daniel B. Prater, K5CAY—Asst. SCM: Sam Whitely, W5WAX. SEC: K5ZCJ, RM: W5QMJ, PAM-75: W5ABIQ.

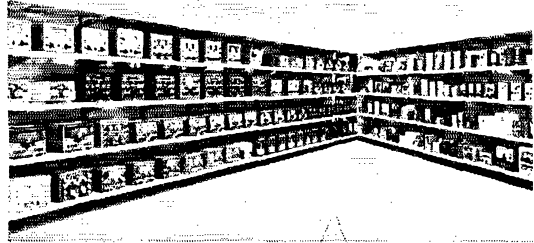
Net	Freq.	Times	Days	RM-PAM	ONI	OTV
OPEN	3850	0800 CST	Sun.	W5PML	159	26
STFCN	3850	1745 CST	M-Sat.	W5BTQ	390	60
OLZ	3682.5	1900 CST	M-Fri.	W5QMJ	61	46
SSZ	3682.5	2145 CST	M-Fri.	W5NML	47	48

I am happy to announce that K5ZCJ has offered to take over as SEC for Oklahoma. I want to thank K5DLP, who did a fine job until I was able to get another SEC. K5TEY received her A-1 Operator certificate, W5YKI received his DXCC certificate. W5FWW is back from California and meeting nets again. W5QGD, of Enid, is operating 2 meters with borrowed equipment until he can convert his ARC-3s. The Wheat-staw ARC won the V.H.F. Field Day trophy again with over 300 contacts on 6 and 2 meters. Oklahoma Central V.H.F. ARC has finalized plans to operate the Information Booth at the State Fair in Oklahoma City. K5MJY will be in charge. W5FVJ, EC for Gurfield County, has acquired a Swan 350. W5EHC and W5OXX and their YFs enjoyed the International Hamfest at Nuevo Laredo, Mexico, very much. W5UZX has his new beam up and work-

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ing, thanks to W5FPN. A new call is WA5QGC, of O.C. W5DRZ-A5DRZ, State Director Army MARS, visited Headquarters and reports he enjoyed himself very much. Traffic: K5TEY 2034, W5NML 269, W5QNJ 78, K5DLP 30, W5MFX 27, W5DRZ 22, W5UYQ 22, W5UZX 21, K5MTC 19, W5NNT 15, W5PML 15, W5MDN 11, W5AIVS 4, WA5KZA 2.

SOUTHERN TEXAS—SCM, G. D. Jerry Sears, W5-AIR—SEC: K5QQG, PAM: W5KLV, RM: K5ANS. New appointments include W5KLV, as PAM, W5VW and K5OLU, as OOs. South Texas has WA5KHE, Kenneth Hackney, Sr., as a new OPS and WA5KIV, Kenneth Hackney, Jr., as a new ORS. They recently moved from the Delta Division to Nacogdoches, Tex. Welcome to So, Texas, fellows. W5ZPD, former PAM, is keeping busy with the grandchildren, etc. The best of everything, Cindy. EC K5HMF reports the new Brazoria County Net is on 145.3 Mc, with good participation. K5LQJ will be set up in Seabrook for the next five months while working with NASA, but will be back at Texas A. & M. in the spring. EC W5TFW reports new Generals are WA5OVV, WA5PVC and WA5VPV in the Port Arthur Area. A bulletin from W5KR and the Texas Southmost Amateur Radio Club indicates they are expecting a good turnout for the hamfest at Harlingen Oct. 9. EC K5GDH obtained complete information on an accident in which five persons were killed and relayed it via WA5PFK to WA7BFG. We understand that Edna, WA5NVS, of Beaumont, has been providing cupid service to WA5EUY at Arlington State College. The result will be a wedding in the very near future. Congratulations, Bill. Edna links missionaries in Central and South America with civilization. RM K5-ANS is leaving for California and reports that WA5MOE is the proud owner of a new Hallicrafters transceiver, also W5AC now has a Galaxy 5. Good luck, Frank. Very little information is available on the flooding in various areas in West Texas. This is a heap big area but amateur radio stations are few and far between and other communications nil, as reported by EC K5HZR in Bexar County. Tex Traffic Net July-Aug. report, 213 with 164 QNI. Traffic: K5HZR 293, W5BGE 208, W5KLV 173, WA5AUZ 154, WA5JOW 69, WA5LNV 30, W5ZIN 29, W5NRJ 20, W5AIR 12, W5ABQ 9, W5TFW 8, K5LQJ 4, K5HMF 2.

CANADIAN DIVISION

ALBERTA—SCM, Harry Harrold, VE6TG—SEC: VE6FK, PAM APN: VE6ADS, PAM ASBN: VE6ALQ, ECs: VE6SA, VE6SS, VE6AFJ, VE6HB, VE6XO, VE6XC, VE6AFQ, ORS: VE6BR, OPS: VE6HM, VE6SS, VE6BA, VE6ADS, OOs: VE6HM, VE6NX, VE6TY, VE6AKV, OBS: VE6HM, VE6AIF, OES: VE6DB. We finally heard from a couple of gentlemen regarding the Edmonton (DX) Club. It has 25 members and sends out beautiful green and gold QSL cards. After working so many you can apply for the Klondike Award, so look for the DX boys in VE6-Land, Edmonton, as you need these beautiful cards and they want your contacts. Don't forget the Boy Scout Jamboree. Check your certificates and send them in for endorsement. Liaison for ASBN are VE6XC and VE6A00. This section has regular liaison with RN7. Your new EC for Edmonton will be VE6PL. Reports are few and far between this month. Traffic: (Aug.) VE6HM 101, VE6XC 75, VE6FK 29, VE6Q 29, VE6ADK 12, VE6SS 11, VE6ALQ 9, VE6PL 7, VE6ADS 6, VE6FS 6, VE6SA 4, VE6FV 1. (July) VE6HM 53, VE6HC 51, VE6ALQ 11, VE6AKQ 4, VE6SB 4, VE6AFX 3, VE6BV 2, VE6KS 1.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB—It is discouraging to know that in B.C. there are 1635 amateurs on the RI's list and it is only our appointees who care enough to buy a stamp to keep us informed of their activities and plans. Some of us do not realize how much the amateurs who are serving in other countries look forward to the news from home through the "Station Activities" reports in QST. (We have letters from VE7s confirming that.) Nothing was heard by mail from clubs on their PD activity, the Okanagon International Hamfest or the BCARA Picnic. You cannot throw bricks at the ECs, ORSs, NCSs and others who put their best switch forward to check the nets and keep them working so efficiently. We had a wonderful three-week holiday so that has nothing to do with the way I feel. Traffic: (Aug.) VE7ASY 340, VE7BCJ 43, VE7DH 21, VE7AC 13, VE7BAV 12, VE7BLO 7, VE7BQB 7. (July) VE7BDJ 256, VE7BLO 11.

MARITIME—SCM, D. E. Weeks, VE1WB—Asst. SCMs: A. E. W. Street, VE1EK, and R. P. Thorne, VO1EL. SEC: VE1HJ, VE1AKO advises that the Maritime Sparkettes now meets Thurs. 0930 AST, 3770 kc., except the last Thurs. of the month when the time is

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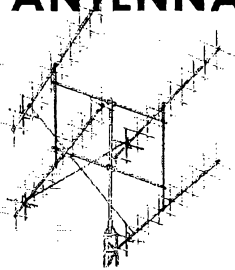
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1330. Pres. VE1AQI acts as Net Control. The Maritime Amateur Radio Council held a very successful "Campfest" at Beaverbank over the Labor Day week end. Credits for the success of the venture go to VE1PX, with assistance from VE1AQK, VE1AKW, VE1UA and VE1AKO. VE1ARB won the code-copying contest for the YIs, with VE1AJM taking the top OM ribbon. The Dr. Leo Doucette Plaque was awarded posthumously to VE1AL. VE1LG was the oldest amateur in attendance, with VE1ARJ taking jr. operator honors. Newly-elected officers of the NSARA include VE1CT, pres.; VE1AAZ, vice-pres.; VE1AKO, secy.-treas. Summer visitors to the section included VE2BEU (ex-VE1YQ), VE3YQ, W9RBI, VE3EAM, VE7AZ, VE3DWG (ex-VE1OF), VE3EIK (ex-VE1AHR), GM3CDD, WA4TWJ, (ex-VP1AA). New amateurs in the area include VE1AOK and VE1AUL (ex-VE2ATT), VE1ADH, VE1AMC, VE1UC and VE1TG recently as KP8DA, Traffic: VE1AAX 9, VE1ABS 4.

ONTARIO—SCM, Richard W. Roberts, VE3NG—By the time you read this the Ontario Convention will have passed into history. At the present time the Ottawa Club intends to hold the Ontario Division Convention in that city in the fall of 1967. Expo year, VE3EZS reports this his SB-100 Serial No. 604776 and power supply Serial No. 6017888 were stolen from his QTH in Willowdale (Toronto) recently. Any information will help. The Nortown ARC has a dandy publication for the newcomers written by VE3CFE. Copies can be had for a nominal price from the Nortown Club, P.O. Box 356, Adelaide St., Postal Station, Toronto. VE3TT was a visitor at the OQN meeting at Outlet Provincial Park in Aug. VE3CYR, VE3AUI, VE3ATI and VE2AGQ, all OQN members, were in attendance. VE3VD visited Northern Ontario. I regret the passing of VE3ART. Our condolences to his loved ones have been passed along. Change of address of the Scarborough ARC newsletter and the Trilliums *Tot-Topics* (YIs, etc.) is as follows: Scarborough, VE3WE, is Cemetery Rd. R.R. 1, Uxbridge, Ont., likewise *Tot-Topics*, same QTH. Both are operated by the Taylor family. The Trilliums held a picnic Sept. 10. This group held the first Canadian YL Field Day effort. Two stations were on the air. The special call signs for Centennial Year have been approved. By now all VE amateurs have received their letter from the DOT. It's up to you whether you take advantage of it or not. Traffic: VE3NG 87, VE3DGB 80, VE3CYR 77, VE3DPO 71, VE3GCE 59, VE3ATI 55, VE3DVE 55, VE3EBH 55, VE3TT 54, VE3BLZ 51, VE3FHV 42, VE3BUR 33, VE3DRG 29, VE3FGV 24, VE3AWE 22, VE3AFA 21, VE3EBC 20, VE3DMU 12, VE3CCB 2, VE3VD 2.

QUEBEC—SCM, J. W. Ivey, VE2OJ—SEC: VE2ABV. RM: VE2DR. We regret the passing of VE2TA, an active old-timer. He had worked hard for nets, c.w. and phone, and was one of the originals in emergency net operation. At his passing he was an active member of the MARC, getting things organized for the 1967 ARRL National Convention. Because of a move for business reasons VE2ABV has resigned as SEC. He has done an excellent job of getting things in order in AREC over the past few months. We wish him the best in his new location and also welcome VE2ALE as your new SEC. Joe deserves all the EC reports and aid he can get. A summer at portable finds many back home including VE2BRD. A great amount of work is required before next summer's canoe race across Canada if it is to get amateur radio coverage better than we heard during the preliminary in August from Lachine to N.Y.C. VE2KO, a comparative newcomer to the advanced license, handles a net and traffic like an old pro. The St.

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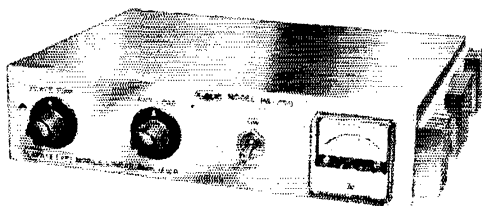
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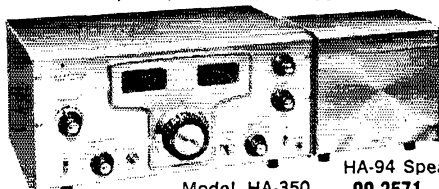
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Maurice Valley group, VE2MO, under VE2BJG held a very successful picnic and under VE2AGI and VE2AJD a complete mobile communications set-up was provided for the swim meet. VE2SD reports the aurora during the Aug. 30 black-out was a real big one lasting 12 hours. Our sympathy to VE2GH in his recent bereavement. Traffic: VE2BLL 93, VE2OJ 79, VE2AJD 73, VE2BRD 70, VE2DR 70, VE2AGQ 42, VE2EC 42, VE2WM 12.

SASKATCHEWAN—SCM, Me. W. Mills, VE5QC—The fall operating season is now underway and the Annual SET Exercise with the many AREC members participating is history. Now is the time for that last-minute checking and tightening of all your antenna parts and installation. We are all looking ahead to the winter's operating fun so let's not have it spoiled by a breakdown in our outdoor installations! Congratulations to PAM VE5HP on the very fine bulletin regarding net and its procedures and roster. We understand that the gang in PA is well underway with plans for next year's hamfest but did hear a rumor that VE5BO is planning to have a riverboat on the Saskatchewan with cards and all that sort of stuff for the boys! This is the last call for material for the Centennial project as being gathered by the Saskatoon Club. For the uninformed it is a very comprehensive history of amateur radio Canada. We saw some terrific pictures of Marconi's original installation in Newfoundland with him sitting at the operating desk and launching the kite that took up the antenna. There is a lot of terrific material from the St. John, Newfoundland, Club, CU on 80. Traffic: (July) VE5HP 72, VE5BO 50, VE5OB 21, VE5RE 12, VE5LM 11, VE5GX 10, VE5EO 7, VE5HQ 4, VE5PZ 3, VE5CB 2.

GET

Happenings of the Month

(Continued from page 85)

Area	Maximum d.c. plate input power in watts							
	1800-1825 kc/s		1875-1900 kc/s		1900-1925 kc/s		1975-2000 kc/s	
	Day	Night	Day	Night	Day	Night	Day	Night
Alabama	200	50	No operation	No operation			100	25
Alaska	200	50	200	50	No operation	No operation	No operation	No operation
Arizona	100	25	100	25	100	25	500	100
Arkansas	200	50	No operation	No operation			200	50
California	No operation	No operation	No operation	200	50	500	200	500
Colorado	200	50	100	25	100	25	500	100
Connecticut	200	50	100	25	No operation	No operation	No operation	No operation
Delaware	200	50	100	25	No operation	No operation	No operation	No operation
District of Columbia	200	50	100	25	No operation	No operation	No operation	No operation
Florida	100	25	No operation	No operation	No operation	No operation	No operation	No operation
Georgia	100	25	No operation	No operation	No operation	No operation	No operation	No operation
Hawaii	No operation	No operation	No operation	100	25	100	25	100
Idaho	100	25	200	50	200	50	500	100
Illinois	200	50	100	25	100	25	200	50
Indiana	200	50	100	25	100	25	100	25
Iowa	500	100	100	25	100	25	200	50
Kansas	500	100	100	25	100	25	200	50
Kentucky	200	50	100	25	100	25	100	25
Louisiana	200	50	No operation	No operation			100	25
Maine	500	100	100	25	No operation	No operation	No operation	No operation
Maryland	200	50	100	25	No operation	No operation	No operation	No operation
Massachusetts	500	100	100	25	No operation	No operation	No operation	No operation
Michigan	500	100	100	25	100	25	200	50
Upper		500	100	100	25	100	25	100	25
Lower	500	100	100	25	100	25	200	50
Minnesota	500	100	100	25	100	25	200	50
Mississippi	200	50	No operation	No operation			100	25
Missouri	200	50	100	25	100	25	200	50
Montana	100	25	200	50	200	50	500	100
West of 111°W		200	50	200	50	200	50	500
East of 111°W	200	50	200	50	200	50	500	100

enter now!!!

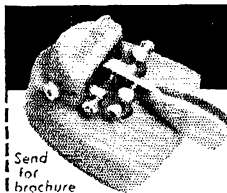
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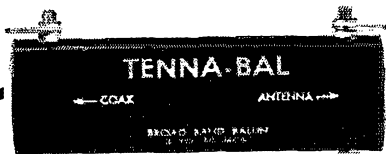
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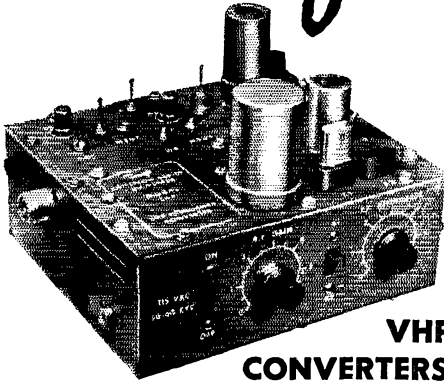
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(Continued from page 136)

Nebraska	500	100	100	25	100	25	500	1		
Nevada	100	25	200	50	200	50	500	2		
New Hampshire	500	100	100	25	No operation	No operation	No operation	No operation		
New Jersey	200	50	100	25	No operation	No operation	No operation	No operation		
New Mexico	200	50	100	25	100	25	500	1		
New York	North of 42°N	500	100	100	25	No operation	No operation	No operation		
	South of 42°N	200	50	100	25	No operation	No operation	No operation		
North Carolina	200	50	No operation	No operation	No operation	No operation	No operation	No operation		
North Dakota	500	100	200	50	200	50	500	1		
Ohio	200	50	100	25	100	25	100	100		
Oklahoma	500	100	No operation	No operation	No operation	No operation	200	200		
Oregon	No operation	No operation	No operation	200	50	500	500	1		
Pennsylvania	200	50	100	25	No operation	No operation	No operation	No operation		
Rhode Island	200	50	100	25	No operation	No operation	No operation	No operation		
South Carolina	100	25	No operation	No operation	No operation	No operation	No operation	No operation		
South Dakota	500	100	100	25	100	25	500	1		
Tennessee	200	50	No operation	No operation	No operation	No operation	100	100		
Texas	East of 103° W	500	100	No operation	No operation	No operation	200	200		
	West of 103° W	200	50	100	25	100	25	500	1	
Utah	100	25	100	25	100	25	500	1		
Vermont	500	100	100	25	No operation	No operation	No operation	No operation		
Virginia	200	50	100	25	No operation	No operation	No operation	No operation		
Washington	No operation	No operation	No operation	200	50	500	500	1		
West Virginia	200	50	100	25	No operation	No operation	No operation	No operation		
Wisconsin	500	100	100	25	100	25	200	200		
Wyoming	200	50	100	25	100	25	500	1		
Puerto Rico, Virgin Islands	No operation	No operation	No operation	100	25	100	100	100		
Swan Island, Serrana Bank, Roneador Key	500	100	No operation	No operation	No operation	No operation	100	100		
Navassa Island	No operation	No operation	No operation	No operation	No operation	No operation	100	100		
Baker, Canton, Enderbury, Guam, Howland, Jarvis, Johnston, Midway & Palmyra Islands	No operation	No operation	No operation	500	100	500	100	500	100	
American Samoa	500	200	500	200	500	200	500	200	500	200
Wake Island	500	100	500	100	No operation	No operation	No operation	No operation	No operation	

U. S. Coast Guard

(Continued from page 88)

NA is used for fixed land stations and NM for land mobile stations.

Auxiliary amateur radio stations are permitted to operate on Coast Guard frequencies when authorized by the C. G. District Commander. Consequently, an Auxiliary radio station, fixed land type, must be capable of operating on the following frequencies:

(a) 2670 kc.

(b) the District 2 Mc. or 3 Mc. voice frequency 143.28 Mc. may also be used by Auxiliary stations but capability on that frequency is not mandatory.

Amateur band operation of Auxiliary nets normally takes place in the 75-meter or 40-meter amateur phone bands.

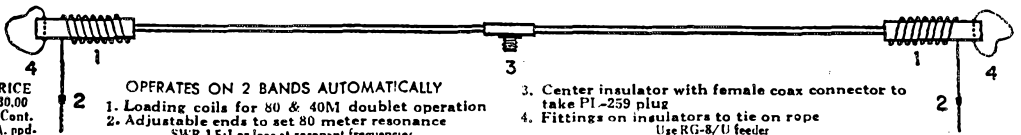
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(Continued on page 160)

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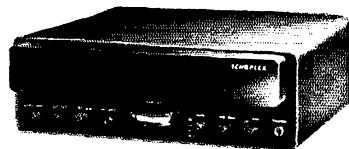
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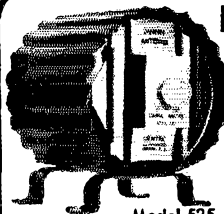


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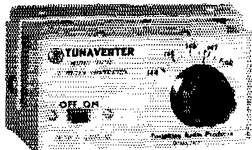
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(Continued from page 158)

over 847 such flotillas in the 50 states, Puerto Rico and the Virgin Islands, with almost 23,000 members. The Auxiliary is administered on a Coast Guard District level by a commissioned Coast Guard Officer, with the title of Director of Auxiliary, who supervises the operation of the units for the Coast Guard District Commander.

The tremendous expansion of recreational boating in the last five years has placed an ever-growing burden on the membership of the Coast Guard Auxiliary. Interested radio amateurs desiring to be a part of this great service on a volunteer, non-military team are urged to contact their nearest Director of Auxiliary for more information on nets in their district, membership qualification information, and frequencies in use.

QST

Use a Monitor

(Continued from page 81)

Be sure to insulate the key jack in the code practice oscillator if a metal chassis is used. Otherwise, the battery would be shorted out when the key was closed. We used a plastic case so this presented no problem.

In the monitor, the relay is mounted to the chassis with its mounting screw through a rubber grommet. This is done to reduce relay noise. Also, rubber feet, or rubber grommets glued to the bottom of the chassis, help cut down relay noise. If desired, the entire monitor unit can be mounted remote from the operating location by making the leads for P_1 and P_2 longer.

We mentioned earlier a tip about improving your code sending ability, or how to acquire a "tape-like" fist. Each month in the Operating News section of QST the coming schedule of WIAW is printed. On certain days of the month, WIAW transmits code practice taken from past issues of QST or other League publications. To improve your sending, all you need do is send along with WIAW. (Not on the air of course!). Tune in WIAW, remove the key plug, P_2 , from your rig, and with the copy being sent in front of you, it becomes an easy matter to monitor your fist in conjunction with the tape-sent code from WIAW. It doesn't take much practice like this to acquire good code character and letter spacing—what's more, you'll find that it's real fun to try and match your fist with WIAW. Most important, you'll be developing sending habits that will make the guy on the other end wish he was a good a c.w. man as you.

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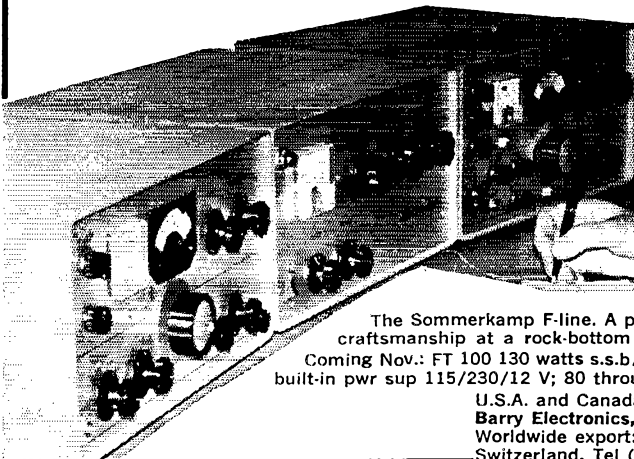
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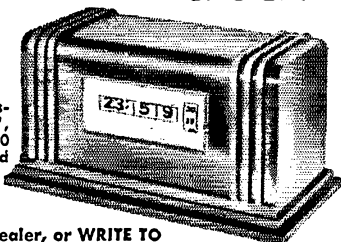
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 W1SB, Chester C. MacDonald, Revere, Mass.
 W2CN, Adolph Schwartz, Teaneck, N. J.
 K2EAY, Ted M. Holtz, Webster, N. Y.
 W2IRH, Arthur G. Smith, Binghamton, N. Y.
 W2JMF, Carl A. Hinkley, Binghamton, N. Y.
 W2KN, Perce B. Collison, Eastchester, N. Y.
 WA2MGX, William R. Nivison, Silverton, N. J.
 K2OIG, James F. Conolly, Rochester, N. Y.
 K2SEQ, Russell H. Gundlach, Falconer, N. Y.
 WA2SJT, Frank Hubatsek, Rochester, N. Y.
 K2TFN, Harold W. Blencowe, Endicott, N. Y.
 W3CBU, Harry J. Nager, Drexel Hill, Penn.
 W3CPE, William G. Darrall, Pittsburgh, Penn.
 W3IS, Albert W. Small, Bethesda, Maryland
 W3JDP, G. William Sherwood, Wilmington, Del.
 W3MVQ, William S. Ashe, Pittsburgh, Penn.
 W3ONW, Donald A. Bush, Greensburg, Penn.
 W3RTF, Ignis M. Norkus, Charleroi, Penn.
 W4DDL, Jesse B. Blythe, Sr., Elizabethton, Tenn.
 W4FRZ, Russell C. Stone, Fort Lauderdale, Fla.
 W4LXR, William C. Lundquist, Atlanta, Ga.
 W4PZM, H. Jack Clodfelter, Lexington, N. C.
 K4RPT, Sonny Jones, Pembroke, N. C.
 K4TRV, Huston Beall, Winchester, Ky.
 W5AWP, William M. Essary, Corinth, Miss.
 W5CRM, Otto J. Nilson, Dallas, Texas
 W5DP, Joseph P. Aversa, New Orleans, La.
 W5JDR, Guy Robards, Burnet, Texas
 W5MLR, Mack C. Thompson, Tulsa, Okla.
 W5NSR, Joseph S. Noble, Oklahoma City, Okla.
 W5OOI, James W. Hill, Lawton, Okla.
 W5YPF, Benjamin Ross Mishler, Dallas, Texas
 ex-W6AAR, John N. A. Hawkins, Pacific Palisades, Calif.
 W6BCN, Robert McIlveen, Jr., Keddie, Calif.
 W6BJWD, Willard H. Altman, Broderick, Calif.
 W6NSS, Al A. Browdy, Los Angeles, Calif.
 W6PYE, Scott Warwick, Sherman Oaks, Calif.
 W6QWP, Frank W. Vogel, Pacoima, Calif.
 W6WNG, Timothy N. Gilliland, Berkeley, Calif.
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 WA8CHU, Jay J. Berkoski, Brooklyn, Ohio
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 W8EFG, W. L. Johnston, Westerville, Ohio
 W8MAH, Wallace T. Ames, Essexville, Mich.
 KSRJB, Darrell L. Bishop, Steubenville, Ohio
 W9CF, Harlan R. Hall, Maywood, Ill.
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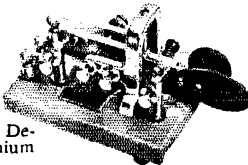
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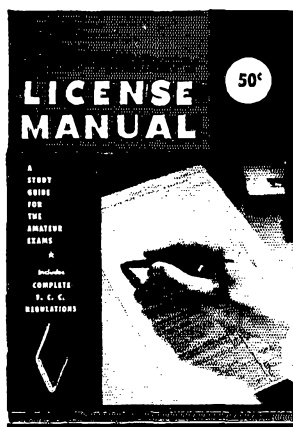
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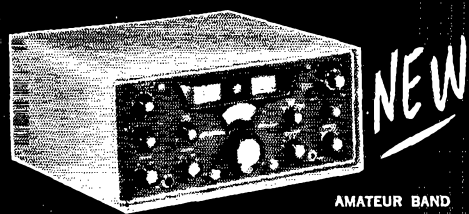
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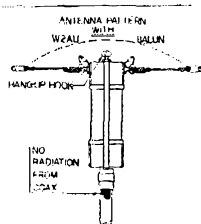


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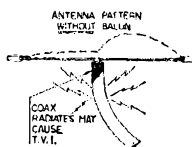
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W1, K1, WA1 — Providence Radio Ass'n., W1OP, Box 2903, Providence, Rhode Island 02908.

W2, K2, WA2, WB2 — North Jersey DX Assn., P.O. Box 505, Ridgewood, New Jersey 07451

W3, K3, WA3 — Jesse Bieberman, W3KT, RD 1, Valley Hill Rd., Malvern, Pennsylvania 19355.

W4, K4, WA4, WB4 — F.A.R.C. — W4AM, P.O. Box 13, Chattanooga, Tennessee 37401.

W5, K5, WA5 — Hurlley O. Saxon, K5QUH, P.O. Box 9915, El Paso, Texas 79989.

W6, K6, WA6, WB6 — San Diego DX Club, Box 6029, San Diego, California 92106.

W7, K7, WA7 — Willamette Valley DX Club, Inc., P.O. Box 555, Portland, Oregon 97207.

W8, K8, WA8 — Paul R. Hubbard, WA8CXY, 921 Market St., Zanesville, Ohio 43701.

W9, K9, WA9 — Ray P. Birren, W9MSG, Box 519, Elmhurst, Illinois 60126.

W0, K0, WA0 — Alva A. Smith, W0DMA, 238 East Main St., Caledonia, Minnesota 55921.

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VE8 — George T. Kondo, VE8RX, c/o Dept. of Transport, P.O. Box 339, Fort Smith, N.W.T.

VO1 — Ernest Ash, VO1AA, P.O. Box 6, St. John's, Newf.

VO2 — Goose Bay Amateur Radio Club, P.O. Box 232, Goose Bay, Labrador.

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(Continued from page 61)

A surprising source of misunderstanding seems to be, of all things, how to read GMT. A number of hams have contacted me upon receipt of a card to report in a huff that they weren't even on the air the day the card shows. They were on

(Continued on page 168)

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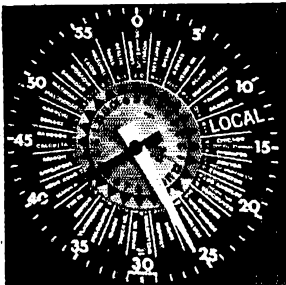
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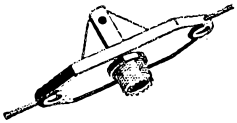
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the previous evening, but not the day indicated. Of course the problem here is simple. If the time indicated on a card is 0400Z on November 15, this time is 2000 PST November 14; the day before. The solution to this problem is to recognize that most OOs (like most hams) use GMT. We should have all now converted to Zulu time, or Universal time, or be able to convert it back to local time if our own logs aren't kept in GMT.

Do OOs make mistakes in calls? Indeed they do! Despite great care in monitoring, and even the use of tape recording for "listening again," some c.w. sending is so sloppy, and some phone enunciation so ambiguous, that errors are sometimes made. Where identification is very shaky, no card is sent, but where identification seems positive, it is the OOs duty to try to be of help, and he sends a card. If you are really convinced that the card was sent you in error (like you were on vacation that month), return it to the OO, and he may check his observing log and contact the other end of the QSO in question, trying to route the card through him.

Conclusion

One of the great "equalizing" virtues of amateur radio is that we are all known by the quality (and sometimes quantity) of our signals. It behooves each of us to take seriously the quality of his signal, to the end that we may invest the phrase "Amateur Radio" with the dignity and respect that only excellence of signal and operation can bring. Complete compliance with "97.73" is a big step in this direction.

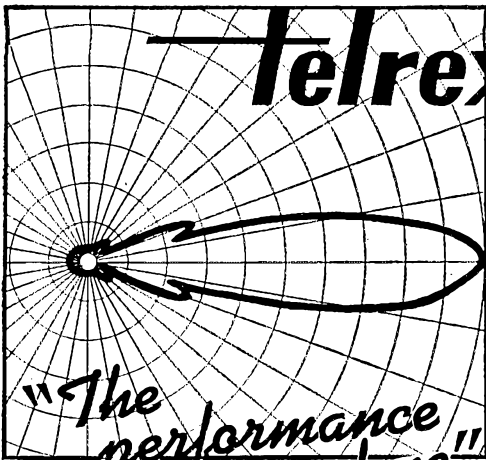
Thanks to OOs W6PCP and W6LDA and to K6HV for their comments and insights.

Low-Level Blocked-Grid Keying

(Continued from page 16)

The same method certainly could be applied to a Class AB₁ final amplifier. It is doubtful that it could be made to work satisfactorily with a final stage that takes grid current, because the resistance introduced by the shaping circuit into the grid-return circuit would be too large for normal grid-leak operation.

In summary, it can be said that with sufficient care in design and adjustment, and the willingness to keep continuous watch on the adjustments to be sure that they *are* right, it is possible to get clickless keying, and may even be possible to work break-in, when the transmitter is keyed in a low-level stage. However, it would appear that the break-in question could be answered more straightforwardly by using differential keying with all shaping done in the final stage. With that system the transmitter noise output can be eliminated, and once the shaping time constants have been set it is only necessary to see that the final stage drive and loading are adjusted for the same operating conditions on all bands — an adjustment that can easily be checked by measuring the plate and grid currents.



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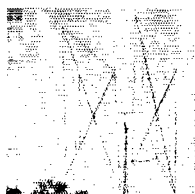
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WE Buy all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co., Box 516, Hempstead, N.Y. ACT Now!! Barry pays cash for tubes (unused) and equipment. Barry Electronics, 512 Broadway, NYC 12. Call 212-Walker-5-7000.

WANTED: Tubes, all types, write or phone W2ONV, Bill Salerno, 243 Harrison Avenue, Garfield, N.J., Tel: Garfield Area code 201-471-2020.

NOVICE Crystals 80-40V, \$1.05 each. Also other freqs. Free list Nat Stinnette, W4AYV, Umatilla, Fla. 32784.

HAM Discount House. Latest amateur equipment. Factory sealed cartons. Send self-addressed stamped envelope for lowest quotation on your needs. H D H Sales Co., 170 Lockwood Ave., Stamford, Conn. 06902.

RTTY Channel Filters, octal mounted, 2125/2975 cps, \$5.95 pair, 88 mhy toroids, uncase, 5 for \$2.50. Herman Zachry, WAnG1, 3232 Selby Ave., Los Angeles, Calif. 90034.

WANTED: Mode #78 Teletype equipment, R-388, R-390A. Cash or trade for new amateur equipment. Electronics—Howard Co., Box 19, Milton, Mass. 02101 (617-742-0048).

WANTED: Drive unit for Boehme Automatic keying-head, Type 4-B. Seals B, State price and condition. H. R. Stewart, Box 57, Point Reyes, Calif. 94956.

SELL: CO. QST, Handbooks, old IRE Proceedings, any quantity. Buy: Old radio gear and publications. Erv Rasmussen, 164 Lowell, Redwood City, Calif.

SACRIFICE: KWM-2 mint condition, \$659. "Factory installed" noise blander, \$69; mobile supply, \$49.00. Mobile Mount, \$64; A.C. supply, \$65.00; 30L-1, \$319.00; Heath HO 10 monitor scope, \$54.00; Hy-Gain full size 3-el. 20 M beam, \$35.00. Fred Breitbart, 1725 Broadway, Brooklyn, N.Y. Tel. GL5-2222.

HALLICRAFTERS SX-101A, Tecraft six meter converter with power supply, and Webeor Regent Coronet tape-recorder. Will sell together or separately for highest offer. Guaranteed perfect condition. Contact Charles Ormsby, K1PCS, 6 Driftwood Lane, Weston, Mass.

WANTED: For personal collection; QST, May 1916: Learning the Radiotelegraph Code, 3rd edition; How to Become a Radio Amateur, Edition 10 and 12; The Radio Amateur's License Manual, Edition 7, 10, 11, 12, 15 and 16. WICUT, 18 Mohawk Dr., Unionville, Conn. 06085.

WANTED: Johnson 240-305-2SSB adapter. Good condition. Pay top price. Will pay shipping costs. Roy Bechtel, 5609 Seminole Street, College Park, Maryland. Tel: (301)474-5585.

600 P.I.V. @ 750 Ma. Tophats, includes by-pass capacitors and resistors, 10 for \$3.00. 10 @ 17 ceramic coil forms, slug-tuned, 5 for \$1.00. All postal. S.A. Fully guaranteed. East Coast Electronics, 123 St. Boniface Rd., Buffalo, N.Y. 14225.

SELL: SX-101 Mark III, and R-46, \$165.00; SB-10 plus power supply, \$55.00; Viking II and VFO, \$90; Johnson T-R switch 250-59, \$18.00; Eimac, PMR-7, AF-67 and M-1070, \$135.00. W8QGP, 7948 Nancy Court, Norfolk, Virginia, 23518.

COLLINS Owners: Tired of out of band operation when working DX-split frequency? Avoid bandswitch changing with our new kit that installs in 60 seconds. S/Linc, \$21.95; KWM-2, \$11.95 postpaid. Front End Conversions and update, 75A-4, \$69.95; 75-S series, \$34.95. 72-hour service. VCZ Sales, Box 15, Ramsey, New Jersey 07446.

SAVE \$500.00! Clegg Zeus, Interceptor B and Allbander, bought new in 1956, mint condx, recently updated by Squires-Sanders. Cost \$1375. Prefer one package pick-up deal, \$875.00. W4APSU, George R. White, 3520 Galloway Ave., Memphis, Tenn. 38122. Tel: 901-323-2372 after 6 P.M.

COLLINS KWM-2, 30L-1, 516F-2, 312B-3, 189A-2 for sale, \$1,050.00. Exclnt condx. Will ship in original boxes. W5LKN, 1205 Cheyenne, Richardson, Texas 75080.

DRAKE 2B, 2BQ, 2AC, extra crystals. Exclnt, used little, \$200.00. W2BAEO, Tel: 212-721-4518.

HEATH HO-10 signal monitor completely wired and in perfect operating condx. Cabinet in A-1 shape. Will ship to first offer over \$60.00. Send check or money-order to Pete Chamiano, W1BFD, 111 Bunka Vista Road, West Hartford, Conn. 06107. (Shipping Continental U.S. and Canada only).

THOR 6 like new, Clegg's best 6 meter AM. Original cartons and instruction book. First \$195.00 takes. Ed Shuey, W3BTA, 4913 Keppler Place, Washington, D.C. 20031.

PORTLAND, Oregon, would like contact with amateur for weekly QSO. Schneider, K6EY, 576 Spruce, San Francisco, Calif. 94118.

4X250B, \$10 pair; 4X150A, \$5 pair; 4CX250B, \$12 pair, used. New \$20 pair p.p. 4-125 new \$10 pair; 4-65 new \$7 pair; 811 new \$5 pair. All above guaranteed, 50¢ extra for glass tubes shipping. C. M. Pruett, Star Rte. C, Flamingo Bay, Ft. Myers, Fla. 33901.

TORONDS, 88 mh, uncase, 5/\$2.50. Postpaid. Humphrey, W6FKN, Box 34, Dixon, Calif.

DRAKE TR-3 and AC-3 power supply for sale: \$475.00. WA1BSE, 66 Osprey Dr., Groton, Conn. 06340.

GOING Sideband: All equipment int, one owner, original cartons, manuals. New Eimac AF68A, M1070 AC/DC power supply, 17 tubes, cables, complete \$165.00. Globe HG-303; companion V-10 VFO, cables, new, \$90.00. Vitoroxy bug, leather carrying case, \$15.00. Newest, HO-110A, beautiful, \$175.00. Firm. Bob Salituri WB2BKS, 2728 Kings Highway, Brooklyn, N. Y. 11229. Tel: ES 7-4285.

GALAXY V and AC 35 supply for sale, immaculate, brand new. Used exactly 10 hours. Original purchase price \$560.00. Will sell both for \$380.00. Write F. Klein, 35 Newton Dr., Nashua, N. H. or call 603-889-2971 after 5:30.

SAVE \$500. Clegg-Zeus Interceptor B and Allbander bought new in 1965, mint condx, recently updated by Squires-Sanders. Cost \$1375. Prefer one package pick-up, \$875.00. W4APSU, Geo. R. White, 3520 Galloway Ave., Memphis, Tenn. 38122. (901)-323-2372 after 6 P.M.

FOR sale: SB-100, SB-200, SB-300. Wanted: any kit to wire and repair, preferably Heathkit. Most Heathkits in stock. Business reply on request. Lan Richter, 131 Florence Dr. Harrisburg, Penna. 17112.

WANTED: Military, Commercial, Surplus, Airborne, Ground, Transmitters, Receivers, Test sets, Accessories, Especially Collins. We pay cash and freight. Radio Electronics, Box 156, Annandale, Virginia. Tel: (703)-560-5480 collect.

Eico 720, 722 VFO, TR-4, Rotator, W2AU quad. Best offer in NYC area. Owner drafted. Call (212)538-8856.

COLLINS Owners! AM wired kit, \$5.00! No soldering! Holes! Chassis Removal! Switch In-Out! (State Model). Kit Krait, B-763, Harlan, Ky.

\$350.00 takes all! Hallcrafters SR-160 transceiver, AC and DC supplies, VOX control, crystal calibr., like new. W2WEE, tel: 301-388-0085.

DX-60, \$55.00; HG-10 VFO, \$30.00; HQ-100C, clock, calibrator, \$115.00; package: \$175.00. All with manuals. W6PCV, 3022 Wynwood Lane, Los Angeles, Calif. 90023.

COLLINS 32S-1, 75S-1, 516F-2, Immaculate, \$650.00. F.o.b. 657 Yorkshire Rd., Winston-Salem, N.C. 27101. Tel: PA 4-8555. R. H. Witherington.

RANGER II, \$175.00; Johnson T-R switch, \$15.00. Bill Adkins, WAOPML, 719 27th St., N.W., Rochester, Minn.

TEKTRONIX 511-AD, \$235.00; 75A-4 filter 6 kc., \$39.00; Eico 460 scope, \$60.00; Bird Wattmeter, \$50.00. Want: SX-62, S-36A, S-27, W8RMH, 1910 Longpoint, Pontiac, Mich.

FOR Sale: 214 new G-E fractional KVA transformers and 3,200 new capacitors (11 sizes) @ 10¢ each or \$341.00 for the lot. F.o.b. Trenton, N.J. 08638. R. Breitingcr, 198 Oaklyn Terr.

SELL: NC-57, \$35.00; S-85, \$50.00; DX-100-B, \$100.00; Knight 50 W. xmtr, \$30.00; Eldico EEA keyer-monitor, \$45.00; KW plate supply \$40.00; 6 ft. Bud rack, \$20.00. All the above with manuals in excellent condition. K&CCCV, R. Schlar, 3471 Norquest, Youngstown, Ohio.

APACHE \$120.00; Cheyenne transmitter with matching 12 VDC supply and mike. Needs recalibration, \$80.00; Two'er, good condition: \$25.00; SX-99, good, \$85.00; Gonset Supr-12 mobile converter, excellent, \$30.00; used 833-A, \$5.00; 4CX1000A, \$15.00. Also 0-8 RF ammeters. F.o.b. Fulton, N.Y. SASE for details. Bob Kooney, W2OCT/W2AET, Box 5, Fulton, N.Y.

WANTED: 5000 ohm spkr for Hallcrafters SX-28. Selowentrich, 135 Colfax Ave., Clifton, N.J. 07013.

COLLINS 75S-1, \$290.00; Darke 13C Hampton Arms, Hightstown, New Jersey. Tel: 609-448-4014.

WANTED: Magnecord PT-6 type tape recorder, any condition. Will also consider Viking. Need schematic for Knight T-100. R. E. Rieder, W9DRY, 727 Garfield Ave., Aurora, Illinois 312-896-9813.

GROUNDLED Grid filament chokes, 30 amp 10-GA tube, bifilar wound, ferrite core, \$3.65. W. Deane, 8831 Sovereign, San Diego, Calif.

SALE: Knight T150A, \$75.00; Mosley Tri-Array Tri-Band beam, \$65.00; Instructograph with tapes, kc. and phones, \$35.00; D-104 with P1F, stand and cables, \$20.00, 100 ft. RG-8/U, \$6.50. All in excellent operating condx. Sam Reck, WA1DXG, Box 241, South Wellfleet, Mass.

SELL Or trade: New 300 mmf and 1500 mmf vacuum variable. Pair new 4-400. Want: KW Matchbox with or without Bridge. Perry, K4ORZ, Rt. 2, Box 75P, Thomson, Ga. 30824.

SELL: Swan 240 xcvr, SW-117 AC supply, HP-13 DC supply. Best offer. Want: 5-Band xcvr. Make offer. WA2RUD, Bill Levy, Holly Park Rd., Rye, N.Y. 10580.

TELEREC 536 Beam with TS-250 rotator, both in mint condition, \$450.00; Central Electronics RF analyzer, \$75.00. Need Collins 312B5, W2AWK, 516-WA1-0783.

DRAKE 2B, Q multiplier, 100 Kc. Cal. Perfect condx. Make offer. W21YR.

E-Z Way 40 ft. crank-up tower, galvanized, perfect condition. Base hinge building bracket, 5 ft. mast. Only \$139.00. W6ming K410, 6417 White Sand Terr., F.o.b. Sarasota, Fla. 33581.

DRAKE 2B, 2BQ, 2AC, \$195.00, Globe 15B-100, \$25.00, Knight VFO, \$10.00; Simpson 311 VTVM with regular and RF probes, \$40.00, Knight Dipper, \$12.00, Mosley Triband whip, \$7.00, Lindberg, 424 Melrose, Centralia, Ill. 62801.

SELL: Adventurer, v. clean, exc. keying, \$25.00; Viking 127 VFO, \$19.00; AR-3 rotor, \$17.00, 3-c. kl. h.b. 20 M beam, \$25.00. Wally, 1784 Germaine Ct., Hayward, Calif. 582-0992.

CLEANING UP. Globe Chief, \$20.00; Eico #460 scope, \$50.00; Eico #488 Electronic Switch, \$10.00; Eico #324, RF gen., \$12.00; A/FM car radio, \$35.00; BC-794 and P/S, \$25.00; EB 3" scope, \$15.00, and other misc. parts. Send for list. The above F.o.b. WA2KSD, Brian Alsop, Box 186, Cold Spring Harbor, N.Y.

CHRISTIAN Ham Fellowship now being organized as non-denominational organization. Donations are needed for work among hams, Christian Ham Callbook for \$1.00 donation. For details, write Christian Ham Fellowship, 5857 Lakeshore Drive, Holland, Michigan 49423.

WANTED: Ted and URR-13 Navy UHF sets, also R-484/APR-14 recs, APR-9, 13, 17, 19 recs., TLR-1 recs. GRC, PRC, TRC, also any electronic countermeasure systems and books for same. Tech Systems Corp., 42 W. 15th St., NYC 10011 N.Y. Tel: CH 2-1949.

HR-10 Receiver used about 25 hours, new condition, with crystal calibrator, \$65.00, also realistic VTVM and Signal Generator, \$25.00, all calibrated, never used. Will sell separately or in one lot. You pay shipping. Robert Otten, 233 East First, Waukegan, Minn. 55387.

COLLINS 7553, \$415.00. J. Gillson, 109 Mullin Road, Wilmington, Del. 19809.

SELL: GPL Broadcast Camera Chain, \$850.00. W2RLG, 42 Union St., Matawan, N.J. Tel (201)-566-9238.

SELL: HQ-170, in exc't condx, with manual, original carton, \$185.00; DX-100, \$75.00; Wheatstone tape perf. and Boehme tape head/mixer, perfect working order, asking \$275.00. Tubes: (3) 833A's, \$10.00 each. Joe Johnson, K9YNG, 300 N. Walnut, Clinton, Illinois. Tel: 217-935-5507.

COLLINS 312B-5, \$225.00; PM-2, \$100.00; CC-2, \$50.00. Also HC-221 with AC supply, \$60.00. K3HCA, 827 N. Leh St., Allentown, Penna.

WANTED: Central Electronics 100V, 160-meter coil. Henry Wing, Chappelle Rd., Briar-Adams (Savoy) Mass.

WANTED: Central Electronics SSB Transmitter with ITS external VFO in good condition. Louis Marko, 70 Beech Terrace, Wayne, N.J.

L.A. Calif. Swap Heath Cheyenne with AC supply, Twoer, plus DC supply, SWR meter for 40-mtr. beam or ORU? Ralph, WB6PCZ, HQ-7-4412.

FOR Sale: Hy-Gain 2BD0, \$12.00; 18V, \$10.00; 14AV0, \$12.00; HRO, 1938 classic receiver general coverage, \$40.00. All in perfect condition. W1OER.

BEST Offer takes fifteen years of OEST, May 1937 thru Dec. 1951. Only four issues missing. W0EVP, 406 Seventeenth St., Bismarck, N.D. Dak.

FOR Sale: SB-10 Heath Sideband adapter excel. condx, \$75.00. WB2CWX, 1153 Outer Dr., Schenectady, N.Y. 12303.

NOVICES! SX-140 reconditioned by E. F. Johnson engineer. Must sacrifice for school expenses. \$69. Will ship. John Koss, Shattuck School, Faribault, Minn.

WANTED: HRO-50 or HRO-60; VLF coil sets E, F, G, H, J and VHF set AD for HRO-60. Bill O'Brien, 14 Laurel St., Rockville, Conn. 872-0000.

SELLING Hallicrafters HT-44 transmitter, \$165.00; matching PS, 150-120 power supply, \$65.00; HT-41 linear, \$195.00. Package deal; \$495.00. All in exc't condx. Pick up only, sry. WA9-KHT, 2224 W. Fletcher St., Chicago Ill. Tel: 935-0309, after 6 PM.

SALE: Heath DX-40 and VF-1, \$50.00, BC221-M with power and calibration book, \$75.00. Jim Bogan, K8OHU, 4430 Bancroft, Toledo, Ohio 43615. Phone 536-6072.

HALLICRAFTERS S-36A, and S-37, excellent. J. C. McKim, 505 1/2 Figueroa, Folsom, California 95630.

SELLING one owner HT-37, \$239.00; SX-101A, \$179.00. Both are in excellent condition. Sixty counties worked SSB with this pair, barefoot. Call 517-EO2-1774. K8PKF, L. Graham Lyday, 3647 W. Arbutus, Okemos, Mich.

NATIONAL NCL-2000 linear amplifier in perfect condition. Original cartons, \$425.00. L. A. Jackson, 37 Coverstone Drive, Dayton, Ohio 45459. W8ARV, Telephone: Area code 513, No. 433-1203.

SELL: National HRO receiver with coils for 80, 40, 20, 10, \$50.00. Hammarlund HC-10, \$50.00. All in excellent condition. W2KZ, 61 E. Dewey Ave. Buffalo, N.Y. 14214.

PHILIP Frederick Thomas (EX-W9GKC, Ravenna, Nebraska). Please write R. Verje Johnson, W2GTQ, Lockwood Road, RFD 2, Peckskill, N.Y. 10566.

WANTED: 6 meter, 4 ring halo, new or used. John Thomas, KN8MT, Box 198, Gallatin, Tennessee 37066.

KWM-2, new February 1965, \$625.00. Will ship in original carton. K3JFV, 18 W. Front St., Media, Penna. Tel: 215-LO6-0934.

WANTED: Morrow 115 volt AC power supply, mod. RTS 600 S. W8NAL.

WANT: Collins 312B-4, 75S-1, 32S-1, K6KA.

DRAKE 2B Q multiplier spkr, crystal calibrator, \$195.00; HT-37 xmtr, \$200.00; HO-10 scope, \$35.00. All exc't condx. B. Binder, WA2CDA, 26 Sarah Drive, Spring Valley, N.Y. 10977. Tel: 914-352-1482.

SELL: Eimac PMR-7, AF67, 1070 supply, good condition, with manuals \$7.00. Archie Foster, Fine, N.Y.

PACEMAKER, \$110.00; RME-6900, like new, \$235.00. W2-TZL, 467 Apple Orchard Lane, Webster, N.Y. 14580. Tel: (716)-671-5872.

SIGNAL Generators, General Radio 605B and Espy I-126. Best offer cash or ham VHF gear trade sets both. I. Bova, 4320 E. Barling Drive, Pittsburgh, Penna. 15227.

TR-3 W/AC-3 and RV-3, \$525.00. F. Corliss, 4557 Feliciana Dr., New Orleans, La. 70126. Tel: 504-288-2794.

FOR Sale: Heath Mohawk SSB/AM receiver by the original owner, complete with manual and trimmers and an auxiliary speaker. This is a good receiver and will move fast at \$135.00. Will ship freight collect upon receipt of the first certified check that I receive. Will receive 160 through 10 meters, Colonel C. E. Woodrow, WASLSK, P.O. Box 775, Sherman, Texas 75091.

FOR Sale: One Swan Model 240 (20-40-75 meters) Serial No. 383730, 1963 kit modification installed. Works beautifully. \$200. W3VDA, P.O. Box #1333, Harrisburg, Penna. 17105.

COLLINS 75S-1 receiver with all crystals, \$310.00 shipped. No personal checks. Jerry Kelly, RR #1, Box 19, Franklin, Ind. 46131.

OVER 200 issues of OST: 1940-1963. Several in early 1930's. Best offer, HQ-100 speaker, factory BFO, \$105.00, VF-1, \$15.00. Bob Olsen, WA2QPX, 41 Mine St., New Brunswick, N.J.

HEATH SB-100 wired and aligned by commercially licensed technician. Never mobile, \$375.00 with homebrew AC and HP-13 mobile power supplies, \$425.00. Drake 2B, 2AC, 2BQ very good condition, \$180.00. W. Dow, 4815 Anson St., Lansing, Mich. 48910.

DX-100B, three extra 1625's, homebrew antenna coupler: \$100. K1RQO, tel: 237-1772.

PRINTED Circuit Boards custom designed and processed to your diagram or layout. New tinned process protects board from corrosion and gives good solderability. Send us your circuit for price and delivery time. Printed Circuit Design and Processing, 714 Walnut St., Rte. 3, Albertville, Alabama 35950.

WANTED: Swan 350, Galaxy V, or Heath 300. Pay cash. Write or phone HU-3-3390. W0WYH, 1507A, Dodge City, Kansas.

FOR Sale: KWS-1 and 75A-4, like new, \$1175 with station control and other goodies. Frank Lindsay, Holdrege, Nebr.

COMPLETE Hammarlund console station: HX-50A exciter, HXL-1 linear, HQ-180XE receiver, HK-1B keyer, Collins 75A-4 (updated), all practically new with complete wiring harness, TA-33 beam with Ham-M rotator, many extras. Best offer over \$1650 takes. W2WK, 3579 Milburn, Baldwin, N.Y.

SACRIFICE: HQ-150, and HC-10 SSB, slicer, both \$175.00. Will ship. Write Vic Weissbrodt, W9JFP, 2100 E. Webster Place, Milwaukee, Wis.

SB-610 perfect condition guaranteed or money back. Wired by professional. Any IF specify, will do for you. Make offer, WA9MZL, Roger Martindell, 3228 S. High School Rd., Indianapolis, Ind. 46241. Tel: (317)-241-2710.

WANTED: A.C. Power Supply for G-76 (Gonset), State price and condition. Joe Borge, WA2VCV, 98 South Street, Milltown, New Jersey.

HW-12 with HP-13 P.S. completely wired and tested, in A-1 condx. Postponed west coast mobile trip, never installed. Asking kit price, plus this ad only. W3DCY, Nicktown, Penna. 15762. Tel: (841)-948-6000.

NEW Generals or Novices, DX-100. Perfect operating conditions. All factory authorized improvements. \$65.00. WA4SCA, Alan Hiddle, University of the South, Sewanee, Tenn.

FOR Sale: New Drake 14-X transmitter; R-4 receiver; A.C. power supply; MS-4 speaker; TH3MK2 beam kit for xtal control. Simply can't get interested in radio. Packing and shipping extra: \$685.00. J. D. Rouse, P.O. Box 792, Brownwood, Texas 76801. Tel: (915)-643-0481.

COLORADO Ham Directory, now available. Over 3700 current listings. \$2.00. Denver Radio Club, Box 356, Denver, Colorado 80203.

SELL: Radio equipment, parts and magazines. Send stamp for list. W9NSG, 1601 Center Ave., Brodhead, Wis. 53520.

FOR Sale: Adcom 12-250, HP-13 power supplies, \$45.00 each. Heath grid dip w/all coils, \$10.00, 1923 Halli-watt with 3 horn-type speakers, perfect condition, \$75.00; Heath 10-12 scope just built and calibrated with Tektronics, \$75.00; SB-10, \$49.95, 7544 w/2 tilters S/N 5099, like new, in original carton. One of last manufactured; \$425.00. Send SASE for list. Don Johnson, K6MIM, 76 LaVerne, Ventura, Calif. 93003.

SELL: HO-160, PE-103A and mobile xmtr, D-104 mike, RG-8/U coax, and misc. other items. D Royal, 3900-11, Des Moines, Iowa.

FOR Sale: Heath RX-1, \$150.00; Heath HX-10, \$150.00; HM-15 pwr. mtr., \$10.00; HD-11 electronic keyer, \$15.00; Hallicrafters HA-1 T/O electronic keyer, \$30.00; Vibrox paddle for HA-1, \$6.00; Simpson 260 VOM, \$15.00; Millen 90651 grid dip meter, \$30.00; RCA, WY-98C VTVM, \$35.00; Sencore FS-127 scope, \$40.00; Heath IP-12 grid, DC pwr. supply, \$25.00; D-104 mike w/stand, \$8.00; Shure 488A mic, \$10.00; all in mint condx. Must sell. First check takes. Bill Newman, Box 1008, La Grange, Ga. 30240.

TA33 SR. Beam, \$60.00 F.o.b. Trade for Fiberglass quad. WA1BDJ.

STAINLESS Steel Hardware. Small quantities. Send SASE for list. Arlington Stainless, Section B, Box 2641, Baltimore Md. 21215.

COLLINS 32S-3, serial number 10,362 with AC supply, \$550; also SX-100, \$150.00. Both very clean, in exc't condx. Will sell separately. Express prepaid. Lindy Watkins, K4ASF, Rte. 1, Millport, Alabama 35576.

HEATHDX-60A, \$65.00; HR-10 with calibrator, \$69.00; HG-10, \$27.00 and Johnson 275 watt Matchbox with SWR meter, \$75.00 or buy all with other accessories for \$200.00. WA1FCJ, Joe Spears, 30 Inwood Road, Darien, Connecticut 06820.

SALE: BC-6101 w/BC-6141 Speech Amp., latest of the 610's, like new condx., on rollers, cabinet finished in light blue, \$200 F.O.B. Austin, Texas. Navy ARB Rec. w/ control head, wood F.O.B., \$30.00. Two Westinghouse Tape Correspondents w/ batteries, charger, tape cartridges and leather cases. Compact recorders w/ no reels to thread, just plug in cartridge. New condx., both for \$70 or \$40 ea. Want orig. VFO and manual for Gonset Commander Model "C". Walter J. Martin, 1013A Catalina, El Paso, Tex. 79925

TV Cameras, Vidicon-Orthicon, industrial new and used lenses, vidicons, pan, tilts, zooms, industrial suppliers camera reconditioning and repair. Closed Ckt TV Center, Inc., Rte. 46, Little Falls, N.J. Tel: 201-256-7379.

HG-10 VFO, Matchbox, HD-II, WA7EP, Rte. 2, Box 216C, Gresham, Ore.

FOR Sale: Hallicrafters latest model SX-122 receiver and speaker. Almost brand new. Cost \$300, sell \$165.00. Weiss, 77 Patton Blvd., New Hyde Park, N.Y. Tel: 516-GE7-1078.

COLLINS KWM-2 516 F-2 AC supply, serial number above \$3,000. One owner only. Never repaired, modified or used in mobile. Verified low hour usage. Good deal for cash and carry. B. Kasmir, W2V BX, 2157 Center Ave., Fort Lee, N.J. 07024.

FOR Sale: TR-4, AC-3, MS-4 speaker, 6 months old, perfect. \$550.00; HA-1 keyer, Vibro, key, new, \$65.00; EU-664 SSB mike and stand, \$30.00; Heath SWR bridge, \$15.00; SP-600SX, new cabinet and reconditioned, in perfect shape, \$295.00; AR-27 rotor, new, \$25.00. All F.O.B. Utica, N.Y.; J. Perry, WA2-YMS, 424 Elmhurst Rd., Utica, N.Y. Tel: (315)-724-5374.

75S-1 Guaranteed perfect, without a scratch. Used less than ten hours. Shipped in original carton. \$275.00. K5BZW, 2098B Falcon Place, Kirtland AFB, New Mexico 87118.

WRL's Blue Book saves money. These prices, without trades, cash or colling: HT-32, \$251.10; HT-37, \$233.10; HT-4-0, \$49.45; SX-99, \$85.05; HX-20, \$134.10; KWM-1, \$224.10; PMR-8, \$71.95; AF-68, \$71.95; King 500A, \$206.10; HQ-170C, \$179.10; Ranger 1, \$89.95; Valiant 1, \$152.10; Galaxy 300, \$161.10, hundreds more. Free list. WRL, Box 919, Council Bluffs, Iowa 51501.

TRADE My Galaxy V, remote VFO, speaker console, AC supply, DC supply, xtal calibrator, in A-1 condx. Want: KWM-2 and AC supply. Will ship in original cartons with original manuals. Don. WOIPB, 626 North Erie, Wichita, Kans.

FOR Sale: Southern California only: GSB-100 with D-104 P.T. mic, \$175.00; 75A-4 SN814 with 500 and 2100 CPS filters, \$375.00. Frank Pfeiffer, K6JIC, 4845 North Baldwin Ave., Temple City, Calif. 91780.

SURPLUS TCS receivers needed for Novices. Advise condition and price. B. T. Scharbach, 502 Scheurmann, Essexville, Mich. 48732

WOULD you believe an NC-303 excellent condx with all National VHF converters in matching cabinet for \$265.00? W5-PZ, Rte. 9, Box 391, Tyler, Texas.

WANTED: Manuals: BC-638A VHF freq. meter, Hickok RF sig. gen. 188, and creek audio sig. gen. 1-151-B. K9WVW, 3988 Ripon Rd., Oshkosh, Wis. 54901.

GONSET G-50 mint, Hy-Gain rotobreak, Shure mike, new Telrex beam, Dumort "snake" Can't ship sry. Complete \$185.00, K6BTH, 123 Forbes Ave., San Rafael, Calif.

MUST Sell! Hallcrafters SX-111, \$130.00; Heathkit DX-60, nine xtals, \$45.00. WB6UGG, 3171 Walker, Los Alamitos, Calif. 90720.

MAGAZINES: QST 1956 through 1961, CO 1958 through 1961, \$3.00 per year plus 50¢ postage. Send SASE for list of odd issues back to 1935, 25¢ each. K2POA, 29 Boone St., Bethpage, L.I., N.Y. 11714.

POLYCOM 2 meter transceiver, Model PC2 issue C, in excellent condx. \$190.00; Instructograph, 110VAC, built-in oscillator, 11 tapes, \$40.00; BC-221-B, Cardwell Mfg., 110VAC power supply, spare tubes and crystal, \$100.00. Ralph Atwood, K21BJ, 577 Seventh St., Brooklyn, N.Y. 11215. Tel: 212-HY-9-9094.

HALLCRAFTERS SX-140 with 2 LF amps, \$75.00; Knight T-60, \$35.00, or your best offer. Also have large Lionel Super "O" train. Steve Powlishen, WA1FFO, 53 Oak Street, East Hartford, Conn. 06118.

SELL: HQ-160, in exlnt condx, gen'l. coverage, ideal for MARS. Will deliver within 150 mi., \$160.00. Gilbert Green, Jr., K1SVW, R.D. #1, Bennington, Vt.

COLLINS 75A-4 3.1 and 6 KHZ filters. In excellent condition; \$425.00. W2OCG, 3 Henry St., Great Neck, L.I., N.Y.

500 Watts, Hallcrafters SR-500 "Tornado" w/matching AC supply. One year old, \$400. Marc Goldman, WB6DCE, 1425 Ord Grove Ave., Seaside, Calif. 93955.

FOR Sale: Collins KW-1 1000 watt AM/CW xmtr, mint condx, extra tubes and VFO, \$950.00. Make offer. New NC-60B revr. Cheap. L. B. Cox, W7ACD, Cottonwood, Ariz. 86326.

SALE: SR-160 w/PS, in exlnt condx, \$275.00. Cash only, no trade. Thomas W. Bilisoly, 513 Thrasher Lane, Austin, Texas. K4RAF/5.

SB-34, like new, \$300.00 or your best offer. Also D-104 mike, 100 KHZ calibrator, antenna accessories. W2KJP, Doug Swanson, Apt. 7, 114 Summit Ave., Ithaca, N.Y. 14850.

SB2-LA linear amplifier, \$175.00; SB2-VOX unit, \$17.00 and SB2-XC crystal calibrator \$12.00. Less than three months old, perfect, don't leave your mobile. W4RPK, 15607 Woodbrook, Cleveland, Ohio 44137. Tel: 475-0768.

GUARANTEED A-1 reconditioned equipment on trial approval at very attractive prices. Terms. Central 100-V: Collins 75S-1, 75S-3, 75S-3B, 32S-3, 301-1; Drake 2-A; 2-B; R-4; TR-4; Gonset GSB-101, GSB-201, G-50, Hallcrafters SX-101A, SX-117, HT-41, HT-32B, HT-37; Hammarlund HQ-110, HQ-170, HQ-180; National NC-190, NC-300, NCX-3, NCX-5, NCL-2000, HRC-500. Much other equipment. Write for lists. Henry Radio Company, Butler, Mo.

INCENTIVE Licensing? You need Posi-Check, Amateur Extra and General Class FCC type exams, complete in detail and style, even to the IBM type answer sheets. A very good aid to learning and a Must in preparation for FCC Amateur exams. General Posi-Check consists of 297 questions and explained answers for only \$2.98. Extra Class, 115 questions and diagrams with explained answers, \$2.00. 139 questions of the 297 in the General Posi-Check apply directly to Extra Class also. Get both for only \$4.50 postpaid. Posi-Check, P.O. Box 3564, Urbandale Station, Des Moines, Iowa 50322.

SWAN 240, SW-12DC supply, dash mount with lock. Used 24 hours, all for \$300. WA4WAO, 1815 Forney Drive NW, Huntsville, Ala. 35805.

SELL: Like new, six months old, Swan 350 with crystal calibrator and AC supply. \$360.00. W. J. Miller, 1075 Second St., Troy, Missouri.

PRINTED Circuit board, Epoxy-Fiberglass. Lowest prices. Details free/sample, 10¢. Reiss. RFD 1, Storrs, Conn.

SELL: Knight R-100, speaker, S-meter, xtal calibrator, \$60.00; Knight T-150A and coax relay, \$80 (prefer local for revr and xmtr); DB-23 preselector, \$20 ppd; Leeds Northrup S-type Wheatstone Bridge, accuracy 0.1%, \$30 or best offer, ppd. Fred Scharmann, WA8MQQ, 37681 French Creek, Avon, Ohio 44011.

DRAKE 2B, xtal calibrator, excellent condition, original carton. \$200. DX-100, wired for SSB, \$75.00. Richard Lyman, WA9GDI, 1009 S. Orchard St., Urbana, Ill.

SELLING: SX-110 revr, perfect condition. \$95.00; DX-100, \$60.00. Ferris, 816 Midpark Drive, Appleton, Wisconsin 54911, Tel: 414-734-9554.

WANTED: Factory sealed HT-32B, WA8AGV.

VIKING II, factory wired, with a modified audio. I guarantee you'll like, complete with Viking VFO, \$125.00; Hammarlund HQ-110A, \$135.00; Heath DX-35 and VF-1. Make offer. All in A-1 condx. Looking for user. Sideband transceiver. Trades considered. Paul Sturpe, 1207 39th N.W., Canton, Ohio. Tel: 492-3392.

COLLINS 75A-2, 3 filters, vernier dial, book. \$375.00; Eico 753, solid state VFO, A.C. supply. Factory aligned, \$325.00. New HG-10 VFO, \$30.00. New factory aligned HQ-10 Hom-Scan I.F. 455 Kc., \$45.00. WA8QMK.

HW12, 12.32 Owner: Convert your rig to three bands for a total cost of \$28.50. This price includes new front panel and dial. Complete assembly manual only 50¢ or send for free brochure. DRC Kit, 215-28 Spencer Ave., Queens Village, N.Y. 11427.

DON'T Struggle with the code! The Codemaster system is a planned program of code learning on magnetic tape which brings you from scratch to 15 WPM. Thousands have learned by this method. Two-hour tape, \$9.95 postpaid. Brochure free. Codemaster, Box 29-A, Portsmouth, R.I. 02871.

LIQUIDATING Station, Johnson Pacemaker, 90 watts input SSB/CW, 35 watts AM, \$127.50. Supreme transmitter, year 1947, 100 watts input AM/CW \$79.50. SX-101, Mark III, \$124.50; Scott RCH Shipboard receiver, LF/HF, \$74.50; G4ZU beam, 10/15, \$49.50. (4ZU telescoping 34 ft. aluminum pipe mast, with swivel base, \$37.50. B-24 Mini-beam, for 6-10-15-20, used four months, \$42.50. 125-watt modulator, \$37.50. Heath SC-6 signal generator, \$10.50. Many other items. What do you need? All inquiries answered, J. T. Maloney, W2BE, 33-63 154th St., Flushing, N.Y. 11354.

CRYSTALS Airmailed; Nets, SSB, Novice, MARS, etc. Custom finished to ordered frequency. Each stabilized FT-243, .01% any frequency 3500 to 8600, \$1.90; (five or more same or mixed frequencies, \$1.70). (Ten or more same frequency, \$1.35). 1700 to 3499 and 8601 to 20,000, \$2.50. Above 10,000 kilocycles are overtones. Add 50¢ each for .005%. Add 75¢ each for HC-6A miniatures above 2000. ARRL SSB Book; Handbook and QST builders crystal kits: "DCS-500", "IMP", \$9.95. Many other frequencies and types available. Write for literature stating exact needs. Postage 5¢ crystal or 10¢ crystal airmail. Crystals since 1933. C-W Crystals, Route #2, Box 22-B, Marshfield, Missouri 65706.

HT-37 new condition, \$225.00. K3OST, 222 Marple Road, Brookmatt, Penna. Tel: (215)-EL6-2849.

WE-33A modulator in whole or part wanted. W2ATQ, Box 143, Huntington, N.Y.

DRAKE 2B, with 2AC and 2AQ, in exlnt condx, \$160.00. Andrew Faber, Swarthmore College, Swarthmore, Penna.

SELL Heath Apache, \$110.00; LR-1 freq. meter, \$90.00. Robert Ireland, Pleasant Valley, N.Y. 12569.

COLLINS 30S-1. Like new. Will not ship, sry. Bring \$895 cash and pick it up. Collins 75S-3, 32S-3, 316F-2, Halcrafters HA-1 Electronic Keyer, Vibrox electronic key. Like new. Sell only as a group, no trades. Will ship collect on receipt of \$1100 cash. Lyle Walters, K9SWA, 2240 So. Patterson, Springfield, Mo. 65804.

75A-4, excellent performer, few scratches, \$325.00. One 518-1, like new, \$122.00. Radio Engineering Service, Hofman-Stevens Building, Route 10, Dover, N.J.

DRAKE T-4X transmitter, \$275.00; Hallcrafters SX-100 receiver, \$110.00; Heathkit Comanche model 301, \$35.00. All in gud condx. Philip Schwebler, W9GCG, 4536 N. 50th St., Milwaukee, Wis. 53218.

HT-37, SX-101A, perf. condx, \$240.00 apiece; HE-50, 10 mtr. xcvr, \$54.00. WA5AXS, Sam, 4128 Drew, Houston, Texas.

COLLINS 32S-1 and 516L2, \$625.00; 30L-1, \$375.00; Drake 2A w/speaker, Q-Multiplier and xtal calibr., \$145.00. Johnson 275 watt Matchbox, \$45.00; all for \$1150.00. J.D. Arnold, K4JOO, 501 Hathon Circle, Virginia Beach, Va. Tel: 340-5791.

KAYRR Estate, Hallcrafters SX-101A rec, HT-37 exciter and Heathkit SB-200 linear. Exclnt condx, make reasonable offer. Brigman, Box 257, Norcross, Ga. 30071.

WANTED: Collins KWM-1 transceiver with A.C., P.S. Must be immaculate and preferably never used mobile. K0GXL, Mark Holland, 509 Des Moines St., Ankeny, Iowa, 50021.

SELL: New Collins VFO 70FRA, Johnson 6N2 converter kit, Teacraft C3 15M converter, DX-35, VF1, HT-17, SX-25, speaker, QF-1, WIPIN, 11 Dorothy Ave., Wilmington, Mass.

SELL Swan 240, exlnt condx, with brand new TCU, both for \$239.00. Want clean 75A-4, high number preferred. Also want kilowatt Matchbox. George Clark, 1030-20th, West Des Moines, Iowa 50265.

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SELL: Hammarlund HK-1B electronic keyer, \$38.00. W3CAJ.

SACRIFICE: HT-45 Hallcrafters, (Loudenboomer Mark IIA) linear amplifier and P-45 matching power supply. Original carton, manual, new condx. Used little illness. Rated 2000 watts P.E.P., \$375.00. W9RLW, Tel: (312)-392-9078. Evenings only.

RANGER with PTT, gud condx, \$85.00. D. Webster, K9MUF, 760 Jonquil, Lisle, Illinois 60532.

COMPLETE Contents of shack of K2OEO, presently in Armed Forces. For sale: NC-98 receiver, 250 watt 80-meter transmitter with kilowatt power supply, enough parts in Junk Box to open a store (no kidding). Price complete \$300.00. Will split up. Contact K2DAC, Larry Finch, 16 Linden Blvd., Great Neck, N.Y. Tel: a.c. (516)-466-0027.

TR-4 \$485.00; AC-4 \$83.00; DC-3, \$123.00. Factory sealed boxes. Warranty, naturally. Sell separately. Mel Balmer, K4-LGR, Box 10021, Greensboro, North Carolina.

100V immaculate, little used, \$35.00 or your best offer. HRO-60T with A.B.C.D coils in excellent condition; \$200. G109 200 watt c.w. VFO transmitter, \$40.00. Meissner EX Signal Shifter with P.M., \$30.00; Transformer 3000, 2500, 2000 VAC ea. side c.t. 400 ma., 115V pri., \$29.00; Stancor KW mod. Multi-Match transformer, A3899, \$25.00; Gonset mobile converter, 80-20-10 Tribander, \$20. F.O.B. my home. Bert Griffin, W2MJA, 131 Hillcrest Dr., Wayne, N.J. 07470. Tel: 694-2281.

COLLINS S/Line: 75S-3, \$400.00; 32S-3, with 516F-2, \$575; 30L-1, \$400. Like new in immaculate condx; with entire package receive Astatic 10-D with G stand. Tom Storch, 139 Greenway Road, Lido Beach, N.Y. 11561. Tel: 516-GE2-1253.

SALE! Invader 2000. W4SD.

SELL: Central Electronics 20A with 458 VFO 160-10 meters, \$95.00; Mosley CM-1 receiver, \$95.00; Heathkit HD-11 Q-Multiplier, \$10.00; homebrew logarithmic speech compressor, \$10.00. All equipment in gud condn, manuals and circuit diagrams included. K7WJT, Hardy Benson, Jr., 6240 Placita Pomona, Tucson, Arizona 85705.

NOVEMBER Specials: New in stock; Drake TR-4, \$495.00; R4A, T4X, \$330; Swan 350 or Galaxy V, \$360; SB-34, \$225 SBL-2, \$195.00; Mark I linear, \$390.00; KG-8/U, \$10/M. Hy-Gain 40M beam, \$85.00 (new). Save at Evansville Amateur Radio Supply, 1306 Division, Evansville, Indiana. Bill Ogg, WA9RMO.

SEL: HQ-170, \$170.00; Johnson Navigator 160-10 meters, \$75.00; Vibroplex original, \$12.00; 45 copies of 1936-1975 15¢ each plus postage. Radio June 1942, \$1.00. Will deliver within 50 miles. H. Hitchcock, W2CLF, 323 North Highland, Upper Nyack, N.Y.

HEATH HW-22 40-meter transceiver with HP-23 supply and crystal calibr., perfect condx. Sell for \$140.00. WA5HGTV, 6321 Kingston, Oklahoma City, Okla.

OSTS 1928 to 1944; CQs 1956 to 1964, few earlier issues; large laboratory spark-coil; Amrad quenched gap. SASE for list. W1TF, Elmer Turner, 2 Virginia Circle, Reading, Mass.

HQ-110A with clock. One of Hammarlund's finest receivers for ham bands. Guaranteed in mint condition. Priced for quick sale: \$100.00, including speaker and manual. D. Spencer, K1FRD, 341 South Rolling Acres, Cheshire, Conn. Phone 272-8723. A.C. 203.

SELL: NCX-3 with Heath AC and DC supplies; 75, 40, 20 Hy-Gain Hytoppers, in A-1 condition. Package: \$275.00. Jerry Knotts, 807 University, Cleveland, Mississippi.

SWAN 350, full ten, dial set, \$295.00. With homebrew AC, \$299.00. With Swan 117C, \$349.00; HQ-145 receiver, \$135.00. All excellent and guaranteed. WA9CPD, 5800 Twickenham Court, Evansville, Ind. 47711.

RANGER 1, PTT, \$120.00; 30L-1, \$350.00. HQ-129X, \$90.00; Clegg 22'er, \$185.00; Swan SW-240 with Swan DC supply, \$50.00. HP-3 AC supply, \$30.00. All in mint condx with instruction manuals. Complete RTTY, Mod. 19 w/desk, TD, PS, mod 14 typing reper. T.T.L. Mainliner, TU, keyer, paper, tape; excellent, package: \$300.00. W2ZBS, 57 Alda Drive, Poughkeepsie, N.Y. Tel: (914)-462-2781.

SELL: HW-32, \$95.00; Unused 4-400A, \$20.00; modified SK-400 socket and chimney, \$6.00; Handbook 15A bifilar choke, \$2.00; SVCT 15A transformer, \$5.00. C. Kump, K10DK, 21 Old Farm Road, Weyland, Mass.

HALLICRAFTERS S-120, like new, \$45.00. Trade. WA3DYW, 1021 Nora Dr., Silver Spring, Md. 20904.

WANTED: 30L1 or 30S-1, State condx. S.N. and price. Elliott, 1409 W. Ave. "M", San Angelo, Texas 76901.

FOR SALE: Collins 32S-3, with 516F2 P/S, 75S-3 rcvr, 30L1 amplifier, 314B-1 station control, all in excellent condition. Package deal: \$1400. No trades! K1FNL, Tel: (203)-583-5433.

FOR SALE: Swan 350 and matching 117C power supply/speaker, new condition; approximately 10 operating hours, original boxes, \$375.00. Base and mobile 6-meter FM equipment, SASE for information. Harold Medley, 709 W. 3rd, Connersville, Indiana.

W8FAZ desea intercambio de OST y otros periodicos tecnicos por Mundo Hispanico solamente. Correspondencia solicitada Joseph Zelle, 1227 Addison Road, Cleveland, Ohio 44103.

CLEANUP! 500 Ma, 600 Piv. Silicon rectifiers, 30¢ each ppd. 6N2 Thunderbolt, 220 Mc transverter, Gonset IV transceiver, 432 Mc amplifier, other goodies SASE. W4API, Box 4095, Arlington, Virginia 22204.

HQ-150 Receiver, \$110.00; matching speaker \$10.00. Vibroplex Champion, \$12.00. K7BTW, 2435 E. Lake Sammamish Rd., S.E., Redmond, Wash. 98052.

KNIGHT V-44 VFO, exclnt condx, best offer. David Fisher, WA6ZMR, 243 Cimmaron, Glendora, Calif.

75A-4, \$349.00; 75A-3, \$249.00; 75A-1, \$135.00; SX-111, \$139.00; SX-110, \$99.00; NC-300, \$149.00; SX-100, \$159.00; 2A, \$139.00; HQ-110, \$109.00; Phasemaster II, \$129.00; HT-37, \$249.00; GSB-100, \$175.00; Galaxy V, \$319.00; Courier, \$50. \$139.00; Free list, Howard Radio Box 1269, Abilene, Texas 79604.

4CX1000A. Have two in exclnt condx. Best reasonable offer. D. Meeves, 215 N. 7th, Council Bluffs, Iowa.

COMPLETE SSB, C.W. AM, station HT-32, \$250.00; SX-101A, \$190.00; 1.7 KW P.E.P. GG w/p.s. and control console w/built-in monitor scope, \$225.00. Extras, all in Hallcrafters cabinets, in mint condx, WB2YM, Bob Hollander, 120 Iroquois Dr., Brightwaters L.I., N.Y. Phone (516)-665-6653 after 6 P.M.

G66B, G77, 3-way supplies, cables, manuals, \$175.00. W2IXD, 153 Belgrave Drive, Kearny, N.J.

VIKING Valiant, factory-wired, NC-125 receiver, \$250.00 for both. In excellent condition. No shipping. sry. K1BHB, c/o Warner's Music Center, 34 West Main, New Britain, Conn. 06051.

FOR Sale: HT-37, \$250.00; SX-111 with matching speaker, \$150.00; Johnson Viking Thunderbolt Linear Amplifier, \$250.00. All with manuals and original cartons. Also: Advance Antenna Relay, B&W Linear Switch, and Low Pass Filter, and Cesco Reflectometer. All \$75.00. Included is an Astatic 10-D dynamic microphone with G-stand. Richard Semaya, WA2UBG.

SELL: Heath SB-100, excellent condition, plus FB HB AC power supply, \$360.00. Never used 4CX-1000A with Eimac 6X4 tube and chimney, \$125.00. Can be seen in N.Y.C. area or Boston area. Call 617-897-9185. Write: Thomas Guszczak, 52 Summer Hill Road, Naynard, Mass.

AMECO TX-86 factory-wired for 12V Johnson Challenger, \$90.00; Dow-Key 12V relay, \$9.00; DB-20 Presclector \$15.00; Bow-tie 10-meter antenna, \$10.00. Hallcrafters SX-J10, \$90.00. W2MNB, Leo Israel, 35 Henry Dr., Glen Cove, N.Y. Tel: 516-OR6-7046.

SELLING 1 1/2 KW combination: Hammarlund HX-50, \$225.00; HX-L1 linear, \$275.00; package deal: \$475.00. Only slightly used, perfect condition. Invite inspection or 20-meter schedule. Dr. Robert Strobel, W0ENL, New Brighton, Minn. Tel: (612)-633-2393.

LIKE New equipment: Sell NC-303 receiver with calibrator, \$245.00; Gonset GSB-100, SSB-GW-AM-FM transmitter, \$190.00; package deal for both, \$385.00. Original owner. R. W. Raabe, W4ZV, 4523 West Seminary Ave., Richmond, Va. 23227.

COLLINS 30L-1 linear, mint condition. Will ship in continental U.S.A. only. \$315.00 W6MGI, 1736 Ridgeview Dr., San Diego, Calif. 92105.

FRANSEIVER, SR-160 Hallcrafters, with matching PS-150-120AC and PS 150-12 DC power supplies; all like new condx. Will include Hustler mobile antenna mast with 40 mtr. and 20 mtr. sections, and PTT mike. First certified check for \$375.00 gets it all. Charles Yaws, W0JKZ, 1307 Hillside Drive, Bettendorf, Iowa 52522. Phone: 319-555-5204.

ROHN Tower Heavy-duty motorized tilt-over, crank-up and down, \$500 or your best offer. Local deal unless you pay for shipping. WA2GYC, Tel: ED 3-0154, 671 Bryant St., Westbury, L.I., N.Y.

SELL: F. W. Ranger, 160-10M, w/manual, spare final, PTT, in gud condx, \$100; Hallcrafters S-85 rcvr, w/manual, in gud condx, \$45.00. Will deliver within 200 mile radius of Marietta, Ohio. L. Beebe, WA8RXU, 519 Mitchell Ave., Beverly, Ohio.

EICO 723 Transceiver with solid state VFO, complete with mike, mobile mount, Heath HP-13 DC and HP-23 AC supplies, also Neutronics Hustler 75 mtr. mobile antenna and bumper mount, \$250.00. R. E. Kohler, K0MWB, 1109 Dover Street, Iowa City, Iowa, 52240. Ship Collect.

SPECTACULAR Clegg Venus with Matching 416A AC power supply, \$375.00 firm. Colossal Heathkit HO-10 Monitor-scope, \$65.00 firm. Smashing Electro-Voice 664 with special pt stand, \$25.00 firm. Or the preceding plus: Ameco SWB Bridge, Rotom Whisper fan, Tvmeter, 24-hour clock, Telex headcphone, microphone combination, and more, \$475.00 firm. W/A/V No. 93 Calfans Road, North Woodmere, New York. Tel: 516-791-2119.

LINEAR For sale: HT-33, Maximum legal power. Free tubes/extras with purchase. Call weekdays: WB2NEE, Anthony Salzman, 212-879-6369.

HT37. Just reconditioned, excellent operating shape: \$225.00. W9HHHA, CR2-2443-2285 Holly Court, Northbrook, Illinois.

HEATHKIT HP-14 12VDC mobile powersupply, wired, tested, never used, cables and book included, \$200.00. Tel: (716)-342-4503. Phil Licciardi, 495 North Park Drive, Rochester, N.Y. 14609.

HEATHKIT SB-300 with c.w. filter, \$240.00; SB-400, \$300, both for \$500. WA1CTL, 16 Woodside Dr., Wibraham, Mass.

OSCILLOSCOPE: Heathkit IO-12 5-inch wide-band scope for sale. Jack Elias, 2416 South 7th St., Philadelphia, Penna. 19148.

HEATH HR-20 Hamband receiver, \$80.00; Knight T-150 transmitter, \$75.00. Both in excellent condition. WB2RAB, 110 S. Roosevelt Ave., Liverpool, N.Y. Tel: (315)-652-3277.

FOR Sale: The original "Spectroscan" spectrum analyzer, \$475.00. For complete information see CO October 1961, No shipping. sry. S. Rand, 27 Forest Ave., Ossining, N.Y.

MODEL 15 Printer with table and automatic roll take-up; TD tape transmitter, TU with a's restorer circuit and some DC loop panel, polar relay, \$200.00. Dr. Crosby, RFD Chatham, Mass.

P & H Linear, Globe Matcher, 755 VFO, 6 volt mobile power supply, PE103A Dynamotor, UM-1 modulator. Make offer all or part. W5GY, P.O. Box 128, Naples, Texas 75568.

COLLINS 75A4, Serial 5373, \$385.00 and Hallcrafters HT-32, \$215.00. Both units excellent condition with manuals and no modifications. W6YZW, G. Burge, 228 No. Glenroy, Los Angeles, Calif. 90049.

WANTED: Will pay five bucks for good clean tech manual complete with schematic for CE-20. Facsimile acceptable. WIACW, 21 Turner St., Presque Isle, Maine.

FOR SALE: Collins 75S-1 receiver, 32S-1 transmitter and 516F-2 powersupply, all for \$600.00. Linear with two (2) 450's. \$100.00. Gonset G-50, \$200.00. Philip Will, W8HPB, 30 West St., Canal Winchester, Ohio.

SELL HQ-170, \$200.00; Globe Deluxe VFO, V10, \$25.00; SB-10, in gud condx, \$70.00; Globe Model 65 Scout, \$25.00. Bill Snyder, W4WG, Box 775, Clarksville, Va.

"HOSS-TRADER" Ed Moory plays Santa Claus for November and December: New equipment with factory warranty, opened and displayed: Galaxy V, \$349.00; Swan 250, \$269.00; Swan 350, \$349.00; NCX-5, \$459.00; NCL-2000, \$549.00; TR-4, \$479.00; R-4A, \$329.95; T-4X, \$335.00; 30L-1, \$429.00; 75S-3-B, \$509.00; new SB-34, \$339.00; Demo Ham-M rotor, \$89.95; Package deal: New Galaxy V, A.C. supply, regular price \$500.00; cash price, \$409.00; Package deal: New NCX-5 and demo NCL-2000, regular price \$1370.00. Cash price, \$999.00; demo Ham-M rotor and new Mosley TA-33 beam, \$179.00. Reconditioned user: TR-3, \$179.00; HT-32, \$199.00; 2-B, \$185.00; KWM-2, \$599.00; HW-12, \$99.00; 32S-1, \$389.00; Famous Hoss-Trader ham neckties, \$1.99. Ed Moory Wholesale Radio, Box 506, DeWitt, Arkansas. Tel: 946-2820.

Designed for



Application



**The No. 90651
GRID DIP METER**

The No. 90651 MILLEN GRID DIP METER is compact and completely self contained. The AC power supply is of the "transformer" type. The drum dial has seven calibrated uniform length scales from 1.5 MC to 300 MC plus an arbitrary scale for use with the 4 additional inductors available to extend the range to 220 kc. Internal terminal strip permits battery operation for antenna measurement.

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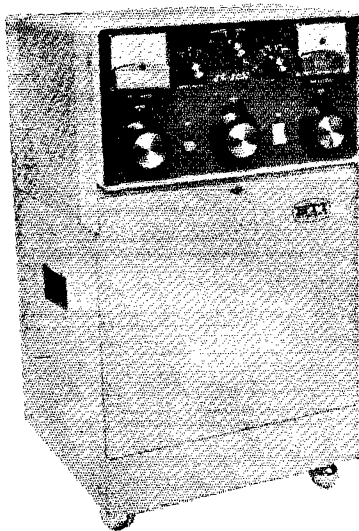
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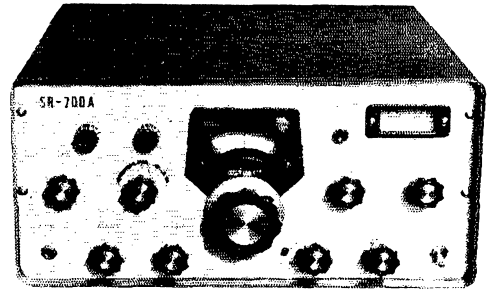
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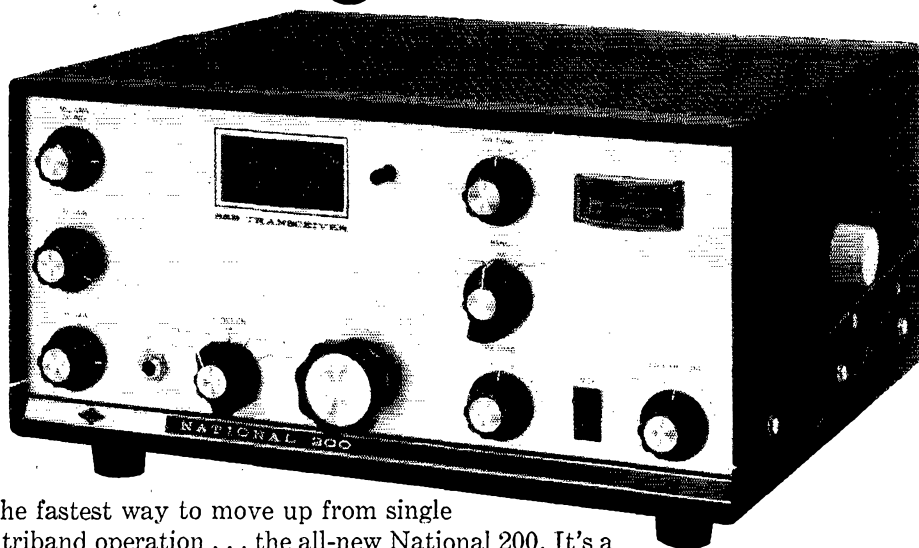
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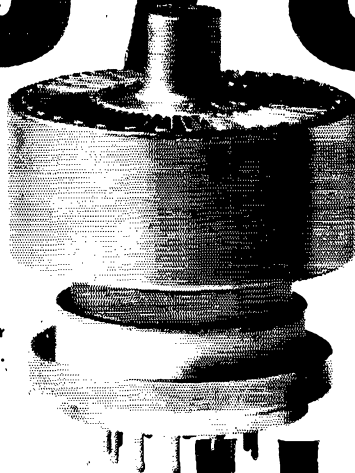
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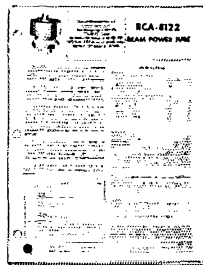
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