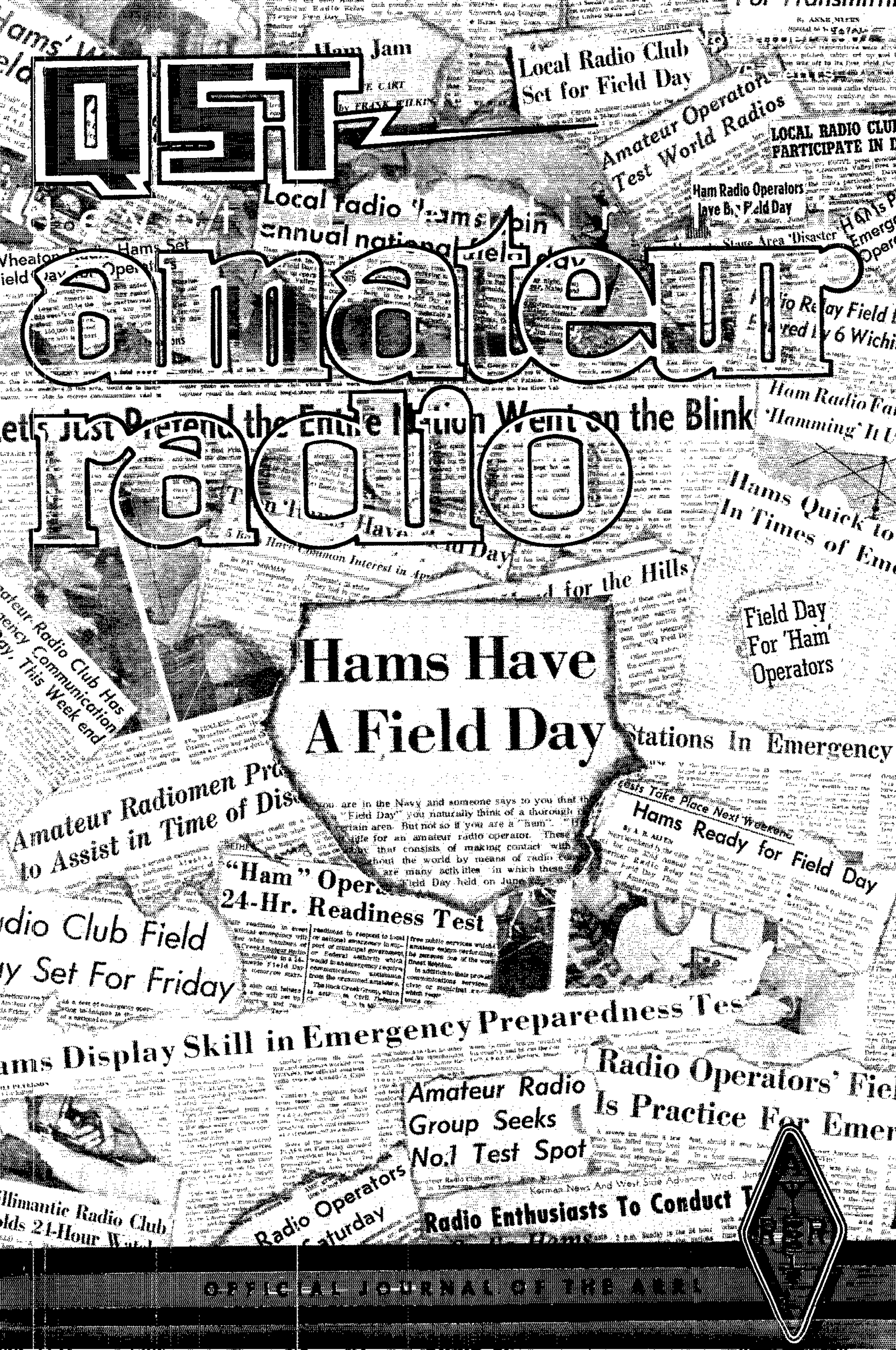
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Local Radio Club Set for Field Day
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Ham Jam
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Field Day For 'Ham' Operators
Hams Have A Field Day
Stations In Emergency
Amateur Radiomen ... to Assist in Time of Dis...
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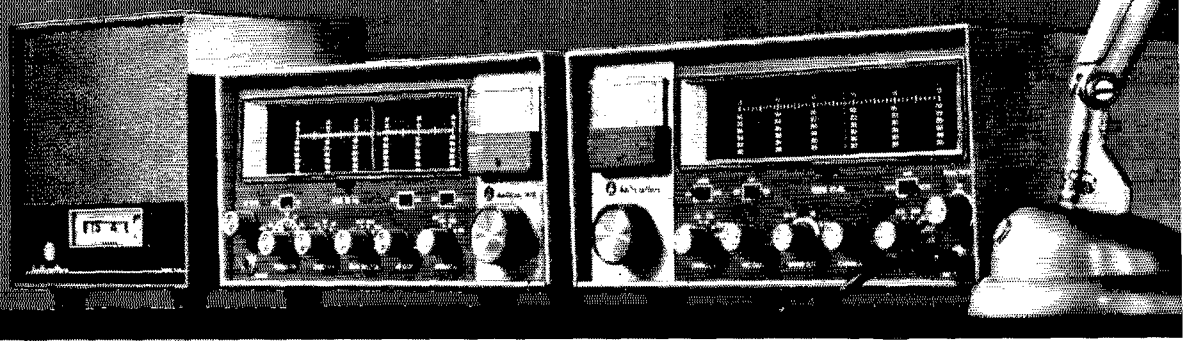

SX-146 Receiver

This is an amateur band receiver of advanced design employing a single conversion signal path and pre-mixed oscillator chain to assure high order frequency stability and freedom from adjacent channel cross-modulation products. The SX-146 employs a high frequency quartz crystal filter and has provision for installation of two more crystal filters. The receiver may also be used from 2 to 30 mc, with the exception of a narrow gap at 9.0 mc, with the connection of auxiliary oscillators. The highly stable conversion oscillator chain may be used for transceiver operation of the matching HT-46 transmitter.

FREQUENCY BANDS: 3.5-4.0; 7.0-7.5; 14.0-14.5; 21.0-21.5; 28.0-28.5; 28.5-29.0; 29.0-29.5; 29.5-30.0 mc (28.0 to 28.5, 29.0 to 30.0 requires extra crystals at users option).

SENSITIVITY: Better than 1 μv for 20 db S/N.

TUBES AND FUNCTIONS: 6JD6 RF amplifier; 12AT7 Signal mixer and cathode follower; (2) 6AU6A 9 mc IF amplifier; 12AT7 AM detector—AVC rectifier—product detector; 12AT7 USB—LSB crystal oscillators; 6GW8 Audio amplifier and audio output; 6BA6 Variable frequency oscillator; 6EA8 Crystal heterodyne oscillator and pre-mixer; Plus diode power supply rectifier, ANL diode and AVC gates diode; *6AU6A—100 kc crystal calibrator oscillator; *Harmonic generator diode.

PHYSICAL DATA: Size: 5⅞" x 13⅛" x 11". Shipping wt., 20 lbs.

FRONT PANEL CONTROLS: Frequency: Power off CW-upper-lower and AM; Audio gain; Band selector—3.5. 7.0, 14, 21.0, 28.0, 28.5, 29.0, 29.5; Selectivity—0.5, 2.1, 5.0 kc (0.5 and 5.0 kc filters optional extra); Pre-selector; RF gain; AVC on-off; Cal. on-off; ANL on-off; Phone set jack; S-meter.

REAR CHASSIS: S-meter zero adjust; Internal-External oscillator switch; Slave oscillator output; External oscillator input; Antenna socket; Speaker, ground and mute terminals; Grounding stud; AC power cord.

POWER REQ.: 105/125 volt—50/60 cycle AC—55 watts.

I-F SELECTIVITY: Uses a 6-pole crystal filter to obtain a nose-to-skirt ratio better than 1 to 1.8.

Amateur net, $269.95

Model HA-19 plug-in, 100-kc quartz calibrator available as accessory. **Amateur net, $19.95**

**Part of HA-19 calibrator.*

HT-46 5-band transmitter

All new from the ground up! Here's the "new breed" transmitter that matches your SX-146 . . . works independently or may be interconnected for transceiver operation.

FEATURES: 180 watts PEP input on SSB; 140 watts on CW; Frequency control independent or slaved to SX-146 receiver; Upper or lower sideband via 9 mc quartz filter; Built-in power supply; Press-to-talk or optional plug-in VOX; grid block for keying for CW.

FREQUENCY COVERAGE: 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5 mc and 28-30 mc in four 500-kc steps. Crystal supplied for 28.5-29.0 mc coverage. Other plug-in crystals at user's option.

TUBES: 6BA6 VFO; 6EA8 Heterodyne crystal oscillator and mixer; 12AT7 Carrier oscillator-third audio; 12AT7 Mic amplifier; 6EA8 9 mc I-F amplifier and AALC; 6AH6 Mixer; 12BY7 Driver; 6HF5 Power amplifier; 0A2 Reg.

FRONT PANEL CONTROLS: Frequency Tuning; Operation-Off, Standby, USB, LSB, CW-Tune, Standby LSB USB; Microphone gain; Driver tune; Carrier level; Band selector; Final tune; VFO selector—Transmitter-Receiver; Dial cal.; Calibrate Off-On; Meter MA-RFO.

REAR APRON FUNCTIONS: AC Cord; Ground lug; Fuse; Key jack; VOX accessory socket; Antenna jack; Receiver input (for transceiver); 11 pin control socket; bias adjust.

PHYSICAL DATA: Size: 5⅞" x 13⅛" x 11". Shipping wt., 26½ lbs.

HA-16 Vox Adapter, **$37.95**

Amateur net, $369.95

R-51 Speaker,

4 x 6 inch oval speaker and attractive 24 hour clock.
amateur net $34.95

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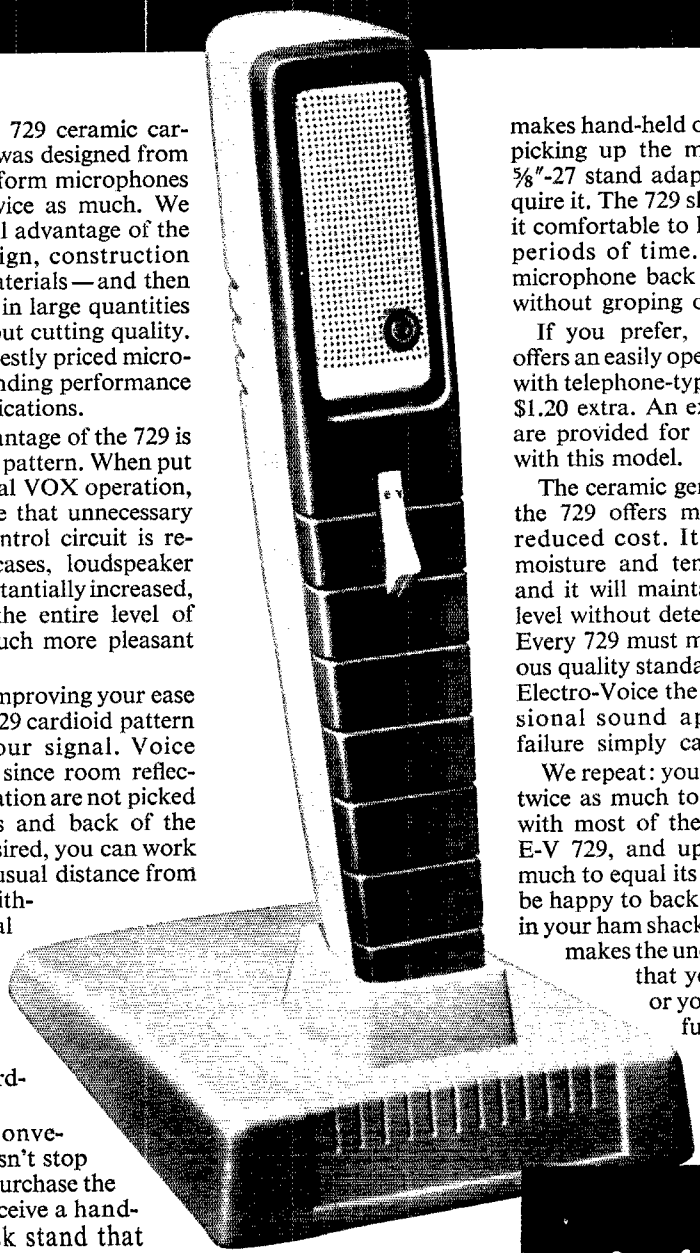
Unless you pay $30.00 or more, you can't buy a microphone as good as the E-V 729...for only $14.70*!



The E-V Model 729 ceramic cardioid microphone was designed from the start to outperform microphones selling for over twice as much. We did it by taking full advantage of the most modern design, construction techniques, and materials—and then producing the 729 in large quantities that cut cost without cutting quality. The result is a modestly priced microphone with outstanding performance for voice communications.

The biggest advantage of the 729 is its cardioid pickup pattern. When put to the test of critical VOX operation, you'll quickly note that unnecessary tripping of the control circuit is reduced. In most cases, loudspeaker volume can be substantially increased, as well, making the entire level of your operation much more pleasant and effective.

But more than improving your ease of operation, the 729 cardioid pattern also improves your signal. Voice quality is crisper, since room reflections and reverberation are not picked up from the sides and back of the microphone. If desired, you can work at up to twice the usual distance from the microphone without losing essential audio clarity. This working flexibility simply cannot be matched by an omnidirectional microphone, regardless of price.

And the 729 convenience story doesn't stop there. When you purchase the Model 729 you receive a handsome slip-in desk stand that makes hand-held operation as easy as picking up the microphone, plus a ⅝"-27 stand adapter should you require it. The 729 shape and size make it comfortable to hold, even for long periods of time. And putting the microphone back in its base is done without groping or fumbling.

If you prefer, the Model 729SR offers an easily operated rocker switch with telephone-type contacts for only $1.20 extra. An extra set of contacts are provided for controlling a relay with this model.

The ceramic generating element of the 729 offers many advantages at reduced cost. It is impervious to moisture and temperature changes, and it will maintain its high output level without deterioration for years. Every 729 must meet the same rigorous quality standards that have made Electro-Voice the standard in professional sound applications where failure simply cannot be tolerated.

We repeat: you have to pay at least twice as much to find a microphone with most of the advantages of the E-V 729, and up to three times as much to equal its performance. We'll be happy to back up our claims right in your ham shack. For Electro-Voice makes the unequivocal guarantee that you must be satisfied or your money will be refunded. Write for free E-V catalog and list of the E-V distributor nearest you.

Model 729 amateur net. Model 729SR (illustrated) $15.90 amateur net.

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Buchanan, Michigan 49107

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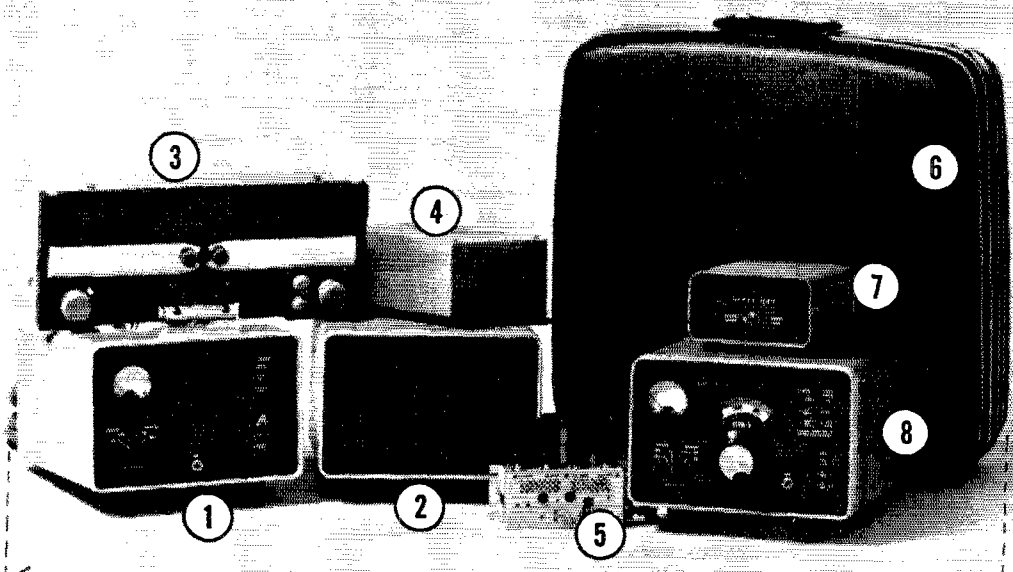

FULL MEASURE OF PLEASURE

Collins accessories add more enjoyment to working your rig. Each Collins accessory is styled to be an attractive addition to your equipment.

The 312B-4 Speaker Console (1) streamlines the operation of your S/line by integrating units into an operating system. It also includes a speaker and directional watt meter.

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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Take them with you. The trim CC-2 Carrying Case (6) makes traveling companions of your KWM-2 and PM-2 Portable Power Supply.

No need to connect, tune and disconnect the Collins DL-1 Dummy Load (7). It can be put on the line with a front-mounted switch or a remote control switch.

Add fixed-station versatility to your KWM-2 with a 312B-5 VFO Console (8). This unit allows limited separation of received and transmitted frequencies and provides speaker and directional watt meter.

See these and many other ham pleasers at your Collins distributor.

COLLINS

QST

NOVEMBER 1967

VOLUME LI NUMBER 11

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OUR COVER

Field Day publicity has become almost as much a part of the event as portable generators, hot dogs, and Murphy's Law. See FD results on page 64

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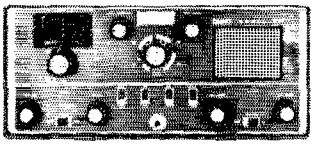
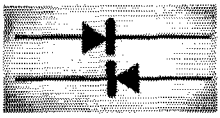
SBE





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Solid-state switching.

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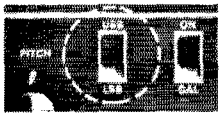
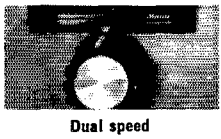
Mechanical Filter.



Panel switch
selects USB or LSB

Delta receiver tuning
plus/minus trans. freq.



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receiver tuning

One knob controls band-
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features for the future . . .

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It would be easy to reel off another dozen **SB-34** features, most of them solid-state—like bi-lateral 2-way circuits—many of them exclusive. But when you actually pick up this mighty miniature —heft its 19 pounds—you will realize how much solid-state components have helped to shrink the size and weight of the package. It would be only natural if you marvelled a bit about the fact that you have at your fingertips a powerful, full-fledged, 4-band SSB **station** in a package only 5"x11¼"x10".

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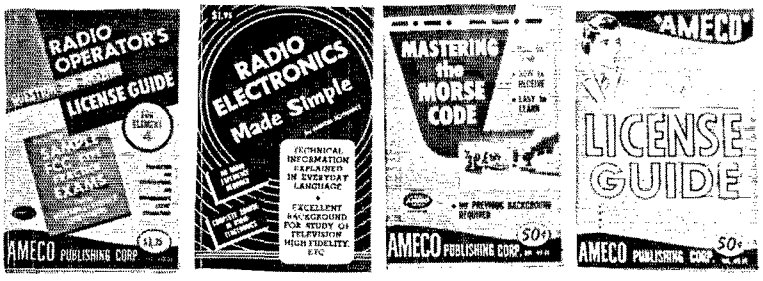

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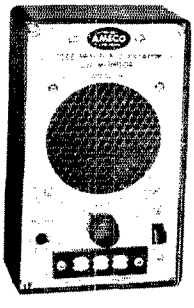

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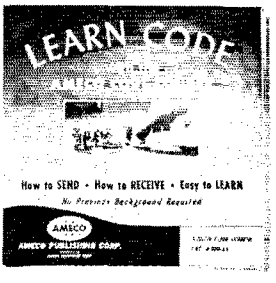

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AMECO

Section Communications Managers of the ARRL Communications Department

Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports are also desired by SCMs for inclusion in *QST*. **ARRL Field Organization station appointments** are available in areas shown to qualified League members. General or Conditional Class licensees or higher may be appointed ORS, OVS, OPS, OO and OBS. Technicians may be appointed OVS, OBS or V.H.F. PAM. Novices may be appointed OVS. SCMs desire application leadership posts of SEC, EC, RM and PAM where vacancies exist.

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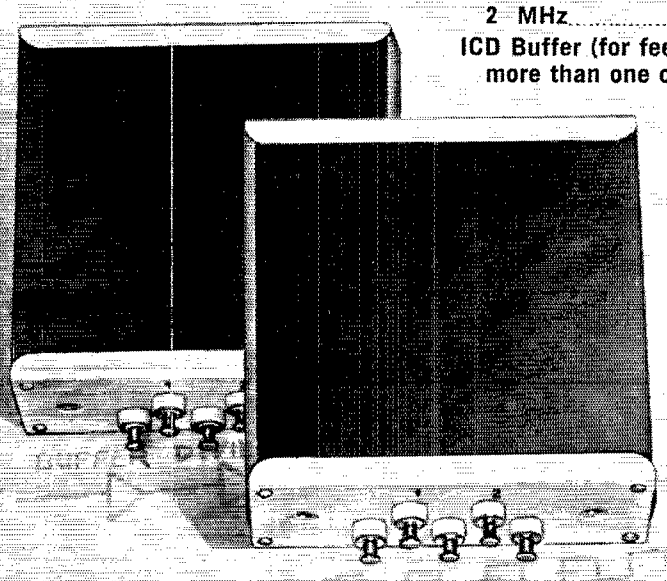

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CRYSTAL MFG. CO., INC.

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THE AMERICAN RADIO RELAY LEAGUE, *INC.*,

is a noncommercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

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

HOW TOUGH AN EXAM?

BARELY in time for this issue of *QST* (by remaking a few pages), the Federal Communications Commission released example study material for the new Advanced and Extra Class examination procedure which goes into effect November 22. The FCC's sample questions are reproduced on pages 83–85. They show the scope of the written examination for the reinstated Advanced Class license, and of the revised exam for the Extra Class ticket.

A new edition of the *License Manual* incorporating the Advanced and Extra Class material is in process, and hopefully will be in distribution some time in November.

An inspection of the questions should put to rest any fears that only an egghead or full-time professional electronics engineer can attain the new grades. They seem to us a sound, practical measure of the ability of an amateur who, through self-training and experience, has paid reasonably adequate attention to what is going on behind the panel of his gear. The new license grades are not by any means unattainable by a ham who has kept up with current developments in the art — or who is willing to devote the necessary effort to brush up on what he perhaps has let slide in recent years while concentrating on operating.

The Extra Class questions are greatly reduced in number; wisely, some of the far-out earlier questions not directly related to amateur communication have been dropped (e.g., what is the CFVD system of transmitting facsimile signals?). The new set of questions is updated, with more coverage of sideband, transistors, linear amplifiers, propagation, and the like. The new exam will contain only 50 questions instead of the previous 100.

The Advanced Class questions are, as the Commission contemplated, roughly of a level between the present General and Extra. This examination will also consist of 50 questions. Note that only 51 examples are provided by the Commission. This doesn't mean that you'll be tested on every indicated subject; many of the questions are broad in scope (e.g., how can receiver sensitivity and selectivity be improved?), and a number of variations of actual exam questions can be devised on this one subject.

From time to time we have received complaints that the *License Manual* does not fully cover the scope of the actual exams. The reason is that we are permitted only to use sample questions provided by FCC itself. It would be improper for Headquarters to include additional sample questions based on those actually in the exam from privileged knowledge (e.g., by reason of having taken it). Equally important, as we have long cautioned in the *Manual*, preparation for the Extra Class exam not only requires review of material for other classes, but the example questions are intended to indicate the *scope* of the areas to be tested. The similarity between actual and example questions is less marked in the case of the Extra than in other classes (as probably will be true of the new Advanced exam as well). Thus memorization of the limited subject covered by a specific sample question is not sufficient; knowledge of related areas may also be required.

In any event, the Commission has completed its end of the incentive licensing procedure by providing goals and objectives through the new rules, and sample questions as guidelines. We have adequate tools available to do the job — League and other publications, and more careful attention to practical aspects of amateur communication in our day-to-day activities. For some of us more than others, it will require time off to travel to an FCC examining point; but there is a whole year to do it.

Incentive licensing was supported by substantially more than half the amateur body. It is now up to us to give more than lip service to this support and produce FCC statistics two years from now which will show more than 50% of the amateur population with Advanced or Extra Class tickets.

QST

Oops! A misunderstanding about a galley proof correction caused our printer to insert (page 78, October) 3825-3900 kc. as an Advanced/Extra restricted privilege effective November 22, 1968; it should have been in the 1969 list. The chart on page 84 is correct.

FCC has spoken loud and clear in the recurring clamor for some sort of segregation of a.m. and sideband. The desirability of continuing wide choice of modes, and reasonably-successful amateur self-adjustment to the change in extent of usage of the two modes, in FCC's view outweigh any arguments for separate band segments. See "Happenings" this month for details.

That H-A-M story, claiming our nickname came from the initial letters of last names of three young amateurs up Boston way in 1910 or so, is still being spread (club bulletins, etc.) despite our efforts to point out that documents of the era fail to confirm the tale, and indeed contradict it. However glamorous it may be, we'll believe it only when the contradictions are successfully explained.

As might be expected in the processing of nearly 300,000 listings, the new edition of the Call Book has some errors in its identification of classes of license. E.g., W1YYM of the Hq. staff, one of the first YLs to achieve Extra, is listed as a Conditional! So go easy in chiding anyone you work whose license class indicator doesn't jibe with the band he's using. Listings should be accurate by the time the band restrictions become effective.

The Building Fund drive closes December 31. Twelve divisions have achieved their quotas, but Atlantic, Great Lakes, Southeastern and Southwestern divisions are short of the mark -- although within striking distance. Last call!

Note to Clubs: Amateur rules provide that both operator and station licensee classes must meet the requirements of the band being used. Thus an Extra Class operator will not be able to use a club station in the restricted bands if the trustee is only, say, a General. Make sure your trustee gets a class of license high enough to cover your planned band operations. (For Field Day, especially!)

Reminder to club program chairmen -- if you don't have a list of the informational and training aids available to all affiliated clubs from headquarters, ask us for a copy. Included are excellent technical and theory films, course outlines, slides and tapes (ideal to help prepare your members for higher grade licenses) -- plus general interest films on amateur radio for community showings.

New members are the life blood of clubs and the League. What are you doing to recruit and build your membership? A limited quantity of "The Case For Belonging" (to a club and to ARRL) is still available for distribution to propects.

An "Obsolete" 50-Mc. Mobile Receiver

In Two Parts — Part I

Transistor Receiver Ideas by the Carload

BY HENRY H. CROSS,* W1OOP

LIKE almost anything one builds with transistors, this receiver is already obsolete: it doesn't use FETs or integrated circuits — and it is finished! You could build a copy of it though this is not recommended, but if you are going to build a transistor receiver for mobile use you may find some of the circuit ideas helpful.

The tuning range is 49.5 to 52.6 Mc., and the same approach could be used for the 10-meter band. The receiver provides for a.m. phone, upper-sideband s.s.b., and c.w. Because of the type of filter used, any n.f.m. had better be pretty narrow, or copy will be difficult. One turn of the knob covers 100 kc., so tuning is a bit touchy on s.s.b., but good signals are solid copy on a bumpy road, and relatively easy to tune in under any conditions.

There is good a.g.c. on sideband, squelch on both a.m. and s.s.b.) but no S-meter, though one could be added readily. Battery drain is 27 ma., squelched, and up to 300 ma. with the receiver making lots of audible noise. Voltage may be anything between 11.5 and 18, and need not be very well regulated or filtered. This can come from an a.c. supply, 9 or 10 flashlight cells in series, or from the car battery.

The block diagram, Fig. 1, will help in understanding the schematic diagrams. The latter are broken up roughly by functions, in the interest of simplicity. The r.f. amplifier, Q_1, is preceded by a bandpass filter, which will be helpful in eliminating interference from the many other v.h.f. services that are found near most desirable sites. Next comes the first mixer, Q_2, and its tunable oscillator, Q_3, 10.7 Mc. below the signal frequency. Mixer output goes to a crystal filter (Hycon Eastern 10ME, 6 kc. wide). This filter is no longer available, but similar types are made by other companies. There is nothing special about this center frequency, but the bandwidth should be 6 kc. or more for good a.m. reception through ignition noise.

A single i.f. stage at 10.7 Mc., Q_5, is followed by a second mixer, Q_6, with injection on 11.155 Mc. from Q_7, a crystal oscillator. There are two stages at 455 kc., Q_8 and Q_9, the latter essentially a power amplifier. For upper sideband or c.w. reception, the b.f.o., Q_{10}, is fed through the last stage. Audio from the s.s.b. signal is amplified and rectified to make a control voltage for the a.g.c. amplifier, Q_{13}. On a.m., the control voltage is taken directly from the diode detector. The r.f. stage, the 10.7-Mc. stage and the first 455-kc. stage are gain-controlled.

*111 Birds Hill Ave., Needham, Mass. 01760.

After the audio gain control there is an audio amplifier of suitable (low) fidelity, which will feed phones or almost any speaker. The amplifier will not be damaged by being run with open or shorted load terminals, so the speaker lead can be opened for muting, if desired. This may be preferable to removing the operating voltage from the receiver, where maximum stability is important.

Stages other than the audio run on 9 volts, from a precision regulator, discussed in Part II. Voltage is held constant within a couple of millivolts for any input from 11.2 to 20 volts. The audio amplifier operates satisfactorily on the unregulated d.c. It has disaster protection in the form of a fairly large power diode across the supply terminals, after the fuse and hash filter, which is supposed to blow the fuse if the supply polarity is reversed. More on this in Part II.

Construction

Components used range from scarce to nonexistent. My design method involved getting a large box of the right sort of parts, and then choosing circuit values to use what was at hand. The cabinet was custom made, after many dummy layouts, the first of which were made with shirt cardboards, for size. Dimensions were determined by the tuning capacitor (from a BC-455) above the chassis, and certain other components below. Space under the dash of my car also was a consideration. Overall, less protuberances, the box is about 4.3 by 6.3 by 10 inches, with smooth bottom, and connections at the rear.

The surplus tuning capacitor, C_1, and dial assembly are weak parts of the receiver. Like any capacitor, this one is sensitive to vibration, and the worm drive and bearings are, at best, just good enough for s.s.b. work. Several manufacturers made them; if you have a choice, be fussy. Plates were invar or brass. I prefer invar, which is magnetic. There were several styles of bearing used at the end of the worm shaft. One allows quite a bit of side play, which causes backlash. Some may have been treated roughly, and may have misaligned plates and/or dimpled ball-bearing races. Make sure the split gear is working freely. Without a knob the action should feel stiff, but not lumpy.

Microphonic effects, such as f.m. observed on a strong unmodulated carrier, can be reduced considerably by cutting small pieces of foam polystyrene and cementing them in strategic spots to keep wires from vibrating, or to damp the motion of the tuning capacitor relative to the chassis surface, which is about one sixteenth

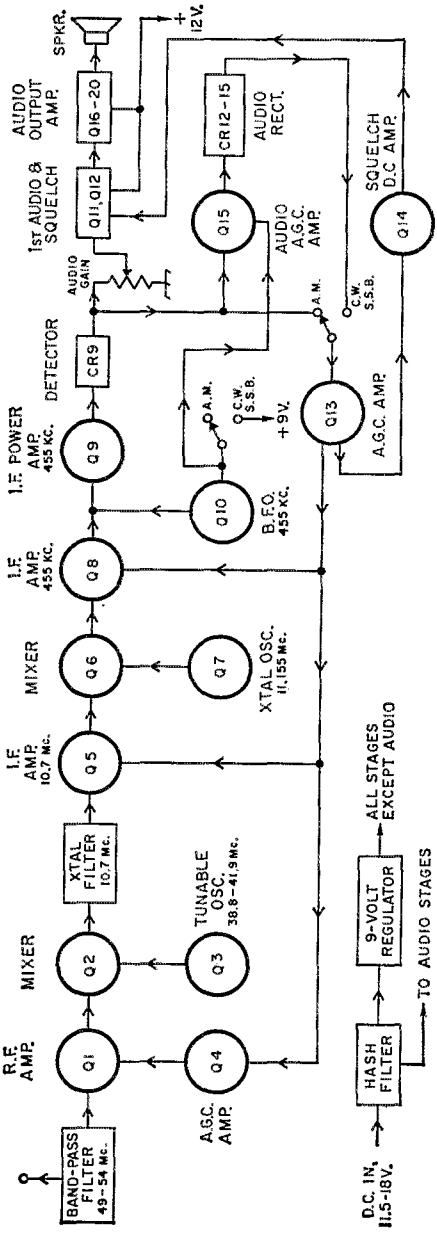


Fig. 1—Block diagram of the W1OOP 50-Mc. transistor receiver.

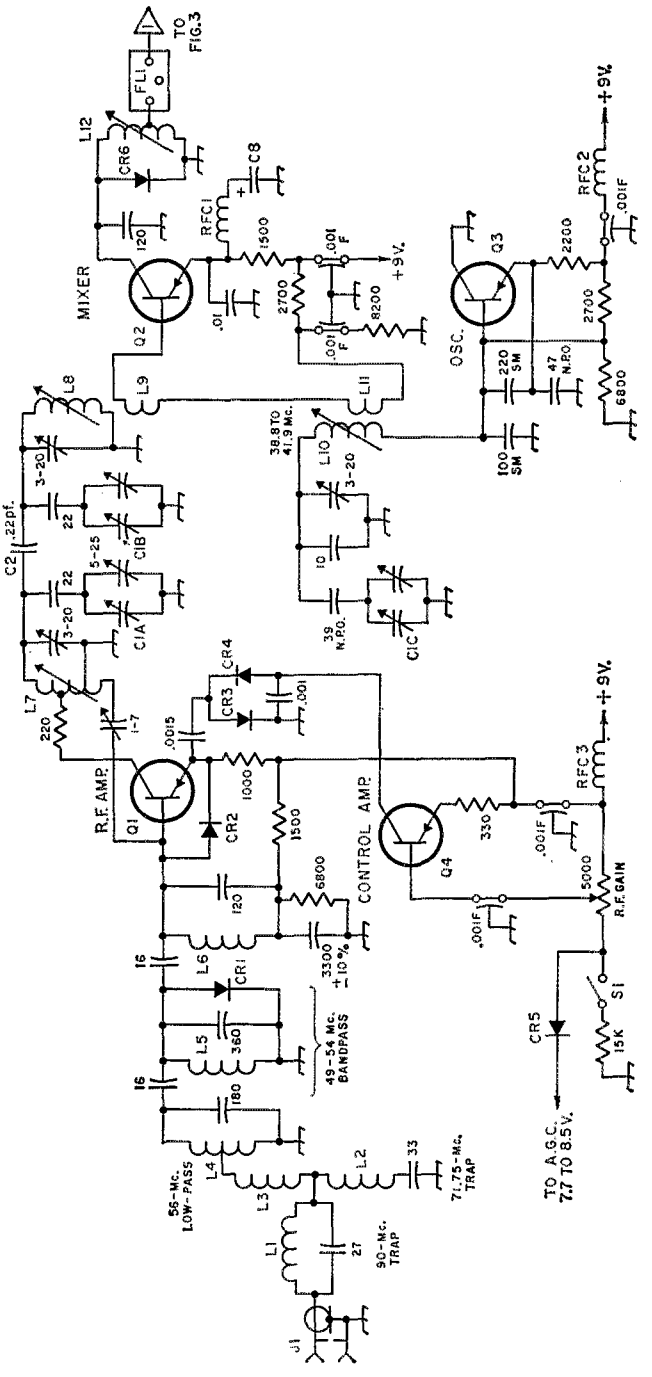


Fig. 2—Schematic diagram of the "front end" of the 50-Mc. receiver. Except where otherwise indicated, decimal values of capacitance are in μf.; others in pf. Suffix F indicates feed-through type; SM silver-mica. Variables not described are trimmers. Resistors are ¼-watt composition.

C_1—3-gang variable from BC-455. B and C sections have trimmers.
C_2—0.22-pf. approx., twisted ends of insulated wire.
CR_1, CR_2—1N904.
CR_3, CR_4—1N3282.
CR_5—1N281. (Can be C-B junction of germanium transistor.)
CR_6—Limiter diode (not essential) MA-4850 or TIV-305.
FL_1—10.7-Mc. crystal filter, 6-kc. bandwidth (Hycon-Eastern 10 ME or equivalent; see text).
J_1—Coaxial fitting
L_1—0.12-μh. airwound, resonated at 90 Mc. with 27 pf.
L_2—0.152-μh. airwound, resonated at 72 Mc. with 33 pf.
L_3—0.227-μh. airwound, resonated at 33 Mc. with 100 pf.
L_4—0.48-μh. airwound, resonated at 53 Mc. with 180 pf. Tap at center.
L_5—0.24-μh. airwound, resonated at 54 Mc. with 360 pf.
L_6—Same as L_4, but no tap. Adjust for best noise figure.
L_7—13 turns No. 22 enamel on ¼-inch slug-tuned form (CTC 156 or Miller 41A000CBl). Tap at 2 and 6 turns.
L_8—11 turns like L_7, no tap.
L_9—1 turn at cold end of L_8.
L_{10}—13 turns like L_7, no tap.
L_{11}—1 turn at cold end of L_{10}.
L_{12}—1.75-μh. slug-tuned coil, tapped at about ¼th of turns.
Q_1—2N2996 or TI-400.
Q_2—2N4122 or 2N1743
Q_3—2N1141, 2 or 3, or 2N1195. Use heat radiator on case.
Q_4—2N3638 or 2N4122.
R_1—5000-ohm control with switch.
$RFC_{1,2,3}$—Ferrite bead (Ferroxcube 56-590-65-4B), or 50-Mc. r.f. choke.
S_1—Switch on r.f. gain control.

of an inch below it. The foam insulation is almost lossless, and it adds very little capacitance. Where r.f. loss is not a factor, black plastic tape will do a good job of making mechanical resonances low-Q.

Components were the smallest that could be obtained cheaply. The i.f. transformers are those common in older transistor radios. I put the collectors across the lower-impedance portions of the windings, to keep gain down. Check windings with an ohmmeter, if they are not marked. The 10.7-Mc. toroids and the b.f.o. coil were hand-wound on cores available from Ferroxcube. Other constructions should be satisfactory, as the crystal filter does all the selectivity work.

Bypass capacitors were either small Mylar types available (now and then!) from Lafayette, or Erie 25-volt Transcap ceramics, Type Y5U. Electrolytic capacitors were aluminum, in large values, and solid-electrolyte tantalum (Mallory TAM) for a.g.c. filters. The 1000-μf. capacitor is a Mallory TC-1501A, smaller than the TC-1501. Resistors were mostly quarter-watt. I find that I cannot read the coding on tenth-watt resistors, and they don't really save much space.

The potentiometers were Mallory MLC, or from old transistor radios. A fairly stable wirewound type should be used in the voltage regulator (Part II), as any voltage change causes frequency shift. The filter choke was a late addition; alternator ripple could be heard without it. I made the one shown by rewinding a small choke core with No. 22 wire. A Stancor TC-1 or Thordarson TR-153 should do.

The transistors are mostly mounted in sockets, to make experimenting easy. There are only two germanium transistors in the receiver now, but when first built it was designed for (and used with) germanium diffused-base MADT PADT types common in auto radios. To use germanium transistors, increase the values of the emitter resistors by 50 to 100 percent. The power transistors (midget size, TO-66) were mounted on the chassis at the rear. One (Q_{19}) had its case grounded; the other two have mica washers. The heat sinking is mostly disaster insurance, as they dissipate only a watt or two in normal use.

The 2N4122 (p-n-p) and 2N3855A (n-p-n) are silicon transistors with good r.f. characteristics, and they sell for less than a dollar. A germanium TI-400 or 2N2996 is used as an r.f. amplifier because it gave a better noise figure than the 2N4122. The tunable oscillator germanium transistor, Q_3, 2N1143, has its collector connected to the case for better cooling, and thus was more stable from a cold start than any of a couple of dozen types tried. Also suitable: 2N1141, 1142, 1195.

The signal-limiting diodes, CR_6, CR_7, across the i.f. coils are a fairly new type commonly used for u.h.f. mixer service. They are known as "Schottky-barrier" or "hot-carrier" diodes, and cost about $3.25. They burn out very easily. Mine were MA-4850. TIV-305 should work as well. Diodes CR_1 and CR_2, protecting the r.f.

amplifier from accidental vaporization, are junction computer 1N914s. These may not be low-loss in all versions. Check for effect on weak signals by connecting and removing CR_1. No change — use it. Mine were over 50,000 ohms at 50 Mc., at zero bias and a 10-mv. signal.

The voltage regulator, Part II, has not only a reference diode, a 6-volt regulator of specified temperature coefficient, but a constant-current diode, Motorola type MCL-1300. It is expensive, but I found that I had to have it.

Circuit Considerations

The band-pass filter (see Fig. 2) was made on a piece of copper-clad epoxy board, and mounted vertically above the chassis. The working parts face the wall, so the filter is well-shielded by its mounting board, yet accessible from above. It was designed to pass 49 to 54 Mc., and to eliminate TV Channel 4 and signals around 10.7 and 29 Mc., and in general act as a "garbage filter." The trap at the input is tuned to around 90 Mc., to knock out local f.m. stations.

To tune up such a filter it is sufficient to have the coil and capacitor values correct to about 10 percent, if care is taken to set the resonant frequencies to about 1 percent. We can assume that the fixed capacitors are close enough, and then adjust the coils so that the circuits resonate at the frequencies indicated under the schematic diagram. The leads should be about the length that they will be in the filter, and the circuits can be dipped by resting them on a cardboard box or a piece of polyfoam. The series trap can be converted to a parallel-resonant circuit temporarily, by shorting its terminals with a strip of thin brass or copper, before dipping it to 71.75 Mc., the frequency of the Channel 4 sound. L_4, L_5 and L_6 (with 56 pf. in parallel with the 120 pf.) are all dipped to the high end of the passband, more or less, before the coupling capacitors and other parts of the circuit are connected. After the receiver is working, L_6 can be touched up while listening to a signal, but do not touch any of the other coils. The assembled filter should be quite effective in removing unwanted signals, when the top and bottom covers of the receiver are in place.

I used Erie 370-series button micas, (several types available) for the two grounded shunt capacitors, and press-fit Teflon standoffs for some of the hot intermediate points, to make assembly and tuneup easier. The 3300-pf. bypass from L_6 to ground is also on the filter board. It tunes with L_6 to make a series trap in the vicinity of 11 Mc., so its value is important. Do not use a ceramic capacitor here. Any mica or silver-mica will be satisfactory. Remaining capacitors can be silver-mica or TC-grade ceramic, marked NP0, N470K, but not GP or GMV.

The tuning capacitor tunes the r.f. collector, the mixer input and the h.f. oscillator, but not the input circuit of the r.f. amplifier. Bandwidth of the double-tuned interstage circuit is about 400 kc. The wire-gimmick coupling capacitor, C_2, should be decreased in value in steps, until the gain just starts to fall off. Repeak the circuits after each coupling capacitance change, of course, using a midband signal.

Variable-resistance diodes in the r.f. stage emitter circuit provide inverse feedback for gain control. The diodes specified for these (CR_3, CR_4) have a measured lifetime of 20 microseconds in a standard 6-ma. test circuit. They act as a linear resistor at frequencies high enough so that one cycle will move only a small part of the total charge. W1DDN suggested the 1N3282, which is sold as a high-voltage rectifier. The diode resistance is varied by changing current through them, in series for d.c. and in parallel for r.f. The control current is furnished by Q_4, a p-n-p transistor that can be the same type as used in other gain-controlled stages.

The r.f. stage is neutralized, to cut down the feedthrough signal at minimum gain. Except for this it worked well without neutralization. The 220-ohm resistor in the collector lead was to eliminate a u.h.f. parasitic oscillation. Similar resistors are in the i.f. collector leads, where they also help to reduce effects of transient overloads.

The audio bypass of the first-mixer emitter was used on the theory that it might reduce cross-modulation. The main effect of extreme overload is that the local oscillator frequency is pulled slightly, apparently because of changes in the input impedance of the mixer. This garbling effect on strong s.s.b. signals can be minimized by removing the a.g.c. from the r.f. stage, and cutting its gain to what seems to be the best point. The switch on the r.f. gain control is for this purpose. It is conceivable that a higher-powered oscillator and an FET mixer might be the solution to this problem.

The working noise figure of the receiver is about 5.6 db. The r.f. transistor is capable of much better noise figure, so the major part of the noise is apparently coming from filter attenuation, mismatch and mixer noise.

The mixer collector tuning capacitor goes directly to ground, for good bypassing of the oscillator drive and harmonics. The collector coil tap steps down from 8000 ohms to the 500-ohm impedance of the filter. Filter output steps down from 500 to 125 ohms, to reduce the detuning effect of the 10.7-Mc. i.f., and to increase the gain control range. Loading is mostly supplied by the 680-ohm resistor. Mixer noise fed through the filter is much stronger than that generated in the i.f. amplifier. The 455-kc. selectivity later on eliminates any wideband noise.

A toroidal i.f. transformer (L_{14}, L_{15}) feeds the second mixer, Q_6. The tap position on the primary, L_{14}, is used to set the gain of the 10.7-Mc. stage. In compact construction, the self-shielding feature of the toroid is a great help. Be sure that its mounting does not make a shorted turn. The one-turn loop secondary is in series with a one-turn loop, L_{17}, on the oscillator coil, as in the first mixer. The toroids can be grid-dipped by coupling to a loop made of the lead going to the associated capacitor. Dip the coils with the inductance or

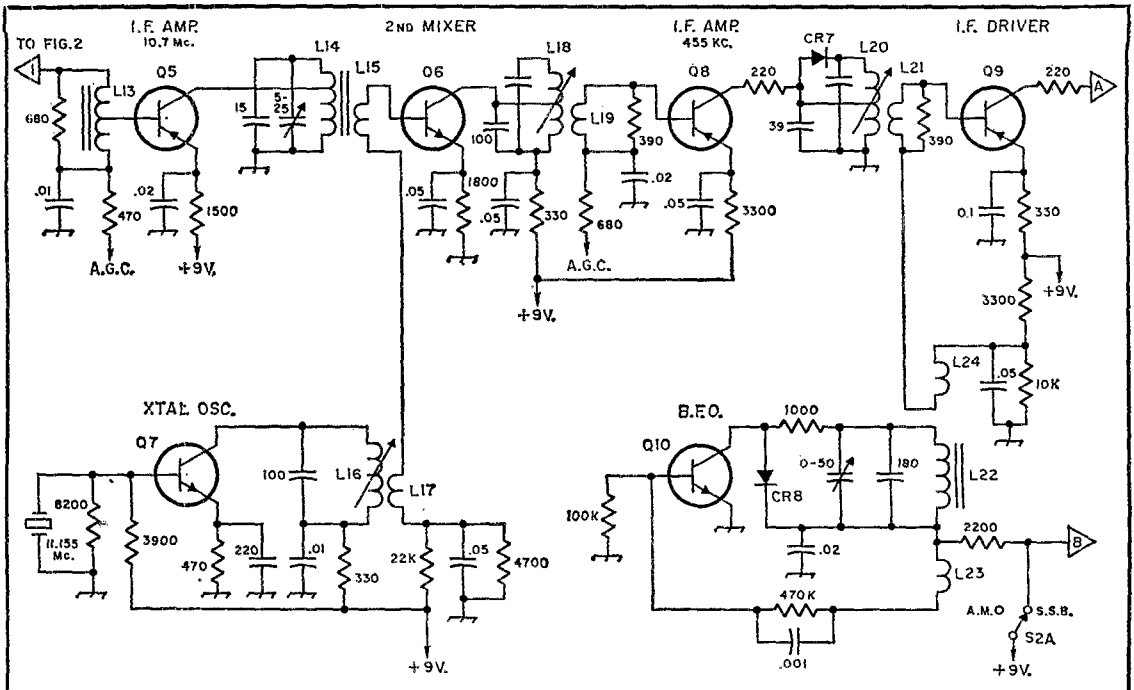


Fig. 3—Schematic diagram of the i.f. stages of the W1OOP mobile receiver. Points A and B, right, run to audio and a.g.c. circuits discussed in Part II.

CR_7—TIV-305 or MA-4850.
CR_8—1N903, 1N914 or FD-100.
L_{13}—Center-tapped toroid, 22 turns No. 28 enamel, on 1041T-060-4C4 core, or 14 turns on 266T-125-4C4 core.
L_{14}—12 turns No. 24 enamel on 266T-125-4C4 toroid core, tapped at 4 turns.
L_{15}—1 turn on core of L_{14}.
L_{16}—18 turns No. 28 enamel closewound on ¼-inch slug-tuned form (CTC LS6 or Miller 41A000CBI).
L_{17}—1 turn over L_{16}.
L_{18-19}, L_{20-21}—Miniature i.f. transformer, 455 kc. (Miller 2031). Fixed capacitors not labelled are built into transformer
L_{22}—90 turns No. 38 enamel on 266T-125-4C4 toroid form.
L_{23}—3 turns on L_{22}.
L_{24}—1 turn on L_{22}.
Q_5 Q_8, Q_9—2N4122.
Q_6, Q_7, Q_{10}—2N3855A.

capacitance set at maximum, with the transistors out of the sockets. The transistors specified have low capacitance, and their inputs are across the low-impedance circuits, so they change the tuning very little, in or out.

The second mixer has a good deal of 10.7-Mc. energy in its collector circuit. In a future design I would use two tuned circuits immediately after the mixer; perhaps two of the midget 455-kc. i.f. transformers capacitively coupled. What I found helped in this receiver was to add capacitance (100 pf.) at the collector pin, which is tapped down on the primary. The transformers still have maximum gain at two slug positions, so they still tune.

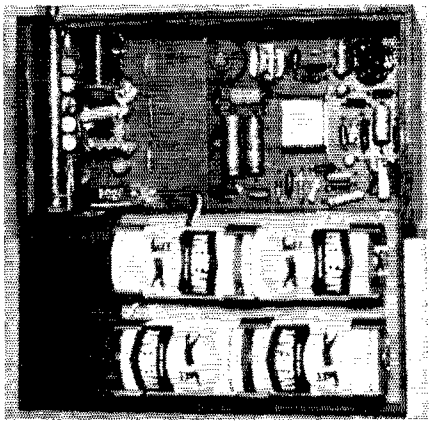
There is a.g.c. applied to the first 455-kc. stage. Three controlled stages seem to be adequate. With the adjustment set properly blocking has not been encountered. The collector of Q_8 has a limiter diode, CR_7, across the larger part of the transformer winding. The diode begins to conduct at a few tenths of a volt. There is another (CR_8) across the first-mixer output, the idea being that limiting should be done where the pulses are short, but I have not been able to prove that it does anything useful. It does no harm, though. I recommend adding the diodes after the receiver has been made to work without them, so that it can be established that they are not limiting at too low a level. Unfortunately, the i.f. amplifiers in a transistor receiver limit well below the level needed by a conventional post-detection noise limiter. Also, such limiters are inadequate for s.s.b. reception. If stage gains vary from those of this receiver by much, some juggling of emitter resistors and tap connections may be needed to make the diode limiter work at the proper level: around twice carrier.

The last i.f. amplifier, Q_9, is designed for power output. The stage should have a quiescent collector current of more than one milliampere. I

(Continued on page 162)

It's easy to build equipment when you have the appropriate parts, but what do you do when components aren't available? VU2JN has an answer.

Front view of VU2JN's a.m. and c.w. transmitter.



Rear view of the 500-milliwatt transistor transmitter.

A Transistor Transmitter From India

Making The Most Of Available Components

BY R. JAYARAMAN,* VU2JN

In the United States it is probably not difficult to obtain parts for a transistor project, but how about in other countries? In a recent article[1] in *The Indian Radio Amateur*, the writer discussed circuit techniques that were dictated by the lack of suitable components. The equipment involved is a transistor, 500-milliwatt, 7-Mc., a.m. and c.w. transmitter. Photographs and schematics of the unit appear on this and the next page.

Referring to Fig. 1, the diagram of the r.f.

* College of Engineering, Trivandrum 16, India.

[1] Jayaraman, "A Miniwatt Transmitter," *The Indian Radio Amateur*, December, 1966.

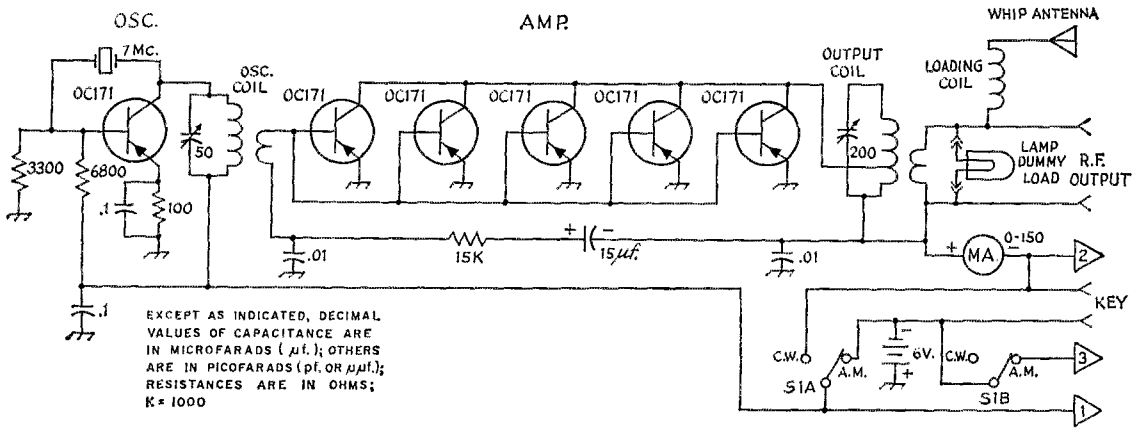


Fig. 1—Schematic diagram of the 500-milliwatt r.f. section.

Oscillator coil—35 turns No. 26 enamel wire, close-wound on ½-inch dia. form, with link of 25 turns No. 26 enamel wire, close-wound at cold end.

Output coil—30 turns No. 22 enamel wire, close-wound on ½-inch dia. form, with link of 14 turns No. 22 enamel wire, close-wound at cold end.

Loading coil—48 turns No. 26 enamel wire, close-wound on ½-inch dia. form (for 40-inch whip).

Lamp dummy load—6-volt, 0.05-ampere pilot bulb.

S_1—D.p.d.t. toggle switch.

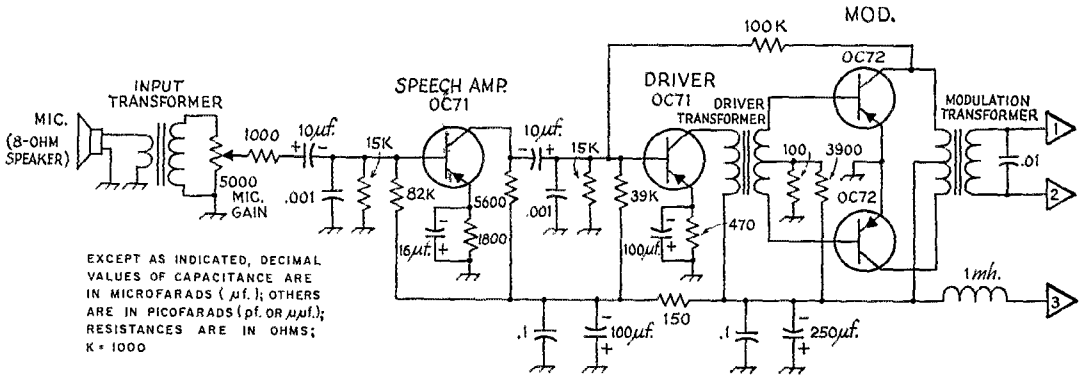


Fig.2—Schematic diagram of the 250-milliwatt modulator. The d.c. resistance of the r.f. choke as well as the d.c. resistance of the modulator-transformer secondary should not exceed 5 ohms.

section of the transmitter, the five parallel low-level r.f. transistors in the amplifier stage handle an input of 500 milliwatts. This configuration probably looks rather preposterous to the American amateur who can easily purchase a single transistor that will replace five or even fifty OC171s, but r.f. power transistors are not yet available here in India. So the writer had to do the next best thing under the circumstances.

It's no easy trick to parallel five transistors. All the units have to be closely matched by measuring their collector leakage current, I_{CBO}, and gain, beta; otherwise the load current will not be shared equally by the transistors and one or more units might be destroyed. This problem can be lessened somewhat by not connecting the transistor bases directly together, but then individual coils are needed to allow the adjustment of drive to each transistor.

In order to obtain the desired output with available transistors, the writer found it necessary to slightly exceed some of the ratings of all the transistors in the r.f. section of the rig. Although this is not a recommended procedure, what more can be said since there have been no transistor failures in the transmitter?

A quick glance at the photographs reveals nothing unusual except the absence of external controls: both r.f. stages are fixed-tuned to the 7-Mc. band. But wait a minute, why is there a speaker in the cabinet? Fig. 2, the schematic of the modulator, tells the answer: the speaker is being used as a microphone. Since an appropriate step-up transformer wasn't available to match the impedance of the speaker to the input impedance of the speech-amplifier, the writer used an ordinary transistor output transformer connected in reverse.

Finally the writer's ingenuity was called upon to come up with a suitable modulation transformer. In this case, a miniature transistor push-pull output transformer was taken and the secondary rewound so that the desired modulator impedance of 75 ohms could be obtained.

The complete transmitter is built inside a $8 \times 4\frac{1}{4} \times 3\frac{3}{4}$-inch rosewood cabinet with a sky-blue Perspex panel. Although the unit has been miniaturized to the extent possible, the writer thought it wise to include an amplifier collector current meter for getting a timely warning in the event of an impending breakdown of the transistors! Also as a safety measure, the lamp dummy load is left permanently in its socket. It is removed only when operating with a matched 7-Mc. antenna.

The writer is glad to state that these circuit innovations have paid off in contacts. QSOs have been had with most of the active Ceylonese and South Indian 7-Mc. phone stations. The best DX was 450 miles, a rather respectable distance for 500 milliwatts.

It is hoped that this article will inspire many amateurs to build and experiment with transistors, even though suitable parts may not always be available. A great deal can be done with very little! QST

Strays

When the news concerning "incentive licensing" broke, it caught a large number of ham club bulletins at a time when they were just going to press. Lots of club bulletin editors were screaming "Stop the press" and one, Harold Smith, WA2KND, editor of *The RaRa Rag* (Rochester Amateur Radio Association) solved the problem of fast and accurate reporting by reproducing in actual size the official notification of the matter from ARRL General Manager W1LVQ.

To bridge the fifteen-month gap between Jamborees-on-the-air, Scout and Scouter hams will hold a low-pressure QSO party December 9 and 10, 1967. No certificates, no awards, no logs to submit and no report to write — just meet other scouts of all nations on the air and talk about Scouting. Call CQ Scouts somewhere near 3950, 7290, 14290, 21290, or 28990 kc. phone; 3696, 7145, 14095, 21095 or 28495 kc., c.w. (*from Boy Scouts World Bureau Circular 25/67.*)

Mark-Hold and Motor-Start for the W2JAV RTTY Demodulator

A simple circuit, using two relays and three tubes, for shutting off the motor of the Teletype machine when there is no mark signal present.

BY L. G. DEDEL,* WA2MSY

MY Model 19 has printed quite a few miles of "brag tapes" which are always generously offered, and seems to make a special effort to print without errors when informed that it is in contact with another W2JAV demodulator.[1] We — the machine and I — are working with the reliable-tube model, and wonder if we could be happier switching to the most recent demodulator design; since the introduction of the "Mainline TT/L",[2] an astounding number of RTTY enthusiasts have found the time and energy to build one and applaud its performance.

This article is written for the RTTY'er whose energy was all spent in the construction of his W2JAV, or whose rig looks too beautiful to discard, or whose mind is made up that nothing will ever work better than what he owns now. Well, if you are determined to cling to that pet of yours, at least treat it — and yourself — to a bit of "automation" which will up-date it and provide increased operating pleasure.

When we modernize a piece of equipment, don't we all first try it the easy way and search through years of accumulated ham magazines to find the pertinent article? — why devote weeks of work, errors and tests to a problem that someone else has already solved? But this "mark-hold plus autostart" circuit was an elusive one, and the older the magazines the less they contained about RTTY in general. I dare assume that no similar circuitry has been described before. The aim of the circuit, Fig. 1, is to create an artificial mark condition to prevent the printer from running "open" in the absence of an RTTY signal, and eventually to shut off the motor as well.

Since space for expansion is hardly available on your demodulator chassis it would be smart to assemble a plug-in module, whose dimensions must be left to the requirements of the constructor. I obtained a 5-inch length of 4 × 2 × 1/8 inch aluminum angle and mounted a male octal plug on the 2-inch side to mate with an octal socket installed on the chassis. All components were then mounted on the large face of the angle.

The RTTY signal for the module was picked up at the arm of the 50,000-ohm balance control through a 22,000-ohm isolating resistor. This connection had no adverse effects on the detector stages of the W2JAV demodulator. The 88-mh. toroid filter, L_1C_1, being sharply tuned to 2125 cycles, will now separate the mark tone from unwanted audio frequencies, which will be severely attenuated. A grid-leak detector, V_1, is used to rectify the signal, and at filter resonance the rectified signal at the grid was 4 volts negative. (A 0.01 μf. capacitor from grid to ground bypasses remaining a.c. from noise pulses which get past the filter without attenuation.) The −4 volts at the grid will cut off the 12AX7, V_1, raising the voltage on the plate sufficiently to fire the NE-2 neon bulb. C_2 then becomes positively charged and relay tube V_2, which was cut off by the fixed bias from a voltage divider, now conducts. This closes relay K_1, thereby disconnecting the grid of the 6AQ5 (V_6 in the W2JAV) from ground, and the demodulator is set up for reception.

K_1 has now, in its closed position, connected a −6-volt bias supply to the grids of the 12AT7, cutting off the plate current in this tube. With the interruption of current, K_2 will drop out and will now, through its back contact, close the 115-volt circuit for the printer motor, and the whole system is in operation.

On reception of a space signal, or noise pulses in absence of a signal, the tuned detector filter will no longer supply that high negative potential to the grid continuously, and V_2 is no longer cut off; plate current flows, lowering the voltage at the plate, and the NE-2 stops firing. Some noise pulses will occasionally hit the cutoff

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[1] The W2JAV demodulator used by the author was described in *The New RTTY Handbook*, by Byron H. Kretzman, Cowan Publishing Corp.

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

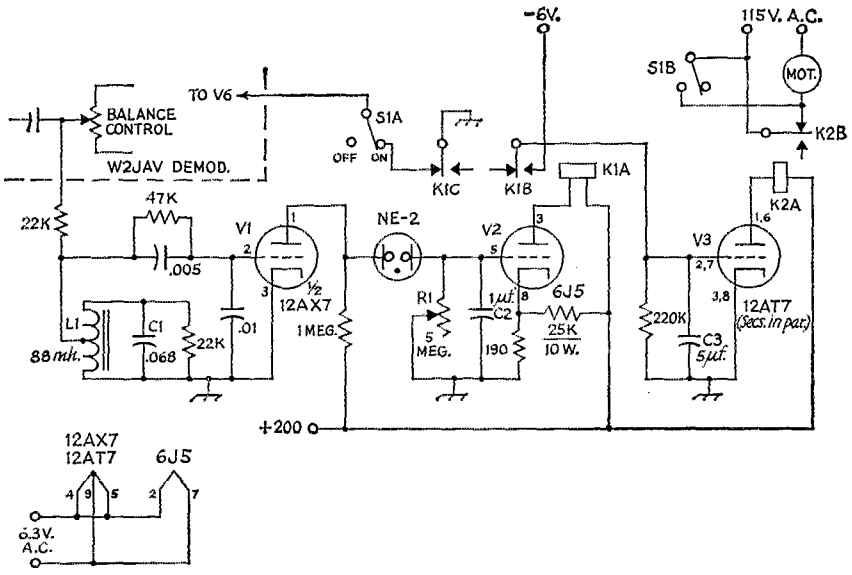

Fig. 1—Circuit of the mark-hold autostart system for the W2JAV converter. Except as indicated, fixed resistors are ½-watt composition. Capacitances are in μf.; except as listed below, capacitors are ceramic. Negative 6-volt supply may be obtained from dry cells or other convenient source.

C_1—Mica.
C_2—Paper, 200 volts.
C_3—Paper, low voltage (lower-capacitance units may be paralleled).
K_1—Plate-circuit relay, d.p.d.t., 10,000-ohm coil (Guardian 1215-2C-10 or equivalent).
K_2—S.p.s.t. or s.p.d.t., 2500-ohm coil (Potter-Brumfield KCP-5 or equivalent).
L_1—88-mh. toroid, with connection to common connection of coils.
R_1—5-megohm linear-taper-control.

value, but their duration is too short to charge C_2. The positive voltage at the grid of V_2 now discharges through R_1 and this tube stops conducting. K_1 drops out, grounding the grid of V_6 and creating an effective mark-hold condition. The other pole of K_1 becomes disconnected from the −6 volt supply, and the charge on C_3 bleeds off. V_3 begins to conduct and relay K_2 closes, thereby opening the 115-volt circuit to the motor; the whole system is now shut off.

Now for some pin-point information: The response of the mark filter at the detector is amazingly sharp and will deprive the grid of its −4 volts within 100 cycles either side of resonance. If you wish to broaden the filter, lower the loading resistor across the filter from 22K to a value of, say, 18K. Don't go too low, because the negative voltage at the grid will be lowered correspondingly.

There is a delay of approximately 3 to 5 seconds before the system begins to operate on the reception of an RTTY signal. The delay before the mark-hold feature takes over can be varied by means of R_1, but should not be less than 3 seconds as the resistance of the potentiometer becomes so low as to make it impossible for C_2 to accumulate any charge. The time constant at the grid of V_3 is not at all critical. The combination of 5 μf. and 220K provides a delay of about 25 seconds before the printer motor shuts off.

The manual switch, S_1, is an absolute necessity for disconnecting the adapter from the demodulator. Printing on space only with the module in the circuit would be impossible, as the system would simply shut down. The system is capable of handling narrow shift equally well.

The values of the remaining components are fairly critical, and their suggested values should be adhered to. The only item not available in my junk box or on the surplus market was K_1. K_2 can be obtained at negligible cost from surplus houses. Be sure to resonate your mark filter at exactly 2,125 cycles or your detector grid voltage will not be sufficiently high to work the system at optimum efficiency.

I have worked with this adapter in my demodulator for some months now, and while I don't claim that it could not be improved upon, it has been working better than expected; as a matter of fact, it works without flaw, at least as far as RTTY signals are concerned. A c.w. signal copied exactly on mark will activate your printer in rhythm, but the printer will not run open as on space. No amount of atmospheric noise, regardless of its amplitude, will cancel the mark-hold condition.

You'll be pleased with the performance of this module and will wonder how you managed to bear the noise of an open machine all these years!

QST

Break-in C.W. With S.S.B. Equipment

BY GEORGE W. HIPPISLEY, JR.,*
K2KIR, K1WJD

Two recent series of articles [1,2] have referred to the problem of complete break-in when operating c.w., but neither author has treated the topic in specific terms — primarily, of course, because it was not the major subject of either series. Many of today's c.w. men have been reluctant to get rid of their older, Class C (for the most part) equipment in favor of the newer s.s.b. rigs for fear that they will find it difficult to continue to have complete break-in facilities. This seems a strange reaction to have regarding a form of equipment which has caused the phone bands to get closer to complete break-in than ever before, but it is unfortunately true that s.s.b. equipment is not generally usable for c.w. break-in until certain internal modifications are made and possibly outboard hook-ups are added.

Fortunately, most of the present-day equipment seems to be pretty much the same with respect to method of generating s.s.b., relay switching, and so on. Thus a detailed description of how the break-in problem has been solved in one station can be applied either totally or in part to most other stations. At worst, maybe this description of how I went at it will stimulate other hams (or the manufacturers) to solve these problems in a better way.

T. R. Switching

In actual practice full break-in cannot be realized without some form of t.r. switching for the antenna. Separate antennas may be fine on 80 meters, but who can afford a spare 20-meter beam for receiving only? To use less than the best antenna you can come up with is to compromise your entire station. The directionality of a 20-meter beam is useless if you receive with a wire thrown out the window. Even if this doesn't bother you, maybe you might consider how much voltage your receiving antenna is going to pick up and dump into the input of your receiver when you key your 1-kw. transmitter. That ought to do the trick!

T.r. switching can be electronic or mechanical. Three years ago, *QST* presented a scheme based on a fairly fast reed relay.[3] (However, I am not about to recommend using a device whose volt-ampere rating was exceeded even at moderate inputs.) There is no lack of relays capable of switching at 60 w.p.m., but there is a decided lack of such relays having suitable voltage, current, or power ratings for amateur equipment of more than 100-watts output. Presently, then, the only avenue open is that of electronic t.r. switches.[4]

No valid objections exist today to the use of electronic t.r. switches because of their *own* shortcomings. A properly-shielded t.r. switch need not generate TVI. A t.r. switch connected to the plate end of a tank circuit through a capacitive voltage divider has no "suck-out" problems. A properly-designed t.r. switch will have negligible cross-modulation and an adequate noise figure at normally-encountered signal levels and frequencies.[5] The prime difficulty with a t.r. switch occurs in conjunction with linear amplifiers — it amplifies any signal on the antenna lead, including the idling noise output of the linear amplifier itself. Hence, if a t.r. switch is to be used with s.s.b. rigs some way must be found to eliminate the noise. Doing so for linear final amplifiers is much easier than for exciters, so we'll have a go at the former first.

Circumventing Transmitter Noise

Two basic types of amplifier exist in ham circles today, grounded-cathode and grounded-grid. Examples of the former are the HT-33 series of amplifiers and the Collins 30S-1, while the Heathkit SB-200 and the Collins 30L-1 are typical of the latter. In grounded-cathode equipment, which practically always uses screen-grid tubes, the primary noise-generation mechanism seems to be partition noise, i.e., noise due to fluctuations in the plate/screen-grid current ratio. Noise from this type of linear will be more or less independent of whether an exciter is tied to its input. In grounded-grid amplifiers, which usually use triodes, no such partition noise is present since there is no screen grid, and the primary noise mechanism is just plain amplification of the exciter noise output. In other words, disconnecting the exciter output from the amplifier input or biasing the exciter's final stage to cutoff will eliminate nearly all the noise voltage produced by the grounded-grid amplifier, leaving only a much smaller noise due to idling current in the linear amplifier itself.

Whether the final is grounded-cathode or grounded-grid, the predominant noise *ultimately* originates as partition noise in screen-grid tubes, such as 6146s in exciters or PL-172s in amplifiers. This noise is proportional to frequency. Very few

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[1] Grammer, "V.F.O. Stability—Recap and Postscript" *QST*, September and October, 1966.

[2] Rockwell, "Station Design for DX", *QST*, September, October, November, December, 1966

[3] "A Keyed Antenna Relay", *QST*, July, 1964.

[4] Vacuum relays have the necessary speed and power-handling capabilities, although relatively expensive. See page 32, August 1967 *QST* — *Editor*.

[5] Although one could hope that eventually manufacturers will put the t.r. switch inside the receiver and on the a.g.c bus, in recognition of the fact that it *is* the first r.f. stage of the break-in man's receiving installation

rigs will have objectionable noise at 80 meters, with normal signal levels on the band, but at 20 or 15 meters even the low-power exciters will be masking weak signals. This assumes that rectifier hash has been completely eliminated. Contrary to what you may have read, Xenon-filled tubes such as 3B28s will not necessarily eliminate hash.[6] Installation of r.f. chokes *at the rectifier plate caps*, and making sure that the rectifiers are separated from any antenna lead either inside or outside the amplifier by adequate shielding, will reduce hash in the t.r. switch to negligible amounts. In my station, I can hear the hash only when no antenna is connected to the t.r. switch.

Since extreme linearity is not a requirement for c.w., the solution for grounded-cathode amplifiers is very simple: jack up the bias! The extra bias needed to reduce amplifier noise below band noise will usually be so small that your exciter will still drive your 1-kw. amplifier to more than 800 watts input (and if you can tell the difference between 800 and 1000 watts at the other end, you've got an unusual ear, believe me!). On the Hallicrafters HT-33A/B amplifiers, for instance, a front-panel control exists for the purpose of setting the bias to the proper value for correct AB_1 or AB_2 plate current on s.s.b. (approximately 200 ma. for the PL-172). This control, when turned all the way down, leaves about 10 ma. of plate current, which causes negligible noise. The tube is just barely cut off, so key clicks are not very likely — i.e., the amplifier is not shaping the exciter's output to any significant degree — and the added harmonic content is easily handled by the pi-network output and an external low-pass filter. Because late models of the 33A and all models of the 33B are operated in AB_1, it is still quite easy to get 800–1000 watts input with negligible grid current, a "must" for long PL-172 life. Even if your grounded-cathode amplifier doesn't have a front-panel bias control, it probably still has a bias supply capable of cutoff bias (with a way of connecting up to the exciter VOX relay) to reduce dissipation during non-transmit periods. Probably a pot to set the bias to the exact value you desire and a switch to disable the VOX relay's effect on the amplifier's bias voltage while transmitting c.w. are all you need (see Fig. 1).

[6] This is also true of silicon rectifiers, although the hash is ordinarily suppressed quite effectively by the shunting capacitors used for "spike" protection. — *Editor.*

Although the manufacturers of s.s.b. transceiving equipment usually say that the gear offers "c.w. break-in", in most cases what you actually get is automatic send-receive switching, not real break-in. Here are some suggestions for minor equipment modifications that will let you hear the other fellow between your own dots and dashes.

The same approach (jack up the bias) also is used with grounded-grid amplifiers, but the actual method is quite a bit different. The usual grounded-grid rigs tend to have very low voltage bias supplies if they have any fixed bias at all. Cutoff during non-transmit periods on s.s.b. is usually handled by inserting a high resistance (1 megohm) in series with the bias supply; this is a rather effective way of cutting off the amplifier. Unfortunately, it does not easily lend itself to break-in keying. However, if your exciter uses a grid-block keying scheme, as most of them do these days, all you have to do is tie in the exciter key line where the resistor is supposed to go. See Fig. 2.

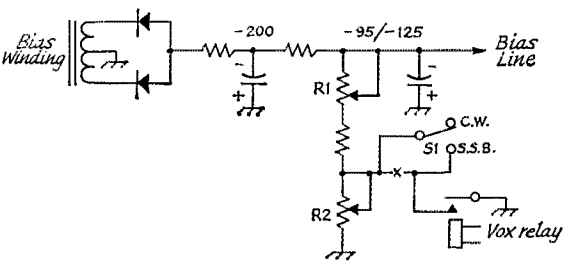


Fig. 1—Bias circuit for near-cutoff c.w. operating or s.s.b. standby with Class AB_1 amplifiers. Except for the s.p.d.t. switch, S_1, the bias arrangement is typical of many s.s.b. transmitters and transceivers. R_2 can be made adjustable, as shown, to permit setting the c.w./s.s.b.-standby plate current to a desired value.

In the case of the Heathkit Warrior, there is a terminal on the back of the cabinet with exactly what you need appearing on it: the positive end of the bias supply. The entire bias supply in the Warrior is left floating with respect to ground, and the junction of components that would normally be grounded is brought out to this terminal. For break-in operation, connect this terminal to the hot side of your key (−20 to −100 volts, presumably). When your key is up, the amplifier is cut off; when your key is down, the amplifier is running in its normal Class B mode.

Some extra control circuitry to bias the amplifier off in s.s.b. operation may be necessary if bias does not appear on the key lead in the s.s.b. position of the MODE switch during standby periods. In the Hallicrafters SR-150, this was accomplished as shown in Fig. 3.

It is not obvious that this connection won't result in sharpening your keying wave shape, perhaps even producing key clicks. However, a large number of people (including myself) are keying their rigs this way and no clicks have been detected by people requested to listen for them.[7] If your amplifier tends toward transient

[7] A probable explanation is that some of the "break" time constant of the blocked-grid keying system is introduced into the final-amplifier grid circuit by this scheme. This is equivalent to applying break shaping to both the exciter keyed stage and the linear amplifier, and although the decay no doubt is shortened it does not necessarily follow that an obvious click is generated. — *Editor.*

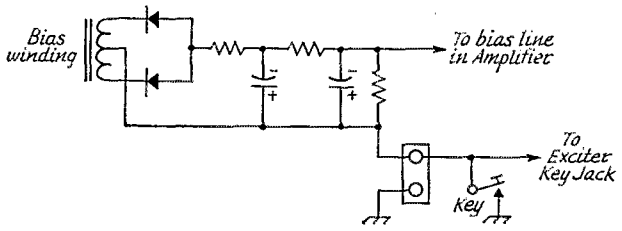


Fig. 2—Simple modification to key standby cutoff bias on a grounded-grid final amplifier. The key is connected in place of the high resistance usually inserted in series with the bias ground lead.

instability(parasitics) key clicks may be present which are not the fault of the keying scheme *per se*, but occur only because the amplifier's operating point is changing rapidly.

Fig. 4 is the same scheme applied to the Heathkit SB-200, as devised by W2ZRC and used by almost all the SB-200 traffic men I know.

By the way, since the key is providing the ground path for the grid circuit of your final, it will be passing 100 to 200 ma. in addition to the normally very small grid-block keying system

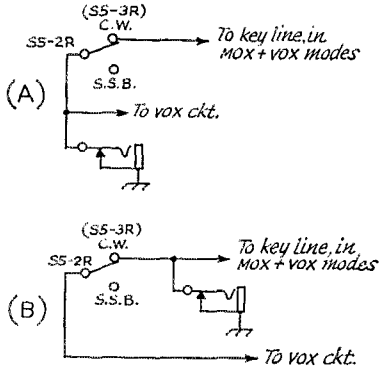


Fig. 3—A—SR-150 key-jack wiring before modification. B—After shifting jack connection so opening the key biases the amplifier to cutoff. This modification requires that the key plug be left in the jack for s.s.b.

current. This causes pitting and sticking of bug contacts, so adding a *good* keying relay is not a bad idea. I used a mercury-wetted relay which needs 6 volts d.c. to operate, thus only 6 volts at 10 ma. (600-ohm coil) appears on the key leads. The mercury-wetted contacts do not pit, and the scratchiness associated with using the bug alone has disappeared. If you can afford an exciter and amplifier, you can afford $10 for a relay to key it cleanly.

Both techniques for cutting off amplifiers eliminate the noise seen by the t.r. switch, whether it comes from the amplifier itself or from the exciter. If you seldom, if ever, operate your exciter without the amplifier, the above should be adequate. Even if you operate with a barefoot exciter quite often, it may be — as is the case with me — that when you don't need the amplifier you don't need the noise reduction, since signals are strong. For instance, I spend most of my non-contest hours on 80 meters, where the exciter noise is inaudible except when the band is totally washed out. When conditions are very poor I can't work anybody without my amplifier anyway, so I don't need to have my exciter "noise-proofed."

Quasi Break-in

With little or no effort it is possible to have a pseudo break-in system for your barefoot exciter. In this scheme, cut-off bias is applied to the output tube(s) of the exciter when the VOX relay is not closed. The Hallicrafters SR-150 transceiver already does this — not for break-in purposes, since there is an antenna relay for the receiver portion, but to reduce power-amplifier dissipation during non-transmit periods.[7] This means that when the VOX relay is operative you will still have noise between dots and dashes for your t.r. switch, but my experience has been that the noise tends to mask only what a weak signal is actually saying, and seldom covers up the *existence* of that signal. Since the usual reason for full break-in is to hear a station start sending while you're sending, most of the time you'll still be able to hear the "breaking" station. Presumably you'll then stop sending, your VOX relay will drop out, and you will then be able to copy the signal without noise being present.

[7] In my home station I have a separate receiver and use the SR-150 as an exciter, not as a transceiver, when on c.w. I have not yet attempted to get full break-in out of a transceiver!

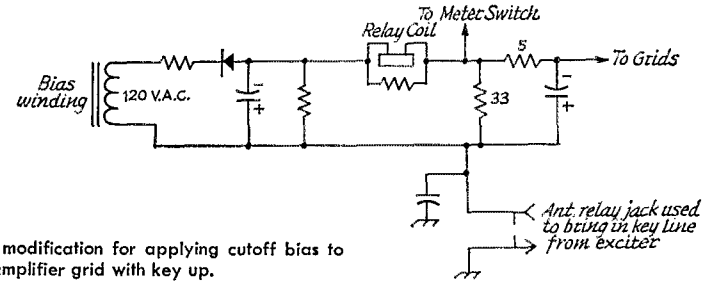


Fig. 4—SB-200 modification for applying cutoff bias to amplifier grid with key up.

If your exciter doesn't already perform this function, you'll probably need to use a spare set of contacts to short or open a resistor in the bias supply. Most exciters have bias supplies with resistive dividers so that the bias voltage can easily be adjusted for the proper idling current in the output tubes. An added resistor can raise the bias to a higher level during non-transmit periods, while shorting the resistor when the VOX relay closes will restore the bias to its normal operating level. Fig. 5 is an example of this applied to a hypothetical bias supply.

If you get the impression that I am trying to avoid actually cutting off the exciter between dots and dashes, you are absolutely right. The reason is as follows: The first possibility would be to just plain raise the bias voltage in the exciter and add a switch section to change it back to the proper lower value for s.s.b.

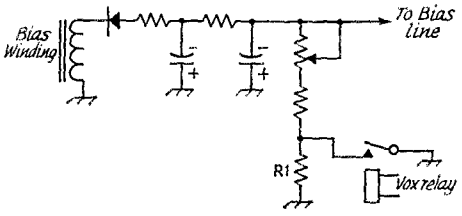


Fig. 5—Resistor (R_1) added to bias-supply bleeder to raise final-amplifier bias when VOX relay is open. R_1 should be selected to put cut-off bias on the amplifier grid. A separate pair of contacts on the VOX relay is needed for shorting R_1 when transmitting.

However, on the higher bands, where you will need the greatest bias for a given reduction in noise, you are also most apt to be running out of drive. Increasing the bias will merely aggravate the situation. Hence, an across-the-board increase in bias voltage will not be acceptable to many. The next question is whether extra bias can be added only to the output tubes during key-up time. To do so by installing a battery in series with the lead going to the grid(s) of the output tube(s) requires a double-pole key, bug, or electronic keyer, since you must simultaneously ground the key line. To do so by increasing the bias voltage and readjusting the resistors in the keying bias circuits for the same key-down bias is a project whose exact nature depends on the particular exciter in question. To avoid excessive "hardening" of the keying, resulting in clinks, it may be necessary also to alter the capacitor values which determine the time constants of the make and break.

Mixer Feedthrough

A difficulty connected with t.r. switches and heterodyne exciters that I have not previously mentioned is mixer feed-through. I remember getting awfully irritated with the station that kept tuning up on my frequency during a contest until I realized that it was a weak signal from my own exciter! Quite often the feed-through won't be audible on the lower bands, and may not even move the S-meter on the higher bands — but then again, neither does most of the DX. In both the HT-32 and the SR-150 the solution is to key *two* mixers instead of one. In fact, Hallicrafters has a service bulletin on this for the HT-32, in which they disconnect the 47,000-ohm grid resistor of the second mixer from ground and tie it into the key line. In the SR-150 the first mixer is unkeyed, but its grid resistor cannot be simply lifted from ground because that mixer is also used for receiving and the key line is not grounded while receiving. I modified mine by using the spare set of contacts on the VOX relay to connect the 47,000-ohm resistor to ground for receiving and to the key line for transmitting (see Fig. 6).

In conjunction with keying an additional mixer, there is always the possibility that doing so will alter the keying waveshape of your exciter. In both the HT-32 and SR-150 there was no audible difference in keying before and after, so I let it go as it stood. W2ZRC has made the same modification to his SB-400, but to be on the safe side, he used the circuit shown in Fig. 7. The mixer turns on instantly through the diode, while the other keyed stages do the original shaping job that was intended. When the key is opened the diode becomes reverse biased and the mixer is turned off by charging the 0.002-μf. capacitor through the 10-megohm resistor — much more slowly than the other keyed stages turn off.

Oscillator Stability

So far the discussion has centered on methods of obtaining superior *receiving* capabilities with s.s.b. equipment through the use of full break-in. In the process, we have tried to avoid techniques which would worsen the character of the transmitted signal. Nevertheless, certain problems may still exist because of congenital defects in the equipment. Chief among these is oscillator chirp.

One of the prime sources of chirp in v.f.o.s used to be r.f. feedback due to insufficient or improper shielding of the v.f.o. compartment. As you can easily see by opening the lid of most of today's commercial equipment, this should no longer be a problem. Indeed, r.f. feedback seems to have

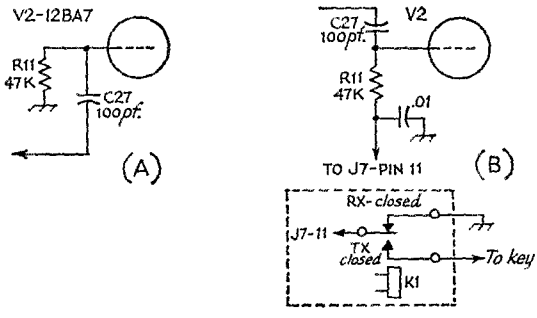


Fig. 6—Modification of the SR-150 to key the first mixer along with other keyed stages. A—Original circuit. B—Circuit as modified. Use is made of a spare set of contacts on the VOX relay to restore the mixer to normal receiving operation with the key open.

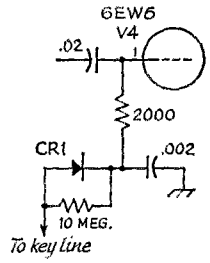


Fig. 7—When the first mixer stage is added to the keying setup, modification of the shaping can be avoided by incorporating this circuit, used by W2ZRC in his SB-400. CR_1 can be any small silicon diode.

been supplanted by poor power-supply regulation as a primary cause of chirp. Although the ideal v.f.o.'s frequency doesn't depend on supply voltage, very few of us own ideal v.f.o.s. With a properly regulated power supply, even a relatively inexpensive v.f.o. can be rock solid. The HT-32 v.f.o. is a good example of that. The v.f.o. is an ordinary garden-variety circuit (with superb mechanical stability, of course) and relies on a VR tube for voltage stability. On the other hand, sometimes things aren't what they seem, and just hooking a v.f.o. to a regulator tube may not work. The following example should point up what I mean:

I was so happy with the keying of my HT-32 that when I sold it I bought an SR-150, which had the same basic v.f.o. circuit and keying scheme as the HT-32B. In addition, the SR-150 had something called "Receiver Incremental Tuning" (RIT), a gadget aimed especially at c.w. operation using a transceiver. When I first fired up the SR-150, I discovered, to my great annoyance, that it chirped. I temporarily disconnected the RIT lead (see Fig. 8) but it still chirped. After some investigation, I found that the VR tube was going out of regulation — but not in the normal direction (extinguishing). Instead, the dropping resistor was too small for the actual current drain, and thus there was too much current left over for the 0A2 to absorb. This caused the +150 to rise out of regulation to +155. Increasing the series resistance cured this problem. The next step was to make it chirpless with the RIT lead connected. Since the v.f.o. frequency is varied not only by the tuning capacitor but also by a back-biased diode, any change in the voltage across the diode will cause the v.f.o. to change frequency (after all, that's the precise purpose of the diode!). Although the voltage on the diode is taken from the regulated +150 line through a resistive voltage divider, the voltage change at the diode due to an entirely normal one- or two-volt change across the 0A2 was sufficient to cause chirp. K9EAK of Hallicrafters suggested adding a 12-volt Zener diode to the RIT potentiometer point, as in Fig. 9. The additional regulation of the Zener diode was enough to do the trick, and the chirp disappeared. (This modification appears in the SR-2000, by the way.)

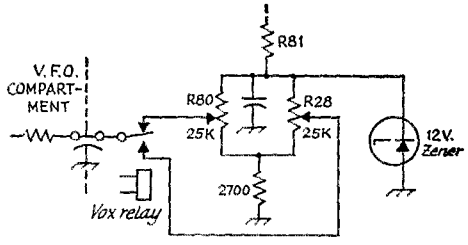


Fig. 9—Modification of the RIT bias circuit of Fig. 8 to provide a stiff voltage source for the frequency-controlling diode. R_{81} should be changed to 47,000 ohms, 1 watt.

The only difficulty remaining was to explain the slow chirp (almost a drift) that remained on 15 and 10 meters. This could not be due to the v.f.o., or it would have been the same on all bands. Eventually I decided that the heterodyne crystal oscillator was changing frequency, and since the higher bands used higher frequency crystals, the chirp or drift would be proportional to the band. The puzzler was that the SR-150 was basically the same rig as the HT-32, and no such difficulty existed in the 32. Unless. . . . Sure enough, in the 32, the crystal oscillators were fed by +150, but in the SR-150 they were fed with unregulated +250! Connecting all crystal oscillators in the SR-150 to the regulated +150 and restoring the VR-tube dropping resistor to its original value, so as to provide more current, eliminated all traces of drift or chirp. (It was necessary to readjust the value of the drive resistors for each band.) Another method is to use a 200-volt Zener diode as shown in Fig. 10. The 50-watt Zener can be mounted on the shield compartment for stage V_5. This may eliminate the need to adjust any drive resistors,

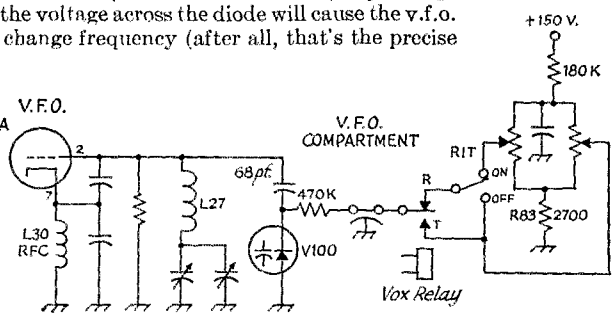


Fig. 8—Essentials of the "Receiver Incremental Tuning" circuit used in the SR-150 to allow tuning the receiver over a small range independently of the transmitting frequency.

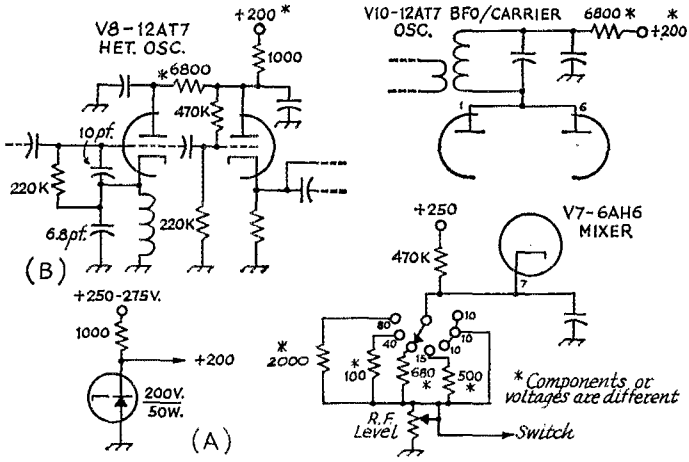


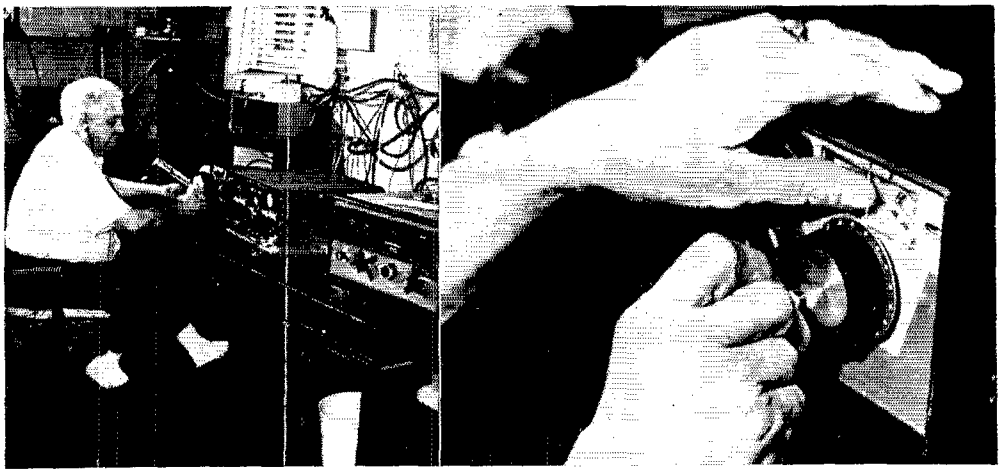
Fig. 10—A—Voltage regulator using 200-volt Zener diode, as applied to the SR-150. B—Changes in circuit values necessitated by change in operating voltage are shown by asterisks.

although their values should not be taken as sacred, anyway, since they have gone through three or four revisions in SR-150 schematics.

Thus you can see that merely hooking the v.f.o. up to a regulated voltage may not solve all your problems automatically. But if you can guarantee that *all* frequency-determining voltage-sensitive elements in your exciter are fed from regulated supplies, and that your "regulated" supplies are truly regulated, you should wind up with an above-average signal. Of course, many other problems exist with particular kinds of s.s.b. equipment when used for break-in c.w. Maybe one of these days someone will describe how he modified his 32S3/75S3-B combination to work break-in in the transceive mode without feedback down the connecting oscillator cable. Better yet, perhaps some day the manufacturers will make their s.s.b. equipment work on c.w. by building the t.r. switch into the receiver (to put it on the a.g.c. bus) or into the transmitter (to avoid suck-out), by cutting off noise-generating stages between dots and dashes with simple and cheap diode logic circuits, and by building oscillator circuits which have the short-term stability required by c.w. in addition to the longer-term stability required by s.s.b.

QST

Strays



K9BCJ (l.) a blind amateur from Chicago, was recently presented the Illinois Radio Amateur of the Year award. Julian has done a considerable amount of message handling for Americans in far-away places. The award was presented at the 33rd Annual Hamfest of the Hamfesters Radio Club. Shown right is Julian's receiver which is equipped with touch-sensitive calibration points.

• Beginner and Novice

A Complete Multiband Antenna System

BY LEWIS G. MCCOY, W1ICP*

Some hams are reluctant to use a transmatch because they fear it may be too difficult to adjust. This article takes the "toughness" out of the adjustments and makes it easy. The end result is a low-loss, high-efficiency multiband antenna system.

Including Detailed Information On Adjustments.

A simple but good multiband antenna system is a dipole fed with low-loss balanced line. Many newcomers think of multiband antennas as coax-fed dipoles utilizing traps to make the antenna more or less resonant on each of the different bands. There are some drawbacks to this type of antenna, including trap losses, poor matching between the coax and dipole, and very little discrimination against harmonic radiation.

The ideal multiband antenna system is one that will cover a wide frequency range with the least loss, will always present a load to the amplifier for which the amplifier is designed, and will be a selective circuit — one that discriminates against undesired harmonics. This last item is of particular importance to the Novices who operate on 80 meters. In the last year, many hundreds of second-harmonic violation notices were issued by the FCC to Novices who had bad harmonic radiation.

This article discusses just such a system. Complete setup and adjustment procedures are included.

Transmitters and Transmatches

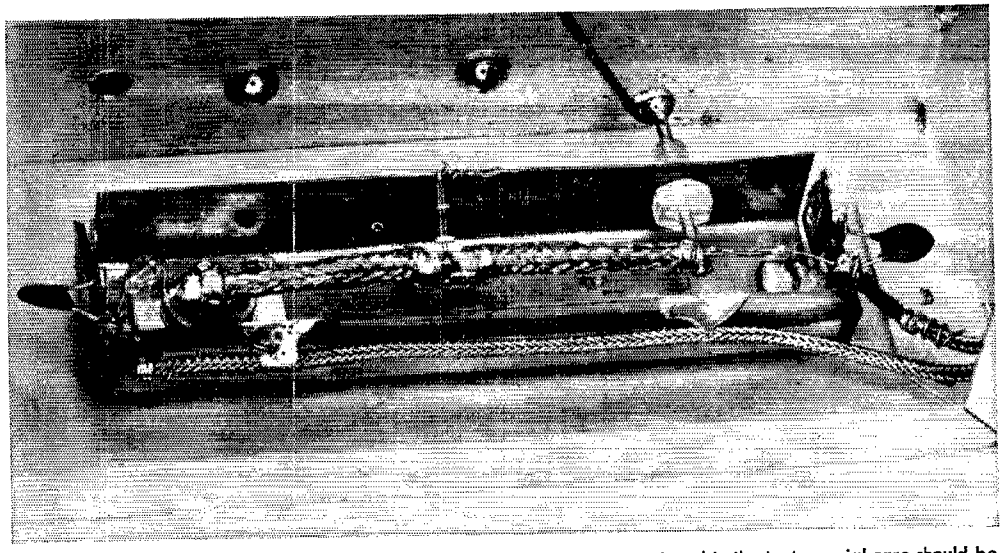
Practically all transmitters, either of commercial or home design, are designed to work into 50-ohm loads. There are many good reasons for this — flexibility in bandswitching using pi network tank circuits, simplified shielding techniques for TVI reduction, and others. For such a transmitter to operate at maximum efficiency, the load should be close to 50 ohms.

Some Novices (and some holders of higher grades of license, for that matter) are under the impression that in order to obtain a 50-ohm load for the transmitter all one needs do is to use 50-ohm coax to feed the antenna. Let's make one thing very clear at this point: The only time the transmitter will "see" a 50-ohm load is when the far end of the coax is attached to a 50-ohm load. If the coax is attached directly to an antenna, the feed impedance of the antenna *must* be 50 ohms if the transmitter is to see 50 ohms.

In the case of a trap dipole, the impedance of the antenna may be 50 ohms, or close to it, on several frequencies. But the frequency range over which the antenna will be 50 ohms is limited; when we QSY from one end of the band to the other the antenna impedance will change. For example, a dipole cut for the center of the 80-meter band may show a mismatch of the order of 5 to 1 at either end of the band. In such a case, the transmitter certainly wouldn't see a 50-ohm load.

One way to get a 50-ohm load for the transmitter regardless of frequency is to use a matching network ("transmatch") between the transmitter and the antenna feed line. The function of a transmatch is to take the unknown load at

* Beginner and Novice Editor



This shot shows the constructional details for the Varimatch pickup unit. As mentioned in the text, special care should be taken when soldering the end of R_1 to the inner conductor to avoid shorting the resistor to the coax braid.

the feed line and transform it into a known load, usually 50 ohms. If low-loss transmission line is used to feed the antenna, a considerable mismatch can be tolerated between the antenna and line before losses become appreciable. A transmatch can be used to handle the mismatch at the transmitter end, and the overall efficiency of the system will be excellent. By low-loss line, we mean open-wire feeders or a good grade of 300-ohm Twin-Lead. A high s.w.r. (standing-wave ratio) in low-loss line, in the lengths ordinarily used, will not appreciably increase the line loss. This is not true of coaxial lines: coax line should be matched at the load end, or at least operated with a low s.w.r. — generally no more than 3 to 1.

So if we use low-loss line to feed the antenna we don't have to worry about mismatches, which means that the antenna-system efficiency will be very good on practically any frequency. The transmatch will transform the feeder load to 50 ohms for the transmitter, and will also provide excellent harmonic attenuation. It will also add selectivity for the receiver; for example, strong broadcast signals in the area may cause cross-

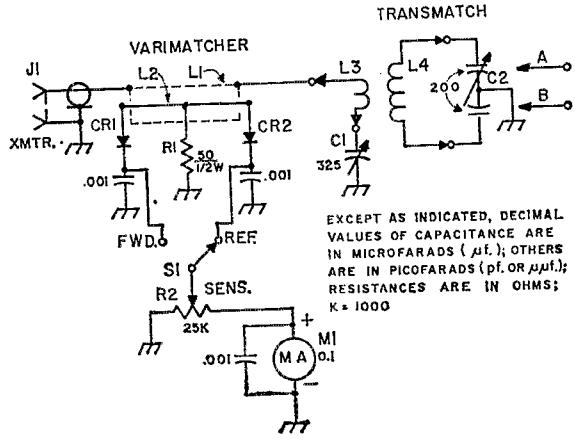


Fig. 1—Circuit diagram of the Varimatcher and trans match. The open-wire or Twin-Lead feeders should be attached to A and B. Decimal value capacitors are disk ceramic.

L_1, L_2—See text and Fig. 2.
L_3, L_4—See text and Fig. 3.
M_1—0–1 milliammeter.
R_1—50 ohms, ½-watt carbon or composition.
R_2—25,000-ohm control.
S_1—Single-pole, double-throw toggle switch.
C_1—335 pf. variable (Millen 19335).
C_2—200 pf. dual variable, 0.077-inch air gap for 1 k.w., (Millen 16200), 0.022-inch air gap for 150 watts and less (Millen 28200).
CR_1, CR_2—1N34A diodes.
J_1—Coax chassis receptacle, type SO-239.

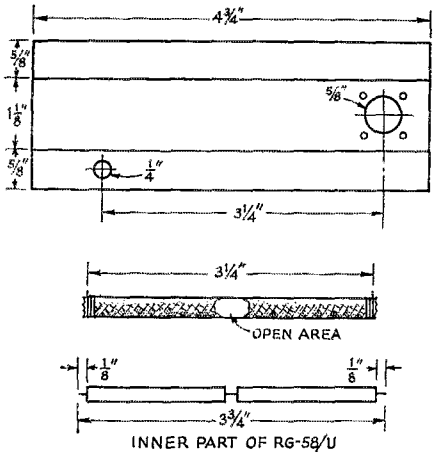


Fig. 2—Constructional details for the s.w.r. bridge section. The braided portion is L_1 and the inner conductor is L_2.

modulation on 80 meters, a problem that often can be eliminated when the transmatch is used between the feeder and receiver.

One problem that bothers many newcomers is how to adjust a transmatch, particularly when setting up an antenna system for the first time. The adjustments can be simplified if a reflectometer is used in the coax line between the transmitter and transmatch. A reflectometer is a simple device that shows you when a matched condition exists on the coax line between the transmitter and transmatch; that is, it shows you when the rig is working into a 50-ohm load. However, because some amateurs have found it a tough problem to find the *initial* settings on a transmatch, we set up the antenna and made a series of tests with various lengths of 300-ohm

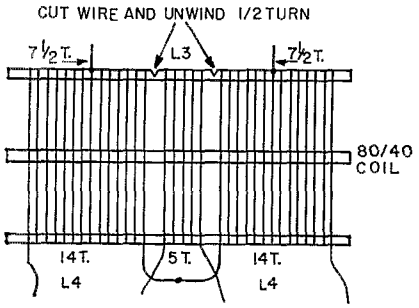


Fig. 3—The 80/40 meter coil. Not shown are the shorting clips attached to each end of L_4 The leads for these are 6-inch lengths of insulated wire. For 40-meter operation connect the shorting clips to the 7½ turn points, shorting out a total of 15 turns. Coil stock for the 80/40-meter coils is No. 14 wire, 18 turns per inch, 2½ inches in diameter (Air Dux 2008T, B.&W. 3906–1, or Polycoils 1775).

The 20-meter coil has 2 turns for L_3 and 6 turns for L_4. Coil stock is No. 12, 6 turns per inch, 3 inches in diameter (Air Dux 2406T, or Polycoils 1778). The 15/10-meter coil is described in the text.

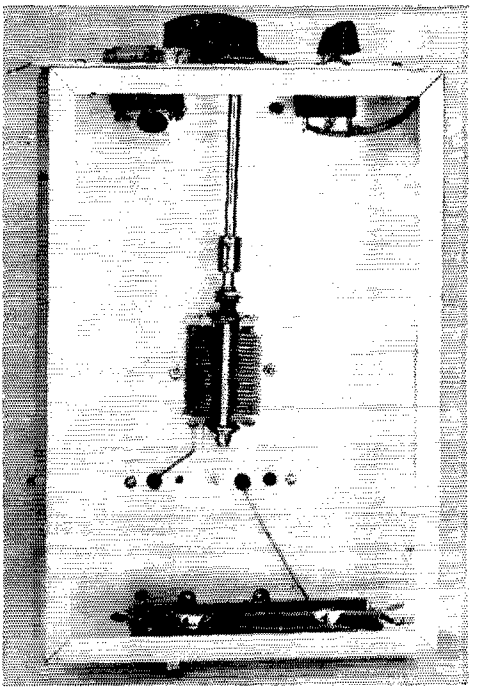
All coils are mounted on Millen type 40305 plugs. The socket is a Millen type 41305.

Twin-Lead and open-wire line. The feeder tap points and approximate settings of the two variable capacitors associated with the transmatch are shown in Table I.

The Antenna

The antenna used is a 100-foot long, center-fed dipole. Many hams can get up a wire of this length, either as a straight horizontal antenna or as an inverted V. The horizontal requires two supports while the inverted V only requires a single support at the center. Also, it is easy to obtain 50-foot lengths of copper stranded wire; such lengths are packaged items in nearly all radio stores.

A cheap and simple support for the antenna can be made from TV mast sections. These can be had in either steel or aluminum, and 10-foot



The Varimatch pick-up unit is mounted on the rear wall of the chassis and the variable capacitor in the center is C_1. Shielded wire is used between the Varimatch diodes CR_1 and CR_2 and the switch at the chassis front.

sections cost only about two dollars. Three sections will make a 30-foot mast which is easy to erect and can be guyed with nylon line.

In the majority of installations the antenna is 25 to 30 feet above ground, so this height was used in our tests. It was thought that there would be considerable difference in the adjustments of the transmatch in the horizontal inverted-V configurations, but we found that the difference was negligible. In the inverted-V setup the ends of the antenna were eight feet off the ground. The figures given in Table I should be very close for any similarly-mounted antenna.

The load at the transmatch end of the feed

Table I

450-ohm Open-Wire Line

Mc.	*100 feet* Tap	C_1	C_2	*75 feet* Tap	C_1	C_2	*50 feet* Tap	C_1	C_2
3.5	3½	40	73	3½	50	75	2½	40	69
3.75	3½	40	60	3½	60	60	2½	35	62
4.0	3½	35	53	3½	70	47	2½	32	56
7.1	2½	45	62	3½	80	24	2½	15	46
14.2	1½	20	32	1½	30	26	1½	22	23
21.2	½	20	37	¼	60	37	½	17	37
28.5	½	8	18	½	5	18	½	20	18
				300-ohm Twin-Lead					
3.5	2½	40	70	1½	25	75	1½	30	78
3.75	2½	61	62	2½	49	73	1½	30	62
4.0	2½	88	40	3½	68	72	1½	30	55
7.1	2½	20	46	1½	15	42	1½	10	41
14.2	1½	35	28	1½	30	27	1½	30	25
21.2	½	40	37	¼	75	37	¾	85	27
28.5	½	32	18	½	30	16	¾	40	18

line will be different for different line lengths, requiring different settings of the transmatch controls. Three feed-line lengths, 100, 75, and 50 feet, are given in Table I, as these were judged to be typical. The open-wire line used was Saxton 1¼-inch spaced, 450-ohm line. The 300-ohm Twin-Lead was a good grade of TV receiving-type line. Open-wire line has less loss than Twin-Lead and is preferable, but some hams prefer to use a continuously-insulated line. The only real problem with Twin-Lead is that its characteristics are inclined to change when the line gets wet, and it may be necessary to readjust the transmatch to maintain a match.

In order for the figures in Table I to apply in your installation, or to be close, the antenna should be about 30 feet above ground at the center. Also, the same components should be used in the transmatch as are shown in Fig. 1. All the components are readily available [1].

The Transmatch

The unit shown in the photographs and Fig. 1 is a modified version of one previously described [2]. It consists of a tuned input circuit, C_1L_3, and a parallel-tuned secondary, C_2L_4. Three plug-in coil assemblies are used to cover 80 through 10 meters. Also included in the transmatch is a built-in reflectometer, a Varimatcher[3]. If you already own an s.w.r. bridge, the Varimatcher can be omitted. The unit shown will handle one kilowatt but information is given in Fig. 1 for a 100-watt model. The difference between the two models is in the plate spacing of C_2.

Constructional Details

The reflectometer and transmatch are built on and in a 3 × 8 × 12-inch aluminum chassis with a front panel measuring 8 × 9 inches. Mounted below chassis are the reflectometer components and C_1. C_2 is mounted on top of the chassis, and the jack-bar assembly for the plug-in coils is 2½ inches to the rear of C_2. Two standoff insulators are mounted at the back for the feeder connections. Attached to the standoffs are the feeder taps, 9-inch lengths of insulated wire with copper alligator clips on the ends.

Construction of the 80/40 meter coil is shown in Fig. 3. This and the 20-meter coil are made from commercial coil stock: The 15/10-meter coil uses No. 12 solid wire; L_3 is a single turn 2 inches in diameter mounted in the center of L_4, which consists of 4 turns, 3 inches in diameter, spaced over a length of 3½ inches. To ensure good connections when soldering the ends of the coil wires to the coil-socket prongs, file off the

[1] James Millen Co. will sell direct if you cannot get the components from a distributor. Write to James Millen Co., Malden, Mass., Attn: Wade Cayewood.

[2] McCoy, "A Transmatch For Balanced and Unbalanced Lines," *QST*, Oct., 1966.

[3] De Maw, "The Varimatcher," *QST*, May, 1966.

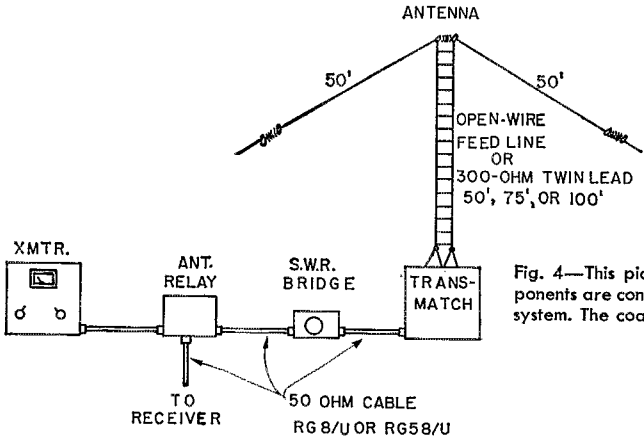


Fig. 4—This pictorial shows the order in which the components are connected together for the multiband antenna system. The coax connecting the units together should be of the 50-ohm type.

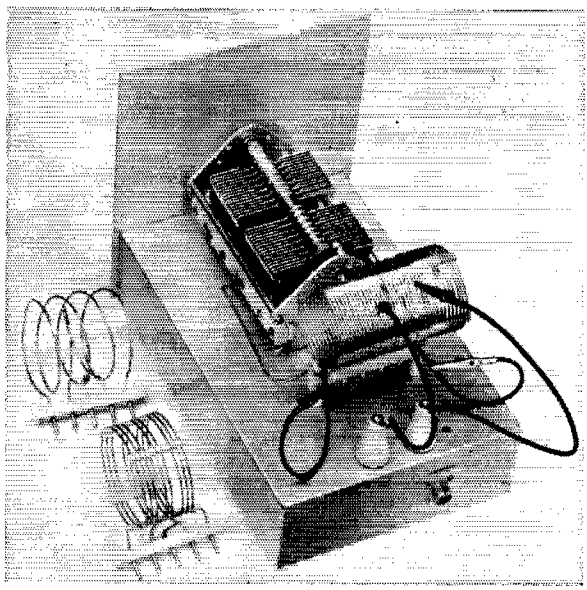
nickel coating on the ends of the prongs. Incidentally, a good source of wire in these days of hard-to-find items is any electrical-supply or Sears store. Solid copper conductors are used for house wiring, and you can get any length you need.

In order for Table 1 to agree with your unit, the dials for C_1 and C_2 should be numbered clockwise from 0 to 100, (or 0–10) over 180 degrees. Millen dials were used in this unit, but there are plenty of similar types available. Make sure that both C_1 and C_2 are fully meshed when the dials read full scale (10 or 100). At minimum capacitance the dials should read 0.

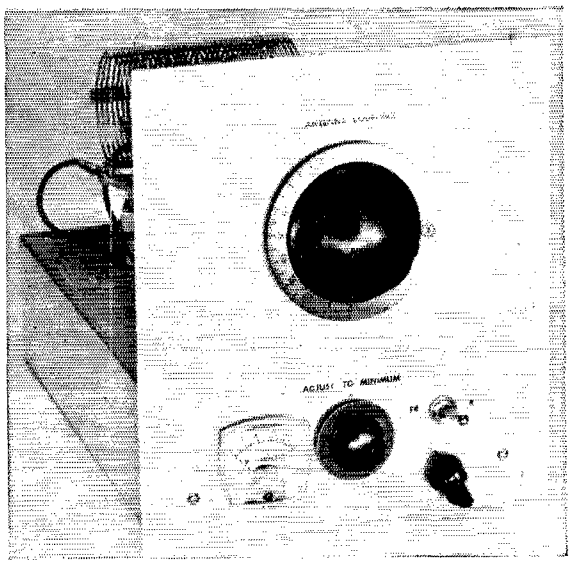
The Reflectometer

The pickup and conductor sections of the s.w.r. bridge are made from a 4-inch length of RG-58/U coaxial cable. Skin off the black vinyl covering, exposing the braid, and then slide the braid off the inner conductor and its insulation. Fig. 2 shows the details; also study the close-up view of the completed Varimatcher. When cutting the insulation from around the inner conductor be careful not to cut too deep or you'll cut right through the inner-conductor wire. Use a soldering aid or probe to open up a small area at the center of the outer braid. After the area is opened it is a good idea to carefully tin the edge with solder, to minimize danger that any of the hair-like braid wires will short to the lead from R_1. After the braid is slipped back over the inner-conductor portion the ends can be wrapped with a few turns of solid wire to provide better support for soldering to the inner-conductor pin of J_1 and to feedthrough terminal.

The metal trough that houses the bridge section is made from a piece of copper flashing, although aluminum could be used. Drill the holes for J_1 and the feedthrough bushing before bending the metal into a U. Shielded wire should be used for the leads running from CR_1 and CR_2 to the front where R_2 is mounted.



At the side of the unit are the 10/15 and 20-meter coils. The 80/40-meter coil is plugged into the jack bar assembly. The antenna feeders would be attached to the two isolantite standoff insulators mounted at the top rear.



This view shows the front panel controls for the transmatch. The Varimatch meter, M_1 is at the lower left, the link capacitor is in the center and S_1 and the sensitivity control are at the right.

Using Table I

As mentioned earlier, the center of the antenna should be about 30 feet above ground for the information in Table I to hold true in your installation. Because actual electrical ground varies with the soil, and because of the antenna's proximity to nearby objects, there will probably be slight variations from the figures in Table I for each installation. However, the figures should be close enough to give you a good starting point.

Always try to mount the antenna in as clear an area as possible. If you don't have enough room to run the wire in a straight line you can bend the ends to fit a smaller space, although this will probably throw the figures in Table I off.

Connect the ends of the feeders to the standoff insulators on the transmatch. The tap point information is given in terms of counting from the center of L_2. In other words, if the tap is "3½", this means that the feeder taps are 3½ turns either side of the center of L_2. We tried to keep all tap points in ½-turn increments because this allows the clips to be on top of the coil, providing easier access. The regular alligator clips are slightly too wide at the ends and are inclined to short to adjacent turns; this can be fixed by using pliers to squeeze the tips closer together. Be sure to use copper clips; steel types should be avoided as they tend to heat up in an r.f. field.

Turn on your transmitter and reduce the output if you have a level control (it is easier to make the transmatch adjustments at low power). Set C_1 and C_2 as required for your feeder length and switch S_1 to "forward." Close the key and adjust your amplifier tuning for a reading on M_1; when the reading is maximum the amplifier tuning is resonated. You will probably have to adjust R_2 as you make these adjustments. Set R_2 for a full-scale reading on M_1 and then switch S_1 to "reflected." The reading should drop to zero or close to it. The object is to adjust C_1 and C_2 so that M_1 reads zero in the "reflected" position versus full scale in the "forward position." When you have this condition the transmitter will be working into a 50-ohm load.

In reaching the exact settings for C_1 and C_2 to provide a 50-ohm load you may have to retouch the tuning of the final amplifier. Once you have obtained the correct settings you can load the amplifier to full input. A good way to do this is first to set R_1 so that M_1 reads about half scale in the "forward" position and then adjust your tuning and loading controls for maximum reading on M_1 — staying within the plate current rating of the amplifier tube or tubes, of course.

In Conclusion

Many amateurs don't understand what a transmatch does — they think it matches the feeder to the *antenna*. This isn't true. What it *does* do is match the output of the transmitter to the *feeder* load. Even though the s.w.r. bridge reads zero in the reflected position, indicating a 1-to-1 standing-wave ratio on the coax line between the rig and transmatch, the transmatch does *not* change the s.w.r. on the line between the transmatch and antenna. If it makes you happy, you can tell other hams you have a 1-to-1 s.w.r., but keep in mind that under most conditions, it will be 1-to-1 only in that short length of coax. However, the important thing is that *if* you use a low-loss transmission line to the antenna, you can tolerate a high s.w.r. on that line without adding appreciable loss to the system. Also, keep in mind that with this system you have about the best multiband antenna you can find. QST

TRANSISTOR PREAMPLIFIERS FOR 1296 MC.

A prime factor in making ever higher frequencies practical for amateur communication is the availability of improved receiving techniques. In recent months several types of transistors have appeared that promise marked improvement in our reception in the 1215-Mc. band. These two articles came in within a few days of one another. Since the transistors and circuitry involved are very different, we present them together. Either "has what it takes." Take your choice — and start hearing the weak ones on 1296 Mc.!

A 1296-Mc. Preamplifier— That works!

BY ALLEN L. KATZ, K2UYH*

ACTIVITY levels and distances covered on the 420-Mc. band have increased significantly in the past few years. Improvement in coverage is mainly the result of almost universal use of low-noise transistor preamplifiers with 432-Mc. receivers. Those of us who are interested in the 1215-Mc. band have been looking forward to the day when a similar improvement could be obtained there. It appears that day is now here. The 1296-Mc. preamplifier to be described gives a gain in excess of 9 db., and a noise figure as low as 3 db. This is a real step forward in receiver performance, and much-improved reliable coverage should be obtained when more such amplifiers are built and used.

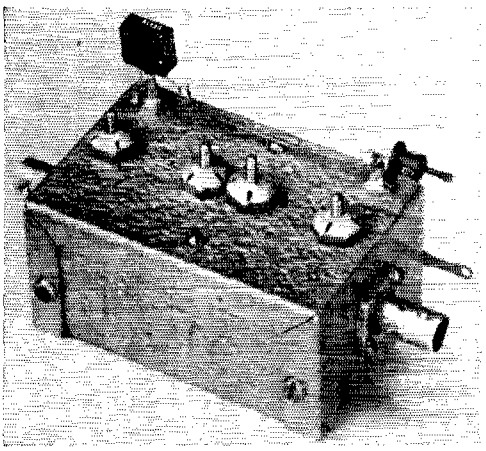
The problem in getting such an amplifier into service is basically twofold. The first part is that of finding transistors that will work on 1296 Mc. The KMC K-2500 series transistors do work up there, and quite well. These are no 50-cent specials. They are expensive, currently going for more than most amateurs would care to spend. They are available to amateurs at a very reasonable price, however.[1] The second part concerns matching. Most transistors like to see a very low impedance. The K-2500's should see about 40 ohms at the input and around 10 ohms at the output.

A circuit using half-wave lines was first tried. Several arrangements were used, but none gave more than 6 db. gain. Then, at the suggestion of Bill Ashby, K2TKN, a circuit similar to one developed by him for 1000-Mc. test jigs at KMC was tried. This uses pi networks (Fig. 1) for both input and output matching. It gave a gain of about 9 db. almost immediately.

Construction

The amplifier was built into a 3¼ by 2⅛ by 1⅝-inch Minibox. Disk ceramic capacitors are used to couple into and out of the preamp. Their leads are cut as short as possible to keep inductance down. The tuned circuits are composed of two 10-pf. glass trimmers (listed in Barry's Green Sheet for about 30 cents) connected to each end of 1-inch copper straps. The width and shape of the copper straps, L_1 and L_2, are adjusted so that maximum gain comes within the tuning range of all capacitors. A ⅜-inch width gave good results with a majority of the K-2500s tried, but variations were noted from one transistor to the next. Notice that the strap is soldered across the tops of the capacitors, to keep inductance down. The position of the end of the strap on the capacitor terminal can be changed to give a slight range of inductance adjustment.

One need not be overly concerned with overheating of the transistor in soldering, if reasonable care is used. Ordinarily the leads will not conduct enough heat to do any damage. The small wire breaks off easily, however. The tran-



The 1296-Mc. transistor preamplifier by K2UYH. Rectangular object at the upper left is a miniature control, R_1, for regulating bias. The diode at the upper right is in the plus 9-volt lead, for transistor insurance in case of inadvertent battery polarity reversal.

*48 Cumberland Ave., Verona, N. J. 07042

[1] Amateur-type KMC 2500-series transistors, and a new and even better 5200 series not available when this article was written, are available at moderate cost from Samuel G. Nelson, W2MHK, Reaville Associates, RFD 1, Box 200, Flemington, N. J. 08822.

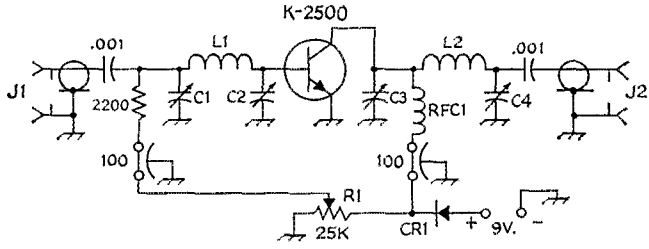


Fig. 1—Schematic diagram and parts information for the K2UYH preamplifier. Decimal values of capacitance are in μf., others in pf.

C_1, C_2, C_3, C_4—1 to 10 pf. glass trimmer.
CR_1—Any power-supply type diode rectifier.
J_1, J_2—BNC fitting.
L_1, L_2—Thin copper strip, 1 by ⅜ inches. See text.
R_1—25,000-ohm trimpot.
RFC_1—5 turns No. 24 enamel spaced on 10,000-ohm or higher ½-watt resistor.

sistor is positioned between the capacitors C_2 and C_3, directly above a thin copper shield mounted across the center of the box. This extends the full height of the interior but has a notch cut at the point where the transistor will be. The emitter wire is soldered to this shield with the shortest possible lead.

Adjustment

For the initial tuneup, the bias should be set, by R_1, so that the transistor draws less than 1 ma. A signal source can then be connected, preferably through an attenuator, and the four trimmers adjusted for maximum gain. Be careful of oscillation and false tuning combinations. The proper capacitor settings will result in uniform gain over a wide frequency range. The bias can then be adjusted for maximum gain, which will occur at a collector current somewhere between 2 and 4 ma. Do not permit the drain to exceed 10 ma., or the transistor will be damaged.

Best amplifier noise figure occurs at bias settings that give less current than that for maximum gain. The optimum noise figure will occur at around 1 ma. The setting which will deliver the best overall noise figure may depend on the noise figure of the mixer, and on the nature of the stages following, if the mixer is the crystal-diode variety. In the light of the high noise figure of most 1296-Mc. converters in use today, it may be that best overall performance will be obtained with the amplifier adjusted for maximum gain, as the full 9 db. may be required to override the mixer and i.f. amplifier noise. The setting that gives best signal-to-noise ratio on weak signals is the one to use.

The important item in this picture is practically invisible: the transistor is a tiny black dot at the center of the original photograph that may not survive the printing processes. Tank circuits are u.h.f. versions of the pi network, for matching the low input and output impedances of the transistor.

The diode, CR_1, prevents damage to the transistor if the wrong polarity is applied. If you're sure that you'll always have the polarity right, CR_1 can be omitted, but it is cheap transistor insurance. QST

QST ——— QST ——— QST

Using the TIXM101 Transistor at 1296 Mc.

BY H. E. HOLSHOUSER, JR., K4QIF*

THE r.f. amplifier for 1296 Mc. shown here uses an expensive transistor. It is regenerative, and a little touchy to tune up, but the end result is worth the cost if one is interested in outstanding performance at this frequency.

Specifications for the TIXM101 transistor indicate that it should work at 1296 Mc., but using it at this frequency will necessarily require some metal work. While this need not be fancy, it should be mechanically stable. This quality was achieved through use of one-inch square brass channel for the outer conductors of dual

*3800 Yaupon St., Chesapeake, Va. 23703

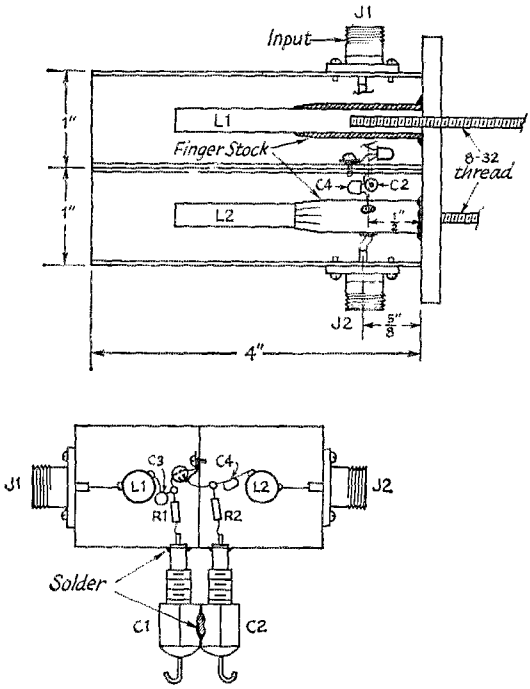


Fig. 1—Details of the K4QIF preamplifier construction. At the top is an interior view of the assembly, with the input line (top of drawing) shown in cut-away form. The lower view is looking into the open end of the lines.

coaxial tanks which comprise the input and output circuits, as seen in Fig. 1. A 1/8-inch hole is drilled in the inner wall of each assembly for the transistor leads, and the two channels are soldered together, side by side. A 1/2-inch wide window was cut in each assembly, over the transistor mounting position, to allow access to the interior. These holes are on a line between the N-type coaxial connectors, J1 and J2, mounted on the outer walls. Brass cover plates for the openings are held in place by screws at each corner, running into holes tapped in the top surface.

The tuned circuits are adjustable quarter-wave lines of 5/16-inch brass tubing or rod, soldered to lead screws that pass through the thick brass bottom plate. The rods slide inside sleeves of finger stock. Great care should be exercised to insure good electrical contact between the sleeve and rod, and mechanical stability in the tuning assembly. Silver plating of all brass parts is very desirable.

Bypassing can present a real problem, as most conventional capacitors work poorly above even 100 Mc. or so. Fortunately, the requirements are not stringent in this circuit, and the feed-through capacitors, C_1 and C_2, work well enough. They are standard types by Erie, but used in an unconventional way. To keep them from projecting too far into the compartments, the small ends are soldered to the brass walls, as seen in Fig. 1. Smaller types and lower values of capacitance should work equally well. Examples would be the Centralab MFT series.

Care should be used in handling the transistor, as it is fragile mechanically, and susceptible to heat. The base and case leads are grounded to a small screw and washer arrangement, as shown in the drawing. Keep these leads as short as possible.

The coupling capacitors, C_3 and C_4, should be good quality types suitable for u.h.f. service. Those used were dipped-micas, though small glass-dielectric types might be better still. The connections from the lines to the input and output fittings are made with 1/8-inch brass ribbon. Before any testing is attempted inspect the assembly for shorts and wiring errors. Then put the cover plates in place over the access windows. The bias network is external.

Testing

A check can be made to assure resonance in the tuned circuits without applying power. With the preamplifier connected to the 1296-Mc. receiver, but with no power on the amplifier, feed in a strong signal (about 1 millivolt) and peak the lines for maximum response. These settings will not hold when power is applied, of course,

(*Continued on page 158*)

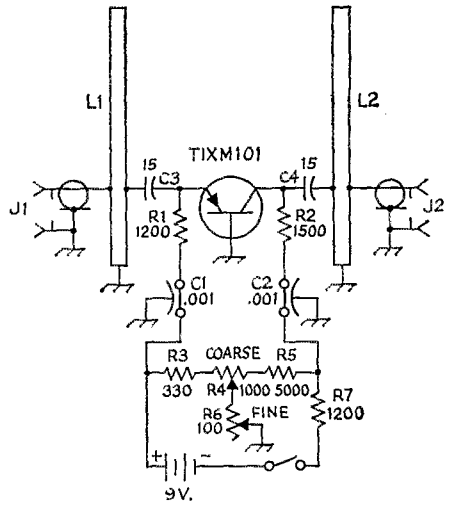


Fig. 2—Circuit diagram and parts information for the 1296 Mc. preamplifier. Fixed resistors are 1/4 watt, valves as given.

C_1, C_2—Feed-through capacitor, 100 pf. to 0.001 uf. (Erie CK70AW102M, with inner lead cut 1/8 inch long).
C_3, C_4—15-pf. dipped mica.
J_1, J_2—N-type coaxial fitting.
L_1, L_2—Adjustable inductor, 5/16-inch brass rod, 3 inches long, sliding into finger-stock sleeve, 1 3/4 inches long. See Fig. 1. Taps 5/8 inch up from grounded end.
R_4—1000-ohm control.
R_6—100-ohm control.

Here's a good weekend project. The addition of a standard pocket broadcast receiver makes a complete portable transistor double superhet for the 10-meter band. No connections between the two units are needed.

The W3KCR 10-Meter Converter

Three Transistors in a Pocket-Size Unit

BY JOSEPH E. GRABER,* W3KCR

I'M an inveterate builder. I get panicky when I see a shoebox full of resistors and capacitors. Most of my projects are of the "gadget" variety that can be assembled in an evening or two. Sometimes they work, and sometimes they don't. If they don't work, little time has been wasted, and I can try something else.

One of the gadgets that does work, and which would probably be of interest to a great many others, is the 10-meter pocket converter shown in the photographs. It uses three widely-available transistors and works into a pocket-size transistor broadcast receiver which provides the i.f. and audio sections. No connections between the two units are needed. The combination will work with the units separated anywhere from an inch up to a foot or so. Any signal that shows S6 or better on the station receiver will be readable on the portable using the miniature loaded whip illustrated. With the station antenna, I can hear anything on the converter that I can hear on my SX-71.

The circuit is shown in Fig. 1. It is a standard combination of r.f. amplifier, mixer and h.f. oscillator. The transistors are all alike. Since they are of one of the types brought out by RCA for universal replacement, they should be obtainable almost anywhere.

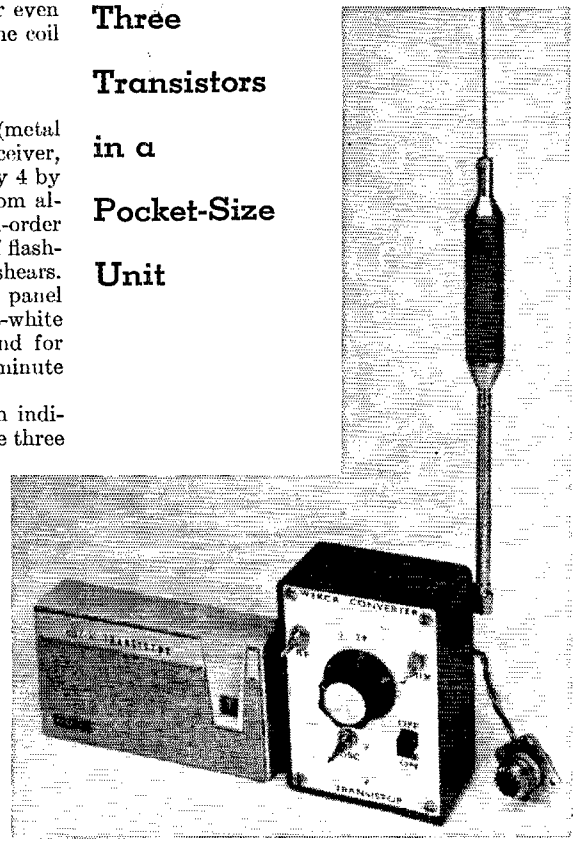
All circuits are fixed-tuned except the oscillator. The tuning capacitor in this circuit covers approximately 1.5 Mc., and this range can be placed anywhere in the 10-meter band (or even in the Citizens' Band) by adjustment of the coil slugs.

Construction

Components are housed in a plastic box (metal would prevent coupling to the broadcast receiver, of course) measuring approximately 2¾ by 4 by 1½ inches. These boxes are obtainable from almost any of the large electronics mail-order houses. I made a panel to fit the box out of flashing aluminum, which can be cut with shears. Before applying the decal lettering, the panel was sprayed with a couple of coats of flat-white Krylon that I happened to have on hand for refinishing Venetian blinds. It dries in a minute or two.

The interior-view photo and its caption indicate the general layout of components. The three sections — r.f., mixer, and oscillator — should be wired up one at a time, starting with the oscillator. It will usually be found easiest to do the soldering and wiring after all resistors and fixed capacitors for a section have been mounted. By using the

*1035 Kipling Road, Jenkintown, Penna. 19046.



The transistor 10-meter converter and unmodified broadcast receiver set up for operation.

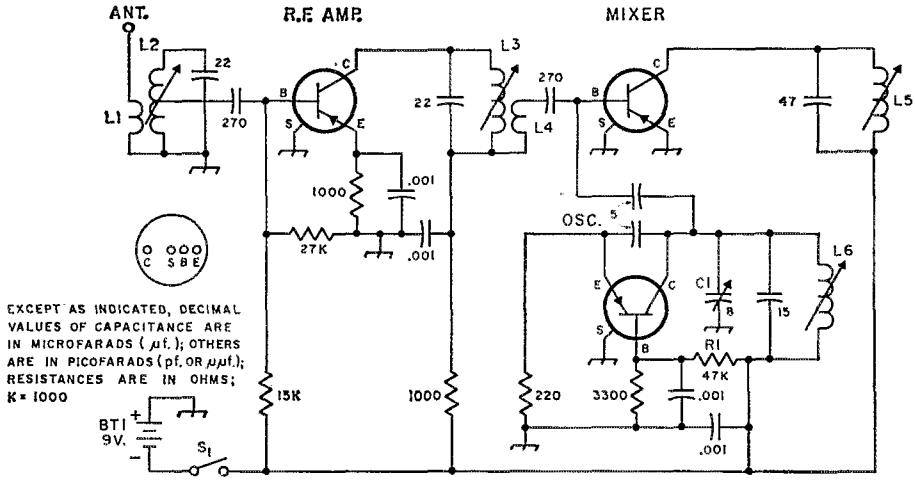


Fig. 1—Circuit of the pocket 10-meter converter. Fixed capacitors are disk ceramic; those of capacitance less than 0.001 μf. should be stable-type. Resistors are ¼- or ½-watt. Transistors are RCA SK3006. Coils are close-wound with No. 22 enameled wire on 7/32 × 19/32-inch ceramic iron-slug forms (Miller 40A000CBI).

BT_1—9-volt battery (RCA VS323, or equivalent).
C_1—8-pf. variable (Johnson 160-104, or Hammarlund MAC-10).
L_1—2 turns over ground end of L_2.
L_2, L_3, L_6—16 turns; tap L_2 at 2 turns from ground end.
L_4—2 turns wound over low-potential end of L_3.
L_5—Miniature adjustable ferrite-rod "loopstick" antenna (Lafayette 99 C 6311, with lead wire removed). Cut off screw after adjustment.
S_1—Miniature s.p.s.t. slide switch.

proper tie points for mounting, only a small amount of wiring will be left to do.

Testing and Adjustment

When you have the oscillator wired up, connect a low-reading milliameter in series with the battery, and connect to the oscillator battery terminals. Be sure that you have the polarity correct, as shown in the diagram. The oscillator should draw 1½ to 2 ma. If the current is much more, or much less, change the value of R_1 until the current is in this range.

Now connect an insulated wire to the antenna terminal of your communications receiver, and drape the end of the wire close to the converter oscillator circuit. With the tuning capacitor C_1 set to minimum capacitance, adjust the slug of L_6 until you hear the oscillator signal at 28.1 Mc.

Now proceed to the r.f. and mixer portions. Before connecting the loopstick into the circuit, connect the 47-pf. capacitor across it, and adjust the slug for resonance at 1600 kc., using a grid-dip oscillator. If your g.d.o. goes down only to 1750 kc., as mine does, start with the slug backed all the way out, screw the slug in until the circuit resonates at 1750 kc., then give the slug another turn or two.

With the mixer and r.f. stages wired up, the battery current should increase to 2½ to 3 ma. If the current isn't greater than it was with the oscillator alone, check your wiring.

Now see if you can find the oscillator signal again on your communications receiver. The frequency will probably have shifted lower, so you'll probably have to back the slug out.

Place the converter next to the transistor broadcast receiver, and tune the receiver to the high end of its range (1600 kc.). Attach a short piece of wire to the antenna terminal of the converter. Turn on the XYL's cake mixer or vacuum or your electric razor (operating it in the same room as the converter). With the converter and broadcast receiver turned on, adjust the slug of the loopstick very slowly for maximum noise. Turn the noise maker off and turn the converter switch on and off. There should be an increase in background noise when the converter is turned on. If you don't get an increase in background noise, try moving the converter around in respect to the receiver. If you can determine where the receiver loopstick is located and how it is oriented, try to place the converter so that the two loopsticks line up, to get maximum coupling. However, maximum coupling usually isn't necessary.

Now run the slugs of both mixer and r.f. coils all the way out. Turn on the noise maker and adjust the slug of the mixer coil for maximum response. Then do the same with the slug of the r.f. coil. The tuning of the latter will be quite broad.

Now, with a length of wire connected to the antenna terminal of the converter, you should be able to pick up 10-meter signals, if there are any stations on in your locality. The tuning range, when the circuits are adjusted as described, should be from about 29.7 to about 28.1 Mc. If you don't hear anything in the 10-meter band, you can go into the CB band by slowly running the oscillator slug in farther. There is usually

activity in this band at most hours of the day and evening. When you have located the band, trim up the r.f. and mixer slugs for maximum background noise. Don't try to line these circuits up on a signal, because the adjustment pulls the oscillator, and you'll just be spending your time chasing the signal around.

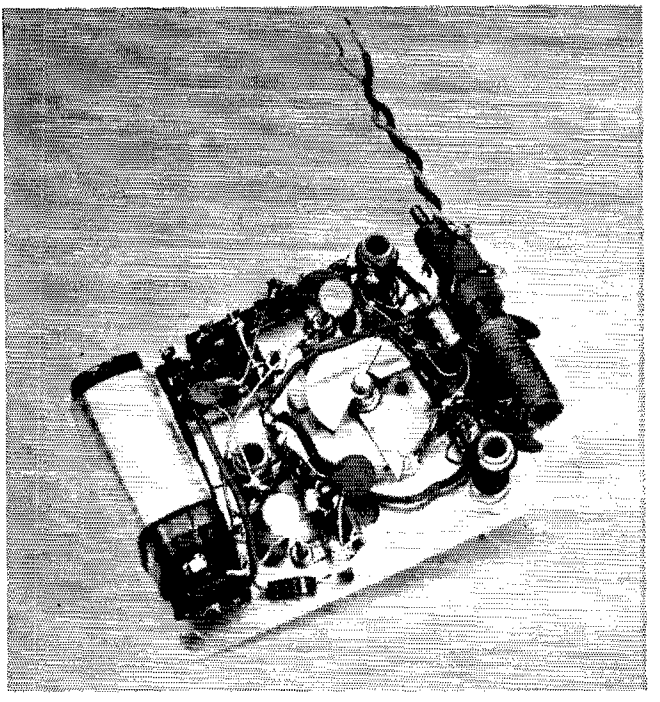
Portable Antenna

The antenna shown in the photograph is a modified Antenna Specialists Model M-131 19-inch center-loaded CB mobile antenna. This antenna comes with a roof-mounting clip and base spring. While it might be used as is by removing the mounting clip and spring, the noncollapsible base section makes it rather bulky to carry. I replaced the base section with a portion of a cheap hand-portable CB telescoping whip, which reduces to a length of about 6 inches when collapsed (Lafayette 99 C 3040, or similar). This whip was cut off at about 1 inch above the second section, making the total extended length about 8 inches. The cut end of the tubing was flared out slightly so that it would follow the threads in the bottom end of the loading coil.

Before mounting the converter in its case, a pair of holes to pass No. 4 machine screws should be drilled about ½ inch apart, and ⅝-inch down from the top of the case, in the upper left-hand corner (as viewed from the back). A third hole ⅛ inch in diameter should be drilled midway between these two holes and ⅜ inch above. Twisted-pair leads from the antenna coupling coil pass through this latter hole, and the ends are fastened to screws in the other two holes, the screws serving as terminals. The bottom end of the antenna is held by a small pair of clamps fastened to the outside terminal screw. When using the whip antenna, a 7- or 8-foot length of wire should be attached to the other terminal screw. (Do not ground this wire.) To use the converter with your station antenna, you can connect a coax connector to the output terminals with short lengths of twisted wire, as shown in the photo.

If you want to work the converter into your car broadcast receiver for mobile operation, connect a 0.001-μf. capacitor between the top end of L_5 and the input to the car receiver.

I have had a lot of fun with this converter. With the combination sitting on a coffee table in my ground-floor living room, I have copied amateurs in Argentina, England, Denmark and other DX spots. (Why spend time in the shack when you can do your listening anywhere in the house?) Using the converter in the car, I have been able to work the XYL back home at distances up to 22 miles, using the CB band. QST



The shaft of the tuning capacitor is centered 1½ inches down from the top of the panel (right-hand end in this photo.) The loopstick i.f. coil is at the extreme right, and the battery at the extreme left. Most of the small components are mounted on, or between tie-point strips—one on either side of the tuning capacitor, one at the right-hand end (hidden by the loopstick), one just to the right of the battery (hidden by the battery), and one along the top edge. H.f.-oscillator components are grouped to the right of the battery, r.f.-stage components are near the bottom end of the loopstick, and those of the mixer near the top end of the loopstick. The slide switch is to the upper right of the battery. The battery holder is a piece of sheet metal shaped to fit almost completely around the battery, and is fastened to the panel with a machine screw.

Note on Beam Stacking

Some Interesting Results at 10, 15 and 20 Meters

BY LEWIS G. McCOY,* W1ICP

Ever wonder what happens when beams for different bands are mounted close to each other on the same mast? Here are the results of some s.w.r. tests.

A COMMONLY asked question from beam owners is how close can beams for different bands be mounted to each other without one having any appreciable effect on the other. Recently, we constructed a 15-meter beam[1] and this looked like a good opportunity to check the effect of mounting this antenna close to an existing four-element 20-meter beam with 0.125λ elementspacing.

Many old timers will recall that it was always considered advisable to break up guy wires or any metal pieces that could be resonant lengths. This was done to avoid coupling between these resonant lengths and the antenna. Such coupling would cause the metal objects to radiate and upset the desired antenna pattern, which should be the *only* radiating element. One important point that is sometimes overlooked is that it is extremely difficult to couple r.f. energy between two nonresonant elements. Twenty and 15-meter beams are not resonant to each other so in theory, they could be mounted quite close to each other without having any interaction.

The tests that were conducted brought out several interesting results that may be of worth to other amateurs desiring to use single-band beams on the same boom or supporting mast. We are not going to go into detail of the advantages in using single-band beams versus the popular tribanders except to state that it is pretty well agreed that tribanders are a "compromise" antenna.

Many amateurs coming into amateur radio in the last ten years take for granted that a triband beam is just as good as a single-band beam, for any given band. For the benefit of those amateurs, a triband beam must be a compromise for a couple of reasons. First, in order to get maximum gain from a beam antenna, there is always an optimum spacing length between the driven element and the parasitic elements. When you use three elements such as is common practice in triband trap beams, you must compromise on the spacing because it is going to be the same on all three bands. Therefore, it is impossible to obtain maximum possible gain on all three bands. Second, the feed impedance of the tribander cannot be the same for all three bands. Because the antenna is fed with a single length of coax there are bound to be mismatches over the three bands. Third, inserting traps in the elements adds to the ohmic losses in the antenna. In a single-band beam you can adjust the elements for optimum gain and because only one band is involved, it is a relatively simple matter to get a match for your coax feed line.

Don't ask us to tell you how *much* better a single bander is versus any given band of the three-bander. We can tell you that if you want to spend an interesting evening, get out your copy of the A.R.R.L. *Antenna Book* and look up the section of multielement directive arrays. There are charts given for spacing versus gain. You can easily see the difference in comparing three-element optimum spacing for single banders versus the fixed dimensions of the tribanders.

To be fair, it should be pointed out that only a single tower and feed line is required for a triband beam. But if you want the most efficient antenna, the monobander is the answer. This of course brings us to the problem and effects of putting different band monobanders to the same boom or support.

Method of Testing

One simple method of checking to see if one beam has any appreciable coupling on the other

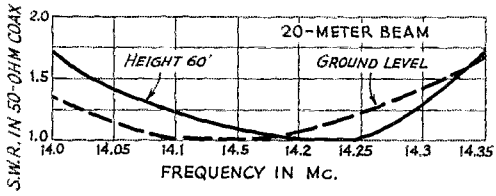


Fig. 1—The solid curve shows the s.w.r. readings across the 20-meter band with the antenna at the 60-foot height level. The broken curve shows what happened when the antenna was lowered to the ground, reflector parallel to earth. (In addition, a test was made with antenna at ground level with the elements vertical to the earth's surface. The s.w.r. curve remained the same but shifted, the matched point occurring about midway between the two matched points shown above.)

* Technical staff.

1 McCoy, "A Two-Element Beam for 15," *QST*, Sept. 1966.

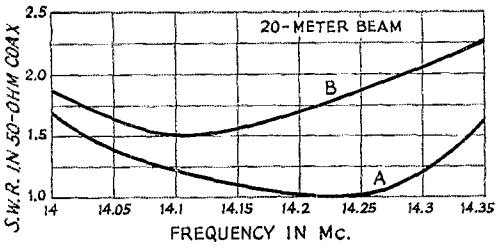


Fig. 2—A—s.w.r. curve for the 20-meter beam alone. B—s.w.r. curve with the 15-meter driven element 1 inch from the 20-meter driven element.

is to check the standing-wave-ratio curves, both with the beams by themselves and then mounted close to each other. If one beam is coupled to the other, the feed point impedances would change, thereby changing the standing-wave ratio. To check, all that is required is to insert an s.w.r. bridge in the coaxial line, make an s.w.r. curve across the amateur band, and then repeat the process with the two beams at different proximities to each other.

We have a 60-foot tilt over tower so it was no great problem to make changes in the antenna. In making these tests, it was a good opportunity to check the impedance change in the beams both at their normal height, tower up, and at ground level, tower cranked down.

Several tests were made including the following:

1) 20-meter beam by itself.
2) 15-meter beam by itself.
3) 15-meter beam stacked 10 feet above 20-meter beams.
4) 15-meter beam stacked 1 foot above 20-meter beam.
5) The two driven elements mounted in line on the same boom, driven elements 1 inch apart (this was as close as they could be mounted without actually shorting to each other).

The above checks were made at normal height. In addition, s.w.r. curves with the beams cranked down to ground level were taken, elements lying horizontally in a vertical plane (reflector of 20-meter beam was actually resting on ground). Also, similar curves were run with the elements vertical to ground, ends at ground level.

Ground-Level Tests

Fig. 1 shows the s.w-r. curves of the 20-meter beam at 60 feet above ground and at ground level, antenna horizontal to ground. It was fully expected that there would be a radical change at ground level, but it is apparent from Fig. 1 that this was not the case. At ground level the entire curve remained approximately the same but shifted downward in frequency about 100 kc. The only assumption that we made, and it is a guess, was that our electrical ground was well down below the earth's surface. Otherwise, it could be expected that the impedance of the antenna would not remain at a matched condition, even though the curve shifted downward in frequency. It would be of interest if someone who could raise or lower a beam, and lived over a salt marsh where the electrical ground was known to be at ground level, could make a similiar test. We always remember the ham who lived in Florida, right on the beach, and as the tide rose and fell, his s.w.r. changed!

Stacking Tests

In our first stacking test, the 15-meter beam was mounted 10 feet above the 20-meter antenna and s.w.r. curves were made on both antennas. The first thing that was apparent was the lack of change in either curve as compared with when the antennas were by themselves. Next, the two antennas were brought within one foot of each other, the 15-meter driven element directly over the 20-meter driven element. To our surprise, the s.w.r. curves still remained the same which indicated no coupling between the antennas.

In the next test, the 15-meter beam was mounted in line with the 20-meter antenna with the two driven elements about one inch apart. In fact they were so close, we had to jury-rig some insulators between the two to keep them from actually shorting. This close proximity showed a marked change, particularly in the 15-meter s.w.r. curve. The 20-meter curve, Fig. 2, didn't have as radical a change. The curve shifted downward in frequency but instead of a perfectly matched condition, the best frequency showed an s.w.r. of 1.5 to 1.

The change in the 15-meter beam curve was

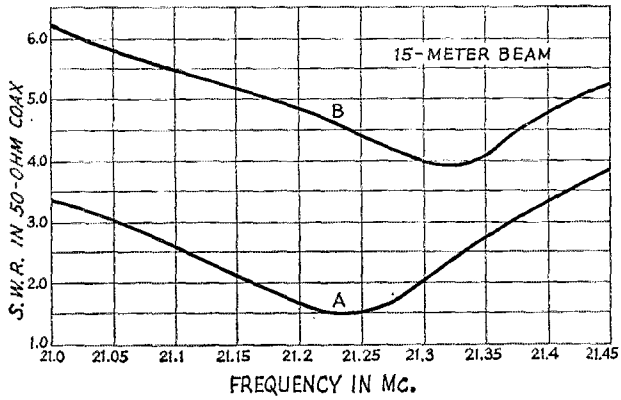


Fig. 3—A—s.w.r. curve for the 15-meter beam alone. B—s.w.r. curve when the 15- and 20-meter driven elements were 1 inch apart. (Note change in s.w.r. scale as compared with Figs. 1 and 2.)

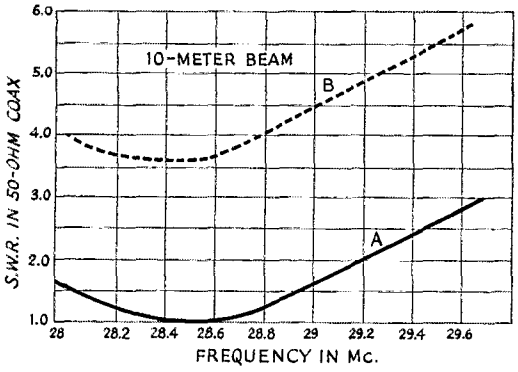


Fig. 4—A—s.w.r. curve for the 10-meter beam, either by itself or 1½ feet above the 15-meter beam. B—shift in s.w.r. curve when the 10- and 15-meter driven elements were about 1 inch apart.

much more evident, Fig. 3. In this case, the best condition for the antenna alone was about 1.5 to 1 (curve A) but this rose to about 4 to 1 (B) when the 20-meter beam was added.

In the last test, the two beams were kept in line on the same boom but with the two driven elements about 1 foot apart, as in the stacked test. The s.w.r. curves were just about the same as with the 1-foot stacking, indicating little if any coupling between the two antennas.

The probable reason for the impedance changes when the driven elements were mounted 1 inch apart was because of capacitive effects of the two masses of metal to each other. Probably the big question is what effect does one antenna have on the other as to pattern changes. In theory, if the two antennas don't couple to each other, there shouldn't be any change in patterns.

After completing the above tests, we checked out a 10-meter beam stacked above the 15-meter unit. The 10-meter beam has 3 elements with 0.2λ element spacing, using Plumber's-Delight construction, gamma matched and resonant at 28.6 Mc.

The solid line in Fig 4 shows the s.w.r. curve of the 10-meter beam by itself, and the dotted curve shows what happened when the 10-meter and 15-meter driven elements were about 1 inch apart. Under the latter condition, the 10-meter resonant point apparently shifted downward in frequency and at the best, the s.w.r. was about 3 to 1. In this test, the 15-meter curve (not shown) also shifted downward approximately 100 kc. and the s.w.r. at best rose to slightly over 2 to 1. In making these tests, the 20-meter beam and in no instance did the 20-meter curve change appreciably.

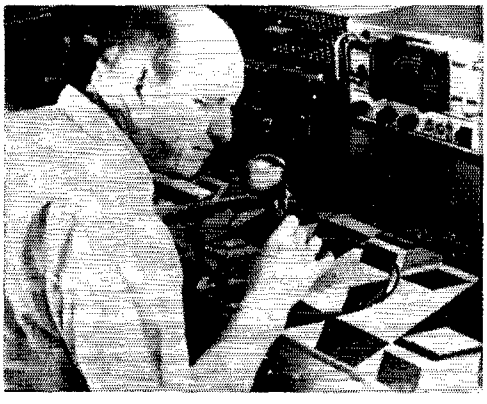
In the final set up, the 10-meter beam was mounted about 1½ feet above the 15-meter beam, was approximately 1 foot below the 15-meter beam, which in turn was about 1 foot above the 20-meter job. With these spacings the 10-meter curve reverted back to what it was by itself, indicating little if any coupling between the 10- and 15-meter units.

Conclusions

With 1 foot minimum separation between the three beams the s.w.r. curves were the same as if the beams were by themselves. Although it was impossible to make practical pattern tests on the stacked antennas, after nearly a year of use we can say there is no *apparent* change in the pattern. For what it is worth, checks with an amateur approximately three miles away showed no appreciable change in the front-to-back ratio either with the beams stacked or by themselves.

As stated earlier, it is a fair assumption that if there is no coupling between the three antennas to change the s.w.r. curves, or the feed impedances of any of the three, then it follows that there should be little if any pattern changes as compared with each beam by itself.

The installation requires three separate coaxial lines (we're looking for a motor-driven coaxial switch!), and wind loading is of course greater than with a trap beam, but the combination has been up for a year without developing any problems. And we don't have to worry about lossy traps and compromise spacing. QST



Strays

After serving two years, Ray Meyers, W6MLZ, former ARRL Director from the Southwestern Division, turned over the duties as president of the Amateur Radio News Service to Al Marcy, W4ID, of Eau Gallie, Florida. Ray will continue as a Vice-President for public relations.

Other officers elected include Andy Clark, W4IYT, Vice-President, Harry Turner, W9YZE, Treasurer, and Shirley Rex, K8MZT, Secretary.

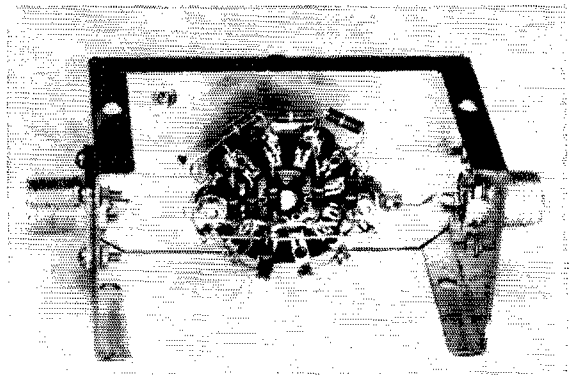
This is K7AJT at his operating position. Dick is one of the many sightless hams doing fine work in the field of traffic handling, civil defense, and rag chewing. *(W7VCB photo.)*

A Low-Z Ladder-Type Attenuator

It is not unusual to encounter extremely strong local signals when tuning across the ham bands. If strong enough, such signals can cause severe front-end overload and the attendant cross-modulation effects. When that happens, the band becomes a jumbled mess of spurious responses from ham and commercial signals. Even if cross-modulation does not occur, problems may arise from the inability of the r.f. gain control circuit to reduce the i.f. signal level to a usable value. Too strong a signal in this regard can cause a phone signal to be garbled, even at minimum r.f. gain, or make it impossible to get a proper ratio of b.f.o.-to-signal voltage. The latter makes it impossible to secure a good beat note for c.w. reception.

Some receivers are worse offenders than others. Simple regenerative receivers, often the choice of beginners, are seriously affected by strong signals. Having no r.f. gain control to work with, there is little that the operator can do to reduce the strength of the incoming signal before it reaches the detector.

The photograph shows a simple, easy-to-build attenuator that can be installed between the low-impedance feeders and the input terminals of the receiver. It provides up to 40 decibels of attenuation, approximately, and can be used in any 50- or 75-ohm line. It serves as an external r.f. gain control, being placed *ahead* of the receiver where it can do the most good. Five switch positions give 0, 10- 20-, 30-, and 40-db. steps of attenuation. This will handle most needs.



Inside view of the attenuator box. The resistors are mounted directly on the switch, using short pigtails wherever possible. Wide strips of copper are used for the input and output leads.

The Circuit

The circuit of Fig. 1 is known as a ladder-type attenuator. It lends itself to applications where the amount of attenuation is to be controlled by a simple switching arrangement. Basically, it consists of cascaded sections of unbalanced pi attenuators. Each section is designed to provide approximately ten decibels of signal reduction. The switching arrangement permits the unit to be taken completely out of the line when in position A, making it unnecessary to remove the attenuator from the circuit when it is not in use.

For use with both 50- and 75-ohm impedances, a mid-range impedance of 60 ohms was used in calculating the values of the resistors. Since the attenuator is a "losser" device anyhow, exact impedance matching is not necessary. The calculated value[1] came out to 115 ohms for the shunt resistors, R_1, and the series resistors, R_2, turned out to be 85.8 ohms each. Because these are not standard values of resistance, 100-ohm units were selected so that available parts could be used. The difference in performance is slight and of no significance in this application. If the builder desires a 75-ohm attenuator, 150-ohm resistors can be used at both R_1 and R_2. For 50-ohm line, 82-ohm resistors will give good results when used for R_1 and R_2. The latter two values represent the readily-available types that are nearest to the computed resistance values for the two impedances.

(*Continued on page 150*)

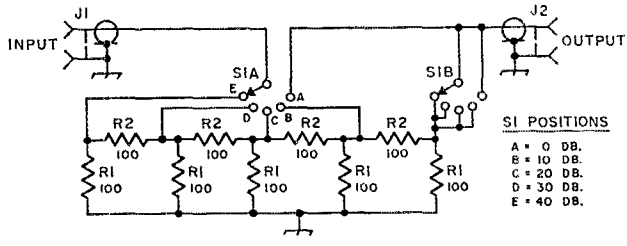


Fig. 1—Schematic of the attenuator. Resistance is in ohms. Resistors are ½-watt composition, 10% tolerance. S_1 is a phenolic rotary 1-section, 2-pole, 5-position switch. J_1 and J_2 are SO-239 connectors. Approximate attenuation in decibels is given for each switch position. R_1 and R_2 designations are for text reference purposes.

[1] *Allied Electronics Data Handbook*, 3rd Edition, page 8.

A Simple and Inexpensive Approach to Building Quads

BY C. STEPHEN AUGELLO*, W7BBC/W1DFJ

Ever want to build a cubical-quad antenna? Here are some hints that should make the job a little easier.

This article describes a few short cuts and helpful hints which might, at one time or another, prove useful to the prospective quad builder. Although the author used these ideas in the construction of a three-band quad for 10, 15 and 20 meters, the techniques described can be applied to any quad antenna.

Spiders and Spreaders

The first quad construction problem to be considered was how to utilize a relatively simple means of forming the basic "X" configuration without welding or cutting elaborate plates or brackets. Fig. 1 shows the solution. One U-bolt fastens each ⅝ by 26-inch long angle iron to the boom and two compression clamps fasten each ½-inch by 10-foot spreader (electrician's conduit) to the angle iron. Should he prefer, the builder can weld together both angle-irons used in each spider. Welded construction proves itself useful, in that the builder can assemble each element on the ground for later placement on the boom. The nonwelded configuration makes it necessary to assemble the elements with the spiders in position. This is accomplished by loosely tightening the spiders' U bolts, and elevating the boom to a height that permits free rotation of the spiders about the boom. Rotatable spiders save time and eliminate the need for climbing a ladder to string the element wires. Using the methods to be described, the final result can be symmetrical elements that are comparable in strength to those of a commercial quad.

Extenders

Each 10-foot conduit spreader, as described above, falls approximately 3 feet short of accommodating a 20-meter element. A simple method to gain the added length is to connect with two compression clamps a 4-foot length of ½- or ⅝-inch angle aluminum to the open end of each conduit spreader. Using this arrangement (Fig. 2), it is a simple matter to adjust or trim the spreader lengths for 20-meter elements.

Boom

The boom can be almost any material that suits the builder's needs. For the builder whose budget is somewhat limited, a 15-foot length of 2-inch diameter round wooden hand railing can be purchased for under $3 at most building supply houses. A couple of good coats of household paint and two guy ropes from the center of the mast to the boom ends will result in a boom that is exceedingly strong and capable of many years of service (see Fig. 3).

Insulators

Good insulators for the element wires are the 4-inch TV-type standoffs that mount with compression straps. Several configurations of polystyrene inserts are available with the insulators. The insert with several round holes of different sizes, designed to accommodate coax or wire of various diameters, was chosen rather than the insert with the single large hole, designed to accommodate TV twin-lead. With the first insert mentioned, the element wire is firmly gripped upon final clamping of the insulator.

Insulator Placement and Element-Wire Measurement

It's easy to determine the exact positions of the element standoff insulators. First the element length, L, of one side of the quad is found from the formula

$$L \text{ (feet)} = \frac{251}{f \text{ (Mc.)}}$$

Then this value is plugged in the formula

$$D \text{ (feet)} = 0.707L \text{ (feet)}$$

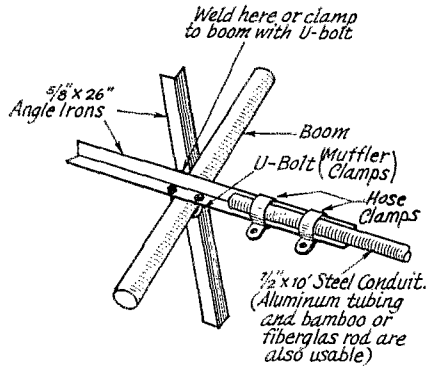


Fig. 1—Drawing showing how the angle-iron legs of a quad spider are attached to the boom. One angle iron can be clamped to the boom with a U bolt, and the other angle iron welded to the first angle iron, or both angle irons can be clamped to the boom with separate U bolts.

*156 Prospect Street, West Boylston, Mass. 01583

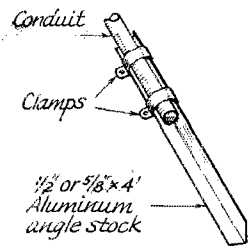


Fig. 2—Method of lengthening a spreader that is too short.

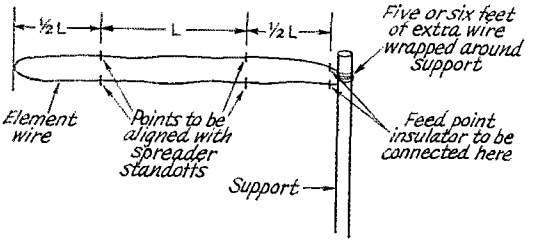


Fig. 4—The exact location of each standoff insulator is marked on a measured length of element wire. Using the marked wire as a guide, the locations of the standoff insulators on the spreaders is easily found. The wire can be measured as shown in the diagram by wrapping a few feet of wire around a support, extending the wire half the required distance and then doubling the wire back on itself. *Dimension L is discussed in the text.*

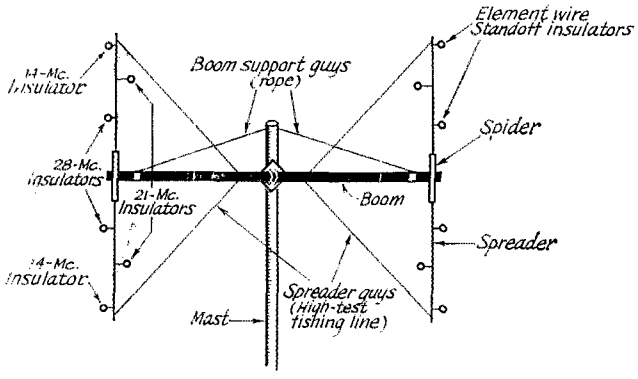


Fig. 3—A sketch showing the location of the quad guys and standoff insulators. For clarity, only half of each spider is shown.

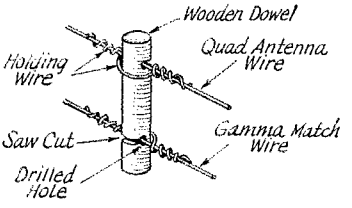


Fig. 5—Details of the wooden spacers used to make the quad tuning stubs.

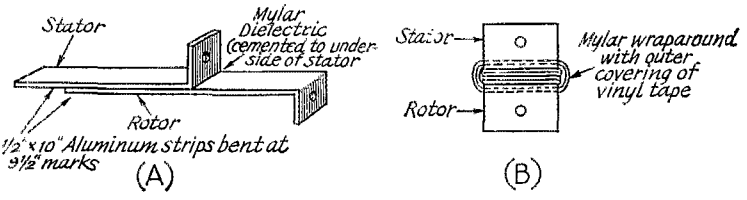
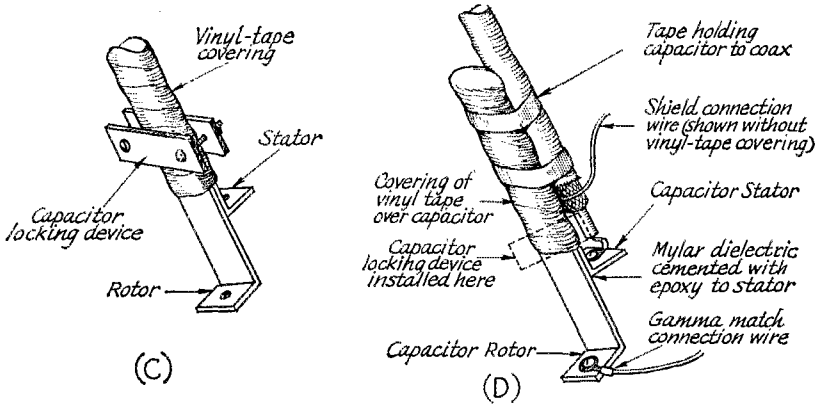


Fig. 6—The makings of a gamma match capacitor. Details given in the text.



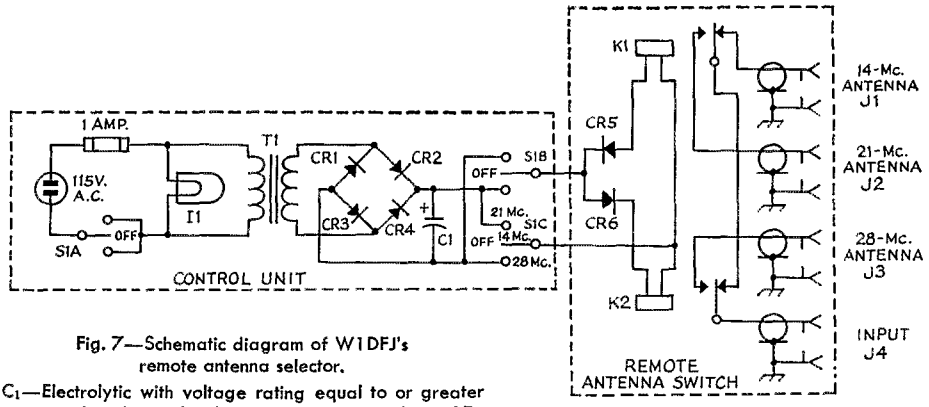


Fig. 7—Schematic diagram of W1DFJ's remote antenna selector.

C_1—Electrolytic with voltage rating equal to or greater than the peak voltage across the secondary of T_1, and sufficient capacitance to prevent K_1 and K_2 from chattering (try 100 μf. as a starter).

CR_1-CR_6—Silicon with p.i.v. rating equal to or greater than the peak voltage across the secondary of T_1, and current rating the same as or greater than that of K_1 or K_2.

I_1—115-v. pilot lamp.

J_1-J_4—Coaxial receptacle, chassis mounting (SO-239).

K_1, K_2—D.c. type, same voltage rating as the secondary of T_1, contacts rated 5 amperes or more.

S_1—3p.d.t. toggle with center-off position.

T_1—Isolation or filament transformer with voltage rating of secondary the same as that of K_1 and K_2.

where D equals the distance between the center of the "X" structure (spider) and the location of the insulator on the spreader. Using Fig. 4 as a guide, the location of each insulator is marked off on the wire. With this method the marked points will always be aligned with the standoff insulators, and the insulator at the feed point will be exactly centered, making a more closely balanced antenna both electrically and mechanically.

Element Wire

Due to the shortage of copper and consequent high price of copper wire, No. 16 or larger galvanized steel wire can be used for the element wires with a substantial saving. However, since galvanized wire will eventually rust, it should be inspected periodically to make sure it stays in goodshape.

Spacers

The spacers on the tuning stubs for the director and reflector elements and the gamma matches can be fashioned from wooden dowels removed from old coat hangers (see Fig. 5).

Gamma Match Capacitors

Some of the many factors that have to be considered in the selection of the gamma match capacitor are as follows: weight, weatherproofing, mounting, ease of adjustment, voltage rating, Q, and cost.

A simple and practical capacitor might be one similar to the one shown in Fig. 6D. It consists of two relatively smooth and flat, ½-inch wide

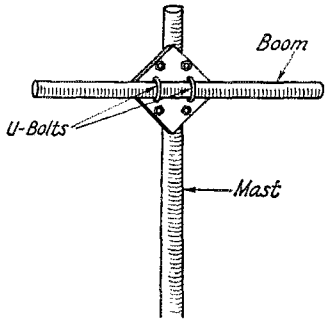


Fig. 8—Simple method of attaching the boom to the mast using a heavy metal plate and four U bolts.

by 10-inch long aluminum strips with turned ends that have been drilled to provide holes for lugs (Fig. 6A). The dielectric material is a strip of Mylar (available at any drafting supply store) glued with epoxy to one of the aluminum strips. As shown in Fig. 6B the whole assembly is tightly wrapped with three or four turns of Mylar, held in place with a tight covering of vinyl tape. Adjustment of capacitance is achieved by sliding either aluminum strip. In lieu of getting involved with the formulas used, the actual maximum capacitance of the illustrated example was 260 pf. Smaller aluminum slider inserts can be fashioned by the builder to give lower capacitances without unnecessary extension of the slider element. By covering all exposed connections with tape, and by taping the entire assembly directly to the coaxial feedline, a light, neat and inconspicuous installation is made. Upon final adjustment, the capacitor is firmly locked in place by tightening the locking mechanism illustrated in Fig. 6C.

Remote Antenna Selector

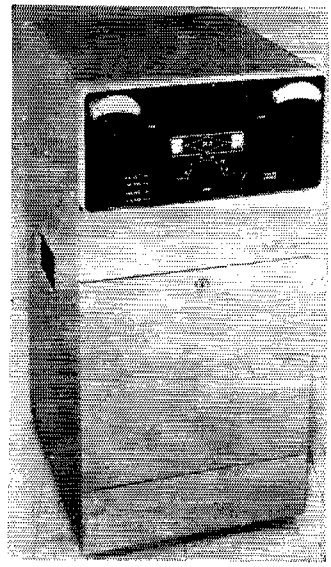
For optimum triband quad performance, three separate coax feed lines should be used. If sufficient coax for such an arrangement is not available to the builder, an inexpensive and efficient remote antenna selector can be constructed utilizing two d.c. relays and a few spare parts

(*Continued on page 148*)

Recent Equipment

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

Henry 2K-2 Linear Amplifier

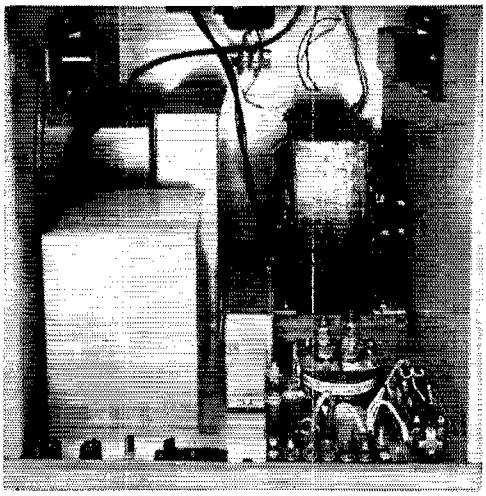


If you compare the photograph alongside with the one that headed up the earlier description of the Henry 2K[1], you may well be excused for wondering where the new model differs from the original. Externally, the difference is small—a slightly different arrangement on the front panel and a lock on the door to the power supply. Internally, it's a different story.

The 2K-2 r.f. amplifier circuit still has two 3-400Zs in parallel, cathode driven, with switched pi-network input circuits to the cathodes and a pi-L tapped-coil plate tank. These were features of the 2K. An added attraction, however, is a standing-wave ratio bridge, and there is a change in the method of checking grid current, which is now measured by using the meter to indicate the d.c. voltage drop in a low resistance (less than one ohm) between the grids and chassis.[2] The multimeter now does four jobs instead of the original two; besides measuring plate voltage and grid current, it also is used for indicating forward and reflected voltage in conjunction with the s.w.r. bridge. This change is responsible for a minor difference in the front-panel appearance, a four-position meter switch being used to replace the voltage push-button on the 2K. The plate meter, which has no other job, is in the negative high-voltage lead as in the 2K.

[1] "Recent Equipment," *QST*, June, 1965.

[2] Orr, Rinaudo and Sutherland, "The Grounded-Grid Linear Amplifier", *QST*, August, 1961; also in *Single Sideband for the Radio Amateur*.

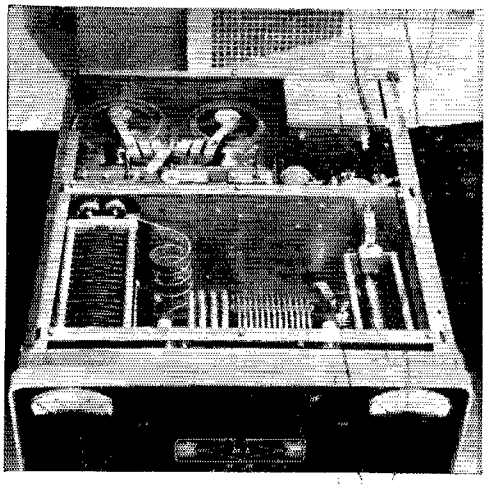


Inside the power-supply section. Rectifier and filter components are at the left, control relays at the near right. The plate-power control relay, immediately in front of the power transformer, is a mercury-plunger type. The plate transformer in this early "edition" of the 2K-2 is uncased; later production has a cased transformer. Part of the blower motor is visible at the top of this picture.

But the principal difference between the old and new amplifiers is the physical arrangement of the circuits. In the 2K, the tubes and plate tank were in one large compartment occupying the rear of the chassis space (see June 1965 *QST*); in the 2K-2, the tank circuit is in the front, shielded from everything else as shown in the accompanying photo. The tubes are at the back, and between them and the tank there is a shielded section in which plug-in cathode-tank modules are installed. Although these need no tuning during regular operation, being preset for each of the five bands (3.5 through 28 Mc.) covered by the amplifier, they do have adjustable inductances for optimizing the tuning. Also, the plug-in feature increases the flexibility of the amplifier in that modules designed for non-amateur frequencies can be installed for use in other services.

The s.w.r. bridge and metering resistors are in a shielded box occupying a rear corner of the chassis. The antenna relay is close by; as in the 2K, this relay connects the antenna to the exciter when the amplifier power is off, so "barefoot" operation is simple.

The shielding of the 2K-2 has been tightened up as compared with the 2K. There is an inside perforated-metal cover (see photo) which is screwed down to the top of the amplifier compartment to complete the shielding afforded by



The amplifier tank-circuit components occupy the front section of the enclosure, separated by a metal wall from the two 3-400Z tubes. Parasitic suppressors are coiled strap between the two plate caps, and a strap connection from the center goes to the blocking capacitors mounted on the rear of the plate tuning capacitor at the left. Cathode modules are between the tubes and the shield wall. The s.w.r. bridge is in the compartment at the rear right; the antenna relay is directly in front of it.

the chassis and inside walls. This is in addition to the wrap-around cover for the entire amplifier section. TVI checks show this shielding to be highly effective, combined with the filtering of the supply leads where they leave the chassis.

In the power-supply section, the major difference, as compared with the 2K, is the use of silicon rectifiers instead of tubes. This eliminates a filament transformer, and, since no filament warm-up time is needed, the power-control circuits no longer have the time-delay arrangement used in the 2K. A built-in 12-volt d.c. supply continues to furnish power for the on-off relay (now a mercury-plunger type) which breaks both sides of the 230-volt supply. A new feature is a latching relay for overload protection, in case of excessive load on the power supply. The high-voltage smoothing filter is similar to that in the 2K — choke input with a 20-μf. capacitor.

Another safety feature has been added to the original interlocks — switches which automatically short-circuit the high-voltage line when the power-supply door is opened or the internal cover is taken off the r.f. section. These are uncomplicated devices — just bent strips of flat stiff spring material, grounded, with a hole through which a post connected to the high-voltage line projects. When the door or cover is in place the strip is pushed clear of the post, but opening the door or removing the cover lets the grounded strip spring back to make positive contact with the post. Simple, but about as effective a safety device as anything could be. The one in the power-supply compartment is in the upper left corner of the photograph.

There has been no change in the ratings of the amplifier, which remain at 2 kilowatts p.e.p. input or 1 kilowatt d.c. input for a driving power of approximately 80 watts. Except for the changes just described, what was said in the earlier article still applies, particularly those remarks about the rugged construction and conservative ratings of components. Since the 3-400Zs have very good characteristics as linear amplifiers, the amplifier easily meets its specifications for power-handling capacity and low intermodulation products.

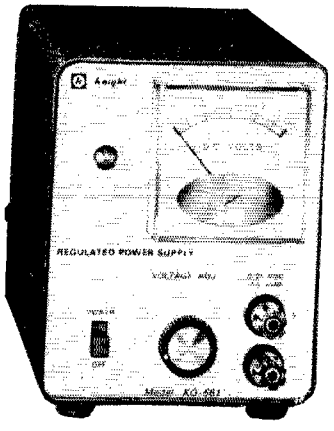
— *W1DF*

Henry 2K-2 Linear Amplifier

Height: 29½ inches.
Width: 14½ inches.
Depth: 13 inches.
Power Requirements: 230 volts a.c., 15 amp., 50-60 c.p.s. or 115 volts a.c., 30 amp., 50-60 c.p.s.
Price Class: $675.
Manufacturer: Henry Radio, 11240 W. Olympic Blvd., Los Angeles, Calif. 90064.

QST ——— QST ——— QST

Knight-Kit KG-661 Low-Voltage Power Supply



To the inveterate circuit tinkerer, a real "indispensable" is an adjustable-output power supply, preferably regulated. Many such supplies, for both tubes and transistors, have been described constructionally in these pages over the years. Also, laboratory-type supplies of various types have been commercially available for quite some time, but they have been rather

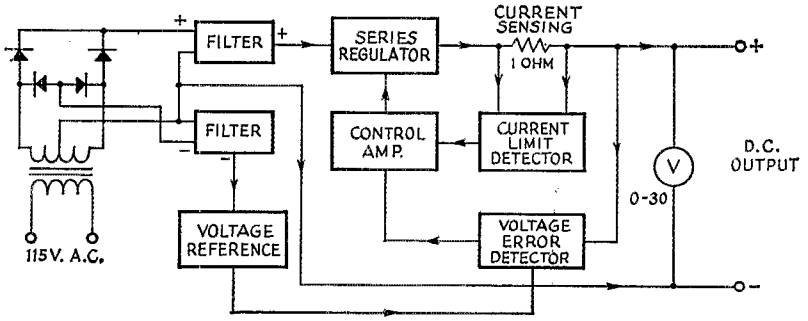
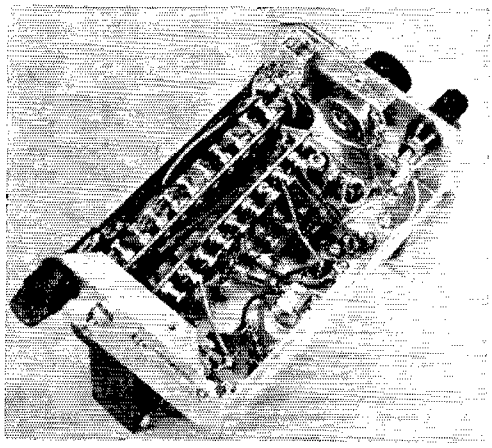


Fig. 1—Block diagram of the KG-661 regulated power supply.

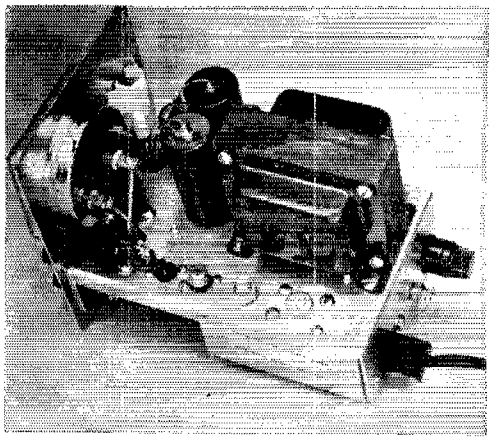
rich fare for the private experimenter. The cost of the new Knight Kit KG-661 supply is more in line with what an amateur would have to pay for parts he might have to buy for a workbench supply.

Rated to deliver load currents up to 500 ma. at voltages from 0 to 25, the KG-661 will take care of most transistor projects. The output voltage, electronically regulated throughout the range, is smoothly adjustable by a panel control. The supply has overcurrent protection, limiting the total current to a safe value at any voltage level. Accidental short circuits will do no damage, even if sustained for a long time. The positive and negative terminals are isolated from the case so that either may be grounded.

The regulator system uses four transistors of varying sizes in a circuit which, by use of a zener-stabilized negative voltage reference against which the output voltage can be compared, permits the output-voltage range to go all the way down to zero (actually, it can be made a fraction of a volt negative). The transistors furnished with the kit are not marked with standard type numbers and thus cannot be identified as to their characteristics, so it would be somewhat pointless to reproduce the complete circuit diagram. In block form, it is shown in Fig. 1.



This underside view of the KG-661 shows the two mounting boards on which most of the components are assembled. The transistor sockets are along the right-hand edge.



Transistors in the regulator circuit are along the near edge of the chassis in this view of the KG-661. The series regulator transistor is at the right. To its left is the heat-sink part of the socket for the control-amplifier transistor; the transistor itself is below the chassis.

The power transformer gives approximately 60 volts, center-tapped, and works into two full-wave rectifiers, one connected for positive output voltage and the other for negative. The two outputs are separately filtered (a 500-μf. capacitor in each case). The negative output is used only for establishing the voltage reference for the voltage-regulating system; the positive output is the one that supplies the external load. Any change in load voltage, whether caused by load changes or line-voltage changes, is sensed by the voltage error detector, which then actuates the control amplifier to adjust the voltage drop in the series regulator to overcome the change. The voltage level at which this sequence begins is established by a variable resistance that sets the operating conditions for the error detector.

The current limit detector is biased to be inoperative until the current through the 1-ohm current-sensing resistor reaches about 700 ma., at which time the voltage drop is sufficient to overcome the bias. The current limiter then takes control away from the voltage error detector, and causes the control amplifier to adjust the voltage drop in the regulator so that a maximum output current of 700 ma. cannot be exceeded. In the limiting case of a short-circuit on the output terminals this means that the series-regulator transistor has to dissipate the entire output power of the supply — a little under 25 watts under these conditions. The transistor uses the aluminum chassis of the supply as a heat sink.

The assembly and wiring job is not difficult, as many of the components are on two vertically-mounted boards visible in the bottom-view picture. These boards are assembled and wired separately, and are installed after most of the chassis wiring has been done. Parts are packed so as to be readily identified, as is a Knight-Kit custom, so preliminary sorting is not required. An unhurried assembly, including double-checking each section as it was finished, took under eight hours. Instructions are clear, and we found no errors. A separate operating manual is furnished.

The finished kit met all the published specifications with something to spare. The voltage regulation is such that going from no load to the full 500-ma. load caused almost no change in output voltage — just a barely-detectable movement of a knife-edge pointer on a large-face voltmeter (not the one in the kit). At light loads the regulation is maintained with as little as 30 volts a.c. input. With 12.5 volts on a 25-ohm load (500 ma.) the regulation held when the a.c. voltage was varied between 70 and 130. Hum at all output levels was less than 2 millivolts.

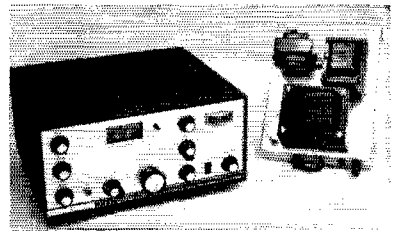
Knight-Kit KG-661 Power Supply

Height: 5½ inches.
Width: 4¼ inches.
Depth: 7½ inches.
Weight: 6½ pounds.
Power Requirements: 100-130 volts, 50-60 cycles; 10 watts no load; app. 40 watts max.
Price Class: $35.
Manufacturer: Allied Radio Corp., 100 N. Western Ave., Chicago, Ill. 60680.

The voltmeter furnished is of inexpensive design, rated at accuracy within 5 percent. It is quite adequate for ordinary purposes, and checked well within the rated accuracy against a laboratory standard voltmeter.

— *W1DF*

Next Month



National 200 Transceiver

Strays

Feedback

Because of a similarity of names in a news story, Arthur R. Craig, VE6BY erroneously appeared in the "Silent Keys" column of September 1967 *QST*. Our apologies to VE6BY.

Dr. Alson E. Braley, WØGET, Professor of Ophthalmology of the University of Iowa, was presented with the 1st annual achievement award of the Medical Amateur Radio Council for founding of the Eye Bank Network. Shown are WØGET (left) and outgoing Medical Amateur Radio Council President Charles H. Gray, M.D. at the association's first annual meeting in Atlantic City. The Eye Bank Network was founded by WØGET in December, 1962 to provide rapid, inexpensive and effective communication once a day, to make known to participating eye banks throughout the country any emergency requirements for eye tissue and where such is available. The sight of scores of patients has been saved since the network was founded.

Hints and Kinks For the Experimenter

HANDY TOOL

For adjusting hard-to-get-at slotted controls, a useful tool can be fashioned easily from a piece of heavy wire as shown in Fig. 1. One end of the wire is bent ninety degrees, and the sides of the bent portion are filed so as to form a flat blade, similar to that of a screwdriver.

The wire is thin enough to get into such tight places as the ventilation holes in a cabinet, yet the flat, angled end provides enough of a blade to easily turn most small trimmers and potentiometers. Of course, care should be taken when using the tool around live circuits. — *Charles G. Newman, WB2NPY*

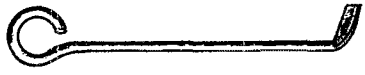


Fig. 1—A right-angle alignment tool made from a piece of heavy wire.

RECOVERING OLD GROUND RODS

On several occasions I have wanted to pull ground rods back out of the ground. I finally discovered that a car jack, with a 2- or 3-foot length of steel cable looped through it and attached to the ground rod with an appropriate-size cable clamp, has never failed to get the ground rod out. If there is a rod holding the two sides of the lifting mechanism together, it is best to loop the cable around the rod as shown in Fig. 2. I have used the hook on the end of the mechanism, but it has bent. Regardless of how you connect the cable to the jack, caution is urged in case something slips. — *John T. Deines, K8QOJ*

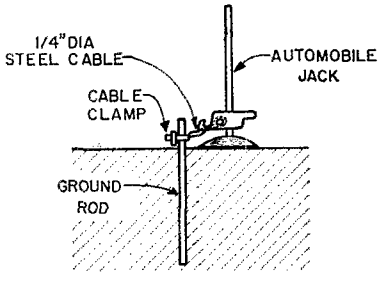


Fig. 2—Removing old ground rods with an automobile jack.

A SIMPLE 80- AND 10-METER ANTENNA SYSTEM

The low antenna system shown in Fig. 3 allows effective high-angle radiation on 80 meters and low-angle radiation on 10 meters; only one feed line is required. To keep interaction between the 80- and 10-meter antennas at a minimum, a lower-band antenna length that is an odd number of electrical half waves at the desired 10-meter frequency should be avoided.

The 80-meter antenna is omnidirectional because of its low height. At the writer's metropolitan residential location, signal reports of S7 have been received from like-distant contacts (W1 and KL7 call areas) off the end and broadside to the antenna. This is with a transmitter input of 100 watts.

Being a vertical dipole, the 10-meter antenna is also omnidirectional. It has performed better than a ground-plane vertical which has four radials and is mounted at the same height (16 feet) above ground. Considerable DX has been worked as well as many North American stations.

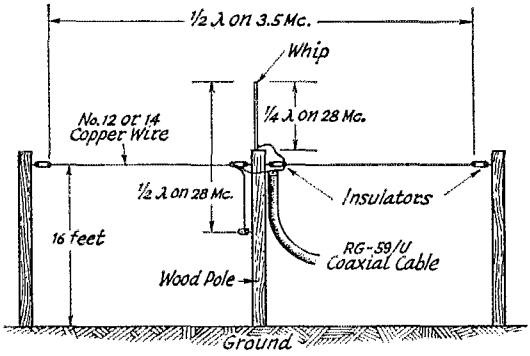


Fig. 3—W6PIZ's 80- and 10-meter omnidirectional antenna system (not drawn to scale).

Obviously, antennas can be combined that have other frequency relationships than the system described. If this is done, a high-impedance point for the frequency in use should be arranged to occur at the center of the antenna not in use. — *Dave Hardacker, W6PIZ*

WINDING SMALL TOROIDS

The winding of small toroid coils is eased if the wire is threaded in a common sewing needle. — *M. E. Deck, W16JVF*

RECORDING HINT

To neatly and positively thread recording tape into a reel, clip a miniature alligator clip onto the end of the tape at right angles as shown in Fig. 4. Then drop the end of the tape into the hub, using the clip as a handle. The clip not only makes flimsy tape easy to thread but also keeps the end of the tape from pulling out of the hub during the first few revolutions of the reel. Before completely rewinding the tape, be sure to remove the alligator clip or you might break the tape. — *Charles W. Kram, Jr., W5TFZ*

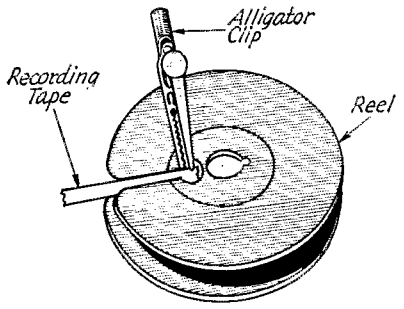


Fig. 4—Sure method of threading recording tape.

SIMPLE BANDSPREADING SYSTEM

The bandspreading scheme shown in Fig. 5 has been used in several applications at my station. It permits the remote tuning of resonant circuits. For example, I use the original dial mechanism and 350-pf. tuning capacitor from a standard broadcast receiver to tune the high-frequency oscillator in my 6-meter receiver. In this case, a two-turn link gives a tuning range of 2 Mc.

Increasing the number of turns on the link, positioning the link closer to the coil, and increasing the value of the remote-tuning capacitor contribute to greater coverage. Low-capacitance line also helps to achieve this end. — *William L. North, W4GEB*

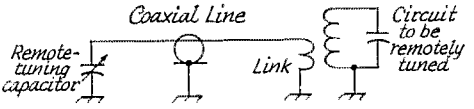


Fig. 5—W4GEB's bandspreading system. Component values are discussed in the text.

COOLING NUVISTORS

The heat radiating ability of a Nuvistor case can be improved by painting it with dull-black stove paint. The metal guide tabs should be left unpainted, however. — *Richard Mollentine, WAØKKC*

SB-100 MODIFICATIONS

When operating c.w. with the SB-100 transceiver, the slow-decay a.g.c. characteristic of the receiver is rather annoying. By making the changes shown in Fig. 6, fast- and slow-release times can both be made available. Begin the modification by replacing the audio gain control with a 500,000-ohm potentiometer that has a push-pull switch attached. Then disconnect R_{117} from circuit-board ground, and wire the resistor to S_1 so that the switch can be used to complete the broken connection. As a result, the receiver will have fast-decay a.g.c. when the switch is pushed in (opened), and slow-decay a.g.c. when the switch is pulled out (closed).

For the brave experimenter installing incremental tuning in the SB-100, the unit can be recalibrated by adjusting the small variable capacitor whose shaft extends through the rear panel of the l.m.o. In this way the same amount of capacitance can be removed from the tuned circuit of the l.m.o. as is added by the incremental-tuning modification. Since the total

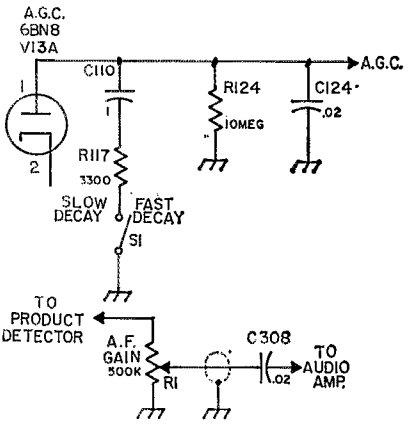


Fig. 6—A.g.c. modification for the SB-100. Resistances are in ohms (K = 1000) and resistors are ½ watt. Capacitances are in μf. C_{110}, C_{124}, C_{308}, R_{117}, R_{124} and V_{13A} are original components.

R_1—500,000-ohm audio taper control with push-pull switch. (Mallory PP55A, Burstein-Applebee No. 14B845).

S_1—Part of R_1.

capacitance will remain unchanged, the calibration of the tuning dial will be no worse after the modification than before. However, if the dial is "slipped" to recalibrate the receiver, as described by WA1BDJ in the "Hints & Kinks" column of *QST* for May 1967, the calibration will not hold from end to end. Also in reference to WA1BDJ's article, it was found that it is easier and much more convenient to move the microphone connector to the rear panel than to move the earphone jack. — *Robert Clark, K9HVW/WA4VYL*

Technical Correspondence

MODERN DESIGN METHODS APPLIED TO THE SPEECH FILTER

Technical Editor, *QST*:

The article by Capt. Ellison in June *QST* on the application of an *m*-derived pi-section filter to attenuate the upper audio frequencies was read with interest, since I am similarly concerned with filter applications in which the low-cost surplus 44- and 88-mh. toroids are used. The results of my experiments in the application of the modern filter design technique to the problem presented in the article are summarized in the curves of attenuation *vs.* frequency shown in Fig. 1. The two lower curves, plotted through points indicated by "o" and "x," show the response of the W6AOI filter design (which I constructed and measured) and from the tabulated data on page 46, June *QST*. The third curve is the measured response of a dual-section elliptic-function low-pass filter designed in accordance with the modern filter design technique. Note that the system impedance is 500 ohms, the cutoff frequency is 2100 c.p.s., and the first frequency of maximum attenuation is 2630 c.p.s. — exactly the same as the design parameters used in the article. This similarity makes it easier to compare the attenuation responses achieved with the image-parameter and modern filter design techniques.

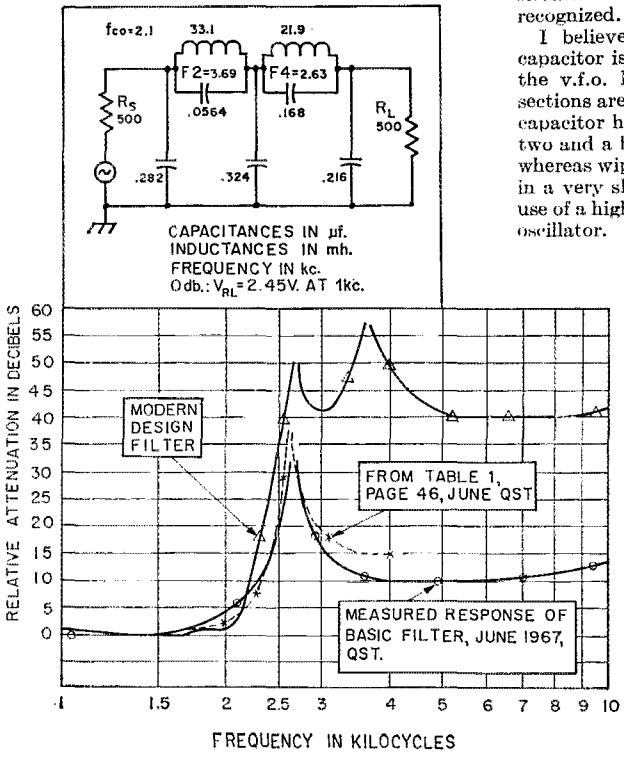


Fig. 1—Comparison of filters constructed according to modern-design and image-parameter methods.

Of course, the elliptic-function filter employs more components than the *m*-derived filter, but for just one extra 35-cent toroid and two more capacitors the increase in filter attenuation performance is unusually good. — *Edward E. Wetherhold, W3NQN, 102 Archwood Ave., Annapolis, Maryland 21401.*

INSTABILITY IN VARIABLE CAPACITORS

Technical Editor, *QST*:

Considerable emphasis is usually placed on the quality of components in the frequency-determining elements of v.f.o.s. Construction articles generally make specific note of such items as "high-quality, double-bearing variable capacitor; low-loss inductance; solid mechanical construction"; and others. However, there is a potential source of v.f.o. instability which can be difficult to trace if the symptom is not recognized. This fault is due to changes in ohmic resistance of the wiper(s) which are used on most variable capacitors. The effect can be a "gurgle" at zero beat or sudden shifts of up to a few kc.

The worst offenders, in my experience, are the APC types which are generally used as frequency-setting elements, and once set are forgotten. Apparently, a film of oxidation develops and the ohmic resistance varies in a random fashion. Contact cleaner will clear it up for a time, but the best remedy is to solder a small pigtail from the tip of the rotor to the wiper during construction of the v.f.o.

Due to frequent rotation, the variable capacitor used for changing frequency within the band is not as prone to variations in wiper resistance. However, many are the hams who have squirted cleaner on the wipers of variable capacitors in their receivers simply because they could hear the noise in the speaker and recognized it for what it was. This situation exists in many v.f.o.s but is not so easily recognized.

I believe that a "butterfly" type of variable capacitor is the best one to use for main tuning of the v.f.o. No wipers are involved when the two sections are connected in series. A butterfly variable capacitor has been in continuous use here for over two and a half years without the slightest problem, whereas wiper-type variable capacitors gave trouble in a very short time. This application involved the use of a high-Q circuit such as is used with the Clapp oscillator.

Permeability tuning, of course, eliminates the variable capacitor and is presumably one of the reasons why high-quality v.f.o.s use this method. However, the construction of a suitable mechanism for positioning the slug is beyond the workshop facilities of most hams, and the variable capacitor will be with us for some time to come. — *H. H. Wood, VE2JD, 476 Montee des Trente, Mont. St. Hilaire, Quebec, Canada.*

[EDITOR'S NOTE: An objection to the butterfly capacitor is the fact that the rotation is limited to 90 degrees. If 180-degree rotation is wanted an ordinary split-stator capacitor may be used with a floating rotor to give the same effect.]

Table I

To determine resistance values for R_s and R_p, Fig. 2, multiply the chosen design impedance value, Z, by the factors given below in the second and fourth columns.

Attenuation, db.	*Series Factor*	R_s *for* $Z = 50$	*Parallel Factor*	R_p *for* $Z = 50$
1	0.115	5.77 (5.6)	17.4	870 (910)
2	0.232	11.6 (12)	8.72	436 (430)
4	0.478	23.9 (24)	4.42	221 (220)
8	1.057	52.8 (51)	2.32	116 (120)
15	2.74	137 (130 + 6.2)	1.44	71.9 (75)
30	15.8	790 (750 + 43)	1.67	53.3 (51)

Values in parentheses in R_s and R_p columns are nearest standard values in 5 percent tolerance series.

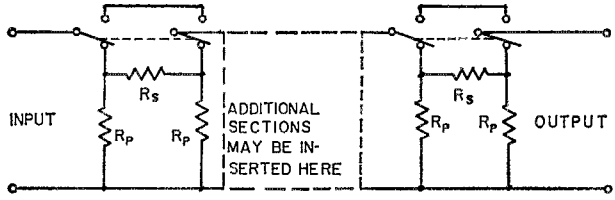


Fig. 2—Sectionalized symmetrical π attenuator. Additional sections may be inserted as desired. Combinations of the six sections listed in Table I will give attenuation in 1-db. steps to 60 db.

THE R.F. ATTENUATOR

Technical Editor, *QST:*

The "Simple Step Attenuator," page 24, August *QST*, is a very helpful device. The rag chewer can give his fellow hams exact signal reports, as well as tell how strong one signal is compared with another.

The procedure is simple: Have one ham transmit a c.w. tone and switch in db.s until your S meter reads, say, S9. Now have another ham transmit, and then switch db.s in or out until S9 is achieved again. The change in attenuation gives the db. difference between the two signals.

Many other things can be checked — antenna adjustments, linear-amplifier gain, carrier suppression, S-meter calibration, to name a few.

While charts and tables giving data for attenuators are available, most hams I know want someone else to figure it out in advance. Table I lists the factors needed for determining the values of attenuator resistors when the source and load impedances are identical and known. — *Joe Poston, K9GCE, 309 Benton Drive, Indianapolis, Ind. 46227.*

ORGANS AND SEWING MACHINES

Technical Editor, *QST:*

This is in reference to the article in June 1966 *QST* on hi-fi and electronic-organ interference. I am running phone patches on MARS frequencies from Vietnam, and it so happens that at the time I am busy with this my XYL wants to use the Hammond Spinet organ we have. My rig is a Hurricane SR-2000 about 15 feet away from the instrument, and while I do not affect either of two TV sets in the house, I do sure get into the organ — and scare the XYL half to death!

The article was the springboard to success here. The bypass capacitors on the speaker leads and the a.c. input did no good, but the tip on putting a resistor in the first audio grid did the job. I didn't happen to have a 75,000-ohm unit so used a 91,000 I had. It took out 99 percent of the interference. You have to strain to hear the little remaining.

I was also getting interference in my receiver from my XYL's Viking sewing machine (tit for tat!). A call to the local representative produced three chokes — known as "TV chokes" by the sales people — and instructions for installation in the machine. That took care of the noise from the sewing machine. It is refreshing to find a manufacturer like Viking that realizes the possibility of producing interference — and does something about it. — *P. L. Simandl, K9SQV/AA9SQV, 2793 Whippoorwill Drive, Green Bay, Wisconsin 54301.*

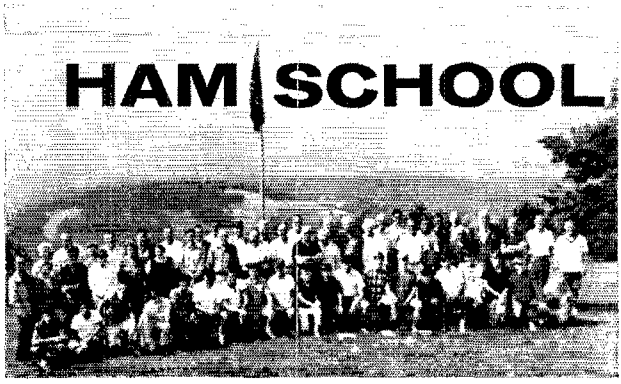
TRANSISTOR QRP

Technical Editor, *QST:*

I felt I just had to write and let you know the outcome of my attempt at building the "Transistor 5-Watter" in the June issue. It is one of the few transistorized gadgets I have built that worked the first time! (However, the earlier failures were not for naught, since I learned *something* from each of them.)

The transmitter and power supply were almost completely constructed from junk-box parts, the only exceptions being the transistors and the chassis. Some small deviations were made in order to accomplish this, but no detrimental effects resulted. I mention this simply because there are many would-be home-brewers who simply do not undertake a project in the absence of a particular capacitor, coil form, wire size, and so on. As an example, I did not have the No. 20 enameled wire or the 1-inch coil forms. I *did* have No. 22 wire and 1¼-inch forms, so I used them. To experienced home-brewers this would be a minor thing, but to the inexperienced it might mean either purchasing a spool of No. 20 wire and 1-inch forms or dropping the project.

A few words on the results obtained: With the 15-volt supply, the rig ran about two 2 watts input. This was hooked up to a 40-meter dipole at a height of 15 feet. I managed to work six different states: New Jersey, Virginia, New Hampshire, Maryland, Massachusetts (Boston) and Ohio. Using the same lash-up with the 24-volt supply and running about five watts input, I worked Canada (Montreal), New Jersey, North Carolina, southern Quebec, and Pennsylvania all in a matter of a few hours. All these contacts were initiated using the QRP rig; in other words, the stations were not contacted on the big rig and then asked to listen for the little one. This proves to me, anyway, that you *can* work 'em with low power. — *Paul K. Pagel, K1KXA, 4 Roberts Road, Thompsonville, Conn. 06083.*



HAM SCHOOL

in the Blue Ridge Mountains

BY DOROTHY C. SAUNDERS,* W4UF

THEY gathered from all over the United States, from Cape Cod to California and Wisconsin to New Orleans. One eleven-year-old boy flew in from London, while his parents continued their European tour. At the other end of the age scale was a 78-year-old man, there for the second time to try to get his heart's desire. Men and women, boys and girls, with every sort of background and with an astonishing variety of livelihoods flocked in by plane, car, and bus to attend the two-week radio camp at Camp Albert Butler, sponsored by the Gilvin Roth YMCA of Elkin, N. C.

The only one of its kind in the country, this non-profit camp under the management of Carl Peters, K4DNJ, the general secretary of the Gilvin Roth YMCA, is held for one purpose only. Each August it offers sixty would-be amateur radio operators a chance to be taught a highly concentrated course in radio theory and to raise their code speed up to the required 13 words per minute in order to pass the FCC General class amateur radio examination. The one and only goal of every one there is to pass that FCC examination on the last day of camp.

Perched on a flat clearing on the side of a 3600-foot high slope of the Blue Ridge Mountains, just two miles from the Blue Ridge Parkway and near Roaring Gap, N. C., the camp's location offers a stupendous view out over fifteen ridges and the plain far below. Rustic cabins are scattered here and there among the trees around the swimming pool, with the large dining hall and a big recreation hall at each end.

The students are divided into three groups for their theory classes: one is for the youngest through age 14; the second is made up of the intermediates from 15–30; and the third consists of the older adults. Everyone takes a code test the night camp opens and then is placed in either the beginners' group with the ability to copy about 5–6 w.p.m., the intermediate group of 8–9 w.p.m., or the advanced group of about 12 w.p.m.

It was my first year of teaching at the camp, and I was given the intermediates in both theory and code. Not having been exposed recently to 15–18 year olds, who made up the bulk of the sixteen students in my intermediate theory group, I expected long hair, "mod" clothes, and guitar music during free time and the sort of disciplinary problems the newspapers seem to be reporting these days.

I couldn't have been more wrong. I found faded blue jeans or shorts and sneakers, real politeness and cooperation, tremendous motivation and interest, and some exhilarating first-class minds. They started out immediately with three solid hours of lectures on theory and one and a half hours of code practice each day, Saturdays and Sundays included. The classes lasted from 9 A.M. until 12:30 P.M. The afternoons were spent studying assigned theory chapters in the textbook, practicing code, and swimming or rifle or archery shooting. Classes went on again after dinner from 7–8:30 P.M. After that, there was basketball or ping pong in the big recreation hall or talk with their families at home through schedules set up via the camp radio station, with one of the instructors manning the transmitter.

My theory group also included a woman who had a Ph.D. in Pharmacology and who was professionally engaged in the most delicate of physiological research on the effects of new drugs on the unborn, the manager of a bank in Puerto Rico, and a retired Lieut. Colonel from the Air Force. Different

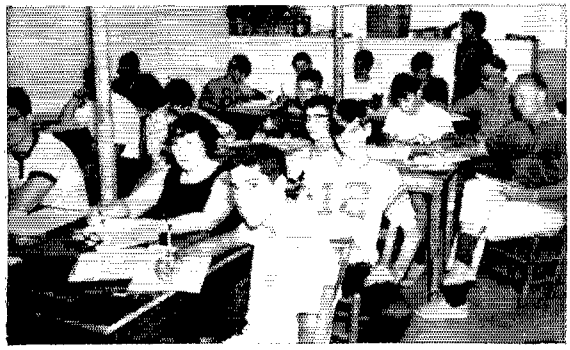
* P.O. Box 295, Englewood, Florida 33533.

Camp Albert Butler, located in the beautiful Blue Ridge Mountains of North Carolina, is a non-profit venture run by the Elkin, N. C., YMCA. Each year, the camp offers a course in amateur radio to prepare students for the FCC exam. Dorothy Saunders, W4UF, spent this last summer at the camp as an instructor. Dorothy wrote us about her experience and said, "It was one of the most exhilarating experiences I have had since I left graduate school, and I believe others should know about it." We agree with Dorothy that the story is worth retelling and so here it is.

members of the class studied together afternoons and helped the slower students understand some of the more intricate points of the day's lectures. It was fascinating to see a YL highly trained in a medical field aiding a banker in understanding the mathematics of Ohm's law or a tough, ex-Lieut. Col. who had fought his way through many of the Pacific Islands in World War II literally dripping with anxiety and tension as he answered questions on the formulae for capacitors and resistors in series versus parallel circuits!

All of the world's usual values were left at the gates of the camp. The successful financier with his large yacht and big car who was struggling to copy 12 w.p.m. envied deeply and sincerely the unassuming fourteen-year old from Kansas who could copy almost faultlessly at sixteen words per minute. There was only one criterion for successfulness or reason for admiration from the other students . . . did one yet have the ability to copy a minimum of 65 consecutive letters of code at thirteen w.p.m., and had one passed the last theory test? How they worked! The dentist, mortician, college professor, realtor, engineer, editor, school superintendent, the citizens banders who wanted to move up to a license which would legally permit them to chat with other operators anywhere in the world, the teenagers from the expensive eastern prep schools, and the boys from the midwest farms and large, southern cities all had the same goal and were drawn together in an *esprit de corps* which they would be fortunate enough to experience only once or twice in their entire lifetimes.

Lucky indeed are the parents these days whose teen-age youngsters become so interested in amateur radio that they want to study hard enough to obtain their General class licenses. These parents won't have to deal with the problems of juvenile delinquency and roving gangs that many other families face. The teens are, without any doubt, the time of life when code and theory can be learned most easily and quickly. It was a revelation to see how many of the younger ones in my code class breezed through to the highest speed group and what a struggle it was for some of the older students to get above the 10 w.p.m. plateau.

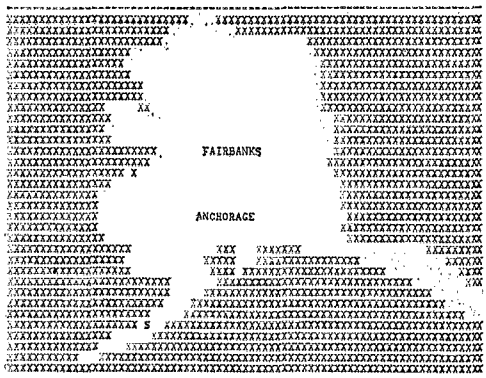


The author (standing) and the Intermediate Theory Class.

As the last day approached and the FCC exam drew near, most of the students had the ability to copy code at from 13–15 w.p.m. Code is sent the last several days at 15 w.p.m. in the highest speed class, as a few words per minute are frequently lost through nervous tension when the exam is taken.

The last morning arrived. A final excellent and hearty breakfast was eaten at 7 A.M., and farewells were said by the staff and students. Then, off down the mountain, the long string of cars wound on its way to Winston-Salem and the FCC examination. Another successful year had passed, and a new group of students from Camp Albert Butler would shortly be heard upon the General-class amateur-radio bands. Next summer it is planned that a course will be offered leading to the Extra class of license. QST

Strays



With Alaska celebrating its 100th anniversary and the first Alaska State ARRL Convention having been held this year, KL7DRZ decided to transmit a map of Alaska during his two-way RTTY contact with ON4CK. Above is a copy of the message as received by ON4CK via a North Pole path on 20 meters.

Feedback

OOps! Captions went awry on the Brantford, Ontario, parade pictures, page 83, October *QST*. The left photo shows club member Oc Mallinson portraying Marconi at Signal Hill, Newfoundland. The photo of club vice president VE3FFH fell to the editor's shears, and was not used for space reasons.

—···—

Oscar bulletins are transmitted by W6ASH on 14.030 Mc., Fridays at 0200 GMT and on 7.015 Mc. at 0500 GMT. Following the bulletin transmission, the operator stands by to answer questions. The bulletins are repeated on W1AW; see page 108 for schedule.

—···—

Who said spark gap was outmoded! Recently, *Commercial Business Daily* (June 2, 1967) reported that a satellite office of the U.S. Air Force is interested in procurement of "additional spark-gap transmitter research." Perhaps some of the OTs will be dusting off their spark rigs to listen to future astronauts? (*Tnx to W4ETA*)

"Who's Gonna Read It?"

BY JOHN G. TROSTER,* W6ISQ

"RELAAAAX, Charlie-babe, relaaax. Here, gimme the car keys. I'd better drive us to the FCC. Want you to take it easy and not think about that old Extrie Class code exam. Just keep saying the old motto and you'll be okay."

"Can hardly wait for '68."

"That's the spirit Charlie. We'll get that old Extrie Class ticket so's we can QSY out of all that General Class QRM. We'll be all alone up there in them little special Extrie Class segments . . . just us and the DX."

"The band's all mine in '69."

"Riiiight. You don't have no experience like me to help ya out, so keep saying them sayings. Give ya the old confidence. But ya got nothin' to worry about. The code's *only* 20 words a minute. And you been practise copying 25 or 30 with no trouble."

"Yeah, I know, OM. I can copy 30 real easy with you sending to me around the shack. But then I get to thinking about that exam room with all the desks . . . and the other fellas all sweating and scratching . . . and the inspectors walking up and down . . . and I get kinda nervous. Sure wish I had all your years and years of c.w. experience."

"Takes time Charlie. And like I told you, fellas with all my experience don't get all clutched up over a little c.w. because we just read the old code in our heads. Like somebody talking at us. Why write it down when ya can read it in your head? Anyway, who's gonna read it after ya write it down? Haw."

"Wish I could read it in my head like you, because when I think about writing it down for the exam, I get all sticky and sweaty and shaky and I can't hold the pencil very well. I dunno, maybe I'm too old to take exams anymore. We'll be there in a few minutes."

"Yeah Charlie, after ya been a ham as long as me . . . never write it down . . . and I'm older than you are and ya don't see me . . . ahhhhhh . . . all in the head. Yeah, we are getting kinda close."

"Sure wish I had all your experience and confidence. Been many a year since I had to sit down in a room jammed with people and take a tough exam."

"Naw Charlie, you just walk right in there and look at all them people right in the old eye . . . and . . . ahhh . . . anyway, it's only 20 per . . . a hunnert characters . . . yeeeaaahhh . . . maybe I should of flexed up the old fingers with copyin' a few practise lines. . . . Nah, with all my experience . . ."

*45 Laurel Ave., Atherton, Calif. 94025.

"Hey OM, aren't you going to park in this lot?"

"What lot?"

"The one in front of us."

"Ohhh. Now don't get nervoused-up Charlie. Only 20 words . . . a minute . . ."

"Here we are OM. 'Federal Communications Commission. Examination Room.' I keep telling myself it's only 100 characters . . . and what's a measly hundred characters?"

"Look at what time it is, Charlie. Maybe we're too late. Maybe we missed the exam."

"Look at all the victims . . . errr people. All of them gonna be watching us trying to scribble out 100 consecutive characters . . . coming fast . . . almost two a second . . . one at a time . . . all in a row . . . and they all have to be correct. . . . Oh well, OM, let's fill out the form."

"What form?"

"The one they just gave us. Then we pay the four bucks."

"I forgot my money, Charlie. Let's go home."

"I'll loan ya the money."

"I hate debt."

"Here comes the inspector, OM. Won't be long now. Ohhhh me. 'Can hardly wait for '68."

"Wait for what?"

"All those wishing to take the 20 wpm code exam for Extra Class licenses sit at the tables."

"What table?"

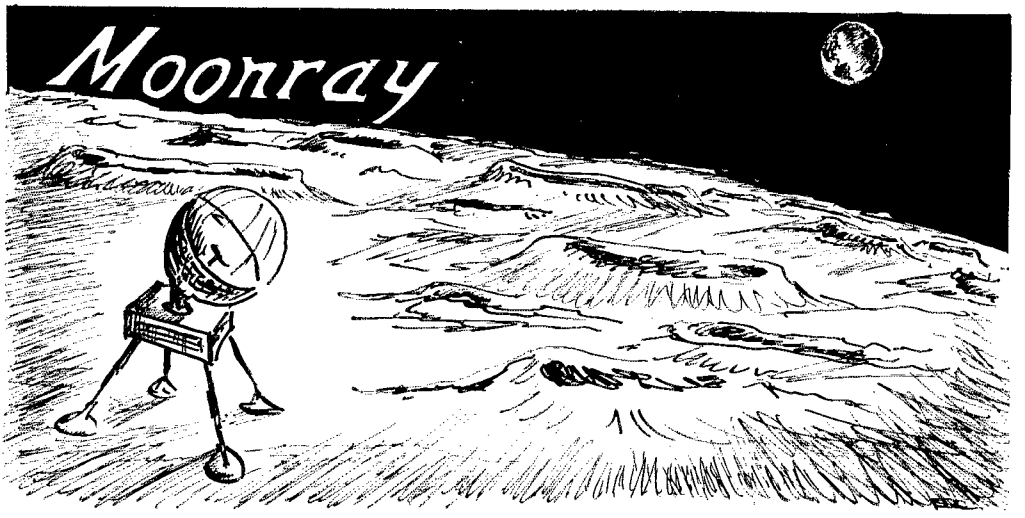
"The one you're leaning on."

"Hey Charlie, they don't have a typewriter for me. How they expect me to rip off 20 per if they don't gimme a mill?"

"When did you learn to use a mill?"

"Oh yeah . . . I forgot. Hey Charlie, where's

(*Continued on page 160*)



YEAR IN REVIEW. The year 1971 has come and gone. It was an interesting year for amateur radio. The League's computerized information service began operation; amateurs may gain free access to the service through the National Traffic System's v.h.f. nation-wide repeater network.

Oscar XII, the first permanent amateur radio satellite started its second year of operation making possible continued international DX on the 432 Mc. band. Several manufacturers began production of solid-state hand-held transceivers for working Oscar XII DX. Amateur activity on the moon began this year with the landing of the LEM (Lunar Excursion Module) III expedition carrying Moonray, *an amateur radio repeater station. . . .*

MOONRAY? Oscar XII?? 1971??? What amateur radio will be like four years from now is difficult to predict. But is all of the above really fiction? Recently plans were announced to develop a permanent Oscar satellite.[1] Oscar XII? Even a plan to put amateur radio on the moon — Moonray — has been proposed. Shades of 1971!

Moonray, first announced in June *QST* by the Nastar (Nassau Satellite Tracking Amateur Radio) club, is a proposed frequency-translator package to operate from the moon. Nicholas Marshall, W6OLO, Nastar president, first discussed the idea of putting amateur radio on the moon at the International V.H.F. Convention sponsored by the East Coast VHF Society in 1964. Moonray would receive v.h.f. or u.h.f. signals from amateurs on the earth and re-transmit the signals back to earth. Communications then would be possible between any two points which could see the moon at the same time.

A lunar repeater — such as Moonray would be — has several desirable features: It would provide an entirely new frequency segment for long distance amateur communication, within our present frequency allocations. Tracking problems would be minimal; the moon can be tracked visually using unsophisticated antenna mounts, or an equatorial mount can be used for automatic tracking. The lunar repeater would be accessible to an individual station for long periods of time — up to 12 hours in one day. Finally, the device would be accessible to amateurs all over the world for amateur communications.

There are also several obstacles which a lunar transponder must overcome. The system gain must be great enough to overcome the tremendous earth-moon-earth path attenuation. This would probably mean that the package must use a high-gain antenna and sufficient transmitting power. The package must also be able to survive the temperature extremes of the lunar day and night. According to W6OLO, the availability of an isotopic power supply to provide the required power, and to also heat the package, would solve the latter two problems.

Moonray is still only an idea; much work is still needed to make it a reality. While Nastar has taken on the job of doing the initial promotional work themselves, they hope that Moonray will be a truly collective ham effort. To help, amateurs can design and build Moonray from anywhere in the world by (1) offering technically sound suggestions on the design; (2) offering to design, develop and/or construct any part of the Moonray package after the system's parameters have been established, and (3) passing along this information to others who may be of assistance.

Before final design specifications can be made, certain fundamentals must be determined, i.e. what band should be used, and what mode of operation should be employed. Purely for discussion of frequency, let us assume several reasonable parameters:

(1) One-watt c.w. r.f. output from Moonray on a discrete frequency.
(2) Six-foot parabolic antennas at moon and earth stations.

[1] W. W. Eitel, W6UF, *Project Oscar: Past, Present, and Future*, 16th National ARRL Convention, Montreal, Canada, July 2, 1967.

(3) Ground receiver n.f. of 3 db., and bandwidth of 500 c.p.s.

Thus, the return circuit from the moon to the earth is illustrated (see diagram below). Such is more arduous than the earth-moon circuit because of moon station power limitations.

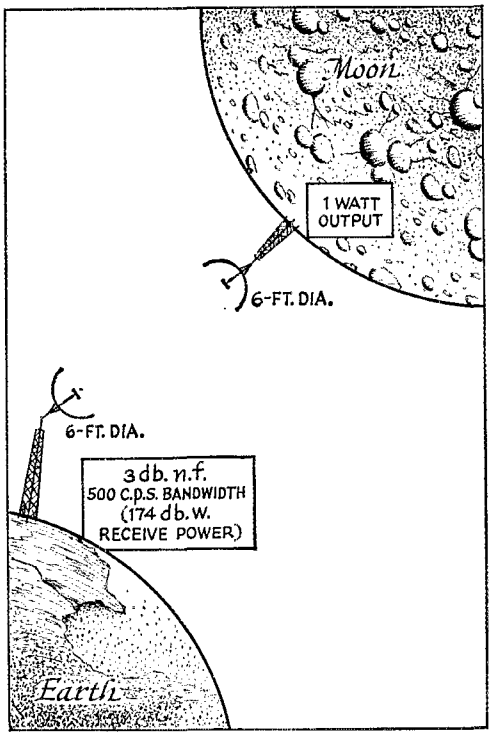
If 432 Mc. were used, the antennas each would have about 15 db. gain, and the path loss would be 198 db. A signal-to-noise ratio of 6 db. would result.

15 db.	moon antenna gain
15 db.	ground antenna gain
+174 db.	receiver sensitivity
204 db.	system gain
−198 db.	path loss
6 db.	signal-to-noise ratio

A shift to 1296 Mc. would increase the antenna gain of each parabola to 24 db. and the path loss to 208 db. Here, the signal-to-noise ratio would be 14 db.

24 db.	moon antenna gain
24 db.	ground antenna gain
+174 db.	receiver sensitivity
222 db.	system gain
−208 db.	path loss
14 db.	signal-to-noise ratio

This seems to point to 1296 Mc. as a desirable frequency. But, there are other factors involved. The generation of ground station r.f. power is more difficult at 1296 Mc. (and there are less amateurs equipped to do it) than at 432 Mc., and it probably would be more difficult to develop a Moonray package to operate at the higher frequency. Perhaps, utilization of 432 Mc. as the up-frequency and 1296 Mc. as the down-frequency would be an acceptable solution. There are many other alternatives. What are your ideas on these and other Moonray design parameters?



The following are basic requirements:

(1) The complete package must not exceed five pounds and 250 cubic inches.
(2) Moonray must operate through the entire lunar month at ambient temperatures ranging from minus 250 F. to plus 250 F.
(3) Reliability, ruggedness, environmental survivability and proven performance will have to be demonstrated and must satisfy NASA's lunar experiment standards.
(4) Design concepts must be such that the package can be installed on the moon by our astronauts, very simply, rapidly and with minimum effort.
(5) The unit must be able to function by earth-command as a site-relocation beacon for later flights. This beacon must be capable of being turned on and off by earth command or from the orbiting Apollo vehicle. Moonray's transmitter must double as a beacon and be identifiable by a special keyed c.w. or tone modulation.
(6) The transponder must also be usable as an easy-to-operate emergency communications link for the astronauts. It must have simple plug-in operation compatible with the space-suit microphone/earphone and push-to-talk systems.
(7) Moonray must have a command shutoff and turn-on capability in addition to an overrideable one-year automatic shutoff timer.

Since operating bands chosen will affect the antenna system, the configuration, method of packaging, storage, handling and unfurling, erecting and pointing of the lunar antenna will have to be considered after other parameters such as operating modes and frequencies are decided. Tentatively, however, Nastar plans presently call for a 6 ft. diameter mylar balloon, packaged flat, which will inflate automatically and be rigidized by a chemical reaction. The inner skin of the balloon will contain the aluminized parabolic surface of the antenna.

Nastar proposes that the Moonray design include several telemetry channels to include battery voltage, internal case temperature, r.f. power output and/or s.w.r., etc. information, and one or two scientific measurements.

Modulation method for the telemetry information could be analog or digital — perhaps pulse amplitude modulation (PAM), pulse duration modulation (PDM), or pulse code modulation (PCM) should be employed.

Nastar points out that while LEM 1 is not scheduled to be launched until 1970, Moonray development and construction time is at a premium. First, a formal proposal to NASA, technically sound enough to win their approval must be made. Once approval has been received, the multi-step process of preparing the final launchable hardware (flight unit and backup package) must be undertaken.

If you are interested in this project and feel that you may be able to contribute toward its development, Nastar would like to hear from you promptly. Write Nastar, P.O. Box T, Syosset, L. I., New York 11791. — *W2INB* QST

Announcing the 34th ARRL Sweepstakes

CONTEST PERIODS

Starts		*Ends*
Saturday, Nov. 11 2100 GMT	PHONE	Monday, Nov. 13 0300 GMT
Saturday, Nov. 18 2100 GMT	C.W.	Monday, Nov. 20 0300 GMT

SUMMER is almost a memory, the days are shortening and a crispness fills the air. Pulses begin to quicken as the first of the Fall club bulletins are digested. It's time again for Sweepstakes! Whatever your operating objectives are, the SS is for *you!*

Although a number of rules changes have been suggested, no clear-cut extensive expression of opinion has led to changes in the format since last year. While we're at it, if you feel changes are needed, note *your* suggestions on the bottom of your entry before mailing it to your Headquarters post-SS time. Some items up for discussion are: revision of the time period, dropping of the low-power multipliers, changing the low-power multipliers from what they currently are (1.25 c.w., 1.5 phone for under 150 watts d.c. input), altering the information exchange, etc. Be sure and let us have your ideas!

The rules pretty much cover basic requirements. A reminder, however, on a few points: you may operate 24 out of the 30 hour period (time-outs may not be taken in less than half-hour periods); the information you send in the preamble refers to you, the operator, whether operating your own or another station; only ARRL affiliated clubs (or those groups awaiting final approval on their affiliation) may participate in the special club competition for certificates and a handsome engraved gavel; you don't have to use the special forms if you follow the log and summary style shown; photos of your operation are welcome!

Log forms and Op. Aid No. 6 (to avoid dupes) are ready. Send for yours post haste: ARRL Communications Dept., 225 Main St., Newington, Connecticut 06111.

Logs must be postmarked by Dec. 15, 1967 to be eligible. *CU in the SS!*

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" × the "sections multiplier" × 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, 1967, 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

EXPLANATION OF "SS" CONTEST EXCHANGES

	Nr	*Precedence*	*Call*	*CK*	*Place*	*Time*	*Date*
Exchanges	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)
Sample	NR 1	R	W6CUF	48	SCV	2101	Feb. 12

scoring Novice or Technician in each section where at least three such licensees submit logs in each mode. A certificate also will be awarded to the highest scoring Novice and Technician from sections of less than three entries . . . that in the opinion of the Awards Committee displayed exceptional effort. Only single-operator stations are eligible for certificate awards. Multiple-operator scores will receive separate *QST* listing in the final results.

A gavel will be awarded to the highest affiliated club entry. The aggregate scores of phone and c.w. reported by club secretaries and confirmed by the receipt at ARRL of contest logs constitute a club entry. Segregate club entries into phone and c.w. totals. Both single- and multiple-operator scores may be counted, but only the score of a bona fide club member, operating a station (his or another club members'), in local club territory, may be included in club entries.

The highest single-operator c.w. score and the highest-single-operator phone score in any club entry will be rewarded with a "club" certificate where at least three single operator phone and/or three single-operator c.w. scores are submitted.

7) *Disqualification:* Failure to comply with the contest rules or FCC/DOT regulations or the necessity for avoiding interference with channels handling amateur emergency communication shall constitute grounds for disqualifications. In all cases or question, the decisions of the ARRL Awards Committee are final.

Message Credit

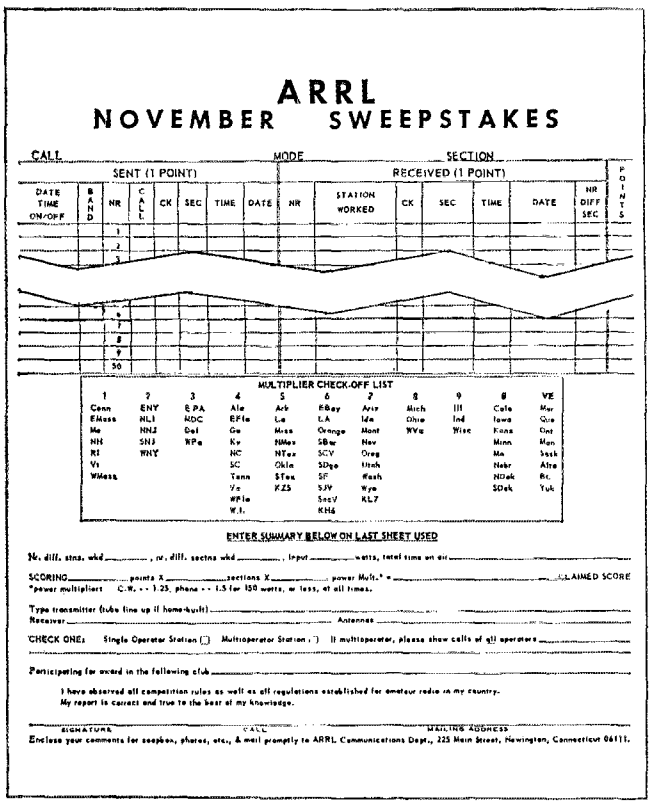
Put all that preamble-exchange experience to work and earn 1000 extra points by the following:

1. Within 5 days following the end of each of the SS weekends, check into a net at local or section level[1] and send a message to your SCM (p. 6, *QST*). SCMs may send their message to ARRL Headquarters. The message must be in proper form.[2] To earn this credit for your phone and your c.w. entry you must originate such a message following the corresponding SS periods.
2. An example of a message in proper form[2] appeared in the Operating Aid 9A[3] enclosure in August 1965 *QST*. The message text (in not more than 20 words) should report claimed contacts, sections, mode, power and claimed score. An exact copy (showing station receipting for the radiogram and time-date sent) *must* be attached to your SS entry for any credit.
3. It's all or nothing. If all the rules are complied with to the letter, the procedure will net you a stock of 1000 points.
4. **The bonus points will be added to your score at Headquarters.**

[1] If there's difficulty reaching a traffic net in your section, it may be sent to a netter in the region.

[2] Time Filed and Handling Instructions are *optional*, i.e. not a "requirement" for crediting the message started, but all other message parts as shown in 9A are necessary.

[3] Copies available without charge from ARRL Hq., 225 Main St., Newington, Conn. 06111.



ARRL
NOVEMBER SWEEPSTAKES

CALL _____ MODE _____ SECTION _____

DATE TIME ON/OFF	BAND	SENT (1 POINT) NR	CALL	CK	SEC	TIME	DATE	RECEIVED (1 POINT) NR	STATION WORKED	CK	SEC	TIME	DATE	NR DIFF SEC	POINTS
		1													
		2													
		3													
		4													
		5													
		6													
		7													
		8													
		9													
		50													

MULTIPLIER CHECK-OFF LIST

1	2	3	4	5	6	7	8	9	0	VE
Conn	ENY	E PA	Ala	Ark	EBay	Ariz	Mich	Ill	Colo	Man
EMass	NLI	NDC	EFla	La	LA	Ida	Ohio	Ind	Iowa	Que
Me	NNJ	Del	Ga	Miss	Orange	Mont	NVa	Wisc	Kans	Ont
NH	SNJ	WPa	Ky	NMex	SBar	Nev			Minn	Man
RI	WNY		NC	NTex	SCV	Oreg			Mo	Sask
Vt			SC	Okla	SDge	Utah			Nebr	Alta
WMass			Tenn	STex	SF	Wash			NDak	Bc.
			Va	WCF	SJV	Wyo			SDak	Yuk
			WFla		SnLV	KL7				
			W.I.		KH6					

ENTER SUMMARY BELOW ON LAST SHEET USED

No. diff. sects. wkd _____, pr. diff. sects wkd _____, Input _____ watts, total time on air _____

SCORING _____ points X _____ sections X _____ power Mult.* = _____ CLAIMED SCORE

*power multiplier: C.W. - - 1.25, phone - - 1.5 for 150 watts, or less, at all times.

Type transmitter (tube line up if home-built) _____

Receiver _____ Antennas _____

CHECK ONE: Single Operator Station ( ) Multioperator Station ( ) If multioperator, please show calls of all operators _____

Participating for award in the following club _____

I have observed all competition rules as well as all regulations established for amateur radio in my country. My report is correct and true to the best of my knowledge.

SIGNATURE _____ CALL _____ MAILING ADDRESS _____

Enclose your comments for soapbox, photos, etc., & mail promptly to ARRL Communications Dept., 225 Main Street, Newington, Connecticut 06111.

This is a sample SS log and summary, *now available without charge* from your ARRL Headquarters.

Strays

When the Amateur Radio First-Day Covers were processed in Anchorage on December 15, 1964, we gambled and had a few extra unaddressed covers prepared, because orders for the first-day covers were still coming in and we didn't want anyone to be disappointed. We still have some of them left. They are all singles, unaddressed but carrying the stamp and the official first-day cancellation, and they will be mailed to you in an envelope. Prices are 35c each, three for a dollar. Send your orders to ARRL Hq., 225 Main Street, Newington, Conn., 06111.

1967 FIELD DAY RESULTS

COMPILED BY ELLEN WHITE,* WIYYM

It was a scant ten years ago that your ARRL contest reporters were bragging about a whopping 10,264 participants in the ARRL annual Field Day. We can do — in fact, we *have* done better than that for a number of recent years! For example, the June 24-25, 1967 test brought in almost 1300 entries, representing about 3050 stations and about 15,100 participants! This year, the three-transmitter club category proved most popular with the 2-transmitter group close behind. Not too surprisingly, the 14-transmitter group, was least popular though most nobly manned by the enthusiastic crew of the Englewood Amateur Radio Association, W2MM/2.

As the hundreds and hundreds of logs poured in following the conclusion of this Field Day, a picture began to form of what Field Day 1967 *really* was. It was an exercise in superb planning by many groups (starting in February and March) itemizing plans, supplies and pitfalls of the past and future. Under the new system of individual point incentives for total emergency-powered operation, a perfect field day message origination and a publicity boost for amateur radio, real goals were met and achieved. Never before has the press-TV-radio media been literally bombarded with amateur radio news! The cover of this issue of *QST* is just a sampling of two large boxes of clippings revealing the "home-town" news potential of amateur radio.

Once again this year, points for that perfect message were hoped for by many but achieved by few. Prime culprits again were: lack of a message precedence, incorrect or absent word count (spell out the punctuation and your count will generally be correct), insufficient or missing handling data.

The general idea of bonus points for bonus efforts has met with a good measure of approval. Under consideration now are the many ideas submitted by FD participants. They cover quite a territory too! We have proposals for eliminating the power multipliers, restricting operation to low-powered rigs, including the set-up time in the operating period (the quicker you set up, the more time for QSOs, etc.), elimination of time-sharing devices, revising the points for FD traffic, etc. If you haven't let us know what you think is needed (and why), don't forget this is *your* Field Day! When you discuss Field Day revisions with your club group remember that FD is unique, it is a field test of portables, a contest, a family outing, a club get-together, in a successful fun-filled formula. Perhaps this is the real secret of success in the FD formula.

For 1968 you'll need a committee, club traffic-handling session, log keeping and duplicate recording meeting, in fact isn't it almost time to get going on FD 1968, June 22-23?

Soapbox

"Our finest year so far, 833 contacts. Our loggers did a marvelous job. We told them to eat, sleep and drink check sheets. We wrote down the contacts on magic slates and they copied them off." — *K2CW/2.* "First time I've ever felt wanted. We had a pile-up going on 20 for three and a half hours . . . that 150 foot fire tower location was tremendous." — *W.15KLX/5.* "Tremendous skip conditions on all bands. Not only were fifteen and twenty open til two in the morning, but six had a great band opening." — *WA5HGX/5.* "FD ended early Sunday when our generator ran out of oil, leaving us with a frozen chunk of metal." — *K2AJA/2.* "Our FD vice-chairman was interviewed on a local TV program which showed shots taken at our location. We had a portable TV along, and the boys really enjoyed seeing themselves on TV." — *W9EJ/9.* "The power unit was sitting right next to the operating position and no hash! Coffee, food, and refreshments were on hand although we could not get any sleeping bags." — *3B2H.1/2.*

* Deputy Communications Mgr., ARRL.

OT **W6AM/6** operated mobile on 5 s.s.b. and 5 c.w bands for a Class C score of 2677. Many of those 253 QSOs were made in motion during marketing. Under the hood of the Olds is a double capacity Autolite battery, 70-amp alternator, transistorized regulator, shielding, bonded hoods, tailpipes, (and engine). The field-strength meter, and three v.f.o.s are in the driver's line of vision, while driving. 21 years ago, mobile W6AM had the high FD single operator score.

"Trouble at 2:00 A.M. when our generator broke its fuel line. Repaired it by using a piece of bailing twine as a gasket in the pipe." — *W0JTA/0.* "Down to three operators. We'll have to start another code class to get more help next year." — *W7TM/7.* "Lots of rain, blown p.a. tubes, smoke from the rig, all one hour before the start. During contest all went smoothly." — *W9LNQ/9.* "The temperature dropped during the night till we were forced to wrap up in blankets to continue operating." — *W9JPX/9.* "When we keyed the rig, the electric fan slowed down, an unusual way of tuning the final." — *W3SL/3.* "After we had set up the rigs in the tent, WB6ITM found a rattle snake by the tool boxes." — *W6UCS/6.* "Everyone had a good laugh when I lost my car keys 350 miles from home and had to call for another set." — *WA3PME/3.* "During our first FD meal, Murphy hit our hamburgers, causing our log-keeper to go home with a stomach ache." — *K7FEX/7.* "We started out with two transmitters, but a passing tornado picked up two tents and an 80 meter vee, destroying our FD hopes for this year." — *K8HPS/8.* "It seemed that locally some of the old time hams are losing interest in FD." — *W2ZJ/2.* "We had to share the shed with a barn swallow and her newly hatched brood nesting directly above the xmtrs." — *W0LMM/0.* "While attempting to repair our generator in the middle of the night, some sleepless operators spotted an orange UFO. It turned out to be the moon." — *WA7FQE/7.* "Had to camp out in a weed field far from other campers because of the genny." — *K9UJN/9.* "Nearly froze that first night. Temperatures dropped to the thirties in N. Dak. We made a special flag to promote FD." — *W0RTK/0.* "Everyone else must have done quite well, for Murphy was with *us* all night. We had fun despite the gnats, mosquitoes, poison ivy, and breakdowns." — *W0SBR/0.* "Operated from the highest point in Pa. with one end of the dipole attached to a fire observation tower." — *K8YSG/8.* "To attract attention, the call 3C3BKO/W1 was used. Confusion reigned, hardly a station copied the 3C3 prefix correctly the first time; so the familiar VE3 came into use." — *VE3BKO/W1.* "The guy who said he was portable in a nudist camp really broke up the whole gang." — *W4IZ/4.* "A VK3 showed up on the log sheet. Seems that the boys on 20 meters just had to try for some DX." — *VE2BAW/2.* "The star operator was WB6NVK. His voice on s.s.b., when tuned incorrectly, sounded like an attractive female. In the early hours of the morning, with a beard sprouting from his chin, he stopped blushing after every 'QRZ the YL?' and 'Cutie, you're five-nine, real five-nine, beautiful.'" — *W6CXW/6.* "This year the kids didn't drink all the pop. The weather was too cold." — *W8TFZ/8.* "Fabulous conditions on 10 and 15. A 14AVQ using a metal roof ground system really worked on those bands." — *K5VBF/5.* "New members, location, and club call put new spirit into FD." — *WA0RJE/0.* "What price (this) FD glory? Well, K6QPH got stung by a big, angry black bumble bee who resented 800 ft. of wire over his hive." — *K6BPC/6.* 'Kept tripping over the radials in the dark and finally broke one in half." — *WA6NYK/6.* "Suggest an 'All Solid State' multiplier as inducement to develop more of this type emergency gear." — *W8KW/8.* "Club didn't spend a cent for FD, but we blew a fortune on food." — *WA4RPI/4.* "W5BQN 'bagged' K6BAG/6 six times, however three were duplicates." — *W5BQN/5.* "When will some of the boys learn to keep check logs?" — *WA2WMT/2.* "K9RUL/9 had a lot of trouble with some horses that were eating the coax and guy wires." *K9RUL/9.* "Still can't spell SJV section." — *WB6AES/6.* "You just wouldn't believe where you'd

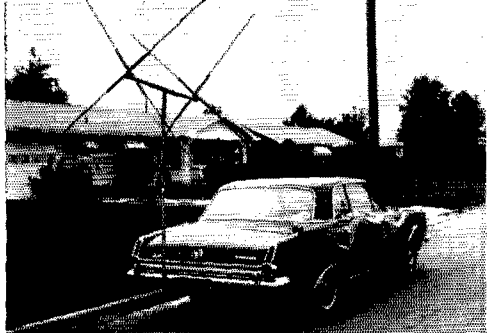
THE OPERATORS (top to bottom): **W5BQN/5,** *the Point Comfort ARC and one of their two set-ups; the* RTTY crew of the Argonne ARC, **WA9BRE/9,** operating 4-A; sisters WA4s BVF BSJ, crack c.w. oprs. of the Buncombe County ARC, **W4MOE/4,** operating in the 6-transmitter class for 7-K points; savvy operator **W9LNQ/9** taking a turn with 3 other operators for better than 500 exchanges in the one-transmitter class.

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
W1VB/1	W1TX/1	W1WHF/1	W1IPJ/1	K1MUJ/1	W1KWX/1	W1AQE/1	.....	.....	W1NY/1
W2EUP/2	WB2SSZ/2	K2ZSS/2	WA2LQO/2	**K2MQW/2**	**K2AA/2**	W2RAK/2	.....	.....	**W2LI/2**
WA3EPT/3	K3HUO/3	W3ATR/3	K3SSC/3	W3BTN/3	W3CCH/3	K3BKG/3	.....	.....	K6BAG/6
W4CQQ/4	W4IZ/4	W4TRC/4	W4SKH/4	W4CA/4	W4MOE/4	**K4BFT/4**	K4DPZ/4	.....	W9CCII/9
W5DDL/5	W5PDO/5	**W5KHB/5**	K5TYP/5	W5MS/5	W5SC/5	W5DPA/5	.....	W5ANR/5	11A
W6UZL/6	W6CXW/6	K6CLZ/6	W6AK/6	W6TJ/6	K6SYU/6	K6QEZ/6	**W6ULI/6**	W6LEJ/6	W3RCN/3
W7OTV/7	K7SKW/7	W7CO/7	W7IO/7	W7VE/7	.....	.....	.....	.....	**W7DK/7**
W8NP/8	W8OHN/8	W8CEA/8	**W8FY/8**	W8NK/8	W8ICS/8	W8IUU/8	K8BYI/8	W8IHF/8	VE3WE/3
W9EJ/9	**K9WMM/9**	W4MPV/9	K9TSM/9	K9AVE/9	K9WLD/9	K9GXU/9	WA9IKN/9	.....	14A
KØAZV/Ø	KØQMH/Ø	WAØASU/Ø	WØEQU/Ø	WØMG/Ø	.....	WØKOU/Ø	.....	.....	
VE4AAA/4	VE2BAW/2	VE7ARV/7	VE3OW/3	VE3RC/3	.....	VE3JJ/3	VE3NAR/3	VE3VM/3	W2MM/2

have to go for gasoline at three A.M. in the Arizona desert." — *W7GV/7.* ". . . and the rains came. Amen." — *W8YDK/8.* "All necessary spare parts and equipment along this year. Even had an extra bar of soap to plug into the hole we punched in the gas tank on the way up." — *K7LZF/7.* "While the scoring was on the low side, the chuck wagon rated high with our members." — *W2WCR/2.* "Murphy didn't join us this year, and we didn't miss him a bit. Best FD ever for this group." — *W8ZPF/8.* "Did you know that instead of pruning the ends of an inverted vee, you can prune the trees around it? Really had some effect on s.w.r." — *W2MJA/2.* "Wish more would QSK so one could break the CQs. Noticed more chirpy and rough c.w. notes this year than before." — *W8IAI/8.* "We were visited by a fox during the night of FD operation. It seemed curious about what we were doing, but was rather tame." — *W8UDB/8.* "Everything was going fine until WA7BVN got bit on the behind by K7ZZG's dog." — *WA7EUT/7.* "Find the all-night biz a bit rough after one gets past the 60-year mark." — *VE3LON/3.* "Our phonetics (Tight Yellow Bikini) really made us popular on 40 s.s.b." — *WA9TYB/9.* "FD was very helpful in bringing our members together and building the club spirit." — *KP4BFF/KP4.* "Our Hellgate ARC decided to split up, young against old. Although we ambitious youngsters made a concerted effort to score big, we pooped out at 2 Sunday morning." — *K7CTI/7.* "While driving back to FD site after getting a mobile whip, we nearly punctured the gas tank by running over a guy wire stake." — *W5DSC/5.* "One hour before FD ended, a violent thunderstorm came up and blew down a doublet and two beams. One of the logs was blown out of the secretary's pocket and had to be found and dried out." — *W4WVJ/4.* "Spent last two hours trying to work Wyo. for last section. Where were they?" — *W2CVT/2.* "22 members showed this year. Our best ever." — *K8LUC/8.* "We wish someone would find a quick way to check out logs for repeats." — *WB4FPB/4.* "This was the most successful FD to date for the SJRA." — *K2AA/2.* "We used a computer to check log sheets for possible duplicate QSOs. Once given instructions and data, it snaps back answer in seconds." — *K2AE/2.* "We find that transceivers make for the easiest operating in FD." — *W1KWX/1.* "Fire towers are great for FD." — *K3ZSK/3.* "The Fullerton RC participates in local competition with three other clubs for a traveling trophy, which is awarded to the highest-scoring contest entry." — *W6ULI/6.* "Back again after missing first year since 1938; my daughter got married last FD and I had to go to the wedding." — *W2FBA/2.* "There always seems to be one station we can't raise, and this year it was W6TJ/6." — *WA9AUM/9.* "Use only what is on the fixed station or makeshift items, but no buying of new items especially for FD. In a real emergency when there is no time to purchase or rent, we will truly be ready." — *VE2AQV/W6.* "When we first arrived at the campsite, heavy rains bogged us down in the mud for two and one-half hours." — *WAØVFV/9.* "We set up on a beach at Puget Sound. Our best dipole was a wire floating on salt water. It worked great!" — *WA7DYB/7.* "Forgot to hook up the 20 meter antenna. Used the coax for the first 45 contacts." — *WA5MUF/5.* "Locked in forest preserve while we operated FD. After much explaining, a policeman let us drive out." — *WAØSBD/9.* "Conditions and lids at a maximum. Surprised how well mobile works atop a 9,000 ft. mountain." — *K5ONE/5.* "W6AM is now 70, a Life Member of ARRL, and 21 years ago had the highest single-operator mobile FD score." — *W6AM/6.* "A.m. doesn't have a chance. Wait 'til next year." — *WA3AKH/3.* "FD mobile in Newington. I'll bet you didn't know there was a Newington, Va." — *W4JVN/4.* "Had to QRT at 2 A.M., became hoarse. Good contest, lots of fun." — *WA4CVF.* "Portable stations should be encouraged to indicate they are operating portable. Since I operated a fixed station, the distinction was important." — *W6LVI.* "Do you have a prize for the most encounters with Murphy?" — *WA4ZUI.* "I just got on to have some fun and provide points for others." — *WØLAJ.*



Away we go! (Or, how to transport a 6-meter quad with a minimum amount of effort.) This represented part of the operation of the Central Missouri Amateur Radio Club, WØAZL/Ø, operating in the 4-transmitter category for 1591 points.

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 d.c. 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

W2EUP/2	RA of Erie County	810-	AB- 5-	7800
K2CW/2	Hudson Wireless Assn.	833-	AB- 9-	6759
WA3EPT/3	Johns Hopkins ARC	695-	A-10-	6655
W8NP/8	Massillon ARC	687-	A-21-	6583
K8MEQ/8	(nonclub group)	626-	A- 6-	6234
W7OTV/7	Tualatin Valley ARC	763-	AB- 9-	6205
W6UZL/6	(nonclub group)	1010-	B- 5-	6060
W2WS/2	RA of Greater Syracuse, Group 1	825-	AB- 5-	5856
W7LRA/7	Utah ARC	909-	B-15-	5854
K2ISP/2	(nonclub group)	718-	AB- 6-	5742
W5DDL/5	Lafayette ARC	558-	A- 8-	5622
W4CQQ/4	Beaches AR Soc.	864-	B-15-	5584
K8UTS/8	St. Albans Group	861-	B- 8-	5566
W3LUW/3	Germantown RC, Sr. Group	611-	AB- 3-	5436
WA5KLX/5	Low Rent RAC	897-	B- 4-	5382
K5IHG/5	Jefferson ARC	838-	AB- 9-	5276
K2AJA/2	(nonclub group)	549-	A- 4-	5141
VE4AAA/4	Winnipeg DX Club	785-	AB-12-	5119

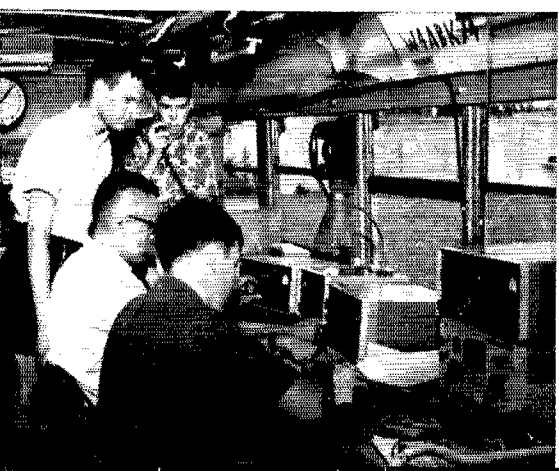
WN4FEC logs for WA4CBX catching a real contest flavor during the Bristol ARC operation in the 4-transmitter category. The **K4ILW/4** stint totalled 6.6-K points.

W1VB/1	Candlewood AR Assn...	613-	AB-16-	5011
K3QBD/3	First State ARC.....	507-	A-15-	4963
W8RTR/8	Canton ARC.....	482-	A- 6-	4548
W8ZA/8	Tusco ARC.....	682-	B-10-	4492
K6LDA/6	Crescent Bay Emergency Radio Net.....	583-	AB-12-	4426
K8WWP/8	(nonclub group).....	756-	AB- 9-	4353
KØAZV/Ø	Kirkwood H.S. ARC....	613-	B-12-	4278
W9EJ/9	Society Radio Operators.	639-	B-30-	4234
K7RAJ/7	(nonclub group).....	467-	A- 3-	4203
W3RVC/3	Alle-Kiski AR Assn. and Skyview RC.....	663-	B-23-	4178
W6VLD/6	Douglas Space Systems Center ARC.....	595-	AB-15-	4055
W7ED/7	Gallatin ARC.....	573-	B-13-	4048
WA2UKA/2	(nonclub group).....	425-	A- 3-	4025
W7NPU/7	Ogden ARC.....	530-	AB-16-	3958
W9FB/9	(nonclub group).....	650-	B- 3-	3900
W4ORF/5	(nonclub group).....	516-	B- 3-	3896
WAØCPX/Ø	(nonclub group).....	580-	B- 3-	3880
WØDEP/Ø	(nonclub group).....	364-	A- 3-	3876
K4SAM/4	(nonclub group).....	470-	AB-13-	3826
VE3GFL/3	(nonclub group).....	399-	A- 4-	3791
WAØCJU/Ø	Viking AR Soc.....	557-	B-12-	3742
WA4YWH/4	Hopewell ARC.....	543-	AB-14-	3736
K7TZZ/7	(nonclub group).....	544-	B- 3-	3664
K8ZUM/8	(nonclub group).....	503-	B-24-	3628
3B2HA/2	Goose Bay ARC.....	504-	B-12-	3624
K2TRN/2	Lockport ARC.....	528-	B- 4-	3568
VE2WE/2	Montreal Field Day Assn.	503-	AB- 6-	3509
W7TYN/7	Anaconda ARC.....	513-	AB-12-	3490
WØJTA/Ø	Upper Iowa RA Assn...	512-	B- -	3472
K7OQZ/7	(nonclub group).....	510-	B- 9-	3460
WA8OTI/8	Strawberry Alarmclock Wireless Assn.....	536	B- 5-	3416
W4OLB/4	Smoky Mountain ARC..	365-	AB-10-	3313
W7TMI/7	Heaven's Devils.....	446-	B- 3-	3276
W9LNQ/9	(nonclub group).....	512-	B- 4-	3272
W8EQ/8	Lima Area ARC.....	468-	AB-10-	3217
W9YT/9	Badger AR Soc.....	916-	C- 7-	3148
VE4AC/4	AR League of Manitoba.	421-	B-18-	3126
WØNWX/Ø	Newton AR Assn.....	302-	A- 6-	3118
W9JPX/9	Indiana School for the Blind R. C.....	418-	B- 4-	3108
K4NVN/4	S. I. R. ARC.....	343-	A- 3-	3087
KØGPV	Southwest Iowa AR Assn.	511-	B- 7-	3066
W3SL/3	Delaware ARC.....	406-	B-17-	3046
VE7ACS/7	UBC AR Soc.....	472-	B- 6-	3032
WB6OTK/6	Santa Clara H.S. ARC..	318-	AB-13-	3007
W7IDA/7	Bonner County ARC....	434-	B- 9-	3004
W5ZYF/5	Caprock AR Soc.....	863-	C- 5-	2989
WB4AIN/4	Rabbit Hash Field Day Operators.....	398-	B- 4-	2988
KØQBI/Ø	Tri-state ARC.....	849-	C-18-	2947
KH6GAY/KH6	Tiki Mobile Club.....	421-	B- 4-	2931
W4BS/4	Delta ARC.....	420-	B-12-	2920
K2MEF/2	(nonclub group).....	414-	B- 4-	2884
W3NNL/3	(nonclub group).....	275-	A- 5-	2875
KØZXE/Ø	Arrow Head RA, C.W. Group.....	409-	B- 3-	2854
KØVPM/Ø	North Star Hibanders and North Suburban Wireless Assn.....	396-	AB-15-	2849
K8DXF/8	Mason County RC.....	402-	B-10-	2812
K2TCB/2	Northern Irvington RAC.	407-	AB- 4-	2756
WAØKSL/Ø	Storm Lake ARC.....	382-	AB-18-	2755
WØFFN/Ø	(nonclub group).....	390-	B- 5-	2740
K4BV/4	Daytona Beach AR Assn.	304-	A- 8-	2736
WA7DOX/7	(nonclub group).....	381-	B- 3-	2686
WAØKUD/Ø	Scenic City ARC.....	336-	AB- 8-	2658
W5FQ/5	Meridian ARC.....	742-	C-15-	2636
W9CHD/9	The Poison Ivy Rainmakers Wireless Assn..	406-	B- 6-	2636
W6UCS/6	Monterey Bay RC.....	365-	AB- 7-	2623
K8BXU/1	Windsor Lids ARC.....	215-	A- -	2605
K2VSU/2	Mt. Vernon H.S. RC....	399-	B- -	2594
KH6RS/KH6	Maui ARC.....	660-	C- 6-	2585
WA5NKV/5	Galveston County Hamcross.....	406-	BC- 5-	2567
WA9NVY/9	(nonclub group).....	392-	B- 4-	2552
WA7DIA/7	Wassuk Range RC.....	357-	B- 3-	2542
WAØNLP/Ø	Honeywell ARC.....	388-	B-14-	2528
W3RQZ/3	Phil-Mont Mobile RC...	370-ABC-15-		2512
K8PAO/8	(nonclub group).....	338-	AB- 3-	2485
WB2SSN/2	Cherry Hill H.S. West ARC.....	229-	A-12-	2471
WØZWY/Ø	Sioux Falls ARC.....	369-	B-22-	2414
WAØPGK/Ø	Central Iowa ARC.....	367-	B-15-	2402
VE6QE/6	Central Alberta Radio League.....	290-	B-10-	2340
KØJKS/Ø	Falls City ARC.....	640-	C-11-	2320
W6UUS/6	Convair RC.....	314-	B- 8-	2284
WAØAUF/Ø	I.M.A. RC.....	307-	B-11-	2242
W9NUW/9	Wisconsin Valley Radio Assn.....	399-	AB-17-	2233
KØFBF/Ø	Millard ARC.....	372-	B- -	2232
WA8PME/8	(nonclub group).....	324-	B- 3-	2144
WB4DAV/4	Central Virginia ARC...	289-	B- 3-	2134
K7FEX/7	Big Sky ARC.....	503-	BC- 6-	2118
KØIOG/Ø	(nonclub group).....	349-	B- 3-	2094
K8HPS/8	General Motors Institute AR & Electronics Club.	259-	AB-14-	2047
VE1JV/1	Pictou County ARC....	204-	A-10-	2036
K2RXO/2	Brantling Hill RC.....	268-	B- 9-	2008
KØOYM/Ø	Mid-Mo ARC.....	297-	B-11-	1982
W4OIX/4	Kinston ARC Soc.....	356-	B-10-	1928
K8LZJ/8	(nonclub group).....	292-	AB- 5-	1911
VE3SAR/3	ARC of Sarnia.....	244-	B- 4-	1884
W9BZN/9	IMO ARC.....	488-	C- 6-	1864
W7FO/7	Butte ARC.....	415-	C-10-	1855
WA4RKS/4	(nonclub group).....	275-	B- 4-	1850
W6CAE/6	(nonclub group).....	275-	B- 5-	1850
W6FBK/6	Humboldt ARC.....	472-	C- 6-	1816
WA8THK/8	Baker's Dozen.....	235-	B- 3-	1810
WB6LTY/6	(nonclub group).....	267-	B- 3-	1802
W5ABF/5	Mineral Wells ARC.....	222-	B- 7-	1732
KØSOQ/Ø	Hastings ARC.....	216-	B-15-	1696
K3UIB/3	Naval Supply Depot ARC.....	360-	C- 8-	1680
W3CDI/3	Baltimore Polytechnic Institute RC.....	241-	B- 6-	1646
WA6YHB/6	(nonclub group).....	482-	C- 3-	1646
K6HM/6	Douglas Aircraft Group ARC.....	238-	B- 6-	1628
VE2MO/2	Assn. RA de la Mauricie.	271-	B-10-	1626
WB2YHB/2	Chenango Valley AR Assn.....	203-	B- 8-	1618
WA7FKE/7	(nonclub group).....	199-	B- 3-	1594
WAØQYC/Ø	Bloomington AR Klub..	195-	B-11-	1570
WØDBD/Ø	Iowa City ARC.....	454-	C-18-	1562
W0WJ/Ø	OBP #1.....	449-	C- -	1547
W1CFT/1	(nonclub group).....	218-	B- 5-	1508
W9ELT/9	Freeport Area ARC.....	218-	B- 12	1508
K2GXT/2	Amateur Radio Assn....	243-	B- 3-	1458
VE7ASC/7	Chilliwack ARC.....	137-	AB- 8-	1437
KØGIA/Ø	Air Capitol AR Assn....	404-	BC- 6-	1430
WB2VPY/2	Chemung County AREC Assn.....	109-	AB-18-	1427
W2ZJ/2	Elmira AR Assn.....	166-	AB- 4-	1411
K9IZV/9	(nonclub group).....	234-	B- 3-	1404
W1MEP/1	Catamount RC.....	194-	B-10-	1364
WØLMM/Ø	(nonclub group).....	225-	B- 3-	1350
WA7FQE/7	Woodland ARC.....	121-	B- 4-	1326
W3ENP/3	Ivyridge ARC.....	153-	B- 6-	1318
VO1GF/1	LakeHead ARC.....	150-	B- 4-	1300
W2QH/2	Greene ARC.....	216-	B- 4-	1296
W6UTU/6	Tuolumne AR Soc.....	99-	A- 6-	1291
K5HTK/5	Enid ARC.....	210-	B- 5-	1260
W4FPI/4	(nonclub group).....	196-	BC- 3-	1249
WA5RFV/5	Fayetteville H. S. ARC..	174-	B- 3-	1244
WA1BGM/1	Townsend AR Soc.....	133-	B- 3-	1198
K7YLT/7	Northern Utah ARC.....	165-	B- -	1190
W6PB/6	Wheel'n Whips Mobile RC.....	163-	B- 6-	1178
W5ES/5	El Paso Arc.....	387-	C-24-	1161
W4GBQ/4	Talladega ARC.....	123-	B- 4-	1138
W8QQQ/8	Shiawassee AR Assn....	155-	B- 5-	1130
K9UJN/9	(nonclub group).....	155-	B- 3-	1130
VE1AO/1	Truro ARC.....	150-	B- 5-	1100
W4TJM/4	Polk County CD Amateur Communications Soc.....	197-	AB- 6-	1092
WA9BWH/9	Notre Dame H. S. RC	182-	B- 9-	1092
KØYCO/Ø	Coon Valley ARC.....	138-	B- 9-	1028
W9JCL/9	Neenah-Menasha ARC..	164-	B- 6-	984
W5OPV/5	(nonclub group).....	130-	AB- 3-	980
WA3CTW/4	(nonclub group).....	128-	B- 6-	968
W8CIA/8	Louisville ARC.....	161-	B- 8-	966
WØRTK/Ø	Theodore Roosevelt ARC	89-	B- 5-	934
WA9TZY/9	Hortick H.S. Ham RC..	86-	B- 5-	916
K7JAT/7	Laurel RC.....	156-	C- -	868
WA5OTR/5	Tarrant County Six Meter Emergency Net...	95-	A- 7-	865
WB4AMY/4	(nonclub group).....	70-	A- 3-	830
KØKKQ/Ø	E. Central Minn. ARC..	133-	B- 7-	798
W1VSR/1	(nonclub group).....	42-	A- 3-	778
WØSBR/Ø	Minnetonka Village CD	96-	B- 3-	776
W8GQ/8	Group Seventeen MARS ARC.....	55-	A- 3-	695
WA9QFT/9	Randolph Co. Contest Assn.....	71-	AB- 3-	686
K7CCH/7	Coos County RC.....	103-	BC- 6-	641
VE8YC/8	(nonclub group).....	67-	B- 3-	602
W2TRS/2	(nonclub group).....	79-	AB- 4-	578
W9DUP/9	DuPage RC.....	94-	B- 3-	564
WN5SBA/5	JARC Novice Bunch....	59-	B- 8-	554
W2RUI/2	W.N.Y. Frontier RA Teletypewriter Soc...	57-	AB- 7-	551
KØGVA/Ø	(nonclub group).....	61-	A- 3-	549
WA8MSW/8	(nonclub group).....	90-	B-10-	540
W9ZDK/9	Maine Twp. H S. East RC.....	8-	A- 7-	472
W8BAA/8	Chippewa ARC.....	30-	B-32-	380
WB2HYK/2	(nonclub group).....	187-	B- 4-	374
W9ABB/9	WIYYM Fan Club.....	182-	B- 4-	364
K8YSO/3	(nonclub group).....	60-	B- 3-	360
VE3BKO/W1	U. of N. H. ARC.....	54-	B- 3-	324

W5DEP/5	Robert E. Lee H. S. ARC	155-	B-	8-	310
W9ANF/9	Fenwick H. S. Alumni AR Soc.	33-	A-	8-	297
W2FSL/2	The Renegades	42-	B-	3-	252
WA3AWH/3	Elizabeth Forward H. S. ARC	24-	A-	4-	216
WN8VVT/8	Columbus AR Assn.	25-	B-	7-	150

Two Transmitters Operated Simultaneously

K9WMM/9	Grains ARC	1651-	A-	5-	15,050
W1TX/1	Conn. Wireless Assn.	1811-	AB-	19-	14,376
W1OP/1	Providence Radio Assn.	1400-	AB-	12-	11,067
W4IZ/4	N. Fla. AR Soc.	1675-	B-	50-	10,659
K9QMH/9	Montrose County ARC.	1044-	A-	12-	9792
K9QKB/9	B.J.M. RC	1003-	A-	3-	9027
W4LX/4	Ft. Meyers ARC	1251-	B-	15-	8100
VE2BAW/2	Sir George Williams U.	885-	AB-	15-	7816
W6CXW/6	Samsons'	1227-	AB-	5-	7697
W9VQ/9	Wilcox Electric ARC	1099-	AB-	12-	7554
W9BRI/9	St. Louis Contest Club	1180-	B-	8-	7481
W8OHN/8	Northern Ohio AR Soc.	1179-	AB-	-	7451
W8ZVI/8	Apricot Net Organization	896-	AB-	30-	7089
WB2SSZ/2	Diode Disintegrators Club	1147-	B-	12-	7082
K3HUO/3	South Hills YMCA RC.	1125-	AB-	13-	6905
K7SKW/7	Mt. Baker ARC	1027-	B-	10-	6772
W8UA/8	Wayne State U. ARC	727-	A-	5-	6743
W8JSU/8	Order of Boiled Owls of Ohio	1034-	B-	7-	6604
W5PDO/5	Los Alamos ARC	997-	B-	11-	6582
W8COE/8	Kanawha RC	1404-	BC-	35-	6439
W4NYK/4	Blue Ridge Radio Soc.	1002-	B-	14-	6412
WA9HVR/9	Minnetonka H. S. ARC	1031-	B-	8-	6386
K7OU8/7	Clackamas AR Soc.	1057-	B-	-	6342
W9LB/9	Jayhawk AR Soc.	1267-	ABC-	50-	6165
W9OJY/9	Prairie Dog ARC	958-	B-	10-	6148
WA9IXT/9	Forx ARC	954-	B-	21-	6124
K7EEA/7	Yellowstone RC	923-	B-	17-	5998
K9TPN/9	Belleville AR Foundation	759-	AB-	5-	5982
W9FTK/8	West Park Radiops	892-	AB-	20-	5884
W8TFZ/8	Aviation RC of North American Aviation, Inc.	808-	AB-	18-	5778
W9BFO/9	S.E. Ill. Ham Soc.	883-	B-	15-	5698
K9LWV/9	Waupaca ARC	914-	B-	15-	5684
W5ABD/5	Westside ARC	844-	B-	11-	5674
K6GJ/6	Foothills AR Soc.	603-	A-	18-	5627
W9GGN/9	Point RA	866-	B-	12-	5596
K8DYB/8	Northern Panhandle ARC	821-	B-	15-	5526
W3WPW/3	Chesapeake ARC	692-	AB-	12-	5506
W6KA/6	Pasadena RC	565-	A-	19-	5485
W5NOT/5	(nonclub group)	832-	A-	10-	5392
W4PED/4	N. Augusta-Belvedere RC	794-	B-	15-	5364
W4DQS/4	Indian River ARC	790-	AB-	16-	5302
K7CBP/7	Klamath Basin AR Assn.	804-	B-	15-	5244
K5VBF/5	(nonclub group)	727-	AB-	6-	5241
K8QIK/8	Lancaster and Fairfield County ARC	745-	AB-	18-	5219
K0GSS/0	(nonclub group)	802-	B-	6-	5212
WA0RJE/0	Tee-ni-Chat ARC	801-	B-	12-	5206
W9YB/9	Purdue ARC	683-	B-	7-	5181
W9UDU/9	Racine Megacycle Club	863-	B-	10-	5178
W5YM/5	ARC of U. of Arkansas.	791-	B-	10-	5146
W2LZ/2	Walton Radio Assn.	551-	AB-	10-	5119
K4KAB/4	(nonclub group)	779-	B-	4-	5074
W5OAR/5	Ozone ARC	776-	B-	22-	5056
W9IEI/9	Outagamie RC	517-	A-	15-	5053
W0ERH/0	Johnson County RAC.	745-	AB-	14-	5053
K6BI*C/6	So. Calif. VHF RC	769-	B-	5-	5014
VE3RAM/3	Ottawa Valley Mobile RC	727-	B-	15-	4962
W8KEB/8	Saginaw Valley AR Assn.	816-	AB-	14-	4914
W7VNJ/7	Casper ARC	715-	B-	12-	4890
W0RFU/0	Bandhoppers RC	675-	AB-	12-	4817
W8LS/6	LERC ARC	702-	B-	10-	4812
W1HEB/1	Middlesex ARC	489-	A-	-	4811
WA6NYK/6	(nonclub group)	759-	B-	6-	4754
W8MEL/8	Peach Grove ARC	725-	B-	6-	4750
W0MXW/0	Rochester ARC	724-	B-	15-	4744
K4UWH/4	Johnson City Radio Assn	533-	AB-	14-	4728
W4AM/4	Frye ARC	707-	B-	20-	4642
W9SMJ/9	Martinsville ARC	601-	AB-	13-	4629
K3AER/3	Lake Shore AR Assn.	702-	B-	7-	4612
W4IRE/4	Forsyth RC	648-	AB-	8-	4566
W2AJR/2	E. Suffolk RC	648-	AB-	10-	4564
W2BSC/2	Stevens RC	749-	B-	11-	4494
K8VNQ/8	Mountain State Transmitters	647-	B-	10-	4482
WB4ANP/4	McGill ARC	676-	B-	8-	4456



1968 FIELD DAY

JUNE 22-23

K8UZW/8	Parma RC	693-	AB-	20-	4433
W3KW/3	ARINC ARC	670-	B-	13-	4420
WA7APE/7	Scottsdale ARC	665-	AB-	20-	4402
W4AB/4	Broward ARC	614-	AB-	30-	4397
K8IEK/8	Port Huron AR Organization	657-	B-	23-	4342
W8BI/8	Dayton AR Assn.	675-	AB-	22-	4307
KØJVN/Ø	Ornate Order of Bloodshot Eyeballs	645-	B-	8-	4275
W3SJI/3	Hazleton ARC	712-	B-	12-	4272
VE4DF/4	Flin Flon ARC	634-	B-	5-	4204
W8TV/8	Marion ARC	481-	AB-	12-	4159
W5NPF/5	Two Rivers ARC	626-	B-	12-	4156
W3AVK/3	West Branch AR Assn.	613-	B-	10-	4078
K5SKF/5	Gulf Area YL AR Klub.	615-	AB-	8-	4037
K5AKS/5	N. Arkansas AR Soc.	605-	AB-	14-	4030
W4YKY/4	Lake AR Assn.	595-	AB-	15-	4009
W6TO/6	Fresno ARC	561-	AB-	40-	3990
W3BQT/3	Wilmington ARC	594-	B-	6-	3964
W5BQN/5	Point Comfort ARC	593-	B-	7-	3958
WA6DDO/6	Yolo County RC	465-	AB-	7-	3879
VE1HE/1	Dartmouth Arc	570-	B-	14-	3840
W3ABT/3	(nonclub group)	606-	B-	6-	3836
K5BHF/5	Carbide ARC	638-	B-	6-	3828
W9CSF/9	Michigan City ARC	738-	AC-	23-	3802
WA0KSS/0	Bell ARC	563-	B-	15-	3778
W2JTG/2	West Jersey RA	368-	A-	12-	3717
WØCVJ/6	Tube and Shutter Club.	512-	B-	11-	3672
WA4RPI	Huguenot H.S. ARC	544-	B-	10-	3664
WA0NNR/0	Ottumwa ARC	544-	B-	14-	3664
K9RHH/9	Falls RC	510-	AB-	15-	3661
WA0PXQ/0	(nonclub group)	543-	B-	5-	3658
W7SAA/7	Salem ARC	540-	B-	15-	3640
W9SA/9	North Shore ARC	573-	B-	7-	3638
W8SSV/5	Port Arthur ARC	530-	B-	24-	3580
W3MCB/4	Brightleaf ARC	524-	B-	14-	3544
WA9PCB/9	Worth Twp. ARC	519-	ABC-	17-	3544
K2LSA/2	State Line RC	455-	AB-	20-	3532
W8SKB/8	Newark AR Assn.	481-	B-	11-	3526
W1SEA/1	Open Air Operators Club.	575-	AB-	3-	3507
W2MO/2	Livingston ARC	403-	AB-	12-	3437
W9CZH/9	Winslow AR Soc.	502-	B-	6-	3412
VE2CSH/2	St. Hyacinthe ARC	667-	BC-	5-	3404
VE3EAR/3	(nonclub group)	499-	B-	8-	3394
K2YCJ/2	Communications Club of New Rochelle	465-	B-	14-	3390
W2RUJ/2	(nonclub group)	564-	B-	7-	3389
K9CJU/9	RA Megacycle Soc.	444-	AB-	15-	3363
WA2PNU/2	Lakefield ARC	441-	AB-	8-	3350
W4YWV/4	(nonclub group)	830-	BC-	3-	3315
W9YW/9	Rho Epsilon AR Assn.	552-	B-	8-	3312
WA0HQR/0	(nonclub group)	474-	B-	5-	3244
K6AAW/6	Yuba-Sutler ARC	506-	B-	3-	3236
K9ENM/9	Communicators Club	539-	B-	10-	3234
W7DLL/7	(nonclub group)	633-	BC-	4-	3206
K5FIQ/5	Kirtland AFB ARC	500-	B-	4-	3200
WB6ADR/6	(nonclub group)	500-	B-	9-	3200
W2OFQ/2	Rome RC	558-	BC-	16-	3198
VE4QD/4	Brandon ARC	462-	B-	6-	3172
WA0DGW/0	Steele County ARC	461-	B-	5-	3166
W8LT/8	Ohio State U. ARC	417-	AB-	19-	3157
WØFIT/Ø	Albert Lea Spiderweb AR Assn.	301-	A-	6-	3109
WB2WIK/2	(nonclub group)	319-	A-	10-	3071
W6MMG/6	ARINC	467-	AB-	7-	3047
WØJUI/Ø	N. Iowa ARC	404-	B-	5-	3024
WB2EZG/2	Richmond County ARC.	435-	B-	6-	3016
WB4FRD/4	Johnston Co. CD RC	436-	B-	10-	3016
VE1CBC/1	CBC Halifax ARC	424-	AB-	8-	2968
WA9LIV/9	Waukegan VHF Soc. & ARC	426-	B-	12-	2956
W5NS/5	Bartlesville ARC	393-	AC-	24-	2955
WA3AOE/3	Explorer Post 328 RC	337-	AB-	12-	2952
W8EMP/8	Edison RA Assn.	379-	AB-	8-	2944
W5DTR/5	Central Ark. ARC	387-	B-	5-	2932
WA4QPL/4	G.L.E.R.C. ARC	420-	B-	8-	2920
W1ECV/1	Southington AR Assn.	474-	AB-	20-	2916
WA2IDU/2	(nonclub group)	436-	AB-	6-	2909
KØALC/Ø	ARC of Jackson County.	437-	AB-	8-	2873
W2BE/2	Trylon RC	407-	B-	11-	2842
K8DVR/8	Kalamazoo RACES Officers	369-	B-	5-	2814
K3NLT/3	Les Voyageurs	467-	B-	7-	2802
WA9DNZ/9	Western Electric Montgomery Shops ARC	366-	B-	15-	2796
WAØJTU/Ø	(nonclub group)	466-	B-	6-	2796
W8DUS/8	Red Bird ARC	465-	B-	9-	2790
KL7GI/KL7	Juneau ARC	396-	B-	-	2776
VE4BB/4	Winnipeg AR Assn.	443-	ABC-	10-	2729
WAØHOT/Ø	Blue Valley ARC	383-	B-	11-	2698
W9HRF/9	Big Thunder ARC	363-	ABC-	12-	2695

Here's the handsome communications bus of the Kentuckiana RC of Louisville with K1GUD operating 40 c.w., WA4VAG logging, WA4AGO on 6-meter f.m. and WA4VAG doing a bit of observing. The club signed **W4ABK/4** in the 3-transmitter group with a final sum of 7338.

QST for

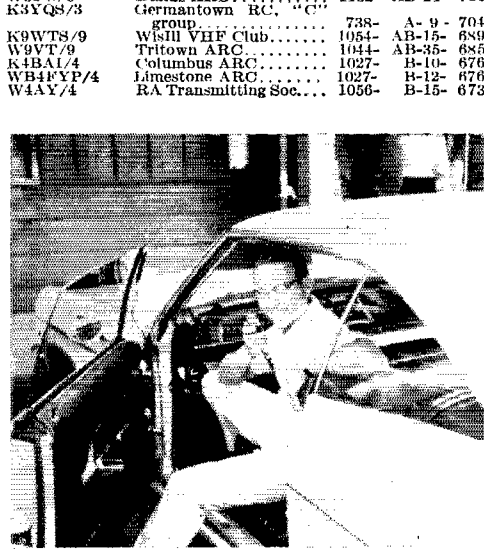
WA8GYT/8	Ballon Buster's ARC	441-	AB-	6-	2658
W3VV/3	McKean County ARC	375-	B-10-		2650
WB6SST/6	Quality Radio Men	347-	AB-	7-	2600
W5ND/5	Orange ARC	363-	B-10-		2578
K9RUL/9	Lombard ARC	428-	B-	6-	2568
WAØKMC/Ø	(nonclub group)	360-	B-	6-	2560
WB2ENJ/2	Trenton Wireless Assn.	281-	A-	3-	2534
W3YP/3	Villanova U. ARC	300-	AB-	5-	2515
W9GFD/9	Prairie ARC	349-	B-18-		2494
WA9QHT/9	(nonclub group)	381-	B-	3-	2486
WA1CPO/1	Cromwell AR Soc	278-	AB-	6-	2448
WB6AES/6	Sgt. Petter's Lonely Hearts Club Hams	340-	B-	4-	2440
K7OOM/7	(nonclub group)	333-	B-	6-	2398
WØZRT/Ø	Bismark Area R Klub	327-	B-10-		2362
WØFLO/Ø	Pine Ridge ARC	325-	B-	8-	2360
K3FWN/3	Explorer Post 114 ARC	244-	AB-	5-	2346
W7DA/7	N.Seattle ARC	237-	A-	5-	2333
W8GET/8	Lorain County AR Assn	319-	B-10-		2314
K2TRS/2	Chenago Valley H.S. RC	369-	ABC-	3-	2295
K8WBL/8	Xavier U. and Indian Hill H.S. RC	346-	B-10-		2276
W9HHX/9	Milwaukee School of Engineering ARC	375-	AB-	4-	2259
W7GV/7	Old Pueblo RC	444-	BC-	6-	2217
WAØAOF/Ø	(nonclub group)	353-	B-	5-	2118
WA9IXF/9	(nonclub group)	695-	A-	4-	2085
K5WPH/5	Sun City ARC	346-	B-12-		2076
3C5JI/5/W7/WØ	(nonclub group)	504-	BC-	5-	2057
WA5QCL/5	Tulsa Teenage Communications Council	286-	AB-13-		2061
K2YBN/2	Rancocas Valley AR Assn.	214-	AB-	9-	2026
K7LIX/7	Southern Oregon RC	233-	B-14-		1998
W2RHM/2	Black River Valley ARC.	262-	B-	8-	1972
VE3BA/3	Brantford ARC	261-	B-12-		1966
W3PNL/3	Souderton Area Electronics Research Assn.	258-	AB-	6-	1963
WA9CJN/	Kishwaukee ARC	258-	B-15-		1948
VE7AWJ/7	Powell River ARC	289-	B-	8-	1934
KØAJW/Ø	Minot AR Assn	322-	B-	8-	1932
WB4AEL/4	(nonclub group)	285-	B-	5-	1910
W2BXK/2	Polytechnic Institute of Brooklyn	317-	ABC-	7-	1906
KØDOK/Ø	(nonclub group)	281-	B-	3-	1886
WØWSV/Ø	Cedar Valley ARC	227-	B-	5-	1762
W9MEP/9	Sterling-Rock Falls AR Soc.	321-	BC-20-		1630
WA1DIU/1	Submarine Base ARC	155-	AB-	7-	1626
KL7NR/KL7	Northland ARC	196-	AB-10-		1607
K1UZG/1	(nonclub group)	260-	BC-	7-	1603
W4COY/4	Tri-County RC	232-	B-	8-	1592
WA5BEL/5	Watonga ARC	132-	A-	7-	1588
K2VOX/2	W. N. Y. Martians	171-	AB-	8-	1573
WA9NJN/9	Random RC	177-	AB-	3-	1573
W3LWW/3	Foothills RC	195-	B-	5-	1570
WØSV/Ø	St. Cloud RC	167-	A-15-		1563
W8VVB/8	(nonclub group)	166-	AB-10-		1553
K9QDE/2	Kokomo ARC	334-	BC-	6-	1552
W6KII/6	Dunsmuir ARC	373-	C-	7-	1519
K7RJM/7	Polk County ARC	188-	AB-	6-	1506
VO1AT/1	ARCON	174-	B-10-		1444
W8KEA/8	Midland ARC	171-	B-20-		1426
WAØLCF/Ø	(nonclub group)	237-	B-	3-	1422
W8YDK/8	Milford ARC	112-	A-14-		1408
W9AML/9	Central Ill. RC	159-	AB-12-		1393
K6ASU/6	Nevada County ARC	231-	B-	5-	1386
WA9SIP/9	WoodDale ARC	216-	BC-	-	1366
W6DUN/6	System Development Corp ARC	298-	C-	-	1294
WA5IPE/5	Wheat Straw ARC	138-	AB-	6-	1285
W5SXA/5	Shawnee ARC	180-	B-	5-	1280
W2OTA/2	Post 673	142-	AB-	5-	1190
W7DMC/7	David Douglas H. S. ARC	195-	B-	4-	1170
W3FT/3	Baltimore ARC	161-	B-11-		1166
WA4TFZ/4	Albemarle ARC	190-	B-12-		1140
WØVEA/Ø	VHF Gang	122-	AB-	8-	1135
VE7ARM/7	Richmond ARC	103-	A-	4-	1127
W2UBW/2	Mid-Island RC	120-	A-	8-	1080
W8PIF/9	M & M RC	109-	B-12-		1054
W8CPQ/8	Marion VHF Highbanders	140-	B-10-		1040
WA8URP/8	Fairview H.S. ARC	111-	BC-15-		1021
VE2CRG/2	ARC de Granby	282-	ABC-	-	1002
W1VLK/1	(nonclub group)	150-	B-	6-	900
WB6VHU/6	Downey Sr. H.S. ARC	84-	AB-	6-	869
K8DVF/8	Climax ARC	77-	B-10-		862
W8QLS/8	Delaware County AR Assn.	104-	B-	-	824
W3WLH/4	U.S. Naval Ordnance Lab AR Soc.	103-	B-	4-	818
K7LZF/7	Heligate ARC	97-	B-	3-	782
K9AUD/9	(nonclub group)	78-	AB-	3-	716
W9HPG/9	Chicago Radio Traffic Assn.	190-	AB-	6-	737
WA5ITW/5	(nonclub group)	351-	B-	4-	702
K7UFT/7	Washington H.S. RC	46-	AB-13-		682
WA3EMO/3	Montrose H.S. ARC	39-	B-	5-	639
W2WCR/2	Amateur VHF Institute	57-	AB-	7-	620
K2VZA/2	Litcom Communications Club	76-	BC-	4-	515
W9ETQ/9	St. Mary of the Lake RC	81-	AB-	7-	492
WB2RPJ/2	Fed's Hamsters RC	46-	AB-	6-	390
W2YNU/2	Ridgewood H.S. RC	52-	AB-15-		342
WØTWU/Ø	McPherson ARC	147-	AB-	5-	297
WØHKI/Ø	Hot Springs ARC	60-	BC-	4-	77

Three Transmitters Operated Simultaneously

W5KHB/5	Old Natchez ARC	2102-	AB-15-		15,595
W3ATR/3	Beacon RA	1651-	A-14-		15,059
K2ZSS/2	Seven-Eleven ARC	1541-	A-25-		14,069
WA5CKF/5	Irving ARC	1890-	B-20-		11,740
W8CEA/8	Miami Valley AR Contest Soc.	1746-	AB-14-		11,158

Heath Hams took to the field as the Mud Lake Michigan Monster Hunting Unindentified Flying Object Sighting and Field Day Society (whew!). Oh yes, they signed **W8IAI/8** in the 3-transmitter class for close to 6-K. This old chicken coop was the elegant spot for 80/40 meter c.w. with WA8YAS operating and W8CGD logging.

W4MPV/9	Louisville's Active Radio Operators	1441-	AB	12-	10,680
W3ISE/3	Soc. for Prevention of Key Clicks, Splatter, and TVI	1434-	AB-	5-	10,202
W4TRC/4	Kingsport ARC	1567-	AB-25-		10,120
VE7ARV/7	Vancouver ARC	1568-	AB-10-		9718
KZ5PA/KZ5	Crossroads ARC	1505-	B-12-		9630
K6CLZ/6	Aerojet RAC	1087-	AB-26-		9599
VE2ARC/2	Montreal ARC	1379-	AB-25-		9542
K3MTK/3	Germantown RC	1088-	AB-	-	9244
K8EMY/8	Southeast ARC	1264-	AB-35-		8995
W5GZG/5	Dallas Ten Meter Net	1387-	B-	-	8722
W4NEK/4	U.S.N.A.S. ARC	1333-	B-16-		8598
KZ5AA/KZ5	U.S. Army Southern Command MARS	1352-	B-10-		8512
W6JBT/6	Citrus Belt ARC	901-	A-20-		8309
W9CQO/9	Ozaukee RC	1181-	AB-25-		8230
W9LM/9	Northwest ARC	1252-	B-18-		7912
W4FVV/4	Anderson RC	1188-	AB-15-		7836
W4MN/4	Palmetto ARC	1236-	B-12-		7616
W8ZPF/8	Bell Telephone Labs and Western Electric ARC	883-	AB-20-		7554
WA9ASU/Ø	Independent FD Club	1177-	B-	9-	7462
W4ABK/4	Kentuckiana RC	1123-	B-30-		7338
K2YAZ/2	Turk Hill RC	1129-	AB-10-		7156
W5FC/5	Dallas ARC	1152-	AB-24-		7145
K3YQS/3	Germantown RC, "C" group	738-	A-	9-	7042
K9WTS/9	WSIII VHF Club	1054-	AB-15-		6892
W9VT/9	Tritown ARC	1044-	AB-35-		6850
K4BAI/4	Columbus ARC	1027-	B-10-		6767
WB4FYP/4	Limestone ARC	1027-	B-12-		6762
W4AY/4	RA Transmitting Soc.	1056-	B-15-		6736



Here's **WA6QGT/6**, third highest mobile with 3605 points, representing the Radio Amateur Mobile Society Inc. The RAMS of Sacramento once again headed the aggregate mobile score listing as they did in 1956–1960–1961–1962 and 1966.

Tenting, tee-pee style, by "Ute" WA7AIA of the Utah Amateur Radio Club, signing **W7LRA/7**, 9th high score in the one-transmitter class.

W6UW/6	Santa Clara County AR Assn.	976-	AB-21-	6711
VE3BSQ/3	Quinte ARC.	1044-	B- 7-	6664
W2MJA/2	Wayne ARC.	842-	AB-45-	6652
W5MPK/4	Panama City ARC.	990-	AB-14-	6603
W8MF/8	Calhoun ARC.	1031-	B-32-	6586
W6HS/6	CrescentaValley RC.	781-	AB-12-	6568
W7CO/7	W. Wash. DX Club.	1071-	B-12-	6426
VE1HI/1	Keith Rogers Memorial RC.	963-	B-10-	6378
W8TO/8	Columbus AR Assn.	848-	AB-18-	6374
W3OK/3	Delaware Lehigh ARC.	964-	AB-20-	6329
K2BR/2	SCARA.	636-	A-12-	6124
W8VVL/8	Queen City Emergency Net.	860-	AB-23-	6111
K4HUF/4	Washington County RACES Network.	951-	B-10-	6106
K2GQ/2	Irvington RAC.	958-	B-30-	5948
K5VOZ/5	Lawton-Ft.Sill ARC.	886-	B-25-	5916
WA3BGE/3	Shenango Valley Teenage RC.	698-	AB- 9-	5907
W8IAI/8	Mud Lake Mich. Monster Hunting, UFO Sighting FD Soc.	905-	AB-14-	5893
K9CWD/9	Hoosier Lakes RC.	914-	B-17-	5884
WA6WRX/6	(nonclub group)	649-	A- 5-	5841
W7RGL/7	AR Communications Service	737-	AB- 3-	5811
K6QDD/6	The QNI-ERS	966-	B- 4-	5796
W0CBL/0	N. E. Mo. ARC.	962-	B-20-	5772
W9ADZ/9	Chain of Lakes ARC.	893-	B- -	5758
W1WHF/1	Hamden AR Assn	926-	B- -	5756
KZ5CZ/KZ5	Canal Zone AR Assn.	1137-	BC-23-	5755
K4TZ/4	Virginia AR Assn.	871-	B-25-	5626
VE7EZ/7	Victoria Short Wave Club.	866-	B-12-	5596
3C6NQ/VE6	Calgary AR Assn	832-	B-36-	5592
K7ESA/7	General Electric AR Soc.	910-	AB-19-	5580
W2DAW/2	Overlook RadioSoc.	850-	AB-23-	5453
W5LIY/5	Loyola U. ARC.	836-	B- 9-	5426
K9NIS/9	(nonclub group)	868-	B- 4-	5408
K8SCH/8	Oh-Ky-In VHF AR Soc.	727-	AB- 8-	5407
W7NBR/7	Spokane RC.	822-	B-12-	5332
VE3DRT/3	Skywide ARC.	851-	B-15-	5306
WA5KQN/5	(nonclub group)	815-	B- 7-	5290
W9MIJL/9	Vermilion County AR Assn.	847-	B-35-	5282
VE1FO/1	Halifax ARC.	797-	B-18-	5192
W8DSO/8	(nonclub group)	813-	B-18-	5078
W9DO/9	Joliet AR Soc.	838-	B-15-	5028
W0VZG/0	Pilot Knob ARC.	768-	AB-18-	5017
K3UKO/3	Harrisburg RAC	734-	B-25-	5004
VE3CCR/3	ARC of Cooksville.	748-	B-12-	4888
W9AB/9	Michiana ARC.	668-	AB-57-	4875
W8QK/8	AR Soc. of Calhoun County.	772-	B-25-	4832
VE3UOT/3	Hart House ARC.	805-	B-11-	4830
W8ZPF/8	Autonetics RC.	735-	AB- 7-	4778
K9EAM/9	Green Bay Mike & Key Club.	758-	B- -	4748
W0SOE/0	Wichita ARC.	757-	B-41-	4742
K6HAI/6	North Shores ARC.	729-	B-10-	4738
WA3DFM/3	Two Rivers ARC	721-	B-20-	4731
WA0PHZ/0	The Hamsters VHF/UHF Club.	717-	AB-20-	4729
W8SJ/8	E. Whittier RC.	804-	ABC-18-	4688
W2BX/2	Cumberland RC	712-	B- 9-	4672
W8QBC/8	Oak Park ARC.	711-	B-17-	4666
W5GKF/5	(nonclub group)	950-	BC- 7-	4632
W7PXL/7	Valley RC.	702-	B-12-	4612
W9EAL/9	Lake County Ill. RACES	692-	B- 4-	4552
WB2VUK/2	Hendrick Hudson Hams.	597-	AB-15-	4524
K4HYB/4	Chas. E. Newton ARC.	1330-	BC-20-	4504
W3VPR/3	Anne Arundel RC.	738-	B- 9-	4428
K4TAH/4	Atlanta Soc. of Teenage Radio Operators.	1133-	BC- -	4416
WB66ZC/6	Monterey Park ARC.	594-	AB-34-	4405
W4IXA/4	Knox RC.	600-	AB-15-	4379
W0BRN/0	Three Rivers ARC.	663-	B-12-	4378
K8NOW/8	Metropolitan Ragchewers Club.	141-	AB-20-	4366
WA1BIQ/1	Newton South H.S. ARC	646-	AB- 6-	4342
W9INL/9	Bloomington ARC.	597-	AB-20-	4302
K0TKF/0	Hiawatha ARC.	584-	AB- 9-	4260
WB6NDU/6	Marina ARC.	612-	AB-10-	4226
W0EBE/0	Southwest Mo. ARC.	637-	B-20-	4222
W2NXB/2	North Fork RC.	464-	A- 5-	4221
W1EDH/1	Middlesex AR Soc.	603-	AB-15-	4207
VE3HB/3	Oakville ARC.	467-	A-14-	4203
K8FCR/8	Kincheloe A.F.B. RC.	631-	B-14-	4186
VE1CR/1	Sydney ARC.	629-	B- 7-	4174
W7EK/7	Cascade RC.	662-	B- 7-	4172
K1FRG/1	Willimantic RC.	597-	AB- -	4137
K2PCQ/2	N. Chautauqua RC.	583-	AB-20-	4066
W8DC/8	Grand Rapids AR Assn.	677-	B- -	4062
W6BML/6	Siskiyou County ARC.	603-	B- 9-	4018
WA9UHY/9	Wabash County ARC	669-	B-15-	4014
W7AW/7	W. Seattle ARC.	122-	A- 9-	3998
W6JW/6	Santa Clarita ARC.	539-	AB-13-	3946
WA6KUH/0	P.H.D.A.R.A.	585-	B-18-	3910
W7DP/7	Walla Walla Valley RAC	583-	B-12-	3898
W0OSC/0	H PAK.	581-	B-10-	3886
W8GFG/3	Shenango Valley AR FD Group.	649-	ABC-10-	3875
K7PKS/7	Boise Navy MARS Group.	612-	B- 4-	3872
VE3NSR/3	North Shore Radio.	627-	AB-14-	3870
W9REG/9	Tippecanoe AR Assn.	610-	B- 9-	3860
W0LAC/0	Blackhawk ARC.	574-	B-18-	3844
W4WSB/4	Ancient City ARC	553-	B- 4-	3718
W2WUX/2	Utica ARC.	549-	B- 6-	3694
VE3HVC/3	Humber Valley ARC.	391-	AB-21-	3662
VE5AA/5	Saskatoon ARC.	737-	BC-30-	3653
W9AZ/9	Kankakee AR Soc.	557-	AB-10-	3650
VE3LON/3	London ARC.	539-	B-12-	3634
K5SLD/5	Arlington RC.	733-	BC-24-	3624
WA0FYA/0	Zero-Beaters ARC.	603-	B-10-	3618
3C3AJ/3	Lakehead ARC.	536-	B- 8-	3616
KØWWD/Ø	U.S.A.F. Academy MARS Club Radio Station.	478-	AB-10-	3607
WAØRAX/Ø	Albert Lea ARC.	530-	B- 8-	3580
K4FEC/4	Brookley MARS RC.	561-	B-22-	3566
WØLUL/Ø	Flint Hills ARC.	521-	B- 7-	3526
W8UDB/8	Fayette County ARC.	511-	B- 6-	3466
K6KII/KG6	Coral Isle ARC.	511-	B-14-	3466
W8VA/8	Tri-State AR Assn.	518-	AB-25-	3450
W2GLO/2	Levittown ARC.	391-	AB-12-	3427
WØAZR/Ø	Austin Area ARC.	599-	ABC-27-	3409
WA8KEN/8	FD Mountain Toppers.	477-	AB- 9-	3271
VE6GZ/6	(nonclub group)	477-	B-10-	3262
W5CZ/5	Central La. ARC.	473-	B-12-	3238
WA7EUT/7	Coconino County ARC.	674-	BC-13-	3237
W6AEX/6	Soc. of AR Operators.	469-	B-20-	3214
K9ZKN/9	Midwest ARC	391-	AB- 7-	3205
W8ODJ/8	Buckeye Shortwave Radio Assn.	847-	AC-14-	3169
W1AQ/1	Associated RA of Southern New England.	499-	BC-15-	3153
VE1PF/1	St. Croix Valley ARC.	422-	AB-10-	3144
K2ODP/2	Woodbridge RC.	455-	B-10-	3130
W4CUE/4	Birmingham ARC.	486-	B-13-	3116
W5AW/5	Big Spring ARC.	785-	AC-12-	3109
K1NQG/1	Fidelity ARC.	417-	B-15-	3102
WØUJK/Ø	Oregon Trail ARC.	588-	ABC- 8-	3095
WA3CCP/3	Aztec RC of Upper Darby.	377-	AB-15-	2947
K2HJY/2	Medford Wireless Assn.	366-	ABC- 8-	2908
K9VHF/9	Hamilton-Southeastern H.S. ARC.	389-	AB- 9-	2884
WA1DGW/1	Somerset ARC.	333-	AB- 8-	2852
W4LLO/4	Key West ARC.	347-	B- 9-	2829
WA4PWF/4	(nonclub group)	480-	A- 4-	2808
W3BAB/3	Friendship ARC.	478-	BC- -	2805
K6BJ/6	Santa Cruz ARC.	443	AB- 6-	2781
K9HDH/9	Elkhart Red Cross ARC.	423-	AB-10-	2756
WØVMN/Ø	Pingville AR Assn.	726-	BC-12-	2756
K5DRF/5	Bayou City VHF RC.	425-	B-15-	2750
W5QAY/5	Central Okla. VHF ARC.	414-	ABC-12-	2716
W7VJD/7	Lewiston-Clarkston ARC	385-	B-15-	2710
VO2AI/VO2	ARC of W. Labrador.	383-	B- 8-	2698
VE3TOT/3	Ontario Trilliums.	366-	AB- 7-	2674
WA9TYB/9	Champaign H.S. ARC.	411-	B-10-	2666
W8INT/8	Six Meter ARC.	267-	A-14-	2603
WA6HMP/6	Madera County ARC.	322-	AB- 8-	2566
WA8QIP/8	Greater Pontiac VHF Soc.	360-	B- -	2560
WØCS/Ø	Clinton ARC.	347-	B- 9-	2482
K9FHQ/9	Clinton County VHF RAC.	309-	AB-15-	2469
W5PJG/5	Caravan Club of La.	312-	AB-12-	2452
W6AY/6	Elmac Gang	406-	B- 6-	2436
W4LEN/4	Triangle ARC	302-	B-10-	2412
K4WWY/4	(nonclub group)	367-	B- -	2402
WB6SVM/6	Thousand Oaks ARC.	325-	AB-10-	2395
WA8IDU/8	Young Whippersnappers.	319-	B- 6-	2314
W4DOC/4	Atlanta RC.	516-	BC-15-	2296
VE3SRS/3	Sudbury District RC.	345-	AB- -	2280
WB6GUG/6	Silverado AR Soc.	350-	ABC- 5-	2244
WB2WME/2	(nonclub group)	249-	A- 5-	2241
WA9PBZ/9	Pike H. S. RC.	368-	B- 5-	2208
WA6DZL/6	Mic & Key Club.	287-	AB- 5-	2204
W2CWW/2	Staten Island AR Assn.	242-	A- -	2178
K4YTZ/4	Rock Hill ARC.	296-	B-10-	2176
WØCUO/Ø	Grand Island AR Soc.	283-	AB-11-	2167
W7TCK/7	Capital City RC.	352-	B- 7-	2112
WA7EQD/7	Emerald AR Soc.	308-	B- 8-	2063
K6LGR/6	Edgewood AR Soc.	283-	AB- 5-	2040
K8VXH/8	Genoa RC.	263-	AB-12-	2030
K1RKF/1	Nipmuc Emergency Radio Corps.	193-	AB- 9-	1963
KP4BFF/KP4	Sabana Seca RC.	610-	BC- 9-	1956

K2RQU/2	(nonclub group)	258-	B-	5-	1948
W6OTX/6	Palo Alto AR Assn	288-	B-	-	1943
K7ODJ/7	New Sevens	256-	B-	4-	1936
VE7FY/7	Royal City AR Assn	292-	AB-	5-	1884
W9MRZ/9	Ninth Area RC	305-	AB-	9-	1869
VE7ANK/7	Cowichan Valley RC	282-	AB-	8-	1848
K9JOQ/9	Crete ARC	300-	BC-	4-	1760
K9LVK/9	Miami County RC	126-	A-	15-	1734
K8PBO/8	Mayham RC	280-	B-	8-	1680
W9PMW/9	Boothill ARC	206-	B-	10-	1636
WA9JKJ/9	Macon County ARC	816-	B-	4-	1632
WB2RLO/2	Fairlawn ARC	289-	ABC-	15-	1602
WA8TXV/8	ARC of Margaret H.S.	165-	B-	5-	1590
VE5NN/5	Regina AR Assn	459-	C-	12-	1577
W2JTZ/2	Chaminade H.S. RC	239-	B-	4-	1574
WA8TMS/8	Tri-County AR Assn	228-	B-	15-	1568
K5QHD/5	Garland ARC	193-	B-	10-	1558
W9BXR/9	Montgomery County AREC	216-	ABC-	5-	1549
WA2WVF/2	H. C. Technical H. S. Techams	282-	BC-	4-	1513
K2SAC/2	North Country RC	333-	AB-	-	1506
WB6WME/6	Lincoln ARC	279-	BC-	5-	1504
WA9IAK/9	Nabage RC	245-	B-	-	1470
VE7NA/7	Nanaimo AR Assn	289-	ABC-	7-	1456
WA2FDJ/2	Ogdensburg ARC	236-	BC-	10-	1393
W9ASM/9	O'Brien County AR Assn	162-	B-	8-	1372
W0BLK/0	Black Hills ARC	361-	BC-	17-	1326
WA8JBG/8	Clinton Co. AR Assn	180-	BC-	11-	1306
K9UXZ/9	National Trail ARC	140-	AB-	7-	1282
K2KHB/2	Brighton H.S. ARC	166-	B-	8-	1196
WA4UGP/4	Patrick Henry ARC	128-	AB-	6-	1189
K1TSL/1	(nonclub group)	200-	BC-	3-	1153
W6LSW/6	El Dorado County ARC	166-	AB-	6-	1128
W5WEI/5	Payne Co. I Tappa Key.	89-	AB-	-	1060
W2EE/2	Genesee RAC	528-	B-	18-	1056
W4AP/4	Montgomery ARC	188-	BC-	5-	1004
K5PXP/5	Ark. River Valley ARC	87-	AB-	3-	994
W5ERC/5	Kingsville RC	196-	C-	4-	988
W8MOP/8	East River RC	669-	BC-	12-	858
K9TNU/9	Eau Claire ARC	278-	C-	12-	834
WA9EDU/9	(nonclub group)	344-	B-	4-	828
W2BMW/2	Tu Boro RC	165-	AB-	8-	760
W8DYY/8	Mound AR Assn	259-	AB-	8-	754
W3EZC/3	VIZ ARC	124-	AC-	4-	738
W4PTG/4	Titusville AR Soc	34-	A-	5-	706
WA9BFF/9	(nonclub group)	102-	AB-	6-	678
W8QE/8	(nonclub group)	104-	AB-	3-	660
WB6SBL/6	Explorer Post 1 BSA	26-	A-	7-	634
WA9RPQ/9	Cooney RC	115-	B-	3-	630
WA8SMJ/8	Lapeer County AR Assn.	107-	ABC-	11-	582
WA9IHI/9	6 & 2 Ham Club	194-	C-	14-	582
W3FQR/3	Dit-Happy Dot-Hounds.	272-	AB-	10-	581
W8PEN/8	Mt. Vernon ARC	176-	AB-	11-	537
W6PIY/6	West Valley RC	221-	AB-	10-	466
K1OUM/1	Somerville RACES/ AREC	78-	AB-	5-	364
WA0DEL/0	Hector Area RC	268-	C-	5-	268
W5BMT/5	N. Little Rock ARC	170-	BC-	7-	235

Four Transmitters Operated Simultaneously

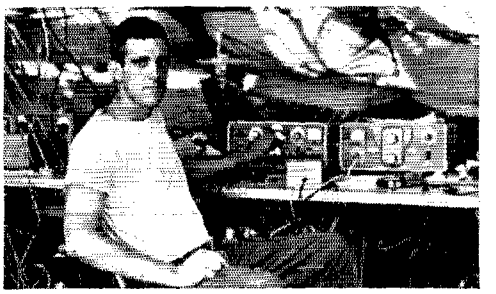
W8FY/8	Van Wert ARC	1507-	A-30-13,973	
W6AK/6	Sacramento ARC	700-	AB-18-11,566	
WA2LQO/2	Grumman ARC	1238-	A-30-11,542	
W4SKH/4	Oak Ridge Radio Operators Club	1370-	AB-25-11,037	
W7IO/7	Arizona ARC	1711-	BC-33-10,228	
K8SSC/3	Delmont RC	1549-	AB-15-10,056	
K5TYP/5	Kresler ARC	1477-	B-30-	9262
W5NGL/5	Kilocycle Club of Ft. Worth	1259-	AB-16-	8608
W4BBB/4	RAC of Knoxville	1305-	AB-28-	8300
W6NWG/6	Palomar RC	1290-	B-20-	8140
W0EQU/0	Ak Sar Ben RC	1241-	B-20-	8046
WB2RMW/2	New Providence ARC	1126-	AB-27-	7750
V63OW/3	Windsor ARC	1135-	AB-22-	7726
W8MAA/8	Central Mich. ARC	1568-	ABC-	7289
W1IPJ/1	1200 RC	1068-	AB-17-	7171
W4BFM/4	Decatur ARC	1081-	B-19-	7121
K0LDP/0	Lincoln ARC	1034-	AB-12-	6831
K1ILW/4	Bristol ARC	1014-	B-12-	6684
K9TSM/9	Goshen ARC	1017-	AB-15-	6637
K2YNT/2	Metuchen YMCA RC	999-	B-15-	6394
W0ILL/0	Story County ARC	989-	B-21-	6334
K6QHQ/6	South Bay AR Soc	1255-	ABC-15-	6168
VO1CU/1	Soc. of Newfoundland RA	889-	B-12-	5944

CLUB AGGREGATE MOBILE SCORES

Radio Amateur Mobile Society (Calif.)	32,497
Long Island Mobile Amateur Radio Club	8,892
Starved Rock Radio Club (Ill.)	2,668
Argonne Radio Club (Ill.)	2,290
Albert Lea Amateur Radio Club (Minn.)	1,235
Hayward Radio Club (Calif.)	1,125
Indiana University Amateur Radio Club (Pa.)	1,084
North Shores Amateur Radio Club (Calif.)	945
Hamfesters Radio Club (Ill.)	522
Central Arkansas Radio Emergency Net	380
Flat Hills Amateur Radio Club (Kans.)	324

KH6WO/KH6	Honolulu ARC	931-	B-	37-	5786
K9JSI/9	La Porte ARC	895-	B-	15-	5770
W0ERG/0	Sioux City ARC	917-	B-	19-	5702
WA2OIL/2	Apple Pie Hill ARC	826-	AB-	12-	5656
W9FBZ/9	NAFI ARC	865-	B-	15-	5590
K4KJQ/4	Bluegrass ARC	1112-	BC-	-	5576
WA2NGI/2	Gloucester County ARC.	721-	AB-	20-	5557
K4DD/4	Platinum Coast RC	821-	B-	7-	5326
WB2EJZ/2	Lawrence H.S. ARC	670-	AB-	16-	5296
VE3RCB/3	Hamilton & District AREC	543-	A-	14-	5287
W8ZHO/8	Muskegon Are AR Council	862-	AB-	-	5250
W6AB/6	Satellite ARC	762-	AB-	12-	5059
W7NCW/7	Lower Columbia AR Assn	929-	BC-	12-	5059
W6OT/6	Oakland RC	803-	AB-	10-	5043
K5YAA/5	Duncanville ARC	731-	AB-	-	4839
WA0JBX/0	WECOMO ARC	764-	B-	15-	4784
K5AXA/5	San Angelo ARC	728-	BC-	6-	4768
K7NWS/7	Boeing Employees AR Soc.	1014-	BC-	29-	4689
VE3CRW/3	Clinton ARC	777-	B-	-	4662
K1BKE/1	Contoocook Valley RC	517-	A-	5-	4653
W3EQ/3	Haverford Twp. Emergency Radio Net	674-	AB-	23-	4431
W1SYE/1	Newport County RC	584-	AB-	32-	4266
WB6GYK/6	Estero ARC	673-	AB-	14-	4255
K3EIY/6	(nonclub group)	571-	AB-	5-	4254
WA9GWL/9	Fall Creek ARC	600-	B-	10-	4200
K9HGX/9	Genois ARC	623-	B-	18-	4138
K7CTL/7	Hellgate ARC, Young Squirts	619-	B-	6-	4114
W2OIC/2	Hicksville RC	619-	AB-	16-	4080
W8VPV/8	Cuyahoga Falls RC	578-	AB-	25-	4057
W2HFP/2	Union County AR Assn.	607-	AB-	14-	4034
W6BWK/6	Delta ARC	507-	AB-	4-	4011
K8PWA/8	Wayne State U. Tartars.	632-	AB-	8-	3873
K1EIN/1	Marlboro AR Assn	540-	AB-	6-	3871
W2DMM/2	QRP International ARC-N.Y.C. Chap. 1	399-	A-	15-	3791
WA9JYL/9	Greenwood ARC	525-	AB-	13-	3724
K2VCL/2	Edison RC	585-	AB-	10-	3693
W2HCS/2	Albany AR Assn	432-	AB-	30-	3669
W7PE/7	Eagle Rock RC	537-	B-	8-	3632
W3DOB/3	Warminster ARC	497-	AB-	12-	3625
W8KGG/8	Huron Valley AR Assn.	567-	AB-	6-	3564
WA9BRE/9	Argonne ARC	526-	AB-	-	3437
W2GTF/2	AR Soc. of St. Peter's College	697-	ABC-	5-	3416
K6FB/6	Hewlett Packard RC	351-	B-	8-	3306
KL7FFR/KL7	Sitka ARC	467-	AB	25-	3238
WA6TOW/6	Coastside ARC	588-	ABC-	6-	3181
W5DSC/5	Victoria ARC	431-	AB-	10-	3001
W4WVJ/4	Loudon County ARC	430-	B-	10-	2980
W9DUK/9	Delaware AR Assn	322-	AB-	30-	2972
W1SGZ/1	AREC of Norwalk	428-	B-	10	2968
W2QYV/2	Niagara RC	450-	ABC-	18-	2932
W8ADR/8	Mich. Six Meter Club	471-	AB-	8-	2901
W8OHR/8	Detroit Metropolitan RC	425-	AB-	6-	2841

Idyllic field sites were enjoyed by (left to right): the Scarborough ARC **VE3WE/3,** in an imposing eleven-transmitter 12.7-K achievement; the Crescent Bay Emergency Radio Net, **K6LDA/6,** running one transmitter atop the Santa Monica mountains; the Wheaton Community Radio Amateurs of Wheaton Illinois, **W9CCU/9** manning ten rigs for just under 16-K points.



FD temperature extremes at (left) **K6KII/KG6** near Ritidian Point on Guam (3-transmitter category) and (right) a cool approach to FD by the crew of **VE8YC/8** at the joint U.S./Canadian weather station in Alert. The Lincoln Sea is in the background and those are icebergs behind the end of the beam and to the left behind the tent. Now what were your weather complaints this FD?

W8UMD/8	Treaty City AR Assn...	473-	B-18-	2838
W8NJH/8	Stu Rockafellow AR Soc.	316-	B-10-	2796
K9YUR/9	Woodford County RACES	390-	B- 6-	2740
WA6STJ/6	(nonclub group)	444-	B- 8-	2684
K6DEX/6	San Carlos CD Club	340-	AB- 8-	2656
K2ERQ/2	IBM ARC	421-	B-16-	2526
K4AVO/6	Castle AFB MARS Club	402-	AB-12-	2448
K9KLT/9	(nonclub group)	326-	B- 5-	2356
W2HLS/2	Matawan Boro CD	280-	AB-15-	2353
W5VAA/5	Texarkana AR Team	540-	BC-12-	2347
W3ZIC/3	Ft. Venango Mike & Key Club	207-	A- 8-	2263
WB2QBP/2	American Red Cross Emergency RC	391-	ABC-12-	2207
WB2NVC/2	Franklin H.S. ARC	299-	AB-15-	2087
K9HDX/9	(nonclub group)	187-	A- 4-	2083
KØHFX/Ø	(nonclub group)	235-	AB- -	2073
W3BEH/3	Bowie ARC	382-	ABC- 5-	2060
WA1DDP/1	Whitman ARC	228-	AB-11-	1996
W1BD/1	Central Vermont ARC	327-	B- -	1962
WA8UGL/8	Shawnee Hills ARC	257-	B-10-	1942
W3PGA/3	Aero ARC	273-	AB-10-	1919
WA7FSB/7	Bountiful ARC	283-	B- 8-	1898
W5DI/5	Central Ark. Radio Emergency Net	301-	BC- 7-	1873
WB6VTG/6	Oroville AR SOC	459-	BC-10-	1835
K9ONA/9	Six Meter Club of Chicago	181-	A-25-	1829
W1ACT/1	Fall River ARC	303-	ABC- 8-	1737
W1MY/1	Northern Conn. ARC	281-	B- 6-	1686
WB4EOD/4	Alleghany Mountain ARC	275-	B- 6-	1650
W5SRW/5	Mesilla Valley RC	469-	C- 9-	1607
WØAZL/Ø	Central Mo. ARC	356-	BC-10-	1591
WA8MTX/8	Monroe County Radio Communications Assn.	252-	AB- 8-	1566
K2REY/2	Jersey City RC	192-	AB- -	1542
W1RPF/1	Avon AREC	201-	AB- 5-	1484
W1NEM/1	Hartford County AR Assn	203-	AC-10-	1301
W8VTD/8	Warren AR Assn	128-	AB- -	1192
K3QBH/3	E. Pa. Wireless Transmitters Soc	278-	AB- 6-	1181
WB2TDD/2	Arthur L. Johnson Regional H.S. ARC	154-	AB- -	1143
W1LN/1	Danvers Assn	75-	B-10-	850
W4RKC/4	Shenandoah Valley ARC	80-	AB- -	842
WØWYV/Ø	Bellevue ARC	231-	B-12-	662

Five Transmitters Operated Simultaneously

K2MQW/2	Five Towns RC	1907-	AB-40-14,493
K9AVE/9	Illinois Valley RC	2181-	B-15-13,686
W2OYH/2	Morris RC	1439-	A-20-13,351
W8NK/8	Ohio Valley AR Assn	1926-	AB-14-12,970
W6TJ/6	Riverside County AR Assn	2036-	B-18-12,646
W8HLD/8	Catalpa AR Soc	1887-	B- -11,722
W2WW/2	Suburban ARC	1164-	A-35-10,876
W6ZE/6	Orange County ARC	1641-	AB-30-10,660
K2UHD/2	Rockaway ARC	1127-	A-14-10,553
K1MUJ/1	E. Conn. AR Assn	1449-	AB-25- 9700
W4CA/4	Roanoke Valley ARC	1503-	AB-20 9643
K4CG/4	U.S.C.G. ARC	1525-	B-15- 9550
W3BTN/3	N. Penn. ARC	1435-	AB-35- 9163
W3TYU/3	William Penn RC	1331-	AB-10- 8259
W3SK/3	Penn Wireless Assn	1163-	AB-18- 8116
K3HKK/3	Kittany ARC	1262-	B-15- 7972
WB2ERM/2	Bergen AR Assn	991-	AB-15- 7916
W1MV/1	Massasoit AR Assn	1126-	AB-12- 7645
K2USA/2	MARS ARC	1118-	AB-15- 7600
W3CSL/3	Monessen ARC	1149-	B-26- 7514
W6JTP/6	Pamalpais ARC	1137-	AB-35- 7351
W1QV/1	Tri-City ARC	1092-	AB-12- 7232
W6NJJ/6	Newport AR Soc	942-	ABC-15- 6655
W2FWG/2	TARCOM	943-	B-24- 6258
WA3GCO/3	R. F. Hill ARC	1412-	BC-30- 6039
W5MS/5	Corpus Christi ARC	1026-	ABC- - 5992
W6MLK/6	H. F. Amateur Mobile Soc	682-	AB-22- 5924
WB4ABT/4	So. Peninsula AR Klub	1345-	ABC-40- 5826
VE3RC/3	Ottawa ARC	871-	B-33- 5626
WA6ODP/6	Livermore ARC	709-	AB-11- 5435
W8ID/8	Seneca RC	793-	AB-15- 5433
W5PFC/5	Jackson ARC	870-	B-18- 5420
W7VE/7	AR Assn of Bremerton, Wash	677-	AB-12- 5362
W5SWS/5	Chetimachi ARC	770-	B-15- 5230
WØMG/Ø	N.E. Iowa AR Assn	792-	AB-12- 5170
W3EXW/3	Etna RC	794-	B-15- 5164
K6AGF/6	Tri-County ARC	726-	AB-30- 5110
W3JDG/3	Havre de Grace RC	765-	AB-10- 5059
W8BAP/8	Scioto Valley ARC	718-	AB-25- 4903
VE3KCD/3	Kitchener-Waterloo ARC	817-	B- - 4902
VE3DC/3	Hamilton ARC	705-	AB- - 4852
W7BB/7	Lake Washington ARC	957-	ABC-15 4603
K6IS/6	North Hills RC	664-	AB-15- 4463
W8FO/8	Toledo ARC	756-	ABC- - 4281
W2CVT/2	Poughkeepsie ARC	875-	ABC-20- 4280
W8PO/8	Intercity RC	626-	B-25- 4156
W2GLQ/2	Nutley AR Soc	689-	ABC-15- 4152
W1RGH/1	Capeway RC	570-	AB- 8- 4134
K8LUC/8	Evendale AR Soc	621-	ABC-22- 3898
W9QQQ/9	R-S-T ARC	583-	B- 5- 3898
W4BHR/4	Mike & Key Club	581-	B-10- 3886
K9CUT/9	La Crosse RAC	574-	B-15- 3844
W9GYN/9	Elk Grove ARC	536-	AB-12- 3844
W8NCM/8	Springfield ARC	539-	AB-26- 3778
W2DMC/2	Crystal RC	469-	AB-18- 3532
WB6HUM/6	Lodi ARC	460-	AB- 9- 3406
WA8HUR/8	Huron County ARC	450-	AB- - 3322
KØLIR/Ø	St. Louis ARC	483-	AB- 9- 3311
W9AA/9	Hamfesters RC	523-	ABC-12- 3210
WA9SKH/9	Forest View H.S. RC	438-	AB- - 2897
VE3QCD/3	Kingston ARC	425-	AB- 5- 2780
W3AD/3	Lancaster Radio Transmitting Soc	430-	ABC-15- 2769
WB4FBP/4	Gulfstream Soc of AR Operators	428-	B- 6- 2768
W1TKZ/1	Wellesley AR Soc	306-	AB-15- 2622
K9IYP/9	PICO RAMS	419-	ABC-10- 2549
K2EB/2	Kessler Institute RC	281-	ABC- 9- 2155
VE7BR/7	Point Grey ARC	331-	ABC-10- 2135
WA6BGS/6	ARC of El Cajon	325-	AB- 7- 1968
W7UNX/7	Whidbey Island ARC	343-	BC-10- 1917
W8EBG/8	Champaign County ARC	465-	C- - 1795
VE3BNK/3	Roblin ARC	262-	ABC- 8- 1640
K9BJJ/9	Dewitt County ARC	149-	AB- 9- 1360
WA8WBY/8	Hazel Park ARC	270-	B- 7- 540

Six Transmitters Operated Simultaneously

K2AA/2	S. Jersey Radio Assn	2341-	AB-35-17,939
W8ICS/8	Indian Hills RC	1965-	B-52-12,390
K2AE/2	Schenectady AR Assn	1896-	AB-53-11,823
W2YKQ/2	Lake Success RC	1445-	AB-17-11,442
K6SYU/6	Anaheim AR Assn	1509-	AB-38-10,030
W6PW/6	San Francisco RC	1219-	AB-19- 8752
W5SC/5	San Antonio RC	1427-	ABC-31- 8751
W8ACW/8	Genesee County RC	1301-	AB-50- 8224
W1KWX/1	Valley ARC	1302-	B-30- 8212
W6WWJ/6	South County AR SOC	1103-	AB-22- 8026
W4MOE/4	Buncombe County ARC	1075-	B-20- 6850
W4PAY/4	No. Va. RC	1055-	AB-15- 6835
W2CGJ/2	Ridgewood RC	1099-	ABC-12- 6658
W3CCH/3	Reading RC	1060-	AB-25 6605
W3VAP/3	Abington ARC	858-	AB-15- 6262
W8HH/8	Marietta ARC	1041-	BC-15- 6157
W2PQZ/2	Taconic ARC	1210-	ABC-25- 6073
K3ZSK/3	Teenage ARC of the Lehigh Valley	627-	A- - 6043
K3GTN/3	Andrews AFB MARS RC	880-	B-23- 5890
W3PIQ/3	South Hills Brass Pounders Modulators	929-	AB-35- 5691
K9WLD/9	Twin City ARC	888-	AB-20- 5609
W2DQ/2	Suffolk County RC	781-	B-28- 5086
W3CWC/3	Antietam Radio Assn	1120-	ABC-14- 4938
W3GV/3	Radio Assn. of Erie	812-	B- - 4872
W8TQE/8	Adrian ARC	728-	AB-37- 4820
W2HGR/8	High Point AR Assn	713-	AB-11- 4795
W2OW/2	Binghamton AR Assn	591-	BB-12- 4146
WA6GYI/6	Cal Poly AR Assn	516-	AB-25- 3848
W3SGJ/3	Beaver Valley AR Assn	611-	AB-10- 3747
WA4WCP/4	Suffolk ARC	472-	AB-10- 3573
WA2VLP/2	AR Assn of the Tonawandas	541-	B-20- 3446
WA6RTM/6	(nonclub group)	574-	B- 6- 3444

W3EIA/3	Lebanon Valley Soc of RA	449-	AB-16-	3184
W9VJX/9	Randolph AR Assn	607-	ABC-20-	3142
K4DXO/4	Vienna Wireless Soc	308-	AB-18-	2422
WB6TCD/6	Simi Valley RC	341-	AB-13-	2405

Seven Transmitters Operated Simultaneously

K4BFT/4	Huntsville ARC	1813-	B-20-11,478	
K3BKG/3	So. Chester County ARC	1675-	B-25-10,650	
W4HFH/4	Alexandria RC	1456-	AB-20-10,553	
VE3JJ/3	West Side RC	1522-	AB-18-10,367	
K6QEZ/6	Sequoia ARC	1559-	B-27-	9764
WA6GFY/6	Lockheed Employees Recreation Assn. ARC	1466-	AB-18-	9688
W6PMO/6	Assoc. RA of Long Beach	1436-	AB-25-	9399
W5DPA/5	Houston ARC	1271-	AB-	8470
W1AQE/1	Chelmsford AR Assn.	1236-	AB-16-	7724
W1FW/1	Merrimack Valley ARC	1523-	ABC-20-	7508
K9GXU/9	St. Clair ARC	1109-	AB-42-	7334
W9PCS/9	York RC	1022-	AB-19-	7314
W8JUU/8	Van Buren County ARC	1107-	AB-15-	7185
W9DUA/9	Sangamon Valley RC	1777-	ABC-25-	6970
W9SWQ/9	Four Lakes ARC	1065-	AB-29-	6537
W6DCC/6	Corona Gang	714-	AB-11-	6145
W4RUL/4	Greeneville ARC	909-	B-14-	6054
WA9IZK/9	Beloit ARC	906-	ABC-18-	5755
W2RAK/2	Flatbush RC	642-	AB-20-	4511
W0KOU/0	Central Kans. RC	621-	AB-25-	4354
K6EAG/6	Hayward RC	555-	AB-40-	3895

Eight Transmitters Operated Simultaneously

W6ULI/6	Fullerton RC	2021-	AB-31-14,140	
VE3NAR/3	Nortown ARC	1703-	AB-19-11,729	
WA9IKN/9	Elgin AR Soc	1751-	B-18-10,706	
W9SW/9	Chicago Suburban Radio Assn.	1588-	AB-35-	9984
K4DPZ/4	Gainesville AR Soc	1477-	AB-19-	9687
W9FLP/9	West Allis RAC	1152-	B-20-	6912
W6BXN/6	Turlock ARC	1238-	ABC-20-	6340
K8BYL/8	S.E. Mich. AR Assn.	623-	AB-10-	5401
VE3MRC/3	Metro ARC	974-	ABC-24-	5292

Nine Transmitters Operated Simultaneously

VE3VM/3	Niagara Peninsula ARC	2105-	AB-20-13,719	
W6LFJ/6	Sonoma County RA	1501-	AB-21-10,134	
W6CX/6	Mount Diablo ARC	1413-	AB-25-	9611
W5ANR/5	Ft. Smith Area ARC	1347-	B-12-	8682
W5KA/5	Austin ARC	1351-	AB-34-	8369
W8HHF/8	Toledo Mobile Radio Assn.	1042-	AB-30-	6670
W6CUS/6	East Bay RC	733-	AB- 9-	4507

Ten Transmitters Operated Simultaneously

W2JI/2	Tri-County Radio Assn.	2896-	A-45-26,669	
K6BAG/6	Pacifico RC	4313-	ABC-20-23,460	
W9QCH/9	Wheaton Community RA	2576	AB-31-15,985	
W1NY/1	Hampden County Radio Assn.	984-	AB-23-	8410

Eleven Transmitters Operated Simultaneously

W7DK/7	RC of Tacoma	3532-	AB-63-24,347	
VE3WE/3	Scarborough ARC	1672-	AB-40-12,757	
W3RCN/3	Rock Creek AR Assn.	2028-	ABC-52-12,704	

Fourteen Transmitters Operated Simultaneously

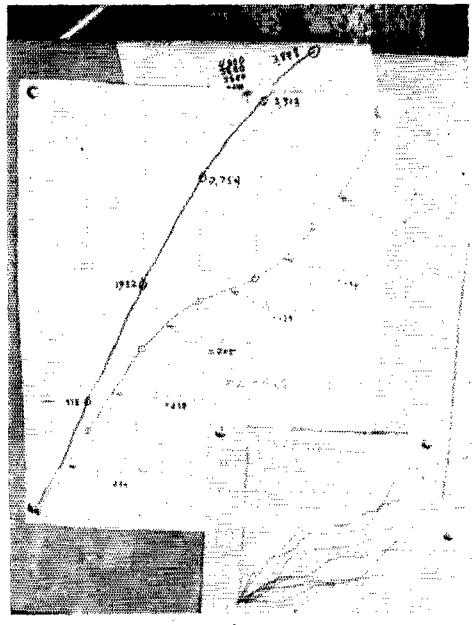
W2MM/2	Englewood AR Assn.	2393-	A-50-21,947	

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.

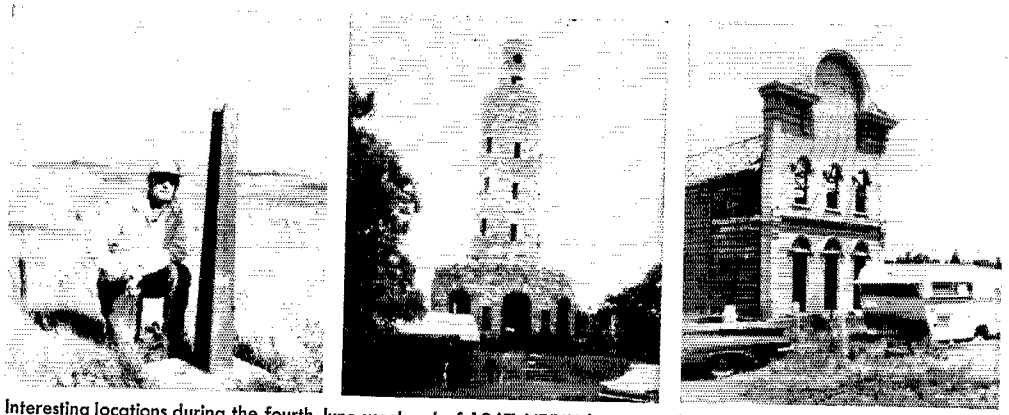
One transmitter

W2FBA/2	529-	A-7742	
W2JBQ			
VE2AWZ/3	738-	A-6842	
VE2BDD			
W0QGM/0	734-	A-6606	
WA0DCQ			
WA9AUM/9	686-	B-4516	
K9UKM			
WB6MQK/5	330-	A-4455	
KH6FKI, KH6	695-	B-4170	
WA0AGM/0	638-	B-3828	
WA0MYN			
W9YH/9	264-	A-3764	
K8HGT			
K9LIO/9	610-	B-3660	
W9JOE			
K9FFA/9	593-	B-3558	
K9DMV			
W6ANB/6	444-	AB-3494	
WB6TBL			
K9MMB	524-	AB-3486	
WA7CIP/7	558-	B-3348	
WA0APC/0	491-	B-2946	
WA0ASQ			
K9XHB/9	119-	B-2914	
WB2FGA/2	299-	B-2891	
WA1ETJ/1			
K7CBZ/4	478-	B-2868	
WA5MCM			
K9KJD/9	273-	A-2857	
WA9TEJ			
WA1FJU/1	360-	B-2760	
WA3FGN			
K9LEO/9 (WA9s NWK, TET)	392-	B-2752	
WA1GYS/1	391-	B-2746	
WA9ORR/9	407-	B-2702	
WA9IQY			
K1LRK/1	174-	A-2540	
K1LAD			
VE3FOY/3	342-	B-2452	
VE3FOA			
WA4UDS/4	347-	AB-2291	
WB4CMR			
VE2BUW/2	326-	AB-2291	
VE2BSS			
WB2IYK/2	249-	A-2241	
WB2ITY			
W6KEV/6	150-	A-2225	
WA4USL/3	211-	A-2169	
K3KHQ			
WA5OQ/5	354-	B-2124	
WA5GGK			
WA7CIA/7	319-	B-2114	
K7YJZ			
3C2AQV/W6	187-	A-2083	
W7SZR/6	147-	A-1912	
WB6UMP			
WA1DEZ/1	161-	A-1889	
WN2BLM			
K7YEV/7	122-	A-1847	
WA7CKL			
WA5QMK (WA5s GVB, NLJ	272-	B-1832	
WB2YPM/2	237-	AB-1814	
WB2ZAV			
WA4ELX/4 (2 ops.)	297-	B-1782	
WN6VXJ/6 (2 ops.)	191-	A-1719	
K0ETA/0 (2 ops.)	252-	B-1712	



The Pacifico RC, **K6BAG/6,** had a real "ham-in" this year and an interesting visual approach to their QSO rate. This graph of contact totals was plotted every 4 hours. The 1966 curves are light, the 1967 curves heavy. Their 10-A operation netted an f.b. 23-K points.

The Monterey Bay ARC entered the one-snake (oops, *one-transmitter*) group for 2.6 K-points. Luckily, Murphy didn't quite "strike" before this uninvited guest was dispatched by the ***W6UCS/6*** crew.



Interesting locations during the fourth June weekend of 1967. VE5JU (on the left), one of the 2-transmitter **3C5JI/5/W7/WØ** crews, at International Boundary Marker 583, where Saskatchewan, Montana and North Dakota meet. In the center, **W1SYE/1** (4-A, 4266 points), the Newport County Radio Club at Miantonomi Tower, Miantonomi Park, Newport, R. I. On the right, at the movie set used for "The Way West" (recently filmed in the Eugene, Oregon area), one of the house trailers used by the Valley Radio Club **W7PXL/7** operating in the 3-transmitter class.

WA1AWD/4 } 475-BC-1691
K3MGJ }
WA3EIN/3 } 214- B-1684
WA6WSO/6 } 777- B-1662
WB6IJS }
WA2LPG/2 160- A-1640
W7TD/7 (K7SNG, WA7FFU) 403- C-1609
WAØAH1/Ø 189- B-1534
WA9ETL/9 } 181- B-1486
WA9PYV }
W6PFE/6 } 215-AB-1479
WA6HUQ }
WAØNLK/Ø 173- B-1438
W8AZA/8 } 221- B-1326
WA8ADJ }
WB6IDTA/6 183- B-1298
K6QPW
K9DMW/2 (2 ops.) 209- B-1254
K3OAE/3 } 401- C-1203
K3QDD }
WA9UWA/9 (WA9FIZ, K9DIV) 132- B-1192
KØKLH/Ø } 163- B-1178
WAØOOU }
WAØNFN/9 121- B-1126
K7NZY/7 } 129-AB-1082
WA7FOE }
WB6MDN/6 (2 ops) 207- C-1021
VE2DEN/2 } 331- C- 993
3C2TQ }
W8ZJM/8 } 132- B- 992
W8LXU }

WA9QQL/9 } 87- A- 983
WA9SXQ }
WB6SJL/6 } 159- B- 954
WB6RSV }
WA7BYP/7 } 82- B- 892
WA7BYF }
K2CC/2 (W1TWX, K2BFF) 143- B- 858
WA4CGY/4 } 33- A- 846
WØFCO }
W6JVA/6 } 140- B- 840
K6HUT }
K9DHC/9 } 64- B- 784
K9WQX }
WA7DYB/7 33- B- 766
WØIUL/6 116- B- 696
W8MPD/1 115-BC- 649
W7DFO/7 } 115-BC- 642
W2MCO }
W7YB/7 (K7KOK, opr.) 68- B- 608
WN0RKE/Ø } 29- B- 574
WN0RKF }
W5AJA/5 } 185- C- 555
W5MTL }
WA8TBB/8 } 91- B- 546
WA8PUR }
VE3FWV/3 91- B- 546
WA4CFN/4 86- B- 516
WB4ECA/4 } 35- A- 515
WB4BDF }
WA1DIM/1 84- B- 504
WA4USO/4 } 6- A- 481
WA4YNP }

W6AWF/6 } 157- C- 471
W6AQB }
W1HDQ/1 28- A- 452
WA1DOB/1 75- B- 450
W9UYB/9 } 26- A- 434
W9TRF }
W7DRA/7 29- A- 392
K6ONP/6 51- B- 306
WB6UTC/6 } 100- A- 300
WN6WK }
WA4WYC/4 } 94- A- 282
WA4VYP }
WA2ANU/2 10- B- 260
W2UJS/2 6- A- 254
VE3BMR/3 126- B- 252
WAØFLL/Ø 3- A- 241
W7DQS/7 40- B- 240
WAØUER/Ø 13- A- 218
WB6FRP/6 16- A- 216
K3SOM/3 93- B- 186
W1EAW (2 ops.) 75- B- 150
WN4FGL/4 16- A- 144
WA1EUJ/1 61- B- 122
WN7GEY/7 40- A- 120
WB6RXR/6 } 57- B- 114
WN6UQS }
K3KRX/8 55- B- 110
WN2YRD/2 33- A- 99
WA3FQA/3 41- B- 82
W1BB/1 36- B- 72
W4AGI/4 64- C- 64
WB6IQT/6 21- A- 63
WB6LFJ/6 4- A- 54
W2MEO/3 12- A- 36

Two Transmitters Operated Simultaneously

K6UJW/6 } 1464- B-9014
WB6JQK }
WA2UOO/2 } 807- A-7663
WA2SRQ }
WA2WMT/2 } 472- B-2832
WB2IYQ }
WA5MUF/5 } 251- A-2259
WA5QVJ }
WB6REA/6 296-AB-2179
W8LVR/8 } 339-AC-1992
W8LXE }
WA9SBD/9 } 248- B-1888
WA9RVY }
WA7CYP/7 } 277- B-1862
WA7HBX }
WA8SKV/8 } 288-AB-1809
W8DNW }
W3SYP/3 } 221- B-1526
K3YVU }
WA3GGV } 234- B-1404
WA3GEP }
K6SUC/6 194- B-1364
WA7GGU/7 } 99- B- 994
WA7GNT }
WA8OAY/8 } 133-AB- 981
WA8PVT }
WB8SQS/6 } 58- A- 722
WA6VFG }
W4FKG/4 } 103- B- 618
W4FIG }
WN4EVK/4 } 59- B- 554
WN4FNR }
K1BZM/1 } 41-AB- 258
K1BUB }
K9APK } 101- B- 202
WN9TJQ }
KL7ACS/KL7 (KL7s BAJ, FHX) 25- B- 150

Tops in the two-operator two-transmitter (2-B) category is the 9-K total by **K6UJW/6,** aided by WB6JQK, 1800 ft. above the San Fernando Valley. (In case the garb fooled you, that's K6UJW at the card table!)

Class C

K5ONE/5 400- B-3800
K2GKK/5 (K2GKK, K5CFQ) 393- B-3737
W6QHP/6 237- A-3605
WB6DFO/6 226- A-3451
WB6SHO/6 232-AB-2703
W6AM/6 253- B-2677
W9RHV/9 252- B-2668
WA6QGT/6 (2 ops) 241- B-2369
WA6THL/6 168-AB-2332
WA6HGH/6 172-AB-2317
WA4MUB/4 (WA4s MCV, MCB) 219- B-2171
WA2BVU/2 206- B-2054
WA6UNL/6 103- A-1796
WAØATY/7 155- B-1795
W6NAA/6 111- A-1699
W6TEE/6 128-AB-1674
WB2FNT/2 155- B-1595
K6HJJ/6 152- B-1568
WB6PHQ/6 129-AB-1487
WB6IAW/6 111-AB-1307
K2QPT/Ø 115- B-1235
W6KDJ/6 104- B-1136
WA2FSD/2 100- B-1100
K3ZYK/3 (K3ZYK, WA3DUX) 76- B-1084
WØKIE/Ø (2 ops) 95- B-1055
WB6WMA/6 83-AB-1053
K6GUQ/6 87-AB-1042

Out-of-this world participants in FD. On the left, WA7GJD and WA7DIA two of the **WA7DIA/7** operators (the Wassuk Range RC) atop 11,200 ft. Mt. Grant in Nevada, in the one-transmitter class. On the right a few of the crew of the U.S.A.F. Academy MARS club radio station, **KØWWD/Ø**, at 14,110 ft. operating three rigs. The WWD group had to remove the snow before occupying the shack!

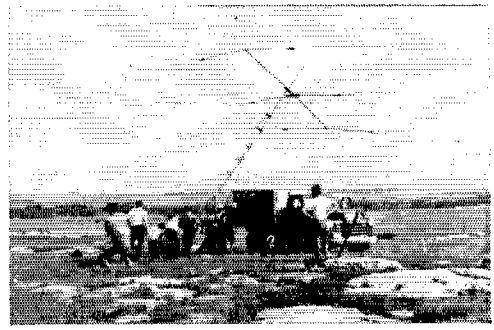
W6AMO/6	76-	A-1026	WB6LGD/6	24-	B- 416
WB6GMM/6	105-	B- 945	W5ENH/5	40-	C- 380
K6ZJY/6	102-	B- 918	WA2ZBV/2	12-	A- 365
W2QNR/2	72-	B- 848	K3TKZ/3	10-	A- 335
W6GDD/6	17-	A- 730	W0LUI/0 (2 ops)	33-	AB- 324
VE4TM/4	53-	A- 718	W6OLO/2	35-	B- 315
K6GUS/6	28-	AB- 693	WA9CKK/9	8-	A- 308
K6JGV/6	52-	B- 668	W2EAT/2	11-	B- 299
K6YBV/6	49-	B- 646	K2PKH/2	10-	B- 290
K6LWR/6	46-	AB- 641	WA6IVI/6	9-	B- 281
W9AVE/9	30-	A- 605	W1GKJ/1	30-	B- 270
WB6RPK/6	67-	B- 603	W2LFX/2	7-	B- 263
WB6KZN/6	21-	B- 589	W9ACU/9	29-	B- 261
VE4OT/4	86-	A- 587	K9AZY/9	4-	A- 254
W6PEQ/6	64-	B- 576	W9QVK/9	4-	A- 254
W9RQM/9	84-	B- 576	WB6CWA/6	27-	B- 243
WB6KGK/6	10-	A- 555	WB6CVZ/6	31-	B- 229
WN9SPA/9	9-	A- 522	K2DGI/2	3-	B- 227
W2EGZ/2	35-	B- 515	WB2URP/2	2-	A- 227
WA3AKH/3 (WA3s AKH, CAS)	7-	A- 463	WA9KQD/9	2-	A- 227
W4JVN/4	50-	B- 450	W6GBE/6	2-	B- 218
K2EEI/2	27-	B- 443	WA9BXI/9	1-	A- 214
WB2JJW/2	54-	C- 443	W9DJR/9	1-	A- 214
WB6OXD/6	18-	A- 443	K9IEI/9	1-	A- 214
WA9OMH/9	18-	A- 443	K6MHW/6	12-	B- 108
			K1FMU/1	2-	A- 27

Class D

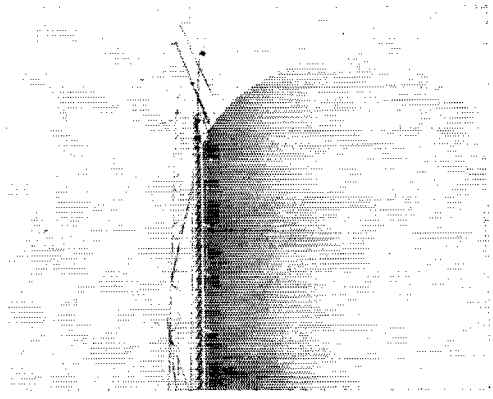
VE3ZM 368, WB6SOM 116, W6ASH 67, W3MCG 43, W1BNB 18, WN4ETW-5

Class E

WB6GFJ (4 oprs., 4 xmtrs.) 1569, WA9HEU (2 oprs., 2 xmtrs.) 966, W4YDD (8 oprs.) 617, W2PDS (2 oprs., 2 xmtrs.) 602, W1AW (WA1CYT, WB2CON) 505, VE3IBM (3 oprs.) 485, WØQDN 431, WAØLKN (7 oprs.) 372, VE3RX/3 (5 oprs.) 349, WA1CVF 306, WB6RCY 265, WA5DOS (3 oprs.) 232, WB2YQH 220, WB6TEE 220, WB6FHH 211, W3MSR 204, K4RDU 195, WA9EKJ 193, WB2ZBM 192, W7IUO 192, W3DGB (4 oprs., 3 xmtrs.), W4NLI 150, WA9QVU 148, WØJUV 145, W2LEJ 143, W4KFC 140, W1LYQ 133, WA4OOD 132, W9JJT 129, K6BXI 126, WA1CQW 123, WA4WOC 118, WA9PZQ 114, WB6OGF 106, W7KUZ 96, WB6UNP/6 92, WB6TJM 85, K6UMV 83, K6LKG 82, W6LVI 80, VE7BRV 80, WA2ANL 79, WB2AHB 77, WB2USG 77, W5CVU (K5CXP, W5CVU) 76, WA8MCQ 74, WAØJTB 73, WA6UZG 70, WB2SMD 65, WA3EXX 59, WA8VBZ 58, W6OJW 54, WA4ZUI 52, WB2NSV 51, WB2WQE 50, WA9THN 50, WA1CRS 48, WA8FIC 47, WA3HAN 46, W8GYG 46, WA3GLP 43, WA9OMO 43, WA9RTU 42, W4HJ 41, W7FCD 41, WØLAJ 41, VE3EZY 40, W9WJL 38, KØGPI 38, WB2ZTZ 36, WB6KVA 36, WA8KME 35, WN5QEV 34, W3DYA 33, WA8VGQ 31, WB2OYE 29, K6RCK/7 28, K7UWT/4 28, W8FEJ 28, WA8JNR 27, W2NHH 25, WB2TJE 21, WA3DYW 21, W8WVM 20, W2REC/4 19, K4HQD 16, K3AKR 15, K4WUM 15, WNØPRS 15, WA1CYT 14, WA9PWR 14, WB6RUQ 13, WB4FOT 12, WA3FYL 11, W4HOS 10, K5DYL 10, WA5IYX 10, WA9RIF 10, VE3DNR 9, K6SIR (WB6KGK, opr.) 8, W8WEG 8, WB6GHK 7, K6ICS 7, WA9RPX 7, WN2YSG 6, WN6WHD 4, K6LJ 3, WB2PGR 2, WB2VIA 2, WN1GUC 1, WAØPUL 1. QST



Running against the clock, 30 minutes before their start, the **KØQBI/Ø** crew makes a second try at getting the beam up. The Tri-State ARC made 849 exchanges in the one-transmitter class, running high power for almost 3-K points.



W2FWG/2, the TARCOM group, used this water tower to get a bit of elevation at Woodcliff Lake, N.J. On top were 6 elements for two meters, and four elements for six. They guyed the middle of the 80-meter dipole from this point. Their 5-A operation paid off with 943 exchanges. Neat to the end, the crew repainted the recently painted tower and ladder scuff marks before leaving. When did someone notice the dangling pulley atop the tower? (Naturally, *after* that new paint job!)

AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART,* W1NJM

The Great Experience

EVERY amateur has an experience to tell about. Most of us have a whole hatful — how you got that antenna up, how you found the trouble in that bug-ridden rig, the thinking that went into the design of your homebrew kilowatt amplifier, your fiendish ingenuity in snaring that elusive piece of DX, your wild experiences on Field Day. When hams get together, either in person or on the air, for a rag chew, the bull flies thick and fast. We all have something to talk about.

But possibly the greatest experience of all is that incident in which you performed a great service for someone else. These days we are getting much correspondence narrating experiences in performing communications services for people with relatives (mostly sons) serving in the armed forces overseas.

For example, K8ONA tells us of her handling of a message from a sailor asking his mother to send him his "dress blues," that he was coming home. The mother was excited, of course, but did not have the money for the shipping cost. The hams shipped the uniform for her, air mail, and when the boy got home they feted him and his mother at a dinner meeting. During the interim, the boy talked with his mother over the air several times. Imagine what *that* pair must think of amateur radio!

There are many amateurs today performing such services for the general public, and more every day. It's something useful, magnanimous, somehow uplifting. Just one such experience can justify your entire amateur career, stormy as it may have been. We recall an incident not so long ago in which we delivered by telephone what seemed to us a routine message. The recipients, however, were so delighted and overjoyed to hear from their son in this manner that they completely forgot to ask who was calling. A week later they finally tracked us down, having spent much time and effort on inquiry to do so, and paid us a personal visit not only to convey their thanks (it was the first word from their son overseas in many months) but to find out more about this service and how it is conducted. The next day, much to our astonishment, there was a piece in the paper about it.

We amateurs have a tendency to handle such matters routinely and forget about them; but they are not routine to John Q. Public. They represent to him something new and wonderful which he either did not know about or about which he previously had misconceptions. And to us, if we only realized it, they represent the best kind of public relations there is — the kind that puts service before publicity and reaps the publicity of modesty along with praise for the service. It comes spontaneously but hits the public squarely between the eyes when it comes out that we are quietly performing these services day in and day out but when asked about it have the attitude of "Shucks, t'warnt nuthin'."

You hear this sort of thing going on down on 20, 15 and 10 meters all the time. Those amateurs who practice it say that it "sort of grabs you." Some of them spend countless hours at it. Not the sort of thing that is easily organized, it is nevertheless an important public service which is daily receiving greater recognition. And the "great experience" is to deliver a message to a worried mother that her son is safe and well or to enable her to talk directly with him over your amateur radio station. Try it, some time.

*Communications Manager.

NIAC

The National Industry Advisory Committee was formed some years ago by FCC to assist in setting up provisions for emergency communications in a dire national emergency, such as but not necessarily restricted to war. Since FCC is the agency which regulates non-government services, its activities in this field are devoted primarily to industry and other organizations which are classified as such for this purpose.

One of the NIAC members represents the amateur service; this is John Huntoon, W1LVQ, general manager of ARRL. NIAC is broken down into a number of subcommittees dealing with specialized phases of emergency communication, one of which is the Amateur Radio Subcommittee, of which W1LVQ is chairman at the behest of NIAC and FCC. Many prominent amateurs are members of this subcommittee, chosen as much as possible to represent widely divergent interests in amateur emergency communication.

In Emergency . . .

Monitor your local emergency net frequency.

Make contact with your local EC or RO.

Take immediate steps to follow any prearranged plans.

Stay off the air unless or until you are *sure* you can be of assistance.

In widespread emergencies, monitor W1AW for latest bulletins and news.

The Subcommittee had a meeting in Washington on Sept. 15 at which all but four members put in an appearance. The names and calls will ring familiar to many: George Bailey, W2KH; Ken Bay, W4DVT; Earl Cook, W4FZ; Frank Cox, K5TRY; John De Bardeleben, W4TE; Ed Handy, W1BDI; George Hart, W1NJM; F. S. Humphrey, K3UJZ; Vince Kenney, W2BGO; Don Meserve, WØWYK; Henry Richter, W6VZA; Clarence Snyder, W3PYF. Considering the distances some had to travel (at their own expense), this is a remarkable showing. Not present were Ray Meyers, W6MLZ; Frank Gunther, W2ALS; Bill Halligan, W9AC; Ken Hughes, W6CIS. Then of course the room was peppered with FCC personnel, including Office of Emergency Communications Chief Ken Miller, Amateur and Citizens Division Chief Ev Henry and representatives from FCC's legal and other divisions. Our old friend Bill Grenfell, W4GF, was absent because of illness.

This was the first meeting of the subcommittee in some time, and for the benefit of the several new members much of the discussion was background and review. At the conclusion of the meeting "ad hoc" working groups were set up to accomplish certain functions for the subcommittee's further consideration. A RACES Plans Group under the chairmanship of W6VZA is to study and review the RACES plans submitted so far from all over the country — some 1200 of them — and to consider what's to be done about all the missing plans. A Review Group under W1BDI is to examine the proposed requirements sent in by various organizations, agencies and industries indicating they had emergency requirements to be filled by the Amateur Service, and couple them with amateur resources looking toward the formulation of a basic plan. A group to draft the plan eventually devised is headed by W1NJM. And a fourth group, to review and draft suggested FCC rules for whatever new amateur service results, is headed by W4FZ.

The working groups are given two months to complete their studies and report back to the subcommittee chairman.

The work being done by the NIAC Amateur Radio Subcommittee, while it moves slowly, is of the utmost importance to us amateurs because it *could* shape our role in public service communication in the future. Requirements have already been submitted by civil defense, Red Cross, the Post Office Department, the Department of Health, Education and Welfare, Selective Service, the petroleum and gas industries and the railroads. Our principal resources are ARPSC (including RACES), existing government agency nets, a large number of independent nets and the vast untapped ranks of amateurs who have not yet taken part in public service activities. The object is to couple the requirements to the resources in the formulation of a basic amateur plan for emergency communication by means of which all may be served by amateur radio.

A formidible task indeed! Are we up to it? Are there enough amateurs dedicated enough and farseeing enough to devote the required time and effort and expense to accomplish it? Time will tell. Not *too* much time; it is later than you think. — *W1NJM.*

Pictures?

A column without pictures is a pretty sick-looking column; but it seems that those we used in the October issue completely depleted our supply.

So what we are going to do is take a lot of pictures of ourselves and plaster them all over these pages if you guys don't send some in. Unless you are prepared to suffer this excruciating torture, you'd better *give!*

QRU? The refueling crew of W2DMN/2 the QRP International ARC, N.Y.C. Chapter 1, composed of WB2OOG and WA2HYY were ready for most anything during the club's 4-transmitter stint for the 1967 Field Day.

Any kind of pictures will do, color or black-and-white, even color slides. The size or shape makes little difference, either. The quality and the subject-matter are important. But even in quality, it's surprising what modern engraving methods can do. As for subject matter, we want *amateurs*, and some connection with public service. We'll return any we don't use, on request.

Well? What's it going to be?

Diary of the AREC and RACES

From July 3 through Sept. 6, the West Coast Amateur Radio Service performed the following services: July 3, WB6PNU and K6GHU were instrumental in obtaining information about the wounded Marine son of a woman who was being treated for a heart condition. The definitive report that the son's condition was not critical greatly relieved the mother and helped her to recover rapidly from her own condition. On August 13, K2ARJ/6, W6QIE and K6KZI assisted in relaying a request for emergency leave to Vietnam. August 25, W4IAN/MM used 7255 kc. to inquire about his wife's condition. She had lost their baby prematurely and as a result of the call the sailor was flown back to shore via helicopter. On August 24, WA6WPB called on 7255 asking for aid in locating a CB licensee (vacationing in Oregon) regarding an emergency at his home. W6DZJ obtained the auto license number and K7GTY relayed the information to the Oregon Highway Patrol. On September 6, W6FCS, K6GHU and K6KCI were instrumental in relaying a message to Korea concerning a change in travel plans because of an emergency at the home of an officer's wife. From Aug. 15 to Sept. 6 there were nine different traffic accidents that were reported to the California Highway Patrol. The following amateurs aided in at least one of the accident reports: K3FMH/7, W5LQH/6, *W6s* ORS PJD, *K6s* EJT GZF UHS, *WA6s* NWR TVK VIB, *WB6s* HGC HZZ IWD IZF.

— • • • —

On July 4 through 6, OK1WGW requested that DL1IG make arrangements to obtain a rare medicine needed for a patient with leukemia. The medicine was transported to

the airport by DL7IG and from the Prague airport by another ham to the hospital. Through the efforts of the amateurs, the patient improved rapidly — *OK2BMS.*

On July 24 to 28, during the riots in Detroit and surrounding areas, W8DSW organized a 2-meter net and arranged for contact with the police. The 20 amateurs in the net provided communications in the suburban areas as well as all sections of Detroit. W8GAI activated the 6-meter f.m. net and the amateurs assisted the local police in seeking out gatherings that looked suspicious. The reports by amateurs with their mobiles enabled the police to operate more effectively. Fourteen different amateurs participated in this effort. The Plymouth Radio Club members and others assisted officials by communicating on 10, 6 and 2 meters. Base stations were at the City Hall and portable or mobile units were deployed around the city. There were minor incidents in the Plymouth area but with the aid of the amateurs, these were quickly quelled. There were fourteen amateurs in the Plymouth effort.

On July 29 and 30, during the Venezuelan earthquake, *YV1s* LA ISA, *YV5s* ATL AVV BQG CIL ISA LA handled welfare messages. These messages were primarily from Caracus residents to the U.S.A. and other countries of South America. There were about 100 Venezuelan delegates attending the Pan American Games in Manitoba. The following hams in the Winnipeg area provided communications with the YVs: *VE4s* BJ HV IM MP OX TJ. Amateur radio was the only method of contact with Caracas. The VE4s were thrilled that every delegate received good news. A group of Venezuelan children visiting Expo also received reports that their families were safe — *VE4OX & W4JPI.*

From August 7 to 13, amateurs in many different areas enabled a little girl with leukemia to be treated with a cancer drug which was available only in the U.S. It started when W2LBB received the plea from CR7CO. CR7AQ took over after equipment problems at CR7CO. There were eventually over a hundred different persons involved in the effort to deliver the refrigerated drug to Mozambique. Band conditions prevented complete details of the initial request from being received. Customs arrangements, interpreters, airline schedules and many other necessary details were all coordinated by the amateurs in many different locations throughout the world. Amateurs known to have participated in this operation are: CT1BH, CR6IV, *CR7s* AQ CO, HP2BZ/MM, KG4AM, SVØWFF, *ZS6s* TE XP, 9L1GQ, *W2s* APF LBB, WA2SFP, W4FPS/4, K4WCC.

On August 15 through 18, during the flooding in Alaska, we received ten reports representing 75 different amateurs (primarily in Alaska and on the West Coast) who handled many messages into and from Alaska. KL7ACS aboard the 300-foot steamer *Nenana*, was operated around the clock by K7AX and two unidentified operators. This station collected messages form KL7FBY and other Fairbanks stations and relayed them to lower west coast stations. W7HMA, W6MLZ and other stations collected messages from Alaska and relayed into National Traffic System nets. WA7CSK also received a number of messages and relayed to other stateside stations for eventual delivery. WA7CSK was one of the many stations who sent many inquiry messages into Alaska. There were nearly 15 thousand persons evacuated to higher ground which made the delivery of many of the messages difficult. There were emergency messages for medical supplies and other important ones handled before the bulk of the health and welfare messages could be handled.

John Naff, W5TFW, makes a call from his operating position at his home in Nederland, Texas. John is the active EC for Jefferson County.

The Wayne County 2-Meter AREC group provided communications for the Dearborn District Girl Scout day camp again this year. Four sites were in session three days of the last two weeks of June. AREC operators at each camp were in contact along with a base station so that the coordination of the activities could be handled for the camp directors. There were also contacts with the police and emergency facilities. Portable 2 meter f.m. equipment was utilized for this exercise. — *W8MPD EC Wayne County Mich.*

On Aug. 6, four Quebec amateurs initiated the start of the National Scout Camp at Liac Liachigan and the amateurs were given a warm reception by nearly 100 Boy Scouts across Canada. VE2AGQ gave a talk on amateur activities and *VE2s* BU DEX ZA gave a demonstration.

Stations were contacted in British Columbia, and also an expedition in Greenland. The exercise was very successful and the amateurs felt that response of the scouts was excellent. — *VE2BU EC Pincourt, Quebec.*

From Aug. 16 through 22, fifteen amateurs furnished communications for a 280-mile horse race that started in Deadwood, S. Dak., and ended in Sidney, Neb. One day a truck carrying two horses became lost and WAØQMZ/mobile called WAØMYS who alerted the state police. The truck was found and sent to another point where the horses could be used for relief. Another day WØPHA/mobile was sent to find one of the stagecoaches which was missing. With the aid of an airplane, the coach was found and put back onto the trail. At the end of each day the amateurs relayed the progress reports so that the many towns in western Nebraska could know the winners of each day's race. The activities were conducted on 75 meters under the direction of WAØQMZ EC Cheyenne County Nebr.

On August 26, there was a tornado alert for the Washington D.C. area. WA3AJR called the tornado watch net on 6 meters and the storm was tracked for nearly four hours that evening. Shortly after the alert was lifted at midnight, the net secured. Fourteen stations were in the operation and covered the Washington and Baltimore areas as well as maintaining liaison with the Virginia net. — *WA3AJR Assistant EC Prince Georges County Maryland.*

From Sept. 1 through 4, Florida amateurs furnished communications between the AAA offices in Orlando and the rest of the state. Data on road conditions, traffic movement, accidents, hotel accommodations and camping sites were consolidated in Orlando every hour. The program was called "bring 'em back alive." The local AAA offices did not understand the capabilities of the amateurs, at first, but later the comment from the Miami AAA was "ARPSC saved the day and was the real backbone of the operation." W4NOG handled over forty messages and a number of other stations logged many hours over the weekend. Both the SCM and SEC of West Florida felt that the operation was handled well and was helpful in demonstrating the capabilities of the amateurs and ARPSC facilities. — *W4IKB SEC West Florida.*

On Sept. 9 and 10, the Mobile Sixers Club furnished communications for the Delaware County (Pa.) Fire School. This service made it possible to keep the emergency frequencies clear in case of an emergency. Key personnel, fire equipment and emergency vehicles were spread out at the several fire school sites. The amateurs set up a central

control point into which all calls were channeled and also set up mobile units at the fire training sites. Eighteen amateurs provided 16 hours of communications over the two-day period — *WA3BTE*

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On Sept. 16, the Washington D.C. Medical Society had an emergency test utilizing amateurs from Fairfax County Virginia and Montgomery and Prince George Counties Maryland. The communications were on two and six meters. Eighty messages were handled representing 17 metropolitan hospitals. K4LMB (SEC Va.), W3WTW (EC), WA3EKS (EC) and K3JYZ (SCM Md.) deemed the overall operation successful. — *W3LDD SEC Maryland.*

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Forty-three SEC reports were received for the month of July, representing 17,147 AREC members. This is one *less report but 975 fewer members than was reported for* the month of July 1966. The following sections reported: Ala, Alta, Ark, BC, Colo, Conn, Del, EFla, EMass, EPa, Ga, Hawaii, Ind, Ill, Kans, Ky, Mar, MDC, Mich, Miss, Mo, Mont, NC, Nebr, NLI, NNJ, Ohio, Okla, Org, Oreg, Que, Sask, SCV, SDak, SNJ, STex, Tenn, Utah, Va, Wash, WFla, WNY, WPa.

National Traffic System

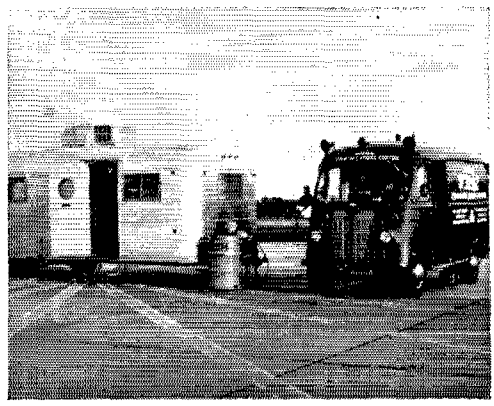
In case you didn't know it, there is a new net directory out. A quick count of nets registered as NTS nets shows a total of 199. This is a rather amazing increase over last year's 149 and we suspect that some of them are nets who want to be identified as a part of the system but don't really perform the requirements thereof. Nevertheless, since this has always been the case, the increase is significant.

Of course all but 18 of these nets operate at section or local level. At the latter level particularly we have picked up many active nets, mostly v.h.f. Of the 199 NTS nets, 43 operate on v.h.f. and 76 on lower phone band frequencies, the remaining 80 on c.w.

Does this indicate that NTS is predominantly a c.w. system, as many phone traffic organizers are fond of alleging? Take another look at the above data; they show that NTS overall now consists of 80 nets which operate on c.w. and 119 which operate by voice. The phone nets have the coverage, no doubt about it, and local v.h.f. nets are rapidly coming into their own as nets serving both the AREC and the NTS, the former for emergency drill purposes, the latter for regular traffic handling. *No longer can the phone operator or the* v.h.f. enthusiast be said to be outside the NTS organization.

One of the principal and most troublesome requirements at local and section level is recruiting. This must be continuous. Generally speaking, the rule at these levels is "the more the merrier," because the aim is *coverage*. You want as many operators as you can get in the net, for coverage of as many places as possible. In large population areas it may be necessary to break them up into ability groups or band groups in order to achieve the maximum in overall efficiency, but no one willing to participate regularly and according to the rules should be turned down. The internal section organization shows great variance throughout the nation. In California, the nine sections are combined into two principal nets operating at section level; but there are also a number of other NTS nets in operating throughout the region. In Alabama there are a number of section nets, and all Alabama nets are registered as such, with a letter designation, into a completely integrated section NTS/AREC organization. In Texas, New York, Pennsylvania, New Jersey and Florida there are combined nets, or they have some combined and some separate features. The situation is certainly not uniform, *as it is at region and area levels, and perhaps more* uniformity would be of benefit. On the other hand, at these levels the circumstances are subject to greater variance and perhaps more flexibility is required. Probably the best approach is this: achieve the greatest possible adherence to NTS principles as stated in the Public Service Manual, but not at the expense of deterioration of the system through lack of qualified participants.

Section and local nets and their problems are very vital to NTS. Occasionally it is alleged that we pay more attention to region and area nets and the TCC and that the lower level nets are left out in the cold to fend for themselves. It may be true that the upper level nets receive more of the attention in this column, but this is because it is the only place they can be treated, while section and local nets can also receive treatment in the SCM's monthly column. However, we are very much interested in your problems. We know you have many of them. The Area Staffs of NTS are also interested and are available to advise you if you need assistance. Drop a line to your Area Staff chairman (W6HC, W9JUK or W2ZVW) if you would like to have your problems discussed at the next Staff get-together. There are also experts here at headquarters who might be able to assist. Without section and local nets, NTS would not exist; it would have no reason to. After all, the rest of the organization is a superstructure built to interconnect the various parts of the system, like the steel framework of a building. The stuff of which the building is made is the local and section nets which make up the bulk of NTS operators. — *W1NJM.*



The Phil-Mont Mobile Radio Club W3RQZ/3 devoted primarily to the publicity aspect, operating in a large shopping mall near Philadelphia. They demonstrated s.s.b. c.w. a.m. and f.m. as well as RTTY. Operating one transmitter at a time, they still managed to amass 2500 points while arousing public interest in their 100% emergency-power operation on Field Day 1967.

August Reports:

Net	*Sessions*	*Traffic*	*Rate*	*Average*	*Representation (%)*
1RN	62	383	.280	6.2	88.2
2RN	61	528	.710	11.8	95.0
3RN	62	612	.442	9.8	100
4RN	53	441	.340	8.3	77.8
RN6	62	1356	.761	21.8	100
RN7	48	464	.368	9.6	34.7
8RN	62	666	.451	10.7	99.5
9RN	62	732	.616	11.8	97.2
TEN	62	758	.601	12.2	78.7
ECN	26	95	.086	3.7	57.0[1]
TWN	29	211	.314	7.3	65.2[1]
EAN	31	1797	1.201	58.0	98.4
CAN	31	1566	1.185	50.5	100
PAN	31	1545	.914	49.8	94.5
Sections[2]	2305	12545		5.4	
TCC Eastern	121[3]	941			
TCC Central	97[3]	835			
TCC Pacific	122[3]	1023			
Summary	2987	26948	EAN	16.4	83.7
Record	2707	31117	1.440	14.8	—

[1] Region net representation based on one session per day.

[2] Section and Local nets reporting (76): AENB, D, H, M, O, R, S, T (Ala.); OZK (Ark.); NCN (Cal.); HNN (Colo.); CN, CPN (Conn.); FAST, FATT, FMTN, GN, QFN, SATN, TPTN (Fla.); GSN (Ga.); QIN (Ind.); Iowa 75; KPN, KSBN, OKS (Kans.); KRN, KTN, FCATN (Ky.); PTN, SGN (Me.); MDDS, MEPN, Termite (Md.-Del.); M6MTN (Mich.); MSN, MSPN (Minn.); MNN, PHD (Mo.); NJN, NJPN (N.J.); Roadrunner (N. Mex.); NLI, NLS, NYS (N.Y.); NCN, THEN, NCSB (N.C.); BN, OSSB (Ohio); OLZ, OPEN, SSZ, STN (Okla.); EPA, EPEN, PTTN, VHFTN, WPA (Pa.); RISPN (R.I.); SCN

(Continued on page 152)

Happenings of the Month

Election Results

FCC Denies A.M./S.S.B. Separation

Two-Letter Rule Corrected

Slow Scan TV Proposed by FCC

ELECTION RESULTS

Three incumbent directors — **Noel B. Eaton, VE3CJ; Charles G. Compton, WØBUO** and **Charles J. Bolvin, W4LVV** — have been re-elected as director of the Canadian, Dakota and Southeastern divisions respectively. They were the only candidates to be nominated by members of the divisions, so balloting is not required.

In each of these three divisions, only one eligible candidate for vice director was found, too. Thus, **Colin C. Dumbrille, VE2BK** of the Canadian Division and **Albert L. Hamel, K4SJH** of the Southeastern Division were also reelected without balloting.

The Dakota Division has a new vice director, effective January 1: **John M. Maus, WØMBD,** who succeeds the late Charles M. Bove, WØMXC. Jack is a stock broker with John G. Kinnard & Co., Minneapolis and lives in St. Cloud. He has been assistant director of the Dakota Division for the past two years. He's past president of the St. Cloud Radio Club and presently serves as treasurer. Jack has also been trustee of the radio club station at the St. Cloud Veterans Hospital and is a member of RACES. Aside from amateur affairs, he's on the boards of several Roman Catholic schools and is active in the Knights of Columbus.

All the other offices are contested. In the Atlantic Division, the candidates for Director are Carl E. Andersen, K3JYZ; Allen R. Breiner, W3ZRQ; Gilbert L. Crossley, W3YA; and Earl H. Mann, W2SEI. For vice director, Atlantic amateurs will choose between Jesse Bieberman, W3KT; Walter O. Carr, W3LDD; Harry A. McConaghy, W3EPC; Karl W. Pfeil, W3KJJ; and Harold C. Smith, WA2KND.

H. Eugene Banta, W4SGI and Philip P. Spencer, W5LDH/W5LXX, are candidates for director in the Delta Division. Max Arnold, W4WHN and Floyd Teetson, W5MUG, are running for vice director.

Great Lakes voters have six choices for director: Dana E. Cartwright, W8UPB; Roger J. Jones, Jr., W8GXR; Alban A. Michel, W8WC/W8SMQ; Leonard M. Nathanson, W8DQL; John E. Siringer, W8AJW and James W. Voorhees, W8EGR. The vice director candidates are Charles C. Miller, W8JSU and Charles C. Whysall, W8TV.

In the Midwest Division, Sumner H. Foster, WØGQ and William J. Schmidt WØOZN are candidates for director. For vice director, the choice is between Ralph V. Anderson, KØNL; Warren C. Dennis, KØBND; Charles O. Gosch, WØBUL; and Ronald M. Schweppe, KØEXN.

Pacific Division members will select Hugh Cassidy, WA6AUD; J. A. Doc Gmelin, W6ZRJ or Larry M. Reed, W6CTH as their next director. The candidates for vice director are David P. Baker, W6WX and G. Donald Eberlein, W6YHM.

Ballots were mailed the second week in October to those who on September 20 were Full Members of the Atlantic, Delta, Great Lakes, Midwest and Pacific Divisions. Members of any of the above divisions who have not received ballot material by November 1 should notify headquarters; be sure to include your zip code.

The completed ballots must reach headquarters not later than noon, November 20; they are kept unopened in a locked cabinet until that time and then opened by a committee of three tellers under the supervision of a certified public accountant. Results will be announced via W1AW bulletin and in the January, 1968, issue of *QST*.

FCC DENIES SEPARATION OF MODES

The Federation Communications Commission has denied four petitions filed by individual amateurs between 1962 and 1967 which would separate s.s.b. from standard a.m. One would have gone further — it proposed that amateur telephony below 25 Mc. be restricted to single sideband!

Two points FCC made in its order are especially noteworthy. First, to be meaningful any provision for separation of the modes requires definition and measurement of the amount that the carrier and unwanted sideband must be suppressed to qualify as s.s.b., yet equipment for this purpose is not readily available to most amateurs.

Second, one of the unique features of the amateur service is the wide choice of emissions and operating frequencies available. FCC's observations indicate a voluntary self-adjusting separation of single *vs.* double sideband has evolved over the past several years and appears to be working rather well. Since the extent of the relief from interference is speculative at best, FCC considers that the proposed amendments are not justified. The full text is as follows.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

In the Matter of Amendment of the Commission's Rules governing the Amateur Radio Service to provide separation of single and double sideband transmissions in the high frequency and 50 Mc/s bands.	RM-365, 545, 904, and 910

MEMORANDUM OPINION AND ORDER

Adopted: September 6, 1967 Released: September 13, 1967 By the Commission: Commissioner Wadsworth dissenting.

1. Four petitions have been filed with the Commission requesting the separation of single sideband amateur telephony transmissions from double sideband transmissions. RM-365, filed by K. A. Slobb, proposes that all amateur telephony below 25 Mc/s be restricted to single sideband, except that present licensees could operate under existing rules until 1978. Reduced bandwidth and elimination of heterodyne interference were the goals presented by this petitioner. RM-545, filed by L. M. Coley, and RM-910, filed by L. A. Murray, propose subdividing the present amateur high frequency telephony bands into generally equal, but separate, segments for double and single sideband. The reduction of interference and the elimination of friction between operators were given as the reasons for these petitions. RM-904, filed by J. M. DuBois and E. G. Taylor, would allocate 50.05–50.10 Mc/s, now restricted to telegraphy only, for use with the single sideband suppressed carrier mode of transmission. The elimination of interference from double sideband emissions and the consequent increased utilization of the band for long distance communication were advanced as the bases for this petition.

2. In all amateur telephony bands, amplitude modulation, A3, is permitted and, by definition, in the Amateur Service, includes single and double sideband with full, reduced or suppressed carrier. Frequency modulated carrier telephony is also permitted in all of the amateur high frequency bands and above. Thus, with the exception of limits on bandwidth, amateurs are generally free to choose any method of telephony they desire in the amateur telephony bands.

3. With the present generalized telephony allocation, specifications for distinction of the subcategories of amplitude modulation are not necessary. To be meaningful, provision of a separation, as requested by the petitioners, requires definition and measurement of the amount that the carrier and unwanted sideband must be suppressed in order to qualify as a "single sideband" emission. (Petitioners did not present any recommendations or suggestions in this regard). Adequate and inexpensive measuring equipment for this purpose is not now available to most amateurs.

4. While the Commission has, in the interest of spectrum economy, encouraged the use of single sideband in other radio services via the rule making process, it is not believed necessary or desirable in the Amateur Radio Service. One of the unique features of the Service is the wide choice of emissions and operating frequencies available. Continuation of this freedom of choice is considered desirable. Our observations indicate that a voluntary self adjusting separation of single vs. double sideband has evolved over the past several years and appears to be working rather well. Where band occupancy is heavy, most amateurs are using the more efficient single sideband emission and interference is to be expected regardless of whether single or double sideband emissions are intermingled or not. Where band occupancy is light, good operating practice will avoid interference. Since the extent of the relief from interference sought by the petitioners is speculative at best, the amendments proposed are considered to be not justified.

5. Therefore, in view of the foregoing, IT IS ORDERED that the petitions RM-365, RM-545, RM-904 and RM-910 are hereby DENIED and the proceedings are TERMINATED.

FEDERAL COMMUNICATIONS COMMISSION
BEN F. WAPLE, Secretary

Harold Samson, W6JBA, accepts the Outstanding Performance Award from Inspector Dave Luethje of the California Highway Patrol for his work in setting up the Patrol's amateur radio auxiliary communications system from February 1966 through March 1967. W6CDY, the Patrol headquarters' amateur station, operates regularly in MARS-AF and the West Coast Amateur Radio Service.

FCC CORRECTS TWO-LETTER CALL RULE

As part of the incentive licensing report and order, the Federal Communications Commission adopted a rule newly permitting amateurs first licensed more than 25 years ago and now Extra Class to obtain a two-letter call. In the report FCC used the phrase," . . . held an amateur station license 25 years or more prior . . ." thereby inadvertently leaving out the amateurs who received operator licenses during World War II when station licenses were not issued.

The order and section 97.51 (a) (5) have both been corrected to read, ". . . any amateur radio operator license issued by the Commission or one of its predecessor agencies, 25 or more years prior . . ." Thus, the "LSPH" amateurs are now turning eligible for the two-letter calls as they reach 25 years and Extra status.

NEW CANADIAN FEDERATION FORMED

The Canadian Amateur Radio Federation was formed on September 2, 1967 at Winnipeg by delegates of provincial societies in Alberta, Manitoba and Ontario. Temporary officers are

Jim Roik, VE4UX, acting president and Jim Couprie, VE4CS, acting secretary/treasurer. The mailing address of CARF is P.O. Box 475, Winnipeg 1, Manitoba.

The purpose of CARF is stated as: "to promote the welfare of the Canadian radio amateur in the national field." Its membership consists of province-wide societies, each of which will contribute 25 cents for each of its own members annually, on January 1.

SLOW SCAN TV PROPOSED

The Federal Communications Commission — acting in part on a League petition (RM-265) filed in 1961 — in September issued a Notice of Proposed Rulemaking looking toward slow-scan television (A5 and F5) emission in h.f. and v.h.f. amateur bands. The proposal, Docket 17736, would authorize picture transmission in the 3800–3900, 7200–7250, 14,200–14,275 and 21,250–21,350 kc. bands (slated to be the Extra and Advanced Class segments) and in 28.5–29.7, 50.1–54.0 and 144.0–147.9 Mc.

FCC mentions successful results of on-the-air tests run on 14 Mc. by amateurs under a special authorization since 1966. It points out that video alone under the new rules will not exceed the bandwidth of an s.s.b. station: with video on one sideband and voice on the other, width will not exceed that of a standard a.m. signal.

Comment deadline is December 1 for original comments and December 15 for replies. The complete text follows.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

In the Matter of Amendment of Part 97 of the Commission's Rules to provide for the transmission of pictures in the high frequency bands by stations in the Amateur Radio Service.	Docket No. 17736 RM-265

NOTICE OF PROPOSED RULE MAKING

Adopted September 20, 1967: Released September 25, 1967 By the Commission: Commissioners Bartley and Wadsworth absent.

1. Notice of Proposed Rule Making is hereby given in the above entitled matter.

2. The Commission has received a petition filed by the American Radio Relay League, Inc., to provide for the use by amateur stations of narrow band modulation techniques for the transmission of pictures in the 21.25–21.45 Mc/s and 28.5–29.7 Mc/s bands. Petitioner proposes that the bandwidth of emissions not exceed the bandwidth occupied by an amplitude-modulated carrier having audio-frequency characteristics adequate for voice communication, and that the purity and stability of such emission shall be maintained in accordance with the requirements of Section 97.65. Simultaneous transmission of voice and picture using the same carrier is proposed subject to the condition that the total bandwidth does not exceed that specified above.

3. The Commission, on May 6, 1966, granted authority to five amateur stations to transmit slow-scan TV signals in the 14.2–14.35 Mc/s band for test and demonstration purposes. The results of these tests were reported to the Commission in July, 1966. Pictures of good quality were received at distances up to 9000 miles with transmitting and receiving equipment of the type used in the usual amateur station with the addition of the necessary video equipment. The simultaneous transmission of voice on one sideband and video signals on the other was also successfully accomplished.

Rose Stewart, WA5ALX, winner of the 1967 Rocky Mountain Division Picon Award for New Mexico, receives the plaque from Section Communications Manager Bill Farley, WA5FLG. The Picon Awards are presented annually for work with nets and in emergency preparation.

4. In other tests good pictures have been exchanged between McMurdo Sound, Antarctica and the Boulder, Colorado, and Washington, D. C., areas. The tests conducted thus far have effectively demonstrated the potential of slow-scan TV as a communications mode and the Commission is of the opinion that authorizing this type of emission will provide additional means for further development of the technical skill of the amateur community.

5. ARRL limited its request to frequencies in the 21 and 28 Mc/s bands. However, since the occupied bandwidth of the picture transmission will not exceed that occupied by single sideband amplitude modulated telephony and the bandwidth required for simultaneous transmission of picture and voice will not exceed that required for double sideband amplitude modulated radiotelephony, there appears to be no valid reason why slow-scan television emission should not be permitted in portions of all bands now available for A3 emission. Because of the advanced techniques required and the expectation that comparatively few amateurs will use this mode of transmission, it is proposed to limit the use of television transmission in the bands below 50 Mc/s to only the frequency sub-bands available to the Advanced and Extra Class licensees in accordance with the Report and Order in Docket 15928.

6. Authority for the proposed amendment is con-

tained in Section 4(i) and 303 of the Communications Act of 1934, as amended.

7. Pursuant to the applicable procedures set forth in Section 1.415 of the Commission's Rules, interested persons may file comments on or before December 1, 1967, and reply comments on or before December 15, 1967. All relevant and timely filed comments and reply comments will be considered by the Commission before final action is taken in this proceeding. In reaching its decision in this proceeding, the Commission may also take into consideration other relevant information before it, in addition to the specific comments invited by this Notice.

8. In accordance with the provisions set forth in Section 1.419 of the Commission's Rules, an original and 14 copies of all statements, briefs or comments, shall be furnished the Commission.

FEDERAL COMMUNICATIONS COMMISSION
BEN F. WAPLE, *Secretary*

Appendix

§97.61 [Amended]

1. In §97.61(a) add "A5, F5" in the "Emission(s)" column of the table opposite the following "Band" column listings: "3500 to 4000", "7000 to 7300", "14000 to 14350", "21.0 to 21.45", "28.0 to 29.7" "50.0 to 54.0", "144 to 148", and "220 to 225" and in the "Limitations" column opposite "220 to 225" add "(16)".

2. In §97.61(b), amend subparagraphs (5), (6), (7), (8), (9), (10) and (11) and add (16) as follows:

§97.61 Authorized frequencies and types of emissions.

* * * * *

(b) ***

(5) 3500 to 4000 kc/s, type A1 emission; 3500 to 3800 kc/s, type F1 emission; 3800 to 3900 kc/s, narrow band types A5 and F5 emission; 3800 to 4000 kc/s, type A3 emission or narrow band F3 emission; except that frequencies 3900 to 4000 kc/s are not available to stations located within the following United States possessions in Region 3, as defined in the Geneva 1959 Radio Regulations; Baker, Canton, Enderbury, Guam, Howland, Jarvis, Palmyra, American Samoa, and Wake Islands.

(6) 7000 to 7300 kc/s, type A1 emission; 7000 to 7200 kc/s, type F1 emission; 7200 to 7250 kc/s, narrow band types A5 and F5 emission; 7200 to 7300 kc/s, type A3 emission or narrow band F3 emission.

(7) 14000 to 14350 kc/s, type A1 emission; 14000 to 14200 kc/s, type F1 emission; 14200 to 14275 kc/s, narrow band types A5 and F5 emission; 14200 to 14350 kc/s, type A3 emission or narrow band F3 emission.

(8) 21.00 to 21.45 Mc/s, type A1 emission; 21.00 to 21.25 Mc/s type F1 emission; 21.25 to 21.35 Mc/s, narrow band types A5 and F5 emission; 21.25 to 21.45 Mc/s, type A3 emission or narrow band F3 emission.

(9) 28.0 to 29.7 Mc/s, type A1 emission; 28.5 to 29.7 Mc/s, type A3 emission and narrow band types F3, A5 and F5 emission; 29.0 to 29.7 Mc/s, special emission for frequency modulation (radiotelephone transmissions and radiotelegraph transmissions employing carrier shift or other frequency modulation technique).

(10) 50.0 to 54.0 Mc/s, type A1 emission; 50.1 to 50.0 Mc/s type A2, A3, A4 and narrow band F1, F2, F3, F5 and A5 emissions; 51.0 to 54.0 Mc/s, type AØ emission; 52.5 to 54.0 Mc/s, type FØ, F1, F2, and F3 emission.

(11) 144 to 148 Mc/s type A1 emission; 144.0 to 147.9 Mc/s type AØ, A2, A3, A4, FØ, F1, F2, F3, and narrow band A5 and F5 emissions.

(16) The use of A5 and F5 emission in this band is limited to narrow band emission.

3. In §97.65 amend paragraph (c) and add a new paragraph (d) as follows:

§97.65 Special emission limitations.

* * * * *

(c) The use of narrow band F3 frequency or phase modulation is subject to the conditions that the bandwidth of the modulated carrier shall not exceed the bandwidth occupied by an amplitude-modulated carrier of the same audio characteristics, and that the purity and stability of such emissions shall be maintained in accordance with the requirements of §97.73.

(d) The use of narrow band A5 and F5 emission for the transmission of pictures is subject to the condition that the bandwidth of emission shall not exceed the bandwidth occupied by a normal amplitude modulated single sideband voice transmission. Simultaneous transmission of voice and picture is permitted provided the total bandwidth does not exceed the bandwidth of a normal amplitude modulated double sideband transmission.

TWO-YEAR NOVICES NOW ISSUED

FCC began in late September issuing Novice Class licenses for two-year terms. Thus, prospective applicants who may have been waiting until November 22, 1967 should go ahead now with submission of their applications.

Volunteer examiners may wish to use an ARRL form, S-45, to certify results of Novice code tests to the Commission. A self-addressed stamped envelope would be appreciated of those requesting the forms from headquarters.

MINUTES OF EXECUTIVE COMMITTEE MEETING

No. 318

September 29, 1967

The Executive Committee of the American Radio Relay League, Inc., met at the Headquarters office of the League in Newington, Connecticut, at 10:15 A.M. September 29, 1967. Present: President Robert W. Denniston, WØNWX, in the Chair; First Vice President W. M. Groves, W5NW; Directors Charles G. Compton, WØBUO, Gilbert L. Crossley, W3YA, Noel B. Eaton, VE3CJ, Carl L. Smith, WØBWJ; General Manager John Huntoon, W1LVQ. Also present was Assistant Secretary Perry F. Williams, W1UED.

The Committee proceeded to examine nominations in the director elections, with careful attention to the application of the eligibility rules concerning membership and freedom from commercial radio connections. The Committee made findings and ordered actions as detailed below, all by unanimous action.

ATLANTIC DIVISION

For Director:

Carl E. Andersen, K3JYZ, Allen R. Breiner, W3ZRQ, Gilbert L. Crossley, W3YA and Earl Howard Mann, W2SEI, were found lawfully nomi-

(*Continued on page 82*)

CHARTER LIFE MEMBERS

The following applicants (prior to August 1) for Charter Life Membership were approved by the Executive Committee at its September meeting. This supplements the original list, page 72, September QST.

John R. Abbott, W6ZOL
Fred W. Albertson, W3FMC
Roy L. Alciatore, W5RU
London K. Allbright, W6SLF
Robert H. Amos, WA3EEQ/WA8PLY
A. Fred Anderson, K2SYA
Clarence A. Andrews, Jr., W6GCG
Merit R. Arnold, W6NLO
Ward S. Atherton, W4RVE
Tom N. Austin, Jr., K4OTM
Stewart J. Baker, K4CGV
Roger A. Barnett, K8DDG
David P. Bates, W2HLI
Kenneth K. Bay, W4DVT
John D. Beeby, K6QQL
Yardley Beers, WØEXS
Alvin B. Berglund, W6WRU
Peter Bertelli, W6CLY
R. Jack Best, W5RPH
Edward E. Bissell, Jr., W3MSK
Donald Blashfield, W8YAN
David P. J. Bold, W8VQM
Adam F. Bowden, W5FPV
John S. Brandau, K2OVN
C. Mike Brennan, W5QOC
Dennis G. Brewer, K8DIU
Edward L. Bruns, K8ZSZ
William T. Buckley, Jr., W5COD
Francis Budavary, WAØIOE
G. W. E. Burnside, VE3QR
R. Judson Burt, K9LBQ
Wells E. Burton, W2UJS
Robert M. Byrne, K2AXM
Laird Campbell, W1CUT
Franklin Cassen, W4WBK
John S. Catron, W5DZA
J. M. Chadwick, W7KRR
Charles Chapman, W4SVB
Robert York Chapman, W1QV
Alfred Christofferson, Jr., KØQHI
Victor C. Clark, W4KFC
Charles W. Clifford, Jr., W6QMY
Ronald Clothier, WA7BUB
Iris Colvin, W6DOD
Lloyd Colvin, W6KG
Willis Conkel, W6DNG
James E. Cooper, W2BVE/W1EEI
William F. J. Costello, W3BQN
Charles A. Cremer, K5AAG
Leo C. Cunniff, W2OEH
Raymond G. Cunningham, W3YBF
Harry W. Dail, W2OGV
Randy N. Davis, WA2OMT
Charles C. Dawson, W9CUW
James L. Dean, W9HCQ
Douglas E. Decker, Jr., WA6TAD
John T. Deines, K8QOJ
Charles T. Derwent, K9SAN
Marlyn Desens, WØOJJ
George A. Dessert, K1FMU
Robert V. C. Dickinson, W2CCE/W1GQK
Harold Dillon, W3EXY
Robert A. Dillon, K6HBQ
Leonard J. Dolton, W6DYA
Richard E. Downing, W1TXS
Alfred Dowd, W2ARO
Victor Drabble, W7LLH
Joe Duffin, W2ORA
Fred A. Duran, Jr., WA5KBK/W4NKI
Claire R. Dyas, WØJCP
Fred E. Ellis, W5PTZ
R. E. Elmore, K5HWN
Richard L. Evans, Jr., WA3FOQ
Dona L. Field, WB6TRW
Joe Fisher, III, K5EJL
Kenneth R. Fleming, WAØNLN
David G. Flinn, W2CFP/WB2QGK
Tommy V. Foltz, WA9VBJ
Sumner H. Foster, WØGQ
Edward M. Gable, W2MPM
A. Walter Gardner, W1FEO
Henry C. Garretson, III, K2SSX
T. W. Gavey, K3FKN
Edward F. Gebelein, Jr., W1YYY
Sam B. Gibson, WA6JAT
Roger Gillette, WØRGR
Carter Glass, III, W4JUK
Charles F. Glass, W6OXQ/W6TOO
Edward Gosselin, W1BCN
Darwin L. Gray, WAØJFC
Henry R. Greeb, W8CHT
John E. Greer, K6HQJ
Frank A. Gunther, W2ALS
Dean M. Hachenberg, KØCJL
Philip E. Haller, W9HPG
Daniel N. Hamilton, WA4WXQ
George D. Hanchett, W2YM
Warren D. Harding, K1BOX
Dennis M. Harmer, K8NGF
George Hart, W1NJM
Eugene H. Hastings, W1VRK
Harley C. Hatch, KØKED
Bill Holman, III, KL7BAJ/W5DHS
Paul S. Honda, KH6QR
Herbert Hoover, Jr., W6ZH
Kenneth D. Hopper, K2VAM
Bruce G. Hosmer, KP4BCL
Louis R. Huber, W7UU
David M. Hyde, WB6FYP
George Jacobs, W3ASK
John W. James, WØJYH
James E. Jones, KØHQX
Jordan Kaplan, W9QKE
Marvin Kaskawits, WB2NDV
Rex Kerley, VE7BNE
Neil Vance Kern, W9CNC/KØBLB
Ben D. Kiningham, III, K9IDQ
Allan W. Klein, WAØDTC
W. E. Klinker, W2CER
Roy C. Koeppe, K6KOL

Paul J. Kollar, W8CXS
Terence H. Ladwig, W9CFN
J. C. LaGrone, Jr., W5PBX/K3JSI
Jefferson P. Lamb, W6WWM
L. Jackson Landers, K5AD
Norman R. Landry, W5VUH
John T. Laney, III, K4BAI
Eugene L. Langberg, WA3AKK
W. R. Lanphear, W7HLL
Richard C. Lathrop, W9LZY
Nick J. Laub, WØIIC
Robert H. Lauzon, WB2NSD
LeRoy D. Lawhorn, W4VIW
Roland M. Levin, W2OCJ
Tracy Levy, Sr., W4HOS
Walter C. Lindsly, W3EOS
Fred A. Linn, W9NZF
Carleton C. Long, W3MBF
James C. Long, WA4LYK
Lester C. Long, Jr., K8OWL
Robert MacLachlan, K4PSD
Walter D. Martila, WA2JLM
Paul T. Mason, WA6EUZ
John M. Maus, WØMBD
A. K. Meen, VE3RX
George D. Meserve, W1FL/WØWYK
Hans J. Meurer, WA2HIU
Stuart Meyer, W2GHK
Charles C. Miller, W8JSU
Yuki Minaga, W9SFM
Thomas M. Moss, W4HYW
Frederick C. Muller, III, W2SEU
John B. McColly, W9OIJ/WB2LZF
William McGrannahan, KØORB/KØVRB
Lee L. McKee, WØFDL
Robert W. McNair, W6MPZ
Arthur E. Miligan, W8ALP
Theodore A. Miller, W1WO
Joseph J. Nameth, W8NBF
Edward M. Neal, W1BGZ
Jon Lyn Neary, KØKHP
Charles E. Nickson, Jr., WØHKC
Reynold L. Nitsch, W4NTO
Lewis S. Norman, Jr., WB6WLT
George F. Norton, W4EEE
Richard J. Norton, W6DGH/K2PHF
Patrick A. O'Bryan, WB6USZ
William R. Ogden, K4DFO
Howard T. Orr, W6EIF/WØKPD
George A. Overs, W2UZB
Lawrence W. Paige, WA4TKZ
Robert J. Peavler, KØYGR
Burton V. Perrine, W5SMG
Leslie W. Phipps, W1VAP
Fotios J. Photiadis, W2KXA
Sylvester Pindroh, W3KVI
Philip Pitman, VE3DQK
Paul O. Platt, WA6HCV
David B. Popkin, WA2CCF/WA2UZH
Thomas W. Porter, W8KYZ
J. M. Powell, Jr., W5LHZ
James O. Pullman, WA4FJM
C. Andrew Randall, W2TER
Edward A. Rauch, W8JAC
William S. Reustle, K6TFT
Zeb W. Rike, III, K5BBN
John R. Rivoire, K5AGI
R. Hamilton Robinson, W1WQC
Charles M. Rogers, K4LNO
F. Douglas Rue, WA2ASM
L. M. Rundlett, W3ZA/K4ZA/K6ZA
John W. Russell, K5RVV
Dorothy C. Saunders, W4UF
Alexander K. Scherer, W9EU
John B. Schmuck, K1SCO
Charles Scholten, W9BZU
S. C. Shallon, K6CYG
William S. Shannon, WØCXD
Charles H. Shaw, K7BEU
Howard F. Shepherd, Jr., W6QJW
William H. Shook, WA5LBP
W. P. Sides, W4AUP/W4AP
Charles D. Simmons, KØMOH
Alden W. Smith, K3ZMS/W2AFJ
Ethel M. Smith, K4LMB
James M. Smith, VE7FO
T. Frank Smith, Sr., W5VA/W5AI
Erwin Ray Sparks, W1ERB
A. V. Spear, WA5REU
Salvatore Spino, K1SCN
Burr Stalnaker, W6IEA
Donald J. Stenz, K9KSA
Frank E. Stewart, K5ANS
Kenneth D. Stewart, W4SMK
Lawrence A. Strasser, K2UMM/W2AVX
H. D. Strieter, W4DQS
Gabe W. Strybos, Jr., K5DBD
Donald G. Swartz, W4LZV
Al Swettman, Jr., K9QFR
K. D. Symington, VE6XJ
Marvin Mitsuo Tanaka, KH6BTH
Frederick S. Tanner, W1CJP
Ian G. Tervet, K6MHQ
John H. Thatcher, W7AAJ/W6NUB
Walter B. Thomas, Jr., WA4LWE
Edward P. Tilton, W1HDQ
John E. Traub, WA1ERM
Edward F. Trego, W9WKC
William E. Twaddell, WA3GIR
Reber M. Van Matre, K3NSY
Albert R. Varney, WA1HNV
C. W. Wade, WØINH
Robert G. Walton, WA6HVM
Frank W. Waxham, Jr., W7OJJ
Norman R. Weible, K4HE
William G. Welsh, W6DDB
James P. West, W6QLO
Robert A. Wilbrandt, WA9OJS
Donald A. Wilcox, VE3DUF
Eugene A. Wille, KH6EVX/W9EKU
Norman H. Williams, W6BHI
William E. Williams, K1OVF
Larry A. Wills, W8SDS
W. A. Wilson, K6ARO
Tom Wing, WØJAN/7
Louis A. Wollaeger, W9ANA/K6MX
Douglas J. Woolley, W3BFY/K4EZL
John C. Zander, W9BJX

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nated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director:

Jesse Bieberman, W3KT, Walter O. Carr, W3LDD, Harry A. McConaghy, W3EPC, Karl W. Pfeil, W3KJJ, and Harold C. Smith, WA2KND, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

CANADIAN DIVISION

For Director:

Noel B. Eaton, VE3CJ, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-laws, to be duly reelected as Director from the Canadian Division for the 1968–1969 term without membership balloting.

For Vice Director:

Colin C. Dumbrille, VE2BK, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly reelected as Vice Director from the Canadian Division for the 1968–1969 term without membership balloting.

DAKOTA DIVISION

For Director:

Charles G. Compton, WØBUO, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly reelected as Director from the Dakota Division for the 1968–1969 term without membership balloting.

For Vice Director:

John M. Maus, WØMBD, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly elected as Vice Director from the Dakota Division for the 1968–1969 term without membership balloting.

DELTA DIVISION

For Director:

H. Eugene Banta, W4SGI, and Philip P. Spencer, W5LDH/W5LXX, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director:

Max Arnold, W4WHN, and Floyd Teetson, W5MUG, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

GREAT LAKES DIVISION

For Director:

Dana E. Cartwright, W8UPB, Roger J. Jones, Jr., W8GXR, Alban A. Michel, W8WC/W8SMQ, Leonard M. Nathanson, W8DQL, John E. Siringer, W8AJW, and James W. Voorhees, W8EGR, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director:

Charles C. Miller, W8JSU, and Charles C. Whysall, W8TV, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

MIDWEST DIVISION

For Director:

Sumner H. Foster, WØGQ, and William J. Schmidt, WØOZN, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director:

Ralph V. Anderson, KØNL, Warren C. Dennis, KØBND, Charles O. Gosch, WØBUL, and Ronald M. Schweppe, KØEXN, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

PACIFIC DIVISION

For Director:

Oscar A. Heinlein, W7BIF, and Donald Johnson, W6QIE, were found lawfully nominated but ineligible due to lack of the required membership continuity. Hugh Cassidy, WA6AUD, J. A. Doc Gmelin, W6ZRJ, and Larry M. Reed, W6CTH, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director:

Stanley R. Babcock, WB6HVA, was found lawfully nominated but ineligible due to lack of the required membership continuity. Donald Johnson, W6QIE, was found lawfully nominated but under the By-laws, his nomination for Director takes precedence. David P. Baker, W6WX, and G. Donald Eberlein, W6YHM, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent Full Members of the Division.

SOUTHEASTERN DIVISION

For Director:

Charles J. Bolvin, W4LVV, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly reelected as Director from the Southeastern Division for the 1968–1969 term without membership balloting.

For Vice Director:

William C. Gann, W4NML, was found lawfully nominated but ineligible due to lack of the required membership continuity. Albert L. Hamel, K4SJH, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly reelected as Vice Director of the Southeastern Division for the 1968–1969 term without membership balloting.

At this point Mr. Williams departed from the meeting.

On motion of Mr. Smith, unanimously VOTED that Wayland M. Groves, Charles G. Compton and Noel B. Eaton, with F. E. Handy, and David H. Houghton as alternates, are appointed a Committee of Tellers to count the ballots in the current election.

The Secretary presented applications for Charter Life Membership. On motion of Mr. Eaton, unanimously VOTED that Charter Life Membership is conferred upon the following members:

[EDITOR'S NOTE: The list appears on pages 80–81 this issue.]

(Continued on page 86)

Just at press time, the Federal Communications Commission released sets of questions to indicate the scope of the written examination for the new Advanced Class license, and the revised material for the Extra Class license. Both become effective November 22, 1967. A new edition of the ARRL **License Manual** *is in preparation and should be in distribution about the middle of November. Meanwhile, we reproduce here the material provided by FCC.*

Study Questions For New FCC Exams

For The Advanced Class Examination

1. Be familiar with Part 97 of the Commission's Rules which governs the Amateur Radio Service.
2. What is a good indication that a high standing wave ratio (s.w.r.) is present on a transmission line? Where is the best point on a long transmission line to measure the s.w.r.?
3. What methods are most commonly used to generate single sideband signals? Draw a block diagram of the filter method showing all essential stages. How can a low frequency s.s.b. signal be converted to the desired transmitting frequency?
4. What happens to the voltage, current and impedance along a transmission line with an s.w.r. of 1?
5. What are harmonics? How can the generation of excessive harmonics be avoided?
6. What factors affect the state of ionization of the atmosphere?
7. What types of emissions can be received with selectable sideband receivers?
8. The ratio of the peak envelope power to the average power in a s.s.b. signal is primarily dependent on what?
9. How can receiver sensitivity and selectivity be improved?
10. How close to the edges of a certain amateur band can you safely operate a v.f.o. c.w. transmitter if you are using a frequency meter having maximum possible error of 0.01 percent?
11. A transmission line that feeds an antenna has a power loss of 10 db. If 10 watts are delivered to the transmission line input, how much power is delivered to the antenna? List possible causes of power loss. How can the s.w.r. of the line be made as low as possible?
12. How do parasitic oscillations affect circuits? What can be done to prevent or eliminate parasitics?
13. What is backwave radiation? How can it be eliminated?
14. Define maximum usable frequency.
15. A resistor, capacitor and inductor each have 100 ohms of resistance or reactance. What is the equivalent series impedance of these three elements?
16. What do oscilloscope patterns showing 25%, 50% and 75% modulated signals without distortion look like?
17. What are some common types of oscillators employed in amateur equipment? How can each be identified in circuit diagrams? What part does feedback play in these oscillators? What points in the circuits should be coupled to provide good feedback?
18. Why is neutralization important in amplifiers? What points in an amplifier circuit should be coupled to provide good neutralization?
19. When is an amplifier operating Class A? Class B? Class C?
20. What happens to even-order products in r.f. linear amplifiers?
21. What is a third party agreement? What countries have such agreements with the United States?
22. What are Lissajous figures in oscilloscope operation? What scope patterns would be produced if the signal applied to the horizontal input has a frequency equal to two, three and four times the frequency of the signal applied to the vertical input?
23. How are bypass capacitors used? How should its impedance compare to the element it shunts?
24. How can TVI caused by cross-modulation be remedied?
25. How can s.s.b. signals be amplified with little or no distortion?
26. A superheterodyne receiver having an intermediate frequency of 455 kc. is to be adjusted to receive a signal on 3900 kc. What frequencies can the high frequency oscillator be set to, to give a beat signal at the intermediate frequency?
27. What circuit factors affect the peak envelope power of a transmitter?
28. How does a full-wave bridge rectifier operate? What is the schematic diagram of this rectifier circuit?
29. When can a low-pass filter be installed in a coaxial cable without causing a large power loss?
30. How can the resonant frequency of an antenna be increased? Decreased?

31. A 70-ohm half-wave antenna operating on a frequency of 7300 kc. is to be matched to a 50-ohm transmission line. Calculate the characteristic impedance of a quarter-wave matching section and the physical length of the antenna at the frequency given. What is the s.w.r. between the antenna and transmission line without a matching section?
32. Power dissipation in what part of a transistor warrants careful observance of power ratings?
33. Define the shape factor of a crystal lattice band-pass filter.
34. Compare the pentode, tetrode, and triode for use in an r.f. amplifier stage. Give advantages and disadvantages of each.
35. What is meant by describing a radio wave as horizontally or vertically polarized? Which type is most suitable for sky and ground wave propagation?
36. Which amateur band is the most suitable for daytime communication over a distance of about 200 miles?
37. Should a voltmeter have high or low internal circuit resistance? Explain.
38. A transformer with 115 volts applied across the primary terminals has a primary to secondary turns ratio of 10 to 1. If a 5-ohm load is connected to the transformer secondary, the reflected primary impedance is what? How much voltage appears across ½ of the turns of the primary?
39. What functions does a variable-mu tube perform in an r.f. amplifier stage of a receiver?
40. Compare transistors and tubes. What are the advantages and disadvantages of each?
41. How do noise limiters operate?
42. How do inductors combine in series and in parallel? Capacitors in series and parallel?
43. Define frequency deviation in f.m. transmissions.
44. How does the peak-envelope power input of an amplifier used for c.w. compare to the p.e.p. of an s.s.b. amplifier when using the maximum legal d.c. power?
45. What are the advantages and disadvantages of using the same antenna for receiving and transmitting?
46. What is the vacuum tube counterpart of (1) a grounded base circuit; (2) grounded emitter circuit; (3) grounded collector circuit?
47. How does the sunspot cycle affect wave propagation? What are the best frequencies to use for day and night, short and long distance communications during the cycle?
48. How does automatic gain control operate? When can it be used for s.s.b. operation? C.w. operation?
49. How should a linear amplifier be adjusted for linear operation?
50. How is the power output of a 100% modulated a.m. signal related to the carrier power?
51. Why does a type 6146 tube have 3 prongs connected to the cathode?

For The Amateur Extra Class Examination

1. What are sideband frequencies? During 100% sinusoidal amplitude modulation, what percentage of the average power is in the sidebands?
2. What do the modulation envelopes of amplitude-modulated waves with 75%, 100%, and greater than 100% modulation look like?
3. How may a limiter be employed in an f. m. receiver?
4. What precaution(s) should be taken when measuring the rectified grid voltage in an oscillator with a d.c. voltmeter?
5. What is meant by frequency shift keying and how is it accomplished?
6. Why is there a practical limit to the number of stages that can be cascaded to amplify a signal?
7. What are A5 and F5 emissions? On what amateur frequencies can these emissions be transmitted?
8. How does amateur TVI usually affect television reception?
9. In what section of a properly operating s.s.b. transmitting system is distortion most likely to originate?
10. What is the meaning of the time constant in a resistance-capacitance circuit?
11. How does a squelch circuit operate? Draw a commonly used squelch circuit.
12. An oscilloscope is used to study the relationship between the input and output of an amplifier produced by a voice signal. How would the scope pattern display a linear relationship?
13. Draw a block diagram of an RTTY system showing the function of each stage. What is the proper way of identifying an RTTY transmission?
14. How can the two-tone test output of a linear amplifier be used to tell if a transmitter is working properly?
15. Define the alpha cut-off frequency of a transistor. How is this parameter of use in circuit design?
16. What are inductive and capacitive reactance? How are their phase angles related?
17. How does the positioning of a powdered-iron tuning slug affect the frequency of the oscillator it is tuning?
18. Define the deviation ratio in a frequency modulated signal.
19. What type of signal will be produced when the output of a reactance modulator is coupled to a Hartley oscillator and multiplied in frequency?

20. How would the reception of a single sideband signal be affected if the carrier is not completely suppressed?
21. How does the beat frequency oscillator affect the tuning of a single sideband signal?
22. Can a lossy transmission line be used to transmit signals? Explain.
23. How can you distinguish between a product and an envelope detector?
24. How can a receiver be adjusted for s.s.b. reception when the receiver does not have a product detector?
25. How do mica and paper dielectric bypass capacitors compare at different frequencies?
26. How do filter capacitors made of mica and paper compare at different frequencies?
27. Where in a receiver circuit should a limiter/blanker stage be placed to provide maximum utility?
28. What frequency should a crystal oscillator circuit be tuned to for maximum stability?
29. What determines the fundamental operating range of a multivibrator?
30. What does the term "power factor" mean in reference to electric power circuits?
31. What factors determine the frequency at which a quartz crystal will oscillate?
32. Explain the properties of a quarter-wave section of r.f. transmission line.
33. How should a wave trap be connected to a receiving antenna circuit to attenuate an interfering signal?
34. Why are synchronizing pulses transmitted with television signals?
35. How may an amateur check his transmitter for spurious sidebands?
36. How can the safe power input to a crystal oscillator circuit be determined?
37. How is the decibel used for voltage and power calculations?
38. How are transistors biased for amplifier operation? How are they biased for cutoff (open circuit) and saturation (short circuit)?
39. How do n-p-n type transistors differ from the p-n-p type? How does their bias differ?
40. How is the output circuit of a transmitter adjusted to increase or decrease its coupling to the antenna systems?
41. How do filters attenuate harmonic emissions?
42. List several advantages and disadvantages each for Class A, Class B, and Class C amplifier operation.
43. What are some different types or sources of noise voltages in reception? How is each type generated?
44. What are the current and voltage characteristics along a transmission line when it is matched and mismatched?
45. How do receivers for remote control of objects and regular type communications receivers differ in basic operation?
46. How will a long and a short time constant a.v.c. circuit affect reception?
47. What useful functions does a balanced modulator perform in a radio transmitter?
48. How does the directivity of an unterminated "V" antenna and parasitic beam antenna compare?
49. If a crystal lattice bandpass filter has bandwidths of 1.5 kc. at the 6 db. points and 3 kc. at the 60 db. points, calculate the shape factor.
50. What would happen if the grid-bias supply of a Class C modulated amplifier was suddenly short-circuited?
51. How do trimmer and padding capacitors affect receiver tuning?
52. What is the phase relation between the input and output signals in the common-emitter, common-base, and common-collector transistor circuits?
53. How can a transmitter be tested for self oscillation? What precautions should be observed during testing?
54. How can unwanted v.h.f. resonances in a transmitter amplifier be moved from TV channel frequencies?
55. A 70-ohm transmission line is connected to a 35-ohm antenna. Calculate the standing wave ratio (s.w.r.), the reflection coefficient, and the percent reflected power. If 10 amperes are flowing in the antenna terminals, what is the current in a transmission line node?
56. What is a grid-bias modulated amplifier? Should the source of fixed bias have a high or low internal resistance? Explain.
57. Of what importance is the signal-to-noise ratio of a receiver? At what radio frequencies is this ratio most important?
58. What are aurora-reflected v.h.f. signals? If such a signal is heard, what does it sound like?
59. Define the conversion efficiency of a mixer tube.
60. How does a cathode-ray tube operate? How should the plates of a cathode-ray tube be biased?
61. What are some causes of the excessive production of harmonics in r.f. amplifiers? How can these causes be remedied?
62. What effect does an untuned antenna and transmission line have on a transmitter?
63. How are reactance tubes used?
64. How are phasing condensers used in crystal filters?
65. What means may be employed to measure low frequencies? High frequencies? V.h.f. and u.h.f.?

66. How are grounded-grid amplifiers used in electronic circuits? List some advantages and disadvantages of their use.
67. What constitutes a parasitic antenna element?
68. What is the image-response of a receiver? How can it be reduced?
69. What is a third-party agreement? What countries have agreements with the United States?
70. What effect will extending the low-frequency response to a signal have on the design of a s.s.b. receiver?
71. List some different types of beam antennas.
72. What radiotelephone transmitter operating deficiencies may be indicated by a decreasing antenna r.f. current during modulation of the final r.f. amplifier?
73. What improper operating conditions are indicated by the upward or downward fluctuation of a Class A amplifier's plate current when a signal voltage is applied to the grid? How can this be corrected?
74. What improper operating conditions are indicated by grid current flow in a Class A amplifier?
75. What may be the cause of a decrease in antenna current during modulation of a Class B r.f. amplifier?
76. What determines the skip distance of radio waves?
77. How can parasitic oscillations be prevented?
78. Give some proven methods of harmonic reduction in transmitters.
79. Describe briefly some well known types of antennas and antenna systems used by amateurs which do, and do not, reduce harmonic radiation. QST

Happenings of The Month

(*Continued from page 82*)

The secretary presented applications for Life Membership. On motion of Mr. Eaton, unanimously VOTED that Life Membership is conferred upon the following members:

Willie E. Booth, Jr., K5DJK; Harry A. McConaghy, W3EPC; Clifford E. Fisher, W6DII; Lawrence W. Joy, WA8FLK; Houston H. Slate, W6WNF; Duncan Stewart, W6DK; Hervey B. Varney, WA1GIA.

On motion of Mr. Compton, affiliation was unanimously GRANTED to the following societies:

Brookhaven National Laboratory Amateur Radio Club — Upton, New York
Caprock Amateur Radio Society — Lubbock, Texas
Central Louisiana Amateur Radio Club — Alexandria, La.
Central Massachusetts Amateur Radio Assn, Inc. — Worcester, Mass.
Delta Amateur Radio Club, Inc. — Stockton, Calif.
Greenville VHF Society — Greer, S. C.
Horlick High School Ham Radio Club — Racine, Wisconsin
Maydale Amateur Radio Club — Silver Spring, Md.
Otero County Amateur Radio Club — Rocky Ford, Colo.
Spokane Dial Twisters, Inc. — Spokane, Wash.
State Health Amateur Radio Emergency Service — Berkeley, Calif.
Tuolumne County Amateur Radio Society — Sonora, Calif.
UCCARC (Union Carbide Caribe Amateur Radio Club) — Ponce, Puerto Rico
Worthington Amateur Radio Club — Worthington, Minn.

On motion of Mr. Groves, unanimously VOTED to grant approval for the holding of a New England Division convention at Swampscott, Massachusetts, June 1–2, 1968; and a Hudson Division convention at Tarrytown, New York, on October 12–13, 1968.

The Committee was in recess for luncheon from 1:15 to 1:55 P.M., during the course of which Treasurer David H. Houghton and Directors Robert York Chapman, W1QV, and Harry J. Dannals, W2TUK, joined the meeting.

At this point the Committee discussed the FCC proposal in Docket 17736 to authorize "slow-scan" television emission in portions of the amateur phone bands. Inasmuch as the comment date is December 1, and another meeting of the Committee will be held prior to that time, the Committee chose to seek more information from directors and amateurs generally before taking action.

During the course of the meeting the Committee discussed, without formal action, designs for the Life Membership certificate, Docket 15928 reactions, a program to assist Citizens Radio licensees interested in advancing to amateur status, and the "Moonray" space project.

There being no further business, the Committee adjourned at 4:35 P.M.

JOHN HUNTOON
W1LVQ, Secretary

Strays

Alexander Volta RTTY DX Contest

The SSB/RTTY Society of Como, Italy, announces that its 1967 RTTY affair will run from 1400 GMT Dec. 2 to 2000 GMT Dec. 3. The test period has been reduced from 48 to 30 hours; one's own country doesn't count as a multioperator; the same country may be claimed as a separate multiplier if worked on additional bands; awards will be issued to the top three scores with power input under 100 watts. In general other rules are similar to those shown on page 57 of September 1967 *QST*. Requests for forms (not mandatory) and entries (postmarked no later than Dec. 24, 1967) should be addressed to the SSB & RTTY Club, Box 144, Como, Italy.

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Third Telephone Pioneer Ham QSO Party

The S.S. Holmes Chapter Ham RC invites all telephone pioneer hams in the U.S. and Canada to participate in contacting as many individual members as possible and to reach members in as many different chapters as possible. *Rules:* Start 1700 GMT Dec. 2, 1967, end 2700 GMT Dec. 3 1967.

(*Continued on page 150*)

I.A.R.U. News

INTERNATIONAL AMATEUR RADIO UNION

HEADQUARTERS TRAVEL

The Hq. of IARU is continuing its policy of visiting with as many of the other societies as possible. During September, ARRL Assistant General Manager W1IKE met with officers of the IARU societies in Liberia, Ghana, and Nigeria, to discuss plans for improving the strength of international amateur radio. W1IKE also met with amateur groups in Dakar, Ivory Coast, Sierra Leone, and Niger, to encourage their participation in activities of the IARU and in conducting training programs for increasing the numbers of amateurs in Africa. Such training programs are already successfully underway in a number of countries.

Also during September, ARRL's General Counsel W3PS met with officers of the Radio Society of East Africa, in Nairobi, for the same purpose.

NEW ZEALAND RECIPROCAL NOTES

In August, we announced a reciprocal operating agreement between the U.S. and New Zealand including Cook Islands and Niue. U.S. amateurs wishing to operate under the agreement should apply to New Zealand Post Office district engineering offices. Assistance may be obtained by writing the *New Zealand Association of Radio Transmitters*, Box 1459, Christchurch. Applicants will be required to produce a current U.S. amateur license and comply with all provisions of the New Zealand Radio Regulations as they apply to amateur radio stations.

The Novice class license will not be recognized for this purpose, and Technician Class licensees will be authorized to operate only on frequencies above 144 Mc. U.S. amateurs authorized to operate will use their own call, followed by a slant-bar and the ZL call issued to them, e.g., W1-AAA/ZL1ZZZ. An indicator for portable or mobile may be added where appropriate.

NETHERLANDS ANTILLES RECIPROCITY

The reciprocal operating agreement between the U.S. and the Netherlands has now been extended to the Netherlands Antilles. Duly licensed U.S. amateurs can now obtain permission to operate on any of the six PJ islands.

The U.S. amateur should send his request to the U.S. Consul General in Willemstad, Curacao, at least eight weeks in advance. A form will be returned to him which should be completed and returned to the Consul along with a photostat of his U.S. license and a cheque for the $7.00 license

Barney Patterson, GI3KYP, president of the *Radio Society of Great Britain* (left photo) and Ragnar Otterstad, LA5HE, vice president of the *Norsk Radio Relae Liga*, (right photo) both spoke at the banquet of the Central Division Convention at Milwaukee in July.

fee. The Consul will then make a formal petition to the Governor. After a processing time of five weeks, the license will be mailed to whatever address is requested by the applicant. It should be noted that — as for PJ hams — third party traffic and one way transmission from the islands are strictly forbidden.

VENEZUELA RECIPROCITY

Venezuela has entered into a reciprocal operating agreement with the United States which became effective October 3. There are now 30 such agreements between the U.S. and other countries: a full tabulation appears elsewhere in this department.

YUGOSLAVIA ISSUES COURTESY LICENSES

The *Savez Radioamatera Jugoslavije* has arranged with authorities for temporary licenses to be issued to visiting amateurs during 1967 on a courtesy basis. To date, applications have been received from amateurs in Austria, Germany, Italy, Sweden, and the United States. For details, write the S.R.J., P.O. Box 48, Belgrad, Yugoslavia. S.R.J. urges other national societies to open-up negotiations for reciprocal operating agreements and offers to assist such efforts.

WEST PAKISTAN RESUMES LICENSING

The *Lahore Amateur Radio Society* reports that the Government of Pakistan resumed issuing amateur licenses in August. All amateur transmitting licenses had been cancelled in May, 1965, due to an emergency in the country.

MEMBER SOCIETY OFFICER CHANGES

The *New Zealand Association of Radio Transmitters* announces the appointment of Mr. George Walker, Box 1459, Christchurch, New Zealand as its General Secretary. Although not a licensed amateur, Mr. Walker is very interested in amateur affairs. NZART is now in the process of moving its headquarters from Auckland to Christchurch. For the present, all correspondence should be addressed to either Mr. Walker, or President H. Burton, ZL2APC, c/o Wilson, Waitohu, Yorks Bay, Wellington.

D. W. Robinson, G3FMT was appointed General Manager of the *Radio Society of Great Britain* as of June 1, 1967. N. Caws, the Honorary Treasurer, was additionally appointed Secretary on a short-term basis only. Both posts had been held by the late John Rouse, G3AHL, who died in May.

The *Liga Panamena de Radioaficionados* reports that Delfin Galvez, HP1DG has become their new president. The new QSL bureau address for Panama is reported elsewhere in this department.

SPECIAL PREFIX FOR FINNISH CLUB STATIONS

In celebration of the 50th anniversary of independent Finland, Finnish amateur radio club stations are authorized to use the prefix OF instead of OH. The use of this special prefix is voluntary among the approximately 50 active club stations. The calls will be used only during the

(*Continued on page 162*)

DX OPERATING NOTES

Reciprocal Operating

(**Bold face** indicates changes since the most recent *QST* listing.)

United States Reciprocal Operating Agreements currently exist *only* with: Argentina, Australia, Belgium, Bolivia, Canada, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, France, Germany, Honduras, India, Israel, Kuwait, Luxembourg, Netherlands, New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, Portugal, Sierra Leone, Switzerland, Trinidad and Tobago, United Kingdom and **Venezuela.** Several other foreign countries grant FCC licensees amateur radio operating privileges on a courtesy basis; write headquarters for details concerning a particular place.

Canada has reciprocity with: Belgium, Bermuda, France, Israel, the Netherlands and U.S.

Third-Party Restrictions

Messages and other communications — and then only if not important enough to justify use of the regular international communications facilities — may be handled by U. S. radio amateurs on behalf of third parties *only* with amateurs in the following countries: Argentina, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Greenland (XP calls only), Haiti, Honduras, Israel, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela. Permissible prefixes are: CE CM CO CP CX EL HC HH HI HK HP HR LU OA PY TI VE VO XE XP YN YS YV ZP 4X and 4Z. Canadian radio amateurs may handle these same type third-party messages with amateurs in Bolivia, Chile, Costa Rica, El Salvador, Honduras, Israel, Mexico, Peru, U. S. and Venezuela. Permissible prefixes are: CE CP HR K OA TI W XE YS YV 4X and 4Z.

DX Restrictions

United States amateur licensees are warned that international communications are limited by the following notifications of foreign countries made to the ITU under the provisions in Article 41 of the Geneva (1959) conference.

Cambodia, Indonesia (including West New Guinea), Thailand and Vietnam forbid radio communication between their amateur stations and amateur stations in other countries. U. S. amateurs should not work HS XU XV 3W8 or 8F. Canadian amateurs may not communicate with Cambodia, Indonesia, Laos, Thailand, Vietnam and Jordan. Prefixes to be avoided are HS JY XU XV XW8 3W8 and SF.

Correspondence From Members-

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

INCENTIVE LICENSING KUDOS . . .

¶ FCC is to be congratulated on its newly promulgated rules for incentive licensing.

While my personal feelings tend toward more difficult examinations and higher code requirements, I think retention and rejuvenation of the Advanced Class was a fine stroke of diplomacy (wish they had made the c.w. requirements 15 or 18 w.p.m.). — *John E. Morris, WA6MLZ, Coronado, California.*

¶ Great! I am 15 years old and looked at the Extra Class license as a dim hope. Now, I want to get that bottom 50 kc. back so much I am almost ready to take the test. Extending the Novice another year is great; and, the phone men who can't make the Extra Class grade can take the Advanced Class and just take a harder theory test — the code is still 13 w.p.m. — *Scott Gibson, Highland Park, Illinois.*

¶ Many of the people I contacted were of the opinion that they were about to lose their licenses at the very least. The loss of some operating privileges is not quite as bad a burden to bear. But the opportunity to regain most of those privileges with a very little effort on the part of most was most joyful news to all I spoke to. — *Matthew Raiken, WB2JJW, Westbury, Long Island, New York.*

¶ Just read the good news of the FCC's recent decision regarding frequency separation for the Advanced and Extra Class holders. I'm sure the ARRL had quite a bit to do with it . . . — *Charles E. Bailey, Jr., W4OXX, Louisville, Kentucky.*

¶ One of my friends has informed me that there will now be incentive licensing. Over the past few years I have been engaged in commercial communications and have had a limited activity in the amateur field. The difference in knowledge between a second and a first class commercial radio operator was something which one who is not engaged in commercial radio would find hard to believe. The incentive of more pay was enough to make every second class operator study so he could get more benefits when he got his first class license. Also some of our stations required a first class operator and this was enough incentive to make our second class operators want to become first class operators so that they could operate these stations.

It is therefore my belief that incentive licensing will be both a benefit to the individual amateur and to all amateurs as a whole. — *Joseph A. Greenberg, K2BIG, Yonkers, New York.*

¶ The new incentive licensing is a very good thing for amateur radio. It will upgrade quite a number who, if not confronted with the new day, would continue through the years with little new effort . . . — *John Watson, W4GD, Memphis, Tennessee.*

¶ When the ARRL gets a look at the questions on the "new" Advanced Class test, would it be possible for *QST* to take 3 or 4 pages and print your normal license manual-type questions and answers. This way all the ARRL folks could have a copy of the questions 2 to 3 months early since it will take time for all the shops to get the new License Manuals. — *Edwin T. Shell, W5ZBC, Bossier City, Louisiana.*

[EDITOR'S NOTE: Indeed we will! *QST* will carry at least a summary of the new study material for the Advanced Class license, and a new edition of the *License Manual* will carry the info.]

. . . LAMENTS

¶ You miserable blockheads!

I regret very much that I am not in a position to see you personally and tell you exactly what I think of you and postal regulations will not permit me to write it here and send it thru the mails.

You should be quite satisfied now that the FCC has acted on your idiotic incentive licensing proposal. Even though changed somewhat, for my part it is still undesirable. You can't let well enough alone; you have to stick your nose where it does not belong and I hope that I can live long enough to see you get it chopped off . . . — *Hood May, Jr., WA4HBY, Memphis, Tennessee.*

¶ You have done amateur radio a great disservice.

Since the proposal to issue distinctive calls has been bypassed, how are we (or anyone) going to tell if the operator in the "banned to all but Amateur Extra license holders" portions of the bands is one of this elite group, or not?

If we assume that amateur operators are all law abiding fellows, these 25 kc. segments are going to be virtually abandoned for the first few years. Unused frequencies are frequencies up for grabs. Does anyone know where the Citizens Radio Service obtained their frequencies?

I have been a victim of "Amoyotonia congenita" (a muscle disease similar to MD) since birth. I cannot stand or walk. I can hardly go to Buffalo, New York, to take the Amateur Extra exam. I am proud to say that I can, with a Vibroplex bug, send and copy 35 w.p.m. quite easily, in my head. I lack the physical ability to put down on paper more than 15 w.p.m. So, since I can't put it on paper, it doesn't matter how fast or slow my c.w. is. I doubt I can make the 20 w.p.m. and it's definitely impossible for me to take the exam direct. Am I supposed to sit idly by while a major portion of my privileges are taken away? — *Michael J. Hagen, II, WB2PPE, Waterloo, New York.*

[EDITOR'S NOTE: FCC makes arrangements on a case-by-case basis to handle licensing of the handicapped. It is standing procedure to allow dictation of code test copy and written examination answers by those who cannot write. OM Hagen's attention should be called to the provision of

the incentive licensing plan which will delay the 1969 expansion of exclusive operating segments if those given over in 1968 are not sufficiently occupied. Self-policing of these segments will be aided by the inclusion in the Fall, 1967 and future issues of the Callbook, of a letter, after each call sign, to indicate the class of license held by the amateur.]

¶ At the present time, I am operating s.s.b. working on DX. If I were to decide to operate ATV, RTTY, or f.m., this would be my incentive to increase my knowledge of these subjects. To study these subjects just for the purpose of passing an exam seems like a waste of effort, for very little will be retained after a period of time. I do plan on passing the Advanced Class exam, at the cost of the four dollar fee, the cost of the study material, and one day's vacation for the trip to Detroit for the exam. As I mentioned previously, (assuming my interest is still in DX) I will soon be right back where I am this date (with the exception of a few kc. reserved for the Extra Class), regarding technical capability . . . — *Jerry Wojcik, WA8LUC, Toledo, Ohio.*

¶ The FCC in the next year and a half is going to take the first 250 kc. on six meters away from Technician and General Class holders and give it to Extra Class operators. Why? The Extra Class will not appreciate or use to any extent this freq. These 250 kc. are the most important part of the band. The c.w. and s.s.b. operators are the ones being affected by the new changes; why does the FCC want to take the more serious and experimental type operators' frequencies away from them?

I can understand that there has to be something other than prestige to attract amateurs to the Extra Class license, but is it right to hurt the more serious operators, such as operators of 6 meter c.w. and s.s.b. — *Ken Birmingham, WB2IFC, Burlington, New Jersey.*

[EDITOR'S NOTE: When the FCC proposed to set aside part of the 6- and 2-meter bands in its docket 15928 two years ago, the League opposed the move. We were only partially successful; the Commission did not adopt restrictions on 2-meters, but did on 6. Further action by the League will depend on the Board of Directors. Members wishing to request action on this and other incentive licensing matters may write their director whose name and address appears on page 8.]

¶ The higher requirements in code speed and theory will not help an operator's proficiency. (The reason the FCC gives for incentive licensing.)

Drop the idea of incentive licensing completely, and instead, at the time when hams renew their licenses, administer the following tests: (1) The conventional 13 w.p.m. code test (General). (2) A 50 question test on operating practice. This test could be oral or written.

This will improve an operators proficiency and also eliminate the need for incentive licensing, a serious threat to the true spirit of amateur radio. — *Robert E. Wilk, WA0OTV, Kansas City, Missouri.*

¶ How do you expect the amateurs of America to pass traffic when this document goes into effect? The QRM problem is bad enough right now without chopping up the bands . . . — *Bill Andersen, WA0QAK, Austin, Minnesota.*

¶ You dirty bunch of lids. Boy! I worked myself 13 years to get up to a Gen. Class now no better than a Tech.

I'll get up to a Extra Class sometime and forget all the crap twice as fast. I don't use it and it's my past time to chase DX, and build gear. I sure don't need all the stuff a Extra Class lic. gives me. I do want the air space I once had.

I for one will do everything to down grade ARRL as long as I live, so help me God! I know I have lots of support from the other Gen. Class.

Boy oh boy you fellows sure are a big support to the ham radio bunch. — *James Leonard, WA6TWZ, Santa Ana, California.*

GOING EXTRA?

¶ The time has come for me to let out a well-guarded secret. For years it was kept hidden by the "upper class" of amateurs, but now it will be revealed.

Simply, the Extra Class exam is a pushover. I'm sorry, but let's face the facts. The reasons? Sure, there are plenty. One is ninety percent of the material is taken from the *Handbook*. Another reason is that the questions are based on things an amateur should at least be aware of. Finally, I'm a lousy theory man, but I practically laughed my way through the test. I choked on the diagrams, but so what? We all miss a few.

Incidentally, the only reason you don't hear other Extras talk about the test to outsiders is because they're afraid that if word leaks out that the exam is a snap, they will no longer be in the "elite" class.

Granted, many of you have demanding jobs and can't give much thought to the exam. I would say under these circumstances, that you will have to make the time or lose privileges. What else can be said?

So, to make a long story short, forget everything anybody ever told you about the exam and listen to me. I have nothing to gain by lying. There are difficult things to accomplish in the world, but the Extra Class ticket does not fit into that category. — *V. Biancomino, WB2EZG, Staten Island, New York.*

¶ I am pleased to inform you that I passed the Amateur Extra exam today! The third time was the charm. Hi. Believe me, I spent many, many hours pouring over the books, but it was all fun.

I felt I should share with you what to me is an accomplishment. — *Jim Joliff, K1LQP, Newton Centre, Massachusetts.*

FB

¶ Many thanks for the August *QST*. I hope that demonstrates the Commission's willingness to walk the extra mile for the amateurs. [See page 64, August — EDITOR] My earliest interest and introduction to radio came from the amateurs in my home community of Iowa City, Iowa, and I have always been proud of their contribution to radio science and to our nation. It's an honor to be included within your pages. — *Nicholas Johnson, Commissioner, Federal Communications Commission, Washington, D. C.*

FIELD DAY LOST — CONTINUED

¶ I am a fairly new amateur being licensed only less than two years, but I have participated in Field Day both years and have enjoyed it very much. I am very much in agreement with W2QCI when he says basically [Sept. *QST*] that the real idea behind Field Day is lost in its long, drawn out preparation. Certainly we would prepare for any emergency, but how can you prepare for something when you don't know when it's coming? There's only one way to be prepared — always.

Field Day has become more of a social event than a test of skill and alertness. I would suggest that it be

something to be looked forward to the year round. I would go even farther than W2QCI's suggestion of a weekend in June, July, or August. I suggest a weekend any time of the year with a 24 hour notice via W1AW and the ARRL OBS system. This would be a *real* test of amateur emergency capability. — *Mark Baugh, WA7EKQ, Roy, Utah.*

¶ I would like to voice my support of Bob Rooney (W2QCI/W2AFT) on his Field Day article. However, I would like to have Field Day go into effect as soon as the ARRL OBS announces it; also any weekend of the year instead of June, July or August. In a real emergency we will have no assurance of advanced notice or nice weather. — *Walter G. Nickles, W8HXZ, Grand Rapids, Michigan.*

¶ I think W2QCI has a very good idea. Our local club plans ahead for Field Day, and I'm sure we're not alone!

If a disaster was imminent, we'd be in a mess! Instead of 2 months, we'd have say, *5 minutes* to plan a "Field Day"! Only the hams with emergency power could do any good. In a town like ours, there are perhaps 1 or 2 of us equipped with emergency power. Suppose we had to handle all communications of a city. Two stations handling all traffic of Wilmington and maybe all of another city (without hams) isn't enough.

If we had this 24 hr. notification, we might even be able to make a plan for emergency communications for our town by actual experience. It would be a valuable experience. I'll back W2QCI 100%! — *Robert Runnels, WA8UGT, Wilmington, Ohio.*

¶ Power system failures of colossal proportions occur repeatedly. All we need is for one of these to coincide with some natural disaster and the amateur fraternity will be, I fear, seriously embarrassed. How many of us could listen (let alone transmit) during the great northeast power failure of November, 1965? The incredible quiet on the 80 meter band, occupied chiefly by a few mobiles in the phone sections, made me, for one, think deeply about my own responsibilities. Let us ask ourselves: (a) Can we get *on the air smoothly* and quickly in an emergency — or does the FD gear gather dust all winter, lacking a power supply even if we *can* remember what plugs into what? (b) Assume the antenna has blown down — are we prepared with something which can be quickly jury-rigged? (c) Are we well enough organized to know when we are needed, and could we pass the word if the landlines were down? (d) Have we at least a skeleton plan so that we know what circuits would have to be set up, and what resources we would have to so do? Have we practiced staffing these circuits, maintaining discipline, logging the traffic? These and many other questions aren't new or original — they are asked in many forms in ARRL publications. But if we expect to discharge our obligations as hams we should each be able to answer at least some of them in a creditable manner. Many of us can answer one or two creditably (for example, the 80, 40, and 2-meter stations here run off emergency power *at all times* — there would not be a millisecond interruption if power failed). But few of us are part of an organized whole. I admire but cannot emulate the c.w. net boys. But would the net be available if the power failure were repeated?

. . . The psychologists tell us that intermittent, unscheduled, reasonably frequent reinforcement of desired behavior is a powerful shaper of such behavior. If unscheduled SETs were held 3 or 4 times per year, I feel sure we would have an upsurge of interest in, and dedication to, this important facet of amateur work. — *Frank Gue, VE3DPC, Burlington, Ontario, Canada.*

[EDITOR'S NOTE: The Communications Department would like to further study the proposal of a "surprise" Field Day although, logistics of such an operation seem formidable. The Communications Manager would like to hear your views and concrete suggestions on logistics.]

C.W. BY MAIL

¶ I am in the Navy in the Gulf of Tonkin. I now have a Technician ticket and I am working towards a Conditional or General license. I would like to get in touch with anyone who would correspond with me by taperecording in c.w. to help build up my code speed since I don't have a way to get on the air. — *Richard Lloyd, WA8PBD, RVAH-12, ASB c/o Fleet Post Office, San Francisco, Ca. 96601*

ELECTRICAL SAFETY

¶ The article on "Electrical Safety" in the August issue of *QST* was most interesting and enlightening. However, when you state that a victim of low voltage shock, who has gone into fibrillation must wait until a physician arrives, I must take issue. True, competent medical aid must be summoned at once, but I believe that in the meantime, closed-chest heart massage could and should be given to help keep the patient alive.

Closed-chest heart massage, as you no doubt know, is merely a mechanical means of forcing the heart to function by pressing on the victim's sternum (breast bone) in a rhythmic fashion; thereby alternately compressing the heart and releasing it and forcing it to function. This system of first aid to cardiac arrest and/or ventricular fibrillation is, I believe, recognized by medical authorities, but only if taught by skilled and competent instructors.

It goes without saying that this would indeed be a fine program for all radio clubs to engage in. Many power companies have competent instructors who, with the aid of a specially-made mannikin, will teach groups both mouth-to-mouth resuscitation and closed-chest massage; there are also some fine films available on these methods. — *Charles E. Rose, Ashtabula, Ohio.*

Strays

Here are three amateurs who signed up for Life Membership at the Washington State Hamfest in Yakima. From left are W7JWJ, K7YFJ, and WØJAN/7.

November 1942.

. . . K. B. Warner asks us "What are we doing?" meaning the stay-at-home reader. Well, he has a considerable list of things we can do and perhaps should be doing. Some of the things: turn in scrap metal particularly copper, brass, etc.; keep up radio licenses; join the ARRL Emergency Corps; sell commercially-built rigs to the government and buy bonds with the proceeds — etc.

. . . An interesting article on how the Navy trains radio technicians. There's a lot more to it than the average radio amateur might think. At the several training centers, the trainee learns about u.h.f. theory and practice, how to draw wiring diagrams — no more scrawling. He learns discipline, how to handle a hammock, and a host of other things. This is an intensive: three-month course and involves 70-80 hours a week.

. . . In the Technical Review section there is a wealth of information on circular and square antennas for u.h.f. A couple of these make one think of the present popular "big wheel" antennas.

. . . Phil Rand, W1DBM, describes a simple transmitter-receiver for WERS work. Funny, one never hears of a *complicated* rig. No, this one is really quite simple, at that using only four tubes for the whole works.

. . . John Huntoon, W1LVQ, has still another article on cryptanalysis. I got lost on this business a couple of months ago and now I perceive that there will be still another article next month on the same intriguing subject.

. . . George Grammer, W1DF, tells us how to build a machine for punching Wheatstone tape for automatic keyers. This might be really worth while to build, since such a tape sends perfect stuff. He also tells how to build the actual keyer, etc. We didn't have good electronic keyers in those days.

. . . Goodwin Dosland, 9TSN, is now Commanding Officer at the U. S. Navy training school at Oxford, Ohio. (He is to become president of the ARRL, you know.)

. . . Carrier current communications seems to be having quite a play with the boys here and there. — *W1AW*

A.R.R.L. QSL Bureau

The function of the ARRL QSL Bureau system is to facilitate delivery to amateurs in the United States, its possessions and Canada of those QSL cards which arrive from amateur stations in other parts of the world. All *you* have to do is send your QSL manager (see list below) a stamped self-addressed envelope about 4¼ by 9½ inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner. **Changes are shown in heavy type.**

Cards for stations in the United States and Canada should be sent to the proper call area bureau listed below.

W1, K1, WA1, WN1[1] — Providence Radio Ass'n., W1OP, Box 2903, Providence, Rhode Island 02908.

W2, K2, WA2, WB2, WN2 — North Jersey DX Assn., P.O. Box 505, Ridgewood, New Jersey 07451.

W3, K3, WA3, WN3 — Jesse Bieberman, W3KT, RD 1, Valley Hill Rd., Malvern, Pennsylvania 19355.

W4, K4[1] — F.A.R.C. — W4AM, P.O. Box 13, Chattanooga, Tennessee 37401.

WA4, WB4, WN4[1] — Richard Tesar, WA4WIP, 2666 Browning St., Sarasota, Florida 33577.

W5, K5, WA5, WN5 — Hurley O. Saxon, K5QHV, P.O. Box 9915, El Paso, Texas 79989.

W6, K6, WA6, WB6, WN6 — San Diego DX Club, Box 6029, San Diego, California 92106.

W7, K7, WA7, WN7 — Willamette Valley DX Club, Inc., P.O. Box 555, Portland, Oregon 97207.

W8, K8, WA8, WN8 — Paul R. Hubbard, WA8CXY, 921 Market St., Zanesville, Ohio 43701.

W9, K9, WA9, WN9 — Ray P. Birren, W9MSG, Box 519, Elmhurst, Illinois 60126.

WØ, KØ, WAØ, WNØ — Alva A. Smith, WØDMA, 238 East Main St., Caledonia, Minnesota 55921.

VE1, 3C1 — L. J. Fader, VE1FQ, P.O. Box 663, Halifax, N.S.

VE2, 3C2 — John Ravenscroft, VE2NV, 135 Thorncrest Ave, Dorval, Quebec.

VE3, 3C3 — R. H. Buckley, VE3UW, 20 Almont Road, Downview, Ontario.

VE4, 3C4 — D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.

VE5, 3C5 — Fred Ward, VE5OP, 899 Connaught Ave., Moose Jaw, Saskatchewan.

VE6, 3C6 — Karel Tettelaar, VE6AAV, Sub. P.O. 55, N. Edmonton, Alberta.

VE7, 3C7 — H. R. Hough, VE7HR, 1291 Simon Road, Victoria, British Columbia.

VE8, 3C8 — George T. Kondo, VE8 ARRL QSL Bureau of Department of Transport, Norman Wells, N.W.T.

VO1, 3B1 — Ernest Ash, VO1AA, P.O. Box 6, St. John's, Newf.

VO2, 3B2 — Goose Bay Amateur Radio Club, P.O. Box 232, Goose Bay, Labrador.

KH6, WH6 — John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, Hawaii 96701.

KL7, WL7 — Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687.

SWL — Leroy Waite, 39 Hanum St., Ballston Spa, New York 12020.

[1] **These bureaus prefer 5 × 8 inch manila envelopes.**

Missouri — The Jefferson Barracks ARC will hold their annual Hamfest and Auction at the Mosley Auditorium, 4610 North Lindbergh, Bridgeton, Missouri, on Friday, November 10.

COMING A.R.R.L. CONVENTIONS

November 3-4, 1967 — Ontario Province, Ottawa, Ontario

November 5, 1967 — Roanoke Division (V.H.F.), Duncan, S. C.

April 26-27, 1968 — Michigan State, Lansing, Mich.

June 1-2, 1968 — New England Division, Swampscott, Mass.

June 7-9, 1968 — National, San Antonio, Tex.

August 3-4, 1968 — Central Division, Springfield, Ill.

October 12-13, 1968 — Hudson Division Tarrytown, N. Y.

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

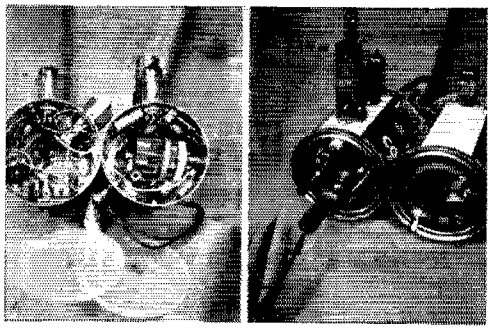
How:

Every ham should have three stations — one that looks good, one he built himself, and one that works.
— AN OLD-TIMER

Next to international person-to-person DX, possibly the most unique privilege of our radio amateur is the authorization to use self-styled equipment. Every other licensed service has its transmitting gear more or less rigidly type- and construction-controlled by FCC — even down to lowly C.B. QRP. Only the ham is gloriously free from constrictive commercial technique. He can work his ZLs with old TV-set parts tacked to an apple crate if he desires, so long as resultant signals conform to statute.

He need not sacrifice safety, simplicity, experimental facility nor circuit performance for the sake of mere customer-pleasing compromise and gimmickry. Knob-meter-jack panel symmetry? He need not bother with knobs, meters, jacks and panels at all if he finds them superfluous to the purpose of his license: QSOs. Tinfoiled cardboard boxes or wire-mesh cages can become convenient and effective cabinets for the amateur. Commercials can use 'em only in their labs.

When you're a bit jaded by quick and easy WACs via the chrome-trimmed Superduper IV route, open the door to some revitalizing homebrew fun. It's surprising how much more satisfying a QSO can be after devising the means oneself. If you're not already a builder don't tackle the most intricate contraption you can find. Small leisurely completed kit gadgets can get your feet wet with plenty of "done it myself" satisfaction.



Two 6U8As, two coffee cans and two watts of c.w. or a.m. How's DX? Both coasts on 80, New England on 160. (Photos by W9GFF)

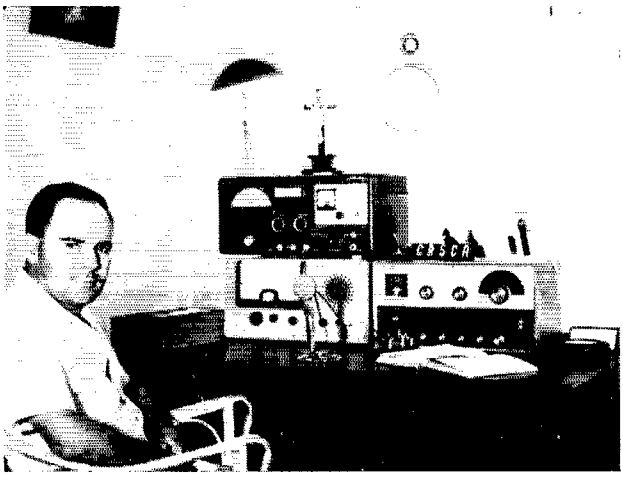
Incidentally, W2MEL's World Institute of Home Brewers will certify homebuilt (nonkit) amateur stations. Try a self-addressed stamped envelope to Al for details on WIHB.

*7862-B West Lawrence Ave., Chicago, Ill., 60656.

—Reprinted from January 1959 QST thanks to WA3FPM

What:

160 offers a double DX feature this coming season. Firstly, there are the popular and annual 160-meter Trans-atlantic and World-Wide DX Tests, a series of activities promulgated by W1BB and associates since 'way back in 1932. Reminiscent of pioneering transatlantic crossings by Deloy, Schnell, Reinartz, Godley and others in '21, the Tests will be held this 1967-'68 season on these Sunday mornings — December 3rd, 17th and 31st, January 14th, February 4th and 18th, 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. W1BB exhorts, "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 1907-1912.5 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." . . . . . Many of the vets on 160 think it's a fine idea to give newcomers to this band a DX break. It is therefore recommended, at 0500-0730 GMT, January 17th and March 4th, that big-sig W/K/VE regulars simmer down and clear the ether for "first-timers." European and African first-timers will be given the same courtesy at their ends on December 17th, January 7th and February 4th . . . . . Meanwhile, sparked by the JA gang, a new similar set of 160-meter Transpacific Tests beckons our westerners at 1330-1600 GMT on December 2nd, 16th and 30th, January 13th, February 3rd and 17th. JAs 1BHG 1CJQ 1GIV 1PVK 1RST 3AA 3JM, KA9MF, KH6IJ, KL7FRY, VK5KO, ZL3RB, other top-band regulars and plenty of fresh Asia/Oceania DX talent will be on hand for the fun. W1BB says, "These Transpacific Tests are a trial activity. Their continuation will depend on results, interest, activity and wishes of those involved." Stew, as usual, offers his good offices as clearing-house for 160-meter DX news from all points . . . . . Remember that commercials KPH on 2045 kc., WNU, 2048, and WCC, 2036 kc., are valuable conditions indicators for 1.8-Mc. skip. FCC-licensed ama-



CR5CA means rare Sao Thome to the country-hungry. "I usually work 15 meters at 2000–2200 GMT," Almeida writes K2KBI, "but will try other bands after a revision of my receiver." (Photo via WA3DSD)

tours new to the band should ascertain what frequency segments and power maximums prevail at their locations. Privileges may vary from state to state. Page 71, September '67 *QST*, provides the picture. Sure, we're nearing a sunspot maximum and nobody has a right to expect DX on 160. Hah — that's what many said *last* season before the fireworks began! See you in the pile-ups?

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More spot-checks on the "How's" Bandwagon next month with the aid of (20 phone) **Ws** 2DY 2VOZ 3HNK 3JZJ/9 3LE 3SEJ 4NXD 4YOK 6AEM 8YGR 9LNQ, **Ks** 3MNJ 4HPR 4HQD 5VTA 7INE 7YDZ, **WAs** 1CYT 1GGN 2LOR 2WIJ 3GJU 5PUQ 8MCQ 9MQI 9SXQ, **WBs** 2ZUB 6KVA, P. Kilroy; (20 c.w.) **Ws** 3HNK 3JZJ/9 4NXD 4YOK 7VCB 8YGR 9LNQ, **Ks** 3MNJ 4UTI ØDEQ, **WAs** 1CYT 1FHU 2LOR 2WIJ 3GJU 5PUQ 6JDT 7BOA 7BOB 8MCQ 9QBM 9SXQ, **WBs** 2LDX 2RJJ 2ZQE 2ZUB 6KVA, I1ER, VE1ZT; (15 phone) **Ws** 2DY 3HNK 4YOK 8YGR 9LNQ, **Ks** 3MNJ ØDEQ, **WAs** 1CYT 2LOR 5PUQ, **WB2LDX**; (15 c.w.) **Ws** 3JZJ/9 4YOK 7VCB 8YGR 9LNQ, K3MNJ, **WAs** 1CUN 1CYT 1FHU 1GXE 2LOR 5PUQ 7GFT 8MCQ 9MQI, **WBs** 2LDX 4EFE, **WNs** 3HRV 8VZS 9TIL ØRJY; (10 phone) W8YGR, **WAs** 2LOR 5PUQ 9MQI; (40 c.w.) **Ws** 3JZJ/9 7VCB 8YGR, **WAs** 1CUN 1FHU 8MCQ 8PVN; (80 c.w.) W1SWX, **WAs** 1FHU 1GXE and 8MCQ, plus reporters now filing. Got a hundred on 10 yet?

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Some *vox DX populi* now as space permits. . . . "Good old straight-a.m. caught forty fast countries on 10." — *WB2WHB*. . . . "I stick to fun-filled 40 most of the time." — *WA8PVN*. . . . "Sure would like to catch a KC4 from here." — *K2YJU/KL7*. . . . "Fifteen wasn't up to par this summer." — *W2DV*. . . . "With my luck I'll draw a real fink of a Five call." — *W8QIU/5*. . . . "Retired from the Navy in August to practice law and DX around Norfolk." — *W4NJF*. . . . "Korean stations are not licensed to QSO countries in the Russian bloc." — *HL9KA*. . . . "Friend 4X4CJ is back on after a three-year layoff." — *WA1CYT*. . . . "MP4MAX (G3SYW) finished U.K. leave last month." — *WB2CGW*. . . . "Too bad there were no 28-Mc. facilities at UA1CK/JT." — *WA6AHF*. . . . "4X8s are in Old Jerusalem." — *W2AAH*. . . . "Fine signal from K7WSJ in the Boy Scout Jamboree on the Air." — *VK9BS*. . . . "Rough getting QSLs to even up my 137/38 worked/confirmed total." — *WA4UXU*. . . . "New triband quad worked 30 fast countries." — *WA8DMH*. . . . "Raised thirty JAs and five VKs within a few hours on 15." — *WA3DSD*. . . . "My 'Round the World' card should have given March 12th as the date for 9M8RS operation." — *K6KA*. . . . "Has anyone worked 5N2AAF since June?" — *W7VRO*. . . . "TG5WJ doesn't go for breakers, tail-enders or contest-style QSOs." — *K2DDK*. . . . "We expect an even larger participation in our 1968 Colombia Contest." — *HK3RQ of LCRA*. . . . "Watch out for my new quad!" — *WA9MQI*. . . . "Stuck in a California canyon but do okay on 40." — *WB6KVA*. . . . "Hot weather, cool bands." — *W7VCB*. . . . "ZL2AFZ sure is a snappy operator." — *K4MYO*. . . . "Worked VU2JA nine days running until a sunburst broke the string." — *W8YGR*. . . . "Need a hotter receiver for 15 and 20." — *WA1GGN*. . . . "VU2DKZ's fifty-watt sidebander really bangs through on 15." — *W2GTQ*. . . . "Thanks to those courteous W/Ks who stood by for DX to work me first on Prince Edward Island." — *WA3ATX/VE1*. . . . "My son climbs 32-ft. sticks for Bell, so that's the solution to my antenna-work problem." — *W6EAY*. . . . "K4QIN can arrange skeds with me." — *WA3DVO/VP6*. . . . "In getting QSLs through to Russian hams, Box 88 seems about five per cent efficient." — *W7UVR*. . . . "They're working hard on the proposition of operational reciprocity with Italy." — *I1DFE*. . . . "DI2LE's *World Cat* has a crew of only two." — *ZL1ARY*. . . . "With so many other kc. to roam around in why do rag-chewers congregate near 7005 kc.?" — *W9BRD*. . . . "Mailed out 350 QSLs for FO8BV." — *W6JFM*. . . . "Broke my SX-28 wafer band-switch." — *P. Kilroy*. . . . "Something like 65 countries on 3.5 Mc. from here." — *K3KMO*. . . . "Homebrew my own gear and improve it from time to time with surplus." — *KV4CI*. . . . "Fine accommodations on our visit to PJ3CC." — *W3AYD*. . . . "K4BAI was my TG9AA partner." — *W4VWX*. . . . "Expect to be W3JZJ/5 by April, so hope I manage DXCC from Illinois." — *W3JZJ/9*. . . . "Want to try my DX-100 on 160 DX from school in the hills of central Mass." — *WA1GXE*. . . . "KL7FRY deserves applause for his 160-meter perseverance this summer." — *W1BB*. . . . "Ready for a busy 3.5-Mc. DX season!" — *W1SWX*. . . . "Lost my 15-meter quad after my rig blew up." — *WA1CUN*. . . . "The WAE Test livened up 80." — *WA1FHU*. . . . "Better conditions, all right, but school cuts my DX drastically." — *WA9MQI*. . . . "Maria, CR4BH, must be good for YL-DXCC." — *WA2LOR*. . . . "DXing like never before; I'll keep this dipole!" — *WN9TIL*. . . . "Don't know what's going on in the F2 layer on 21 Mc. but I hope it continues." — *WN8VZS*. . . . "Fifteen is *booming*." —

DI2LE uses the German nautical prefix aboard 44-foot trimaran World Cat on a global swing that started from San Francisco last July to end at Hamburg next August. Jurgen radiates sideband from a vertical mounted on the craft's mizzen. (Photo via ZL1ARY and W1WPO)

WB4EFE. . . . "There will be frantic DXCC-finishing before new FCC regs take over." — *K0DEQ*. . . . "Spent most of my month touching up my quad gammas." — *W3HNK*. . . . "Hospital ship *Repose*, K7YCH/mm, boils through on 15 from Vietnam." — *K3MNJ*. . . . "Fifteen dropped out for a spell in September." — *W2DY*. . . . "I've had a serious relapse in my ten-year battle against the DX bug." — *K4HQD*. . . . "ZD8J is a most efficient operator." — *WB2ZQE*. . . . "VR4CR warns against slow surface mail out his way." — *W4YOK*. . . . "A borrowed HW-32 and 2-el. quad caught ET3USA on 20." — *WA1GGN*. . . . "Just bought a new home with a lot for antennas, so bye-bye attic dipole." — *W4NXD*. . . . "With summer conditions so good I look forward to the coming months." — *W6AEM*. . . . "They get hard to find after No. 200." — *WA7BOA*. . . . "Twenty's still the band!" — *K7INE*. . . . "Enjoyed a long 3-way with VK3NC and ZS5QU on 20 c.w. in September." — *VE1ZT*. . . . "The early 10-meter worms are getting the bird." — *WA9BRC*. Huh?

Where:

ASIA — "I have the logs for BV1USA from December, 1962, through August 2, 1966, when operation was discontinued," writes W7MVC. "Many incoming cards have been sent direct to the Taiwan American Radio Club and are now stranded. Efforts are being made to have these QSLs forwarded for answering but none has been received to date. Upon receipt of QSLs and self-addressed stamped envelopes I'll be happy to verify QSOs during this period." . . . . . SL3ZO offers, "If anyone has trouble getting QSLs from UW9I-stations he should get in touch with me. I know several Magadan amateurs and they promised to help.' Sven adds, "Am I the only collector of International Reply Coupons? I have them from 58 countries, old type, and from 15 countries, new issue. My best is from Czechoslovakia (1949); I also have a '48 France and a '47 U.S.A. 9-center. I'd like to swap IRCs with other collectors, if any." SL3ZO suggests tagging your IRCs with your call to make things interesting. They really get around . . . . . "HL9 calls are reissued immediately after the holders turn 'em in," says Al Martin, HL9KB for six years. "Someone else may be signing HL9KB already." Thus Al can't help you confirm QSOs with that tag after this August . . . . . WA2EFN of LIDXA hears that JT1AC may soon begin reducing his 4000-QSL log jam.

AFRICA — CR5CA tells K2KBI, "If you want my QSL direct, inform me of this during QSO as otherwise I send them through the REP (Portugal) bureau. Required are four IRCs for airmail, one for slow mail. Do not send envelopes for return because they are usually too small for my card." . . . . . CR6IK assures K5PNI he QSLs 100 per cent . . . . . "Starting September '67 I'm QSL manager for ZD3D," notifies W9JVF. "My policy is s.a.s.e. for direct answers, bureaus for others." . . . . . "I'm no longer QSL agent for ZS5OV," regrets WA3DVO after ten fruitless months awaiting Brian's log transcript.

OCEANIA — FO8BW (W6JFM) exclaims, "Found 800 QSLs waiting for me when I got back home. I know the boys mean well, but the dollar bills enclosed will be returned because I think this is wrong and should not be permitted." Postage cost defrayal is one thing, forcing DX stations to make change is another . . . . . "I will handle all QSLs for the Timor operation of VK8s AV and DI," states K9JJR . . . . . QSL biz is boomin' down under, according to word from VK3ARX to LIDXA. Within four days VK3RJ's bureau inhaled 2000 Russian QSLs, 2000 from Japan, and a thousand others.

EUROPE — IT1MNG is WA9UET's QSL-help client as of August 1, 1967. Incidentally, IT1AGA points out that Italy has joined the zipcode parade as indicated in his address listed among those following. Goes before the city. Gius further specifies oversize envelopes for his direct QSL reply. Europeans usually favor the maximum international postcard dimensions. Why don't we? . . . . . WA9AEA, QSL pusher for SMs 5CAK 5EAC 6CPI and 7CPI, has moved to 6830 N. Sheridan Rd., Chicago, Ill., 60626 . . . . . HB9CK can steer you toward HB4FE confirmations, according to the *DX News-Sheet* of G. Watts. Walter's been manning that military/amateur station . . . . . W3AYD reminds us he can supply QSLs for the Jan. '61 to June '62 operation of ZB2AD . . . . . "I hold a number of QSLs due hams formerly stationed in the Land of Ice and Fire," discloses TF2WKP (ex-W5ILR-K4GBX). Ex-TF2s WFA WFE WGB WGK WHG WHY WIA WIG WIJ WIL WIN WIO WIW WJA WJC WJD WJF WJG WJH WJI WJJ WJK WJO WJS WJT WJW WJY WJZ WKA WKB and WKH can claim their stacks with s.a.s.e. to [the TF2WKP address in the list to follow]. They represent QSOs dating since 1962. QSLs for future contacts with American hams in Iceland can also be sent through me." . . . . . SL3ZO tells W7UVR of the Polar Bears Radio Club QSL service, claiming special effectiveness in the rare 1 U.S.S.R. regions. Consult Sven for terms . . . . . WB2ZQE commends the DJ/DK/DL gang for high QSLing reliability.

SOUTH AMERICA — VERON'S *DXpress* suggests consultation with W3DJZ re VP8IE pasteboards since

"DXCC²" No. 48, the fifth for Germany, is claimed by DL3AR who submits the required photo of QSLs resulting from QSOs with 100 or more members of ARRL's famed DX Century Club. Note the requirements change in last month's column before you dig into your card files for this trick. No QSLs, please—just a clear picture.

PY2s PA and PE relay Dave's log transcripts through him . . . . . W3AYD can assist with FY7YI verifications for QSOs dating November, 1960, to January of '63, also PJ3CC contacts on August 9–17 of this year . . . . . W9JVF apprises, "In five months as QSL manager for 8R1S I've sent out almost 400 cards." . . . . . W5CXM says her OM, W5HUX, maintains no QSL managerial arrangements, Chilean or otherwise.

HEREABOUTS — 73 huzzahs and a tiger for "QSLers of the Month" DK1HA, DL2HI, G3KTJ, HR1HEH, KP4DAP, KR6CF, OH0AA, ON5KO, PY7APS/0, TF2WKM, TJ1QQ, VKs 2ANZ 6RU 9XI, VP6WR, VQs 8CA 8CC 9BC, VS9ALV, W3DWG/VR6, YJ1DL, ZDs 3G 3I 8J, ZP5EC, 3V8BZ, 9J2AB and 9X5PB, plus QSL assistants Ws 2GHK 4DQS 6RGG and WA6SBO, all applauded by "How's" correspondents Ws 1SWX 2DY 8YGR, K1YKN, WAs 2HIU 7GFT 9MQI, WB2ZQE and P. Kilroy. Have you recently logged candidates for such compliments? . . . . . *Alp*! Obviously for QSL purposes, the following gents in italics desire to get in touch with stations listed after their calls: *W1SWX*, TA3FA, VS9JFT, ZC4BN, all '66; *W2DY*, EA8CB, KW6EJ, MP4BBA, 9L1KG, 9M2NF; *K3KMO*, M1NJ; *WA1CYT*, TI2WD, TU2BH, XE2AA; WA5OUW, CR5CA, FP8DS, OD5EJ, OX3AL, 3C3FZJ/SU; *WA9MQI*, CE1AD '66, PZ1s CL CP, ZE1AE/p; *WA0GQI*, 5V8AB; and *F3DJ*, TA3US. 'Alp? . . . . . WAs 8UHN 9MQI and WB2YJS volunteer to serve as QSL aides to needful overseas DX, the juicier the better . . . . . K4QIN, managing WA3DVO/VP6's W/K QSLs, requests the customary s.a.s.e. for direct reply. Non-W/Ks should QSL via W3KT. "Cards will be sent out twice monthly, QSO reference in Greenwich Mean Time a must." . . . . . "Tried to QSL 100 per cent for my QSOs from portable locations in Nevada and Prince Edward Island," declares WA3ATX . . . . . KV4CI writes ARRL Assistant Secretary W1UED: "With rising mail and printing costs I find it is now becoming too costly, time consuming and frustrating trying to keep up with the enormous demand placed upon medium rare DX such as myself. I had the good fortune to have W2CTN as QSL manager for four and one half years in which time Mr. Cummings sent out some 13,000 QSLs for me. Add to his efforts my own since 1948 and the total is in excess of 40,000. So from now on, except for rare exceptions, I will not QSL." . . . . . WB2ZQE agrees that a note of

TF3AU ran up a respectable c.w. score in this year's ARRL DX Test with his hideaway layout in Reykjavik. Agust's ground-plane gives a DXcellent account of itself on 14 Mc. (Photos via W1YYM)

personal interest along with one's card greatly increases chances for QSL response . . . . . WA5RTB recommends POD-51, titled *International Mail*, a free 12-page pamphlet available at your local post office, to keep up with fast-rising DX mail rates . . . . . W3AYD can still confirm QSOs with VP2DA (February to November '62), VP5BL (May '61 to May '63), 6YABL (May to August '63) and the 1961 Caymans DXpedition, VP5BL/5. The usual s.a.s.e., or s.a.e. plus IRC, please . . . . . In Columbus A.R.C.'s organ W8ZCQ lists, in order of occurrence, common QSL goofs as applied to DX: use of local time instead of GMT, GMT conversion error plus or minus an hour, lack of GMT conversion from local date, wrong or no band endorsement, wrong or no mode endorsement . . . . . Time for a peek at the mailbag's monthly assortment of individual "Where" specifications, being mindful that each is necessarily neither accurate, complete nor "official" . . .

ex-BV1USA (via W7MVC: see preceding text)
COs 2DL/4 5GG/4 4DL 4FA (via Cuban bureau)
CR4BH, Box 90, Sao Vicente, Cape Verde Is.
DI2LE (via DL9ST or ZL1ARY)
DL4FS, CMR Box 4488, APO, New York, N. Y., 09057 (or to W8IMZ)
DL4WQ, CMR Box 1507, APO, New York, N. Y., 09057
DM4WPL, 8245 Glashuette, P.O. Box 65, E. Germany
EA8GE, Box 860, Las Palmas, Canary Is.
FL8FP, B.A. 188, Djibouti, French Somalia
HR1HEH, P.O. Box 79, Tegucigalpa, Honduras
IT1AGA, G. de Luca, 18, via Generale Di Giorgio, 90143, Palermo, Italy
KC6CL, Peace Corps, Truk, E. Carolines
KZ5AO, Box 102, Howard AFB, Canal Zone
LZ2KKW, Box 18, Varna, Bulgaria
PY1BQO, J. Niess, Rua Teodoro da Silva 825, Apt. 203, Vila Isabel, Rio, GB, Brazil
PY0s AMP AUU BCS TX (via LABRE or PY1TX)
SMs 5CAK 5EAC 6CPI 7CPI (via WA9AEA; see preceding text)

4S7NE of Dehiwela, lately a 14-Mc. s.s.b. favorite world wide, knows his way around on c.w. or a.m. as well. Nelson prefers the homespun DX approach and has thoroughly modified that HRO. (Photo via W1TS)

TF2WKP, E. Daigre, Box 22, U. S. NavCommSta, FPO, New York, N. Y., 09571
TG7EH, Santa Elena, Peten, Guatemala
UP2NV, P.O. Box 310, Kaunas, Lithuanian S.S.R., U.S.S.R.
VP1MW, Box 554, Belize, Br. Honduras
VP2GAR, Box 201, St. Georges, Grenada, W.I.
VQ8s CBR CHR (via K6TCF)
VQ9B, P.O. Box 191, Mahe, Seychelles
WA1EXR/XE1, Myrna Packard, c/o U.S. Embassy, USAID, Mexico, D.F., Mexico
WA3DVO/VP6 (W/Ks via K4QIN; others via W3KT)
WA5LAB/mm, D. Chadbourne, 314th AEMS, APO, San Francisco, Calif., 96319
XE2JJE, P.O. Box 267, New Laredo, Mexico
YA1FV, F. Vogel, USAID, APO, New York, N. Y., 09668
ZD8JG, PAA-Bendix, Ascension, Box 4187, Patrick AFB, Fla., 32925
ZS9H, P.O. Box 17, Gaberones, Botswana
5L2KG, *Yasme* Foundation, P.O. Box 2025, Castro Valley, Calif.
6W8BB, Box 847, Dakar, Senegal
6W8DD, P.O. Box 190, Dakar, Senegal
9X5s MH MK (via DL1ZK)
CT2AO (to CT1IW)
DJ2IB/LX (via DJ2IW)
EL2AC (via K6RMM)
EL9B/2 (to EL9B)
EP2MK (via JA1AG)
F3CC/FC (to F3CC)
F0BZ/p (to DL9XN)
FM7WO (via WB2SSK)
FP8DH (to WA9QXY)
FP8DI (to WA9PYY)
FP8DJ (to WB2FXB)
FY7YI (via W3AYD)
ex-HL9KB (to KH6FRQ)
IT1MNG (via WA9UET)
IT4PST (via IT1FTT)
JA1KG (via JA1CNO)
ON4QM/LX (to ON4QM)
SP9AI (via SP9AXV)
TA4EK (to DJ4EK)
TG0AA (to W4YWX)
ex-TT8AE (to 6W8DX)
TY6ATE (to 5U7AL)
VK5XK/LH (to VK5XK)
VO2GA/0 (to VO2GA)
VP8FL (via RSGB)
VQ8CCR (to VQ8CC)
VQ9JW (to G3ONU)
XE1PJL/XF4 (to XE1J)
YA1BW (via DL8AX)
ZB2BE (to K1OTA)
ZD3D (via W9JFT)
ZP3CW (via WB2WFR)
4X4CJ (via WB2SSK)
5Z4KO (via 5Z4KN)
9X5PB (via DL1ZK)

Solid thanks to **Ws** 1MD 1WPO 2DY 2VOZ 3JZJ/9 4NXD 4YOK 7UVR 7VCB 8YGR 9LNQ, **Ks** 3MNJ 4HQD 9AVQ 0DEQ, **WAs** 1CYT 1GGN 2HIU 2LOR 7GFT 9MQI, **WBs** 2SIH 2UHZ 2ZQE, **SL3ZO**, **WN6VKU**, Columbus Amateur Radio Association *CARAscope* (W8ZCQ) DARC's *DX-MB* (DL3RK), DX Club of Puerto Rico *DXer* (KP1RK), *DX News-Sheet* (G. Watts, 62 Belmore Rd., Norwich, Nor. 72.T, England), Florida DX Club *DX Report* (W4BRB), International Short Wave League *Monitor* (A. Miller, 62 Warward Ln., Selly Oak, Birmingham 20, England), Long Island DX Association *DX Bulletin* (WB2EPG), 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), Southern California DX Club *Bulletin* (WA6GLD) and VERON'S *DXpress* (PA0s FX LOU TO VDV WWP) for the preceding recommendations. Come again! By the way, for direct reply, unless specifically waived, self-addressed stamped envelopes (self-addressed envelopes with sufficient International Reply Coupons when appropriate) should be included in mailings to QSL managers designated. This is generally advisable when seeking postal response from *anyone* these days, for the penny postcard is long gone.

Whence:

AFRICA — UCRA (Republic of Congo) offers its 9Q5 Contest from 0001 GMT, December 9th, to 2200 the 10th, combining s.s.b. straight a.m. and c.w. effort. Non-

HV3SJ supplements HV1CN's activity from the Vatican on DX bands. WB2ETI, visiting Italy, photographed chief op Brother Amran, Society of Jesus, during a brief respite from pile-ups.

9Q5s work R.C. stations only, exchanging the customary RS- or RST001, RST002, etc., serials for 5 points per 21-Mc. QSO, 10 points per 14-Mc. contact, 20 per 28-Mc., 30 per 7-Mc., and 60 points per 3.5-Mc. QSO, each 9Q5 worked but once on each band. Final score equals total QSO points, and log entries go to Contest Manager, UCRA, B.P. 1459, Kinshasa, R.C., before next March 15th, to be eligible for possible performance awards . . . . . Sao Thome comment from CR5CA via K2KBI: "My receiver has not enough selectivity so I receive badly. I have in mind a new receiver but I'm not yet a millionaire! RST is too difficult because of the S and T so I prefer the Q-code system for reports, QSA(1–5), QRK(1–5) and QRI(1–3). Let us try to simplify and abbreviate our QSOs." . . . . . "I usually hit 20 meters from 1800 to 0300 GMT or later with the transmitter and linear of ex-EL2AT," writes EL2AC . . . . . W3QT says 6W8DD should be back on the air in France by now . . . . . "ZD3D tells me he may be the only Gambia station active after October unless someone else shows up," relays W9JVF. "Cecil uses an HW-32 and quad on 20 sideband." . . . . . "My good friend CR6IK needs Wyoming to complete WAS," says K5PNI. "Wil's sideband appears just below 14,200 kc. almost daily, 0600-0630 and after 2000 GMT." . . . . . African addenda courtesy the organs of aforementioned clubs and groups: ZD9s BE and BH display Tristan and Gough while ZS2MI still offers Marion with straight a.m. near 14,180 kc. at 1300–1400 GMT. . . . ZD3G knocks off for WA6LBP after eight kiloQSOs with nearly 200 countries. . . . 9X5s BW CE IH MH MK SA and SP keep Rwanda raisable on 14- and 21-Mc. voice. . . . VQ9JW of the Aldabras reserves even-numbered dates for U.S.A. work on 14,080, 14,110, 14,250, 21,080 or 21,400 kc., c.w. or s.s.b., and is available for 80- and 160-meter schedules.

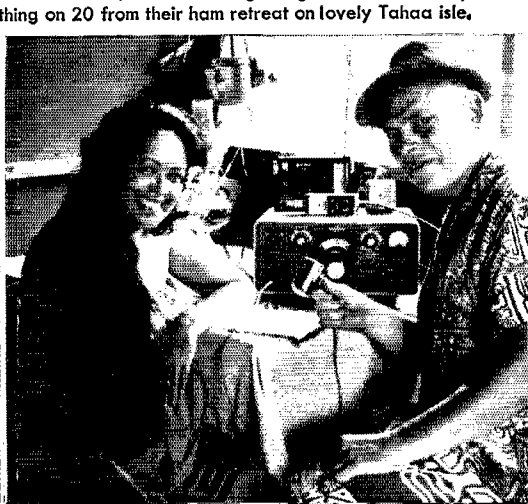
ASIA "Had a *fine* time on 80 through 10 meters," reminisces ex-HL9KB, "mostly c.w., always with less than 100 watts output." Al now signs KH6FRQ with an SB-400, cube quad and R-4 on 10, 15 and 20. "Finally made DXCC in Korea but missed WAS by a couple." . . . . . W9LNQ hears JA9AEQ/1's two-watter RST 559 on 20 c.w. . . . . W1ICP of ARRL notes that JA1WMK/mm entertained touring K6s JCL and PII aboard *Argentina Maru* this summer. Jenny and Bob also took in JA1BYJ's gang at Tokyo's JARL headquarters . . . . . Check with Far East Auxiliary Radio League (M), Hq. 5th AF, Box C-89, APO, San Francisco, Calif., 96525, for specs on their WFKAS, WTFKAS, WSKAD and WAKAD, certifications based on confirmed contacts with 5 or 25 KA stations, 7 or all KA call areas . . . . . Okinawa nationals KR8s AG AP and EA like 14-Mc. c.w., DE 21-Mc. code, at 1200-1700 GMT . . . . . VS6s AJ AZ BE DO FS and FX calmly stay with us through all that honking in Hong Kong . . . . . Great to hear APs 2AD 2MR 2NMK 5HQ and 2AR back on, the latter from rare East Pakistan (20 c.w.).

OCEANIA — "Great time on the isle of Tahaa this summer," writes FO8BW (W6JFM), "with a KWM-2, kw. generator and dipoles. Everything held together despite three weeks of rain and winds up to 70 knots." Illness cut Pat's stay two weeks short, however. "FO8AG, head engineer for the power company in Tahiti, has a Swan 500 in his station wagon, the first FO8 mobile. He enjoys working France while traveling to and from work." . . . . . Have fun in the VK/ZL/Oceania Test? Mr. N. Penfold of that activity's '67 committee writes, "Because of erratic conditions some scores may be low, but a sincere appeal is made for as many logs as possible to be posted to WIA." January 20th is the deadline . . . . . With old ten jumpin' again ARRL SCM KH6BZF wants it well known he offers Hawaii regularly on 28,570 kc. around 2000 GMT . . . . . W4NJF may be able to smooth your paths toward YJ8BW QSOs . . . . . K9JJR's friend VK9DJ regularly aims his new quad Statesward . . . . . DU1OR, 14,040 kc. around 1130 GMT, tells W4YOK that South Carolina is his WAS bugaboo . . . . . KØDJG calls attention to the Down Under Award sponsored by VK4SS, based on QSLs from 50 VKs in five Aussie call areas on three bands, plus five other Oceania countries. And WB2ZQE nominates VK colleagues as RCCers of the Month. "They can really ramble!" . . . . . KC6BY devised a pleasant surprise on 20 phone for W8YGR. Hearing that Jack needed Eastern Carolines, he had buddy KC6JC sneak up and rattle W8YGR's headphones unbidden . . . . . ZL1ARY and family enjoyed DI2LE's four-month stopover in New Zealand before *World Cat* headed west for Africa and more sailing records . . . . . Pacific pickings via interesting literature of the club clan: W3DWG/VR6 likes 21,350 kc. when not busy tracking satellites on Pitcairn. . . . VK2ABL is ex-VK9WE, and VK2ASA eyeballed here recently with W7WKF. . . . VS5MH skeds W1DGJ around 1100, Wednesdays, 14,215 kc. . . . ZK1CI tantalizes from Rarotonga with QRP c.w. . . . VK9XI's Judy can boost your YL-DXCC on 14- or 21-Mc. sideband. . . . VK7ZKJ expects to join VKØCR on Macquarie this month where the latter sports potent new skywires on 14,180 kc. at 0730 GMT. . . . Fresh ham arrived Kure's KH6EDY in October. . . . VR1L, reported on Ocean Island, sticks to 80 meters. . . . Ex-ZL1ABZ expects to sign ZL5AA for a year's Scott tour. . . . W4CHA made some ten kilo-contacts from Norfolk as VK2BRJ/VK9. . . . 5W1AS goes for s.s.b. on 14,140 or 21,300 kc. at 0730-0900 GMT with a TR-3, RV-3, multiband dipole and rotatorless TA-33. . . . VK6WS, 93 years young, is still game for the Game.

EUROPE — Don't pass up the Czech DX Test due the 12th of this month as detailed last *QST*. Those OKs really spill out for this one, plenty of code practice for all . . . . . HDFE custodian K7YUC gets over to 4U1ITU

(Continued on page 156)

FO8BV (F8EN), FO8BW (W6JFM), HB9VP, FO8BH (ex-FB8CV-FI8AN-FN8AK) and FO8AQ got together for the birdy this summer in Tahiti. At right Mrs. and Mr. W6JFM stir up something on 20 from their ham retreat on lovely Tahaa isle.



The World Above 50 Mc.

CONDUCTED BY BILL SMITH,* WB4HIP

Worldwide 50-Mc. DX?

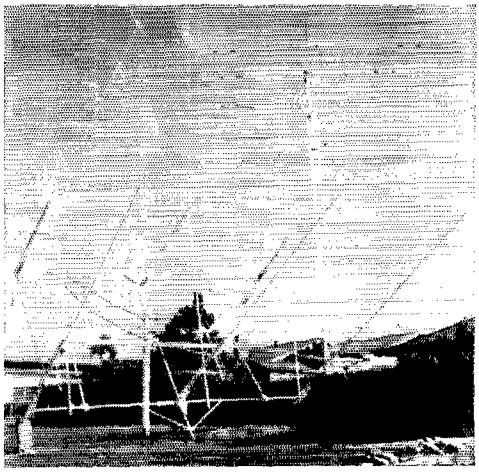
THE 6-meter DX enthusiast may be in for an interesting winter. Scattered openings between the most southern areas of the U. S. A. occurred last spring, and more have shown up this fall, as we go to press. K6EDX, Fresno, Cal., worked CE3QG on 50-Mc. s.s.b. Sept. 12, at 1807 PST. There was what appeared to be E_s into Mexico City at the same time. On Sept. 16, WA3AXV, Southampton, Pa., worked CE4BP, at 1949 EST.

These dates and times (the month of September, and the early-evening hours) are characteristic of the transequatorial scatter mode and should not be confused with the normal F_2-layer DX that we may see later in the fall. In the sunspot maxima of 1947 to 1950 and 1956 to 1960, F_2-layer DX was worked on 50 Mc. in all latitudes, and in all areas of the world where the 50-Mc. band was in use. Signal levels equalled those of lower-frequency DX bands, and distances up to half way around the world were covered, especially from the fall of 1957 through the spring of 1959. There were times when the 50-Mc. band was the best DX band in the radio spectrum!

Whether or not these conditions will be repeated this solar cycle is a matter of conjecture. There is some evidence of a long-term trend towards a period of lesser solar activity that may last beyond our life-times. Nevertheless, the fact that our lowest frequency v.h.f. band has opened to South America several times recently has raised the hope this is a sign of more widespread openings to come.

The possibility of F_2 propagation may be checked by several methods. A general-coverage receiver that tunes the 30 to 50 Mc. range is useful for keeping check on the maximum usable frequency (m.u.f.) as it moves toward 50 Mc. Many stations in various services throughout the world operate in this frequency range. Government, industrial, military, and commercial stations provide plenty of "beacons." The March, May, June, and July editions of this column give additional suggestions for stations and frequencies to check for openings to various areas of the globe. Another good indicator is the 10-meter band. When the single-hop skip distance shortens below 1000 to 1200 miles, the m.u.f. may be approaching 50 Mc. Check the 40-Mc. range for activity. If you hear DX signals above 47 Mc. or so, it would be wise to transmit on 50 Mc. The band *may* be open to some area where there isn't a 50-Mc. station to provide a beacon signal. Six meter population in foreign countries, possibly excepting Japan, isn't nearly as high as in the U. S., and there is no 50-Mc. band in Europe, so we must do some digging. We have no way of knowing how many DX contacts have been missed because someone just sat and listened on 50 Mc. only, and hearing nothing, failed to put a signal on the air. The band may have been open. If calling constant CQs on seemingly "dead" band bores you, there are several methods of keying the transmitter automatically such as code wheels and audio-rectified tape loops useful for both c.w. and phone. But put a signal on the air.

Speaking in generalities, which is always dangerous when one is talking about v.h.f. propagation, the band is more likely to be open to areas where the sun is over the midway point of the path. There are variances to this, however. Transequatorial propagation (*TE*) is possible during the hours of darkness and during periods of high auroral activity as discussed in the September column. Openings of this type are usually restricted to between stations 1500 to 2500 miles above and below the equator. Again, however, periods of high m.u.f. may extend this distance.



Ross Adey, WB6DEX, built this 120-element e.m.e. array in the backyard of his Malibu home. Since the picture was taken, Ross has increased the 2-meter array to 180 elements. *(photo via K6MYC)*

*Send reports and correspondence to Bill Smith, WB4HIP, ARRL, 225 Main St., Newington, Conn. 06111.

Back scatter is another phenomena of high m.u.f. Signals reaching the ionosphere are reflected back to earth and scattered there in all directions. Stations several hundred miles apart may be able to work each other when their antennas are aimed at a common point, but not at each other. This is also a good indicator of favorable DX conditions in the same general direction. Back scatter signals are typically weak and distorted because of their multipath arrival. C.w. and s.s.b. will provide the more readable signals.

Volumes have been written on *F*-layer propagation, and research in the field continues. This discussion is, by necessity, limited, but should provide a few hints to the prospective *F*-layer 50-Mc. DXer. A more thorough discussion appears in the ARRL *V.H.F. Manual* and its associated footnotes. Good DXing, and we would be interested in a report of your results.

WØEYE Beacon Transmissions

In an experiment to determine frequency dependence of meteor scatter, Don Hilliard, WØEYE, has established three c.w. beacons from his 8500-foot mountain location 15 miles northwest of Boulder, Colorado. The beacons, operating on 50.015, 144.015 and 220.015 Mc., will be keyed simultaneously with the message, "Propagation test de WØEYE Boulder, Colorado" followed by 15 seconds of key-down signal. Don says each transmitter delivers 150 watts. The antennas vary in height from 45 to 68 feet and are aimed east.

According to WØEYE, "the purpose of this experiment is to study frequency dependence of aurora, meteor scatter, and tropo. It should also be of interest in sporadic-*E* studies for some." Don says the main problem is getting amateurs at the optimum 1000-mile m.s. distance to put three receivers on simultaneously with calibrated strip chart recorders or something similar. The operator should know his antenna gain, feedline losses, receiver noise figure, and calibration accuracy. Equipment for 432-Mc. will be installed if interest in the project warrants.

The signals should be of considerable interest to the DX man and should prove valuable if enough stations participate in the experiment. Operating times are available from WØEYE. His address: Don Hilliard, P.O. Box 563, Boulder, Colorado 80302. Telephone 303-459-3257.

Roanoke V.H.F. Convention

The first annual Roanoke V.h.f. Convention is scheduled for Sunday, Nov. 5, in Duncan, S. C. This affair is unique, in that it is the first ARRL Division Convention to cater to a special-interest group within amateur radio; in this instance the v.h.f. fraternity. It is expected that leading v.h.f. enthusiasts throughout the Southeast will be in attendance. W4GJO, Sarasota, Florida, and K4SUM, Alexandria, Va., are two who have already signed up.

A full day's program is planned, including a Roanoke Division Forum with ARRL Director Vic Clark, W4KFC, in charge. Talks will be given by William L. Smith, W3GKP, coworker in the first successful amateur effort in the moonbounce field; Carl Ebhardt, W4HJZ, who will discuss the design of high-power v.h.f. amplifiers; and Edward P. Tilton, W1HDQ, V.h.f. Editor of *QST*, who will speak on "Making the Higher Frequencies Pay Off." The conductor of this *QST* department will also be on hand, to participate in the open-forum sessions and other events.

The Convention is sponsored by the Greenville V.h.f. Society, with Rick Cruickshank, WA4LTS, as chairman. More details in October *QST*, page 91, and from WA4LTS, 709 Magness Drive, Spartanburg, S. C. 29303; phone 803-582-4883.

2-METER STANDINGS

W1JSM	33	8	1398	K5TQP	27	7	1254
W1AZK	33	8	1384	W5SWV	20	5	960
K1HTV	32	8	1252	W5WAX	18	7	1310
K1ABR	31	8	1330	W5ML	17	6	700
W1AJR	25	7	1130	W5BEP	16	5	1000
W1HDQ	24	7	1040	W5KFU	15	5	1360
W1MEH	24	6	1000	WA5MFZ	12	6	1225
W1MMN	22	8	1200				
K1BKK	22	7	1275	W6GDO	17	4	1325
K1WLT	22	7	1030	W6WSQ	16	6	1390
K1WHS	19	7	1030	W6NLZ	12	5	2540
K1UCQ	19	6	1250	WB6KAP	12	4	1120
K1JIX	18	6	800	K6HMS	11	5	1240
K1MTJ	16	5	1225	W6DNG	9	5	5850
K1OYB	16	5	1225	K6JYO	9	4	1240
				K6HCP	1	2	690
W2NLY	37	8	1390				
W2CXY	37	8	1360	W7JRG	27	6	1320
W2ORI	37	8	1320	K7NII	24	5	1275
W2BLV	36	8	1020	K7ICW	16	4	1246
W2AZL	35	8	1380	W7LHJ	12	4	1170
K2LMG	32	9	1710	K7ZIR	11	4	1130
K2HLA	32	8	1300				
WA2FGK	31	8	1340	W8PT	41	9	1260
W2CLL	26	8	1150	W8KAY	39	9	1210
K2CEH	25	8	1200	W8QOH	38	9	1320
W2AMJ	25	5	960	K8AXU	37	9	1275
W2ALR	24	8	1100	W8SDJ	37	8	1220
W2LWI	24	7	1050	W8YIO	36	9	1250
WB2FXB	20	7	1025	W8LOF	34	8	1060
W2UTH	20	7	880	K1CRQ/8	32	9	850
WA2FMW	19	6	1000	W8SVI	31	8	1100
WA2LFM	17	7	730	W8EHW	31	8	860
K2DNR	18	6	1010	W8BKI	30	8	1240
K2YCO	20	7	650				
WA2JAM	17	6	670	K9SGD	42	9	1300
K2JWT	16	6	550	K9UIF	41	9	1150
WA2UDT	16	5	550	W9WDD	40	9	1300
				WA9DOT	40	9	1200
W3RUE	36	8	1100	W9WOK	40	9	1170
W3BYF	34	8	1275	W9MAL	38	8	1060
W3GKP	32	8	1108	W9AAG	37	9	1200
W3SGA	32	8	1080	K9AAJ	37	9	1200
W3KCA	28	8	1110	W9BRN	33	8	1210
K3OBU	21	7	930	W9YYF	31	8	1050
W3LNA	21	7	720	W9IFA	31	8	1050
K2RTH/3	20	7	1200	W9PBP	29	8	820
W3BDP	19	7	1100	W9OJI	27	8	910
K3CFA	19	6	870				
W3MFT	19	6	600	WØBFB	45	10	1350
				WØDQY	41	9	1300
W4HJQ	39	9	1150	WØNXF	40	9	1325
W4WNH	38	9	1350	KØMQS	40	9	1150
W4HHK	38	9	1280	WØEMS	33	9	1350
W4MKJ	37	9	1250	WØLFE	33	9	1040
W4LTU	37	8	1220	WØEYE	33	8	1380
K4LXC	36	8	1423	WØENC	32	7	1250
W4ZXI	34	8	954	WØMOX	27	7	1300
W4FJ	33	8	1050	WØLER	22	8	1100
W4MNT	32	8	1225	KØEMO	20	7	1125
W4CKB	30	8	1300	WØCUC	20	6	1403
W4AWS	26	8	1350	WØLCN	19	6	1000
K4YYJ	26	8	850				
K4MHS	24	8	1000	KH6UK	2	2	2540
W4VLA	24	8	900				
K4QIF	24	7	1100	VE1CL	8	5	800
K4EJQ	21	7	1125	VE3DIR	39	9	1300
K4SUM	17	6	653	VE3AIB	29	8	1340
				VE3EZ	20	7	690
W5UGO	42	10	1280	VE3ASO	19	7	850
W5RCI	41	9	1280	VE3AQG	18	8	1300
K5WXZ	34	9	1225	VE3HW	17	7	1350
W5AJG	33	9	1360	VE6HO	1	1	915
W5FYZ	33	9	1275				
W5JWL	33	7	1150	F8DO	1	1	5100
W5UKQ	29	8	1150				
W5PZ	29	8	1300	OH1NL	1	1	5850
W5HFV	27	10	1285	VK3ATN	2	2	10417

The figures after each call refer to states, call area and mileage of best DX.

OVS and Operating News

50 Mc. conditions proved exceptionally good through late summer and into early fall. Al Olcott, K7ICW, Las Vegas, Nevada, worked W1s and 2s as late as mid-August for the first time so late in the *Es* season. During the summer, Al worked all of the contiguous 48 states except Maine.

Several DX stations were reported active via *Es* in late summer, including FG7XT on Guadeloupe (QSL via K5AWR); VP9s HB, TC, WB and WB6SEW/VP9, all Bermuda; KP4BRJ, Puerto Rico; VP7DD, Bahamas, and

Photo highlights of the Central States V.h.f. Conference held at Wagoner, Okla. Upper left: WØMOX and WØPFP talk over 50-Mc. scatter. Right: Don Lund, WAØIQN, readies his 32-element expanded collinear for the antenna measuring party. Middle left: W9BRN assembles his 13-element Yagi. Right: serious discussion of sideband potential for m.s. occupies WØDQY and K7NII. Lower left: W5UGO, first 2-meter man to work all 10 call areas, shows off QSL proof of the feat. Left to right: K9UIF, W5UGO, K5IQL, W9MAL. Lower right: W5GVE/4 presents oversize Perseids QSL to KØMQS. Visitors from at least 6 call areas attest to the success of the Conference.

the usual helping of our Canadian friends, K6EDX reports that KS6CL, Samoa, and KW6EJ, Wake Island, are on 6, and KH6NS is back on in Hawaii.

From Australia's VK8AU, via W4GJO, we learn of renewed *TE* openings between Australia and Japan, and W5ORH says South African stations ZS1PP and ZS1XX are looking for stateside f_2 contacts.

My thanks to each of you who have submitted 50-Mc. reports. Although your call may have not been mentioned here, your report is appreciated and has been recorded.

144 Mc. meteor-scatter buffs agree that the August Perseids was an excellent shower, and the best Perseids in several years. The best DX report appears to be the reception of WØENC, Rapid City, South Dakota, at K4IXC, Melbourne, Florida. No contact resulted, but K4IXC did make positive identification over the 1675-mile path! Another fine piece of DX was the 1600-mile reception of sidebander WØDQY and K9SGD at K6HAA. The Illinois station also copied the Californian on a nice 7-second burst. W1AZK worked W5BAU for the first known New Hamp-

shire/Arkansas 144-Mc. contact. Other stations reporting successful Perseids schedules are WA2FGK, W3BDP, W3BYF, K3OBU, K4EJQ, K4YYJ, W5HFV, W5UGO, WA5MFZ, K5TQP, K6JYO, W8PT, W9MAL, W9YYF, WØLCN and WØLER. Additional Perseids reports appeared in last month's column.

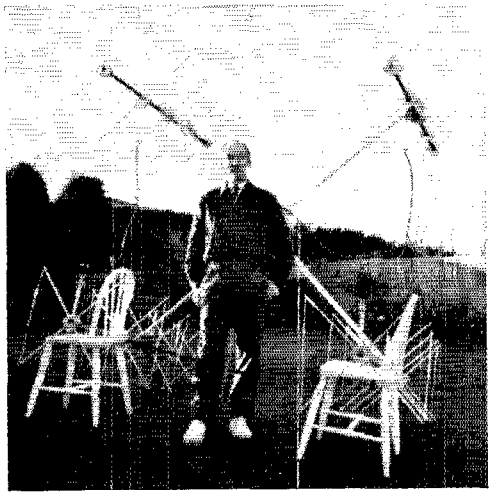
Judging from the reports, interference was quite a problem during the shower. Several operators suggest more use of the band other than the bottom 100 kc., and standardizing on either 15 or 30-second calling sequences.

K2OJD operated as FP8CA on St. Pierre Island in early September keeping schedules with several stations in the Northeast. No contacts resulted, but W2AZL listened to a 2-minute burst go unused during one 5-minute calling sequence. The next night they switched to 15-second periods, but Carl still hasn't recovered. W1AZK was also copied well at FP8CA and K2HLA copied sets of calls and short bursts.

Need we remind of the Leonids shower, November 14–18? The 1966 peak came on November 17, roughly between 0900 and 1200 GMT.

This month's e.m.e. news comes from Mike Staal, K6MYC, and Bill Conkel, W6DNG. Mike reports WB6DEX working on a 20-cycle bandwidth detection system. WB6DEX has also completed a 180-element Yagi array for tests with VK3ATN. In New Zealand, ZL1TFE, has built an extended expanded collinear for tests with K6MYC and others. And ZL1AZR, an e.m.e. newcomer, has obtained a special one-kw. license and is using a LaPort rhombic. He has heard his own echoes and signals from K6MYC and VK3ATN. Ray, VK3ATN, is nearing completion of his 50-foot dish and plans on 432 tests in January and February before expanding the dish to 150 feet for two meters. Ray will likely be scheduling W1FZJ/KP4. Political problems in Greece apparently keep Greek amateurs silent and there has been no word from SV1AB for several months. I understand he was forced to dismantle his equipment. K6MYC and VK3ATN continue to hear each other, but not at the proper time for another contact. In Stockton, WB6VYM, has a 60-element collinear set for e.m.e., and at Martinez, W6BXE is readying a 60-element Yagi array.

W6DNG has rebuilt his collinear e.m.e. antenna by increasing the number of elements from 32 to 48. He added 16 directors and says the gain increased 1.5 db. K6MYC has experienced similar results, see this past April's column for constructional details. W6DNG has also modified his receiving system, going to a 2N4416 FET pre-amp and a revised 50-cycle audio filter. He is presently scheduling F8DO, SM3AKW and SM5BSZ.



Ralph Carter, ZL1TFE, of Auckland, New Zealand, is one of the many newcomers to e.m.e. This is the cubical quad array for 144 Mc. that was his first e.m.e. antenna. The quad array has been replaced with an expanded extended collinear array because of weight problems in adding three more bays like the one pictured. ZL1TFE has obtained special permission from the New Zealand government to run one kw. input. (photo via K6MYC)

220- and 420-Mc. STANDINGS

220 Mc.			
W1BU	14	5	600
W1HDQ	12	5	450
W1AJR	12	4	480
K1JIX	11	4	615
K1UGQ	9	3	400
K2CBA	16	7	660
W2AOC	15	5	530
W2SEU	12	5	450
W2DZA	12	5	410
W2NTY	12	5	300
K2DZM	12	5	400
W2LWI	12	4	400
K2KIB	12	4	300
K2FTQ	11	5	265
K2ISA	11	4	300
K2ITP	10	5	265
K2AXQ	9	3	240
K2JWT	6	3	244
K2UUR	6	3	210
WA2BAH	6	3	200
K2DIG	4	3	140
K2YCO	3	2	200
W3ARW	17	8	600
W3FEY	11	5	350
W3RUE	10	5	480
K3IUV	10	3	310
W3LCC	10	3	300
W3JYL	8	4	295
W3NG	7	4	350
W3JZI	4	3	250
W4TLC	5	1	315
K4QHF	4	2	500
W5AJG	3	2	1050
W6GDO	2	2	100
K7ICW	4	2	250
W7AGO	2	1	160
W8PT	11	7	660
W9OVL	6	3	475
W9JCS	6	2	340
WØEYE	4	2	175
VE3BPR	3	3	300
420 Mc.			
W1BU	13	3	390
W1AJR	12	4	410
W1OOP	11	3	390
W1UHE	10	4	430
W1HDQ	10	3	250
W1QWJ	10	3	230
K1JIX	9	3	310
W2BLV	13	5	460
K2DZM	10	4	390
W2OTA	10	4	300
K2CBA	9	7	220
W2VCG	9	4	280
WB2EGZ	9	4	260
WA2EUS	9	4	220
K2UUR	9	3	280
K2YCO	8	6	500
K2ACQ	8	5	525
WA2HQE	8	4	280
K2HQL	8	4	250
W7PUA/2	7	4	500
W2YPM	6	3	300
WA2DTZ	6	3	200
WA2TOV	5	3	140
K2GGA	4	4	383
W3MMV	11	5	410
W3RUE	11	5	470
K3CLK	9	4	——
W3FEY	8	4	296
K3IUV	9	3	310
W3SZD	5	4	300
W3UJG	4	2	350
W4HHK	12	4	550
K4SUM	8	4	368
W4GJO	6	2	1000
W4TLV	6	2	500
WA4BYR	6	2	420
W4GOO	6	2	415
W4RFR	5	2	665
W4TLV	4	2	500
K4QIF	4	1	285
W5RCI	16	5	725
W5ORH	11	3	700
W5AJG	7	3	1010
W5ORH	7	3	650
W5SWY	7	3	525
W5HTZ	5	3	430
W5UKQ	5	2	600
W5ML	5	1	350
W6GDO	2	2	493
K7ICW	3	2	165
W7JRG	2	2	420
W8PT	11	7	715
W8YIO	11	6	560
W8TYY	9	5	580
W8IFX	8	5	470
W8FWF	6	4	450
K8REG	6	4	275
W8JLQ	6	3	275
W8RQI	6	3	270
K9UIF	13	6	520
WA9HUV	12	6	500
K9AAJ	11	5	425
W9AAG	11	4	600
W9GAB	9	4	608
WA9NKT	9	3	400
W9OKB	8	4	430
W9OJI	6	3	330
WØDRL	9	4	550
WØNXF	5	3	375
WØEYE	5	2	425
WØENC	2	1	400
WØPHD	2	1	225
VE3BPR	7	4	600
VE3EZC	5	4	510
VE3AIB	5	4	450
VE3BQN	5	4	447

The figures after each call refer to states, call area and mileage of best DX.

Those interested in e.m.e. are invited to check 21.415 Mc. Tuesday at 0215 GMT. That is on Monday night in the states.

Also, a growing number of weak-signal enthusiasts hold a nightly get-together on about 3.815 Mc. at 0200 GMT. The group is primarily the midwest contingent, but they have check-ins from both coasts. This is in addition to the regular Sunday night nets on the same frequency beginning in the east at 0100 and spreading across the country until 0300 GMT or later.

The fall tropo season provided periods of good DX such as the 875-mile contact between South Dakota's KØGJX and K4EJQ in Tennessee. On the same day, September 12, W5GVE/4 in Alabama copied K2HLA, on Long Island, calling FP8CA for several minutes. The path distance is about 925 miles!

Two more 144-Mc. *Es* reports have been received. VE5NC, near Moose Jaw, Saskatchewan, says he copied a W5 calling CQ on c.w., but didn't get the call. The station was audible for about 5 minutes on June 25. And WA4GDY, Oak Ridge, Tenn., reportedly worked W5URZ on August 14. The report from K4FKO didn't say where the five is located and the call doesn't appear in the summer issue of the Callbook.

(Continued on page 154)

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

YLRL

THERE is a classic statement that warns of the consequences of "woman scorned," but in the case of licensed women amateurs, the fury was sparked by a fancy, lacy looking advertisement in *QST*, in May 1939, assuring the ladies of amateur radio that they, too, could purchase the publication *Two Hundred Meters and Down*, and that they would enjoy it. The indignation of Ethel Smith, then W7FMB, now K4LMB, fanned her curiosity to the point of writing to ARRL regarding the number of YL operators there were, with an additional request that the gals send the information to her. "Perhaps," wrote Ethel, "we should band ourselves in a YLRL."

Twelve girls answered the appeal in the letter that was published in *QST*, and, as in any group there is one person who is willing to take on any load of work, with the organization of YLRL, it was Enid Aldwell, W6UXF, (then W9NBX). Enid picked up the job of compiling the lists of YLs, drew up a tentative Constitution, and set dues at 25c a year. By October of 1939 the Constitution was adopted, and officers appointed with Ethel Smith, W7FWB (K4LMB) as the first President. Carol Keating, W9WWP, was appointed Vice-president, and activities manager, while hard working organizer, Enid took on the rough job of Secretary and Treasurer. But YLRL needed more than just a group of officers to properly administer a nation wide organization, so the office of District Chairman was created. Each District covered a Call Area, with the chairmen acting much in the same manner as an SCM in the ARRL field organization.

The first news letter appeared in November 1939, with an appeal for a name. In December, this bulletin was christened *YL Harmonics*. Other YLRL identifying symbols followed quickly, the emblem, the diamond, with the YLRL scroll designed by Ethel Smith: Nita, WSTAY's suggestion of "QRV" was adopted as the official slogan: and Clara Rogers, W2RUF originated the well known signature of "33" meaning "Love sealed with friendship, in the first year of organization.

A December QSO Party in 1939, was the start of YLRL activity which has developed into a number of contests, the YL Anniversary Party (YLAP), is a really feminine contest for YLs only. Howdy Days, held early in the fall, is an informal contest, that is more of a lets-get-acquainted affair, than the serious competition that the word contest usually implies. YL-OM held each

Betty, KL7FJW, K7UBC, Verda, president of MINOW, KL7FQQ.

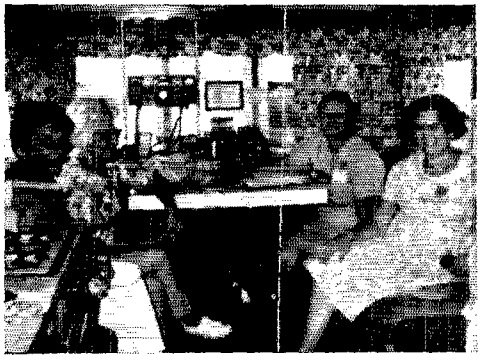
* YL Editor *QST*. Please send all news notes to WB6BBO's home address; 1036 East Boston St., Altadena, Calif. 91001.

Ruth Siegelman, W2OWL, member QCWA, as well as her well known long time activity in YLRL where she is now the Continuous Membership Custodian. A member of YL Open House and Tangle Nets, she is also busy with YL-ISSB and local YL club work.

February is one of the most popular on the amateur calendar.

Perhaps the most sought after award sponsored by YLRL, and open to both men and women, is YLCC, awarded for having worked 100 women. The WAS-YL, and WAC-YL are the feminine counterparts of the ARRL, WAS, and WAC Awards, while DX-YL was created exclusively for women operators only.

While women have held licenses far back as the 1920s, and YLRL has 57 members who have been licensed for more than 25 years, and are therefore eligible for two letter calls under the new FCC regulations, the average member has been licensed for ten and a half years, and has been a member of YLRL for eight and a half years,



Jessie, WA6OET; Lou W6GDH (ex KØWEN); Esther, WA6UBU; W6QGX, in WA6UBUs trailer at the Torrance Airport, terminal point of Powder Puff Derby.

according to Maxine Hanberry, WA6AOE, secretary, and president-elect for 1968.

From 1939 to the present, YLRL has grown to be the largest organization formed exclusively for licensed women radio operators. OMs may share some of the activities and certificates, but membership is reserved for the ladies of the amateur radio service. Membership includes all fifty states, and thirty seven countries.

YLRL membership is open to all women who hold a current amateur radio operator's license. Novices are as welcome as Extra class, but the Novice membership is limited to the term of the license. Dues are now $3.50 a year, and joining is as simple as writing to the membership correspondent of the area in which a gal lives. The Eastern membership correspondent is K4RNS, Marge Campbell, 1700 Nova Road, Holly Hill, Florida; and Beth Taylor, W7NJS is Western membership correspondent, 14637 S.E. Fair Oaks Avenue, Milwaukie, Oregon. For the DX YLs, the international membership chairman is Virginia Powell, K1LCI, P.O. Box 174, Damariscotta, Maine.

YLRL Election Results

The "world's friendliest election" has taken place and the officers for the YLRL for 1968 are as follows:

Beverly Wilcox, WB2UHZ, one of the finalists in the WNBC-TV program, "It's Academic" active on traffic nets including 2RN, ESS, NYS, EAN.

President — Maxine Hanberry, WA6AOE
Vice-president — Claire Bardon, W4DVT
Secretary — Ivy Smythe, VE3EZI
Receiving Treasurer — Toni Chapman, K8PXX
Disbursing Treasurer — Barbie Houston, K5YIB

District Chairmen

1st District	Norma Gilbert, K1WXF
2nd District	Dorothy Wescott, K2DPN
3rd District	Molly Silverstein, K3FYS
4th District	Meg Hannon, K4HSC
5th District	Mildred Bell, K5LUZ
6th District	Jacqueline van de Kamp, W6YKU
7th District	Carol Kimber, K7WUR
8th District	Mary Clemens, WA8CTE
9th District	Verna Franz, K9LUI
10th District	Estelle Hanfelt, WØESD
KH6 District	Ardelle Johnson, KH6TI
KL7 District	Betty Marsh, KL7FJW
VE District	Doris Cody, VE3BBO

Congratulations and best wishes to all the officers and the district chairmen for a very successful year.

The Trilliums Memorial Week

The Albert Theodore Jensen Memorial Trophy was donated to the Trilliums by Dot and Jack Abel in memory of a truly great amateur. The Trilliums will help perpetuate his memory by holding an Annual Trilliums Memorial Week each year.

Dates November 15 to November 27, 1967

Times from 1800 GMT Nov. 15, to 1800 GMT, Nov. 22.

The Trilliums being the host club will call "CQ TMW," and all others will call "CQ TOT."

Exchange signal reports, name and QTH. Trilliums will give their club numbers.

Scoring:

c.w. contacts count 2 points
phone contacts count 1 point.

Low-power multiplier 1.25 for all transmitters running 150 watts c.w., 150 watts a.m., 300 watts p.e.p. and under.

Each Trillium station may be contacted once only, regardless of band or mode. Logs must show: date, time in GMT, RST, band, mode, TOT number, name and address and claimed score signed by the operator.

Send logs to Chris Weeks, VE1AKO, RR 2, Lower Sackville, Nova Scotia, Canada.

Logs must be postmarked not later than December 31, 1967, and received not later than January 15, 1968.

Award: The Albert Theodore Jensen Memorial Trophy for winning member of the Trilliums.

Non-member with highest score will be awarded a plaque.

Suggested frequencies: 3650, 3900, 7100, 7220, 14050, 14,260, 21,100, 21,400, 28,600 kc.

Powder Puff Derby, Terminal Point

They took off from Atlantic City, and landed in California, and were monitored every mile of the way by amateur radio. Eleven stations across the country maintained the communications link at Atlantic City; Martinsburg, W. Va.; Cincinnati, Ohio; Carboundale, Ill.; Springfield Missouri; Tulsa, Okla.; Amarillo, Texas; Albuquerque, New Mexico; Flagstaff, Ariz.; Palm Springs, Calif, and the terminal airport at Torrance, California.

The Los Angeles YLRC set up two stations, one in the trailer of Esther, WA6UBU at the airport, and the other at the Plush Horse Inn in Redondo Beach. The weather delay of two days and the resulting accidents only whetted the interest at the California end to be sure there would be plenty of communications coverage so the women could land safely.

Myrtle Cunningham, WA6ISY, co-chairman, with OM Tom, W6PIF, had a busy time keeping everything properly set up and manned. She said "It sure was fun. All the television stations were there, and we were interviewed by all of them, but wouldn't you know we played second fiddle to the ball game?"

So women flyers crossed the country with the help of women amateur radio operators on the ground, and at the end they met W6DVP, WA6VDK, WA6LWE, W6CEE, K6ELO, W6QGX, WA6WFZ, WA6OET, W6GDH, WB6CGA, W6PJU, WA6ISY who gave them the same interest and warmth that they had enjoyed across the country.

WA6AOE

The president elect of YLRL, Maxine Hanberry, WA6AOE, started her radio life as KN6SLP in 1956, let her license lapse, and in 1958, received her General Class license, with the call WA6AOE. Ever since that ticket arrived Maxine has kept the tubes warm from her activity, not only on the air, but she has been just as busy in her off the air activity. In 1958

WA6AOE

VE3EZI

she joined YLRL, and the Los Angeles YLRC. By 1959 she was the LA/YLRC corresponding secretary, vice president in 1960, and president in 1961. Her YLRL activity on the air has resulted in all the certificates that are offered by the Club. In 1965 she was elected district chairman for the Sixth YLRL District, in 1966 she became secretary, remained in that office for 1967, and will assume her duties as YLRL president in 1968.

Maxine's on the air interest is the YL Nets, and YL-ISSB. She has been most active with the Eyebank Net. Her outside hobbies are boating and painting, but mostly she loves radio which she shares with OM, Bill, K6MQT, and their son John, WA6IYM, at home, and WA7SFY, when he is attending the University of Washington.

Maxine's credo is that women are at their very best when they have interests in which they can not only participate together but can contribute, as in amateur radio.

VE3EZI

Ivy Smythe, VE3EZI, was born and educated in England. She became interested in amateur radio in 1961, when her shortwave radio picked up a QSO. Ivy could hear both sides easily, but they seemed to be having trouble and she wanted to help them. That was the spark that both she and OM, Cliff, VE3EZC, needed to start studying for those coveted call letters.

VE3EZI has no preference when it comes to bands, or modes of operation. She says: "But, if I had to choose only one mode to use from now on, I would say c.w." At present she operates both s.s.b. and c.w., dreams of RTTY one day, and has a desire to investigate the exciting possibilities of moonbounce, and meteor scatter if she could only break away from making those outstanding scores in contest operation.

Outside interests include those she shares with Cliff, fishing, swimming, boating, photography, model airplanes and dancing. When she is in the mood, and has the time, needlepoint and knitting.

A member of YL-ISSB, YLRL, and founder member of the Ontario Trilliums, Ivy is secretary elect of YLRL for 1968. QST

Feedback

In the September "YL News and Views," Gloria, WB6QXY, was listed by mistake as WB2QXY, in the caption of the photograph of her and OM Les, on page 78.

Operating News

GEORGE HART, W1NJM, Communications Manager
ELLEN WHITE, W1YYM, Deputy Comms. Mgr.
Administration: LILLIAN M. SALTER, W1ZJE
Public Service: WILLIAM A. OWEN, W1EEN
DXCC: ROBERT L. WHITE, W1WPO
Training Aids: GERALD PINARD

SS Rules Comments. You will recall the discussion on this subject in June *QST*, advancing proposals to (1) eliminate the low-power multiplier, (2) equalize the power multipliers for phone and c.w., and (3) return to the RST for the "check" in place of the date of first license.

A few interesting and interested comments were received, but they were not numerous, nor were those received slanted heavily in either direction. It seems, therefore, that the great majority of SS participants (a) like the rules as they are, (b) don't feel strongly enough to comment, or (c) couldn't care less. As one correspondent said, "except for those in the upper scoring brackets probably most of the participants wouldn't care if there were no rules at all."

On the first-mentioned question above, the great majority expressed a desire to retain the power multiplier. Most of those commenting were similarly in favor of equalizing the phone and c.w. multipliers and of retaining the date of first license in place of the "check." But actually, not enough commented to make any count really conclusive and so we attach no real significance to the above.

Some specific suggestions made were: exchange an entire message instead of just a preamble; retain present rules, but standardize on how to transmit birthdate; create a 75th "section" multiplier for overseas participants; eliminate birth date because it encourages origination of meaningless "happy birthday" messages; drop birth date altogether and change power dividing line to 200 watts.

It seems obvious from the above that there is no depth or strength of feeling about the present SS rules except among an infinitesimal minority. Consequently, no changes have been made in this year's rules, as you will note elsewhere in this issue.

How Rule Changes Are Made. The democratic process functions in a number of different ways. The League processes are similar in many ways to government processes; that is, the members elect the directors who, as a body, set the policies and hire a general manager to carry them out. The GM then hires the staff he needs to do the job. This is something of an oversimplification, but it gives the general idea. The Board is ultimately all-powerful. However, it deals at high policy levels for the most part, delegating most functions to the general manager and staff.

One of the functions is the promulgation and supervision of League-sponsored on-the-air contests. The communications manager has sole responsibility for determining the nature, extent,

OPERATING EVENTS (Dates in GMT)

ARRL-IARU-SCM-Affiliated Club-Operating Events

November	December	January
1-2 YLRL Anniversary Party, Phone (p. 93, Oct. *QST*).	1 **Qualifying Run, W6OWP**	4 **Qualifying Run, W6OWP**
2 **Qualifying Run, W6OWP**	2 **LO Time** (League Officials only).	6 **LO Time** (League Officials only).
4 **LO Time** (League Officials, only).	2-3 Alexander Volta RTTY DX Contest (p. 86, this issue).	6-7 **VHF SS**
4-6 Connecticut QSO Party (p. 120, this issue). Delaware QSO Party (p. 107 Oct. *QST*).	9-10 9Q5DX Test (p. 96, this issue).	11 **Qualifying Run, W1AW**
11 **Frequency Measuring Test** (ARRL Official Observers only).	9-10 Boy Scout QSO Party (p. 17, this issue).	13-14 **CD Party, phone***
11-13 **SS, phone** (p. 58, this issue).	13 **Qualifying Run, W1AW**	20-22 **CD Party c.w.***
12 OK DX Contest (p. 101, Oct. *QST*).	16-17 West Virginia QSO Party (p. 134, this issue).	26-28 Old Old Timers Club QSO Party (p. 43 Oct. *QST*).
14 **Qualifying Run, W1AW**		27-28 **Simulated Emergency Test**
18-20 **SS, c.w.** (p. 58, this issue).		* League Officials and Communications Dept. Appointees only.
		Feb. 3-4 DX Test (phone)
		10 FMT
		17-18 DX Test (c.w.)
		Mar. 2-3 DX Test (phone)
		16-17 DX Test (c.w.)

frequency and general conduct of such contests; but of course this does not mean that he is in any sense a "dictator" or "czar" in such matters. The wishes of the membership must be served. If they are not, pressure from topside will quickly enough see that they are, one way or another.

So how does one go about determining the wishes of the members? Well, the obvious way is to take a poll; but of whom? All members? Just those interested in the particular matter being polled? A sampling? Polls are time-consuming, expensive, sometimes inconclusive. Experience with them has not indicated they are productive of the greatest good for the greatest number.

By committee? This is sometimes successful and is now being used in our National Traffic System. Where the committee members are widely scattered, however, it can be quite unwieldy if not properly organized.

By surveying comments? This is the method used in the recent past and at present. It is not without disadvantages, but perhaps if they are taken into consideration one can arrive somewhere near the correct conclusion. For example a zealot on some particular issue may run around marshalling and rallying supporters and getting them to write in, while those on the other side of the fence may not do so, thus perhaps giving an inexact picture of the feeling on a particular question. In such a case the survey must take into consideration the geographical distribution of those commenting, or their specialization interest, in order to make it possible to arrive at a better understanding of the spontaneity of feeling on the matter.

But it "ain't easy." It would be so much simpler to just count votes and then disclaim any responsibility for the result. Such a procedure is neither practical nor progressive. We all know that whatever is decided will not be universally popular, even if it's the result of a poll, so it is necessary to ask that you let us know how you feel, and *why;* that you think about it, consider the overall good, help in shaping a decision which will represent the wishes of the majority at the same time it will be of the greatest benefit.

How are rules made? Proposals are run up the flagpole, salutes or missiles solicited, then lowered and examined carefully. No snap decisions are made; everything is carefully considered, all kinds of counsel consulted. If the rules resulting turn out to be too unpopular, they can be reconsidered and perhaps changed. We can make mistakes, and circumstances and conditions can change. Nothing is forever. By keeping us informed of your viewpoints and feelings you are making your weight felt in the rules.

SCM Nomination Solicitations. In the recent past, several SCM nominating petitions have been received a day after the deadline date. Since they were the only petitions received, the temptation was to consider them valid and declare the nominee elected without opposition. After all, plenty of time had been allowed to get petitions in, and a membership so apathetic as to nominate only one candidate must expect not to have a choice. But rules are rules and must be followed. The petitions were accepted as valid, but the deadlines for receipt of additional petitions were extended another two months. See the election notice, page 104 of the October issue.

ARRL members should be aware of the procedures for election of their SCMs. Each two months an election notice is published in *QST* detailing SCM terms about to expire and soliciting nominating petitions, indicating deadlines for receipt of each. Is your section listed? Do you know your SCM? Is he doing a creditable job, or would you rather have someone else?. How about taking more interest in this, gang? Election by acclamation is fine, but election by default is an indication of apathy. Sometimes a section goes month after month past the SCM's term (2 years) without any five members in the section nominating the incumbent or another candidate to take over the office officially. Election by default is all too common.

So we call your attention to the bi-monthly election notice. Watch for the listing of your section. If you don't know what section you are in, see page 6, or drop us a line and we'll gladly tell you. It takes only five signatures of full ARRL members to nominate. Why not try to put your man in office? — *W1NJM.*

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for August Traffic:

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
K6BPI	4628	2334	2156	178	9296
W3CUL	444	1621	1386	234	3685
W7BA	22	1002	742	247	2013
K0ONK	187	742	729	21	1679
K9IVG	13	618	522	10	1163
W6RSY	38	525	465	84	1112
W6OBD	36	518	517	1	1072
W6GYH	159	446	420	11	1036
K5TEY	28	705	272	16	1019
WA7DXI	39	458	405	32	934
WA4UAZ	84	391	356	18	849
W7HMA	30	397	395	2	824
WB6BBO	41	391	359	4	795
WA4WWT	40	363	344	2	749
W3EML	32	402	292	1	727
WØLGG	15	370	303	13	701
W0LCX	36	332	311	21	700
K7NQX	31	328	0	328	687
WA7CSK	187	247	235	12	681
W6VNQ	25	338	317	0	680
W3VR	76	297	226	10	609
W8UPH	19	295	257	35	606
W7DZX	10	305	254	3	572
WA1FVH	67	260	152	65	544
KØYBD	37	256	227	23	543
W6EOT	0	266	269	0	535
W2SEI	27	257	236	14	534
WB4AIN/4	12	256	241	9	518
WA3CFK	4	260	242	11	517
Late Report:					
WAØIEF (July)	726	35	2	18	781

BPL for 100 or more *originations-plus deliveries*

WA4BMC 386	WA0ORO 156	W3TN 108
W4BAZ 287	WA8MCQ 133	WB4CJM 106
WA9CCP 237	K1PGQ 127	WA3GAT 105
W8IV 187	WA4VUE 122	VE2DCW 103
KH6GHZ 183	W6LNZ 121	KØAKK 102
WA4DYL 177	W2OE 117	WB2TNB 101
W9EET 165	W6QJW 114	K7CTP 101
	K6IBI 113	

More-Than-One-Operator Stations

K6MCA 242	K4CG 150	WA3GYE 105

BPL medallions (see Aug. 1954, p. 54) have been awarded to the following amateurs since last month's listing: WB4BPL, WA4UAZ, K8LRK, WØMHS.

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.

DX Test Feedback

For some mysterious reason, the N. Y. C.-L. I. c.w. score of **W2PCJ** neglected to appear as it should have (as 3rd high in the section) in the October *DX Competition results*. Larry's 1,105,650 points reflects 350 multipliers, 1056 exchanges, a kilowatt and 86 hours operation — a credit to the Order of Boiled Owls of New York!

While we're at it, it was a double-header of an error with **W3WJD's** multioperator c.w. scorcher (4,011,432–463-2889-C-96) disappearing from the top of the multiops in the E. Pa. listing. Sig's country break-down did appear and that Frankford club total was enriched with that 4-meg. total. Look for W3WJD, single-op in '68.

Sincere apologies, OMs.

—•••—

Re DX Test '68, a new one-page DX Test announcement has been mailed to hundreds of prospective non-W/VE participants for the 1968 bash. The new sheet outlines rules, supplies a state/province check-list and gives a sample log form. Let us know if you can use a few to send to your DX buddies.

DX CENTURY CLUB AWARDS

From August 1, through August 31, 1967 DXCC Certificates based on contacts with 100-or-more countries have been issued by the ARRL Communications Department to the Amateurs listed below.

New Members

K6BFZ....276
DJ1ZG....271
H2JG....260
G3HSR....247
K1LBH....220
W5CGR....213
K4EWG....184
W3DBF....142
JA1KFN....132
OK1AH....130
WB6NWW..128
UA9KOH...127
WA5AUZ...123
WA8CIA...123
WA4MDA..121
JA8EL....120
YU1NOH...118
WA0GQL...117
UA3DB....115
W6ECM....115
DL1DH....114
WB6FCR...114
LA2IG....111
UF6FE....109
OK2KBR...108
K4PRT....108
UA6KJG...108
W1AFM....108
WB2YQH...107
WA8FKD...105
DJ1KOA...104
JA6CNL...104
K3VZV....104
CR6EI....103
G3ESF....103
H1CCZ....103
H1WL....103
JA1PTX...103
K2VFX....103
UW6LZ....103
WA9OTH...103
DJ6MH....102
HB9AHF...102
JA7FC....102
UA4KNA...102
W9MFW....102
DJ6OM....101
DJ6TR....101
DJ6TU....101
PY1BQO...101
K1EUS....100
K3SWU....100
K4ADK....100
K8LSK....100
K9GCM....100
KØHR....100
W1HTE....100
WB2PMP...100
W3JXS....100
W4DMT....100
W4LXA....100
WA4BNI...100
WA5BFB...100
WA5OCN...100
WA6THG...100
W8FMG....100
WA9MMT..100
WAØMLD..100
WØRRS....100

Radiotelephone

G3HSR....235
DJ1ZG....221
DL8OA....164
JA1IBX....162
VE3CPB....142
JA1DFQ....125
W6PTS....124
JA8EL....115
F7AA....112
WA6DOB...109
WB6FCR...109
DJ8YQ....108
WB2VEG...108
K3ZCA....107
PY2OY....107
DJ9QO....106
W3BYQ....105
W9ABM....104
CE6EW....103
W1EED....103
WB2VZW...103
WA4MDA..103
WA9BNX...103
K2DJD....102
K3CBW....102
W4DFK....102
DJ6FN....101
DJ9XA....101
H1WL....101
WA4EKF...101
K7MJC....100
W4BCB....100
WA4RQD...100
WA8NDE...100
W9EPM....100

Endorsements

Endorsements issued for confirmations submitted from August 1, thru August 31, 1967 are listed below. 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.

320
W4AVY
W8QJR

300
K6BPR
PY1HX
W1YYM
W4ZYS
W5KTW

280
K6EXO
K8AJK
K8EHD

OK3MM
W2FAR
W6YCW
W4HKQ
WA2EPN

260
K6POC
PY2BGL
SM6CAS
VE3WT
W2BXC
W2MEL
W3QQL
WA6HRS
WØWRO

240
H2PB
K4AUL
K4BT
K9JJR
OE1HGW
W1AW
W1CUX
W4NML
W6ONK

220
KØIFL
SM7BHF
W3FIU
W4OEL
W6OAQ

W8ELE
WA8LSO
7XØAH

200
EA2CR
JA1IBX
JA4XW
K3JLI
K3MNJ
K6OT
SM4CLU
UW3DR
WB2UKP
WA4FDR
WB4BDO

W7MVC
W7QON

180
DL1MD
JA1HGY
KØWKE
VE2DR
VE8BB
WA2ZEZ
W4ZSH
WA6OIU
WB6JWY

160
DJ5MX

HA5KDQ
K1RQY
K2QOU
K32CA
K9JJS
VO1AW
WB2CGW
WA7FIG
W7MVC
W8BRL

120
F9AP
HB9EC
K1PVB
K4ELK
K4FRM

OH2SF
WA2QHK
WB2HZH
W5OER
WA6TQK
WA8GPX
WA8OVC
W9OPD
W9PUY

120
W6MTP
W6TMP
WB6SEV
W8GGQ
W9KYK
WA9LUD

K6EBB
K7QMK
SM7DQK
W1HQO
WB2OLN
WB2RJJ
W3TVB
W4KAT
WA5HS
W6HS

Radiotelephone

320
W8QJR

280
K6EXO
WA2EOQ

260
W5IPH
W9TKD

240
H2ZG
K1DPI
K4BVQ
SM6CAS,
W4BYU

220
F8CW
H5CA

H2ZPB
K4ET
K6BPR
W1FAR
W4FRO
WA5IEV
WA8OJI

200
CX2CN

HP1JC
K9JJR
W2RBK
W4NML
W9HPS
ZS8L

180
CX9CO
K2RAP
KØWKE

SM7BHF
VE3CTX
W1CUX
W4WHF
W5KTW
WA6OIU
WA6LDV
WB6JWY
WA8LUC
XE2WH

160
K1INO
K4UFE
K9JJS
KØIFL
TN8AA
W1AW
W1HOO
W1MRQ
WB2CGW

WØYDB

140
CT1FL
JA1BWT
W8BRL
WA8LSO
9L1HX

120
JA1HGY

K1PVB
VE4AS
VE4XN
WB2OLN
WB2PWU
W4JFW
WA4FDR
WB4BDO
WØDP
6Y5GG

W1AW SCHEDULE, NOVEMBER 1967

The ARRL Maxim 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. If you wish to operate you must have your *original* operator's license with you. The station will be closed November 23, 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[6]	3.555[6]	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[6]	7.080[6]	3.555	7.255	3.555
0600-0700	.....	.....	7.080	3.945	14.100	3.555	7.080
0700-0800	.....	.....	14.280	7.255	3.945	14.100	14.280
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, 14.095 and 21.095 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] W1AW 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 QIS WPR NPG.* Times/days in GMT. General operating frequencies approximate.

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. 14 at 0230 GMT. Identical tests will be sent simultaneously by transmitters on listed c.w. frequencies. The next qualifying run from W6OWP only will be transmitted Nov. 2 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 Mar. 16 becomes 2130 EST Mar. 15.

Any person can apply. Neither ARRL membership for 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 transmitted, 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 W1AW at 0030 and 0230 GMT, simultaneously on all listed c.w. frequencies. At 0230 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 fist by sending *in step with W1AW* (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 September *QST*
Nov. 3: *It Seems to Us*, p. 9
Nov. 7: *A Low-Noise Converter For 144 Mc.*,* p. 11
Nov. 15: *Clicks and Chirps — Let's Clean 'Em Up!*, p. 17
Nov. 23: *Forced-Air Cooling of Transmitting Tubes**, p. 20

(Continued next column)

Date Subject of Practice Text from *Understanding Amateur Radio*, First Edition
Nov. 27: *Buffer Amplifiers*, p. 75
Nov. 30: *Frequency Multiplication*, p. 76 QST

* Speeds will be sent in reverse order, highest speed first.

Strays

WB2NGZ, licensed for about four years and a member of the Nassau County Police Dept. for two years, was recently promoted to the rank of detective. Through chance, he was assigned shield No. 73 out of a possible 2500 other shield numbers!

SUGGESTED OPERATING FREQUENCIES

RTTY 3620, 7040, 14,090 21,090 kc.
WIDE-BAND F.M. 52.525 146.94 Mc.

GMT CONVERSION

To convert to local times subtract the following hours:

ADST —3, AST —4, EDST —4, EST —5, CDST —5, CST —6, MDST —6, MST —7, PDST —7, PST —8, Hawaiian —10, Central Alaska —10.

A convenient conversion card is available free from the ARRL Communications Department, 225 Main St., Newington, Conn. 06111. QST

Station Activities

• 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—Acting SCM, John L. Penrod, K3NYG—RM: W3EEB. There was a good attendance at the hamfest even if it did rain cats and dogs. W3DKX gave his EICO 753 to his son W3AQL. K3KAJ returned to college for another year. WA3DUM is now on 2 meters. W3FEG is mobile in a new self-propelled mobile home. The K3GKF Field Day Trophy was won by the First State Radio Club. K3NVV needs volunteers for next year's hamfest. K3AXW is supplying Delaware QSOs for the DX on 10 and 20 meters. W3BDP recently worked W5UGO during the perseids shower. This gives him 19 states, 7 call areas and a maximum distance of 1100 miles on 2 meters. DEPN reports QNI 51, QTC 2; DSMN QNI 63, QTC 4. Traffic: W3EEB 115, K3KAJ 30, W3DKX 15, WA3DUM 7, WA3DYG 7, K3NYG 3.

EASTERN PENNSYLVANIA—SCM, George S. Van Dyke, Jr., W3ELI—SEC: W3AES. RMs: W3EML, K3YVG, K3MVO, W3MPX. PAM: K3MYS. V.H.F. PAM: W3FGQ. PFN reports QNI 352, QTC 601; PTTN, QNI 301, QTC 276; EPAP&TN, QNI 696, QTC 352; EPA V.H.F., QNI 102, QTC 44. OO reports were received from W3KEK, W3BFF, K3TXG, K3RDT, K3PSW and W3NNC; OVS reports from K3VAX, W3ZRR, WA3EEC, K3MSG and K3HHE; OBS report from WA3AFI. WA3CFU got his Extra Class ticket. WA3EEC is now on 6-meter MARS. WA3EXW needs the manual for the BC-348N. WA3GAT made the BPL and is looking for a c.w. chess challenger. WA3FPM added a 10-meter ground plane antenna to his antenna farm. K3VAX went back to school. WA3ATQ is busy with skeds. K3HLN's generator is now all automatic. W3FPC is busy with RACES. K3NSN is busy teaching amateur radio to cerberal palsy victims. K3PSW is working on an FET converter for 6. W3FGQ is doing an FB job on the EPA V.H.F. Tfc Net. K3JHE bought a new house and will be set up soon. WA3AIB is starting to work a bit of DX on 15. W3NNL has a new 500-watt final. WA3EMO went back to school and the club station. K3WEU, home from Maine, has his antenna back up. WA3GYE made the BPL. W3HNK added a TI2JCC to his DX QSL service. WA3CTP is doing an FB job with the KC paper. W3AIZ was top scorer in E. Pa. in the 1967 NYS QSO Party. W3EU vacationed at Expo. WA3ERJ finally got his EICO working on 20. W3RV had another set-back, his own ticket started acting up. W3EML made the BPL even though he had rig problems. W3CUL made the BPL plus. W3VR also made the BPL. K3MYS is a very busy PAM. W3AES still is looking for needed ECs. WA3BSV states that his ARPSC sticker in his car window draws other hams! K3ADS leaves for a year in Vietnam. Best of luck from the E. Pa. section for a safe return. K3YVG reports the EPA C.W. Net had QNI 385, QTC 401. Traffic: (Aug.) W3CUL 3685, W3EML 727, W3VR 609, K3MYS 477, WA3CTP 328, K3MVO 282, WA3EXW 256, W3FGQ 235, WA3GAT 174, W3MPX 173, K3VBA 157, W3KJJ 135, WA3FPM 121, WA3ATQ 120, WA3GLI 109, WA3GYE 108, WA3AFI 100, WA3EEC 99, K3YVG 97, WA3EMO 86, K3RUA 79, W3AIZ 70, WA3FVK 70, WA3BSV 64, K3-WAJ 55, WA3AIB 53, W3ELI 51, K3WEU 51, W3FPC 50, W3AES 37, W3KQE 36, W3HNK 34, W3CFU 30, WA3-CKA 29, W3NNL 28, W3VAP 28, W3OY 25, W3RV 23, K3KTH 17, K3MDG 16, W3JKX 11, WA3EIO 9, WA3-ERJ 8, WA3EXB 8, K3HKW 8, K3NSN 7, W3BFF 5, K3UZO 4, W3ADE 2, K3ADS 2, WA3BJQ 2, W3EO 2, K3HLN 2, WA3IAZ 2, W3ISN 2, W3KEK 2, K3VAX 2, K3FOB 1, K3JHE 1, K3PSW 1, W3ZRR 1. (July) K3-FOB 2.

MARYLAND-DISTRICT OF COLUMBIA—SCM, Carl E. Andersen, K3JYZ. SEC: W3LDD.

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QTC*	*QNI*	*Mgr.*
						Ave.	
MDD	3643	2300Z Daily		31	253	10.0	K3OAE, RM
MDDS	3643	0030Z Daily		31			W3ZNW, RM
MEPN	3820	2200Z M-W-F		23	113	24.6	K3NCM, PAM
		1700Z S-S					
MTMTN	145.206	0100Z M-W-F-S		9	4	8.0	K3NOQ
CVTN	145.615	0200Z T-S		9	127	7.0	WA3CFK
BNON	50.250	0300Z Daily		31	20	10.0	K3URE

New appointments: WA3DWF as EC for Garrett County; K3VGX as EC for Baltimore County; W3SRC as EC for Carroll County. Renewals: K3WUW as ORS. The SEC reports that 100% of the appointed ECs for MDC reported this time. The MEPN had a fine picnic and made plans for the coming traffic season. K3URE reports on the progress made on the new PVARS club and station building. K3CYA reports two intruders in the bands. WA3CFK and W3TN made the BPL list. WA3GTX and W3BQV have been actively assisting wayward amateurs with their OO work. WA3GLH is getting the RTTY bug. W3GKP temporarily deserted the v.h.f. bands for a contact with VR6 on 15. G5AFO/W3QCW reports he will be QNI on MDD during the winter again. WA3CFK is so busy with amateur radio that I don't think he will have time for school this year. W3GEB is stretching his vertical trying to improve his 80-meter signal. W3MCG is dismantling his antenna farm to move to a new QTH. K3FKU passed the Extra Class exam. W2DPR is now W8IBX. K3LFD has completed his antenna improvements. WA3EOP has gone back to school for another year. WA3FCN is using a sixteen-element beam on 2 meters. W3TXQ was the high scoring MDC station in the N.Y. QSO Party. W3CDQ has resumed her duties as OBS. WA3DWF has a new T-4X/R-4A combination. The EARS is taking on the job of QSL managing for EP2 stations as it celebrates its third anniversary. K3ORP was elected Honorary Mayor of Bowling Green, Ky. WA3RZQ has moved to a new antenna farm and will be ready to start planting in the spring. Traffic: WA3CFK 517, W3TN 231, WA3EOP 142, K3JYZ 79, W3CBG 74, K3FKU 74, W3MCG 74, K3OAE 74, W3ATQ 57, K3GZK 45, WA3GLP 44, WA3FCN 41, W3ECP 21, K3NCM 21, W3DPR 17, K3ORW 16, K3URE 16, WA3BNL 14, WA3ERL 14, K3LFN 8, WA3CEK 5, W3JZY 4, K3LFD 3, W3GEB 1.

SOUTHERN NEW JERSEY—SCM, Edward G. Raser, W2ZI—Asst. SCM: Charles B. Travers, W2YPZ. SEC: W2BZJ. RMs: WA2KIP, WA2BLV, PAM & NJPN Net Mgr.: W2ZI. NJN reports QNI 505 stations and total traffic 313. N.J. Emergency Phone & Tfc Net reports QNI 308, total traffic 116. WA2ANL is moving to Bridgeton, N.J. He had to resign as EC for Burlington County but will take over the same job in Cumberland County. WA2BLV hopes to have RTTY to TCC going again soon. WB2BSD signed up in the USAF and now is on the way to Texas for boot training. W2VX again took on the big job as SJRA Hamfest chairman, after steering the club's 50'th Anniversary Banquet to a successful conclusion. I am very sorry to report that WB2RRA is now a Silent Key. The SJRA had a most successful FD, running up a score of over 18,000 points. WB2MNF has a new tower and is going 2-meter mobile. WB2WXA is going 6 meters and also is putting up a new tower. W2KGM is a new member in NJPN and wants OPS appointment; so does WB2SEZ. W2FTX has been with the RCA Camden plant for some 26 years and worked with NJN faithful W2RG, now deceased. K2DSL, a former NJN YL member is home on vacation from California. K2SNK moved to Ewing Twp. and will be back on the air soon. He is one of the "faithfuls" at W2ZQ, Sun. morning sked. W2ZEW reports he misses NJPN, now working late. WB2MOQ was high scoring station in the 1967 N.Y. State QSO Party. Twenty-eight Trenton hams and their wives attended the welcome party for ZS6TE from Johannesburg, S. Africa. W2OA was host. Traffic: (Aug.) WA2BLV 166, WA2KIP 154, K2SHE 28, K2JJC 18, WA2KAP 18, WA2MNF 18, W2ZI 15, W2BZJ 5. W2ORS 4, WB2WXA 1. (July) K2JJC 12.

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 1400 GMT and 2345 GMT Mon. The Eastern Area Traffic Net, on 3900 kc. at 2330Z daily, invites check-ins from W.N.Y. stations. Net mgr. is WB2FUW. W2OE and W2SEI made the BPL. Congratulations. W2SEI reports that RAGS had the best exhibit yet at the N.Y. State Fair. ATV was demonstrated with three outside stations transmitting. K2KTK, K2KIR and W2SEI manned c.w. traffic facilities. WB2FPG is secy. of the Worcester Tech RC. WB2FPG was endorsed as ORS and WA2EDG/WA7GVP was appointed ORS. New officers of the SIARC are WA2RHW, pres.; K2BWK, vice-pres.; K2KLP, secy.; WA2BMM, treas. Area representatives are WB2LZM, K2RTU, K2VBK and WB2YHD. W2UTH is editor of the *Smoke Signal*. The RARA will conduct a code and theory class again this year under the directorship of WB2HZG. Silent Keys: W2LF and W2RGA. From the mailbag it seems that almost every other ham is a camper and that every club is starting out fall meetings with a combination revival meeting and incentive licensing program. Your SCM was sorry that he missed the NYS C.W. Net Picnic. W2RUF reports that all the VIPs were present and that it was a huge success. WN2ZLK is finally on 15 meters with a new 2B and 5 new countries. He should have his General Class ticket by now. K2EE celebrated his 60th wedding anniversary. He is now 84 years old. The Tomkins County ARC operated portable at the Town and Country Fair in Ithaca under WB2VHX. Participants were K2GQU, K2MVC, W2CRP, WA2UJM, WB2TQF, WB2UAF, WB2YNU and WN2ZNP. Traffic: W2SEI 534, W2OE 436, K2RYH 258, W2RUF 164, W2OYE 140, WB2VSL 138, WB2GAL 111, W2HYM 107, WA2NDC 106, W2FEB 76, WB2SMD 70, W2MTA 56, W2RQF 42, K2QDT 32, K2IMI 27, K2KIR/2 25, WA2ANE 22, WB2SIA 20, K2DNN 18, WB2BJN 15, K2OFV 15, W2FCG 14, K2JBX 12, WB2VHX 8, W2CFP 7, W2PVI 5, WA2ISE 4, K2HUK 2, W2PNW 2, WA2GLA 1.

WESTERN PENNSYLVANIA—SCM, Robert E. Gawryla, W3NEM—SEC: K3KMO, PAM: K3VPI (v.h.f.). RMs: W3KUN, W3MFB, W3UHN, K3SOH. Traffic nets: WPA, 3585 kc. daily at 7 P.M. local time, KSSN, 3585 kc. Mon. through Fri. at 6:30 P.M. local time. The traffic gang from WPA and KSSN, plus the AREC gang, met at Clearwater State Park Aug. 27 for their annual picnic and planning session for the fall and winter session of traffic and emergency operation. K3SOH/K3PYS, father-and-son team, broke their consecutive QNI WPA Traffic Net at 411, a record that should stand for a long time. W3UHN now has 143/158 for DXCC. WA3FLM is at Duke University, Durham, N.C., studying as an EE major. Look for him from the club station. W4AHY, WA3ILB (ex-WA8KUW) is back at the University of Cincinnati, where he also is majoring in EE. Look for him from W8YX. K3TEZ also is going back to school at Shippenburg State (Pennsylvania). The Conemaugh Valley ARC has a newly-formed 10-meter net going. K3ASI has stimulated some 2-meter work in the Meadville area. K3ASI and K3YAK have generated a little RTTY activity and have an auto-start net on 146.7 Mc. W3YXV and K3GDV join K3ASI and K3YAK on 2 meters. W3NLU joined the ranks of Extra Class license holders. WA3BLE has a new TH6-DX-tribander up 55 feet. W3MFB, WPA RM, reports 31 sessions, 255 messages, 344 QNS, plus 5 visitors, for a fine month of traffic. Traffic: (Aug.) K3PYS 230, W3NEM 218, W3KUN 143, W3MFB 127, K3TEZ 107, W3LOS 101, WA3BLE 58, WA3AKH 53, WA3AKB 22, K3SOH 19, K3ASI 18, K3SJN 13, K3SMB 12, K3HCT 11, K3EDO 10, K3EXE 10, W3LOD 9, K3RZE 8, W3VA 8, WA3FLM 3, W3UHN 2. (July) W3MFB 103, K3TEZ 65, WA3AKH 31, K3RZE 8, K3SJS 2.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—SEC: W9RYU. RM: W9EVJ. PAMs: W9VWJ, WA9CCP and WA9KLB and WA9RLA (v.h.f.s.). Cook County EC: W9HPG. Net reports:

Net	*Freq.*	*Times*	*Days*	*Tfc.*
IEN	3940 kc.	1400Z	Sun.	
ILN	3760 kc.	0000Z	Daily	172
NCPN	3915 kc.	1200Z	Mon.-Sat.	211
NCPN	3915 kc.	1700Z	Mon.-Sat.	187
Ill. PON	3925 kc.	1700	Mon.-Fri.	
Ill. PON	50.25 Mc.	2000	Mon. & Thurs.	349
Ill. PON	145.5 Mc.	2000	M.W.F.	
TNT Net	145.36 Mc.	2100	Sun.-Fri.	243

W9EVJ, of Elgin, has been appointed the new RM for the Illinois section, replacing WA9GUM, who has entered college. Thank you, Dave, for a job well done. The 75-Meter Interstate Single Sideband Net had a traffic count of 596, according to Net Manager W9NWK. New appointments include WN9UHA and WN9TOC as OVSs. W9JCK topped a field of 8 entries from Illinois in the 1967 New York State QSO Party. A new call heard in Princeton is WN9VMP. WA9LIV is finishing his 2-meter repeater station. The Ninth Regional Net handled 732 pieces of traffic during August. With the new FCC regulations just announced, this department has received many notices from the various clubs throughout the state announcing their intention of starting new and additional code and theory classes this coming season. Those interested should contact the local clubs. WA9NGB has a new 2-meter beam and enjoys working v.h.f. DX. WA9AHZ is vacationing in Europe. Make your vacation plans now for 1968 and include the Central Division Convention, to be held Aug. 3 and 4 at Springfield, Ill., on your itinerary. The committee promises a grand program for the whole family. WA9CCP and W9EET are recipients of the BPL award. Traffic: W9EET 333, WA9CCP 282, WA9QXT 231, WA9MHU 198, K9KZB 167, WA9GUM 166, W9JXV 153, WA9OTD 136, W9EVJ 127, W9HOT 113, K9AUD 104, W9CGC 88, WA9SPA 84, WA9SFB 81, WA9PFB 49, WA9FIH 40, WA9RSN 40, WA9PPA 30, W9DOQ 24, W9PRN 20, W9PVD 19, W9NXG 18, WA9RLA 18, WA9PIJ 16, W9IDY 13, WA9LDC 11, W9LNQ 11, K9HSK 8, WA9VKX 6, WA9HSZ 3, K9RAS 1.

INDIANA—SCM, Mrs. M. Roberta Kroulik, K9IVG—Asst. SCM: Ernest Nichols, W9YYX. SEC: WA9GKF.

Net	*Freq.*	*Time*	*Aug. Tfc.*	*Mgr.*
IFN	3910	1330 Daily 2300Z M-F	251	K9IVG
ISN	3910	0000Z Daily 2130Z M-S	624	K9CRS
QIN	3656	0000Z Daily	225	W9HRY

W9PMT, mgr. of the Hoosier v.h.f. nets, reports Aug. traffic of 57. K9VFY, mgr. of IPON, reports Aug. traffic of 65. W9QLW, RM/9RN, reports Indiana was represented 100% in the Aug. QIN Honor Roll: WA9FDQ 29, W9QLW 27, K9HYV 25, W9UQP 22, W9BDP, WA9MXG and K9VHY 21, K9WWJ 17, WA9KAG 16. W9TWU is building the SB-300 and SB-400 series. W9YXV is enjoying a new Swan 500. W9IDS has moved back to Hoosierland. WA9PIV is studying for his 2nd-class commercial license. K9CJE is quite proud of his Drake R4A receiver. WA9QMW has built a seven-element 2-meter beam. K9QCB has home-brewed a transceiver which works fine. Welcome to new Generals WA9BTV and WA9SPF. K9GEL has gone mobile with an SB-101. W8CHX moved back to Indianapolis and got his old call back. W9UEM. The club call of the Fishers HSARC, now named Hamilton-Southeastern HSARC, is K9VHF. Another new General is WA9UGG. Congrats to WA9FDQ on passing the Extra Class exam. K9IVG made the BPL. *Amateur radio exists because of the service it renders.* Traffic: (Aug.) K9IVG 1163, W9JUK 364, WA9FDQ 265, W9HRY 217, K9FZX 210, K9HYV 158, W9QLW 147, WA9MXG 90, WA9LTI 62, W9VAY 60, WA9KAG 59, WA9GNA 57, K9CRS 53, W9EJR 52, K9OXA 52, WA9KVP 41, WA9OYI 37, K9CBY 36, W9DKR 33, K9VHY 33, W9BUQ 32, WA9IZR 32, W9SNQ 27, K9HZY 25, W9UB 24, K9WGN 23, W9RTH 22, W9YYX 22, W9IJZC 21, W9FWH 20, W9LG 19, W9CMT 16, W9CLF 15, K9RWQ 14, WA9TUK 14, K9KFM 13, K9ILK 12, WA9MFY 12, K9UEO 12, WA9GJZ 11, WA9AXF 10, WA9CFW 10, K9DHN 10, K9KTB 10, W9PMT 10, K9FUJ 8, K9JQY 8, W9BDP 7, W9CUC 7, K9EFY 7, WA9JIX 7, WA9CHY 5, K9YFT 5, W9HWR 4, WA9QMW 3, K9STN 2, WA9RNT 1. (July) WA9OYI 25, W9DZC 11.

WISCONSIN—SCM, Kenneth A. Ebneter, K9GSC—SEC: W9NGT. RM: WA9MIO. PAMs: W9NRP, WA9QNI and WA9QKP.

Net	*Freq.*	*Time*	*QNI*	*QTC*	*Mgr.*
BWN	3895 kc.	1300Z Mon.-Sat.	310	123	W9NRP
BEN	3985 kc.	1800 Z Daily	689	96	WA9QKP
WSBN	3985 kc.	2315Z Daily	1204	206	WA9QNI
WIN	3662 kc.	0115Z Daily			WA9MIO
SWRN	50.4 Mc.	0300Z Mon.-Sat.	165	1	W9JZD

Net certificates went to WA9PKM for BEN; WA9TBQ, W9ESJ, WA9DHO, K9CPM, WA9AIB, K9OGT and WA9SLZ for WSBN. New appointments: W9NGT as SEC and W9PAS as EC for Washington County. Renewed appointments: K9FHI and W9AXS as ECs; K9WIE, W9SUF and K9GSC as ORSs; W9NRP, K9WIE and WA9LWJ as OPSs; K9HJS and WA9GJU as OBSs. K9JYX has moved to Baraboo and joined the circus. WA9MOF is getting set up on RTTY. WA9MFZ was the high scoring Wisconsin station in the New York QSO Party. WA9QJI is active on s.s.b. with

on NCX-3. WA9RAK topped Wisconsin QNI in 9RN. WA9QKP is handling liaison from the phone net to 9RN. W9BCY and K9SQV are providing communications for servicemen. WA9RAK and WA9NDV received CAN net certificates. Traffic: (Aug.) WA9RAK 332, WA9QNI 159, WA9NDV 146, W9ESJ 134, WA9NPB 125, W9DYG 123, W9IFS 111, WA9QKP 72, W9CXY 56, WA9-NVY 49, W9DND 41, K9CPM 32, W9NRP 32, W9AYK 27, W9BCH 26, W9DXV 25, K9FHI 25, W9CBE 12, WA9PKM 11, WA9SAB 3, K9KSA 2, W9YT 1. (July) WA9QKP 63.

DAKOTA DIVISION

MINNESOTA—SCM, Herman R. Kopischke, Jr., WØTCK SEC: WAØIEF. RMs: KØORK, WAØEPX. PAMs: WAØMMV, WAØJKT, WAØDWM. MSN meets daily on 3595 kc. at 0030Z. MJN meets Tue.-Sun. on 3595 kc. at 0100Z. Noon MSPN meets Mon.-Sat. on 3820 kc. at 1805Z, Sun. and holidays at 1500Z. Evening MSPN meets daily on 3820 kc. at 2300Z. MSTN meets Tue.-Sat. on 50.4 Mc. at 0430Z, Sun. at 0200Z. Minn. WX Net meets daily on 3830 kc. at 2400Z. Note that these are all GMT times and is the winter schedule for standard time. Congrats to WAØDOT, a new ORS. KØORK renewed as ORS. WAØIEF received the BPL award for July traffic. WAØHRM is back in Minnesota to stay, we hope. The Rochester ARC provided communications for the Boy Scouts Annual Canoe Derby held on the Mississippi, and also again in conducting code and theory classes. The Duluth ARC handled considerable traffic from its display booth at the Duluth Portorama Days celebration. The Mankato ARC again had a booth at the Blue Earth Co. Fair. The summer picnic season wound up with the well-attended annual St. Cloud Picnic. The Albert Lea Spiderweb ARS has added a bicycle mobile unit. Complete with a Heath Sixer, rechargeable battery and Halo antenna it can be used in emergency areas where regular mobiles would be unable to go. A possible change of frequency for both MSPNs and the Minnesota Weather Net is being contemplated. Check your favorite net for details. Traffic: (Aug.) KØORK 125, KØZRD 68, WAØJKT 54, WAØMMV 45, WØATO 34, WAØEDN 20, WAØQAK 20, WØTCK 20. KØFLT 19, WAØRXB 18, WAØLVK 15, WAØPFT 13, WØHEN 11. WAØEZQ 10, WAØRJH 10, WØIYP 9, WAØPPY 9, WAØNQH 8, WAØODB 8, WØUMX 8, WAØHRM 6, WØMFW 6, WAØJPR 5, WØKLG 5, WAØDVH 3. (July) WAØIEF 781, WAØ-EDN 92, KØORK 84.

NORTH DAKOTA—SCM, Harold L. Sheets, WØDM —SEC. WAØAYL. OBS: KØSPH. Here are the operating nets of the section:

RACES 2330 GMT-6:30 P.M. CSDT Mon.-Fri. KØSPH SO 3996.5 kc.			
Post Office	5:30 P.M. Sun.	WAØHUD Mgr. 3845 kc.	
TEN	0230 GMT 9:30 CSDT Daily	WAØHUD-WAØELO 3635 kc.	
Goose River	Sun. AM	WØCDO NC	

The Winnepeg Hamfest was attended by WAØDQX, KØHXL, KØOVE and WAØPPK from Grand Forks. KØOVE took honors for mobile installation. WAØAYL put together a new Heath SB-200. WØMQA came home from Minneapolis over Labor Day. KØOVE and XYL WAØPPK have returned from Texas. WAØJPT has a new TR-4. KØSPH has a new Drake L-4 linear. WØLWH has won the battle with the "Indians." KØQYD will be with AT&T in Fargo soon. WØCAQ and his HT-37 are not hitting it off too well so he is not on the air at present. WØDNJ and XYL WØOAB are back in action again. WAØGZA is ready again after vacation. WAØELO has been spelling WAØHUD while on vacation on the TEN C.W. Net. If interested in getting into a slow c.w. net, contact WAØELO. WØDM will be teaching radio classes and doing other work in the Grand Forks, School District. He has a new Telrex duo-bander for 40/80 meters. WØGFE acquired a 75A-4. TEN report: WAØELO 19 QNI, WAØ-HUD 17 QNI. July-Aug. RACES: 56 sessions, 1068 check-ins, 202 messages. Traffic: (Aug.) WAØELO 170, KØSPH 82, WAØJPT 14, WØDM 12. (July) W9QNI/Ø 5.

SOUTH DAKOTA—SCM, Seward P. Holt, KØFXW—SEC: WØSCT. RM: WAØAOY. S.S.B. Net Mgr.: KØBSW. NJQ Net Mgr.: WAØLLG. The South Dakota Picnic sponsored by the Prairie Dog ARC was considered a great success by all who attended. Over 200 attended the Sat. night smorgasbord and over 300 attended the festivities Sun. KØJVI, Sac City, Ia., got the Swan 500 and K5OXE, Enid, Okla., the TV set. The members of the Prairie Dog ARC are to be congratulated on their fine organization and their ability as hosts. S.S.B. Net reports 1123 QNI, 58 QTC, 154 informal for Aug. S. Dak. C.W. Net reports 35 QNI, 21 QTC in 220 min. NJQ Net reports 247 QNI, 8 QTC, 49 informals for Aug. Traffic: KØVYY 50, WAØLLG 46, WØSCT 30, WAØRIQ 29, KØTNM 12, WØDVB 6, WAØQMV 5.

DELTA DIVISION

ARKANSAS—SCM, Don W. Whitney, K5GKN—SEC: W5DTR. PAM: WA5GPO. RM: W5NND. NMs: WA5-PPD, W5DTR, W5MJO and K5ABE. Our congratulations to W5DTR, our new SCM for Arkansas. This is Curt's second hitch as SCM so he'll be no stranger to the task. K2UFT, contest chairman for the 1967 New York State QSO Party, informs me that K5KDG/5 was the high scoring Arkansas station. New reports for Aug.:

Net	*Freq.*	*Time*	*Day*	*Sess.*	*QTC*	*QNI*	*Time*
RN	3815 kc.	0030Z	Daily				
AFN	3885 kc.	1100Z	Mon.-Sat.	27	9	609	1605 min.
OZK	3790 kc.	0001Z	Daily	31	80	230	586 min.
APON	3825 kc.	2130Z	Mon.-Fri.	23	194	304	640 min.

Traffic: W5OBD 1072, W5NND 148, W5DTR 138, WA5KEF 112. W5MJO 74, WA5QPI 20, WA5PKO 16, WA5OSC 8. WA5KQU 7.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—SEC: W5BUK. RM: W5CEZ. V.H.F. PAMs: W5UQR, W5DXA. W5BUK is having power supply trouble in his mobile. The GNOARC has a complete station ready to go in the new Trade Mart Building. WA5NYY and WA5KQN are new ORSs along with WA5OJG, who holds new OPS. WA5CAU, besides his morning stint on 3900, is chasing DX. I know all of you agree the new FCC regs are a fair shake! Congrats to W5MBC on his appointment as manager of LAN. WA5EID had a very enjoyable DD cruise in the Pacific and hopes to break into DXCC shortly. WA5LGO has put RTTY equipment on the air. W5MXQ says his 2-meter pole is still on the ground! WA5SSE is a new ham in Monroe. W5CEW is another old-timer back chasing DX. WA5-BIM gave the Lafayette RC a fine talk on emergency equipment. WA5BDO is working on a c.w. rig. K5EGW has a new station wagon mobilized. W5EXI has enjoyed a nice vacation mobiling along the way. W5SKW has an HT-32 ready to go. W5BUK was the high scoring La. station in the New York State QSO Party! W5EA claims activity is sporadic. WA5GNM gave the CLARC an interesting talk on antennas. W5NMS has gone s.s.b. K5JXH and his ex-YL have returned from a vacation in the Smokies. WA5JVL is converting 2-meter f.m. to ham use. Traffic: W5CEZ 216, W5MXQ 84, W5MBC 56, W5EA 8, WA5LGO 8, W5KC 6, WA5KLF 6.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—SEC: W5JDF. A special welcome to WB6VHX/5 now in Natchez and to W4PJB/5 now in Meridian and congratulations to new licensees WA5POH and WA5QQT. The Columbia Amateur Radio Club held a very successful picnic at Lake Columbia. Congratulations to K4RIN/5 on being the highest scoring Mississippi station in the New York State QSO Party. Look for K5TYP on CD Parties' with new equipment and new operators. KØGYK/5 is officer of the club station. The Mississippi Sideband Net Picnic at Grenada was a big deal with over fifty in attendance. New officers of the net are WA5KEY, net manager; WA5OHQ and WA5OKI asst. net managers; WA5OKI, secy.-treas. It is always a pleasure to hear K5MFY checking into the groups. Sorry to lose K5HB to Arkansas. Traffic: WA5OKI 170, W5JDF 97, W5EMM 15.

TENNESSEE—SCM, Harry A. Phillips, K4RCT—Asst. SCM: Lloyd Shelton, WA4YDT. RM: K4UWH. PAMs: W4PFP, WA4CGK, WA4EWW.

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*	*Mgr.*
TSSB	3980	Tue.-Sun.	0030Z	27	1251	162	WA4CGK
TPN	3980	M-Sat.	1245	31	931	125	W4PFP
		Sun.	1400				
ETPN	3980	M-F	1140	23	NR		WA4EWW
TN	3635	Daily	0100	59	432	417	K4UWH

The Tenn. Council of AR Club's delegates will meet on 3980 kc. at 1230Z the first Sun. of each month. The council provides a means for the exchange of ideas and closer liaison between the clubs in Tennessee. If your club is not affiliated, contact W4OGG. The Delta ARC sponsored a traffic station at the Mid-South Fair. K4-KYL reports an increase in 6-meter s.s.b. activity in Knoxville. WA4HGN (Memphis) and K4TAX (Donelson) have been operating on 144.1-Mc. s.s.b. The TN welcomes all newcomers. Appointments: WA4TJJ as OVS; W4OGG and K4PUZ as ORSs. Lloyd WA4YDT is now the Asst. SCM. I am sure that Lloyd's interest in amateur radio will be very beneficial to the Tennessee section. Traffic: K4UWH 458, W4FX 201, W4DIY 143, WA4YDT 119, K4PUZ 73, W4WBK 69, W4AST 35, WA4-

ZBC 35, WB4DJP 32, WA4YHO 29, WA4NEC 28, W4TZB 26, WA4YEM 25, K4UMN 24, W4PFP 16, WA4CGK 15, K4OUK 13, WA4TJJ 5, WA4AJB 3.

GREAT LAKES DIVISION

KENTUCKY—SCM, Lawrence F. Jeffrey, WA4KFO —SEC: W4OYI. Endorsements: W4BAZ, K4DZM, K4VDO, WA4VUE, WA4ZIR as ORSs; WB4ACQ, WA4AUR, WA4ELG, W4NBZ, K4NHY, W4RCE, K4UMN as OPSs; W4BAZ as OBS; W4JUI as OO; WA4BZS, W4CSN, WA4GMA as ECs.

Net	*Freq.*	*Days*	*GMT*	*QNI*	*QTC*	*Mgr.*
KRN	3960	M-F	1130	400	36	K4KIS
MKPN	3960	Daily	1330	328	51	WA4KFO
KTN	3960	Daily	0000	901	617	WA4AGH
KYN	3600	Daily	0000/0300	610	1176	W4BAZ

Kentucky State Fair Traffic was originated by W4BAZ, WA4DYL, WA4VUE, WB4CJM and WA4HJM/9. K1GUD/4 led Kentucky in the N.Y. State QSO Party. WB4BKG was portable at Rough River in Aug. K4TXJ/4 helps on Navy MARS. W4JKC has a new NC-200. WB4AUN has a new home-built 20-meter beam. WN4GQQ is getting a good start as a Novice. W4KKG keeps regular traffic skeds on 15. K4FPW is getting his poles ready for winter. W4JUI can read a frequency of 1 cycle in 10 Mc. WB4FOT is on s.s.b. with an HT-37. W4CMP is on RTTY. W4WNH still is trying meteor scatter with limited facilities. W4RHZ is back in business with code practice, according to Ham Call in the *Cincinnati Enquirer*. This column is good publicity for the boys in the Covington area. WA8COA writes it. We need more of this kind of help. W4NUQ is now on 2-meter f.m. Traffic: WA4UAZ 849, WA4WWT 749, WB4AIN/4 518, WA4DYL 415, W4BAZ 401, WA4VUE 182, WA4UIH 146, WA4AGH 136, WB4CJM 126, WB4AGO 111, WA4KFO 110, WA4TWB 81, W4NBZ 46, W4OYI 41, WA4UHR 33, W4KJP 27, W4GVU 23, WA4VEC 22, W4YOK/4 21, K4KKG 20, K4LOA 18, W4MWX 13, K4FPW 6, K4TXJ 5, WB4BKG 4, W4BTA 3, K4HOE 3.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: K8GOU. RMs: K8KMQ. PAMs: K8JED, W8IWF. V.H.F. PAMs: W8CVQ, W8YAN. Appointments: W8CKK, W8CQB, W8CNL, W8JAC as ECs; WA8MCQ as ORS; W8AAM as OPS; W8CVQ as OVS. Net reports:

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*Sess.*	*Mgr.*
QMN	3663	2315	Dy	180	425	31	W8RTN
WSSB	3935	0000	Dy	961	115	31	W8IWF
PON-Dav	3935	1600	Mon.-Sat.	385	321	27	WA8OGR
PON-CW	3645	2400	Mon.-Sat.	157	37	27	3C3DPO
MTN	3605	0245	Dy	12	10	31	WA8QAF
BR	3930	2130	Mon.-Fri.	797	80	23	K8JED
Mich 6	50.7	0000	Mon.-Sat.	315	38	27	WA8LRC
Noon 6	50.4	1600	Mon.-Sat.	224	2	27	WA8FXR
Lenawee 2	145.3	0200	Dy	218	52	28	WA8AAQ
MEN	3930	1300	Sun.	234	10	4	K8JED
SW Mich 2	145.2	2400	Mon.	55	0	4	W8CVQ
UP	3920	2230	Dy	No Report			

Officers: Great Lakes Emerg Net—W9ILU, Mgr.: W8PEB, asst. mgr.; K8SLG, secy. Amateur V.H.F. Assn. —K8BMC, pres.; W8CLH, vice-pres.; W8KOX, secy.; W8VRU, treas.; K8IAI and W8JXU, editors. Thanks to the PON and other nets W8IV has made the BPL for ten months, handling Vietnam traffic. The PON is going great. WA8MAM made Extra and got it back in 8 days. The W8CQUs are now grandparents. WA8RPJ is leaving for Thailand and WA8OXF will go to Iceland. K8ZSM is net mgr. of the UP Eve. Net and W8EMC is mgr. of the Sunday Emerg. Net. W8WA retired and moved to Tarpon Springs, Fla. Al was licensed as 8WA in 1920. K8LJD and K8SFZ are out of the hospital. W8EYJ still is in the hospital. W8KLK was hospitalized and lost a leg. The GRARA gang is working on a 2-meter repeater system. Our sympathy to W8QAM, whose XYL passed away. W8UA, Wayne U., now is on with a Swan 350, c.w. and s.s.b. WA8MCQ and W8IV made the BPL. The CMARC handled communications for the Ski Championship at Lansing. WA8DXW now is an EE student at Purdue. W8MPD went to summer school in Mass. WA8URE moved to Jenison and now is General Class. Traffic: (Aug.) K8KMQ 416, WA8OGR 271, W8IWF 254, WA8MCQ 237, W8IV 187, WA8VBZ 129, WØGXQ/8 125, WA8MAM 116, WA8ORC 91, W8EU 87, W8QQK 77, W8CQB 67, WA8LKI 58, K8JED 49, K8ETU 45, K8GOU 43, W8IUC 43, W8FX 41, K8ZJU 41, W8RTN 38, WA8AAQ 36, K8QKT 32, W8BEZ 30, WA8ENW 30, WA8PZT 30, WA8LRC 29, W8VAN 29, W8AUD 23, W8FWQ 21, W8MPD 17, K8MXC 17, WA8QAF 17, WA8SQC 16, W8TDA 15, K8VDA 15, W8NOH 14, W8JTQ 13, K3KRX/8 11, WA8UQK 11, WA8TSB 10, W8UFS 10, WA8GTM 7, WA8JDF 7, WA8KRH 6, W8TBP 6, W8DSE 4, W8SS 3, WA8SME 2. (July) WA8ENW 32, W8UA 20.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM: J. C. Erickson, W8DAE. SEC: W8OUU. RM: WA8CFJ. PAMs: W8VZ and K8UBK.

Net	*QNI*	*QTC*	*Sess.*	*Ave.*	*Freq.*	*Time*
OSSBN	1683	1029	60	17.1%	3972.5	2345Z
BN	421	633			3580	0000Z

There is one way to give public service and that is to start handling traffic by entering into either of the above named nets. They both need outlets in all parts of the state. Please check your certificates to note the latest endorsement date and if it has been a year since last endorsed send them to me pronto as the first of November I'll have to consider cancellation. W8TTM is now WA4FPR and visited W8TZO. W8AQ reports that W8IJT is home from the hospital after a serious operation, W8IA received the call W4HM for his winter QTH and W8CZU built a home-brew s.s.b. rig. Your SCM attended the QCWA Canton Chapter Dinner in Ragersville, along with W8AQ, W8AXR, W8CPU, W8DCI, W8ERR, W8EUK, W8HR, W8LVW, W8LYQ, W8MEI, W8MVX, W8NAL, W8NBK, W8NYS, W8OE, W8OUZ, W8OYV, W8PEN, W8PWA, W8QAZ, W8RZ, W8SBM, W8SJC. W8TAJ, W8ZA, WA8SAK ex-W3JIW, WA8YIW and WA8YLW. WA8IZC moved to Florida and is now WB4EHR. WA8MVV is operating s.s.b. using an EICO 753. K8DDG is mobile in his new car. The Portsmouth RC provided communications for the NOA Boat Races. WA8GYX spent three months in Germany. WA8RYC built a home-brew 6-meter rig and will start as a freshman at OSU. Springfield ARC's *Q-Five* tells us that WA8FZS was in the hospital with a fractured hip and arm. WA8HVK vacationed in the west, the club is celebrating its 20th year. WA8LYM vacationed in Michigan and W8GUD joined the Silent Keys. WA8WKQ is a new Technician. Massillon ARC's *MARC Newsheet* tells us the 1968 officers are WA8FAA, pres.; K8NFB, vice-pres.; and W8YHU, secy.-treas. WN8YGO, WN8YGP, WN8YGQ, WN8YGR, WN8YGS, WN8YGT, WN8YGU, WN8YGV and WN8YGW received their Novice Class licenses as a result of the club's Novice code class. K8DHJ drove your SCM to the Warren Hamfest where over 2500 attended. K8BXT reports that K8NEE vacationed in Florida and was appointed trustee of the Warren ARA. K8OTF was in the hospital. WA8SRB has a new Swan 350. W8CMS is interested in antique radios, W8WOL and W8KCE put up multi-band trap antennas to operate 80 through 10 meters. We learn from Westpark Radiops' *The Log* that the club held a picnic and presented trophies and medallions to the following Sweepstakes stations: c.w. 1st and 2nd place, WA8PJA and K8CFH; phone 1st and 2nd place, W8AJW and W9FTK/8. Columbus ARA has a Rex-Rotary Model D-270 mimeograph to print its *Carascope*. Toledo's *Ham Shack Gossip* informs us that WA8UTQ received his General Class license, WN8WZX, WN8WZY, WN8WZZ, WN8YAA, WN8YAB, WN8YAC, WN8YAD, WN8YAE, WN8YAF, WN8YAG and WN8YBC their Novice Class licenses and WA8UTQ his Technician Class license. WA8CJO reports that K8DMU is in the hospital because of body burns, WA8CJP vacationed in the western states, W8THV joined the Silent Keys and W8QLS is holding weekly code and theory classes at the Delaware County ARC. WA8YFN reports that WA8YFN received his Technician Class license and eleven-year-old WA8TKW his General Class license. W8UPH made the BPL in August. Appointments made in Aug. were W8ERR and K8LRN as ECs. Traffic: (Aug.) W8UPH 606, WA8OCG, 259, WA8NTA 246, W8QZK 239, W8IMI 238, WA8FSX 226, K8LGA 216, WA8PMN 191, W8NAL 158, W8WEM 154, WA8UPI 153, WA8LAM 149, WA8PQL 146, W8DAE 121, WA8LQT 120, W8GVX 118, W8CHT 108, K8UBK 106, WA8AUZ 101, WA8VNU 101, W8QXQ 87, K8ONA 80, W8TV 74, W8QCU 73, W8WDU 57, WA8QFK 56, W8ERD 54, K8BYR 50, WA8PPK 46, W8FZU 42, WA8DWA 39, W8UDG 37, WA8MHO 35, WA8SED 35, W8OE 34, W8ILC 32, W8GOE 27, W8OUU 22, WA8KPN 21, W8FGD 20, WA8SHP 20, K8LGB 19, WA8EYF 18, W8LZE 11, K8DDG 10, WA8MMV 10, K8LXA 8, W8WEG 7, W8EEQ 6, W8VND 5, W8YGR 3. (June) K8HKB 2. (May) K8HKB 6.

HUDSON DIVISION

EASTERN NEW YORK—SCM, George W. Tracy, W2EFU—SEC: W2KGC. RM: WA2VYS. PAM: W2IJG. 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 and WB2JYV as ORSs. Congratulations to our Aug. BPL winner, WB2TNB. Among those away at college are WB2JYV at Cornell and WB2WBA at RPI. K2AJA is attending Brandeis: WB2TNB is a student at Carnegie Tech. We salute all our E.N.Y. college students and wish them the best of luck. The Schenectady Club Picnic was held at Sacandaga Reservoir Aug. 20. WB2HXZ is the new RACES Radio Officer for Dutchess

EIMAC

3-400Z's used in prototype 6-meter linear amplifier for 2 kW PEP at 50 MHz

The prototype Swan linear amplifier shown here uses two EIMAC 3-400Z triodes in grounded grid circuitry to achieve two kilowatts PEP input at 50 MHz. Drive power is less than 100 watts PEP. The prototype amplifier features a tuned cathode circuit for low intermodulation distortion, and uses a pi-network plate tank circuit. The new linear may be driven with modern six-meter SSB transceivers, and offers real operational economy at 50 MHz.

Swan chose EIMAC 3-400Z's because these compact, high-mu power triodes are ideal for grounded grid operation. They can provide a power gain as high as 20 in a cathode-driven circuit.

For more information on EIMAC's line of power tubes for advanced transmitters, write Amateur Services Department, or contact your nearest EIMAC distributor.

3-400Z TYPICAL OPERATION
(Minimum IM Distortion Products at 1 kW PEP Input)

DC-DC Plate Voltage	2500 V
Zero-Sig DC Plate Current*	73 mA
Single Tone DC Plate Current	400 mA
Single Tone DC Grid Current	142 mA
Two Tone DC Plate Current	274 mA
Two Tone DC Grid Current	82 mA
Peak Envelope Useful Output Power	560 W
Resonant Load Impedance	3450 ohms
IM Distortion Products	−35 db**

* Approximate

** −35 db or more below one tone of a two tone test signal.

We have a new brochure entitled "Linear Amplifier and Single Sideband Service." Write for your copy.

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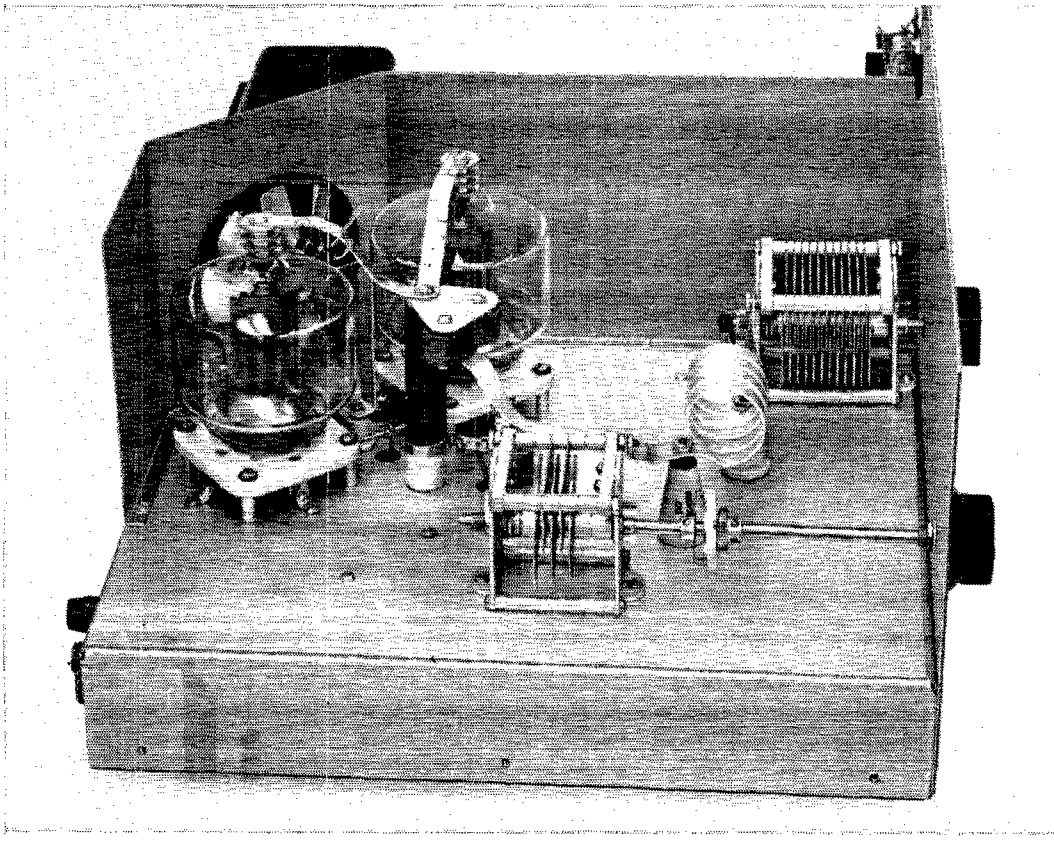

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EIMAC TYPE	CLASS OF OPERATION / SERVICE	TYPICAL OPERATION — SINGLE TUBE								
		D.C. PLATE VOLTAGE	D.C. PLATE CURRENT (AMPERES)	D.C. SCREEN VOLTAGE	D.C. GRID VOLTAGE	APPROX. MAX. DRIVE POWER (WATTS)	APPROX. D.C. SCREEN CURRENT (AMPERES)	APPROX. D.C. GRID CURRENT (AMPERES)	APPROX. MAX. POWER OUTPUT (WATTS)	FILAMENT VOLTS / AMPERES
3-400Z	B / SSB	3000	.100 / .333[3]	—	0	32	—	.12	655	5.0 / 14.5
3-1000Z	B / SSB	3000	.240 / .670[3]	—	0	65	—	.30	1360	7.5 / 21.3
4CX250B[1]	AB1/SSB	2000	.1/.25[3]	350	−55[5]	0	0/.005[3]	0	300	6.0 / 2.5
	C/CW	2000	.25	250	−90	2.9	.019	.026	390	
	C/AM	1500	.20	250	−100	1.7	.02	.014	235	
4CX300A	AB1/SSB	2500[6]	.1/.25[3]	350	−55[5]	0	0/.004	0	400	6.0 / 2.5
	C/CW	2500[6]	.25	250	−90	2.8	.016	.025	500	
	C/AM	1500	.20	250	−100	1.7	.02	.014	235	
4CX1000A	AB1/SSB	3000	.25/.90[3]	325	−60[5]	0	−.002/.035	0	1680	6.0 / 10.5
4-65A	AB1/SSB	3000	.015/.065[3]	360	−85[5]	0	0/.006	0	130	6.0 / 3.5
	C/CW	3000	.112	250	−105	1.6	.022	.009	270	
	C/AM	2500	.102	250	−150	3.1	.026	.013	210	
4-125A	AB1/SSB	3000	.03/.105[3]	510	−95[5]	0	0/.006	0	200	5.0 / 6.5
	B/SSB[4]	3000	.02/.115[3]	0	0	16	0/.03	0/.055	240	
	C/CW	3000	.167	350	−150	2.5	.03	.009	375	
	C/AM	2500	.152	350	−210	3.3	.03	.009	300	
4-250A	AB1/SSB	3000	.055/.21	600	−110[5]	0	0/.012	0	400	5.0 / 14.5
	C/CW	3000	.345	500	−180	2.6	.06	.01	800	
	C/AM	3000	.225	400	−310	3.2	.03	.009	510	
4-400A	AB1/SSB	3000	.09/.30[3]	810	−140[5]	0	0/.018	0	500	5.0 / 14.5
	B/SSB[2] [4]	3000	.07/.30[3]	0	0	40	0/.055	0/.10	520	
	C/CW	3000	.35	500	−220	6.1	.046	.019	800	
	C/AM	3000	.275	500	−220	3.5	.026	.012	630	
4-1000A	AB1/SSB	4000	.17/.48[3]	1000	−130[5]	0	0/.04	0	1130	7.5 / 21.0
	B/SSB[4]	4000	.12/.67[3]	0	0	105	0/.08	0/.15	1870	
	C/CW	4000	.70	500	−150	12	.137	.039	2100	
	C/AM	4000	.60	500	−200	11	.132	.033	1910	
3CX100A5 / 2C39A	C/CW[7]	800	.08	—	−20	6	—	.03	27	6.3 / 1.0
	C/AM[7]	600	.065	—	−16	5	—	.035	16	

[1] Ratings also apply to 4X250B.
[2] Ratings apply to 4-250A within plate dissipation limitation.
[3] Zero signal and maximum signal dc current.
[4] Grid and screen grounded, cathode driven.
[5] Adjust to give stated zero-signal plate current.
[6] For operation below 250 Mc only.
[7] At 500 Mc.

Above you see popular Eimac tube types suitable for ham transmitters. Remember this chart when you need a tube. And remember the name Eimac. It means power. Quality. Dependability. For Eimac has more know-how, more experience with power tubes than any other manufacturer. Your local Eimac distributor can supply you with any of these tubes listed and Eimac sockets to match. Or for complete data, write Amateur Services Department, EIMAC—a division of Varian Associates, San Carlos, California.

County with headquarters in Poughkeepsie. With 99 confirmed, WA2WGS has one more to go for DXCC. Congrats, Bob. WB2UHZ reports 19 new countries in 13 days; Beverly has WAC and 67/32 toward DXCC. Among our Novices, WN2ZPS has 32 countries and 39 states plus handling traffic on EASN. Everybody was busy during the summer. A new fifteen-element beam up 60 feet on 2 meters added five new states for WB2YQU. The new officers of the Schenectady Club include WB2HNO, pres.; WA2VWI, vice-pres.; WA2WQI, secy.; WA2BLD, treas.; W2ODC, WA2SFP, WA2DWU and WB2BDB, directors. Many OVSs reported several band openings on 6 meters during August. Traffic: WB2UHZ 448, WB2TNB 157, K2SSX/2 120, W2EAF 112, WB2VVS 93, WA2VYS 80, WB2NKN 43, WB2HXZ 38, WB2FOA 26, W2ANV 22, W2ODC 22, K2SJN 18, WN2ZPS 12, WB2WGS 9, W2UC 7, WB2QYZ 6, WA2HGB 5.

NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—Asst. SCM: Fred J. Brunjes, K2DGI. SEC: K2OVN. PAM: W2EW. Traffic nets (all times shown are local):

NLI*	3630 kc.	1915 Nightly	WA2UWA-RM
NLI VHF*	145.8 Mc.	1900 Nightly	WB2RQF-PAM
NLI Phone*	3932 kc.	1600 Daily	WB2SLH-PAM
NLS Slow*	3715 kc.	1845 Nightly	WB2UQP-RM
Clear Hse	3925 kc.	1100 MTWTF	WA2GPT-Mgr.
Mic Farad	3925 kc.	1300 Ex. Sun.	K2UBG-Mgr.
All Svc	3925 kc.	1300 Sun.	K2AAS-Mgr.
NYSPTEN	3925 kc.	1800 Daily	WB2QAP-Mgr.

*Section Nets.

The NLS Slow Net is a training net with the prime purpose of introducing newcomers to the pleasures of handling traffic on c.w. It teaches all of the mechanics required to become an expert and at the speed of the slowest station in the net. So jump in and never mind if your c.w. is a little shaky right now because the net will operate at your particular speed. That's the law! Listen, the NLI V.H.F. Net is now on at 1900 (local) nightly to provide additional metropolitan outlets for NLI, NLI Phone, NYSPTEN, etc. By the same token, it needs access to the long-haul services. So, you find stations with the capability of bridging h.f./v.h.f. are sorely needed to interconnect the long-haul and short-haul networks. Hey, WA2GPT (who is very lovely for a girl) finally hooked a YL-Hawaii to complete her WAS-YL! WB2ZEL spent his three-week vacation out West playing with the Grand Canyon from the back of a cross-eyed mule and shooting the rapids of Snake River in a rubber kayak. W2BCB reports the leak in the shack roof has lost its stature with the passing of the recent rain season. W2PF says he's already for the new licensing procedures as he's had his Amateur Extra since they first came out in 1952. WB2UIV was in the hospital in August, but he's back in Brooklyn 6-Meter RACES now. K2DGI, a new member of the Suffolk County RC, is sending up DX smoke signals with his new SB-101. Congratulations to WB2UZU, who made General Class in August. Jolly old W2TUK is gonna go TR-4/mobile as soon as he can muster up the beef to yank the SR-160 out! WB2PTS, who got the KH6 needed for WAS, allows that, "Massapequa's better'n campin' out 'cause them things lumberin' around in the black o'night ain't pussycats!" WA2VKK, who is the news director for WICB AM/FM/TV up at Ithaca College, also is in charge of Tompkins County RACES. W2IAG, beloved old Queens 10-Meter EC, reports the nets fire up each Mon. at 2000 local with a.m. on 29.5 Mc. and s.s.b. on 28.7 Mc. Also, he is looking for operators of your caliber to help fill out the net rosters and at the same time allow you to provide a worthwhile service to your community. WB2EZG passed the Extra Class exam with ease. WB2QNL went off to MIT. The New York RC certainly acquired experience in its fiscal matters. Its treasurer, K2MOO, just retired from Chase-Manhattan after 30 years. Traffic: WA2UWA 495, WA2GPT 358, K2UBG 121, WB2ZET 104, W2EC 92, W2EW 92, WB2QIL 84, WB2UQP 78, WB2JJW 66, WB2AEK 64, WB2DVK 34, WB2ZEL 33, WB2PTS 24, WB2UGP 23, W2BCB 18, W2GKZ 18, WA2LJS 13, K2IDB 9, WB2TBP 8, W2DBQ 7, W2PF 6, WB2UIV 4, WB2RWD 3, K2DGI 1.

NORTHERN NEW JERSEY—SCM, Louis J. Amoroso, W2LQP—Asst. SCM: Edward F. Erickson, W2CVW. SEC: K2ZFI.

ARPSC Section Net Schedules

NJN	3695 kc.	Daily	7:00 P.M.	W2BVE RM
NJ Phone	3900 kc.	Ex. Sun.	6:00 P.M.	W2PEV PAM
NJ Phone	3905 kc.	Sun.	9:00 P.M.	W2ZI PAM
NJ PON	3900 kc.	Sun.	6:00 P.M.	WA2TEK PAM
NJ 6	51150 kc.	M-W-Sat.	11:00 P.M.	K2VNL PAM
NJ ECTN	146700 kc.	Ex. Fri.	10:00 P.M.	WB2IYO PAM

All times shown local. New appointments: WB2ZGP as OVS and WB2TKP as ORS. OO reports: W2TPJ 16, K2AGZ 9. The NJ PON Aug. report shows 88 QNIs with 38 traffic. The ECTN reports 286 QNIs with 164 traffic. WB2MVI, with WA2ASM assisting, is providing code practice sessions when ECTN QNFs. WB2NHF has built a transmatch. WN2BYR is a new ham in Little Ferry. WN2BYQ is a new ham in Paramus. WN2BAN has a two-month total of 37/38 for WAS and worked 20 for DXCC. WB2TQK is helping his brother study for the Novice test. WB2UFV got his T4-X back and is once again set up for s.s.b. and c.w. He also is the new editor of the *NJN Bulletin*. WB2WWH, the former editor, moved to W4-Land with his family. Many thanks for an FB job, OM. WB2FUW went back to college and W3RPB. The EARA reports another successful NJ QSO Party with a good quota of logs received. The gang would like comments on the rules for next year. It's your contest. W2CVW reports finding a noise limiter circuit for his KWM-2A. WB2WFO still is recruiting members for his AREC net. W2PEV has his antennas back up after summer storm damage. WB2VUJ completed his transistorized TU for his RTTY setup. WB2KTO has a four-element 20-meter beam on a 50 tower. WB2RKK won first place in N.J. and was second highest nationally in the N.Y. QSO Party. WB2TQK completed his homebrew 40-meter a.m.-c.w. rig and is planning a 6-meter transceiver. W2TIW reports that the Fairlawn ARC is looking for Generals who would be interested in the Extra Class course that the club is sponsoring. WB2SEZ received his 2nd-class commercial ticket and is joining Navy MARS. WB2ZSH has all the bugs out of the rig. We hope to see you in the SS. Good luck to all. Traffic: (Aug.) WA2IGQ 402, WB2YVU 370, WB2UFV 295, WB2FUW 289, WA2TBS 197, WB2SEZ 141, WB2IYO 129, W2CVW 61, WB2JWB 57, W2LQP 46, WA2ACJ 32, WB2VLC 32, K2EQP 30, WB2WFO 29, W2PEV 25, WB3NSV 24, WA2TEK 23, WA2WGR 19, W2DRV 17, WB2BCS 16, WB2PXO 16, WB2CGI 15, K2ZFI 13, WA2NJB 8, WB2NZU 8, WA2SRK 7, WB2VUJ 6, WB2ZSH 6, WA2CCF 3. (July) K2VNL 50, W2DRV 38, WA2ASM 17, WB2NSV 17, WB2DDQ 14, WB2KTO 11, WB2WWH 9. (June) WB2NSV 32, WB2KTO 4.

MIDWEST DIVISION

IOWA—SCM, Owen G. Hill, WØBDZ—Asst. SCM: Bertha V. Willits, WØLGG. SEC: KØBRE. PAM: WØNGS. RMs: WØTIU, WØSCA. Visitors at WØBDZ during August included WØJDV and family. WAO-AUF/Ø operated at the Davis Co. Fair in Aug. WAØDAG spent the summer traveling. WAØOTQ is now a student at Ia. State University. WAØKST was the high-scoring Iowa station in the N.Y. State QSO Party. WØPFP reports some openings on 50 Mc. in Aug. WAØOLC/Ø had an amateur station set up at the National Antique Air Show at Ottumwa for demonstration purposes. W8FAW/Ø also is now WAØSDC. WØJAQ kept schedules with ZP5EE/AM while flying to Asuncion, Paraguay, and also is keeping schedules with his XYL, now in Asuncion. WØDIB has joined the Silent Keys; also Ruth, sister of WØCGL, both well known on 160 meters. AWONI (WX Net) meets on 3855 kc. at 7 P.M., Mon.-Fri., 9 A.M. Sun. For information about the WX Net drop a line to WØGPL. The Ia. 75-Meter Phone Net reports QNI 1361, QTC 121, in 27 sessions. Ia. 160 Meter Net reports QNI 550, QTC 31, in 31 sessions. TLCN (c.w.) reports QNI 101, QTC 24, in 25 sessions. Traffic: WØLGG 701, WØLCX 700, WØVAU 148, WØCZ 129, WAØSDC 103, WAØBSF 23, WAØPUJ 19, WAØJUT 17, KØBRE 12, WØJPJ 12, KØKAQ 12, KØTDO 10, WAØIYH 8, WAØDUB 4, WAØMIT 4, WØNGS 4.

KANSAS—SCM, Robert M. Summers, KØBXF—SEC: KØEMB. PAM: KØJMF. RM: WAØMLE. V.H.F. PAMs: WAØCCW, WØHAJ. WAØKSK, WAØLSH. To those who voted me another term as SCM, a hearty thanks. To those who didn't, your comments and suggestions for a better section would be appreciated. WAØLLR has been appointed Asst. EC of Zone 14, and mgr. of the Phone Net on 3920 at 1330 CDST. WAØLLC telephone relayed from Okinawa to Topeka. WAODZI was quite busy v.h.f.ing during Aug. WØVRZ is trying for an amateur radio booth at the State Fair in Hutchinson. Do you belong to a radio club? There is one near you, for instance in Salina, Central Kansas Amateur Radio Club; in Topeka, Kaw Valley Radio Club; in N.W. Kansas, Wheat Belt Radio Club; in Concordia, Kansas-Nebraska Radio Club; in Kansas City, Kans., Jayhawk Amateur Radio Society, Inc.; in Mission, Johnson County Radio Amateur Club. In Wichita there are the Wichita Amateur Radio Club, Inc.; the Air Capitol Amateur Radio Assoc. and the Tecnichat Radio Club. There's a radio club in Coffeyville, Hutchinson, Newton, Hiawatha, Lawrence, Leavenworth, Independence, Garden City, El Dorado and Emporia. In Dodge City its the Boot Hill Amateur Radio Club. Clubs that need ideas should consult ARRL for some help. If you have a bulletin or a club reporter, get your SCM some news of what's going on each month. KPN Phone Net, QNI

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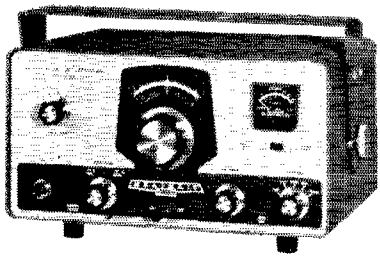

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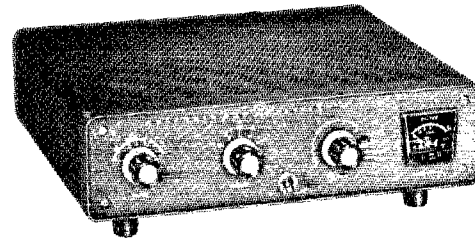
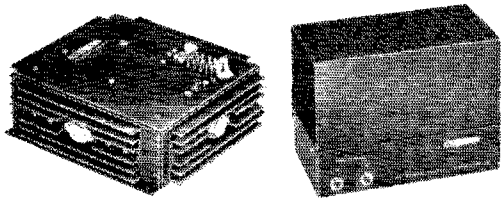
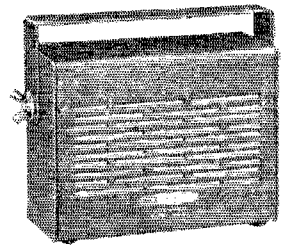
Kit HW-32A, 20-mtr., 15 lbs., no mon. dn., $11 mo.. **$104.95**



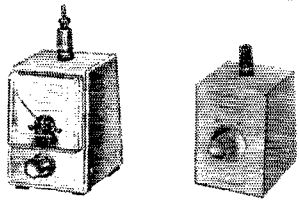
HA-14 "KW Kompact" KW SSB Linear Amplifier . . . 1000 watts PEP input SSB on 80 through 10 meters. Built-in SWR meter. Built-in antenna changeover relay. Pretuned broad-band input circuit requires no tuning. Full provisions for control of "remotely" located fixed or mobile power supplies.
Kit HA-14, 10 lbs., no money dn., $10 mo. **$99.95**



HP-14 Mobile & HP-24 Fixed Station 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., no money dn., $8 mo. **$79.95**
Kit HP-24, 22 lbs., no money dn., $5 mo. **$49.95**

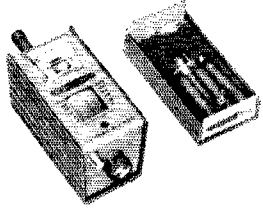


HS-24 Mobile Speaker . . . this 8 ohm speaker provides excellent communications response. Features a husky steel cabinet & gimbal mounting bracket.
Kit HS-24, 4 lbs. **$7.00**

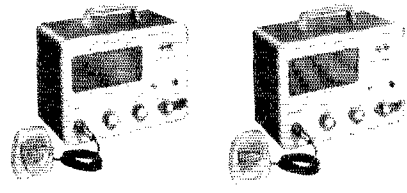


Amateur Station Accessories . . . PM-2 RF Power Meter indicates transmitter relative power. Covers 100 kHz to 250 MHz. No power connections or battery required. **HD-20 100 kHz Crystal Calibrator** provides accurate calibrating signals every 100 kHz up to and beyond 54 MHz. Uses 9 volt battery (not included.)
Kit PM-2, 2 lbs. **$12.95**
Kit HD-20, 1 lb. **$14.95**

Tools For The Amateur Station . . . HN-31 "Cantenna" Transmitter Dummy Load . . . provides a non reactive 50 ohm load to transmitters up to 1 kw . . . better than 1.5:1 SWR for frequencies 160 to 2 meters. Oil coolent not included. Soldering iron kits, needle nose pliers, nut drivers, and more are included in the new 1968 Heathkit catalog.
Kit HN-31, 3 lbs. **$9.95**



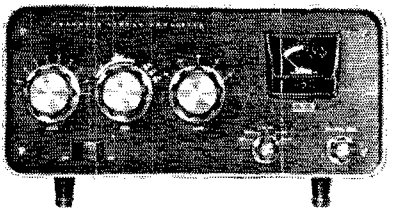
HM-10A Solid-State "Tunnel Dipper" . . . a solid-state version of the classic grid-dip meter. Features a tunnel diode oscillator. Covers 3 to 260 MHz. Uses an AA penlite cell (not included.)
Kit HM-10A, 3 lbs., no money dn., $5 mo. **$29.95**



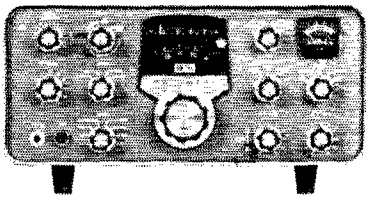
Benton Harbor Lunch Boxes — Complete Transceivers . . . for 6 and 2 meters. Feature crystal-controlled transmitters with 5-watt input and tunable super-regenerative receivers with RF stage. Built-in 115 VAC power supply and speaker. Mike included. Less crystal.
Kit HW-29A, 6-meter, 9 lbs., no money dn., $5 mo. **$44.95**
Kit HW-30, 2-meter, 9 lbs., no money dn., $5 mo.. **$44.95**
Kit GP-11, Mobile Vibrator Power Supply, 6 lbs. . . . **$17.95**

Selection of Amateur Radio Kits

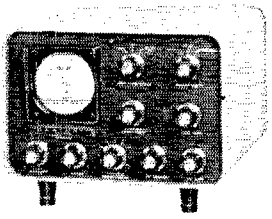
FINE EQUIPMENT AT LOWER COST



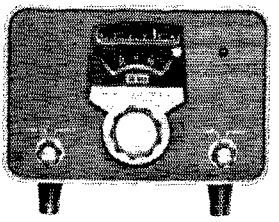
SB-200 KW SSB Linear Amplifier . . . 1200 watts PEP input SSB, 1000 watts CW on 80 through 10 meters. Built-in antenna relay, SWR meter, and power supply. Drives with most popular SSB transmitters & transceivers.
Kit SB-200, 41 lbs., no money dn., $21 mo. **$220.00**



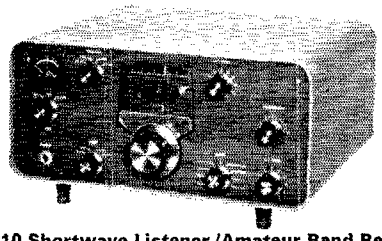
SB-101 80 Through 10 Meter SSB/CW Transceiver . . . 180 watts PEP input SSB, 170 watts CW. Front panel selection of SSB filter or optional CW filter makes the SB-101 an exceptional CW rig. Unmatched in engineering and performance.
Kit SB-101, 23 lbs., $37 dn., $35 mo. **$370.00**



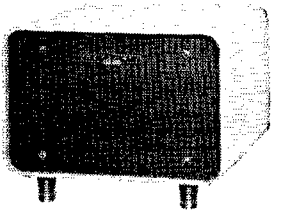
SB-620 Amateur Radio Spectrum Monitor . . . displays all received signals up to 250 kHz either side of receiver tuned frequency. New narrow sweep function shows 10 kHz for single signal analysis. For Heath SB Series gear.
Kit SB-620, 15 lbs., no money dn., $11 mo. **$119.95**



SB-640 External LMO . . . provides an additional LMO (Linear Master Oscillator) for independent control of SB-101 transmitter and receiver frequency.
Kit SB-640, 9 lbs., no money dn., $10 mo. **$99.00**

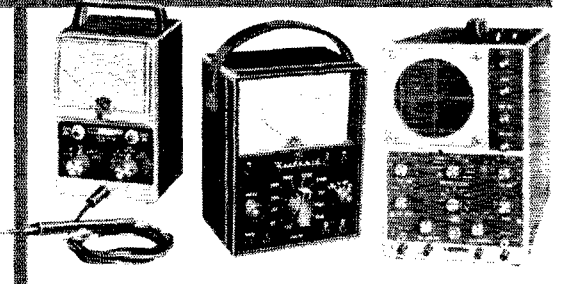


SB-310 Shortwave Listener/Amateur Band Receiver . . . covers 49, 41, 31, 25, 19 & 16 meter bands plus amateur bands 80, 40 & 20 and 11 meter CB. SB-Series performance and quality (less speaker).
Kit SB-310, 20 lbs., no money dn., $23 mo. **$249.00**



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, 6 lbs. **$18.95**

Communications Microphones & Solid-State Electronic Keyer . . . Heathkit recommended microphones for optimum voice communications. Electronic keyer features built-in sidetone to provide audio monitor . . . no relays to stick or chatter . . . speed ranges 10 to 20 wpm and 15 to 60 wpm. Grid block keying transmitters only.
HDP-21A Desk-top microphone, 4 lbs.,
no money dn., $5 mo. **$29.40**
GH-12 Hand-held PTT mike, 2 lbs. **$6.95**
HD-10 Electronic Keyer, 6 lbs., no money dn., $5 mo. **$39.95**



A Complete Line Of Test Instruments . . . to provide the ham with professional instrumentation at a price he can afford. Features **New Heathkit Instrumentation Series** . . . solid-state Volt-Ohm meters, power supplies, and more! See the "new look", new performance instruments in the 1968 Heathkit catalog.

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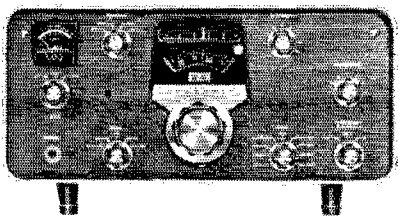
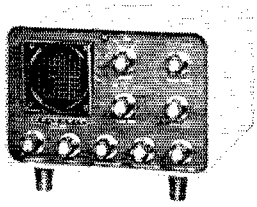
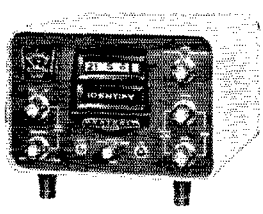


SB-301 Amateur Band Receiver . . . SSB, AM, CW, and RTTY reception on 80 through 10 meters plus 15 MHz WWV reception. Tunes 6 & 2 meters with SBA-300-3 and SBA-300-4 plug-in converters. (less speaker)
Kit SB-301, 25 lbs., no money dn., $24 mo. **$260.00**

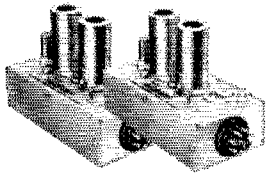
SB-401 Amateur Band SSB Transmitter . . . 180 watts PEP SSB, 170 watts CW on 80 through 10 meters. Operates "Transceive" with SB-301 — requires SBA-401-1 crystal pack for independent operation.
Kit SB-401, 36 lbs., no money dn., $27 mo. **$285.00**
SBA-401-1, crystal pack, 1 lb., no money dn., $5 mo. **$29.95**



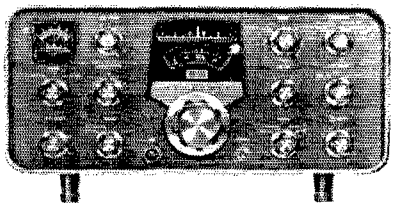
SB-610 Signal Monitor Scope . . . operates with transmitters on 160 through 6 meters at power levels from 15 watts through 1 kw. Shows transmitted envelope. Operates with receiver IF's up to 6 MHz. Spots signal distortion, overmodulation, etc.
Kit SB-610, 14 lbs., no money dn., $7 mo. **$69.95**



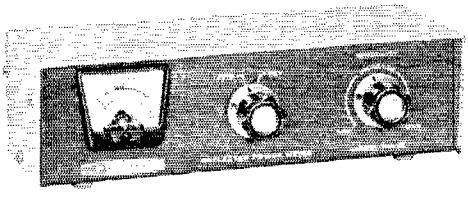
SB-630 Amateur Station Console . . . including 24-hour clock, SWR meter, 10 minute timer with audio-visual signaling, and more. Styled to match your SB-Series station.
Kit SB-630, 10 lbs., no money dn., $8 mo. **$74.95**



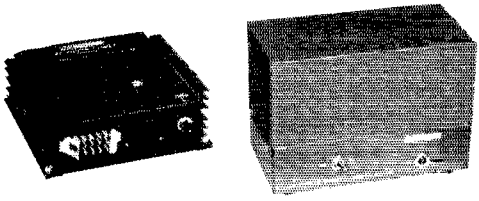
6 & 2 Meter Plug-In Converters For SB-301 . . . 10 meter output — operate from front panel switch on SB-301. Better than 0.2 uv sensitivity for 6 db signal-plus-noise to noise ratio.
SBA-300-3 (6 meter), 2 lbs. **$19.95**
SBA-300-4 (2 meter), 2 lbs. **$19.95**



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 kHz dial calibration, and the ultimate in stability (less speaker).
SB-110, 23 lbs., no money dn., $28 mo. **$299.00**



HM-15 Relative Power SWR 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, 2 lbs. **$14.95**

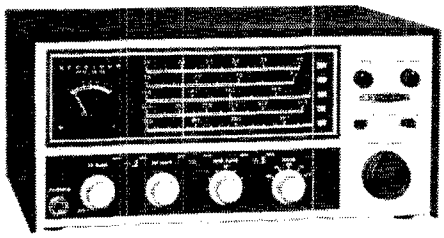


SBA-100-1 SB-Series Mobile Mounting Bracket . . . cantilever mounting for SB-110 and SB-101. Allows quick-change from fixed to mobile installation.
Kit SBA-100-1, 6 lbs. **$14.95**
HP-13 Mobile & HP-23 Fixed Power Supplies . . . for SB-110 and SB-101 and "Single-Banders." All necessary voltages.
Kit HP-13, 7 lbs., no money dn., $7 mo. **$64.95**
Kit HP-23, 19 lbs., no money dn., $5 mo. **$49.95**

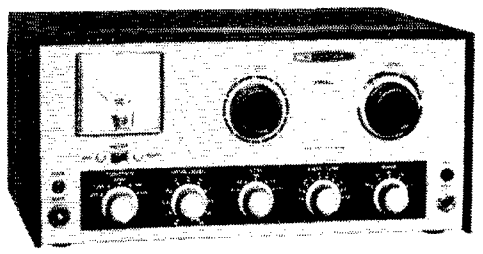
No-Money-Down Credit . . . Write for Application Blank

Selection of Amateur Radio Kits

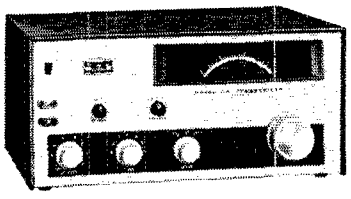
ON $25 TO $300 PURCHASES...WRITE FOR APPLICATION



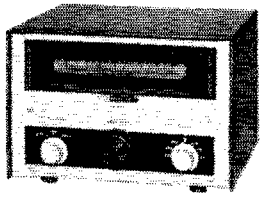
HR-10B Amateur Band Receiver . . . with new extra-durable two-tone wrinkle finish to match the new "Single-Banders" and novice transceiver. Tune AM, CW, and SSB with 80 through 10 meter coverage. Provisions for plug-in 100 kHz crystal calibrator.
Kit HR-10B, 20 lbs., no money dn., $8 mo..... **$79.95**
Kit HRA-10-1, 100 kHz crystal calibrator, 1 lb..... **$8.95**



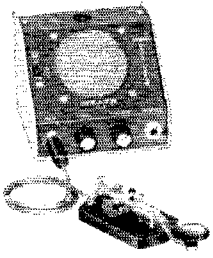
DX-60B Phone & CW Transmitter . . . with new wrinkle finish matching HR-10B and the new "Single-Banders". Here's 90 watts on 80 through 10 meters . . . operates at reduced power for novice class.
Kit DX-60B, 24 lbs., no money dn., $8 mo..... **$79.95**



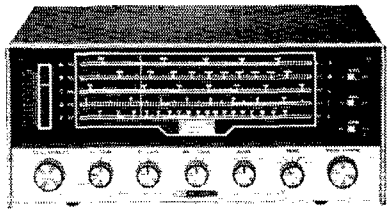
New HW-16 Novice CW Transceiver . . . a high-performance 3-band CW transceiver . . . covers the lower 250 kHz of 80, 40, & 15 meters. 75 watts input for novice class — 90 watts for general class. Provisions for VFO transmitter control with Heathkit HG-10B.
Kit HW-16, 25 lbs., no money dn., $10 mo..... **$99.50**



HG-10B VFO — Perfect For The DX-60B or HW-16 . . . provides 5 volts RMS signal — plenty of RF for Heathkit rigs and ample for most transmitters. Calibrated for 80 through 2 meters. Requires 108 volts DC @ 25 ma., 6.3 VAC @ 0.75 amperes.
Kit HG-10B, 12 lbs., no money dn., $5 mo..... **$37.95**



New HD-16 Code Practice Oscillator . . . includes radio telegraph key . . . a complete code-practice outfit. Perfect for future hams. Controls let you adjust both tone and volume. Switch for blinker light or tone. Build-in speaker and jack for headphones. Requires two 9 volt batteries and one "C" cell (not included).
Kit HD-16, 3 lbs..... **$8.95**
Heath Recommended Headphones GD-396 . . . excellent for shortwave listening or code practice.
GD-396, 1 lb..... **$3.50**



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. Excellent for the novice, beginner, or short wave listener.
Kit GR-54, 25 lbs., no money dn., $9 mo..... **$87.95**

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218, QTC 14, Mgr. KØJMF. M-W-F 0645 Sun. 0800, 3920 kc, KSBN Sideband Net, QNI 693, QTC 161, Mgr. KØJMF, M-Sat. 1800 CDST 3920. QKS C.W. Net, QNI 154, QTC 98, Mgr. WAØMLE. daily 1900 and 2100 CDST 3610 kc. HBS Hambutchers Net, QNI 571 and 71, QTC 107 and 36, Mgr. WAØBHG, M-Sat. 1205 CDST 7280 kc., 3880 alt. KWXN Weather Net, QN1 790, QTC 50. Mgr. WAØLLC. daily 1800 CDST 3920 kc. KPIN 2-Meter PI A.M. Net, QNI 73, QTC 3, Mgr. WAØHMZ, Sat. 2100 CDST 145.35. KECN EC Net, QNI 17, QTC 1, Mgr. WAØLLC, Sun. 1300 CDST 3920. V.H.F. AREC Nets: Newton ARC 2-Meter, QNI 5; Coffeyville ARC 2-Meter, QNI 11; Zone 7 AREC 2-Meter QNI 30; Zone 15 AREC 6-Meter QNI 12; NCK 6-Meter June and July, QNI 5. QTC 7. Low-Band AREC nets: Zone 7 QNI 17; Zone 9 10 meters, QNI 32, QTC 4; Zone 15, QNI 40, QTC 4; Zone 14, QNI 14. WAØGKQ was killed in a car wreck near Mapleton, Kans. Traffic: WAØMLE 193, KØHGI 126, KØJMF 124, WAØKDQ 118, WØCJZ 109, WAØLLC 96, KØBXF 83, KØEMB 38, WAØCCW 35, WØCWJ 29, WØFII 18, WØFDJ 17, WAØJOG 13, WAØKDJ 10, KØGII 9, KØUVH 9, WAØEMQ 8, WAØDZI 6, WAØLLR 5, KØGZP 2.

MISSOURI—SCM, Alfred E. Schwaneke, WØTPK—SEC: WØBUL, WØOZO was appointed OPS. WØGBJ renewed as ORS; and WAØFKD as ORS, OPS and RM. KØBQI was high-scoring Mo. station in the N.Y. State '67 QSO Party. KØYBD received a CAN net certificate and has been substituting TCC for WØTDR, who has been in K.C. attending school. WØRTO has returned to 75 after a two-months wait for repair parts for the s.s.b. rig. WAØELM is off because of lightning damage at home but can be heard over WØCBL, the H.S. club station. WAØCXI, WAØDGG, WAØHQR, WAØLKT and WAØRAC are attending UMR at Rolla, and can be heard on WØEEE. WAØFKD and WAØLOG are at U. of Mo. at Columbia and will be on WØZLN. KØJPS has joined AF MARS, and also assisted in the Fairbanks Disaster operations. WAØKUH reports that the PHD ARC now has 22 members. WAØFLL has received Gen. Cl., and now has 30-w.p.m. CP endorsement. About 90 hams and their families registered at the Springfield Picnic. Regulars on SMN (3585, 10 P.M. local time) are WAØDGG, WAØFKD/WØZLN, WAØQOA and KØYBD. OO reports were received from KØORB and WØQWS. I am sorry to report that WØKHX is a Silent Key. Net reports for Aug.:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MEN	3885	2230Z	M-W-F	13	170	10	WØBUL
MON	3585	2400Z	Daily	31	133	92	WØTDR
MNN	7063	1900Z	M-Sat.	27	114	11	WØOUD
SMN	3585	0300Z	Daily	14	38	14	KØAEM
MoSSB	3963	2400Z	M-Sat.	17	345	124	WØRTO
MTTN	3940	2200Z	M-F	20	170	41	WAØELM
MoPON	3810	2100Z	M-F	22	255	92	WØHVJ
QMO	3585	2100Z	Sun.	3	8	4	WAØFKD
PHD	50.4	2430Z	Mon.	5	57	12	WAØKUH

Traffic: (Aug.) KØONK 1679, KØYBD 543, KØAEM 274, WAØDGG 98, KØJPS 98, WØOUD 92, WAØJIH 86, WAØQOA 65, WAØHQR 58, WØHVJ 53, WØBUL 52, WAØFKD 36, KØREV 33, WAØLOG 23, WAØFLL 16, WAØFMD 13, KØORB 12, WAØKUH 7. (July) WAØHQR 23.

NEBRASKA—SCM, Frank Allen, WØGGP—SEC: KØOAL. Monthly net reports: West Nebr. Net, WØNIK, QNI 604, QTC 19. Nebr. Morning Phone Net, WAØJUF, QNI 814, QTC 46. Nebr. Storm Net, WAØKGD. 1st sessions QNI 834, QTC 81; 2nd session, QNI 791, QTC 57. Nebr. C.W. Net, WAØGHZ, 1st session, QNI 62, QTC 254; second session QNI 124. Nebr. AREC C.W. Net, WAØEEI, QNI 12. Nebr. Emergency Phone Net, WAØGHZ, QNI 1333, QTC 56. Nebr. AREC Phone Net, WØIRZ, QNI 129, QTC 2. Late report: Nebr. Storm Net, 1st session (July) QNI 876, QTC 58; 2nd session QNI 668, QNI 92. WØVEA has wired an EICO 717 for c.w. work. The Lincoln ARC is helping the Boy Scout program and may sponsor the Explorer Post. KØAKK is a new ORS. Traffic: WAØGHZ 387, WAØORO 217, WØLOD 178, KØAKK 125, KØJTW 82, KØQIX 82, WAØOCW 74, KØJFN 55, WAØOHO 40, WAØQMZ 40, WAØGVJ 32, KØIXY 27, WAØPCR 24, KØKJP 22, KØFRU 20, WAØIBB 20, WØGGP 16, WØHTA 15, WØVEA 13, KØDGW 12, KØHNT 12, WØAGK 9, WØBFV 8, WØLSI 8, WAØOQX 8, WØWKP 7, WAØFIG 6, WØYFR 6, KØFJT 5, WØLEJ 5, WAØLOY 5, WAØNYM 5, KØOAL 5, KØRPC 5, WAØCBJ 4, WAØJUF 3, WØNIK 3, WØRAM 3, KØUWK 2, WØCXH 2, WAØIBL 2, WAØIXD 2, WAØRPB 2, WØHOP 1, KØODF 1.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, John J. McNassor, W1GVT—SEC: W1PRT. RM: W1ZFM. PAM: W1YBH. Net reports for Aug.:

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*
CN	3640	Daily	1845	31	341	297
CPN	3880	M-S	1800	31	421	144

High QNI: CN—K1TKS, K1LMS, WA1HSN, CPN—WA1FVH 30, W1GVT 29, W1YBH 26, K1EIC 23, WA1EEJ 18, K1UWO 17 and W1LUH 16. SEC W1PRT requests that all amateurs join the ARPSC and support the civil defense/RACES program. Volunteers are needed. Please help. W1PRT and W1HHR, with amateurs from Bloomfield and Columbia, provided communications for the National Canoe Regatta Labor Day week end. W1KAM reports the Slo Speed Net (3740 at 6 P.M.) had 31 Aug. sessions with 372 QNI and 69 QTC. The Nutmeg V.H.F. Traffic Net meets at 9 P.M. on 145.55 and 50.6 Mc. The Conn. QSO Party, sponsored by the Danbury CARA, is planned for Oct. 28 and 29 and all are invited to take part. The Conn. Council reports that W1OP, Providence Radio Assn., requests that it be relieved of the duties of handling the W1 QSL Bureau. Our thanks for its help in providing a much-needed service which must be continued. K1MUJ/1 was active at the Woodstock and Brooklyn Fairs handling traffic. The W1EFW CN Traffic Bulletin suggests more cross-net operation between CN, CPN and the Nutmeg V.H.F. 6 and 2 Nets. Congratulations to WA1FVH and K1PGQ on Aug. BPL; WA1GOI on CP 25 certificate; WA1GGN on CP 20 certificate and K1TKS on the Conn. high score in the N.Y. State QSO Party and 3rd high nationally! W1BDI is revamping the 522 and BC-625. K1HTV has 1252 miles DX on 2 and 32 states in 8 call areas. The recent FCC decision is now history. We hope all amateurs concentrate on a self-improvement program, not only for a higher class ticket but for the good of all amateur radio! Traffic: (Aug.) WA1FVH 544, WA1HSN 217, W1EFW 188, K1PGQ 167, W1EEN 138, K1TKS 125, K1EIR 113, W1KAM 87, WA1CYV 78, K1EIC 71, WA1FNJ 71, K1EYY 68, W1AW 60, K1LMS 32, WA1DUV 30, K1SXF 29, W1GVT 27, K1UWO 27, W1WHR 25, W1BDI 17, WA1GOI 17, W1QV 15, W1YU 14, W1YBH 9, K1YGS 9, W1ZL 9, W1BNB 8, W1CUH 4, WA1GGN 1, W1YNC 1. (July) W1CTI 6.

CONNECTICUT QSO PARTY

November 4-6

The Candlewood Amateur Radio Association invites hams throughout the world to take part in the 5th Connecticut QSO Party.

Rules: 1) The contest period is from 2100 GMT November 4 to 0300 GMT November 6. 2) The general call is "CQ Conn" on c.w. and "CQ the Connecticut QSO Party" on phone. 3) Exchange number, RS(T), ARRL section, Conn. county or country. 4) Scoring: 5 points per QSO. Out-of-state stations multiply times Conn. counties. Conn. stations multiply times ARRL sections, countries. A station may be worked once per band/mode. 5) Suggested frequencies: 3540 3840 7040 14,040 14,240 21,040 21,300 28,040 and 28,940. (Slow speed operators use 3700 7150 and 21,000 for Conn. QSOs.) Awards: Certificates will be sent to the high scorer (5 or more contacts) in each ARRL section and country, also the two highest scorers in each Conn. County. 7) Logs must show dates, times, band, mode, numbers, RS(T) and QTH. Note your license class, your address and show your score calculations. Send all logs before December 4th to Connecticut QSO Party, Candlewood Amateur Radio Assn., Tom O'Hara, W1DDJ, 7 West Wooster Street, Danbury, Connecticut 06810. Include an s.a.s.e. for results.

For information regarding the WACONN Award, write Stan Lamb, W1WHQ, RFD 2, Ledyard, Conn. 06335.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—New appointments: W1AWA as EC for No. Reading, WA1DXI as EC for Medford, WA1EUU as ORS. The Central New England Net had 1083 QNIs, 20 traffic for July, reports WA1EYY. EM2MN had 80 QNIs, 141 traffic, 23 sessions. WA1ICW is on 6. W1SPW went to California to see his son get married. WA1DWV got married. W1LVK moved to Wilmington. K1SYF moved to Walpole and W1OFK to Plymouth. K1SBX is back at college in Andover. W1AAU has a Swan 500. WA1BFD has a daily sked with KC4USN at 1000 GMT on 20. Another get-together was held in

Townsend arranged by K1PNB, RM for our Novice Net. W1s EAE, ALP, AOG, EMG, DFS, DAL, K1s YUB, ETT, WA1s ECY, FSH, FSI, DSZ, DWS, FCV and a few XYLs were present for a nice chicken barbecue supper. WA1FKQ has a new HA-1 keyer. The Eastern Area Slow Speed Net meets daily on 3740 kc. at 2200Z and is looking for new check-ins. EMNN for July had 12 sessions, 89 QNIs, 54 traffic. W1AOG, our SEC, received reports from W1s RPF, LVK, K1s ERO, PNB, DZG. The T-9 Radio Club met at W1IIB's. The 6-Meter Cross Band Net had 22 sessions, 144 QNIs, 23 traffic. W1DMD took first place for Plymouth County in the 2nd Mass. QSO Party. Appointments endorsed: W1AKN Sandwich, W1QMN Acton as ECs; W1PEX as OPS; W1AQV as OBS. WA1DGG is back at MIT as a sophomore. W1FJI is back on 20-meter c.w. W1AKN is doing a lot of fishing. WA1ETC has an eleven-element beam for 2 and an SR-42. WA1GCH has a Clegg 22er. K9AQP/1 moved to Groton. K1ZCU built a magnetic detector. K1ZGH/1 is portable from Pembroke, Marshfield and Duxbury on 6 for the Worked All Mass. Cities and Towns Award. K1FJM returned to Worcester Polytechnic Inst. for his junior year in EE. W1PSL is buying some lighter equipment so he can travel around. K1s QAM, OVA, WLK, TKI, WA1GLW and WA1ELV operated at the Fireman's Field Day Parade under the Foxboro C.D. and Tri-Town Emergency Net. WA1BFD has a new baby girl. W1UIR is going on a trip. W1AQV says he feels a bit better but it will take time. K1RSZ has a new QTH. The Capeway Club met at W1ZXG's. New Novices: WN1s IEZ, IDV, IEF, IDX, IEO, IDW, IEQ, IFO, IFG, IFQ, IFS, IFR, IFE, IFF, IFN. Other new hams: WA1s IDX, IEB, IDZ, IEM. W1AOG was in Maine for two weeks. K1VOK has been endorsed as ORS/OPS. K1LJT had his first son. W1EHT has a new Galaxy 5, Mark 2. The Yankee Radio Club and the Quannapowitt Radio Assn. held their first meetings. WA1DRO took over as PAM for the 2-meter band Oct. 1. Thanks to W1DOM, who helped us out. The EMCWN had 29 sessions, 182 QNIs 120 traffic. Traffic: (Aug.) WA1EYY 373, W1EMG 190, W1DOM 155, WA1-GXC 117, W1UIR 63, WA1FKQ 52, WA1EOT 46, W1DAL 45, W1CTR 22, W1AOG 17, WA1DEC 17, K1OKE 15, W1AEC 8, W1FJI 8, WA1GCH 8, WA1DEC 7, K1VOK 6, WA1DFL 3, WA1DJC 3, W1PEX 3, K1YUB 3, W1NF 1. (July) K1PNB 131, W1AEC 6, K1ESG 3.

MAINE—SCM, Herbert A. Davis, K1DYG—RM: W1BJG. PAM: WA1FCM. Traffic nets: Sea Gull Net, Mon. through Sat. on 3940 kc. at 1700; Pine Tree Net, daily on 3596 kc. at 1900 c.w. W1UOT was the high scoring Maine station in the 1967 New York State QSO Party. The PAWA has its new station on the air and will hold regular meetings every Tue. at 7:30 P.M. Everyone is invited. K1RQE will be home from the National Guard in Sept. K1MTJ was home from Japan. The International Phone Net meets Sun. at 0930 on 3900 kc. for Aroostock County and Canadian stations, and over the last five years has an average of 12 stations per net. K1TFX is the new Navy Recruiter in Presque Isle. WN1IGP, a new Novice, is instructor at Northern Maine Institute. Things are looking up on the PTN. There are a few new stations checking in and helping out. Traffic: W1BJG 152, WA1FCM 90, W1GU 68, K1WQI 20.

NEW HAMPSHIRE—SCM, Robert C. Mitchell, W1-SWX/K1DSA—SEC: K1QES. PAM: K1APQ. RM: Open. K1APQ reports 804 check-ins and 75 traffic. K3-FMP/1 is now W1EIL, WA1EUJ went to Expo 67. K1-PQV was in the QRP Party. K1QES reports 83 check-ins and 3 traffic for the 2-meter AREC Net. W1DYE was N.H. winner in the N.Y. State QSO Party. New hams: WN1IDB, WN1IDC, WA1IEA, WA1IEC, WN1IEL, WN1IES, WA1IFD, WN1IFH, WN1IFI, WN1IFJ, WN1-IFK, WN1IFT. The MVAREC report by K1DWK shows 122 check-ins and 12 traffic. Endorsements: W1CTW and W1IQD as OVSs, WA1EUJ moved back to Manchester. WN1HGL is moving to Boscawen. The contest season is here again and we hope to hear many of you in there representing New Hampshire. *Late Flash*: GSPN, CNEN and the NHEPN moved from 3842 to 3945 Oct. 2. This will beat the rush that will be caused by the FCC changes. See you all on 3945. Traffic: W1MHX 35, WA1EUJ 34, K1BGI 25, K1PQV 14, K1QES 8, W1BYS 3.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: K1LII. RM: W1BTV. PAM: W1TXL. V.H.F. PAM: K1TPK. Endorsements: K1TPK as V.H.F. PAM and EC. RISPN report: 31 sessions, 388 QNI, 55 traffic. The Newport County RC issued certificate No. 74 to WN1IJB for working NCRC members. WN1HBG passed the General Class exam and is waiting for his new ticket. The W1AQ Club of Rumford held its second picnic of the summer at Lincoln Woods. K1AMG was chairman of the event. WN1ICO was admitted to membership in the club and WRI certificate No. 100 was issued to K1GUD. K2UFT, contest chairman for the New York

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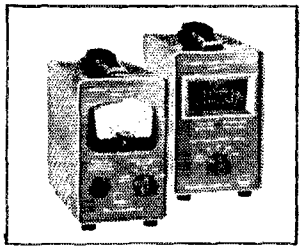

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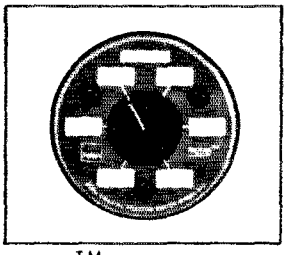

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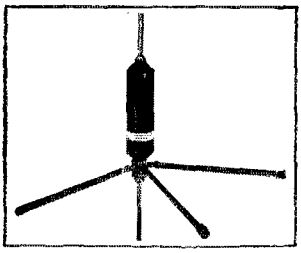

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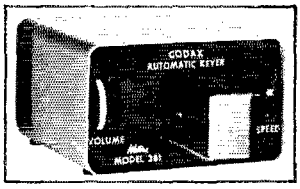

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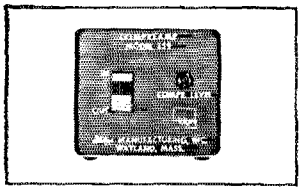

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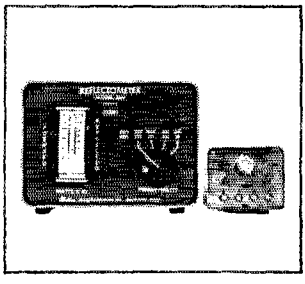

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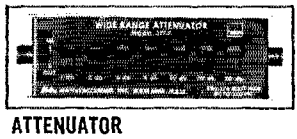

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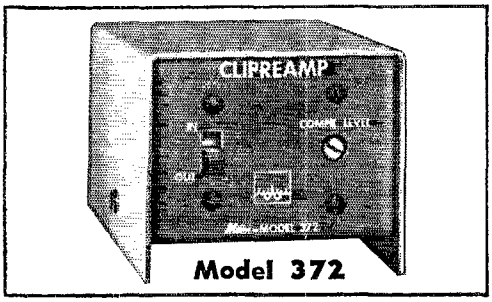

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State QSO Party, has announced that WA1BOP was the highest scoring R.I. station in the contest. WA1EEJ is NCS on the Northeast Traffic Net and the N.E. Teenage Net. He also is active on several other nets and enjoys traffic. The SCM still has several appointments available to qualified hams and if you desire information about them write him. Traffic: (Aug.) W1TXL 222, WA1EEJ 95, W1YKQ 54, K1VYC 34, W1BTV 24. (July) WA1EEJ 118.

VERMONT—SCM, E. Reginald Murray, K1MPN—

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*NCS*
Gr. Mt.	3855	2230Z	M-S	582	22	W1VMC
Vt. Fone	3855	1400Z	Sun.	no	report	W1UCL
VTNH	3685	2330Z	M-F	no	"	K1UZG
VTCD	3900½	1500Z	Sun.	no	"	W1AD
VTSB	3909	2230Z	M-S	608	27	W1CBW
		1330Z	Sun.			

Please note above net times are effective after Daylight Saving Time goes off. We welcome Novices WN1IET (Stephanie), WN1IEU (Aurelius), both from Bellows Falls; also WN1IER (Maurice) from Grafton and WN1-IEV (Ralph) from Brattleboro. The Franklin County Club now has the call WA1IFB. Congrats. We still need more reports of nets and traffic. Don't be shy—put them in message form on nets or drop me a postcard by the 6th of each month, please. Traffic: K1BQB 301, W1FRT 6, K1MPN 6.

WESTERN MASSACHUSETTS—SCM, Norman P. Forest, W1STR—C.W. RM: W1DWA. The Western Mass. C.W. Net handled 171 messages during Aug. with the following most active: K1AEC, W1DVW, K1WZY, K1-IJV, WA1ABW, W1ZPB, W1MNG (10 or more QNI). This net meets on 3560 kc. every night at 7:00 and needs activity from Worcester County to improve coverage. W1MNG has a new station set-up at Westfield State College using his own call. W1FJK reports that a small group of amateurs in the Fitchburg area have formed a club known as the Hilltoppers Amateur Radio Experimenters and has acquired a hilltop location in Westminster for contemplated projects such as Moonbounce. The Worcester Tech. Radio Club announces its new slate of officers for the 1967-68 year as K1TVF, pres.; K1PHT, vice-pres.; WB2FPG, secy.; K1THQ, treas.; K1TKS, chief of. The club call is W1YK. W1IWV expects early shipment to Guam by the U.S. Navy and willl take his complete station. The Hampden and Hartford County Radio Clubs are planning a joint meeting for Nov. 9 at the Veterans Memorial Hall in East Hartford. The program will include top League Officials with a question-and-answer period. They hope to promote inter-club activity and amateur radio in general. The HCRA is having Richard Hoagland, Springfield Museum of Science, at its Nov. 3 meeting. Traffic: W1DVW 138, K1IJV 87, K1WZY 45, W1EOB 40, W1DWA 36, W1ZPB 32, WA1ABW 30, W1MNG 19, WA1EYF 17, WN1HHA 13, W1BVR 8.

NORTHWESTERN DIVISION

ALASKA—Acting SCM, Albert F. Weber, KL7AEQ —Asst. SCM: John P. Trent, KL7DG. New appointees: KL7FRZ and KL7GEF as OOs; KL7CAH as OBS. The Fairbanks Flood as well as the Nenana and Minto high water managed to use up most of the month of August for the Interior Alaska hams and dragged quite a few from the Anchorage area. The weak points in our emergency communications came out "in the wash" and many changes are in the offing. The value of the old 11-meter band and the people presently occupying it was proved beyond the shadow of a doubt during this period. KL7FID and XYL KL7FIE are heard these days from the Bethel area. KL7GCI has deserted Tetlin and will be wintering at the U. of A. this year. KL7EKZ, at Sitka, informa us that there are 25 to 30 very active hams in that area, complete with a v.h.f. net, and that it appears that an OBS in southeastern is in order. Any applicants? The distances and propagation conditions being what they are up here, it appears that an OBS is really in order for each of the large geographic areas. CAH can cover a large area, but how about someone in the Nome/Kotzebue area? Barrow mebbe? Would like to get reports from all on a regular basis. You can catch me on 3866 kc. or 145.35 Mc. most evenings. KL7-ENZ has QSY to Healy and EUW will follow soon. Traffic: KL7CAH 180.

IDAHO—SCM, Donald A. Crisp, W7ZNN—The FARM Net convenes Mon. through Fri. on 3935 kc. at 0100 GMT. Congratulations to K7THX, who has been appointed SEC for Idaho. Please give Everett your support; join the EC or organize one in your area. The Lewiston-Clarkston Club plans to sponsor a Novice and Advanced Class code and theory course. WA7HGV has just received his General Class ticket and is installing a

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60-ft. tower. KL7FOZ is a new ham in Lewiston. WA7-EWV is installing a new beam. Hats off to the FARM Net members who are doing a fine job with area traffic. More FARM Net check-ins are needed, particularly from the northern part of the state. FARM Net report for Aug.: 23 sessions, 600 check-ins, 75 traffic handled. Traffic: WA7BDD 194, WA7ETO 38, W7ZNN 16, W7GGV 15, K7OQZ 15, K7OAB 14.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—Asst. SCM/SEC: Harry Roylance, W7RZY. Endorsements: K7DCH, K7MRZ, K7PFQ, K7OZU, WA7AEX, K7CHA, K7EGJ, K7UPH, W7RZY and W7FIS. WA7-HYC is a new call in the Billings area. K7CPE is a new call in the Bozeman area. K7DCB received his Doctor's Degree in Agriculture from Montana State University. WA7CAC received a very fine write-up in the Bozeman newspaper in recognition of his efforts for the Fairbanks Flood Communications Nets. The ERL is erecting a log periodic antenna which will be 140 ft. high. This antenna will be in the 3-to-65-Mc. spectrum. The station call will be W7YB. The Bozeman group provided communications for the annual Model T Race. K7ZIX is working as a fire spotter at the Noxon Ranger station. K7TQM is working Vietnam traffic from Billings. If you are interested in the Montana C.W. Net, please write to Doug Smith, WA7DMA, RFD 5, Miller Creek, Missoula, Mont. Doug would like to start up this fine net and is trying to find out the interest in his project. It's a good chance to get your c.w. up. Traffic: WA7DMA 52, K7EGJ 17, K7YNZ 9.

WASHINGTON—SCM, William R. Watson, K7JHA —SEC: W7UWT. RM: K7CTP. PAM: W7BUN.

NTN	3970 kc.	1830Z	Daily Traffic	481	QNI	924 Sess. 31
WARTS	3970 kc.	0100Z	Daily Traffic	187	QNI	1135 Sess. 31
WSN	3535 kc.	0200Z	Daily Traffic	417	QNI	320 Sess. 31
NSN	3700 kc.	0300Z	Daily Traffic	104	QNI	354 Sess. 31

Public service was aspected during August with the Fairbanks Flood and the World Scout Jamboree. WA7-CSK made his first BPL on Fairbanks traffic at the age of 15, plus local TV coverage along with W7PGY. WA7-DXI and K7VNB relayed formal traffic in and out of the World Scout Jamboree via 2 meters. Most of the QSO buzzing is over the FCC docket. With the OBSs on the job the first transmission was made within an hour after WIAW's Official Bulletin. The NW Tech Net plans to concentrate on the higher grade license material as an assist. The net will meet on 3970 kc. at 4 P.M. local time each Sun., moving to 3 P.M. when the long skip comes in later in the fall. New appointments: K7OXL as OBS for Wash. PON, W7PUL as OBS, WA7DXI as OVS, W7BUN as OPS, W7PUL as OVS. W7SAB is planning to expand his OVS activity. The WSN Net reports a change of frequency from 3535 to 3575 kc. effective Sept. 10, prompted by the new FCC frequency alignment. RN7 reports a change from 3560 to 3563 kc. to get away from QRM from foreign stations. W7BUN made WAS and sent in his first traffic report. W7IEU reports the recent Snohomish County tests brought good cooperation with CBers. W7UU has been hamming on his field trips. WA7EMM now has a Two-er. W7MCW mobiled to the Okanagan Hamfest. W7BTB reports KL7 schedules and has his antennas winterized. WA7BGG hit the local papers on Alaska traffic. W7CXJ and W7OEB and families vacationed in the Montana area. W7OEB sends in FB reports on the tri-cities. W7RXH has new 2½-k.w. generator and now is equipped for full emergency. W7WCW mobiled into California for a vacation. W7EGR took a European cruise and visited the MARS station in Hamburg. PAM W7BUN reports the *Parasite Bulletins* will contain operating aids in the next issues. W7BA, W7RXH, W7DZX and WA7DXI were endorsed as OPSs. We regret the passing of W7CIS Aug. 25 at Palouse. Traffic: (Aug.) W7BA 2013, WA7DXI 934, W7HMA 824, WA7CSK 681, W7DZX 572, W7ZIW 492, K7VNB 425, W7PI 340, K7CTP 239, W7KZ 180, W7JEY 155, W7BTB 149, WA7DZL 148, K7JHA 120, W7PGY 80, W7MCW 75, W7IEU 74, W7BUN 47, K7OVN 45, WA7EDQ 41, K7MCA 41, W7APS 38, W7UU 17, W7OEB 16, W7AMC 13, K7TCY 10, K7YDZ 10, W7AXT 9, WA7EMM 9, W7RXH 9, W7AIB 8. (July) K7MCA 60.

PACIFIC DIVISION

HAWAII—SCM, Lee R. Wical, KH6BZF—SEC: KH6-GHZ. PAM: Vacant. V.H.F. PAM: KH6EEM. RM: KH6GGR.

Net	*Freq.*	*Time (GMT)*	*Days*
League Appointees	7.290 Mc.	0700Z	Wed.
Friendly Net	7.290 Mc.	2030Z	M-F
No Ka Oi	7.290 Mc.	2230Z	Sat.
50th State	3.895 Mc.	0500Z	Tues.-Sat.

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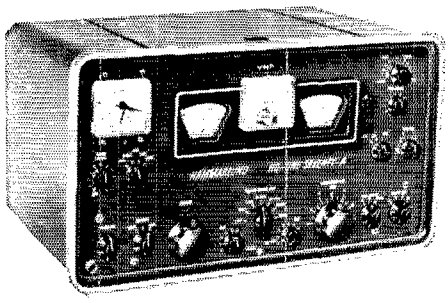

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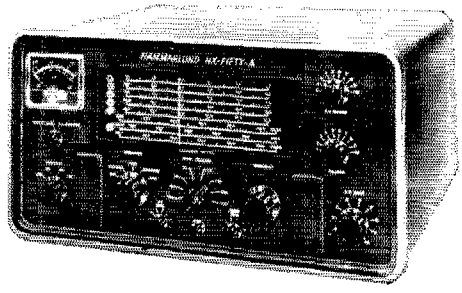

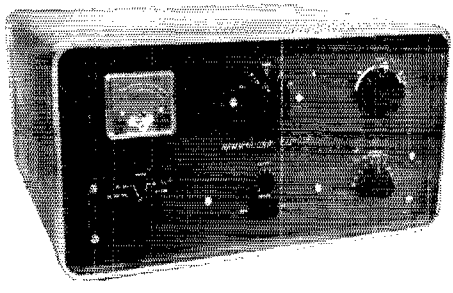

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NEVADA—SCM Leonard M. Norman, W7PBV—SEC: WA7BEU/W6EBW. W7BIF and W7PBV visited the Boy Scout World Jamboree in Idaho with a group of scouts operating mobile. W7YDX is active on 40 meters handling emergency traffic and is looking for some 6-meter contacts. WN7GVX is active on 7179 kc. WN7GRC and WN7HFL passed the General Class exam. K7-ADD/3, active again on 20 meters, now is employed as a design engineer in solid state. WA7AEL, ex-WA6LLT and W8UEM, is active on 20 meters. WA7FBF is moving to 6-Land. W7TVF will schedule anyone needing Nevada, DX or stateside. W7PRM is mobile and vacationing with the family in Ore. K7RKH and family vacationed in Tenn. K7ZOK had business and vacationed in the Washington, D.C. area. W7DNX, K7VYT and W7YKN are starting a 2-meter f.m. net. WA7ARZ has a new summer retreat. W7JLN vacationed in KL7-Land. Southern Nevada 2-Meter f.m. repeater receives on 146.94 and transmits on 147.5 Mc. The newest member is W7EBT. Traffic: K7OHX 15, WA7BEU 2, W7BIF 2, W7PBV 2.

SACRAMENTO VALLEY—SCM, John F. Minke, III, WA6JDT—SEC: WB6BWB. ECs: WB6MXD, K6RHW, WB6RSY, W6SMU, WA6TQJ. RM: W6LNZ. ORSs: WB6QZZ, WB6RSY, W6VUZ, K6YZU. OPSs: WB6EAG, K6IKV, WB6MAE, WA6TQJ, W6VUZ. OBSs: W6AF, WB6MAE, W6NKR, WB6PHQ, WA6TQJ. OOs: W6-GDO, WB6MPP, W6ZJW. OVSs: WA6CXB, WA6FWU, W6GDO. With the new FCC release W6WLI, who has an Extra Class ticket and has been licensed in excess of 25 years, is going to apply for a 2-letter call. OK, you Generals, see you in San Francisco for that Advanced Class privilege. W6LNZ has just earned himself his third BPL. W6VUZ handled some Fairbanks emergency traffic and was quite pleased with the "thank you" at the delivery end. WB6MXD, of Crescent City, traded in his a.m. rig for some s.s.b. gear. WB6BWB, WB6QMT, WB6OYI and WA6CXB have kept SCEN going as NCSs. Check-ins have been just over 50 percent. WN6VYW is a new member of the SCEN. WN6WBP is a new ham on 2 meters. The RAMS provided communications for the Annual Sacramento-Colusa Boat Race. W6QHP topped the RAMS again during the Field Day test. WA6JDT joined the CHC. Don't forget to vote for your new Director. W6HC, after 12 years as Pacific Division Director, is resigning along with W6ZF, who is Vice-Director and a former SV SCM. Thanks, gentlemen, for a job well done. WA6AUD and W6ZRJ, both SCMs, are running for Director. Both are capable for the job. Vote for the man of your choice. Vote! Vote! Traffic: W6LNZ 200, WB6QZZ 13, WB6MXD 3, W6VUZ 2.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD—W6GQA was on the air as OBS giving everyone the full details on the FCC decision. W6ZC is another in Marin County to make DXCC in the last few months. WB6UJO reports the new tower and beam helpful in working more DX. WA6BYZ handled most of the traffic during Aug., followed closely by that other big traffic man, W6KVQ. WB6JQP has been home again and handling traffic on the NCN. WB6GVI reports operating on 6 meters from the Tri-County Picnic in Crescent City. WA6BHX reports completing a home-brew phase shift transistor oscillator of pseudo break-in keying through the VOX of his SB-34—all in a 1x3x4 plastic pill box. WA6ALK reports that a broken leg has slowed up her mobility. WA6NDZ reports that he has been studying a prerequisite assignment for wide-band data communications. W6WLV worked St. Brandon's in the Indian Ocean on 40 meters with 100 watts. The Marin Club held its annual auction at its Oct. meeting and the usual swapping of junk boxes took place. W6SG, operating from the Marin County Red Cross Chapter House, is running a 2-meter check-in on Sun. mornings at 1015 local time

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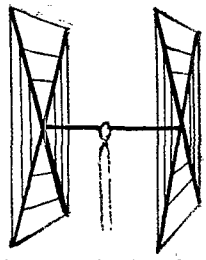


CUBICAL QUAD ANTENNAS — these two element beams have a full wavelength driven element and a reflector; the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; 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 foolproof 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!

10/15/20 CUBICAL QUAD SPECIFICATIONS

Elements: A full wavelength driven element and reflector for each band.

Frequencies: 14-14.4 Mc.; 21-21.45 Mc., 28-29.7 Mc.

Dimensions: About 16′ square.

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10′ × 1¼″ OD, 18 gauge steel, double plated, gold color.

Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

Radiating elements: Steel wire, tempered and plated, .064″ diameter.

X Frameworks: Two 12′ × 1″ OD aluminum 'hi-strength' alloy tubing, with telescoping ⅞″ OD tubing and dowel insulator. Plated hose clamps on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings.

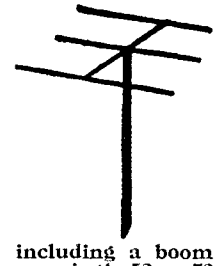
Feedline: (not furnished) Single 52 ohm coaxial cable.

Now check these startling prices — note that they are *much lower* than even the bamboo-type:

10-15-20 CUBICAL QUAD	$35.00
10-15 CUBICAL QUAD	30.00
15-20 CUBICAL QUAD	32.00
TWENTY METER CUBICAL QUAD	25.00
FIFTEEN METER CUBICAL QUAD	24.00
TEN METER CUBICAL QUAD	23.00

(all use single coax feedline)

BEAMS The first morning I put up my 3 element Gotham beam (20 ft) I worked YO4CT, ON5LW, SP9ADQ, and 4U1ITU. THAT ANTENNA WORKS! WN4DYN



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2 El 20	$16	4 El 10	$18
3 El 20	22*	7 El 10	32*
4 El 20	32*	4 El 6	15
2 El 15	12	8 El 6	28*
3 El 15	16	12 El 2	25*
4 El 15	25*		
5 El 15	28*		

*20′ boom

ALL-BAND VERTICALS

"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, T12FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2-FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1-MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2-KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1-LC, PY5ASN, FG7XT, XE2I, KP4-AQL, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!

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V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters . . . $18.95

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through the K6GWE repeater—input 146.6 Mc., output 145.1 Mc. W6DTV is back home after a summer at Old Station on the slopes of Mt. Lassen. WB6DJI lost out on a lot of DXing because of some physical problems. The Marin Club again provided the communications for the DIPSEA Race this year with K6RKG the ramrod for the action. WA6IVM was in there running up a big score in the All-Asia Contest this year. Last year Ray was No. 2 in the U.S. scores. W6BIP also ran up a good score last year. The Tamalpais Club had an outing at Clear Lake in Aug. with the usual lively time. Next stop is the Annual Deer Hunt in the Lake Almanor country. K6CWS has put up a new tower and beam and is another potent Marin DXer. A new Novice call heard on 40 meters is WN6YMS. W6KUF has a new vertical up and is back on the air. Also seen at the Pacific Division/ Southwestern Convention in Los Angeles were W6HSA and WN6TXA. Traffic: WA6BYZ 154, W6KVQ 132, W6-WLV 49, WB6JQP 38, K6TWJ 34, WA6AUD 17, WB6GVI 6, WB6IMO 5, WB6OGF 4, K6TZN 4, WB6RKI 3, WA6-BHX 2, W6GQA 2, W6MTJ 2.

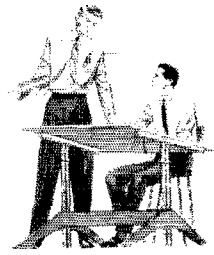
SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—It is with deep regret that I report that Irv Weihe, W6FIS, passed on in Santa Monica. Irv had many friends on 75-meter s.s.b., and was one of the early ones on s.s.b. K6OZL is going to Court Reporting School in S.F. WB6PUS got a bug. W6FUA has a Swan 350. W6ASV has retired and got a Jeep and will be mobiling around the country. The TCARC had a pot luck at Burris Park in Aug. W6PIX is act. mgr. for the TCARC. The Delta Amateur Radio Club has a Guard Channel on 146.00 Mc. and all are invited to check in. WA6FUF has a sixteen-element beam up on 2 meters. WB6SUP is active on 6 meters. For personal reasons, WA6BUH resigned as president of the Fresno Amateur Radio Club. WA6WXP is now president of the FARC. WA6WXP has a KWM-2. W6KTW is chasing DX on 20 meters. Summer activities seem to be low this year. Let's hope that it improves, now that incentive licensing is here. Traffic: WB6HVA 375, K6KOL 154, WA6SCE 54, K6OZL 25, WB6TFU 4.

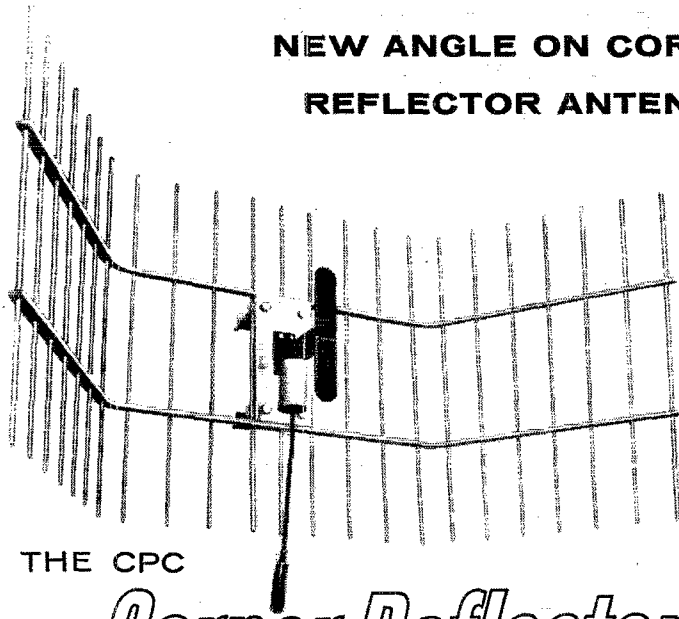
SANTA CLARA VALLEY—SCM, Jean A. Gmelin, W6ZRJ—Asst. SCM: Ed. Turner, W6NVO. SEC: W6-VZE. RM: W6QMO. W6WX reports that the new pres. of the Northern California DX Club is W6CUF. Jim also is a new OO. W6RSY is active on NTS nets and made the BPL. K6DYX was busy making plans for the Division Convention but found time to handle his regular RTTY OBS schedule. W6HC reported that he is retiring as Director of the Pacific Division but would be active on the NTS. W6OII was kept very active on MTN, SJVN and GBN. Frank was involved with emergency traffic in the Alaskan floods. W6BPT now has a new product detector and is keeping it "hot" on 75-meter phone. W6-AUC has a daily schedule with K6AUL, a field geologist, and also is busy with OO work. W6DEF is active on NCN, WX Net, AREC Net, SCARS C.D. and SPECS C.D., as well as with EC activity. W6PLS reports that DX conditions are improved on 14 and 21 Mc. WA6LFA is a new fist on NCN in Mountain View and is a new ORS. W6ACW is active on NCN. WB6IZF reports that he has a good set of color slides of his operations of Boy Scout Station K7WSJ at the National Jamboree and will make them available to any interested clubs. W6-BVB reports activity on NCN. K6YKG was QRL on vacation and busy making plans for the fall traffic season. W6MMG reports that the San Carlos Civilian Defense Radio Club handled traffic from the Fairbanks, Alaska, floods via W6OWQ. Operation was mostly on 14-Mc. s.s.b. W6YBV reports that most traffic on NC for cities north of San Francisco is being mailed for lack of stations. W6SAW is active on RTTY and keeps regular OO listening schedules. W6VZE reports emergency activity for the section. Charlie is doing a bang-up job as SEC and will hold a meeting some time this fall. Traffic: (Aug.) W6RSY 1112, W6YBV 369, K6DYX 132, W6DEF 107, W6HC 68, W6ZRJ 42, W6OII 40, W6AUC 36, W6PLS 20, WA6LFA 14, W6ACW 10, W6RFF 10, W6BVB 5. (July) W6RFF 10.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4-BNU—Asst. SCM: James O. Pullman, WA4FJM. SEC: WA4LWE. RM: K4CWZ. PAM: W4AJT. V.H.F. PAM: W4HJZ. W4NAP says their 6-meter AREC net is doing pretty well considering vacations, summertime activities, etc. Contest Chairman W2UFT writes that WA4QLP was the high-scoring N.C. station in the New York State QSO Party. WA4KWC is having good results with his new Hustler 4-BTV vertical antenna. WB4FGU has his General Class license and is checking in with the CCEN. WB4BGL is now on 2 meters. WB4CVM has been appointed ORS. WA4NZS now has some 2-meter gear operational. W4NQA has been appointed OO and EC. New

CPC ENGINEERS HAD A NEW ANGLE ON CORNER REFLECTOR ANTENNAS





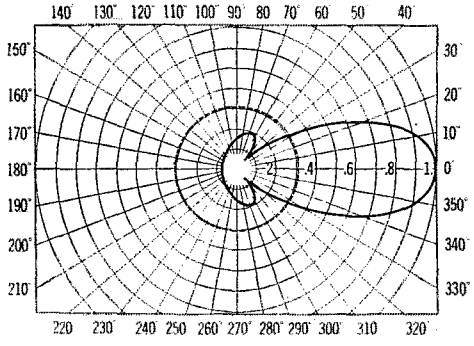
Combining maximum strength with optimum electrical performance, this 10.0 db gain antenna meets the increasing demand for rugged durability at minimum weight. Cat. No. 465-509, has a reflector 55 in. by 29 in., yet weighs only 20 lbs. Its rated wind velocity is 150 mph. The radiating element material is brass, reflector screen components are of high strength aluminum alloys, and mounting accessories are fabricated of hot galvanized steel. This CPC Corner Reflector Antenna is ideally suited for use in multiple corner arrays.

THE CPC

Corner Reflector Antenna

Cat. No. 465-509

Frequency Range 406-470 Mc



Horizontal field strength pattern; a dipole pattern is shown for reference.

Note: dbd gain indicated as per EIA RS-329

Electrical Specifications

NOMINAL INPUT IMPEDANCE	50 ohms
FORWARD GAIN	10.0 db at 450 Mc
FRONT-TO-BACK RATIO	25.0 db
MAXIMUM POWER INPUT	250 watts
TERMINATION	Type N Female with metal weather shield and Type N Male with Neoprene housing
VSWR	1.5:1
BANDWIDTH	406-470 Mc
LIGHTNING PROTECTION	Direct Ground

Mechanical Specifications

REFLECTOR	55" wide by 29" high
REFLECTOR MATERIAL	6061-T6 aluminum
RADIATING ELEMENT MATERIAL	Brass
RADIATING ELEMENT SIZE	13-1/4" long by 2" wide
RATED WIND VELOCITY	in excess of 150 MPH with no ice 85 MPH with 1/2" radial ice
LATERAL THRUST AT RATED WIND	164 lbs. no ice 180 lbs. with rated ice load
WEIGHT	20 lbs.

Communication Products Company
DIVISION OF
PHELPS DODGE ELECTRONIC PRODUCTS CORPORATION
Marlboro, New Jersey 07746 — Tel. (201) 462-1880
Los Angeles, California 90065 — Tel. (213) 245-1143

officers of the Forsyth Radio Club are WA4OZY, pres.; K4EIP, vice-pres.; and WA4YLF secy. W4FUI has been appointed RTTY OBS.

Net	*Freq.*	*Time*	*Days*	*QTC*	*Mgr.*
THEN	3865 kc.	0030Z	Daily	160	WA4GMC
NCN(L) (July)	3573 kc.	0300Z	Daily	96	WA4CFN
SSBN	3938 kc.	0030Z	Daily	83	WA4LWE

Traffic: (Aug.) WB4BGL 288, WA4CFN 121, W4ZZC 81, W4LWZ 80, K4CWZ 61, W4BNU 28, K4EO 28, WA4FJM 23, K4PKE 18, K4CDZ 14, K4TTN 11, WA4ZLK 11, W4NAP 9, WB4CVM 4. (July) W4YMI 25, W4AJT 18, W4OSG/4 5.

SOUTH CAROLINA—SCM, Clark M. Hubbard, K4LNJ—SEC: WA4ECJ. Asst. SEC: W4WQM. RM: K4LND. PAM: WA4EFP.

SCN	3795 kc.	Daily	2300Z/0200Z	Aug. Tfc. 76
SCSSBN	3915 kc.	Daily	2300Z	Aug. Tfc. 76

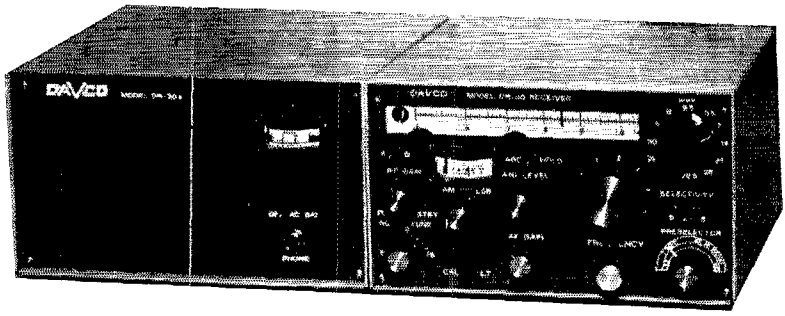
The C.W. Net held 56 sessions and the S.S.B. Net held 31 sessions. W4CE and WA4ECJ held a joint RACES and AREC meeting at the Camden Picnic. WA4APD is getting back on as work permits. W4PFH is back on his OOing work and getting his generators with emergency equipment back in good shape. K4PIK now is set up in Aiken and ready for traffic. Traffic: WB4DXX 129, WA4NWI 43, W4JA 39, WB4BZA 34, W4FFH 32, K4LNJ 27, W4PED 23, W4NTO 20, W4FVV 19, WA4APD 18, WA4HFA 8.

VIRGINIA—SCM, H. J. Hopkins, W4SHJ—SEC: K4LMB. PAM: W4OKN. RMs: K4MLC and WA4EUL. W4ACC is a newly-appointed EC in the Winchester area. VSN is doing well under new manager K4MLC. WA4OUS reports into nets from Williamsburg. WA4DAI is working on a new linear, while WB4GTS is busy debugging some commercial kits. W4DVT made the WAS on 80 meters. W4OKN has issued VSBN certificates to W4OP and WA4CXO. WA4FCS is getting settled in a new house. What with all the director work and trips, W4KFC still finds time for contest work. Watch for him and the PVRC group at PJ3CC during the Nov. 24-26 DX Test. W4TE has retired after 27 years with the FCC. New amateur licensing regulations go into effect Nov. 22 and first restricted frequency segments one year later. There is plenty of time to plan ahead for the SET, which will be in January this season. Traffic: (Aug.) W4NLC 301, W4DVT 288, K4CG 202, W4ZM 165, W4RHA 128, WA4EUL 123, K4FSS 108, WB4GTS 90, K4KNP 74, W4MUJ 72, W4OKN 49, WA4FCS 38, K4MLC 36, WA4JJF 35, WB4DRB 27, K4CRK 22, WA4PBG 22, WA4OUS 16, W4KFC 14, W4SHJ 14, W4JXD 10, W4KX 10, W4LK 8, W4TE 8, W4MK 7, K4LMB 6, W4BZE 4, K4GR 4, W4WG 3, WA4WQG 3, W4JUJ 2, K4YEE 2. (July) WA4JJF 42, W4ZMT 8, K4ITV 3.

WEST VIRGINIA QSO PARTY

December 16-17

All amateurs are invited to participate in the annual West Virginia QSO Party, sponsored by the Kanawha Radio Club of Charleston, West Virginia. The contest starts 0001 GMT Dec. 16 and ends 2400 GMT Dec. 17. Use all bands, all modes. Each station may be worked twice on each band, once by phone and once by c. w. Complete exchanges consists of QSO number, reports and West Virginia county (or ARRL Section/Country for non-West Virginians). Each completed exchange counts one point. Non-West Virginia stations will try to work as many West Virginia stations as possible. West Virginia stations are not permitted to work stations in their own state for point credit. Suggested frequencies: 3570 3890 3903 7050 7205 14,050 14,300 21,050 21,410 28,050 28,800 and 50,250 kcs. In scoring, non-West Virginia stations multiply total points by the number of West Virginia counties worked. West Virginia stations multiply total points by number of ARRL sections/countries worked. Certificates will go to the highest scoring phone and c.w. stations in West Virginia and in each ARRL section/country. Multioperator stations are not eligible. Logs showing usual information in GMT, should be mailed to Don Thompson, WA8YNT, Route 1, Box 376, Hurricane, West Virginia 25526. To be eligible logs must be postmarked no later than January 15, 1968.



If the DAVCO DR-30 is only the finest amateur receiver made, why have so many professional users bought DR-30's?

By now, most hams know that the DAVCO DR-30 is one of the most versatile ham-band receivers ever manufactured. They know that the DR-30 is a rugged, compact, solid-state communications receiver covering all the ham bands from 3.5-50.5 MHz with exceptional performance and almost every feature any ham has ever desired. But they may not realize that people other than amateurs have also recognized the excellence of the DR-30 for other uses. Commercial, scientific and government users have bought DR-30's for applications ranging from wolverine tracking to short-wave monitoring, from radio astronomy to receiving WWV. Obviously, the requirements for these varied applications differ widely; only a receiver with the versatility of the DR-30 could satisfy them all. Professional users have discovered that the characteristics that make the DR-30 ideal for any type of ham receiving application also make it perfect for other uses. They value the DR-30 for its ruggedness, reliability, modular construction, exceptional sensitivity, resistance to overloading, stability, choice of modes and bandwidths, excellent noise blanker, wide frequency coverage, low power consumption, convenient compactness, protection from incorrect polarity, low spurious responses, accurate frequency calibration, complete detailed manual and reasonable price ($389.50).

These users know the versatility of the DR-30. If the DR-30 excels in so many exacting professional applications, imagine how it would perform in your shack!

We would like to tell you more about the DR-30. Drop us your card for our complete data pack. It includes an eight-page technical brochure, a large schematic and reprints of reviews of the DR-30 from QST, CQ, and 73. If you would like even more information, the 48-page DR-30 Instruction Book is available for $2.00 (which will be refunded with your DR-30 order, of course).

Here is a partial list of DAVCO professional customers:

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WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8IRN. RMs: W8HZA, K8TPF. PAMs: K8CHW, W8IYD. Your new SEC, W8IRN, would like to hear from all amateurs in West Va. interested in ARPSC work. New amateurs in the Martinsburg area are WN8YHD, WN8YHE, WN8YHF and WN8YHG. WA8HSB was top scorer from West Va. in the New York QSO Party. W8SSA received WACWV certificate No. 47. WA8RQB reports 23 sessions, 534 stations and 100 messages for the WVN Phone Net. WN8YCD is interested in forming a traffic net in the 3.7-Mc. band. The Kanawha Radio Club will sponsor the West Va. QSO Party Dec. 15-17 with WA8YNT as chairman. K8MYU and W8JM visited ARRL Headquarters and W1AW. Director Clark, W4KFC, was guest speaker at a joint club meeting in Charleston, with the Kanawha ARC as the host club. Worked West Virginia, 55 Counties and the WACWV certificates are available from the Kanawha, East River and MARA ARCs. K8MHR has been transferred to Huntington. W8HZA has been inactive because of a heavy work load. Traffic: W8SQO 217, WA8POS 130, W8CKX 61, WA8RQB 36, K8BIJ 24, K8MQB 16, W8GUL 6, WA8LAL 6, K8CHW 5, WA8IMY 5, K8MYU 4, WA8CRW 3, W8JM 3, WA8KQX 3, WA8UIH 3, WA8CKN 2, W8IYD 2, WA8NDY 2, K8OQL 2, WA8QZO 2, K8ZDY 2, WA3FRB/8 1, WA8AFX 1, W8CUL 1, WA8RHT 1, WA8RZM 1, W8WEJ 1.

ROCKY MOUNTAIN DIVISION

NEW MEXICO—SCM, Kenneth D. Mills, W5WZK—Asst. SCM: Marty Petsonk, WA5MCX. SEC: K5KTQ. OPSs: W5BWV, WA5MIY. We need new PAMs and RMs. Contact Marty. Thanks, Bill, for a job well done the last two years. W5NUI maintained communications for Holloman AFB during the power outage Sept. 1. W5ALL is keeping a TV eye on the bears in Clouderoft. 26 on 2-meter f.m. in the Alamogordo area working through the repeater. Several in Roswell are on that repeater. 14 mobiles in Albuquerque are on f.m. A repeater is to go up in the Manzanos soon, according to K5CCQ. Approximately 30 more are on f.m. in the Santa Fe area.

NMRRTN	Mon.-Fri.	3.838 Mc.	1800 MDT
PON	Sat.-Sun.	3.838 Mc.	1900 MDT
Breakfast Club	Daily	3.838 Mc.	0630 MDT

What are the others? Write your SCM. Support your local nets. Traffic: K5DAB 87, WA5RBU 48, WA5LFX 33, W5BNY 22, WA5JNC 13, WA5MCX 13, W5NUI 5, W5BWV 4, WA5MIY 1.

UTAH—SCM, Gerald F. Warner, W7VSS—SEC: W7WKF. RM: W7OCX. Traffic nets:

BUN	Daily	7272 kc.	1830Z
UARN	Sat.-Sun.	3987.5 kc.	1400Z
URN	Mon. through Fri.	146.2-146.8 Mc.	0030Z

After a great summer season of hamfests and steak fry outings, most Utah radio clubs are back in full swing with fall activities. K7RAJ is back at BYU and reports for traffic-handling duties at W7OHR. WA7EVO was the high scoring Utah station in the '67 New York State QSO Party. K7HEN has left Utah for duty with the Air Force. WA7IAW reports he is in business on 6 meters with new equipment. Would you like an active part in the Amateur Radio Public Service Corps? Your SEC, EC, RO or Net Manager would like to hear from you. Traffic: W7LQE 244, W7OCX 124, K7RAJ 105, WA7ARK 4.

WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: W7YWE. RM: WA7CLF. PAMs: W7TZK, K7SLM. OBSs: W7TZK, K7SLM, K7NQX. Nets: Pony Express, Sun. at 0830 on 3920; YO, daily at 1830 on 3610; Jackalope, Mon. through Sat. at 1215 on 7255, Wx Net, 0630 Mon. through Sat. on 3920. For the Casper hams: K7TAQ has a pretty complete supply of ARRL Operating Aids if you need any. All hams attending the University are asked to contact WA7EGK to help get a club and station started. WA7BDI has been doing a fine job handling traffic—mobile. W7CRP should have his rig on the air by now. The WIMU Hamfest sponsored this year by Wyoming, was a great success. All of you who want to increase your code speed and learn about handling traffic, check into the YO Net. The NCS will go your speed. Traffic: K7NQX 687, WA7CLF 116, K7KSA 75, W7TZK 62, WA7AJP 40, WA7BPO 36, K7-VWA 29, K7SLM 26, W7NKR 25, K7SDD 23, WA7EDC 17, WA7EGK 14, WA7DNZ 12, W7VJI 12, K7POX 10, W7HTL 8, K7QJW 8, WA7HAB 7, W7CQP 6, WA7BDI 5, K7YPT 4, W7AEC 2.

SOUTHEASTERN DIVISION

ALABAMA—SCM, Edward L. Stone, K4WHW—Asst. SCM/PAM: Sybil M. Holley, WA4EEC. SEC: W4FPI.

RM: WA4EXA. Congratulations to the Muscle Shoals ARC on the fine hamfest at Florence. WA4YDR, of Mobile, was the high Alabama station in the 1967 New York QSO Party. Your SCM enjoyed visiting with the Tuscaloosa, Mobile and Florence Clubs in August. All operators are reminded to get set for the Annual SS Contest in November. Let's have some real competition in the section this year. The PAM and RM awards will be given to the individual high scoring stations in the phone and c.w. divisions. The SCM award will go to the high scoring club. WA4UXC is now the proud holder of a CAN certificate. WA4EEC has a new pair of 4-400s. V.h.f. activity is progressing nicely in the Tri-Cities and in Macon County. WA4YYV is a new OPS and NM of AENT. K4KJD is now an OO. WA4ZDW, now living in Florence with a new bride, will be back on portable soon. Thanks for the Form 1 reports; we need them by the 5th of each month. Traffic: (Aug.) WA4FYO 345, K4AOZ 180, WA4UXC 160, W4FVY 147, WB4DCR 75, WA4EEC 68, K4BSK 61, K4NUW 57, K4WHW 52, WB4CYU 39, WB4AYV 29, WB4BLX 26, WA4YYV 26, K4GXS 22, WA4VUG 22, WA4EXB 16, K4UPL 16, WB4BAS 14, WB4CII 14, W4MKU 14, WA4PIZ 14, WA4ROP 14, W4DGH 12, WB4EKJ 11, K4UUC 9, WA4VEK 9, W4YPC 9, WB4DIN 8, K4KJD 7, WA4YOP 7, W4YRM 5, K4EAO 4, W4FPI 4, WA4WLD 4, W4LYJ 2, K4WOP 2, WA4AZC 1. (July) WA4YUG 40, K4HJX 38, WB4DIN 27, WB4BAS 21, WA4AKA 18, W4YPC 6, WB4EYZ 3, WA4WLD 2.

CANAL ZONE—Acting SCM, Russell E. Oberholtzer, KZ5OB—SEC: KZ5MV. RM: KZ5FX. KZ5MV is back from a stateside vacation with a new Galaxy Mark 2 mounted in a new 1967 Plymouth. KZ5FG is back among the actives with a new NC-200 and a TA-33 Jr. KZ5FH is back in operation on 20 meters at a new QTH. The Atlantic-side Civil Defense Amateur Radio station is being reactivated. Practice drills are being planned. The Crossroads Amateur Radio Club Net again meets every Tue. at 7:00 P.M. EST on 28.9 Mc. Welcome to new KZ5s: KZ5AC, KZ5AN, and KZ5KC. Traffic: KZ5SF 366, KZ5OA 119, KZ5WR 32, KZ5AD 20, KZ5AJ 20, KZ5FN 18, KZ5OB 15, KZ5JC 12, KZ5FX 7.

EASTERN FLORIDA—SCM, Jesse H. Morris, W4MVB—SEC: W4IYT. Asst. SEC: W4FP. RM C.W.: W4ILE. RM RTTY: W4RWM. PAM S.S.B.: W4OGX. PAM 40M: W4SDR. PAM 75M: W4TUB. V.H.F. PAM: WA4BMC. The Florida ARPSC has just completed a very successful operation in cooperation with the Florida American Automobile Association. The operation was headed by K4KRG, located in the AAA headquarters at Orlando. Stations from all over the state gathered traffic and other information for AAA Headquarters in Orlando which then transmitted bulletins throughout the state. The operation, called BEBA (Bring 'em Back Alive), had good participation among Florida amateurs. Western Florida SEC W4IKB, as well as Eastern Florida Asst. SEC W4FP, assisted in the operation which took place over the Labor Day weekend. QFN welcomes new members W7BNR/4, WB4DHZ, WB4GYX, WA4IIF and WB3WWH/4. The Gator Net has two new net controls in WA4IJH AND K4HQK. K4EIX and his XYL have a new baby girl. Another nice report was received from WN4FLW. WA8ICZ is now WB4EHR in Lake Worth. Bob worked thirty-three states on 6 this past summer. WA4LCO was high scoring E. Fla. station in the New York State QSO Party. We regret to announce that K4BY became a Silent Key on Sept. 1. Traffic: (Aug.) WA4BMC 471, WB4AIW 262, WA4SCK 255, WA4NEV 223, W4ILE 196, W4SDR 93, W4AKB 84, W4MVB 78, WB4DSP 76, W4YPX 71, K4QCG 64, WA4IJH 63, W4IAD 62, WA4OHO 59, W4SMK 59, W4VDC 59, WA4HDH 53, WA4TWD 53, K4DAX 48, W4SME 46, W4EHW 45, WA4CIQ 42, W4GUJ 42, K4COO 36, W4OGX 36, W4TRS 35, WA4YII 34, W4PBK 32, W4NGR 30, WA4BGW 29, WA4NBE 29, WA4WOW 27, W4KHY 25, WA4PWF 25, W4HQK 23, W4KRC 23, WB2WWH/4 22, W4DVO 21, K4LPS 21, WA4EYU 19, W4IYT 18, W4WHF 16, W4CWI 13, W4IE 13, W4FDZ 12, K4DSN 11, WA4MOL 11, W4GDK 10, K4IEX 9, K4BLM 7, W4TJM 7, WB4ADN 6, WA4FJA 4, K4SJH 3, W4VPQ 3, WN4FLW 2. (July) W4BKC 22, W4IYT 13.

GEORGIA—SCM, Howard L. Schonher, W4RZL—Asst. SCM: James W. Parker, Sr., W4KGP. SEC: W4DDY. RM: W4CZN. PAM: K4PKK. New officers of the Georgia Cracker Radio Club are WA4URI, pres.; WA4IQU, secy.-treas.; W4PCF, vice-pres.; K4JYC, historian. New officers of the Atlanta Radio Club are WA4MDT, pres.; WB4EPI, vice-pres.; WB4CMZ, secy.; WA4MZI, treas.; W4WKP, act. mgr.; WN4FUL, editor. W4YWX was high Georgia station in the N.Y. QSO Party. He also was high for out-of-state honors. W4HWY was active in the Illinois and S.C. QSO Parties. He is now a Charter Life Member of ARRL. WA4YPB has a new GSB-100. K4UVD is on 6-meter s.s.b. WB4FMY has a new TR-106. K4HQI has a Globe Hi-Bander.

WA4NED helped handle emergency traffic from South America. Look for the Georgia Post office Net on 3990 each Sun. at 0900 EDST. K4FLR is net mgr. Any amateur is welcome to check in and is eligible to become a member of National PON. Let's help it grow. GSN 3595 0000 & 0200 GMT 60 sess. 408 QNI 177 QTC. WB4EMF now is an MARS member. K4AKP is back in Atlanta. W4UVP is operating from Tucker. The ASTRO set up an exhibit at a local shopping center and originated 250 messages. W4FQX QRD Detroit. Traffic: W4FOE 326,W4CZN 191. WA4RAV 104, WB4EMF 76, WA4WQU 76, W4FDN 51, WA4LLI 30, W4PIM 28, K4BAI 24, W4UVP/4 24, WB4AJR 23, WA4JES 23, W4DDY 16, K4FLR 16, W4FQX 11, K4AJF 8, W4RZL 3.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4IKB. PAM: WA4ZGI. RM: W4BVE. Section net reports:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*
WFPN	3957 kc.	2200Z	Daily	31	534	61
QFN	3651 kc.	2230/0200Z	"	62	—	—

Many West Fla. hams took part in the AAA Bring 'em Back Alive program. Special thanks go to W4IKB and WA4DED. Pensacola: WB4DHZ and W7BNR/4 QNI QFN when not QRL football practice! K4LAN QNIs WFPN regularly and serves as liaison to QFN. EC W4NOG kept a Pensacola outlet on the BEBA Net throughout the Labor Day week end. Assistants included WA4BYI, WA4WAR and K4LAN. Fort Walton: W5BJG got a second call for his Fla. QTH—WB4GYX. W4UXW now has 2-meter f.m. at home, at the store and in the car. WB4ENK worked several Europeans on RTTY. Panama City: W4JJ went mobile with an HW-12, with the aid of WA4JIM. Chipley: WB4FLK was appointed OPS. WA4TUO, brother of WA4SRR, is operating from here for several months. WB4ADL was a recent visitor from Jacksonville. Port St. Joe: W4WEB is getting on 2-meter f.m. W4MXN makes regular QSOs with WB4AWU in Tallahassee on 145.2 Mc. Tallahassee: WA4EAO is Acting EC for Jefferson County. Madison: WA4GHE had Lafayette added to his EC responsibility. W4RDQ expects to be back on the air shortly. Traffic: (Aug.) K4VFY 345, K4BSS/4 196, WA4JIM 99, W4IKB 61, W4BVE 57, W7BNR/4 32, W5BJG/4 3. (July) WB4FLK 8.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Floyd C. Colvar, W7FKK—PAM: W7CAF. RM: K7NHL. OOs: K7RUR, K7OIX and W7CAL. W7IZ/KH6 had a wonderful two months vacation at Kailua, Oahu, Hawaii. He had many fine contacts with his old friends on the Mainland. Endorsement: K7NHL as RM for TWN. The present schedule of OBS K7MTZ is Tue., Thur. and Sat. on 7.080 Mc. at 0100 GMT and 3.878 Mc. at 0200 GMT. W7CAL reports that he has his 160-meter rig ready to put on the air, but the Salt River trout have been taking their toll of his ham radio time. OBS WA7GOG has been receiving fine reports on its telecasts. K7RUR had a fine time during the summer with his trailer and mobile rig, operating from the cool mountains and getting out of the valley's heat. Traffic: (Aug.) K7NHL 171, K7MTZ 59, W7FKK 12, W7DQS 6. (July) K7NHL 168.

LOS ANGELES—SCM, Donald R. Etheredge, K6UMV—SEC: K6QPH. Congratulations are in order for W6GYH and WB6BBO on earning BPL certificates! A new club has been formed in the SFV known as the West Valley ARC with WB6KPN, prexy.; WB6UHF, vice-pres.; WB6TYW, secy.; K2GMY/6, treas. W6PCP has been doing an excellent job as OO and has added an HW-22 to his equipment collection. W6KXM took a trip to Europe during the summer. W6AQP got the Swan 500 and ZL1MN the Invader 2000 at the Southwestern/Pacific Division Convention in Sept. WN6VVF, WN6WUI, WN6YDH and WN6YEW are checking in on CNN (Calif. Novice Net) which meets on 3710 kc. at 0300Z daily. WB6GFD has remodeled his operating position. Look forward to the *LA Section Bulletin* which will be sent all appointees and clubs in the L.A. section. WB6HGU was high scorer in the N.Y. State QSO Party. K5ANS/6 is now back in 5-Land traffic circles. MCW code practice on the 6- and 2-meter bands by regular schedule is in the planning stages to aid those amateurs with v.h.f.-only gear to improve their c.w. speeds in the L.A. section. WA6WKF worked his first XE on 50 Mc. WB6SCK is a new ORS in the section. W6TXJ recently was in the hospital but is recovering nicely. Lee's wife now holds a Novice license, too! K6QPH visited Mt. Whitney but had no rig along. W6ORS was found playing bingo in the ladies' session at the Sept. ARRL Convention. K6BPC handled several messages from KL7AVD following the summer Alaska flood. Listen to W6MLZ's program "Calling CQ" each Sat. at 1030 local time on KPFK, 90.7 Mc. F.M. All are invited to join AREC and/or traffic nets in the section. Traffic: (Aug.) W6GYH 1036, WB6BBO 795, W6QAE 250, WA6KZI 218,

WB6GGL 214, K6CDW 180, W6FD 129, W6DSC 117, WB6TMC 114, WB6SCK 75, WB6PKA 72, W6OEO 56, W6BHG 46, K6BPC 44, K6QPH 42, WA6WKF 40, K5-ANS/6 37, K6ASK 37, WB6KGK 33, WB6OLD 26, WB6-AEL 24, W6DQX 24, K6KA 24, K6LJ 20, W6AM 16, W6-PCP 16, W6HUJ 15, WB6QMF 10, K6UMV 9, W6ORS 8, WB6SLG 6, W6DGH 5, K6HSQ 5, W6USY 5, W6TN 3, WB6KIL 2, W6RCV 2, W6LVQ 1, WB6OUD 1, W6YRA 1. (July) WA6KZI 235.

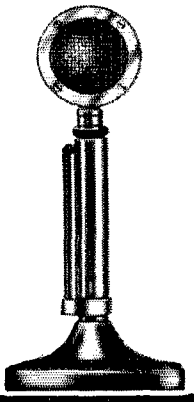
ORANGE—SCM, Roy R. Maxson, W6DEY—KØGJD/6 was the high scoring Orange station in the 1967 New York State QSO Party per K2UFT, Contest Chairman. WB6TIF, ORS, has CE2OA on the air working TI8LH and handling p.p. WA6ROF, RM, gave an ARPSC presentation Sept. 7 at the Autonetics RC. WB6MWL, OVS, advises the AREC 6-Meter Net meets Wed. at 7:30 P.M. on 50.4 Mc. and needs more check-ins. WN6WKN moved to Westover AFB. WB6-TYZ has the rig fixed and is back on the air. W6FB worked Revilla Gigedo, Andorra and St. Brandon to bring his total to 217. He also keeps weekly skeds with DUIFH. WB6UTC, ORS, spends the majority of his out-of-net time working and helping Novices in the 3.7-, 7-, 15- and 21-Mc. bands. WB6JFO, EC, needs a volunteer for 6-meter OBS. K8PWE, operator at K6MCA, MCB 29 Palms, advises they set up a booth at Base Carnival and boosted their originated message totals. Traffic: WB6JFO 300, WA6ROF 294, K6MCA 255, K6IBI 205, WB6UTC 143, WA6PTU 140, WA6QZA 123, WB6TIF 92, W6WRJ 52, WB6TYZ 40, K6IME 31, WB6MWL 8, WN6WKN 7, WB6VQE 4, WB6AKR 1.

SAN DIEGO—SCM, Don Stansifer, W6LRU/WA6-VUI—W1ICP, from ARRL Headquarters, spoke in San Diego Sept. 11 under the sponsorship of the San Diego Council. K6YRF enjoyed Expo 67 this past summer. W6-CAE and family visited Colorado. Former San Diegian K6LPG now lives near Fresno. A number of area hams enjoyed the joint Pacific-Southwestern Division Convention in Los Angeles. The 1968 Division Convention is scheduled for Phoenix, and the 1969 one for San Diego. Area amateurs interested in a c.w. traffic net are reminded that the second session of SCN meets each night of the week at 9:30 P.M. on 3600 kc., and is a slow-speed net used primarily for training. All visitors are welcome. Learn the QN signals and join the fun. The Sept. meeting of the San Diego DX Club was held at the home of W6LRU and hosted by W6CHV. W6ID continues his good work on the Intruder Watch. W6ECP is now active on both SCN and RN6. Don't forget the ARRL SS Nov. 11-13 (phone) and Nov. 18-20 (c.w.) Traffic: K6-BPI 9296, W6VNQ 680, W6EOT 535, W6BGF 239, W6-QJW 228, WB6GMM 103, W6ECP 72, WB6SQZ 5, W6-LRU 2, WA6TFC 2.

SANTA BARBARA—SCM, Cecil D. Hinson, WA6-OKN—SEC: K6GV. The Mission Trail Net has 2 active members in the Simi Valley. K6EVQ and W6ORW not only check in, they get out the monthly *Blazer*. The Ventura County ARC again is conducting code classes and anyone interested should contact K6LSA or WA6-COT in Oxnard. Regular meetings are held the 2nd Fri. of each month at the Oxnard Recreation Center. W6-OED, in Lompoc, is checking in on three 80-meter nets and reports that there is c.d. activity on 80 every Mon. at 7:30 to 8:00 P.M. Active Novices who have reported via MARS are WN6VKN and WN6WKU, Los Osos: WN6WCK, Santa Barbara, and WN6WFP, Thousand Oaks. K6LOV got the news to a proud daddy of a baby boy in Viet Nam within one hour. K6GV, our new SEC, has announced the following appointments: WB6LNF, Simi; W6RJM, Fillmore; WB6RII, Thousand Oaks; WB6PGK, Morro Bay as EC's. The Estero ARC meets in Morro Bay the 2nd Thurs. of each month. WB6PGK is pres. and W6JTA vice-pres. The club frequency is 145.1 Mc. W6TOE and K6GV recently acquired new KWM-2s. Traffic: W6OED 8.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. L. Harbin, W5BNG—Asst. SCM: E. C. Pool, W5NFO. SEC: W5PYI. PAM: W5BOO. RM: W5LR. The announcement by the FCC of the new licensing rules should put more interest and activity into the operation on the ham bands. I have heard plenty of comment, both pro and con, and personally I think that a better solution could not have been made. The FCC has left it up to the amateurs to police their own bands which, in my opinion, is as it should be. The job of the OO will be increased and will require more exacting frequency measurements. The would-be amateur that has been waiting for a decision can now go ahead knowing what to expect. After several years of hard work the LTV Radio Club now has a fine building, air-conditioned and paneled, for its club room. The club also will have space and plenty of utility poles available for an antenna farm. The club station is now set up for operation in the amateur bands as well as the citizen's band. All interested employees are invited to participate in the club's activities. W5TUU is pres.; W5ONQ is trustee. Some of the KC Club members, also flying enthusiasts, hopped into their light



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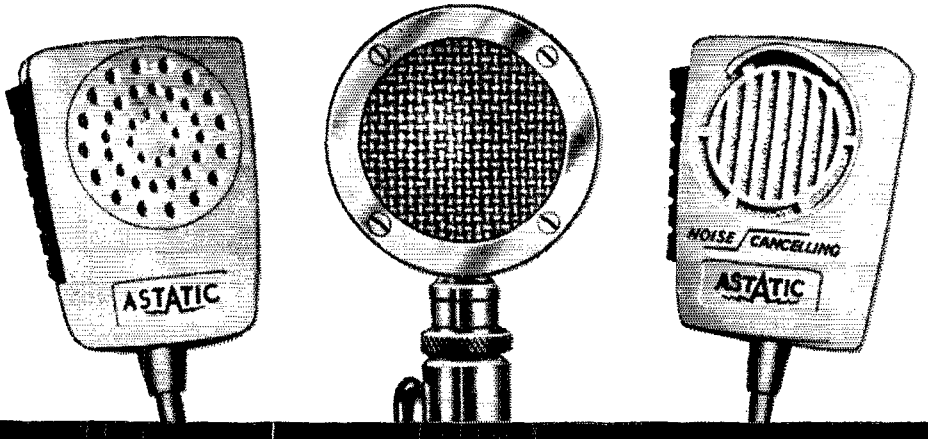

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planes and flew to Expo 67 at Montreal, Canada, the first part of July. Contact between the four planes was maintained by use of 2-meter equipment. Those making the flight were W5YUO, K5BLP, WA5KTO, WA5QEA, WA5GUB, WA5HWW and two hams-to-be, Bill and Juanita Larson. WN5RAI passed the General Class exam. Traffic: WA5AGH 67, W5PBN 67, K5DBJ 65, WA5EVS 38.

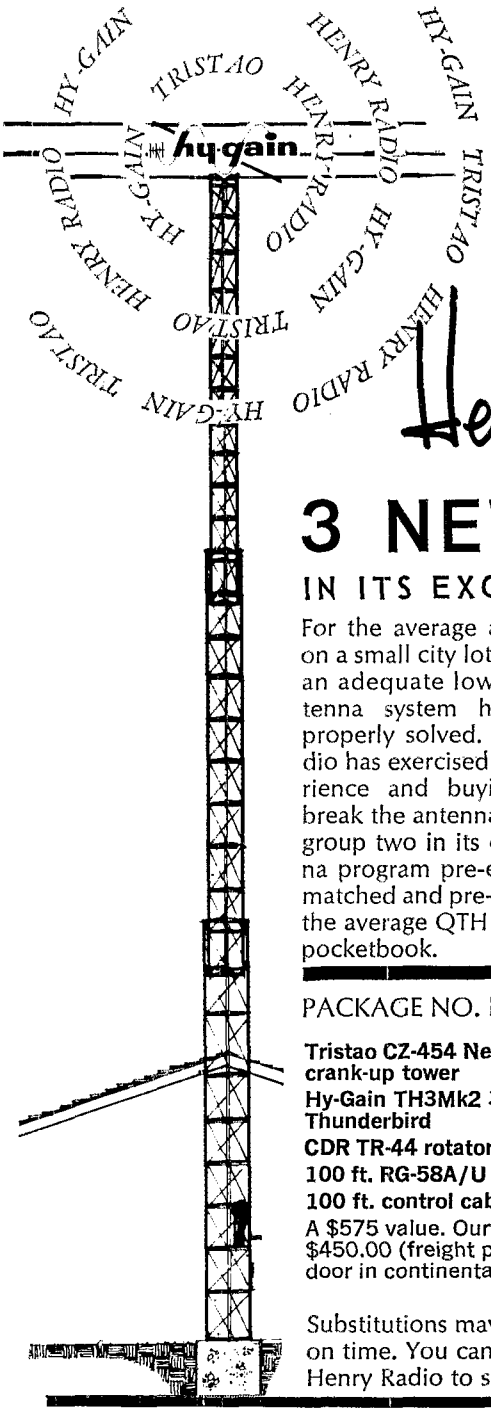
OKLAHOMA—SCM, Daniel B. Prater, K5CAY—Asst. SCM: Sam Whitley, W5WAX. SEC: K5ZCJ. RM: W5QMJ. PAM-75: W5PML. WA5KCL is a new OBS and will transmit Bulletins three times a day on 146.34 Mc., which is the Tulsa repeater input frequency. K5VTA was high scorer from Oklahoma in the New York QSO Party. WA5NTI is mobile now with a new SBE-34. K5WPP, NCS for STFN, is off the air with a burned-out transmitter power supply. Oklahoma County EC, WA5AOB, has started holding the AREC Net every Sun. at 1600 CDT. W5UYQ, our Vice-Director, spent several days in the hospital and is home recovering. The Oklahoma Central V.H.F. Club will have a display at the State Fair in Oklahoma City again this year. K5ZCJ has accepted a position on the board of directors for the Red Cross at Tulsa. He is the disaster chairman for the Red Cross. The Red Cross has a new 90-ft. communications tower at its new location. WA5QYE is working on a repeater for the Enid area operating on 146.34 and 146.94 Mc. K5KHA is using a T-4X now. WA5QGD is on f.m. with an 80-D and WA5OUF is mobile f.m. with a Link unit. WA5KZA, Pawnee County EC, is back from Washington, D.C., and active in traffic nets again. W5QMJ, RM for Oklahoma, is mobile with an 80-D. The OLZ Traffic Net reports 19 sessions, QNI 57, QTC 61; SSZ, 23 sessions, QNI 52, QTC 92; Sooner Traffic Net, QNI 611, QTC 140. Traffic: K5TEY 1019, WA5IMO 79, W5PML 31, W5MFX 22, W5OLB 21, WA5BTQ 14, WA5NTI 12, WA5OHX 7, K5WPP 6, W5RHC 4.

SOUTHERN TEXAS—SCM, G. D. Jerry Sears, W5AIR—SEC: K5QQG. PAM: W5KLV. RM: W5EZY. South Texas emergency nets were on alert while three hurricanes were off the Southern U.S. Coast. ORS W5ABQ advises that K5KRZ and others also report getting back on c.w. "where the real ops are." K1ERI/5 is moving to Waco. W5ABQ sends amateur radiograms to get off the unrequested mailing lists—says results about 50/50. WA5QKE completed one year's operation Aug. 31. He has been very active with traffic his main interest and DX running a good second. He now is going for the new Advanced and then the Extra First Class licenses. K2UFT reports that K2EIU/5, now at San Antonio, was high scoring Southern Texas station in the 1967 New York State QSO Party. EC W5TFW reports the AREC Training Net is on the RACES Net frequency the 1st Mon. of each month. According to W5KR and the *Southmost ARC Bulletin* W5KFI is the new Asst. EC for Cameron County. WA5GZX has a new Galaxy V Mark II and has been busy with traffic. He will operate W5AC at Texas A & M on TFX and RN5. W5GFI is going back to school at WACO and already has an antenna up for portable operation. *Note:* There have been three or four mobile rigs stolen from automobiles in the Houston Area recently. Mobile operators should keep their cars locked. An alarm can be rigged at very little expense. Be sure to keep a record of serial numbers and put identifying marks on your rig where only you will know. The TEX Traffic Net is going fine on 3770 kc. at 1900 and 2200 local time. TEX reports 62 sessions, 147 QTC. Your location is needed for fast traffic delivery. Keep an SASE at your QSL Bureau at all times if you expect to get these QSL cards. Traffic: WA5QKE 392, WA5GZX 230, WA5MBC 208, K5HZR 128, K2EIU/5 111, W5KLV 81, W5ATR 76, W5BGE 76, W5EZY 46, W5ABQ 41, K5HMF 24, W5TFW 23, W5AQN 20, WA5ODA 9, K5WYN 3.

CANADIAN DIVISION

ALBERTA—SCM, Harry Harrold, VE6TG—SEC: VE6FK. PAM APSN: VE6ADS. ECs: VE6SA, VE6SS, VE6XC, VE6PL, VE6AFQ. ORSs: VE6BR, VE6ATH, VE6ATG. OPSs: VE6HM, VE6SS, VE6ADS. OOs: VE6HM, VE6TY. At the present time with the late report coming that I should have had five days ago, it leaves me with the feeling that I am not doing the job. Therefore, it is time that this section elected a new SCM as I have nothing to report this month. Traffic: VE6ATH 133, VE6HM 81, VE6XC 23, VE6FK 15, VE6FS 6, VE6SS 3, VE6WN 2.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB—The BCARA Picnic was enjoyed very much. The closing date for application for motor vehicle license plates has passed. Those who procrastinated must now wait till 1969. So many found the fifty cents a nuisance to convert to a money order and to meet the expenses. One dollar can easily be tucked into an envelope with the card for 1969. VE7KA's son was seriously injured in a bicycle accident. VE7BWH reports his car had some difficulties while at the International Hamfest with fire,



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part of the fuel pump falling into the crankcase and the wheel falling off. BCEN 3650 should be in full gear this fall. VE7AAF has reapplied for ORS appointment. VE7BFL has just finished five years and made his BSC at the UBC. Our RM, VE7BLS, has returned from three weeks in the U.K. VE7BAV reports from the rain bowl of Northern Vancouver Island, Port McNeil, a new community and a brand new junior-secondary school teaching math and physics. He blew the DX-35 but received ARRL 20 w.p.m. and WAS certificates. VE7IR, who has been 3V8, VK2IQ, VP7DO/mm, ZI23-WC, VK6IR/6 and Z11BFR, now is being issued 9M2IR, will be active and also sign 9M2IR/9V1 and also has applied for an 8F call. VE7QQ is now in Smithers and may be active soon. Traffic: (Aug.) VE7BHH 137, VE7-BFL 15, BE7BLS 8, VE7AC 6. (July) VE7BHH 116, VE7BLS 1.

MANITOBA—SCM, J. Thomas Stacey, WE4JT—VE4HI is active again on 2-meter f.m. and has his mobile and base station completed and was active during the Paraplegic Games in Winnipeg. VE4HK/m and VE4-KF provided emergency communications on 2-meter f.m. to summon a police ambulance for a serious accident. VE4UM, the UMARS station has new antennas up for 80 and 40 and is completing new quarters in the new Students Union Building at U. of M. VE4NE has portable antennas for 80 through 10 and with the help of VE4FO tested out his portable generator for AREC work in the Dauphin area. VE4DP, at Ste. Rose, has been checking the c.w. net and the phone net welcomed W4ILF/VE4, operating from Clear Lake. VE4LG has returned from Toronto and reports FB operating in OQN with 70 watts and a BC-453 with his antenna six feet off the ground. Visitors through the local hamshack were K4RCE and W8MMG. MTN now operates on its frequency, 3615 kc. Net reports: Phone Net, sessions 31, QNI 403, QTC 9; C.W. Net, sessions 30, QNI 97, QTC 50. Now is the time to give serious thought to supporting one of the traffic nets or signing up with the AREC for emergency work. PAM VE4EX, RM VE4EI and SEC VE4JC would be pleased to hear from you. The SCM would also welcome activity reports. A hamgram or postcard will bring report forms. Traffic: (Aug.) VE4JT 103, VE4NE 45, VE4GN 25, VE4LG 18, VE4LG/3 18, VE4RW 10, VE4AP 7, VE4QJ 6, VE4CR 5, VE4JA 4, VE4NN 2, VE4DQ 1. (July) VE4LG 54.

MARITIME—SCM, J. Harley Grimmer, VE1MX—Asst. SCM: R. P. Thorne, VO1EI. SEC: VE1HJ. Congratulations to the MAARC on its fine efforts in staging the Maritime Convention. Everyone present had a most enjoyable time and it was a pleasure meeting so many of you there. Many awards were made at the convention and some of these were: The VE1GR Trophy, VE1FQ: the Brown-Holder DX Trophy, VE1ARM; the Dr. Leo Doucette Plaque, VE1RT. The oldest amateur present was VE1LG, who celebrated his 92nd birthday at the convention. A special presentation was made to VE1FQ through the cooperation of the amateur radio organizations in the VE1 area in appreciation of his 30 years service as VE1 QSL Manager. It was in the form of an NCX-3 and power supply. Deepest sympathy is extended to the family of VE1AV, who passed away recently. Amateurs recently transferred to Goose Bay include WAØSDP, WAØSCM, WAØQMW, WA9CMR and WA4KUK. VO2KR is a new call in Sagalek. VO2NA is retiring soon and will be heading for the Halifax area. VO2AH and VO2AF have returned to the U.K. APN: sessions 31, QNI 219, QTC 16. Traffic: VE1AMR 17, VE1ARB 16, VE1AAX 8.

QUEBEC—SCM, J. W. Ibey, VE2OJ—SEC: VE2-ALE. RM: VE2DR. PAMs: VE2BWL, VE2AGQ. VE2-BYN was a great help during the Regional Canoe Races. VE2IL was high scorer in the N.Y. State QSO Party. VE2CK gave a very interesting talk at the Maritime Section Convention. Canadian Vice-Director VE2BK chaired the ARRL Forum and we chatted with VE2HI and VE2KJ, who also attended. VE2AGQ has a new s.s.b. rig and we hope he won't forsake his excellent c.w. VE2BSZ is a new EC in Verdun. VE2-BU, VE2AGQ, VE2ZA and VE2DEX performed a wonderful service when they visited the National Boy Scout Camp at Lac L'Achigan. Scouts from across Canada and Bermuda were treated to a demonstration of amateur radio at work and VE2AGQ gave an interesting presentation on amateur radio activities. Phone stations interested in traffic, please call VE2BWL. Guy will be pleased to hear from you. May I repeat that I am interested in getting reports for this column in the French language from anyone who may want to do it either regularly or occasionally. We congratulate new Advanced Class licensees VE2ALE and VE2BXW and welcome new hams VE2AVP (XYL), VE2APT and VE2DGT. Remember the Quebec AREC Net is now on at 6:00 local time each Sun. on 3780 kc. Traffic: VE2DR 155, VE2DCW 116, VE2BRD 86, VE2BGJ 71, VE2AJD 52, VE2OJ 50, VE2BVY 36, VE2AGQ 15, VE2ALE 13, VE2XPO 13, VE2EC 7. QST

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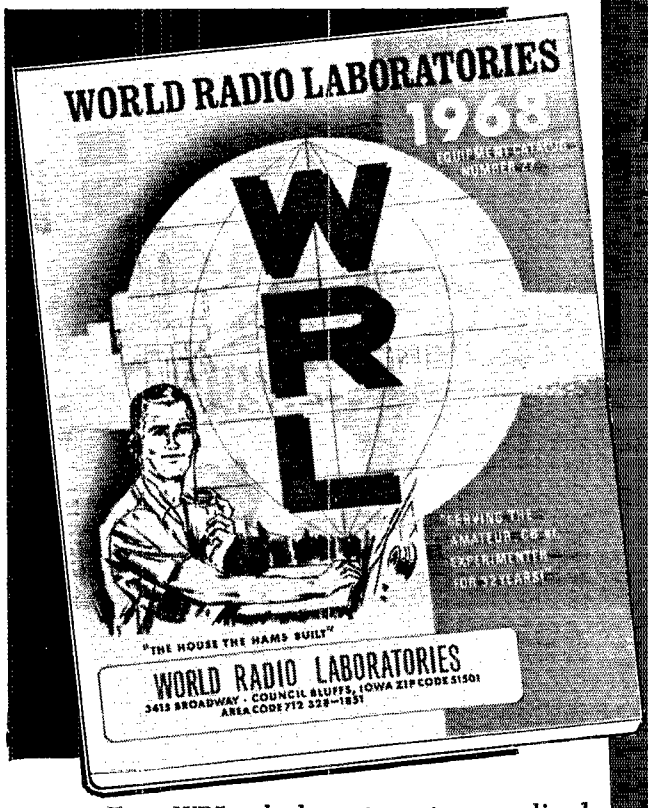

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A Simple and Inexpensive Approach

(Continued from page 44)

from the junk box. The first circuit tried by the writer utilized half-wave rectification and a two-pole control switch; however, it was scrapped because large amounts of capacitance were needed to completely eliminate chatter and hum from the relays and because it was necessary to mount two filter capacitors in the relay box where they would be difficult to replace in case of component failure. The present circuit (Fig. 7) uses a full-wave bridge rectifier and a three-pole control switch; it requires less filter capacitance than a half-wave rectifier and it allows the two capacitors in the remote unit to be replaced by a single capacitor in the control box.

The circuit is designed to use a two-wire control cable (household extension cord) rather than the more expensive three-wire cord. However, depending which part of the circuit is grounded, if any, either control lead can be grounded; thus the coax shield or the tower itself can be utilized as the ground return. Although this procedure is not recommended, it can be successfully employed where single wire control operation is imperative.

The relays used should be capable of continuous service with a pilot light serving as a reminder to return the switch to the off or no voltage position, when the big switch is pulled for the evening. The antenna for the band most frequently used should be the antenna that gets connected to the input receptacle when the control unit is turned off.

Miscellany

Due to the general layout of the quad, there is a tendency for the elements to vibrate to some extent. This vibration can be eliminated by using a light-weight guy, such as high-test fishing line, tied from the element ends to a point near the boom center (Fig. 3).

The elements should all be strung offsetting each other, with the largest element always on the outside of the spreaders. Since a slight bowing of the spreaders will generally occur towards the largest element, the guying, as mentioned above, will correct this situation by adding a certain amount of static strength to each element.

The simplest method of connecting the boom to the mast is to utilize a plate and U bolts as shown in Fig. 8.

Although steel conduit was used by the author, the lighter and more resilient spreaders of aluminum, fiberglass or bamboo should be the first choice in areas where high winds are prevalent.

(Continued on page 150)

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1 AMP SILICON RECTIFIERS

PIV	Sale	PIV	Sale	PIV	Sale
50	☐ 5¢	800	☐ 23¢	1800	☐ 99¢
100	☐ 7¢	1000	☐ 40¢	2000	☐ 1.50
200	☐ 9¢	1200	☐ 59¢	3000	☐ 1.90
400	☐ 11¢	1400	☐ 69¢	4000	☐ 2.50
600	☐ 19¢	1600	☐ 89¢		

"GLASS" ONE AMP

PRV may be exceeded without the rectifier breaking down.

PIV	Sale	PIV	Sale
50	☐ 5¢	600	☐ 19¢
100	☐ 7¢	800	☐ 29¢
200	☐ 9¢	1000	☐ 45¢
400	☐ 13¢	1200	☐ 59¢

1 AMP

Actual Size →

MICROMINIATURE SILICON RECTIFIERS

PIV	Sale	PIV	Sale
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200	☐ 9¢	800	☐ 29¢
400	☐ 12¢	1000	☐ 45¢

12 AMP Rectifiers

PRV	Sale
50	☐ 22¢
100	☐ 40¢
200	☐ 65¢

24 volt wt. 5 lbs.
3 amp. DC
ARC-5 ☐ power supplies! in 117 VAC./60
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or your money back.

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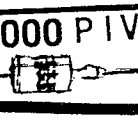

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☐ 39¢ 3 For $1

5 WATT "PELLET" EPOXY POWER TRANSISTORS

with heat sink.
RATINGS:
3 AMP; 250 HFE ★
★ Max.

I strongly hope that the prospective quad builder can profit, at least in part, from this inexpensive approach to building quads. QST

Pioneer QSO Party

(Continued from page 86)

All bands and all emissions may be used; the same station may be worked on more than one band. On phone call "CQ Telephone Pioneers." On c.w. call "CQ TP." *Suggested Frequencies:* Phone, 3830, 3860; 3930, 3960; 7230, 7245; 14,255, 14,275; 21,320, 21,150; 28,670, 28,710 kc. C.w., 3640, 3660; 3740, 3755; 7060, 7080; 14,050, 14,070; 21,090, 21,150; 28,090, 28,140 kc. *Scoring:* One point for exchanging reports with another pioneer in any chapter. One point for exchanging reports with each different chapter. *Exchange:* date, chapter name, and number. *Reporting:* Send log extract showing date, time, QSO number to Joe Dugan, W2CML, 100 Central Ave., Kearny, N.J. 07032 not later than January 6, 1968.

Gimmicks and Gadgets

(Continued from page 41)

The ideal arrangement would be perfect isolation between the sections of the attenuator. With the style of construction used, this is neither possible nor practical. Again, this kind of perfection is unnecessary for the application described here. The writer tested this circuit in the broadcast band, at 3.8 Mc., 7 Mc., 14 Mc. and 30 Mc. The performance was quite uniform across this range, giving the relative readings listed in Fig. 1.

How It's Built

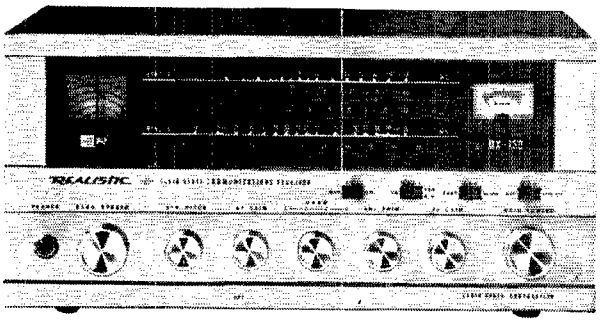
A 2¼ × 2¼ × 4-inch Minibox is used to house the attenuator. A smaller box would have worked as well but was not at hand when the project got under way. Although SO-239 coax fittings are used at J_1 and J_2, they are not necessary. There is no reason why phono connectors cannot be used, reducing the cost somewhat.

Any single-section rotary wafer switch can be used in this circuit. Since we are dealing with low-level signals in a low-impedance circuit and efficiency is of no consequence, phenolic insulation is ample. The ground bus, serving as a tie-point for the R_1 resistors, is connected between two solder lugs which have been mounted on the switch posts. These posts are common to the framework of the switch, providing a ground return to the chassis. All leads are kept as short as possible, to reduce inductance that might cause stray coupling. Wide strips of copper are used between the input and output jacks and the switch, as a further aid to the reduction of lead inductance.

Using the Attenuator

All that is necessary in connecting the attenuator in the circuit is to place it between the feed line and the input of the receiver. The coax connecting cables should be long enough to enable the operator to locate the attenuator box within easy reach. When strong signals are not present, the unit can be switched to the out (A) position and forgotten. The switch setting

(Continued on page 152)



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New, big, exciting, professional — the Realistic DX-150 obsoletes tube receivers and warm up, banishes forever your dependence on house current to stay in operation. For example: **the DX-150 will run 100 hours on 8 D-cells** if current fails, or isn't available, or on field day. Additionally, it will operate from a car's cigarette lighter or any other mobile or base 12VDC source! Of course a 117VAC power supply is built in. DX-150 is a husky brute: 14⅛ x 9¼ x 6½", with a massive silver extruded front panel, solid metal knobs, grey metal cabinet, 14 pounds of quality.

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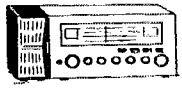
Priced Radio Shack's way (factory-to-you) the DX-150 saves you about $100 off traditional pricing methods. Yet it offers 11 front controls; dual power supply; 12¼" slide-rule dial in 5 colors; **continuous coverage** from 535KC through 30MC, including 160 through 10 meters; separate detector circuits for AM (diode) and SSB/CW (4-diode bridge); sensitivity good to 0.5μv at 30MC. Nobody **but nobody** but 44-year-old Radio Shack could have created this unique product for $119.95. You better believe it!

REALISTIC DX-150 CUSTOM ACCESSORIES



Exact-match external Voice-Frequency speaker cuts out built-in monitor, includes lead and plug. 20-1500: $7.95 (4 lbs.)

12VDC portable pack with all cables, plugs, 8-long-life batteries; includes plug-to-plug and plug-to-lighter cord sets. 20-1501: Only $7.95 (wt. 4 lbs. w/batteries)

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NEBRASKA — Omaha
NEW HAMPSHIRE — Manchester
NEW JERSEY — Pennsauken
NEW MEXICO — Albuquerque
NEW YORK — Albany, Binghamton, Buffalo, New York, Schenectady, Syracuse
OHIO — Cincinnati, Cleveland
OKLAHOMA — Oklahoma City, Tulsa
OREGON — Portland
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RHODE ISLAND — Providence, East Providence
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TEXAS — Abilene, Arlington, Austin, Brownsville, Corpus Christi, Dallas, Fort Worth, Houston, Lubbock, Midland, San Antonio, Sherman, Waco
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will depend upon the amount of attenuation required to lessen the effects of strong-signal interference.

Don't use this unit as a power attenuator between transmitters and amplifiers! It can handle a maximum power of only ½ watt before the resistors are damaged.—*WICER*

ARPSC

(Continued from page 75)

(S.C.); NTTN, TEX (Texas); BUN (Utah); VN, VSBN, VSN (Va.); WSN (Wash.); WVPN (W.Va.); BEN, WSBN (Wis.); APSN (Alta.); GBN, RPQ (Ont.-Que.).

[3] TCC functions performed not counted as sessions.

WA2GQZ sez the NLI problem on representation is becoming acute and there are no NYC stations reporting into 2RN. K3MVO reports a little gain on traffic and a return to 100% representation; lots of substitutes during the summer months and plenty of QRN. WB6BBO reminds that APO/FPO messages must contain the *zip code;* ARL numbered texts should only be spelled as on the form CD-3; and the fraction bar for portable stations should only be sent by portable stations. K7JHA sez much of the Fairbanks and Jamboree traffic was not handled by RN7; in fact, no Alaska representation. W8CHT has moved to a new antenna farm site; reports 8RN skeds shaken with the return of school but the best crew in years. W9QLW sez many thanks to all for their efforts; lets keep the good QNI record going. W0LGG reports good band conditions for August; good attendance but no new members. K7NHL sez that 40 meters is working out well. W9DYG reports a very fine month; shows what good conditions and more traffic can do for any good net. W6VNQ sez conditions still fighting PAN but the rate is up 50% over July; 14 Mc. is great for TCC skeds.

Transcontinental Corps: W3EML sez August was not one of the better months with the daily thunderstorms; traffic is down and the good operators have nothing to do. It seems that 85% of applicants come from the 2nd call area; he is reluctant to make TCC Eastern a one-call-area show. W9JUK reports a little improvement over last month and 4 extra skeds because of a few overloads; new call for W8FAW/0 is WA0SDC. W7DZX sez things have changed considerably in the last few months because of conditions; stations, times and frequencies all changed.

August TCC reports:

Area	*Functions*	*% Successful*	*Traffic*	*Out-of-Net Traffic*
Eastern.....	121	93.4	2402	941
Central.....	97	87.7	1715	835
Pacific.....	122	91.8	2406	1023
Summary...	340	91.2	6523	2799

August TCC roster: Eastern Area (W3EML, Dir.) *W1s* BJG EFW EMG NJM, *W2s* GKZ MTA SEI, *K2s* KTK RYH SSX, *WA2s* BLV UPC UWA, *WB2s* OHK RKK, UHZ, *W3s* EML NEM, K3MVO, *W4s* DVT NLC ZM, W8CHT, K8KMQ. *WA8s* CFJ, OCG PMN. Central Area (W9JUK, Dir.) W4OGG, *K4s* BSS/4 DZM, WA4WWT, WB4AIN/4, *W5s* KRX GHP, *W9s* CXY DYG JUK VAY, *WA9s* NPB RAK, *W0s* LCX TDR, *K0s* AEM YBD, *WA0s* LAW MLE SDC.

Other Net Reports

Net	*Sessions*	*Check-ins*	*Traffic*
Hit and Bounce.....31		360	665
20 Interstate.....22		400	2448
75 Interstate.....31		1103	596

(Continued on page 158)

SWAN **SWAN**

LOOK at your low Monthly Payment
AFTER JUST $5.00 DOWN

SWAN 350 80-10m Transceiver	(14.98)	$420.00
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117XC AC Supply w/spkr. in cabinet		95.00
14-117 12v DC Supply w/Cable		130.00
405X MARS Oscillator - less crystals		45.00
406B Small Phone Band VFO		75.00
410 Full-Coverage VFO		95.00
210 6 Meter VFO		120.00
VX-1 Plug-in VOX		35.00
SSB-2 Selectable Sideband kit for 350		18.00
22 Dual VFO Adaptor		25.00
100 kc Calibrator kit for 350		19.50
500 kc Calibrator kit for 250		19.50
RC-2 Mobile Remote Control kit		25.00
45 Swantenna – manual		65.00
55 Swantenna – Remote control		95.00
Custom Contour Bumper Mount		24.95
Kwik-On Antenna Connector		3.25

NOTE: Above are listed the "Standard - Everyday" Swan Products – Below are listed some Special Purpose items:

14X 12v DC Module/cable	$ 65.00
14XP As above, but Positive Ground	70.00
117X Basic 117v AC Supply ONLY	65.00
230X Basic 230v AC Supply ONLY	75.00
117 or 230vac Line Cord (specify)	5.00
8' Cable w/ plug (Supply to Transceiver)	3.00
Cabinet w/Speaker & AC Line Cord	30.00
230XC 230v AC Supply, speaker & cabinet	105.00
14-230 12v DC Supply w/230v Basic	140.00

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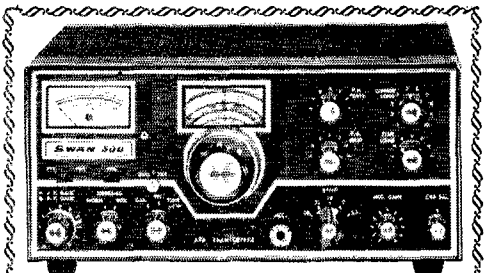

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I have the following to trade: (what's your deal?)

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City _____

State _____ Zip _____

☐ SEND YOUR NEW 1967 CATALOG.

The World Above 50 M.C.

(Continued from page 101)

220 Mc. was tested for m.s. unsuccessfully during the August Perseids by W1AZK, W8PT and WØEYE. The only thing heard was one sharp ping at W8PT from WØEYE. The 220 Mc. m.s. barrier is still to be broken. W8PT also had negative results with WØENC on 432.

From Connecticut, K1YON worked WB2CNK and K2JDI, both New York, and K1JIX in Massachusetts at summer's end. And in Cicero, Illinois, K9ZWV and WA9FIH, are trying to stir interest in 220.

432 Mc. is receiving the attention of the Australian e.m.e. group. W5ORH passes along the following from VK2HO in Sydney. About 25 stations in the Sydney area are working towards e.m.e. The city is located in a valley and VK2HO says e.m.e. appears to be the only way for them to make 432 DX contacts! VK2AJ has a 4X150 rig and a large phased array, and VK2AAK has a station built around commercial gear ready for both Oscar and e.m.e. VK2HO says the group needs information on antennas, mounts and narrow-bandwidth detection systems. He says commercial equipment is out of the question because of import duty. VK2HO's address is H. J. Hart, 6 Waterhouse Avenue, St. Ives, New South Wales, Australia. Australian amateurs are limited to 150 watts d.c. input.

At Pasadena, California, W6PUZ has received kw. authorization and has completed a 4CX250B amplifier and a W1HDQ Yagi array. K4EJQ has a similar rig on from his well-known Tennessee mountaintop and wants schedules into Kentucky, Ohio, Pennsylvania and North Carolina. W4WQZ is active from Kingsport, Tennessee and he, too, wants schedules. W1QWJ is still scheduling VE2LI and VE3BPR. WA2VTR, Spring Valley, New York, says W4JFU is active from Onancock, Virginia with a 5894 and 48-element collinear. WA2VTR has a 5894 also, and an 8-over-8 slot. W9AAG, Woodhull, Illinois, says he works WØDRL, Topeka, and WA0ENM, Osage City, both Kansas, and WØDDX at Smithville, Missouri fairly often. And rumor has it that 2-meter stalwart WØEMS in Omaha is gearing-up for 432. *Eh Frank?*

1215 Mc. and up activity is highlighted by WA2VTR. He reports nightly schedules with K2JNG over a hilly 29-mile path produce contacts with 8 watts output at each end. K2JNG uses a 32-element extended collinear, WA2VTR a 4½-foot dish. WA2VTR also schedules K2DZM in Rahway, New Jersey with consistent contacts over the 40-mile path. WA2VTR says conditions on 1215 and 432 seem to parallel and he observes 1296 ducting on some paths, particularly to W2CCY in Morristown, New Jersey. All of the stations are crystal controlled, and most are using a K2UYH-designed-and-built KMC 5200 series transistor pre-amp. The claimed noise figure is about 3½ db. See an article elsewhere in this issue for preamp details.

432-Mc. Antenna Contest

Here is a tabulation of the results of the antenna measuring contest at the Central States V.h.f. Conference. The measurements (gain over reference dipole) were made by WØEYE and WØKEI.

Entrant	*Antenna*	*Gain*
W5LUU	Modified HyGain 13-element Yagi, gamma matched	12.3 db.
WAØIQN	32-element extended-expanded collinear	12.0 db.
K5IQL	10/10 J-Beam Slot	11.0 db.
KØCQA	11-element W1HDQ Yagi, gamma matched	11.0 db.
KØCQA	11-element CushCraft Yagi, hb gamma match	10.0 db.
KØDOK	13-element hb Yagi, folded dipole fed	9.0 db.
W9QXP	16-element hb bi-square	8.0 db.
KØCQA	11-element CushCraft Yagi	8.0 db.
KØCQA	11-element CushCraft Yagi with extra launch director	8.0 db.
WØEVZ	17-element hb 12-foot Yagi	6.7 db.
W5ORH	16-element CushCraft collinear	6.0 db.
W5GVE/4	hb skewed wheel	−3.0 db.

Late report: Widespread aurora Sept. 20. WA9DOT W3BDP QSO on 144 heard by KØMQS, 900 miles plus, 27-day recurrence dates in Oct. and Nov. worth watching.

QST

How's DX?

(Continued from page 97)

occasionally and awaits his F and YU calls. "We have a space problem with I1DFE but I'm working out a trailer deal." . . . . . WA1CYT wonders if SM0KY/JW might count the same as Smokey/Bear . . . . . IT1AGA's c.w. remains in daily search of rare countries and counties, 1300-1700 and 2200-0300 GMT, on 7 through 28 Mc. . . . . "If they want you they can hear you," learns WB2ZQE. "Normally my 75 watts, with a pretty fair DX record, has an unimpressive replies-to-calls ratio. But in the WAE Test 28 calls brought 25 replies." . . . . . Sven of club station SL3ZO writes W7UVR that PBRC recently surprised restaurant guests by whipping out a 15-meter set-up good enough for U.S.A. contacts on 15 meters. The outfit's Polar Bear Award newly adorns the shacks of W1s CV VG, K7BJE, KL7JDO and VE3JZ . . . . . DL4s FS (W8IMZ) and WQ (W0BUT) anticipate participation in all possible ARRL activities from Langen . . . . . *DX News-Sheet* (address at the end of "Where") continues to offer its Islands on the Air sheepskin and a yearly IOTA marathon as well . . . . . ARRL's W1YYM finds SP2PI handling a Nicolaus Copernicus Award of possible interest to wallpaper hounds . . . . . GD3AIM, who prefers 21-Mc. c.w., nears the 3000-QSO mark since closing his G3AIM books in Liverpool . . . . . "I work mostly 20 and 40 c.w.," remarks GM5AHS (WA2DHF), "plus a little s.s.b. with my NCX-3 and trap dipole. Other reciprocals here include GM5s ACE AEC AFF AGM AIF and AII. Between us we cover just about all bands and modes." Steve's on a two-year Navy hitch that may bring us some rare ones . . . . . WB2ZUB has ON4JW fixed up with a triband rotary, next step a sideband linear . . . . . Ten-meter conditions are ably indicated by beacon stations DL0AR, 29,000 kc.; DM3IGY, 28,000; GB2SM, 28,200; GB3LER, 29,005; ZD7WR, 29,000; and 5B4WR, 29,008 kc. Incidentally, SM4DXL publishes QUA-X, a monthly dealing DXclusively with 28 Mc. . . . . *News-Sheet* notes: M1B likes 14,170-kc. sideband at 2000 GMT but M1s D and H hide out on 40. . . . Need SM1? Dig AMY and CXE on 14-Mc. voice, AS on 21,350 kc., and DUW on 15 c.w. . . . SV0s WFF WL and WN create crises from Crete on 10 and 15.

HEREABOUTS — "I'll operate 10 through 40 meters," states WA3DVO/VP6, "and will make it a point to use the 15-meter Novice band at least five hours per week." . . . . . RSGB bureau chief G2MI and spouse scheduled an autumn visit to W8YGR and vicinity . . . . . The Connecticut Wireless Association plans to operate PJ3CC, Curacao, on November 25 and 26. Operation will be on all bands except 160. W1's BIH, TX, 2ADE, 3GRF and 4KFC operating. QSL s.a.s.e. to W1JYH. "Finally joined the Century Club before joining the Navy," pens WA6GQI. "Like WA6SLU I caught TA2AC just before QRT. Don't know where I'll be during my four-year hitch but I'll make as many DXpeditions as possible." . . . . . "Just put up the vertical driven array *a la* the ARRL *Handbook*," reports W6EAY. "Hooked to my 28-watt 2E26 rig it cuts through to Europe and Asia." Eric can switch to his trusty 4-400As and 3-el. yagi when necessary . . . . . W9JJN forwards an article about those mysterium phenomena, galactic radiations that appear to display characteristics required of artificial interstellar communications. Who's their QSL manager — W2CTN? . . . . . WA1FHU hears that DX hawk W9IOP becomes W2IOP again with headquarters in Jersey and/or New York City . . . . . W9NN confides, "Been dabbling in s.s.b. rag-chewing a little but I'll be back after my 236th 7-Mc. country as soon as I dry out my receiver. Got it soaked in all the tears brought on by new FCC regs." Come to think of it, our new top-grade ticket is misnamed. Should be *DXtra* Class . . . . . Drool, city dwellers, over W7VCB's latest skywire project: a 20-meter sterba curtain hung between a pair of mountains with a lake below, beamed northwest-southeast. Ken opines, "It's time Radio Peking moved off 7023 kc." . . . . . After discovering the charms of single-sideband via his SBE-34, K4HQD is DXcited enough to join the quad club . . . . . W3JZJ/9 files our Gripe of the Month after making the mob scene for PY0CZR on 20 c.w. "Never heard such disgusting conduct by W/K DXers as their techniques in trying to raise this one. Two prominent Sixes kept blasting away while the callee was transmitting, clobbering fellows who couldn't hear the DX because of such liddish conduct. Maybe crime pays — they must have 300 countries to my 80-plus." . . . . . WA3ATX/VE1 gave 403 P.E.I. contacts to 36 countries and 39 United States in his nine-day DXcursion this summer, clinching many a WAVE effort . . . . . PY7s AOA ACQ and AKW plan a week at St. Peter & Paul early this month, probably as PY0s DX and SP . . . . . Ex-VP8IQ works at RCA Communications, N.Y.C. . . . . Ws 1HWK 1PRI 1WPO 1WQC 1YYM and 2NSD were billed on the 17th Annual New England DXCC Meeting program at Waltham in October . . . . . W1WQC may again employ his new VP5AA privileges on South Caicos . . . . . W8ZCQ, *CARAscope* DX scribe, points out that VK9GN, a typically rare DX type, pays 28 cents per kilowatt hours of ham juice. W/Ks average about 3 cents or so. Feel better now? QST

Mike Farad	47	400	306
7290	27	1645	806
Clearing House	23	285	304
New England Teenage	29	272	115
QTC	23	371	241
North American	27	712	575

QST

TIXM101 at 1296 Mc.

(*Continued from page 34*)

but the check will show if the dimensions are "in the ballpark." It is important that the terminations be relatively flat 50- or 75-ohm loads, as tuneup from this point on will be a lost cause otherwise.

The bias network, R_3 through R_7, can now be connected, power applied, and adjustment made for optimum performance. Gain will be determined by the settings of the coarse bias control, R_4, and the fine, R_6, with maximum gain obtained with maximum bias. Starting in a low-gain condition, peak the lines for maximum signal. Then increase the coarse control in gradual steps, readjusting the input and output circuits each time. The signal level should be kept low during this procedure.

As bias is increased, a point will be reached where the amplifier begins to oscillate as the tuned circuits pass through resonance. Back off the bias until the amplifier shows no tendency to oscillate as it is tuned. A gain of 15 to 20 db. will be obtainable, and optimum noise figure will be obtained just below the bias setting where oscillation starts. It may be desirable to decrease the gain two or three db. from this point. This will entail a sacrifice in noise figure, but it will be helpful in insuring stability across an appreciable frequency range.

A very careful adjustment of the input circuit is needed for minimum noise figure, and it is best achieved with a very weak signal. It will not occur at the tuning adjustment that gives maximum gain. Peak the output circuit for maximum gain each time, but the input for best signal-to-noise ratio. This work may be done with a noise generator, if one that is reliable above 1000 Mc. is available. Taps on the lines do not appear particularly critical.

At first the adjustment will seem very tedious, but after the operator gains a "feel" for it the procedure becomes relatively simple. Measurements made here indicate a noise figure under 3 db.

If the preamplifier is used in a working station, be sure that adequate protection is included to prevent transistor burnout from transmitter r.f. power. QST

Who's Gonna Read It

(*Continued from page 55*)

the paper? How do they expect me to write everything out of my head without a piece of paper?"

"They haven't passed it out yet."

"Yeah, don't get tightened up now, Charlie. Sure is hot in here though. How come somebody don't open the windows?"

"There aren't any windows."

"All these hot bodies crushed into this one stuffy, stifling little room. Hey Charlie, I gotta change desks. Top of this one is all wet and sticky."

"The band's all mine in '69."

"Oh my, here comes the warden . . . errr, inspector Charlie. He's comin' down this way. He's lookin' right at us . . . it's the Last Mile . . . we already flunked. Let's go home . . . while we can still escape . . ."

"He's just giving out pencils and paper."

"Everybody's staring at me, Charlie."

"They're wondering how you're gonna write down 20 per when you're standing up."

"I haven't took a exam for about 85 years."

"Those taking the exam should hear a tone now."

"Hold it . . . *hold it.* I don't hear a thing inspector. Not a peep."

"Put on the head phones."

"Inspector I got a bad pencil. It keeps slipping. Somebody must of polished it . . . or greased it up . . . or . . ."

"Copy only what you hear."

"Charlie, loan me some friction tape to wrap around this stick."

"Ditditditdah . . . ditditditdah . . ."

* * * * *

"How'd ya do? How'd ya do, OM?"

"Ahhhhhh, yeah Charlie. Well, I had it solid copy in my head, of course. But they slipped me that slippery pencil and . . . ahhhh . . . and if the inspector would of only let me talk the letters into a tape recorder like I asked him . . . anyway, I thought it was supposed to be straight plain english text."

"It was."

"Ahhhh . . . I mean I didn't expect they'd send so many numbers."

"What numbers?"

* * * * *

"Well OM, that sure was too bad you didn't have your recorder. But don't feel too bad 'cause I'll be sure and listen up there in the General's part of the band for ya . . . just like you used to listen for me in the Novice band."

"And to think it was you, Charlie, my old phone-man friend, that flatly refused to loan me some friction tape for that slippery pencil they made me use . . . so's at least I could write down the solid copy I got in my head."

"And ya know OM, now that I passed the Extra Class code, I'm gonna start practise copying c.w. in my head too. Like you say, why should anybody want to write down c.w. anyway? Who's ever gonna read it?" QST

50 Mc. Receiver

(Continued from page 15)

found that gain was best at about 5 ma., so that is how the stage is biased. Dissipation is still only about 35 mw. There should be more than 5 volts out of the diode under overload conditions. The b.f.o. should make more than 2 volts, as less will not give proper product detection. The a.g.c. for a.m. should hold all strong carriers (those out of the noise) within a narrow range. The proper setting of the a.m. a.g.c. control is such that the carrier level is around half the clip level, or about 1 to 2 volts.

Adjusting the b.f.o. level is not simple. The pickup coil is only one turn, so it cannot be changed by a small amount. The 1000-ohm resistor and diode CR_8 perform this function. The resistor value, or the number of turns in the base feedback winding, L_{23}, could be changed to adjust output. If I were starting again I would use a separate buffer on the b.f.o., feeding the detector directly, but the s.s.b. performance of this combination is very good. QST

(Part II will appear in an early issue of *QST*.)

I.A.R.U. News

(Continued from page 88)

50-day celebration period, October 18 to December 6 (ending 2200 GMT), the annual Independence Day in Finland.

NEW HEBRIDES CALL SIGNS

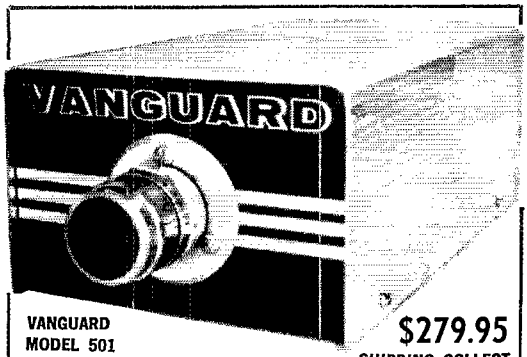
All amateur call signs in the New Hebrides now have the prefix YJ8 followed by two letters. This is in accordance with the Geneva (Radio) Conference. All other call signs formerly used, such as the FU and YJ1 series, are cancelled.

CHANGES AND CORRECTIONS

Please note the following *revised* QSL bureau addresses: Liga Panamena de Radio Aficionados, P.O. Box 9A-175, Panama 9-A, Republic of Panama. Bahama Amateur Radio Society, Box 6004, Nassau, Bahama Islands.

The QSL bureau list in June IARU News showed two zip codes for the DL4-DL5 bureau. The correct one is 09175. The same bureau list showed Jamaica as the QSL bureau for Turks and Caicos Islands and the Cayman Islands. This was an error; cards for these islands should be sent direct. QST

The Post Office Department promises faster mail service with the new Zip codes. Use yours when you write League Headquarters. Use ours, too. It's 06111.



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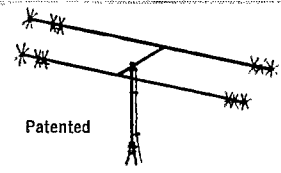

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Power Rating	2000 Watts P.E.P.
El. Length	11′
Turn. Radius	7′
Total Weight	11 lbs.
Single Feed Line	52 ohm
SWR at Resonance	1.5 to 1.0 max.

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WA2DMC	W6AJZ
WB2ERE	WA7HLS
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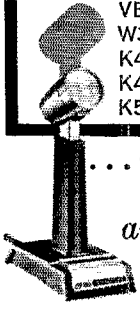
W3DGP	WA8PWF
K4DXR	K9DLJ
K4VBJ	WA9NEE
K5EKN	WAØOUR



. . . notice their improvement in intelligibility and added punch?

Shure Brothers, Inc.,
222 Hartrey Avenue, Evanston, Ill.

Silent Keys

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

W1CK, Philip F. Robinson, Scituate, Mass.
W1HTY, William F. Howarth, North Andover, Mass.
W1LIW, John T. Maher, Holyoke, Mass.
W1OW, Nelson B. Stackpole, Seekonk, Mass.
W1QJN, John Weighell, Holyoke, Mass.
K2BN, Herbert M. Warner, Great Notch, N. J.
K2BQ, S. Paul Suflin, Larchmont, N. Y.
W2KU, Oscar Oehmen, Bayshore, L. I., N. Y.
WB2NCM, Franklin L. Brobst, Camden, N. J.
WA2QCQ, Donald Gillmore, Hillside, N. J.
WA3BGT, Charles G. Reuwer, Pasadena, Md.
W3OIE, William H. Tracy, Erie, Pa.
W3PXX, Joseph Welch, Riverdale, Md.
K3QCX, Richard A. LeDonne, Apollo, Pa.
K3UGX, O. James Lloyd, Sewickley, Pa.
K3UTS, Austin J. Cousineau, Monroeville, Pa.
W4BLV, John James Ross, Edenton, N. C.
K4BY, James D. Felsenheld, Bradenton, Fla.
K4CP, Claude Black, Richmond, Va.
W4HEY, Lawrence P. McGoldrick, Sarasota, Fla.
K4HGL, Thomas O. Butler, Memphis, Tenn.
W5DYL, Charles S. Fleming, Forrest City, Ark.
K5KNU, H. M. Dyer, Henderson, Texas
W5RJO, Albert Le Roy Baxter, Texarkana, Ark
K5RNC, Fred F. Fannin, Choctaw, Okla.
K5YHQ, Wallace F. Wiley, Albuquerque, N. M.
W6DVD, Plummer Walsh, Oroville, Calif.
WA6HQX, Edwin M. Ackley, San Diego, Calif.
W6IT, Jack Tait, Walnut Creek, Calif.
K6JNB, James O'Bryant, San Diego, Calif.
K6LPA, George B. Fetterolf, San Diego, Calif.
K6MND, Wendall Reed, Mill Valley, Calif.
W6MOH, Charles S. Sydenstricker, Sacramento, Calif.
W6PG, Carl Rogatsky, San Diego, Calif.
W6RRI, E. W. Thompson, Los Angeles, Calif.
W6UJ, Chris Schrotke, Bakersfield, Calif.
W6YUH, Claude Gribble, Salyer, Calif.
K7CSV, Thomas Farnum, Las Vegas, Nev.
W7HII, J. W. Nelson, Phoenix, Ariz.
ex-W7LSK, Harry L. Woodley, Flagstaff, Ariz.
W7UWY, Bernard J. Schmitz, Helena, Mont.
W8FW, Harry E. Van Kirk, West Milton, Ohio
WA8HVV, William R. Norfolk, Columbia Station, Ohio
W8KSP, Paul M. Shepard, Jonesville, Mich.
W8WWG, John B. Wisenall, Cincinnatti, Ohio
K9BSE, Richard Simpson, Two Rivers, Wisc.
WA9GIP, Charles A. Poe, Kokomo, Ind.
WA9GRQ, Jack Harms, Indianapolis, Ind.
K9HHA, Roland L. Gariepy, Fort Wayne, Ind.
W9ROQ, E. J Brown, Sparland, Ill.
W9UPL, Joseph Chamness, Anderson, Ind.
WØDIB, Thomas Wildman, Mitchelville, Iowa
KØKYG, Elmer J. Seener, St. Louis, Mo.
KØMUB, Zanona E. Young, Falls City, Nebr.
KØONH, Arthur, Malsbury, Auburn, Nebr.
ex-VP4TN, Robert Eric Duff, Port of Spain, Trinidad

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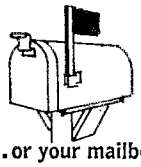
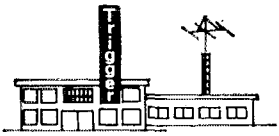


...or your mailbox



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100V	399	SX110	97	1-1/4 METER CON	19
SWAN 350	329	SX111	147	EICO 720	49
117XC	84	SX122	189	EICO 730	39
SBE-34	289	SX130	127	HEATH HR10	79
SB2LA LINEAR	189	S38D	37	DX60A	77
SBE33 INVERTER	39	HQ145C	179	HG10 VFO	34
INTERCEPTOR B	329	HQ170AC	279	SENECA VHF-1	177
DRAKE R4A	329	HQ180AC	379	10ER KIT	39
T4X	319	NCX5	349	2ER WIRED	49
PEN LA600C	119	NCL2000	499	SB100	199
ZENITH SHORT W	44	NC80	69	KNIGHT VFO	27
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HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a box number or telephone number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 35¢ per word, except as noted in paragraph (6) below.

(4) **Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.**

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) **A special rate of 10¢ per word will apply to advertising which, in our judgment, is obviously noncommercial in nature.** Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 10¢ rate. Address and signatures are charged for, except there is no charge for zipcode, which is essential you furnish. **An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 35¢ rate.** Provisions of paragraphs (1), (2) and (5), apply to all advertising in this column regardless of which rate may apply.

(7) **Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking-copies can be supplied.**

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

(9) Due to the tightness of production schedules, cancellation of a Ham-Ad already accepted cannot be guaranteed beyond the deadline noted in paragraph (5) above.

Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

INVITATION: New York Radio Club cordially invites New York City area hams and SWLs to its regular monthly meetings. Second Monday of each month at George Washington Hotel, 23rd St. and Lexington Ave., at 8 P.M. All are welcome. W2ATT, New York Radio Club.

OLD Old Timers Club now over 760 members with verified 2-way contacts before 1926. Life membership $15.00. Bi-monthly "Spark Gap Timers" $2.50 annually. Roster free to members. Write Secretary, W5VA, Box 840, Corpus Christi, Texas 78403.

MOTOROLA used FM communication equipment bought and sold. W5BCO, Ralph Hicks, 813B No. Federal Hiway, Fort Lauderdale, Florida.

WANT Callbooks, catalogs, magazines, pre-1920 for historical library. W4AA, Wayne Nelson, Concord, N.C. 28025.

SELL: Eimac 4X250B tubes. Guaranteed gud condx. $6.50 each. $10.00 paid repair in U.S.A. Send check or m.o. Everett Stidham, Jr., W5LQ, 722 So. 30th, Muskogee, Okla.

TUBES, Diodes and Transistors wanted. Astral Electronics Corp., 150 Miller St., Elizabeth, N.J. 07207.

SELL, swap and buy ancient radio set and parts magazines. Laverty, 118 N. Wycomb, Landsdowne, Penna.

TUBES Wanted. All types higher prices paid. Write or phone Ceco Communications, 120 West 18th St., N.Y. 11, N.Y. Tel: 242-7359.

DUMMY Loads, 1 KW, all-band, $7.95; wired, $12.95. Ham Kits, P.O. Box 175, Cranford N.J.

WANTED: 2 to 12 304TL tubes. Callanan, W9AU, 118 S. Clinton, Chicago 6, Ill.

MANUALS for surplus electronics. List 10¢. S. Consalvo, 4905 Roanne Drive, Washington, D.C. 20021.

WANTED: Collins Parts. BC-610, GRC-2, Autodyne, Bethpage, L.I., N.Y. 11714.

HAM'S Spanish-English manual. Gabriel K4BZY, 1329 N.E. 4th Ave., Fort Lauderdale, Florida 33304.

BEST Offer paid for any piece of aircraft or ground radios, tubes or test equipment. In a hurry? Cash-in-advance arranged. Turn those usused units into money. Air Ground Electronics, 64 Grand Place, Kearny, N.J.

FOR Sale: SB-101 and SB-200. Wanted, kits to wire. Heath preferred. 12% of cost, some in stock. Professionally wired. Lan Richter, K3SUN, 131 Florence Drive, Harrisburg, Penna. 17112.

1916 QSTS needed for personal collection. Price secondary. Ted Dames, W2KUW, 308 Hickory Street, Arlington, New Jersey 07032.

CASH Paid for your unused Tubes and good Ham and Commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, N.Y., N.Y. 10012. Tel: (212) WAlker 5-7000.

WANTED: For personal collection: QST May 1916; Learning the Radiotelegraph Code, Edition 4; How to Become a Radio Amateur, Edition 9; The Radio Amateur's License Manual, Edition 2, 11, 12. W1CUT, 18 Mohawk Dr., Unionville, Conn. 06085.

WE buy all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co., Box 516, Hempstead, N.Y.

QSLS "Brownie" W3CJI. 3111 Lehigh, Allentown, Penna. Samples 10¢. Catalog 25¢.

QSLS?? Personalized made-to-order. Samples 25¢. DeLuxe, 35¢ (refunded). Sakkers, W8DED, Box 218, Holland, Michigan 49423. (Religious QSL samples 25¢).

QSLS stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md.

C. FRITZ—QSLs that you're proud to send, bring greater returns! Samples 25¢ deductible. Box 1684, Scottsdale, Arizona 85252 (formerly Joliet, Illinois).

QSLS-SMS. Samples 10¢. Malgo Press, Box 373, M.O., Toledo, Ohio 43601.

DELUXE QLS Petty, W2HAZ, P.O. Box 5237, Trenton, N.J. 08638. Samples, 10¢.

10¢ Brings free samples. Harry R. Sims, 3227 Missouri Ave., St. Louis, Mo. 63118.

CREATIVE QSL Cards. 25¢ for catalog, samples, 50¢ coupon. Personal attention. Imaginative new designs. Wilkins Printing, Box 787-1, Atascadero, California 93422.

RUBBER Stamps $1.15 includes tax and postage. Clints' Radio W2UDO. 32 Cumberland Ave., Verona, N.J. 07044.

QLS, finest YLRL's, OMs samples 10¢. W2DJH Press, Warrensburg, N.Y. 12885.

QSLS, SWLS, XYL-OMS (sample assortment approximately 9¢) covering designing, planning, printing, arranging, mailing, eye-catching, comic, sedate, fabulous, DX-attractive, protopal snazy, unparagoned cards (Wow!) Rogers KØAAB, 961 Arcade St., St. Paul, Minn. 55106.

3-D QSL cards, recognized leader among raised designs. Compliments aplenty! Prized collector's item. Samples 25¢ (refundable). 3-D QSL Co., Monson, Mass. 01057.

QSL, SWLS, WPE. Samples 10¢ in adv. Nicholas & Son Printery, P. O. Box 11184, Phoenix 17, Ariz. 85017.

QSLS 300 for $4.35, samples 10¢. W9SKR, George Vesley Rte. #1, 100 Wilson Road, Ingleside, Ill. 60041.

QSLS 3-color glossy 100, $4.50, Rutgers Vari-Typing Service. Free samples. Thomas St., Riegel Ridge, Milford, N.J.

QSLS-100 3-color glossy $3.00; silver globe on front, report form on back. Free samples. Rusprint, Box 7575, Kansas City, Mo. 64116.

ORIGINAL EZ-IN double holders display 20 cards each in plastic, 3 for $1.00 or 10 for $3.00 prepaid and guaranteed. Free sample to dealers or clubs. Tepabco, oJhn K4NMT, Box 198T, Gallatin, Tenn. 37066.

QSL's: Quality with service. Samples free. R. A. Larson Press. Box 45, Fairport, N.Y. 14450.

QSL's. Free samples, attractive designs. Fast return. W7IIZ Press, Box 2387, Eugene, Ore. 97402.

QSLS. Kromkote glossy 2 & 3 colors, attractive, distinctive, different. Choice of colors 100-$3.00 up. Samples 15¢. Agent for Call-D-Cals. K2VOB Press, 31 Argyle Terrace, Irvingston, New Jersey 07111.

QSLS. Fast service. Free samples. Bolles, W5OWC. Box 9363, Austin, Texas.

QSL, SWL, cards that are different. Quality Card stock. Samples 10¢. Home Print, 2416 Elmo Ave., Hamilton, Ohio.

FINE Embossed QSL's Samples. Ace Printing, 6801 Clark Ave., Cleveland, Ohio 44102.

QSLS Glossy coated, 100, $2.00. 3 and 4 colors. Samples, dime. Bob Garrra, Lehighton, Penna. 18235.

RUBBER Stamps, 3-line address $1.50. J. P. Maguire Company, 448 Proctor Avenue, Revere, Massachusetts 02151.

QSLS by Jansen, K2HVN, samples 25¢. 860 Atlantic Street, Lindenhurst, N.Y. 11757.

QSLS. Information book and samples. 25¢. W1QFB Press, Hadley, Mass. 01035.

PICTURE QSL Cards for your shack, etc. Made from your photograph. 1000 $14.50. Also unusual non-picture designs. Samples 20¢. Raum's, 4154 Fifth St., Philadelphia, Penna. 19140.

QSLS. New catalog 10¢. Filmcrafters, Box 304, Martins Ferry, Ohio 43935.

QSLS. Second to none. Your personal combination from largest selection, glossy reds, blacks, calypso, Pinecraft, vellum, and Crystallon. All ink colors. Many card styles. Fast service. Samples 25¢. Includes your call in beautiful 4½ inch letters. Ray, K7HLR, Box 1176, Twin Falls, Idaho 83301.

HUNDRED QSLS, $1.25 postpaid. Samples dime. Holland, R3, Box 649, Duluth, Minn. 55803.

QSLS-Samples dime. Joe, WB2YIV, 518 Glenmere Ave., Neptune, N.J. 07753.

AWARD Winning QSLS. Curiously colorful, incomparably different. Samples 10¢. WA8NYB Print, 645 Reynard Ave., Cincinnati, Ohio 45231.

QSLS by K1FF, $2.00 for 100. Others at reasonable prices. Samples 25¢ deductible. Box 33, Melrose Highlands, Mass. 02177.

RTTY Gear for sale. List issued monthly, 88 or 44 mhy toroids, five for $1.50 postpaid. Elliott Buchanan, W6VVC, 1067 Mandana Blvd., Oakland, Calif. 94610.

WANTED: Tubes, all types, write or phone Bill Salerno, W2ONV, 243 Harrison Avenue, Garfield, N.J., Tel: GArfield Area code (201)-773-3320.

WANTED: Military and commercial labory test equipment. Electronicraft, Box 13, Binghamton, N.Y. 13902.

TELEPRINTRONICS—Toroids, 6/$2.00 postpaid. List. Typetronics, Box 8873, Ft. Lauderdale, Fla. 33311.

ESTATE Liquidation offers. Big list. Parad Engineering Service, 284 Rte. 10, Dover, N.J. 07801.

JOHNSON Ranger II F/W, like new, $169.00; also Instructograph code instructor, complete with all tapes, best offer. Floyd Scott, 66 W. North Ave., Northlake, Ill. 60164. Phone (312)-562-0674 after 5 P.M.

CANADIANS: Best used gear list in Canada. Free Etco, c/o Marv, VE2ANN, Box 744, Montreal 3.

CANADIANS! Heathkit SB300 Receiver with AM filter. Professionally wired and aligned, $300. Jeff Rivett, VE2BLO/1, 567 Smythe St., Fredericton, N.B., Can.

WANTED To buy: Tuning coils for National receiver SW-58 or 6 pin coil forms. The coils wanted are No. 60, 64, 65, 66, 67. If you have coils that tune lower than this I would be interested even in the above type set. Like to hear reply by mail any amateur in USA or Canada. Leonard V. Avey, Lombardy, Ont., Canada.

WANTED: Model #28 Teletype equipment. R-388, R-390A. Cash or trade for new amateur equipment. Alltronics-Howard Co., Box 19, Boston, Mass. 02101.

SELL: CQ, QST, Handbooks, old radio magazines, any quantity. Buy old radio gear and publications. Erv Rasmussen, 164 Lowell, Redwood City, Calif.

NOVICE Crystals, all bands, $1.30 each. Free list. Nat Stinnette, Umatilla, Fla. 32784.

TOROIDS, 88 mh uncased, 5/$2.50. Postpaid. Humphrey, WA6FKN, Box 34, Dixon, Calif.

FREE Catalog. Loads of electronic Bargains, R. W. Electronica, Inc., 2244 South Michigan Ave., Chicago, Illinois 60616.

ILLUSTRATED Certificate Guide: Radio Amateur's Vocabulary German/English. $1.00 each. Zangerl, OE9CZI Dornbirn 1, Nachbauerstrasse 28, Austria.

TOOOOBES: 6146B, $4.00; 6CW4, $1.40; 811A, $4.25; 4D32, $15.90. All new, boxed, guaranteed. Free catalog. Vanbar Distr., Box 444Z, Stirling, N.J. 07980.

WANTED: Tubes and all aircraft and ground radios. Units like 17L, 51X, 618T or S. R388, R390, GRC. Any 51 series Collins unit. Test equipment, everything. URM, ARM, GRM, etc. Best offer paid. 22 years of fair dealing. Ted Dames Co., 308 Hickory St., Arlington, New Jersey 07032.

INTERESTING Sample copy free Write: "The Ham Trader," Sycamore, Illinois 60178.

HALLICRAFTERS HT-37, $250.00. SX-111 with speaker, $130.00. Heath Ham-Scan, $40.00. K2UWM, 1302-8th St., North, Bergen, N.J. 07047.

SAVE at Evansville Amateur Radio Supply: "Cash prices, no trade deals on bonus offers" New equipment: bonus No. 1, Drake TR-4, $599.95, free AC-4 and MS-4. Bonus No. 2, Drake T4X and R4A, $799.95, free AC-4 and MS-4. Bonus No. 3, Swan-500, $495.00. Free 117XC. Bonus No. 4, Galaxy-MK II $420.00. Free AC-35. Bonus No. 5, Mosley TA-33, $99.00. Bonus No. 6, Ham-M, $95.00. Freight f.o.b. Send SASE for the best deal on new or used gear. 1329 S. Kentucky, Evansville, Ind. 47714. Tel: (a.c.) 812-422-4551, Bill Ogg, WA9RMO.

COLLEGE Bound: HT-44 plus P.S./150, SX-177 Clegg 99'er. In exclnt condx. Peter Williams, 615 Marview Terrace, Cincinnati, Ohio 45231

SOLID State rectifiers. Replace those tubes and up operating efficiency. *5U4 5V4* and 5YS units, $4.00; *5R4* units, $9.00. Both units, $11.95 postpaid. Merely plug them in. RF Devices, Box #15. Ramsey, N.J. 07446

HAM Discount House. Latest amateur equipment. Factory sealed cartons. Send self-addressed stamped envelope for lowest quotation on your needs. *HDH Sales Co., 170* Lockwood Ave., Stamford, Conn. 06902.

SQUEEZE Keyer (WØEPV circuit, July QST) is world's best. Complete kit (less paddle) includes my printed circuit board, pre-punched cabinet and instructions: $69.50 (plus postage). Brown double-lever paddle, $16.95 (plus postage). Satisfaction guaranteed. Jimmy Moss, W5GRJ, Box 442, Natchitoches, La. 71457.

MICHIGAN Hams! Amateur supplies, standard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, W8RP. Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan 48104. Tel. NOrmandy 8-8262.

HALLICRAFTERS SX-117, WWV and complete 10m xtals, HT-44, spare finals, PS-150-120, transceive cables, mint condition. No trades, $550. Alan Kogerup. Tel: a.c. (312)-894-1328, 324 Crestwood, Roselle, Ill. 60172.

SAVE On all makes of new and used ham equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts. 617-598-2530 for the gear u want at the prices u want to pay.

WANTED: IRE-IEEE-IEE-AIEE publications. Also BSTJ, RCA Review. TPI. Box 67, Palo Alto, Calif. 94301.

SELL: for college: Apache with SB-10, $200.00; Mohawk, $140.00, both for $300.00. WAØJNA, 1541 Atlantic St., St. Paul, Minnesota 55106.

REPAIR and install Amateur Radio Transmitters, receivers and accessories. Ted Drell Electronics, Inc. 4103⅛ Dumaine St., New Orleans, Louisiana 70119.

COLLINS 75S-3. "Perfect". can't tell from new. $375.00. K7YRP, 3460 Roger Dr., Salt Lake City, Utah 84117. Tel: 277-4995.

WANTED: Lynmar, type TRS-1, TRS-2, T-R switch, or TRS-1T RF output transformer. K5RYV, Star Rte., Box 79, Clovis, N. M. 88101.

HT-32B, $325.00; SX-115, $325.00. Both like new. Gonset 2-meter Sidewinder, less supply, $150.00; SR-42 plus VFO, $150.00. W4MVC, 10 Carjen Avenue, Asheville, N.C. 28804.

FOR Sale: Drake TR-3 with matching AC supply, like new, $325.00; late SBE-33 with matching mike, $150.00; Heathkit Warrior linear, like new condx, $140.00; Swan 175 modified but works OK, $75.00; Century 500 d.c. supply. $65.00; Hi-Verter 6M xmtr& conv., $25.00; Commaire 6 and 2 ant. tuner with built-in SWR meter, $25.00; Challenger, $45.00; HQ-110C, $90.00. Phone 3724911 during days and 3726957 nights, or write K8AON, Box 8. Ripley, West Virginia 25271.

FOR Sale: Heath SB-400 and SB-300, new condition, complete, $500.00. Heath Monitor 'scope HQ-10, new condition, $50.00. Ted Brix, 5573 No. Van Ness Blvd., Fresno, Calif. 93705.

WANTED: Early Hallicrafters, Hammarlund, National receivers. Best price and conditions in your first letter, please! Howard Hoagland, Jr., 639 North Sierra Bonita Ave., Los Angeles, Calif. 90036.

FOR Sale: Galaxy 300 with matching PSA 300 SSB PTT D-104 mic included. $200.00 cash. Phil McKee, 2617 McKinley, Perry, Iowa 50220.

SELL: Hallicrafters SX-100 receiver, w/R48 speaker, in exclnt condx, $150.00. Dan Liebrecht, 3950 Blackstone Ave., Bronx, N.Y. 10471. Tel: KI9-4409.

SX-111 receiver, excellent, $150.00; DX-60A, $65.00. Leo Herber, MD, Thief River Falls, Minn. 56701, tel: 681-4839.

LINEAR, Gonset 500W, 10-80, x L/N, $65.00. W2DTD, 29 Charles, Merrick, N.Y. 11566.

QST-CQ magazines from 1964 to 1967. Write for list and prices. George M. Clark, 123 Davis Ave., Hackensack, N.J. 07601.

COLLINS Owners: Now is the time to get that long awaited conversion. If you want the very best in receiving capabilities this upcoming season, a VCZ front end conversion is your answer. 75A4's for immediate shipment. Dealers in fine used Collins gear. Write for details. VCZ Sales, 5 Pinetree Rd., Ramsey, N.J. 07446. Tel: (201)-327-9494.

FOR Sale: Globe Chief, $25.00; VF-1, $15.00; Two BC-683 receivers, 3 ft. 237-D mounts. 20-meter Telrex beam. Frank Melvin, Box 566, Clarkton, N.C. 28433.

SELL: T-90 xmtr (built-in VFO) and power (as is—working most bands), $35.00. SX-99 rcvr, gud, $50.00. Handbook 2-mtr. xmtr 15-watts, power, modulator, perfect. $60.00. F.o.b. Nat Wadsworth, 1 Edgarton Ct., Darien, Conn. 06820. Tel: 212-655-4629.

WANTED: DC-3 power supply. J. M. Tucker, Box 3395, San Francisco, Calif. 94120.

HEATH Apache, SB-10, $200.00; SX-110 receiver, $90.00, good condition. WA3HPF, J. A. Wagner, 4647 Wave Drive, Erie, Penna. 16505.

WANTED: AA and AC coils for HRO-50T1. State price and condition. W7LBV, 1295 Overlook Avenue, NW, Salem, Oregon 97304.

SALE: Heathkit DX-40, $40.00; Lafayette HE-45A six-meter transceiver, $60.00; Cush Craft six meter Squalo antenna, $8.00. *James Edwards, WB4DQJ, 294* Pine St., Shaw AFB, S.C. 29152.

WE'RE Trying to complete our collection of Callbooks at Headuarters. Anyone have extra copies of Government Callbooks 1822-1925 and Radio Aamteur Callbooks 1928-1934? ARRL, 225 Main St., Newington, Conn. 06111

HAMMARLUND HQ-180AX *with S-200 speaker. New in* April 1964, Factory alignment August, 1967, provides 90-day warranty. Receiver incorporates Nuvistor-crystal oscillator in addition to VFO. Performance *outstanding, $360.00.* Heath Hi-Fi AA22 amplifier and AJ33A tuner, both are factory-checked—$180.00. Concertone Model 801 auto-reversing tape tape-recorder, in A-1 condition, $295.00. I pay all shipping costs. W. B. Howell, Box 583, Badin, N.C. 28009.

WRL's used gear, trial-terms-guaranteed. NC-303, $199.95; 2B, $199.95; HQ-170AVHF, $279.95; *SB-300,* $239.95; Galaxy 300, $149.95; SR-150, $269.95; 753, $119.95; G-76, $99.95, 650A & VFO, $99.95; G-66B, $39.95; Viking II, $84.95; *Champ 350,* $149.95; Thor 6, $169.95. Free "blue-book" lists hundreds more. WRL, Box 919, Council Bluffs, Iowa 51501.

SWAP And shop! Bring your goodies and wheel and deal (no commissions). Taconic Amateur Radio Club, November 6th at 7:30 PM at Chase Bank, Yorktown Heights, N.Y. 10598.

BEST Offer or swap. See Oct. Ham-Ad: Sonar 6AG7-6L6 exciter; 504 B-W 6AQ5-807 multiplier. Also A-61 Webster bandspanner ant. (new): G-E EP-14, new *transistor p.s. 12 200 425v;* BC-312; BC603C fm-rx; BC457A 458A; '48-'63 Proc.of IRE; Natl. 101-XAS rx. Boston area. OT gear: Radiola IIIA, 04A, K-80-X, 4x5 Graflex, 127-size exakta (trade?); used std. mill for Jones MicroMatch, AM-2. coax switches, 50 Mc. xmtr, etc. List, infor for SASE. Ed Handy, W1BDI, 35 Brookline Dr., West Hartford, Conn. 06107

SELL: SX-101 Mark III, $140.00; DX-100, all modifications, $80.00; HT-41 linear, $125.00. Shipped collect. K5LIW, R2, Box 124, Sherman, Texas 75090.

KNIGHT Compressor: 6m. "Squalo", other goodies. Send for complete list. W7DZW, 8556 Elm, Fairchild AFB, Washington 99011.

FM Transceivers, 2 meters; RCA CMVA, $45.00; Federal AMB-297, $39.50; *Dumont 301B, $65.00;* Motorola 41V, $65.00; Viking I transmitter, $45.00; NC-100 receiver, $45.00; RCA-30, 50 Mc receiver, 110V, $45.00. Wanted: cables and *heads for Link equipment. B. C. Higley, 1196* Elberron Ave., Elberon, N.J. 07740.

SWAP: $435.00 worth of c.b. equipment. (Two complete stations), including one "shoulder pack" unit. All solid state factory-built by Cadre Industries; 3 years old, in xclnt condx, used very little. Want: good 3-band (75/40/20M) mobile ham transceiver with built-in power supply (12 v.). Must be in excellent condition also. Write to M. B. (Tiny) Worden, WA8FYA, 322 W. Clinton St., Jackson, Michigan 49201.

WRITE, Phone, or visit us for the best deal on new or reconditioned Collins Drake, Swan, National, Galaxy, Gonset, Hallicrafters, Hammarlund, Hy-Gain, Mosley, Waters, SBE, Henry linear, towers, rotators, other equipment. We try to give you the best service, best price, best terms, best trade-in. Write for price lists. Your inquiries invited. Henry Radio, Butler, Missouri 64730.

HAMMARLUND HQ-145C, $140.00; HC-10 slicer, $65.00; SB-400, $245.00; Hy-Gain TH3 beam, $60.00; Elmac AF67, $35.00; Heath Warrior linear, $160.00. Stamp for list. W2-FNT, 18 Hillcrest Terrace, Linden, N.J. 07036.

CHRISTIAN Ham Fellowship now being organized for Christian fellowship and gospel tract efforts among hams. Christian Callbook available for $1.00 donation. Free details on request. Christian Ham Fellowship, 5857 Lakeshore Drive, Holland. Michigan 49423.

RTTY Station. Model 19, $125.00; Model 14, $75.00; 14TD, $50.00; Heathkit Mohawk, $125.00; Marauder, $175.00; Worrior, $125.00. All items are clean, operating perfectly. Discount for purchase of two or more items. No shipping, sry. Will deliver reasonable distance according to number of units purchased. K9CQB, 1525 Winding Way, Anderson, Indiana 46011.

COMPLETE VHF Station, Ameco TX-62 transmitter, Ameco #621 VFO; two Ameco Nuvistor CN converters for 6 and 2 meters, with power supplies. Dow-Key relay, all are in mint condition! Hammarlund HQ-170 receiver, speaker, Superex APS Headphones, Pennwood clock 24-hour, with timer; Cesco bridge Astatic D-104 mike with "G" stand. Will only sell as a complete station; no break-ups. $300 takes all. WA2KQZ. Call after 6 PM. Tel: 769-8185.

WANTED: KWM-2 needing repair. Please state price and condition. 4-100As swap. WB6SBR/KG6, 1132 R. T. APO 96334 S.F.

EXCELLENT HQ-10 'scope, not compatible with my new transceiver. $48.00 f.o.b. Martin Peterson, 1311-W. 5 St., Winona, Minn. 55987.

TR-4, $480.00; AC-4, $83.00; DC-3, $123.00; R4-A, $330.00; T4-X, $330.00; MS-4, $17.50; RV4, $83.00; L-4, $580.00; factory-sealed boxes, fully guaranteed. Mel Palmer, K4LGR, Box 10021, Greensboro, N.C. 47404.

RANGER II, new condx, $135.00. Joe Doubrava, WB2PCY, P.O. Box 1077, Mattituck, L.I., N.Y. 11952. Tel: 516-298-4704.

FOR Sale: Heath "Twoer", mike, 2 xtals, 6v. power supply; $35.00. Knight T-60 xmtr, $25.00. Scott Biondi, Box 735 Moore House, Clarkson College, Potsdam, N.Y. 13676.

SELL: Excellent condition Drake TR-3; AC-3, RV-3, $450.00; Heath HA-10 linear, $160.00. John Winward, K3AOT, 3554 Parkview Dr., Cornwells Heights, Penna. 19020. Tel: 215-639-7523.

WANTED: Military, Commercial, Surplus, Airborne, Ground, Transmitters, Receivers, Testsets, Accessories. Specially Collins. We pay cash and freight. Ritco Electronics, Box 156-11, Annandale, Virginia 22003. Phone: 703-560-5480 collect.

4KV, 200 Ma. Varian, VA1302 power supply, General Electric 1250 volts at 500 Ma. Power supply catalog number 516E739G1, General Electric Regulator catalog number 516E734G1. Above mounted on 19 inch rack panels. Sorry, that's all the info I have. Two Eimac SK-400 sockets. Make offer for any or all. K3ZPN, Box 6001, Philadelphia, Penna. 19114.

KT-340 (HA-230 semi-kit), excellent, $47.00; 720, new, crystals, $65.00. Both for $105.00. U pay shipping. WB2BEG, 43 Judson, Dobbs Ferry, N.Y. 10522.

COLLEGE Expenses: Must sell. Excellent Hammarlund HQ-145C, good Johnson Viking II, and excellent Heath HG-10 VFO with coax, spare final, relay, xtals, all only $200. Write for pictures. Dave Mitchell, WA3CPC, 502 Taylor Ave., Shillington, Penna. 19607.

SELL: Lafayette HA-350 excellent condition, 6 months, $100. Bob, Box 21, Glen Oaks, N.Y. 11004.

FOR Sale: Collins KWM-2 transceiver, 516F-2 power supply, Astatic 10-2 mike, speaker. Practically new. $750.00. Leonard, 2702 Woodstock Rd., Los Alamitos, Calif. 90720. Ph: 596-1886.

KNIGHT R-100 rcvr, $50.00; Globe Chief 90 xmtr, $35.00; Heath VF-1 VFO, $10.00. Bernie Frank, 105 Stouffer Ave., Hagerstown, Md. 21740.

DRAKE T4X and R-4 with AC-3 supply and MS4 speaker, $600.00; Hammarlund HQ-140X, $75.00; Clegg 99'er, $70.00; Lysco c.w. transmitter, $20.00; Eico 760 'scope, $60.00. Speaker for HQ-180, $10.00; Knight VFO, $10.00; Eico 377 audio generator, $25.00. Philip Schwebler, W9GCG, 4536 N 50th St., Milwaukee, Wis. 53218.

BARGAINS: HQ-170C, new, unpacked, $290.00; mint SB-400, $280.00; SB-33, mobile inverter, mike, $190.00. Much more. Stamp for entire list. W3CNS, 21 Terrace Lane, Elizabethtown, Penna. 17022.

WANTED: Gonset G-76 transceiver, cabinet for Swan 117-X supply. Electronic Keyer. State condition and your bottom price. All replies will be answered. Robert D. Burns, 128 S. Lincoln Ave., Mundelein, Ill.

HEATH HX-20 SSB exciter, $75.00; HO-10 monitor 'scope, $50.00; Drake 2-B, 2AC, 2BQ, $200.00; Waterman 'scope S-10-A, $30.00; Gonset SB-200, $125.00. F. H. Garrahan, W3QZ, 1445½ Wyoming Ave., Forty Fort, Penna. 18704.

HEATH, SB-200, in mint condition. WB2MOI, 16 Raynor Ave., Mount Vernon, N.Y. 10552.

WANTED: HRO-50T "A" coil. Will buy, or trade for "AA" coil. Gonset #3226 VFO for Communicator III, $35.00 or trade for good VHF police receiver. Getz, 5647 Beechnut, Houston, Texas 77035.

TRANSMITTER: 80 thru 6, built-in VFO, 150 watts. Never used. $65.00. Burton, 526 W. 152 St., New York, N.Y. 10031. Tel: AV6-2375.

SELL: TR-3 with AC-3 power supply, in excint condx, $400 ppd in USA. W6MGI, 1736 Ridgeview Dr., San Diego, Calif. 92105.

FOR Sale: HT-40, $55.00. SX-110, $50.00. Will ship. Kenneth Lucas, WA4WIN/9, 665 East 66th St., Indianapolis, Indiana 46220. Phone: 317-255-0547.

SELL: Eico 720, in excellent shape; $75.00; Eico 730 modulator, in mint condition, $55.00, both factory-wired. Frank Heuslein, WA2PND, Cold Spring Harbor, N.Y. 11724.

HEATH New SB-401 w/xtals, $295.00; HW-12A, $85.00; HA-14 linear with AC and DC supplies, $190.00. Built by Heath engineer. W8NDG, RR#3, Box 440, Stevensville, Michigan 49127.

SALE: Navigator, VFO and xtal 160-10M c.w. w/extra 6146As and coax relay, $60.00. W2NJS, Tom Donohoe, 39 Gramercy Park, NYC 10010. Tel: 212-673-3458.

12AVQ, three months old; $18.00. G. Arroyo, One Bogardus Place, NYC 10040. Tel: 212-942-4526.

1 KW PEP or c.w. homebrew linear. Built-in Hallicrafters case to match SR-160, etc. Winner of several homebrew contests. Price: $100 or your best offer. Details: Erv Greene, W7RDE, 4326 Hermosa Way, Salt Lake City, Utah 84103.

6-METER Gonset Communicator III, 4 xtals cord, schematic, mike, in xcint condx: $100.00. Daniel Kane, 9-05 166 St., Whitestone, LI., N.Y. 11357.

SELL: SB-200, $170.00; SB-300, $200.00; SB-400 (needs new LMO), $250.00; HO-10, $50.00. Lot price: $650.00. E. M. Leutwyler, WØKTO, 4917 Harrison, Davenport, Iowa 52806.

TRADE Even: Have new boxed Drake TR-4 with AC-4 power supply, trade for mint condition R-390A/URR receiver with filters. Advise S/N and condition. Will also trade new ham gear, Drake, Swan, National, Gonset, Ameco, for clean unmodified surplus equipment. Bill Slep, W4FHY, Slep Electronics Co., Drawer 178Q, Ellenton, Florida 33532.

FOR Sale: Globe Chief $25.00. VF-1, $15.00. Two BC-683 receivers, 3 ft. 237-D mounts. 20-meter Telrex beam. Frank Melvin, WA4VLL, Box 566, Clarkton, N.C. 28433.

HALLICRAFTERS SX-101A, excellent, no drift, receiver, $150.00. Shipped prepaid upon receipt of certified check or money-order. WB2YJS, Mike Tarnowsky, 24 S. Middletown Road, Montvale, N.J. 07645. Tel: 201-391-6450.

FOR Sale: Collins 30L1, Serial 12737, $350.00; 62S1, Serial 11429, $575; 32S-3, Serial 10439, $525.00; 51J4, Serial 7608, w/1.6, 3.0, 6.0 KHz filters, $700.00; 312B4, Serial 915, $150.00; MM2 oscilloscope, Serial B-1073, w/455KHz amplifier, $50.00. All equipment excellent condition. Prices firm. W8JRG, Richard Littler, 640 Snowhill Blvd., Springfield, Ohio 45504. Tel: 513-399-8697.

ANTENNA Tuner, homebrew, 1 kw 80-10. $35.00. WB4DRB, 4519 N 35 St., Arlington, Va. 22207.

VARIOUS Six and two-meter gear for sale or trade. WB2UWN. Tel: (212)-653-3187.

DRAKE 2B with 2AC 2AS, extra bands, $160.00; HT-32, $220.00. Both clean, no bugs. 15M beam, 24 ft. tower, rotor, guys, 220 ft. RG59/U, rotor lead, $50.00. KØUMW, 4475 Broadway, Boulder, Colorado 80302.

NATIONAL NCX-3 with AC, $179.00; DC supply, $40.00. Aerotron Aircraft transceiver, $40.00. Wanted: SB-200. W9-JCE, 370 Aspen Lane, Highland Park, Illinois 60035.

COLLINS VFO 70E-24 for 75A-4, new, $39.00; AN-APR4Y receiver, AF-FM converted by Goodheart, $175.00; CV253/ARL tunes 38 to 100 Mc. converter, $175.00; TN-19 APR4 tunes 975 to 2300 Mc., $50.00. Complete package, in excint condx: $350.00. R. E. Mann, 430 Wilmot Road, Deerfield, Ill. 60015.

SELL: Galaxy 300, AC supply, mic, gud condx, $2.00. Shipped prepaid. Two Heathkit Teners, $25.00 each. Tom Armour, 803 North Mulanix #16, Kirksville, Mo. 63501.

HALLICRAFTERS SX-101 Mark III, excint condx. Operating manual. $135.00. WA9ORX, Duane Bassett, 1529 N. 27 St., Milwaukee, Wis. 53208.

WANTED: 312-B4 and 30-L1, perfect condx. Lowest cash prices. K4IQ, Dave Manning, 6417 White Sands Terr., Sarasota, Fla. 33581.

SX-115. Must sell. Absolutely perfect in appearance and operation: $300. Philly area. K3EEP, 2649 Colmar Ave., Cornwells Hts, Penna. 19020. Tel: (215)-639-4659.

DUMMY Loads 1 KW, all-band, $7.95; wired, $12.95. Ham Kits, P.O. Box 175, Cranford, N.J. 07016.

NCX-5 owners: NCX-501 VFO, brand new, factory-sealed carton, $160.00, ship prepaid. Wanted: Popular Radio, 1922-1929. W9EJN, 1204 Bowdoin Rd., Madison, Wisconsin 53705.

SELL: Microwave test equipment. TS-147A easily modified to "D"; excellent condx, with manual, $85.00. IM-81/UP standing wave indicator, $22.50. WB2PLY, Box 207, Princeton Jct., N.J. 08550.

HRO-500 National. Rare opportunity to save $450.00 on the ultimate receiver. Better than new, still in box. Px 205/822-6768 or Gavin, P.O. Box 7684, Birmingham, Ala. 35223.

FOR Sale: DX-100; HQ-170C with matching speaker; Multi-Elmac AF68, PMR8, M-1070 power supply, (complete unit sale only); Hallicrafters model S53A general-coverage receiver; all in excellent condition. Best offer. Robert Horner, W3ZUX, 54 North Sixth St., Chambersburg, Penna. 17201.

GOING S Line. For sale: Hammarlund HQ-180, $250.00; Hammarlund HX-500, $250.00; Henry 2KD2 seven months old, $600.00; Heath Monitor 'scope, $50.00; Utica 650, $100; Telrex 624 beam, $30.00; Cliff Dweller Antenna, $60.00. Heath SWR Bridge, $7.00. Clark, W3HZ, 19073.

RANGER II factory wired, in excint condx, with manual and original carton. Asking $215.00. Make offer. WB2VZA, 7224-11 Ave., Brooklyn, N.Y. 11228. Tel: (212)-BE6-9412.

SELLING: Eico 315 signal generator, new condx, $35.00; Cush Craft 2m halo and mast, $5.00; new Alliance C-225 rotor system. Case and front of control box missing (cost about $5). Never installed. In perfect working order, $18. WB2OOK, 1129 Astor Ave., Bronx, N.Y. 10469.

HAMMARLUND HQ-110-AC receiver, brand new condition. Used only a few days. With manual, $155.00. Ron Deak, K2SJS, 99 Ulster Ave., Saugerties, N.Y. 12477.

HT-40 xmtr; JT-30 microphone, $40.00; HA-5 VFO with 6 m. xtal, $45.00. K9AUD, 223 Weston URH, Champaign, Illinois 61820.

SELL: DX-60A transmitter, microphone, four crystals, perfect condition, $59.95; ship express collect. Ray Dopmeyer, 1042 Mary, Opelousas, Louisiana 70570.

WANTED: Trade for an SSB transceiver 80-10 with chemical apparatus. Will consider other equipment. Send SASE. K5CAV, 205 Pine, Hammond, Louisiana 70401.

WANTED: Power transformer for Heath DX-100. Will sell unit without transformer. K3CEW, 238 Duncan Ave., Wilmington, Del. 19803.

SUPERDYNE (Tuska) wanted. Washburne, 837 Adam Circle, Plainfield, N.J. 07062.

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WANTED: UTC "Special Series" transformers and inductors. Send model, condition, price. Alan Robinson, 6651 Forward, Pittsburgh, Penna. 15213.

RTTY Channel filters, octal mounted, 2125/2975, $5.95 pair. Special filters for TT/L-2. SASE for information. 88 mh toroids, uncased, 5 for $2.50. Herman Zachry, WA6JGI, 3232 Selby Ave., Los Angeles, Calif. 90034.

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NC-183D speaker, phones, $110.00; Signal Centry,- $8.00; Heath VTVM, $12.00; signal tracer, $7.00; 5Y3 power, $3.00. Manuals prods. extras, all for $125.00. W2SGH, 81-16 259 St., Floral Park, N.Y. 11004. Tel: (212)- FI-3-6091.

SELL: ARB Receiver, covers 190 kc.-10 mc., $25.00; Morrow 5BR-2 mobile converter, $28.00; Heathkit WA-P2 preamplifier, $12.00. Write for list of goodies. Peter Johnson, Rte. 1, Box #1943, Salem, Oregon 97304.

COLLINS S/Line, new last year, immaculate: 75S-3B modified by W2VCZ, $475.00; 32S-3, $475.00; 516F-2, $75.00. Package deal, $995.00. F.o.b. W4ETO, 13315-108th Ave. North, Seminole, Florida 33540. Phone Clearwater 813-595-3447.

SELL: BC-348-R with S-meter, built-in ac. supply. Excellent, $65.00. Write for full details. Jim Shipkowski, 126 E. Union St., Nanticoke, Penna. 18634.

COLLINS 75A-4, serial number 4603. Includes 800 cycle, 3.1 kc. and 6 kc. filters. $350.00. Frank Mills, K1FVU, 148 Chalmers St., Springfield, Mass. 01118.

COLLINS 32S-3 with 516F-2 AC power supply. In mint condx. $600.00. Plus shipping. John Middleton, WØGZV, 1695 Country Club, Marion, Iowa 52302.

COLLEGE: Hallicrafters SX-101A, $200.00; HT-37 xmtr, $250.00; HT-41 linear, $200.00. All three extremely fine condx. Heath VX-1, $15.00. W8PKU, John Page, 206 Chicago St., Eaton, Ohio 45320.

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32S-3, $525.00; 516-F2, $75.00; 750S3, $400.00; 312-B4, $125.00; SB-200 (linear), $175.00. HO-10 (monitor 'scope), $50.00. 10% off on a package deal. K1VCB, Fern Belanger, 61 Lafayette St., Fall River, Mass. 02723.

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VIKING 500 with power supply and modulator, in A-1 condition—$250.00. Viking 500 with power supply and modulator, requires choke in power supply, $225.00. Clegg Seus 6 and 2 meter transmitter with power supply and modulator, excellent condition, $400.00. BC221T with original calib. book, $40.00. W3AEM estate. Write: Mrs. Russell E. Freed, RD#1, Box 284, Pottstown, Penna. 19464.

DRAKE 2B/2AC, Heath Q-mult., $185.00; SB-200, $160.00; HT-32, relay, E-V 729, $175.00. K2AJA, Ralph Katz, Glen Lane, Mamaroneck, N.Y. 10543. Tel: 914-698-7329.

TA-33 Jr. beam, AR-22 rotator. Must sell. Kaye, 1361 E. 17th St., Brooklyn, N.Y. Tel: (212)- DE9-0349.

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WATERS 334 load-wattmeter, $75.00; Measurements 59, $90.00; 432 mc. amplifier, Bird Thruline, other gear. List for stamp. W4API, Box 4095, Arlington, Virginia 22204.

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HALLICRAFTERS Mobile Mount MR150, $20.00; P3-150-12 DC supply, $50.00. V. Barry, 306 E. Gilpin Ave., Norfolk, Virginia 23503.

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VHF—NC-303, National 6M, Ameco CN-144 and CN-220 Nuvistor converters, like new, $250.00. Manuals. W9REW, 4811 Forest Ave., Ft. Wayne, Ind. 46805.

FOR Sale: QST 1955 to 1967. "73" 1960 to 1967 in Binders. New Cush Craft three element twenty meter beam. Knight tape recorder. K1APA, 3 Sunny Acres, Brattleboro, Vt. 05301.

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IN College: Can't use NCX-5 MK II, NCX-A power supply/spkr, and Heath HO-10 'scope. All are in mint condx. Sell and ship for $600. Barry Watzman, WA4PCC, Warren Hall, Rm 207, Burdett Ave., Rensselaer Polytechnic Institute, Troy, N.Y. 12181.

FOR Sale: Heathkit HW-10 Shawnee, $140.00; Hallicrafters S-108 rcvr, $75.00; Heathkit VF-1 VFO, $10.00. Wanted: Elmac PS2V AC power supply, Hallicrafters HA-2 transverter. Gordon Brown, WAØAZV, New Madrid, Missouri, 63869.

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FOR Sale: Swan 350 transceiver and fixed station and mobile Swan 117-X power supply, in original carton; used less than 20 hours. Will sell for $475.00. Tom Jones, 86 Wing Road, APO New York 09845.

SALE: Heath SSB transmitter HX-20, $125.00; receiver HR-20, $60.00, ACPS, $20.00; DCPS, $25.00.All $200. E. M. White, 848 Broad St., Shrewsbury, N.J. 07701.

NEW 4CX250B, $21 pr. pp, 4X150A, $7 pr. pp, 4-125A, $16 pr pp. Heath HX-20 SSB xmtr with AC supply, $95.00. C. M. Pruett, Star Rte C, Flamingo Bay, Ft. Myers, Fla. 33901.

100-FT. AF P & B #P223-35 Contr #1868 galvanized steel triangular tower, five sections, 145 lbs each. 9 guys, all bolts, turnbuckles, plates. Best offer over $130.00 or will swap for 75 meter equipment, or what have you. Cliff Piper, WA1IEC, Highland Rd., Atkinson, N.H. 03811.

FOR Sale: B & W 5100B, manual, in excellent condition, $150.00. WB2GZU, RD #1, Little Falls, N.Y. 13365.

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NOVICE c.w. xmtr 50 watts Johnson Viking Adventurer $30; Knightkit FM Monitor receiver 152 mc, 174 mc, $35.00; Heathkit Visual-Aural signal tracer, Model IT-12, $18.00; Master Mobile #750 all-bander loading coil, $9.00; army mobile spring collapsible whip (127 in. long), $3.00; 6-Meter Halo (37 in. dia.), $4.00; Heathkit SWR Bridge, $8.00; 2-meter crystals, $1.00 ea. Pls call after 7 P.M. Telephone No: ES 2-7927. Paul, WB2JMD, Brooklyn, N.Y.

INVADER 2000, perfect, solid KW but too big. Sell for $850 firm, or trade for gud KWM2A. Also HQ-180 with IF noise-silencer, $350. Both for $1100. K4ZOR, 409 Kaelin Dr., Louisville, Ky. 40207. Phone a.c. 502-895-4733.

WANTED: Vibro-Keyer. Send photo and price desired. Carl, WN5QYJ, 6126 Grapevine, Houston, Texas 77045.

PRINTED Circuits. Build the modern way. 10¢ stamp for catalog. Harris Co., P.O. Box 985, Torrington, Conn. 06790.

SELL: Heath Mohawk RX-1 receiver, in vy gud condx. Heath speaker, manuals, trimmers. $150.00. Will ship REA collect. Bill Robinson, W6RMY, 1640 Wandering, Monterey Park, California 91754.

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WANTED Collins 32V3. Must be in excint condx. Sam Horowitz, 1115 Willis Ave., Albertson, N.Y. 11507.

WANTED: Heath HX-20 SSB exciter and booklet. K6IU, 1206 So. Irena Ave., Redondo Beach, Calif. 90277.

SELL: Swan 250, 117XC power supply, 14-XP DC module. All for $350.00. V. Babcock, 4720 Clinton St., Los Angeles, Cal. 90004.

WANTED: HT-32B or HT-32 in mint condition, also need tower, Triband beam, Ham-M. State full details and prices. Art Rehm, 80 Douglas Dr., South Meriden, Conn. 06450.

SELL: Swan 500, latest model and 117XC AC supply, in mint condx, in original packing. 14AVQ antenna, $550. Lafayette HE45, 6 meter transceiver with 5 element Cush Craft antenna, excellent condition, $75.00. WA2AMC 1199 Pierce Ave., N.Y. 10461, 824-7920.

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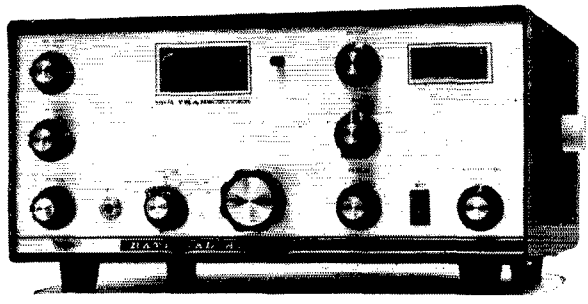

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Inverter
Limiter
Mixer
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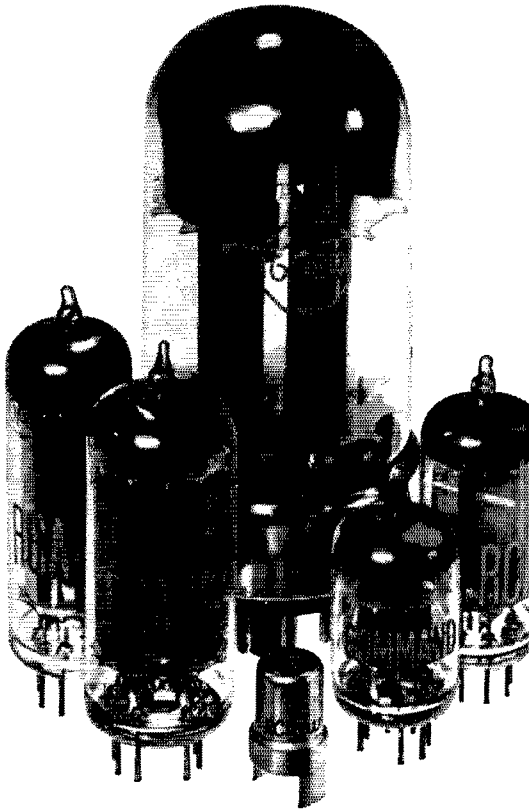

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