January 1968
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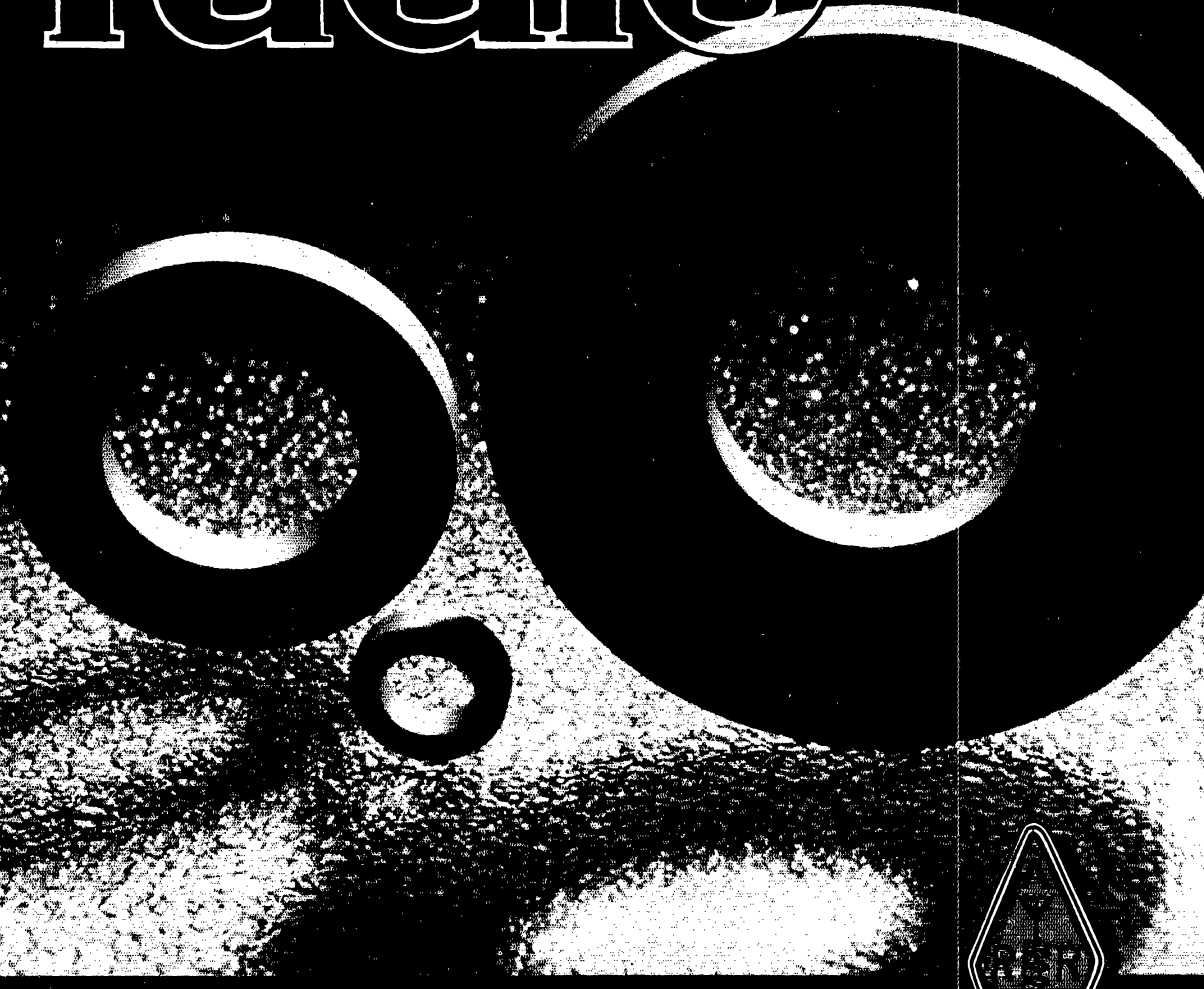
amateur radio



OFFICIAL JOURNAL OF THE ARRL

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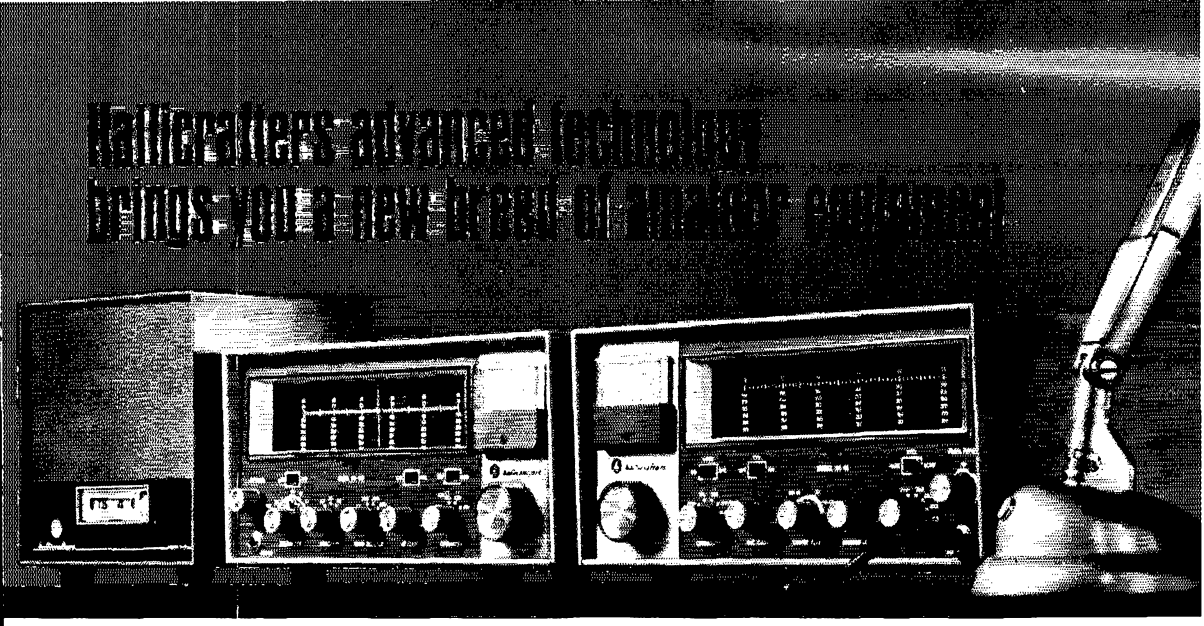

SX-146 Receiver

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, $295.00

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, **$44.95**

Amateur net, $395.00

R-51 Speaker.

4 x 6 inch oval speaker and attractive 24 hour clock.

amateur net $39.95

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The microphone with backbone...

now has a staunch new companion!

In just a few short months the Electro-Voice Model 676 has gained quite a reputation as a problem solver—no matter what the odds. Now the 676 has a teammate. The Model 674 has the same unique backbone that rejects unwanted sound . . . an exclusive with Continuously Variable-D (CV-D)® microphones from Electro-Voice. And the improvement in performance is dramatic.

Troubled with noise pickup or spurious VOX tripping? Most cardioid microphones cancel best at only one frequency—but CV-D* insures a useful cardioid pattern over the entire response range. And its small size means the pickup is symmetrical on any axis.

Bothered by lows that cut your P.E.P.? A recessed switch lets you attenuate bass (by 5 or 10 db at 100 Hz) to stop problems at their source. And there's no unwanted bass boost when you work ultra-close. CV-D eliminates this "proximity effect" so common to other cardioids.

And on field days, wind and shock noise are almost completely shut out by the CV-D. Efficient screening protects against damaging dust and magnetic particles, and guards against annoying "pops."

As for delivering a clean signal, nothing beats the 676 and 674. The exclusive E-V Acoustalloy® diaphragm gets the credit. It's indestructible—yet low in mass to give you smooth, peak-free response with high output.

The Model 676 slips easily into its 1" stand clamp for quick, positive mounting. The fine balance and shorter length of the 676, and absence of an on-off switch makes it ideal for hand-held and VOX applications.

The Model 674 offers identical performance but is provided with a standard mounting stud and on-off switch (which can be wired for relay control). Either high- or balanced low-impedance output can be selected at the cable of both microphones.

Choose the 676 or 674 in satin chrome or non-reflecting gray finish for just $60.00 amateur net. Either one can solve your toughest audio problems. Proof is waiting at your nearest E-V ham microphone distributor's. Or write for free catalog of Electro-Voice microphones today.

An important footnote: There is no time limit to our warranty! If an E-V microphone should fail, just send it to us. If there's even a hint that our workmanship or materials weren't up to par, the repair is no charge—even decades from now! Fair enough?

*Patent No. 3,115,207

ELECTRO-VOICE, INC., Dept. 182Q, 631 Cecil St., Buchanan, Michigan 49107

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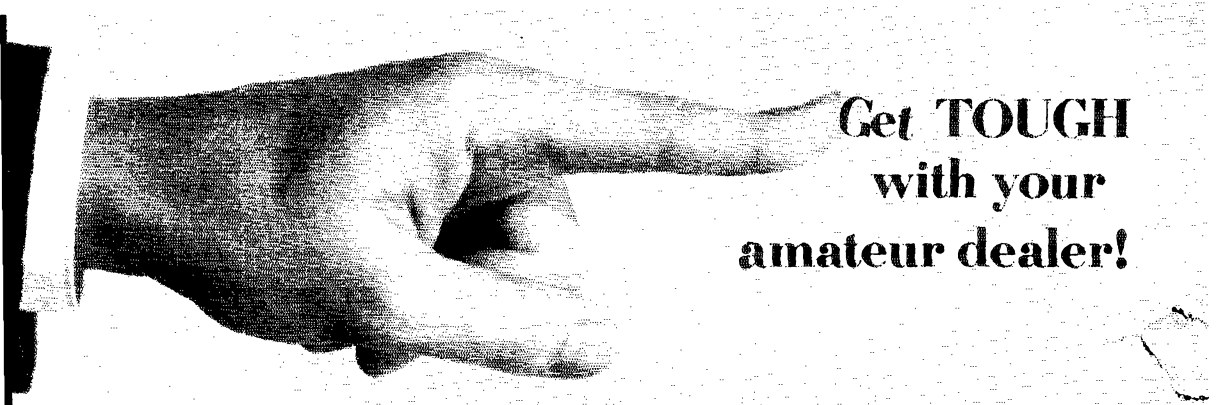

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JANUARY 1968

VOLUME LII NUMBER 1

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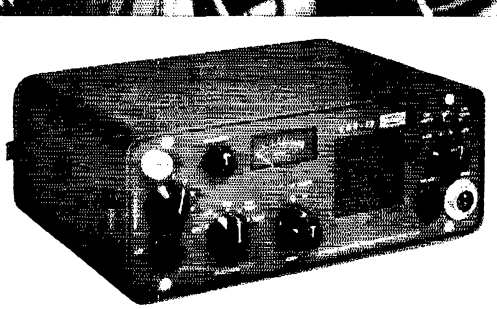
OUR COVER

Garden hose washers? Rolls of tape? Ancient prayer wheels? Nope—just three toroid cores. See page 11.

—CONTENTS—

Versatile Raytheon SSB Transceiver... completely reliable in every climate



This Raytheon Model CSB-15 incorporates circuit and construction features that assure complete reliability in any climate. Its all-transistor circuits, small size, and light weight make it ideal for manpack, mobile, or base station operation.

Up to four switchable channels—from 2 to 10 MHz—can be supplied with the CSB-15. In addition to selectable SB, the unit provides CW operation with sidetone monitoring.

Simplified operation. The CSB-15 is designed for operation by non-technical personnel. Its rugged, waterproof construction assures reliability under field conditions. The microphone and optional handset have excellent speech characteristics.

Designed for 12V DC operation, the CSB-15 can be operated from 12V automobile or boat battery or from rechargeable Ni-Cad-type dry batteries. It can also be operated from 115/230 AC with accessory power supply.

Write for complete data to *Raytheon Company, International Sales and Services, Ltd., Lexington, Mass. 02173.* Cable: Raytheonex.

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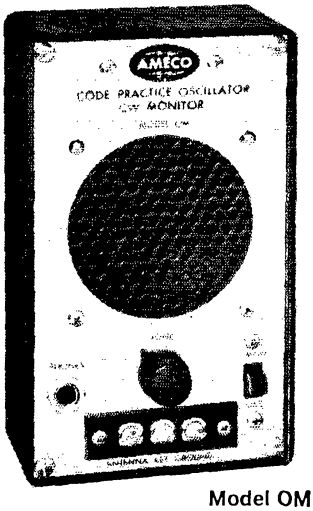


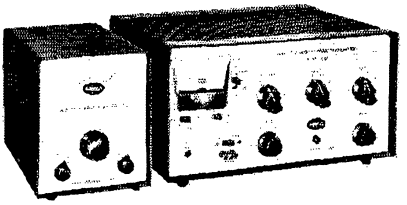
Model OM

Improve your CW sending

- **MONITORS TRANSMITTER'S RF OUTPUT WITHOUT ANY CONNECTING WIRES**
- **TRANSISTORIZED**
- **KIT OR WIRED**
- **BUILT-IN SPEAKER**
- **LOW COST**

Model OM is a combination code practice oscillator and C.W. monitor. It monitors the transmitter's RF output WITHOUT any connection to the transmitter. It may be used with any ham transmitter or transceiver. There is a tone control and headphone jack on the front panel. Model OM contains 2 transistors and 4 diodes. Size 6" x 3" x 2".

Model OMK.....KIT FORM $9.95
Model OM Wired and Tested 12.50
Model OCPK.....KIT.....Code Practice oscillator only (NO MONITOR)..... 7.95
Model OCPW Wired.....Code Practice oscillator only (NO MONITOR).....10.50



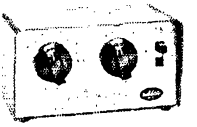
VFO-621

VFO for 6, 2 and 1¼ meters. Transistorized oscillator plus doubler, buffer and amplifier stages give highest stability and output. Built-in zener diode regulated power supply $59.95

TX-62

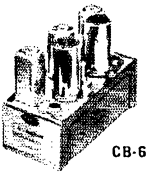
6 and 2 meters, 75 watt phone and CW transmitter. Built-in solid state power supply. Broadbanded circuits make tuning easy. Uses inexpensive crystals or external VFO $149.95

ALL BAND NUVISTOR PREAMP 6 THRU 160 METERS



MODEL PCL $24.95

2 Nuvistors in cascode give noise figures of 1.5 to 3.4 db. depending on band. Weak signal performance, image and spurious rejection on all receivers are greatly improved. PCL's overall gain in excess of 20 db. Panel contains bandswitch, tuning capacitor and 3 position switch which puts unit into "OFF," "Standby" or "ON," and transfers antenna directly to receiver or through Preamp. Power required — 120 V. at 7 ma. and 6.3 V. at .27 A. — can be taken from receiver or Ameco PS-1 supply. Size: 3"x5"x3"



CB-6

CB-6K — 6 meter kit, 6ES8-rf Amp., 6U8-mix./osc. $19.95
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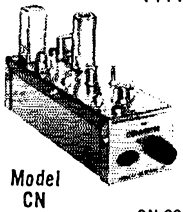

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NUVISTOR CONVERTERS FOR 50, 144 AND 220 MC. HIGH GAIN, LOW NOISE

Has 3 Nuvistors (2 RF stages & mixer) and 6J6 osc. Available in any IF output and do NOT become obsolete as their IF is easily changed to match any receiver. Average gain — 45 db. Noise figure — 2.5 db. at 50 Mc., 3.0 db. at 144 Mc., 4.0 db. at 220 Mc. Power required 100-150V. at 30 ma., 6.3V. at .84A. See PS-1 Power Supply. Model CN-50W, CN-144W or CN-220W wired, (specify IF.) **$49.95.** Model CN-50K, CN-144K or CN-220K in kit form, (specify IF.) **$34.95**

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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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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.

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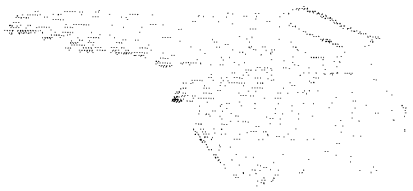


THE YEAR IN REVIEW

If years were named here as they are in the Far East, 1967 would be "The Year of Incentive Licensing." Ending a four-year, sometimes-agonizing, reappraisal of amateur radio's progress and status, surely the most important event of the year was FCC's decision to reactivate the Advanced Class license and tie meaningful operating privileges to it and the Extra. Its proponents rejoiced; even the majority of those originally opposed heaved a sigh of relief that it was settled and buckled down with determination to attain the higher grade tickets. New exams omitted obsolete questions and added topical material, e.g., on solid-state devices. Novices got two-year terms, but will lose voice privileges on 2 meters late in 1968. Two-letter calls were made available to 25-year hams holding the Extra. Cheered by all was FCC's decision to drop the proposal for a complete revamping of call signs.

Elsewhere in the regulatory field, FCC eased identification requirements, in effect legalizing tail-ending and removing the necessity for transmission of geographical location by portable and mobile stations. Proposals from individuals for separation of sideband and a.m., and for codeless licenses, were denied by the Commission. Across the border, Canadian amateurs switched to five-year station licenses from the annual basis in effect for 50 years, and in celebration of the country's centennial were permitted to use 3C and 3B prefixes for 1967 activities.

Canadian members also marked their centennial by staging in mid-year a wonderful ARRL National Convention in Montreal (first ever held outside the States) — with Expo 67 as an added fillip; VE2XPO operated from the Youth Pavilion at the Fair. Elsewhere in the hemisphere, the big events were the triennial meeting of the Region II IARU at Caracas in May, and the annual meeting of FRACAP (Central American amateur societies) in Honduras in October. Amateurs provided some of the communications for dignitaries at the Conference of American States in Uruguay.

On the international scene, Bulgaria, Faroes, Honduras, Ivory Coast and Malta societies joined IARU, bringing the total membership to 77. A new tool for presenting the amateur story to telecommunications authorities was a report commissioned by ARRL and produced by Stanford Research Institute: *Amateur Radio: An International Resource*, distributed worldwide largely through IARU member-societies. Two ITU seminars at Geneva provided additional opportunity for contact between ARRL/IARU staff and telecomms people. Project DARE (Developing Amateur Radio Everywhere) programs were underway in more than a dozen developing countries, each tailored to the needs and potentialities of the particular country, but all with the end objective of increasing the number of amateurs and their usefulness to their homelands.

Highlights of the operating year: a very successful Field Day, with more favorable public notice than ever before; K7WSJ at the World Scout Jamboree in Idaho; outstanding communications emergency performance in Hurricane Beulah and several dozen smaller crises; message traffic for servicemen overseas, plus slow-scan circuits to the isolated Antarctic crew; and global moonbounce contacts. The rhombic was re-installed at W1AW and provided a better signal for west coast members.

On the organizational side, the Board raised membership dues (first time in eight years) and established a Life Membership, for which more than 400 have already signed up. Hamquest 67, which concluded in February, added hundreds of members to the roster. The first issue of a new periodic bulletin for affiliated clubs appeared late in the year. The Building Fund closed out at year-end with its quota practically fulfilled. A new *Operating Manual* made its appearance and enjoyed excellent sales; a revised *License Manual* late in the year was snapped up by amateurs eager for advancement to the new higher grades of license. Extensively-revised copy for the 1968 *Handbook* went to the printer, with a striking new cover to match.

Yes, 1967 was an interesting and eventful year. More important, with the cloud of incentive licensing indecision removed, and the sunspot cycle turning rapidly in our favor, at year-end amateur radio seemed poised for a resurgence of activity. In 1968 our combined enthusiasm, cooperation, determination and drive can make it so! QST

League Lines . . .

The Simulated Emergency Test of AREC communications facilities, for years held each autumn, switches now to January (27-28). In southern climes there may be little difference, but for the rest of the country we could be battling snow and ice. As actual disasters are no respecters of the season, we might even hope for such weather to give our capabilities a real test. Anyway, check page 66 for details and pitch in with your local group.

There are now some 325 paid up Life Members of the League, with another 100 in process through quarterly payments. Will we make the total 1,000 by the end of the year? Applications are available from Hq.; dues are single payment of $130, or eight quarterly installments of $16.25 each.

Some bad apples in every barrel? There is a group on 75 phone regularly with suggestive remarks bordering on obscenity, and derogatory comments on FCC officials. Like other enforcement agencies, FCC is probably hampered by recent court decisions which provide escape routes for violators. Yet, if the obscenity rule can't be adequately upheld, there's always the provision in the Communications Act that licenses shall be granted "if public convenience, interest or necessity shall be served thereby." The only public interest to be served in these cases is revocation of the licenses.

Handsome club awards are available in the ARRL DX Contest (Sweepstakes and VHF SS also) to the top-scoring member from each club submitting at least three entries per mode. The club with the highest cumulative-member score in each affair receives a trophy in the form of an engraved gavel.

From time to time, beginning with this issue (page 44), we plan to present a "QST Extra." These will be articles which, for reason of space or topic, we might not ordinarily be able to publish as quickly as we would like. But now we have made arrangements to bring you an occasional "bonus" without in any way decreasing the amount of space devoted to regular technical articles, or to the many other areas which QST must cover. That is, these QST Extras will be in addition to our usual monthly fare. Let us know how you like the idea.

Remember the "Vital Triangle" -- amateur, local club, League -- mutually dependent to provide a united voice, strengthen the art, improve operating and technical capability, and to get the most out of "the wonderful world of amateur radio." You're not IN unless you're in all three.

A reminder when renewing your license -- FCC will not return old licenses submitted, but will accept photocopies in case you want to keep your old tickets for sentiment's sake.

We wish you all a good year in 1968, loaded with many enjoyable hours of hamming, and an equal amount of personal satisfaction through increasing technical and operating skills to make those hours even more pleasant.

This article explains some of the advantages of toroids, how they can be put to work in ham radio circuits, and how to build them. Additional information shows how you can make your own toroid cores and where you can buy commercial forms.

Toroidal-Wound Inductors

Why, Where, and How to Use Them

BY DOUG DEMAW,* W1CER

With many builders of ham radio gear, miniaturization has become the watchword of the day. This is especially true of those who enjoy working with solid-state and etched-circuit projects. One of the deterrents encountered when designing small-volume equipment is the squeezing in of bulky inductors — slug-tuned or air wound — into a hoped-for compact assembly. Toroids offer a practical solution to the problem of mass. The good points do not end there, however; toroidal-wound inductors not only fit into small places, they offer exceptionally high values of tuned-circuit Q, a definite attribute when selectivity is an important consideration in equipment performance. Ordinarily, air-wound inductors which provide comparable Q are many times larger than are their toroidal kinsmen. Naturally, the correct type of core material must be used in order to realize the best possible Q at a particular frequency.

Minimum interaction between the tuned stages of a given piece of equipment is usually of paramount importance to the builder. Here is where the toroid really puts on a stellar performance. In layman's terms, a toroidal inductor is self-shielding. That is to say, its magnetic flux is very nearly all contained within the coil itself. This feature cuts down stray inductive coupling between adjacent circuits and permits the toroid to be mounted physically close to other components — including the chassis and cabinet walls — without impairment of its efficiency. The latter is not true of ordinary r.f. inductors. Because the flux is contained within the toroid coil, tighter coupling between windings, when a primary and secondary are used, is possible.

The high permeability of ferrite toroid cores permits the user to employ fewer turns in the tuned-circuit inductor. With fewer turns of wire required larger wire gauges can be used, with a resultant reduction in heating and I^2R losses. This feature is especially beneficial in transistorized equipment where high collector currents are frequently required.

* Assistant Technical Editor, *QST*.

It is best to understand that the word "toroidal" refers to a physical format — doughnut shape — rather than to a specific device or type of material. Toroid cores come in a host of sizes, are manufactured by many firms (each with a different identifying code for the type of core material used), and are fashioned from a wide variety of materials. Some cores are made by rolling up great lengths of thin silicon steel tape (Hipersil) into a toroidal form. Such cores are held together by means of plastic covers, or are wrapped with glass tape which holds the core intact while insulating it from the wire which is wound on it. This type of core is commonly used for low-frequency power applications such as d.c.-to-d.c., and d.c.-to-a.c. converters. For audio and r.f. applications powdered iron and ferrite (a newer type of ceramic) material are generally used. Ferrite acts like an insulating material, making it unnecessary to place a layer of tape between the core and the winding of the transformer or inductor.

A portion of this article will deal with nickel-zinc ferrite cores of commercial origin. Because Indiana General Corp. supplies their toroids on a single-lot distributor basis to amateurs,[1] we will refer to specific cores and type-designators used by them. A number of other companies manufacture ferrite cores and rods, but most of them have a minimum billing of $5 or more per order.[2] They should not be overlooked as possible suppliers, however, and most of them offer catalogs, price lists, and data sheets to those who

[1] Indiana General Corp., Electronics Div., Keasbey, N. J., 08832. Address all correspondence to Termag Corp., 88-06 Van Wyck Expressway, Jamaica, N. Y. 11418, authorized distributors for IGC. Ask for price bulletin #101, Bulletin 101A, and data sheets for Q1, Q2, and Q3 Ferramic materials.

[2] Ferroxcube Corp. of America, Saugerties, N. Y. 12477. Ask for Bulletins 301 and 330-A.

Permacor, 9540 South Tulley Ave., Oak Lawn, Illinois 60453.

Ami-Tron Associates, 12033 Otsego St., North Hollywood, Calif. 91607. No minimum billing. Several kits available, including a basic two-toroid experimenter's kit for $1.50. Write for catalog and price list.

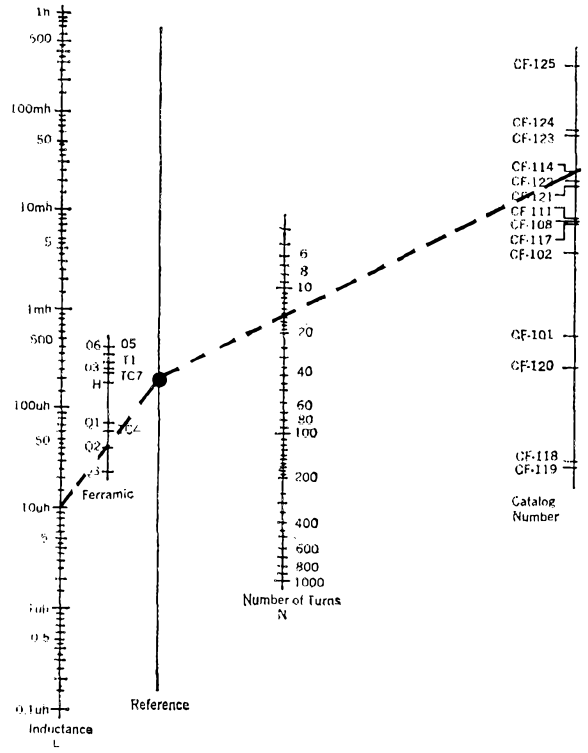


Fig. 1—Nomograph which can be used to calculate the number of turns required for a specific inductance once the type of core (Indiana General) is known. Draw a line (shown dashed) from the desired amount of inductance, *L*, through the marker which indicates the core material being used, Q1, Q2, Q3, etc. Complete this line until it intersects the Reference line. Now draw a line from the intersect point on the Reference line to the catalog number line of the nomogram (CF number of the core). This line will cross the Number of Turns (N) line, indicating the number of turns needed. Example shows 15-turn winding required for 10-μh. inductance on CF-114 care of Q2 material. (Nomogram courtesy of Indiana General.)

are interested. The remainder of this discussion will show the experimenter how he can fabricate his own toroid cores from familiar components that can be found in most junk boxes.

Choosing a Core

There is no simple rule that can be used for selecting a toroid core for a particular job. Many things must be considered: notably the intended frequency of operation, the operating frequency versus the physical size and permeability of the core, and whether or not the core will be used in a small- or large-signal tuned circuit. The higher the permeability rating of the material, the fewer will be the number of turns required to obtain a specific inductance value. For example: if a core of certain size has a permeability rating of 400, it might require, say, 25 turns of wire to give an inductance of 10 μh. Another toroid core having the same physical dimensions but with a permeability of 100 may require 75 turns of the same-size wire to exhibit an inductance of 10 μh. Therefore, where minimum I^2R loss in the winding is desirable, the higher permeability is better. A core with a larger cross-sectional area (computed from inside diameter, outside diameter, and core height) will reduce the required number of turns also. These are but a few possibilities to consider when selecting a core. Q1 material is rated for r.f. applications up to 10 Mc., Q2 stock is good to 50 Mc., and Q3 ferrite is rated to 225 Mc. These three ranges handle most r.f. needs. If the improper material is chosen for a given frequency of operation, the core material will not provide a high-*Q* inductor. In fact, the wrong material can completely ruin a tuned circuit. If too large a core (physical size) is used in the upper h.f. region, or at v.h.f., it may be impossible to wind a suitable coil on the toroid because so little wire will be required to provide the needed value of inductance. For this reason, the smaller cores, and those with low permeability ratings, should be used in the upper frequency range.

It is helpful to have some knowledge of the core types offered by the various companies before ordering a toroid for a particular project. Indiana General offers a specification sheet for each of their core materials (see Table 1). Each sheet lists such data as permeability, flux density, residual magnetism, usable frequency range, and the loss factor at a specified frequency. Bulletin 101A lists the physical dimensions of their cores and also gives the cross-sectional area of each model in square inches. With this information one can calculate the required number of turns for a specific inductance value, using a selected core size. With the foregoing information at our disposal, the formula given here will enable the constructor to determine the inductance of a toroid when the number of turns is known:

$$L = \left(0.0046\mu N^2 h \log_{10}\frac{\text{O.D.}}{\text{I.D.}}\right)\ \mu\text{h.}$$

Where L = inductance
μ = permeability of the material

N = number of turns
O.D. = outer diameter of core (cm.)
I.D. = inner diameter of core (cm.)
h = height of core (in cm.)

To obtain dimensions in centimeters, multiply inches by 2.54. The inductance nomogram given in Fig. 1 can be used when designing toroidal inductors which are to be wound on the standard cores offered by Indiana General.

Specific Applications

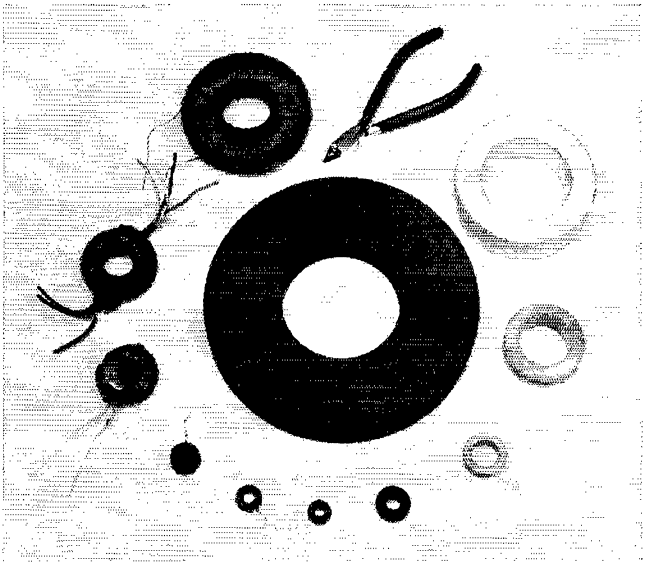
Because toroids can be used in circuits that handle anything from microwatts to kilowatts, they can be put to good use in almost any tuned-circuit or r.f.-transformer application. The smallest core this writer has seen is about the diameter and thickness of the head on a common pin (I.G.'s CF-118). An extremely large model, the CF-125, offered by the same company has an outer diameter of almost 6 inches, is more than half an inch thick, and has an i.d. of 2½ inches. It was designed for high-power applications and has been used as a core for balun transformers at power levels up to 20 kilowatts in the h.f. spectrum.

Most amateurs are familiar with balun transformers, having used them at one time or another in their antenna systems. Toroids find widespread use as balun transformers because they provide a broad-band transformer that is compact and offers good power-transfer efficiency. An article which describes how to construct home-made toroidal baluns was published in August 1964 *QST*. Core size with respect to four different power levels — 150 to 1000 watts — is treated in the article.

Toroidal inductors are especially useful when applied to circuits such as those in Fig. 2, in which a high degree of selectivity is desired. A high-Q toroidal tuned circuit in the r.f. and mixer stages of a communications receiver can do a great deal more when it comes to image rejection than is possible with conventional slug-tuned inductors. In fact, if the circuit is designed to have a high enough Q, even the very strong ham signal from the guy down the block won't affect your receiver too much if it's a hundred kilocycles or more away from your operating frequency. Because of the high Q circuits, however, the peak when adjusting the preselector or antenna-trimmer controls will be sharper, and it will be necessary to retune for a peak more often than is normal with coils of lower Q.

Another application that is tailor-made for toroidal inductors is in transistorized transmitting and receiving equipment — and in some vacuum-tube circuits — where broad-band input, interstage, or output r.f. transformers are desired. Toroids can be used in such circuits to provide good efficiency and small physical size. The broad-band transformer requires no tuning controls when properly designed for a given frequency range — a particularly useful feature in mobile equipment. It is not difficult to design a broad-band transformer[3] that will work over a range of 3 to 30 Mc., but one must take precau-

[3] C. L. Ruthroff, "Some Broadband Transformers", *Proc. IRE*, Vol. 47, p. 137, Aug. 1959.



Toroids come in many sizes and styles. Shown here is a collection of toroid cores, one of which can handle as much as 20 kilowatts of r.f. power (large unit at center). The two smaller cores at the right of the diagonal cutters are tape-wound types which are ordinarily used for d.c. to d.c. converters or in audio equipment. The remaining cores are made from ferrite materials and are suitable for use at frequencies as high as 250 Mc. The core on the left of the cutters is wound with several layers of No. 18 enamel wire, is a tape-wound type, and provides an inductance of 2 hy. The large core at the center has an outer diameter of 6 inches, an inner diameter of 2⅜ inches, and is ½ inch thick.

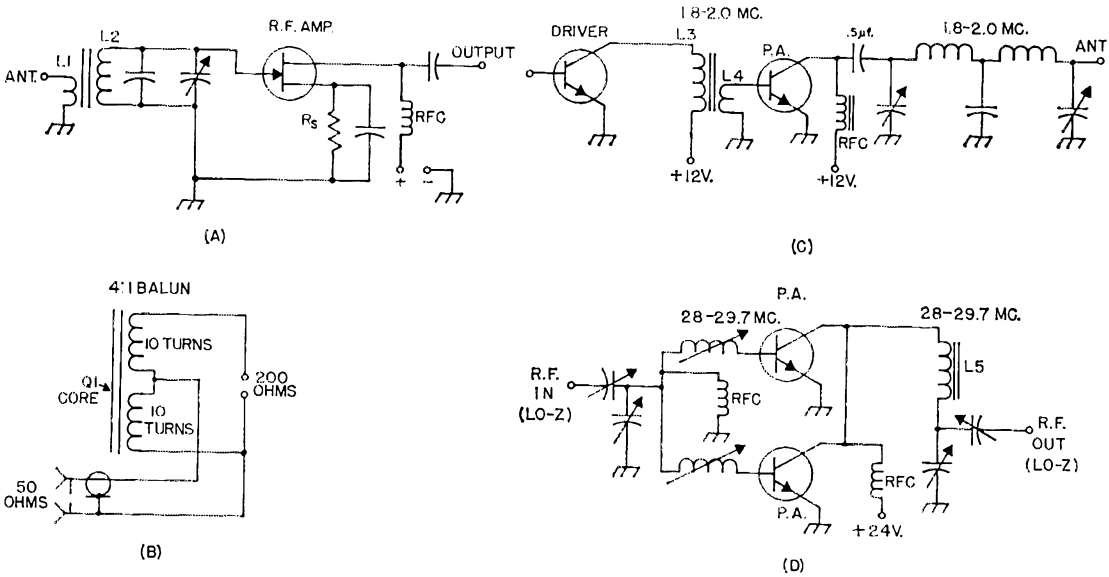


Fig. 2—Examples of typical applications for toroidal inductors. A: L_1 and L_2 are wound on a toroid core to assure high Q and consequent good front-end selectivity in a receiver. This circuit can be used both in the r.f. and mixer stages. B: a typical 4:1 ratio broad-band balun transformer using a toroid core. The two windings are bifilar. In circuit C, L_3 and L_4 represent a broad-band interstage transformer such as might be used between the driver and power-amplifier stage of a solid-state transmitter. No tuning controls are needed. Typically, L_3 would have approximately 15 turns and L_4 would have 5 turns for the operating frequency shown. D: L_5 is wound on a toroid core to make the transmitter more compact.

tions against the radiation of harmonic energy when using this kind of transformer in the final stage of a transmitter.

Compact equipment calls for the close spacing of component parts, often requiring that the tuned circuits of several stages be in close physical proximity. This sort of requirement often leads to electrical instability of one or more of the stages, because of unwanted interstage coupling, thus impairing the performance of the equipment. Because the toroidal transformer or inductor is self-shielding, it is possible to place the tuned circuits much closer together than when using conventional inductors. The self-shielding feature also makes it possible to mount a toroid against a circuit board, or against a metal chassis or cabinet wall, without significantly affecting their *Q*. Normally, the most noticeable effect of moving a toroid closer to or farther away from a metal surface is a change in overall circuit capacitance, which in turn slightly affects the resonant frequency of the toroidal tuned circuit. Because fewer turns of wire are needed for a toroid coil than for ordinary air-wound or slug-tuned inductors, the assembly can be made extremely compact — a much sought-after feature in miniaturized equipment.

Home-Made Toroids

Most experimenters have a well-stocked used-parts coffer. Many items found in these junk boxes contain ingredients that can be transformed into home-style toroid cores. The final product may not always be as pretty as that which is possible when using commercial cores, but it will usually perform well — the important consideration. For example, in browsing through the "goodie" cache one might come upon a handful of slug-tuned war surplus coil forms, a few old i.f. transformers, a ferrite antenna rod, or the tank coils from an old Command Set transmitter. Each of these items contains powdered-iron or ferrite core material which can be drilled and shaped into a toroid form.

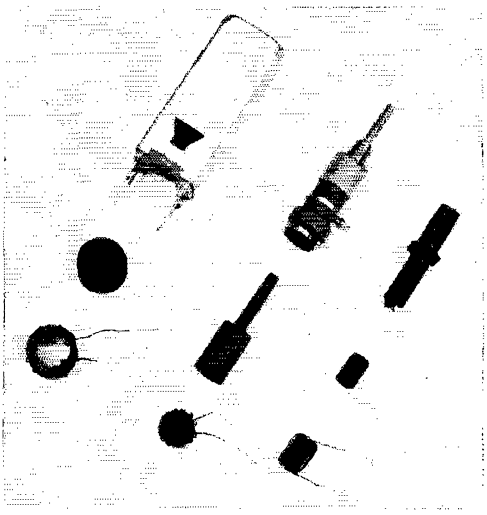
It is important for the builder to be familiar with the properties of the powdered iron or ferrite material that he will be working with. Unfortunately, much is left to the imagination when attempting to utilize substances of unknown characteristics. This should not discourage the experimenter, however, because there are a number of ways by which rough checks can be made. For example, let's assume that the junk box has yielded a nondescript war surplus slug-tuned coil. Its slug appears to be greyish in color (dull) and is $\frac{3}{8}$ inch in diameter by $\frac{3}{4}$ inch long. The winding on the form indicates that quite a lot of inductance was required because the coil is a pi-wound affair consisting of one hundred or more turns of Litz wire. These clues indicate that the coil was probably designed for very-low-frequency use, probably in the range between 15

and 1500 kc. The core material, being a dull grey color, is probably powdered iron that was designed for low-frequency use. If used in a 3 to 30-Mc. inductor, it would probably destroy the Q of the tuned circuit. If however, the original slug-tuned coil had a winding of, say, 20 turns of No. 20 enameled wire, it would probably work well in the 3- to 30-Mc. region, having been so designed. The relative properties of unknown cores can be checked by winding an appropriate number of turns for the intended frequency of operation on the coil form, then placing a low-value fixed capacitor across the coil and making a check with the grid-dip meter. If the core material is capable of providing a good Q figure, there will be a sharp dip at resonance. If the slug varies the inductance a great deal, the permeability of the core material is quite high. If not, it is a low permeability type. A comparison between normal circuit Q and that of the experimental coil can be made by building a standard from an air-wound coil and a small variable capacitor. This network, when tuned to the proposed frequency of operation, should cause a sharp dip on the g.d.o. when the latter is tuned across the resonant frequency. If the slug-tuned experimental coil provides no dip, or a very broad, small dip, the core material is probably unsuitable for your application and will not make a good toroid. A Q meter, of course, will tell the story much more accurately than a "grid dipper" will, but is not available to most radio amateurs.

Probably the best system for selecting a core material from available materials is to take the core stock from a component of known characteristics. A 455-kc. i.f. transformer will contain material suitable for operation in that frequency range. A 4.5-Mc. TV i.f. transformer will contain a core that is usable to 30 Mc. The same holds true of i.f. transformers designed for use at 10.7 Mc. and higher. Old TV sets offer a wide range

TABLE I

Characteristics (at 25° C)	*Material*		
	Q_1	Q_2	Q_3
Initial Permeability @ 1 Mc.	125	40	16
Saturation Flux Density (Gauss)	3300	2400	2600
Residual Magnetism (Gauss)	1800	750	1470
Loss Factor @ 10 Mc.	20×10^{-6}	85×10^{-6}	——
Loss Factor @ 50 Mc.	60×10^{-6}	170×10^{-6}	——
Loss Factor @ 150 Mc.	——	——	0.00042
Freq. Range	To 10 Mc.	To 50 Mc.	To 225 Mc.



Some home-made toroid cores. In the diagonal row at the left, a standard 10.7-Mc. i.f. transformer, one of its two cup cores, and a toroidal inductor wound on the cup core after its closed end has been ground off. The center row represents the same theme, but using a standard powdered-iron slug for core material. Some slugs will provide sufficient material to fashion three or four toroids of the type shown. The right-hand diagonal row illustrates how a 44-Mc. TV i.f. or similar can be used as a source of core material. The slug already had a hex hole through it, therefore it was not necessary to drill or saw the material. The completed toroids shown here are all wound for 14-Mc. operation and provide a Q of 135 or better.

of core materials in that they use slug-tuned inductors (and a flyback transformer core), some of which work well at audio frequencies, while others perform well into the u.h.f. spectrum. Many of the i.f. transformers found in TV and f.m. sets contain cup-core type powdered-iron slugs which are 9/16 inch in diameter and are approximately ½ inch in height. By grinding off the closed end of the cup, an excellent toroid core will result.

When working with solid powdered-iron rods, it is necessary to remove a slice of the material with a hack saw (a jeweler's saw is even better), then *carefully* drill out the center of the slice to the desired diameter. The smaller the center hole, the fewer will be the number of turns needed for a specific inductance. Once the toroid core is thus fashioned, the rough edges should be smoothed off with a file. This will prevent damage to the enameled wire which is wound over the form. The slugs that are used in the coils of the oscillator and p.a. sections of Command transmitters (WW II vintage) are quite large both in diameter and length and are excellent for making home-built toroids.

Some TV i.f.s and some slug-tuned coils contain long, small-diameter cores which have a hex-shaped hole completely through them. These cores work well as toroids and require no modification. The small size dictates the need for

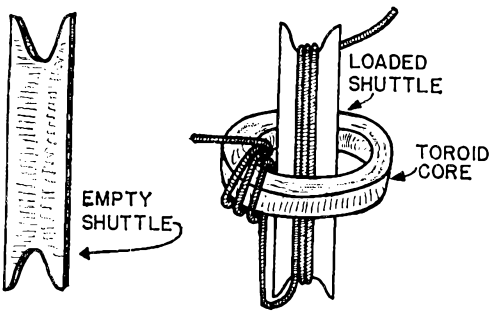


Fig. 3—Details of a hand-winding system suitable for toroid inductors of medium or large dimensions. At A, a home-made winding shuttle fashioned from a piece of stiff cardboard or fiber insulating board. The sketch at B shows how the wire is wound on the shuttle (see text) and passed through the toroid core, again and again, until the winding is in place. The turns should be evenly spaced around the circumference of the form, maintaining uniform spacing between turns. Multi-layer inductors can have their turns close-wound and over one another.

small-gauge enameled wire when winding the inductor.

It is quite probable that the experimenter will run across some rods and slugs that are made from ferrite materials. Ferrite is darker and more shiny than powdered iron, and is very difficult to saw or drill because of its hardness. If the experimenter has the patience of Job, and doesn't mind resharpening his drill bits frequently, ferrite can be worked into toroid forms too. It too should be tested for frequency response in the same manner that has been recommended for powdered iron. Generally, ferrite materials will produce a toroidal inductor with a somewhat higher Q than the irons will. Because ferrite is a type of ceramic, it is very brittle and will shatter if subjected to undue stress. For this reason, be careful when drilling and cutting. The author checked out the useful frequency range of several ferrite rods taken from broadcast-band "loopsticks" and learned that they were very good from 1.8 to approximately 5 Mc. At 7 Mc. the material was still fairly effective, but its performance fell off markedly above 8 Mc.

Some Winding Tips

Getting the wire onto the toroid can be a touchy job, especially when it comes to winding a small core with hair-fine magnet wire. Some builders like to use a sewing needle for this purpose. Others prefer to take their chances by feeding the loose end of the winding through the toroid again and again, without the aid of an accessory device. The author uses a home-made shuttle on which the entire toroid winding has been wound in advance. Details of such a winding aid are given in Fig. 3. It is necessary first to determine the number of turns wanted, then cut the required amount of wire and wind it on the shuttle. The shuttle is then passed through the center hole of the toroid core, repeating the process until the winding is in place. The amount of wire needed for a particular number of turns can be determined by wrapping a single turn around the toroid core, then measuring its length to see how much wire was needed for one turn. This figure is then multiplied by the total number of turns planned, allowing a few extra inches for safe measure. The completed coil can be coated with Q dope, or similar, then bolted or cemented in place in the circuit. In experiments conducted with the Q meter to learn whether there was any noticable effect on a toroid when a steel bolt was used (passing it through the center hole of the toroid) to attach it to the chassis, none was observed.

A Few Observations

Some experiments were conducted to determine whether or not there was a change in Q for a given toroidal inductor when the winding was compressed to occupy only a small section of the core. A coil on a commercial core made from Q2 type ferrite was resonated at 11.5 Mc. with a parallel capacitance of 80 pf. The Q was measured at 250. Initially, the 22-turn winding was spaced out around the entire circumference of the core, maintaining equal spacing between the turns. When the winding was compressed to occupy approximately one third of the core's area, the Q dropped only slightly — to 240 — but the resonant frequency of the tuned circuit dropped some 600 kc., to 10.9 Mc.

Three cores were made from standard powdered-iron slugs, one from a 4.5-Mc. TV sound i.f. transformer, one from a 10.7-Mc. f.m. i.f. can, and one from a 44-Mc. TV i.f. coil. Using a sufficient amount of wire to obtain resonance at 14 Mc. with a parallel capacitance of 70 pf., Q measurements on the toroids so made were compared with similar measurements on a 14-Mc. tuned circuit which used a commercial ferrite core made from Q2 material. The coil with the Q2 core had a Q of 250. A Q of 135 was obtained with the 4.5-Mc. core stock. Both the 10.7 and 44-Mc. i.f. slugs produced inductors whose Q's were 150. Most medium-priced commercially-built slug-tuned coil forms use core material that will give readings in this range, a suitable value for building tuned circuits with average selectivity. While working with manufactured ferrite toroid cores, the writer has fabricated inductors with Q's as high as 500. It can be seen from this that ferrite cores are much better for use in circuits requiring greater-than-average selectivity characteristics.

It can be said in summary that a toroid can be used in any circuit that requires a fixed value of inductance. The advantages of toroids should stimulate more than casual interest in their use. Your first toroid core is probably as near at hand as your junk box. Whether you merely want to be the first guy on your street to use doughnut-shaped coils or are genuinely interested in the benefits offered by the use of toroids, the information in this article should help head you in the right direction. QST

Cavity Amplifier for 1296 Mc.

Using 2C39-Type Tubes in Medium-Power U.h.f. Service

BY PETER LAAKMANN,* WB6IOM

On all lower frequencies the amateur has some choice of tubes for use in transmitter power amplifiers, but in the 1215-Mc. band there is only one that will provide reasonable power output at moderate cost. This is the 2C39, and various newer versions such as the 2C39A, 2C39B, 3CX100A5 and 7289. All look more or less alike, but only early versions are found readily on the surplus market, at low cost. The cavity amplifier shown here uses two of these tubes, and is capable of delivering 100 watts or more as a linear amplifier, with a gain of 6 to 10 db. It can be built with simple tools. A ring amplifier using eight 2C39As has also been built. It has not been completely tested at this writing, so is not described.

Amplifier Details

U.h.f. circuits, particularly those involving cavities, do not lend themselves well to conventional schematic presentation, but the circuit diagram, Fig. 2, may aid the reader in identifying the components and understanding their functions. The structural features of the amplifier are not all apparent from the photographs, so it will be described in some detail, using component designations of Fig. 2 in referring to the various parts.

This is a grounded-grid amplifier. The large square box visible in the pictures houses the cathode input circuit. The whole assembly is shown from the top in Fig. 1, and from the bottom in Fig. 3. Details of the principal metal parts are given in Fig. 4. It will be seen that the bottom cover of the cathode compartment (part D in Fig. 4) is cut diagonally to permit access to the cathode circuit for adjustment purposes. The tuned circuit, L_2-C_2, is effectively a halfwave line, tuned at the end opposite to the tubes. The inductance, part E in Fig. 4, is tuned by means of a beryllium copper spring finger, visible in the lower left corner of Fig. 3. It is actuated by an adjustment screw running through a shoulder nut mounted in the removable cover plate. Input coupling is capacitive, through C_3, a small glass trimmer at the center of the line, between the tubes. An approximate input match is established by adjustment of this capacitor.

The plate circuit, L_1-C_1, is a square tuned cavity not visible in the pictures. It is made by bending part G into a square, and soldering it to the top of part C and to the bottom of part B, with all lined up on a common center. The *outside* of the cavity is at r.f. ground potential. The tubes are mounted on a diagonal, at equal distances from the center. The plate tuning capacitor, C_1, is coaxial. Its movable element is a 6-32 screw, running through a shoulder nut in the top plate of the bypass capacitor, C_4, soon to be described. The fixed portion is a metal sleeve 9/16 inch inside diameter and 5/8 inch high, soldered to the top side of part C. It is centered on a 6-32 binding-head screw, threaded into the center hole in part C. This screw also holds a 3/8-inch insulating spacer that supports the cathode inductance, part E. Output coupling is by means of a fixed loop, L_3, on a BNC or TNC coaxial fitting mounted in the 3/8-inch hole in part G, the cavity wall.

The bypass capacitor, C_4, consists of the top cover of the plate cavity, part B, a layer of 0.02-inch Teflon sheet, and the top plate, part A. This combination does not act as a pure capacitance, because of the large size of the plates in terms of wavelength at 1296 Mc. It is important not to make substitutions here, as variations in size of the plates or thickness of the insulation may cause the capacitor to become resonant. The plates are held together with nylon screws. Metal screws with insulating sleeving, and insulating shoulder washers, may also be used. Nylon screws and other insulation, other than Teflon, may melt if the bypass capacitor becomes resonant. Nylon is very lossy at 1296 Mc.

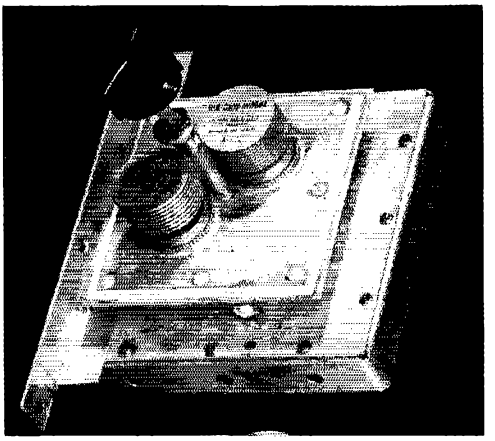


Fig. 1—A 2-tube 1296-Mc. amplifier, capable of 100 watts or more output. Two 2C39As are used in this grounded-grid setup by WB6IOM. The large square base unit houses the cathode input circuit. The plate cavity is not visible, as it is obscured by the plate bypass assembly seen here.

*8001 Airlane Ave., Los Angeles, Calif 90000.

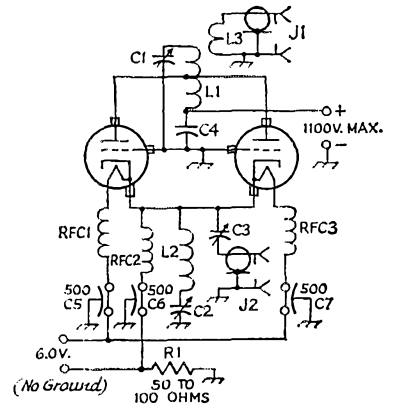


Fig. 2—Schematic diagram of the 1296-Mc. cavity amplifier. The plate cavity and tuning device are indicated by L_1–C_1, the cathode inductance and tuning capacitor by L_2–C_2. Note that the heater supply must not be grounded.

C_1—Coaxial plate capacitor; see text.

C_2—Beryllium-copper spring finger; see text and Fig. 3.

C_3—5-pf. glass trimmer.

C_4—Plate bypass capacitor, composed of parts A and B, Fig. 4, separated by 0.02-inch Teflon sheet. See text.

C_5, C_6, C_7—Feed-through bypass, 500 pf.

J_1, J_2—Coaxial jack, BNC or TNC type.

L_1—Plate cavity, composed of parts C, B and G, Fig. 4. See text.

L_2—Cathode inductance, part E, Fig. 4. See text and Fig. 3.

L_3—Copper strap ⅜ inch wide, from pin of J_1 to top side of part C.

RFC_1, RFC_2, RFC_3—10 turns No. 22 enamel, ⅛-inch diam., 1 inch long.

R_1—50 to 100 ohms, 2 watts.

Construction

Major sheet-metal parts are cut from 0.04 or 0.05-inch sheet brass. It helps to have access to a machine shop, but the cutting, bending and soldering can be done with hand tools. The soldering is done readily over a kitchen stove, or with a 300-watt or larger soldering iron. Silver plating is recommended, to assure good r.f. contact throughout. Several methods usable in the home are outlined in *The Radio Amateur's V.h.f. Manual*. All sheet brass parts are shown in Fig. 4, with dimensions and hole locations. Note that the bottom plate of the cathode assembly, part D, is cut diagonally, and fitted with spring finger stock to assure good electrical continuity when the assembly is closed.

On the smaller part of D is a 6-32 screw that runs through a shoulder nut soldered into the sheet, with the head of the screw on the outside when the cover is in place. The end of the screw bears on the beryllium copper spring finger, ⅝ inch wide, bent so that its position with respect to the cathode circuit varies with the position of the screw. Its position and approximate size should be evident from Fig. 3. The bottom end is soldered to the inside of part C. The free end should be wrapped with smooth insulating tape, so that the cathode bias will not be shorted out if the capacitor is closed down too far.

Spring finger stock is used to provide flexible low-inductance contact with the plate, grid and cathode elements of the tubes. Finger stock numbers are given for stock obtained from Instrument Specialty Co., Little Falls, N. J. The material used for tube contact purposes is No. 97-380. That on the triangular cover plate is 97-134. If tubes with recessed grid rings are used (example: the 7289) it is necessary to solder a small piece of brass against the bottom of the grid finger stock, to prevent the tube from being pushed in too far. Otherwise it is impossible to remove the tube without damage to either the finger stock or the tube. The finger stock used in the grid, plate and cathode holes should be preformed to fit, and then soldered in with a 200-watt or larger iron. That on part D is soldered to the outside of the plate. It may be necessary to strengthen the cover plate with a strip of brass soldered to the inside, opposite to the finger stock, to prevent bulging. This should protrude about 1/16 inch from the edge of the cover plate. Any intermittent contact here will detune the input circuit severely.

The finger stock in the plate bypass should be flush with the sheet metal on the side facing the cavity. With the grid and cathode connections the stock may protrude somewhat. The soldering of the cavity parts should be done first. The parts should be lined up carefully, clamped together, and then soldered in place over a gas flame for preheating, doing the actual soldering with a small iron. Check alignment prior to final cool-down. The output BNC fitting can be soldered in at this time, adding the coupling loop later. It is merely a strip of copper or brass, ⅜ inch wide, soldered between the center pin of J_1 and the cavity bottom. The strip should rest against the teflon shoulder of the fitting, and extend ¼ inch beyond the center pin before being bent 90 degrees down to the cavity bottom. Solder solidly to part A, and to the full length of the pin on J_1. Now put in the finger stock. If a small iron is used, preheating with the gas flame, the heavy brass parts will not come loose. The top cover of the plate cavity, part B, is then soldered in place, using a clamp as before.

In cutting the Teflon insulation for the plate bypass, make tube holes only just large enough to clear the tube. There should also be some area of insulation around the outer edges of the top plate. These precautions are helpful in preventing arc-over.

Connection to the tube heaters is made by bending a U-shaped piece of beryllium copper or spring bronze to make a snug fit in the heater cup at the end of the tube. The air-wound r.f. choke is connected directly to this, with the other end running to the feed-through bypasses. The heaters being brought out separately permits a check on condition of tubes, by turning off the heater in one at a time. Leaving the tube in place, but

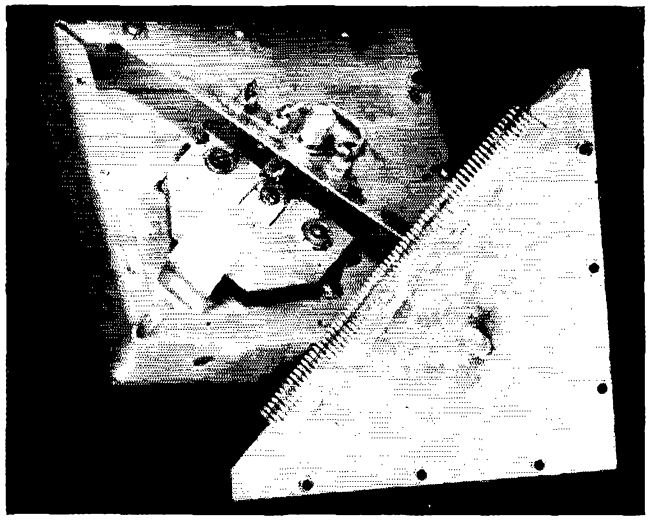


Fig. 3—Bottom (or back) view of the cathode circuit and housing, showing the divided cover plate, part D in Fig. 4. Inside are the cathode inductance, part E, and the spring-finger tuning capacitor plate, C_2. The heater and cathode feed-through bypasses and the input coaxial fitting are on the cover plate, near the center. The outside surface of the removable cover plate is shown.

cold, does not detune the system, and a comparison of the tubes may be made in this way. Note that neither side of the heater circuit can be grounded.

Tuning and Operation

When construction is completed and checked out, apply heater power to the tubes. Connect a milliammeter in series with the cathode resistor. Set the input glass trimmer at the middle of its range, and place the cover plate in position, but without putting in the screws as yet. Keep some pressure on it by hand to insure uniform contact. Apply 10 to 20 watts of driving power, tune C_2, and observe the cathode current. Open the cathode compartment, move the input trimmer, replace the cover, and observe the current again. Repeat until highest current is achieved, but do not go over 120 ma. Reduce driving power, if necessary, to keep below this level. Fasten the cover plate in place, and recheck cathode current.

Supply cooling air, if this has not already

(Continued on page 146)

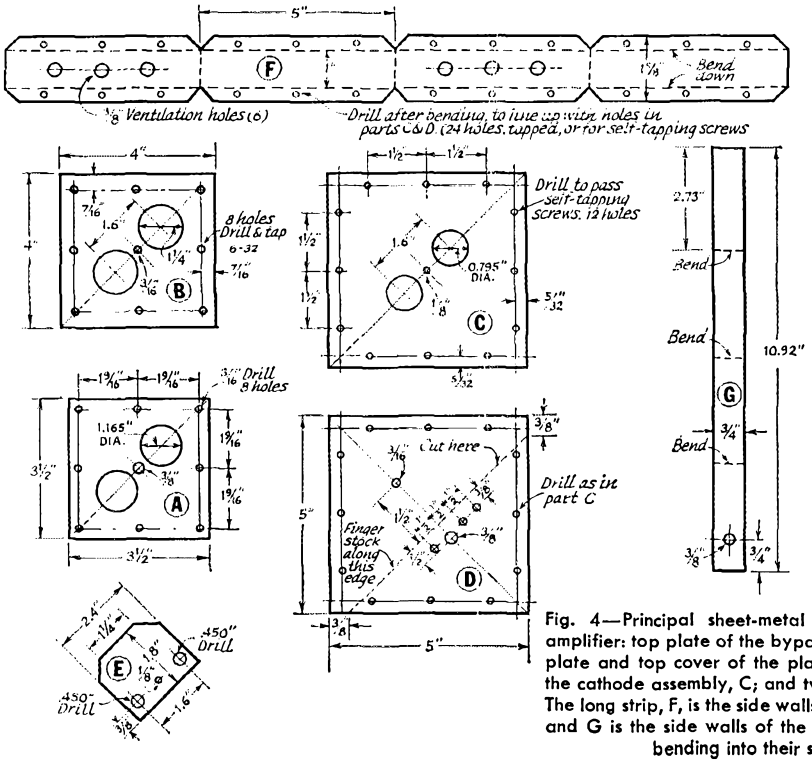


Fig. 4—Principal sheet-metal parts of the 1296-Mc. amplifier: top plate of the bypass capacitor, A; its bottom plate and top cover of the plate cavity, B; top plate of the cathode assembly, C; and two-piece bottom cover, D The long strip, F, is the side walls of the cathode assembly, and G is the side walls of the plate cavity, both before bending into their square shape.

Transistor F.S. Meter with Drift-Free Amplifier

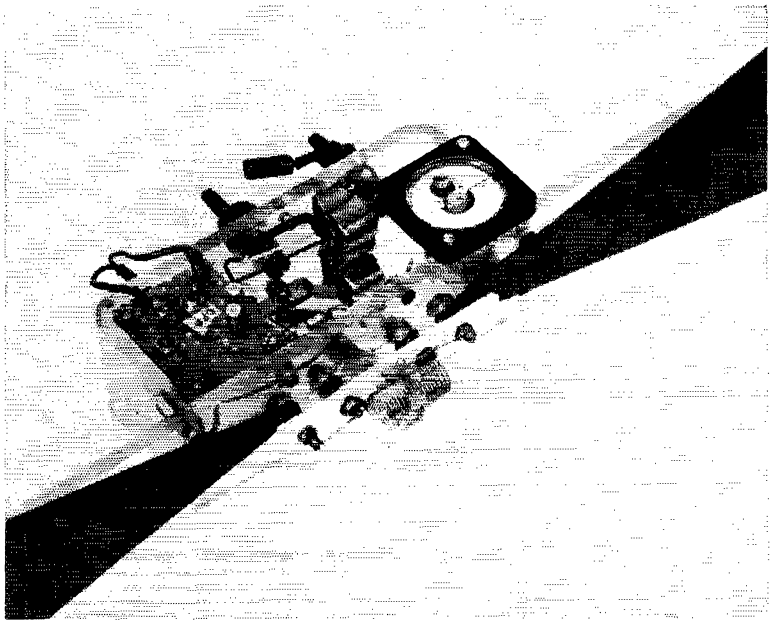
BY WATSON P. CZERWINSKI,* W2JTJ

In designing a portable, self-contained field-intensity measuring probe, I reasoned that its sensitivity would be of a practicable level if I simply followed the r.f. tuning stage with a diode detector and a transistor d.c. amplifier. This is not a new idea, of course, for the ARRL *Handbook* shows such a circuit in the measurements section. However, after building my initial model, I found that the zero setting on the indicating meter drifted with changes in the surrounding temperature. A strong breeze could change the balance adjustment so that the meter indicated half scale with no r.f. present.

A search through published literature on temperature-stabilized d.c. amplifiers revealed a symmetrical complementary circuit approach, described in the *Army Technical Manual TM-11-690*. The system makes use of two transistors, one a p-n-p and the other an n-p-n, selected for equal d.c. gain. I decided to redesign my measuring probe to incorporate this concept. The circuit I finally worked out is shown in Fig. 1. On suggestion by WB2EDC, I used a matched pair of transistors marketed by Amperex Electronics Corp., Slatersville, R. I., under the package designation of 2N2707. After checking through a large number of different available diode types, I found the 1N82A to be the most sensitive for this application.

With the coil dimensions given under Fig. 1, the tuned circuit will cover both 6 and 10 meters. Other frequency ranges may be covered by plugging in suitable coils.

* 202 Beechwood Drive, Shrewsbury, New Jersey 07701.



W2JTJ's 6- and 10-meter field-strength meter. Components are mounted in a frame made of ¼-inch Lucite. The extensions on the front side of the frame form supports for the bow tie, and serve as handles when using the instrument. A system of banana plugs and jacks provides a means of changing the coil to cover other bands.

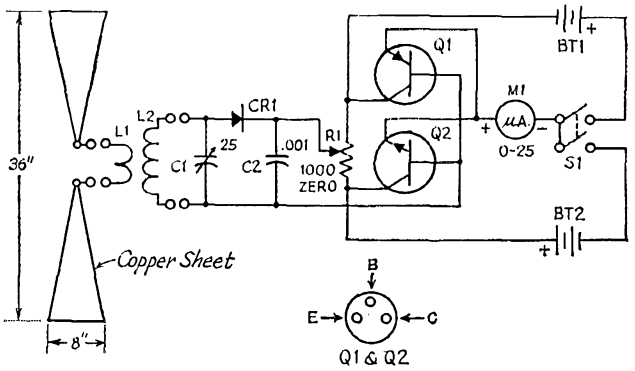


Fig. 1—Circuit diagram of the field-intensity measuring probe with drift-free d.c. amplifier.

BT_1, BT_2—1.3-volt mercury cell (Mallory type BA-1312/U).
C_1—25-pf. miniature air variable capacitor.
C_2—0.001-μf. button capacitor.
CR_1—1N82A.
L_1—2 turns No. 20 wire, ¾-inch diam., 16 turns per inch (Illumitronic 616, or similar), at center point of L_2.
L_2—17 turns No. 20 wire, ½-inch diam., 16 turns per inch (Illumitronic 416, or similar).
M_1—0-25-microampere d.c. meter (or any other range, depending on required sensitivity).
Q_1—P-n-p transistor (Amperex type 2N2706; see text).
Q_2—N-p-n transistor (Amperex type 2N2430; see text).
R_1—1000-ohm linear control.
S_1—Miniature d.p.s.t. switch.

The bow-tie probe, although only 3 feet long, is a happy compromise of portability and sensitivity.

The meter zero, once set by R_1, holds steady as a rock. A test of temperature sensitivity made by bringing a hot soldering iron near the transistors showed no change in the zero setting.

The gain of the new amplifier is somewhat higher than that of the single transistor circuit shown in the *Handbook*. The meter response is linear in respect to voltage, except at the bottom of the scale (below 2 μa.).

I used the probe to measure the pattern of a 10-meter dipole, excited with only signal-generator power, at a distance of approximately 30 feet. If the antenna to be measured has more gain or is excited with higher power, the distance at which useful measurements can be made will increase correspondingly. Alternatively a less sensitive meter can be substituted at M_1, or a 1-megohm control across the meter can be used to adjust the sensitivity. QST

Strays

The Talcott Mountain U.H.F. Society co-sponsored (with the Talcott Mountain Science Center for Student Involvement[1]) an eight-week summer course leading to a Novice Class license. Club member W1VLK is shown here instructing the students.

[1] *QST*, June 1967, p. 56.

Collins Radio, Dallas, Texas has built a *long*-wire transmitting antenna over five miles long! The Air Force is testing the antenna which trails behind the aircraft to provide v.l.f. and l.f. radio transmission capability from jet aircraft. R.f. power into the long antenna is 20 kw. and the minimum transmitting frequency is 17 kc. (*Thx K4WUM*)

A recent CQ from G3UMI brought two notable results: his first trans-Atlantic QSO — and by pure chance with his father, G2MI/W8, RSGB's long-time QSL manager visiting the U.S.A.

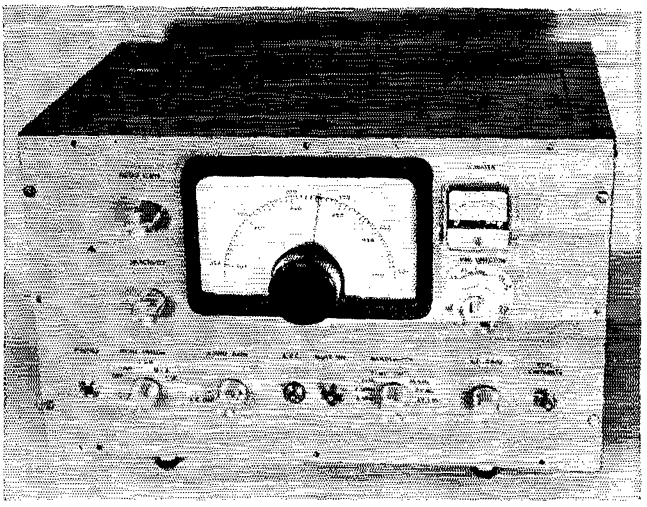
—•••—

Having just moved to a new QTH and in view of what was currently going on in his yard, VE3CJ got quite a kick out of the lesson in church one recent Sunday: (Luke 14). 28. For which of you, intending to build a tower, sitteth not down first, and counteth the cost, whether he have sufficient to finish it. 29 Lest haply, after he hath laid the foundation, and is not able to finish it, all that behold it begin to mock him. 30. Saying, this man began to build, and was not able to finish.

The W5OMX Communications Receiver

Single-Conversion Superhet with Good Stability

BY COL. DAVE CURTIS,* W5OMX



The W5OMX receiver. Main tuning dial (J. W. Miller, MD-7) has both 6:1 and 36:1 tuning ratios. A 6:1 planetary drive assembly (Arrow Electronics, Type 4511) is used on the preselector tuning capacitor. The pointer is home-made. (Photos by A/3C Michael M. Steinbacher)

LONG-TIME *QST* readers will recall W1DX's excellent article on receiver design in the January, 1957 issue.[1] At the time it appeared, the article was studied with great interest. Particularly, the point that selectivity belongs as close to the antenna as possible seemed to make a great deal of sense. With the appearance of high-frequency filters at reasonable prices, the author initiated the design of a receiver to utilize this principle. For various reasons, however, this receiver never got beyond the block-diagram stage. A more recent article by W1DX,[2] which was illustrated with an operational piece of hardware, provided the final push. Serious design and construction followed, and the "W5OMX" receiver, described here, is the result. It is a spectacular performer.

Unfortunately, the author's shack is not equipped with test gear adequate to permit performance measurement. Consequently, resort had to be made to subjective comparison, and the opinions of fellow hams. These judgments suggest that the double-conversion receiver, utilizing a low-frequency second i.f. to obtain selectivity, may be on the way out. The author's second receiver — a 16-tube double-conversion job of sound design — simply cannot compete. In side-by-side tests, using a common antenna, the contrast is remarkable. The new receiver's performance is characterized by a clarity in signal quality, the result of a markedly lower overall noise level. Signals masked to unintelligibility by noise in the older receiver become readable copy. In conditions of reasonably low atmospheric noise, signals appear to pop out of surrounding quiet.

Performance

In more useful specifics, here is how the receiver stacks up:

Sensitivity: Very FB. Digs right down to the noise level on all bands, 80 through 10 meters. The receiver has made possible R5 copy of both ends of a W6/W2 QSO on 40, and of a KL/W4

As communications receivers go, this one is reasonably simple and straightforward. It combines some of the best features of previous designs, including a high-frequency crystal filter for s.s.b. selectivity, an audio filter for c.w. selectivity, a beam-deflection mixer, dual detectors, audio-derived a.g.c., and a temperature-compensated v.f.o.

* 29 Outer Octagon, Randolph AFB, Texas 78148.

[1] Goodman, "What's Wrong with Our Present Receivers?" *QST*, January, 1957.

[2] Goodman, "Some Thoughts on Home Receiver Design," *QST*, May, 1965.

QSO on 20, using only a finger touching the input connector as an antenna!

Stability: Truly marvelous. From a cold (room-temperature) start, drift is inconsequential after a 15-minute warm-up. Further, the switching arrangement permits leaving the filaments on continuously. When this is done, and heat soaking has occurred, there is no apparent drift after the mode switch is turned to the appropriate "on" position. If there is any drift, it is the other guy!

Selectivity: About right for s.s.b. Gives good single-signal selectivity on c.w.

Mechanical: Can take sharp raps with no noticeable frequency shift.

Birdies: A few. There are one or two of consequence on each band segment, except on 15 meters where there are six (by actual count). These tune sharply, and seldom bother reception. Nevertheless, this is a basic design deficiency which, perhaps, could be overcome by someone who is mathematically inclined and who can select conversion frequencies more intelligently.

A.g.c.: The circuit suggested by W1DX[2] is the best we have seen. S.s.b. signals ranging from S2 or 3 to 10 over 9 come out of the speaker at quite reasonably similar levels. This is one a.g.c. that will be used most of the time.

Circuit Outline

Interested? Let's have a look at the schematic of Fig. 1. As far as the signal is concerned, this is a single-conversion receiver. The incoming signal is amplified in the single r.f. stage using the pentode section of a 6AZ8. It is then converted to an i.f. of 9 Mc. in a 7360 mixer. A band 2.8 kc. wide is sliced out by a steep-skirted crystal filter, FL_1. The signal is then amplified through three i.f. stages using 6BA6s, and finally detected by an infinite-impedance detector, V_{3B}, if a.m., or by a 6BY6 product detector, if s.s.b. or c.w. The otherwise conventional audio system includes a selective filter for c.w. work. The a.g.c. system is audio-derived.

The main tuning element is the v.f.o., covering 5 to 5.5 Mc. Bands are changed by altering the frequency of local injection to the signal mixer. This is accomplished by heterodyning signals from the v.f.o. and from the crystal oscillator V_{2A} to produce the required injection frequency in the output of the heterodyne mixer, V_{2B}. A 3.5-Mc. crystal oscillator, using the triode section of the 6AZ8, provides markers for the ow-frequency edges of the bands covered.

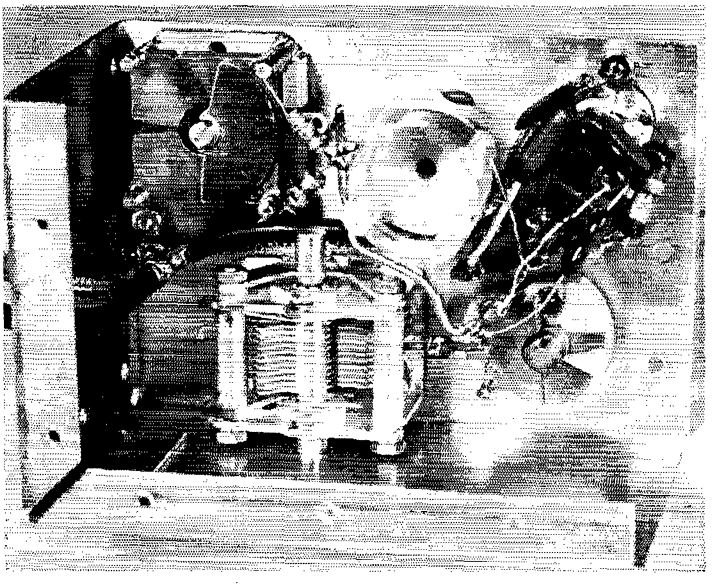
The V.F.O.

The v.f.o. is a 6AU6 in a very high-C Colpitts configuration. A differential capacitor, C_8, in combination with NP0 and N750 fixed capacitors, permits simple and accurate adjustment of temperature compensation. With reasonable attention to mechanical design, and careful adjustment, stability is impressive indeed. This circuit was used in an earlier project,[3] and was found to provide stability comparable to that of the BC-221 frequency meter. No small part of the stability is due to the use of the rugged low-torque Miller tuning capacitor.

R.F. Stage and Crystal Calibrator

Air-wound coils are used in the preselector. The gain in this stage appears to be approximately 12 to 15 db. on 80 and 40, dropping off to about 6 to 8 db. on 15 and 10. It does a good job of rejecting i.f. images (none have been found). With some antennas, the gain of this stage may have to be reduced slightly to prevent oscillation on the 80-meter band; on other bands the amplifier is perfectly stable at full gain. Input and output circuits are gang-tuned. Ceramic trimmer C_1 (one for each input coil) is used to adjust tracking.

[3] Curtis, "The W4JWV Single-Sideband Exciter," *QST*, January, 1963.



V.f.o. assembly with side-top cover removed. The 6AU6 socket and associated components are at upper right with the band-set capacitor C_7 at lower right. The coil is glued securely to a ceramic standoff insulator. The differential capacitor, C_8, with temperature-compensating capacitors C_9 and C_{10} attached, is at upper left. Note that all major components and tie points are fastened securely to the same side of the enclosure for maximum mechanical integrity. When mounted on the chassis the right-hand end of the box in this view is at the top, the left-hand end is bolted to the chassis.

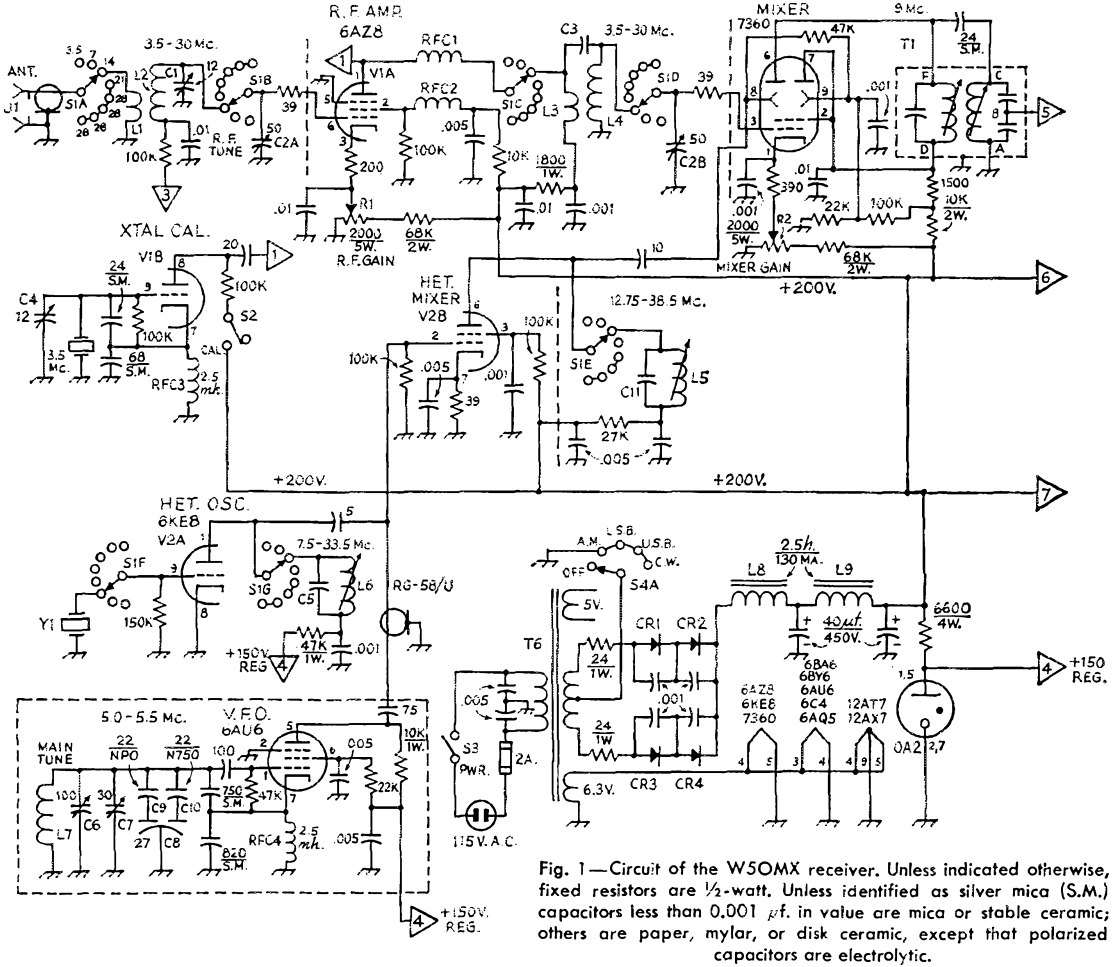
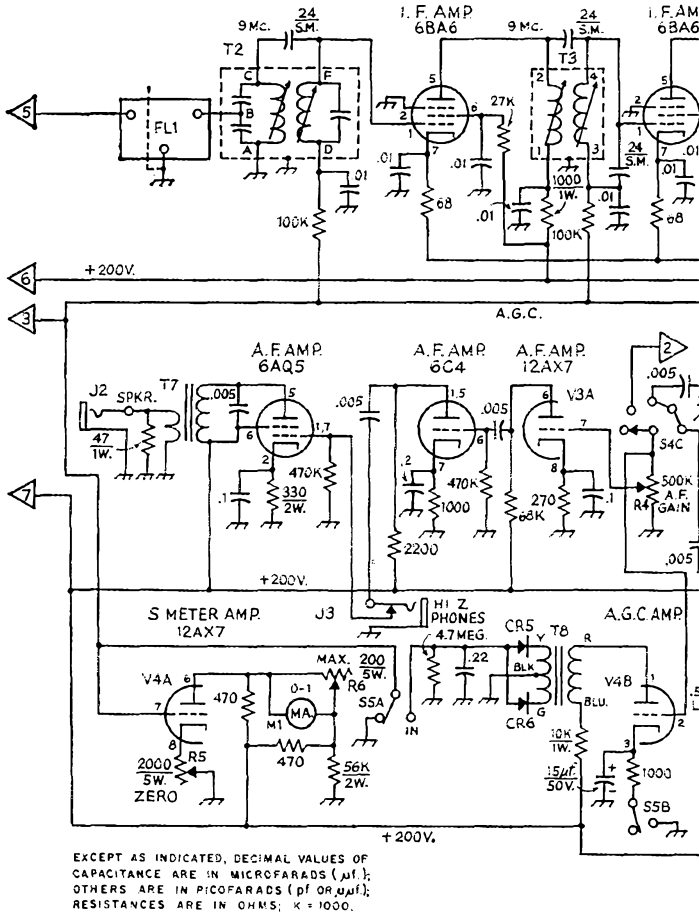
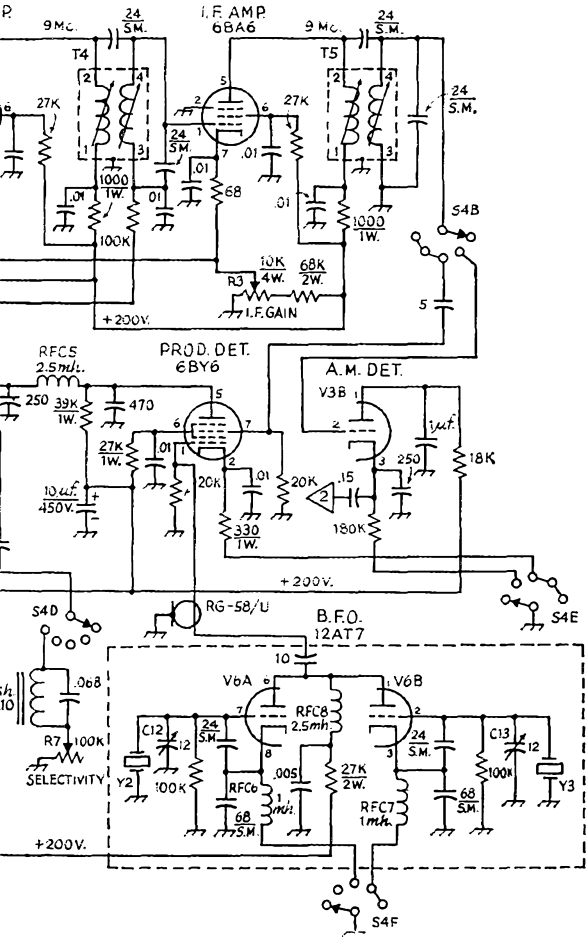


Fig. 1—Circuit of the W5OMX receiver. Unless indicated otherwise, fixed resistors are ½-watt. Unless identified as silver mica (S.M.) capacitors less than 0.001 μf. in value are mica or stable ceramic; others are paper, mylar, or disk ceramic, except that polarized capacitors are electrolytic.

C_1—2-12-pf. ceramic trimmer (one for each L_2 coil).
C_2—Dual-section air variable, approx. 50 pf. per section (Hammarlund HFD-140 used, with all but 7 rotor plates removed from each section).
C_3—See coil table.
C_4, C_{12}, C_{13}—Approx. 12-pf. Compression trimmer.
C_5—See coil table.
C_6—100-pf. variable (J. W. Miller 2101).
C_7—30-pf. air trimmer.
C_8—27-pf. differential capacitor (Johnson 167-32).
C_9—22 pf., NP0.
C_{10}—22 pf., N750.
C_{11}—See coil table.
CR_1–CR_4, incl.—Silicon diode, 400 p.i.v., 1 ampere.
CR_5, CR_6—Silicon diode, 200 p.i.v., 750 ma.
FL_1—9-Mc. crystal filter (McCoy "Silver Sentinel").
J_1—Chassis-mounting coaxial receptacle.
J_2—Open-circuit jack.
J_3—Closed-circuit jack.
L_1–L_7, incl.—See coil table.
L_8, L_9—Filter choke (Stancor C-2303).
L_{10}—0.5-hy. toroid (UTC MQA-10).
M_1—S meter (Lafayette 99R2513).
R_1, R_2, R_3, R_5 R_6, R_7—Linear control.
R_4—Audio-taper control, S_3 attached.
RFC_1—24 turns No. 26 wound on 470,000-ohm ½-watt resistor.
RFC_2—Same as RFC_1, 14 turns.
RFC_3, RFC_4, RFC_5, RFC_8—2.5-mh. r.f. choke (J. W. Miller 70F253A1).
RFC_6, RFC_7—1-mh. r.f. choke (J. W. Miller 705103A1).
S_1—7-section 7-pole 8-position ceramic rotary switch (Centralab P-272 index assembly, 7 type UD wafers).
S_2—S.p.s.t. toggle switch.
S_3—S.p.s.t. switch (see R_4 above).
S_4—3-section 6-pole 5-position phenolic rotary switch (Centralab PA-1021).
S_5—D.p.d.t. toggle switch.
T_1—9-Mc. input transformer (J. W. Miller 1740).
T —9-Mc. output transformer (J. W. Miller 1741).
T_3, T_4, T_5—10.7-Mc. interstage transformer (J. W. Miller 1457). Mount with spade bolts.
T_6—Power transformer: 550 volts r.m.s., center-tapped, 110 ma.; 6.3 volts 5 amp. (Triad R-112 A, 5-volt winding not used).
T_7—2-watt audio output transformer (5000 ohms to voice coil) (Burstein-Applebee 17B393).
T_8—Transistor audio input transformer, 5000 ohms to 7500 ohms, center-tapped (Lafayette-Argonne AR-154).
Y_1—See coil table.
Y_2—9001.5 kc. (see text).
Y_3—8998.5 kc. (see text).



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


I.F. AMP
6BA6
9 Mc.
24 S.M.
T4
T5
27K
.01
1000 1W.
100K
68
10K 4W.
68K 2W.
R3
I.F. GAIN
S4B
+200V.
RFC5
2.5mh.
PROD. DET.
6BY6
A.M. DET.
V3B
250
39K 1W.
470
27K 1W.
10 µf. 450V.
20K
330 1W.
.15
180K
1 µf.
18K
S4D
S4E
RG-58/U
B.F.O.
12AT7
V6A
V6B
RFC8
2.5mh.
RFC6
1 mh.
RFC7
1mh.
C12
C13
.005
27K 2W.
100K
68 S.M.
R7
SELECTIVITY
Y2
Y3
S4F

The triode section of the 6AZ8A, V_{1B}, is used in the crystal calibrator. The frequency can be "zeroed in" against a calibrating source by means of C_4. Notice that the 15-meter band and all ranges of the 10-meter band are covered with a single set of preselector coils.

Signal Mixer

The 7360 performs the mixing function effectively, and contributes inconsequential noise. It does not appear to overload on even the very strongest signals. The mixer gain control, R_2, is used to prevent oscillation on 80 meters, and to adjust the overall gain on the other bands. By adjusting the gain at this point, the high-gain i.f. strip may be operated at full amplification at all times for optimum a.g.c. action.

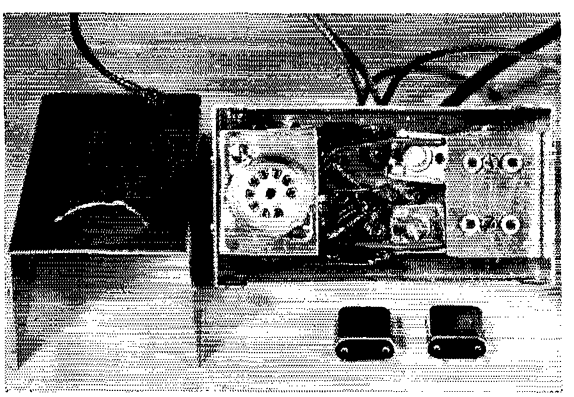
I.F. Amplifier

Since selectivity is provided ahead of the i.f. strip, these stages are designed purely for amplification. The 24-pf. capacitors across the hot ends of the i.f. transformers increase the overall gain spectacularly. A 0.2-volt signal at 9 Mc. injected into this strip ahead of the crystal filter comes out at a whopping 20 to 25 volts. This accounts in a large measure for the rather impressive overall sensitivity of the receiver. The i.f. gain control, R_3, is used only during initial adjustment and testing; therefore it is not mounted on the panel, but on the rear apron of the chassis.

Detectors

The 6BY6 product detector, developed by W6TC for his very efficient HBR receivers,[4] works well at 9 Mc. This circuit has the very desirable feature of accepting a wide range of signal levels with little or no apparent distortion in the audio product. The infinite-impedance detector provides these same advantages in a.m. reception, without overloading the last i.f. transformer as would a diode.

[4] "Hints & Kinks, *QST*, June, 1962.



B.f.o. assembly with tube, cover and crystals removed. The sockets for the crystals and the 12AT7 are mounted on small aluminum brackets, the small components underneath being wired prior to final assembly. The crystals are plugged in internally and require no clearance holes in the cover. Crystal trimmers C_{12} and C_{13} are fastened to the bottom of the Minibox enclosure, at the center. The shielded leads and output coax cable leave the enclosure through tightly-fitting holes to minimize r.f. leakage.

B.F.O.

The b.f.o. uses the two triode sections of a 12AT7 as separate crystal oscillators. The crystals at 9001.5 and 8998.5 kc. (supplied by McCoy with the filter), permit selection of lower and upper sidebands, respectively, by keying the appropriate 12AT7 cathode. These crystals are adjusted to proper frequency by trimmers C_{12} and C_{13}.

Audio Section

Three stages of audio provide generous output to high-impedance phones or a speaker. You can hear signals on this receiver over the QRN of all but the noisiest "harmonics"! In the c.w. mode, a high-Q audio filter, composed of toroid L_{10} and its related capacitor, permits peaking the beat note at approximately 1000 cycles. Substitution of a different value of capacitance will move the resonant frequency to your choice of pitch. Selectivity may be varied by adjustment of R_7.

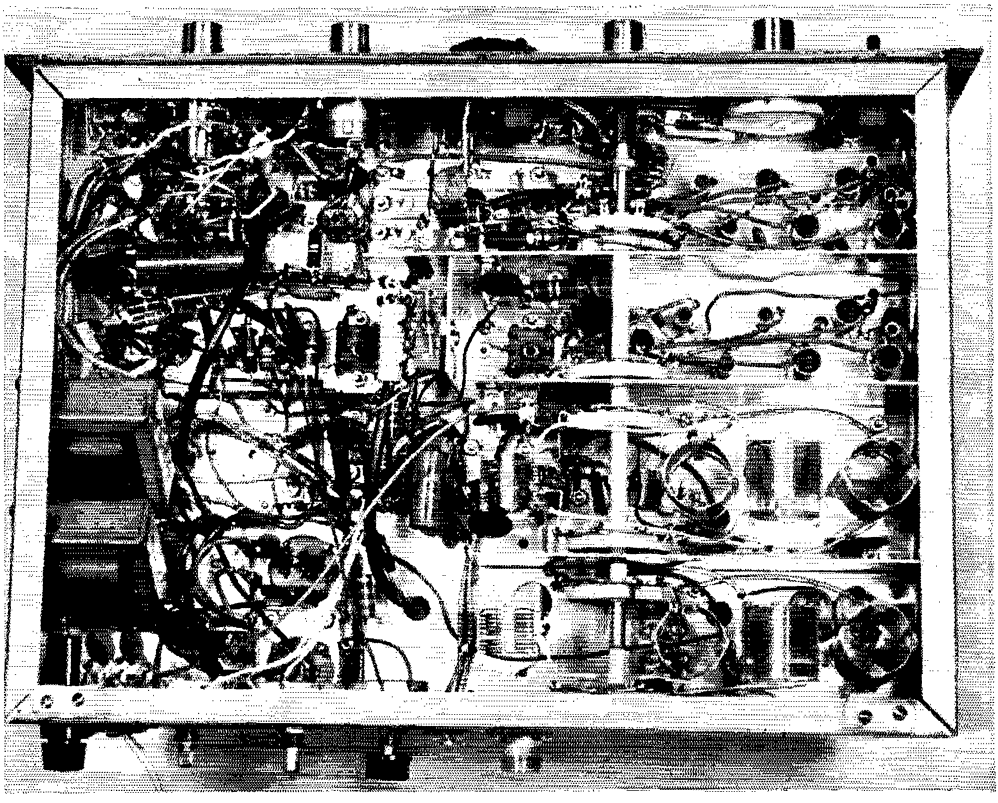
A.G.C.

The a.g.c. circuit amplifies and full-wave rectifies audio from either detector, and controls the r.f. amplifier and all three i.f. stages. It is remarkably effective, and makes the multiparty s.s.b. ragchew a real pleasure. (Those who enjoy fiddling with knobs probably won't like it!) The fast-attack/slow-decay characteristics which result from the component values suggested by W1DX have proven to be very close to the ideal.

The S-meter and power-supply circuits should be familiar to most readers. S-meter adjustments are made at the rear of the chassis. Silicon rectifiers are used in the power supply, and a voltage-regulated tap supplies the v.f.o. and heterodyne oscillator.

Muting

You will note that no provision for muting is indicated in the circuit schematic. Three possible arrangements are suggested. Your choice should be based upon how you intend to connect the receiver into the overall station setup. If you intend to monitor your transmissions on the receiver, and use an antenna relay that grounds the receiver input on transmit, break the plus B or cathode connection of V_{1A}, and insert the muting switch and remote connections at this point. If you have side-tone monitoring, you can cut off the receiver entirely by breaking the plus B or cathode connection of the 7360 mixer, and inserting the muting connections at that point. Finally, and perhaps the best of all, although additional components will be required, use the muting arrangement suggested by W1DX.[2]



Bottom view showing band switch and coil compartments. The pair of close-spaced wafers at the top switch the heterodyne-oscillator coils and crystals. The single wafer below switches the heterodyne-mixer coils. The signal-mixer coils are in the next compartment, switched by the pair of widely-spaced wafers. R.f.-stage coils are in the bottom compartment; one of the two switching wafers is hidden by the lip of the chassis. The 40- and 80-meter air-wound coils are cemented to platforms made of polystyrene sheet. The higher-frequency coils are supported on switch terminals. The mode switch is in the upper left-hand corner, filter chokes in the lower left-hand corner. A.g.c. components are mounted on tie points on the short vertical shield near the center.

Construction

Viewed in its entirety, the construction of a receiver of this complexity may appear to be an overwhelming task. Certainly, it would be a very ambitious first project. However, for anyone with sufficient experience and skill to do the minor fabrication and locate sensibly the many small components, it should be a feasible undertaking. The primary ingredients of successful homebrew construction seem to be patience, a willingness to take one step at a time, and the interest to keep going. If you have these talents, you can probably build a receiver of the same superlative performance as the one described. And it should be better looking: this one is the final result of many, many component substitutions in the search for optium performance.[5]

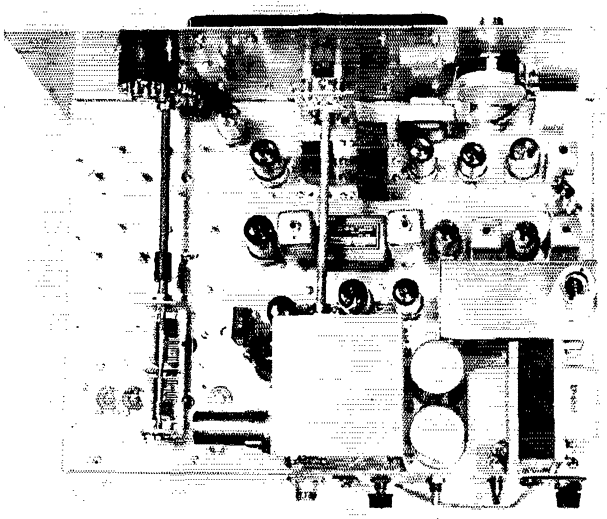
The following paragraphs contain construction and alignment suggestions, roughly in the order followed by the author. Additional information may be obtained by a careful study of the several illustrations and accompanying explanatory captions.

The receiver is built on a 10 × 14 × 3-inch aluminum chassis which fits into the 11 × 15 × 9-inch cabinet (Wyco CR-7725). An additional 10 × 17 × 3-inch chassis (the smallest size obtainable made from 16-gauge stock) was purchased as a source of material for the v.f.o. enclosure and shielding partitions.

Assembling the V.F.O. and B.F.O.

Make the v.f.o. first. The main part of the enclosure was made from a corner of the spare chassis. Its dimensions are 4⅝ by 3¼ by 3 inches. The side/top cover was cut from adjacent spare chassis material. (The rear of the box is left open.) Mount the major components all on one side of the box, as shown in the detail photo, to minimize frequency changes with mechanical stress. Care should be used in locating the tuning capacitor so that its extended shaft will be high enough above the chassis to clear the

[5] To assist those who wish to duplicate this project, the author will provide full-size templates for chassis and front panel, an enlarged schematic, complete parts list, and 8 X 10-inch enlargements of the four primary illustrations, at a cost of $4.50, postpaid.



Top chassis view of the W5OMX receiver. Mounted in two groups in the upper left-hand corner of the chassis are the slug-tuned coils L_8 (top) and L_5 (below). In the lower left-hand corner are the preselector tuning capacitor and the C_1 tracking trimmers. The i.f. strip runs across the center with components in logical order, starting with the 7360 mixer, and turns vertically at T_4, ending at T_5. Proceeding to the left from T_5 are the two detector tubes, the 6AQ5 audio output tube, the heterodyne crystals, the 6KE8 and the 6C4 (above). The audio output transformer and c.w. filter toroid are to either side of the mixer-gain (top) and c.w.-selectivity controls. Occupying the lower right-hand corner of the chassis are the v.f.o. and b.f.o. units, and power-supply components. Immediately above the v.f.o. compartment are the calibrator crystal (with hole for access to trimmer C_4 just to the left), the 6AZ8, the 12AX7 a.g.c. tube (V_4), and the VR tube. Along the rear apron are the antenna connector, speaker terminals, i.f. gain control, S-meter controls, muting terminals, and fuse holder.

McCoy filter in the i.f. strip (see top-chassis photo), and yet not be so high that it will crowd the dial too close to the upper edge of the panel.

The b.f.o. components are assembled in a $1\frac{5}{8} \times 2\frac{1}{8} \times 4$-inch Minibox. Construction is detailed in one of the photographs.

Band Switch

Before starting to lay out the component pattern on the chassis, the under-chassis shields should be cut, using material from the aprons of the spare chassis. The longer shield has a length of $8\frac{3}{4}$ inches; the other two are 7 inches long. Then they should be placed temporarily in the chassis while their positions are adjusted. Space them apart suitably to provide adequate room for the coils, and measure the spacing accurately. Make a mark on the rearmost shield, indicating the distance that the switch shaft will be placed from the end of the chassis. Mark and drill the switch-shaft and mounting holes in the three partitions, using extreme care to see that they are as identically located as possible. Make the holes reasonably oversized. Then assemble the switch and shields as a unit, using spacers on the switch assembly rods to obtain the partition spacings measured earlier. Do not tighten the assembly nuts more than finger tight. Place the assembly in the chassis, and press down firmly on the shields while the assembly nuts are tightened. Spot the shield mounting holes, remove the assembly, and drill the holes. Avoid any mounting holes in the area that will be occupied by the v.f.o. box, since this box must rest flat on the chassis. (The b.f.o. assembly can be raised on spacers to clear any mounting screws in its area.) Additional holes that should be drilled in the shields are one in each of the shields, below and to the left (in the bottom view) of the switch wafers (for wires), one in the upper left-hand corner of the second shield, and another in the same relative position in the first shield (for tie-point strips). A $\frac{3}{8}$-inch hole should be drilled in the first shield, to the left of the short vertical shield. This will be used to pass the coax feed line from the v.f.o. to the heterodyne mixer, and some of the power leads. The corners of the partitions that rest in the fold of the chassis should be cut off to allow passage of wiring between the panel and the rear of the chassis.

Chassis Layout

Once the shield locations have been determined, the positions of the two main rows of components will become apparent. With the v.f.o. subassembly placed with its rear edge flush with the rear edge of the chassis, and the shaft of the tuning capacitor central on the chassis, the location of surrounding components can be spotted. In locating the preselector tuning capacitor, place it far enough toward the edge of the chassis to assure space for its dial on the panel.

After all hole centers have been marked and hit with a center punch, the various holes may be drilled or cut. The author used a nibbler to cut the i.f.-transformer holes to approximate size, and finished up with a file.

Before mounting any components on the chassis, fasten the panel temporarily in place, and place the shafts of the v.f.o. and preselector tuning capacitors against the back of the panel while you mark the shaft heights.

Wiring

Tie-point strips should be located liberally on the underside of the chassis, convenient to tube sockets and related components. It is advisable also to place grounding solder lugs on most of the mounting screws. You may not use all of them, but it is much more convenient to install them as you mount the components, than later on when space becomes scarce as the wiring progresses.

Power-supply and filament connections should be made first. Thereafter, the wiring procedure

is not particularly critical. Installation of the preselector coils can be left as a last operation, after the v.f.o. and b.f.o. circuits have been adjusted. To make sure that no connection is overlooked, it is a good idea to mark the schematic with a colored pencil as each connection is completed. The author wired the front circuits first, working toward the rear of the chassis. Following standard practice, long leads, particularly those connecting front-panel controls and switches to components at the rear of the chassis, may be made with shielded wire. This practice permits fastening the leads solidly in place by soldering the shield to conveniently-located soldering lugs along the way. Shielded wire should also be used for all a.f. grid leads to avoid unpleasant feedback problems. R.f. bypass-capacitor leads should be as short as possible, using the center post of the related tube socket as a common grounding point.

Testing the V.F.O. and B.F.O.

The v.f.o. tuning range should be checked first with all tubes except the v.f.o. voltage-regulator tube out of their sockets. After power has been turned on and the v.f.o. allowed to warm up, a v.t.v.m. with an r.f. probe should show about 2 volts at the output coupling capacitor. The v.f.o. frequency can be checked by comparing it with the signal from a calibrated source, such as a BC-221 frequency meter, or a general-coverage receiver. Set C_8 at about midpoint. Set the tuning capacitor C_6 at about 3 degrees from maximum capacitance. Then adjust C_7 to bring the frequency to 5.0 Mc. Turn C_6 to about 3 degrees from minimum capacitance, and check the frefrequency again. If the frequency is higher than 5.5. Mc., spread the end turns of the coil apart, and repeat the process. If the frequency is too low, squeeze a few of the turns slightly closer together, and repeat the process. It should be possible to arrive at an adjustment where the 5-to-5.5 Mc. band occupies about 95 per cent of the dial, with the band central on the dial.

Plug in the b.f.o. tube and check the r.f. output voltage. It should be about the same as from the v.f.o., i.e., 2 volts.

Checking the Audio Section

Plug in the audio tubes. With speaker or headphones connected, and the a.f. gain control near maximum, a sharp click, when the top end of the gain control is touched with the lead of a pencil, will tell you that the audio stages are working.

I.F. Alignment

Plug in the 7360 mixer and i.f. tubes. Connect the r.f. probe at the arm of S_{4B}. Introduce a 9-Mc. signal at the input to the last i.f. stage. The author used the crystal calibrator as the source, with a 9-Mc. crystal, borrowed from his s.s.b. exciter, plugged into the calibrator. The 20-pf. calibrator coupling capacitor was temporarily disconnected from Pin 1 of the 6AZ8, and connected by means of an extension lead to Pin 1 of the last 6BA6 i.f. tube. (A reasonably-accurately-calibrated r.f. signal generator may be used, if available.) Tune T_5 for maximum output. Move the signal source to Pin 1 of the second i.f. tube, and adjust T_4. Do the same with the first i.f. tube and T_3. You will probably have to reduce the i.f. gain as you move down the i.f. strip to avoid burning out the diode in the probe. Introduce the signal at the output connection of the crystal filter, and adjust T_2. Finally, inject the signal at Pin 3 of the 7360 mixer, and adjust T_1. (If you are using an r.f. signal generator, you may have to jockey the frequency slightly to hit the center of the crystal-filter passband.) Reconnect the calibrator coupling capacitor to the plate of the 6AZ8.

S-Meter Adjustment

The next step is to adjust the S-meter circuit, since it will be used in adjusting the preselector. With V_4 out of its socket, adjust R_6 for full-scale S-meter reading. Plug in V_4. Allow the tube to warm up and, with the a.g.c. switch off, adjust R_5 for a zero reading.

Heterodyne Tuning

Now plug in the 6KE8, and adjust each slug-tuned coil (L_6) for approximately 3 to 4 volts as measured with the r.f. probe at the "hot" end of the coil. The lower-frequency crystals are capable of producing much more than 4 volts; the higher-frequency crystals may not provide quite 4 volts. Tune for all you can get up to a maximum of 4 volts.

Using a grid-dip oscillator, tune the heterodyne-mixer coils (L_5) to the frequencies listed in the coil table. Be sure that the band switch is set to the band corresponding to the coil you are checking, because the stray capacitance may vary with the switch position.

Preselector Alignment

Alignment of the preselector coils can now be undertaken. The author built the preselector coils for 80 meters first, and aligned the front end on this band before proceeding to the higher-frequency bands, in order. However, it need not be done this way. The alignment procedure is the same for all bands. The important consideration in making the coils is to keep L_2 and L_4 as nearly identical as possible, including lead length and proximity to chassis and shields.

With a set of coils in place, introduce a signal near band center at the antenna connector. Set the v.f.o. to mid scale, and the mode switch to one of the sideband positions. Adjust C_2, and the slug of L_5 for maximum S-meter reading. Then tune the preselector slowly across the signal. If the signal peaks at two dial settings, it means that the circuits are not tracking. By cautious adjustment of C_1, and the turn spacing of either L_2 or L_4, a condition should be found where only a single S-meter peak occurs as C_2 is tuned across the signal. (The paragraphs on r.f.

Coil Table

L_2, L_4					L_1	L_1/L_2	L_3	L_3/L_4	C_3
Band	*Turns*	*Wire Size*	*Diam. In.*	*T.P.I.*	*Turns*	*Space*	*Turns*	*Space*	*pf.*
80	50	24	1	32	6	2 t.	6	10 t.	None
40	22	24	1	32	6	2 t.	3	10 t.	None
20	12	20	1	16	4½	1 t.	3	6 t.	5
10–15	6	20	¾	16	3	1 t.	3	2 t.	5

L_5					L_6				
Band	*Freq. Mc.*	*L μh. (Nom.)*	*Type*	*Y_1 Mc.*	*Freq. Mc.*	*L μh. (Nom.)*	*Type*	*C_5 pf.*	*C_{11} pf.*
80	12.75	3.3	21A336	7.5	7.5	6.8	21A686	45	25
40	16.25	2.2	21A226	11.0	11.0	3.3	21A336	30	20
20	23.25	1.5	21A156	18.0	18.0	2.2	21A226	20	10
15	30.25	1	20A106	25.0	25.0	1.5	21A156	None	None
10	37.5	0.82	20A827	32.00 33.50	32.25	1	20A106	None	None
	38.5	0.82	20A827	33.0 33.5	33.25	1	20A106	None	None

L_7 — 8 turns No. 20, 1-inch diam., 16 t.p.i.

L_1/L_2, and L_3/L_4 (as well as L_7) are of Miniductor, Air Dux, or Polycoil stock, with the indicated number of turns removed to provide spacing between the main coils and the coupling links.
L_5 and L_6 are iron-slug coils (phenolic). Type numbers are J. W. Miller (suffix RBI). Those with prefix 20 are ¼-inch diam.; prefix 21 indicates ⅜-inch diam.

alignment in the "Receiving Systems" chapter of the ARRL *Handbook* explain how this is done.)

Temperature Compensation

To adjust the v.f.o. temperature compensation, the most stable frequency source you can get is required. The crystal calibrator will do nicely. Allow the receiver to warm up thoroughly; leave it on for at least an hour or two. Tune the receiver to zero beat with the calibrator. Then, as drift occurs, adjust C_8 slightly, and bring the receiver back to zero beat with C_7. Continue to do this until no drift is apparent.

B.F.O. Adjustment

Remove the cover of the b.f.o. enclosure, and adjust trimmers C_{12} and C_{13} for optimum s.s.b. reception. Most 80- and 40-meter stations use l.s.b., while those operating in the higher bands use u.s.b. (Most c.w. operators prefer the u.s.b. position.) The b.f.o. frequency is adjusted so that it falls only high enough on the filter slope to assure adequate low-frequency response. With this adjustment, the "other side" of a c.w. signal simply is not there.

V.F.O. Calibration

After checking to make sure that the 5-to-5.5-Mc. band is still centered on the dial, the dial may be calibrated (0 to 500, and 500 to 0) against a standard, such as a BC-221 frequency meter. The tuning should be found to be close to linear. A single dial calibration for all bands requires the exact crystal frequencies listed in the Table. Crystals not too far off on the high side can be "rubbered in" with a small compression trimmer in parallel with the crystal. Crystals on the low side must be ground or etched in. (The 3.5-Mc. band-edge marker will provide a reference.) Otherwise, C_7 in the v.f.o. will have to be retrimmed each time bands are changed, zeroing the v.f.o. against the calibrator with the v.f.o. dial set at the previously-calibrated zero mark.

Before placing the receiver in the cabinet, punch 4 or 5 holes through the bottom, and along the top back of the cabinet for air circulation.

You should now be able to make R5 copy of signals that your ham friend down the block may not be able to hear. Congratulations! QST

Why A Transmatch?

Basic Information for Newcomers

BY LEWIS G. McCOY,* W1ICP

THESE days, nearly all transmitters have a pi-network tank circuit in the final amplifier. There are good reasons for this. With the pi tank it is possible to design a band-switching transmitter with excellent shielding (in order to prevent undesired harmonic radiation as far as TVI is concerned) and to accomplish the job with a minimum of complications. Additionally, the tank circuit easily can be set up to work into 50- or 70-ohm loads, the characteristic impedance of the popular types of coaxial feed lines. However, as we will see, this is where a "clinker" can get into the act.

When a pi network is designed to work into a 50-ohm load, the load *must* be 50 ohms in order for the transmitter to work at full efficiency. Merely connecting 50-ohm coax to the tank circuit does *not* accomplish this. For the tank to "see" a 50-ohm load, the far end of the coax — the load or antenna end — must also have the same impedance as the coax, 50 ohms. If the load is not 50 ohms the pi network will see some other value than 50 ohms. Usually, too, the tank will see reactance as well as resistance when the line is not matched. While reactance is expressed in ohms, it isn't a true resistance, and what it does is make it more difficult to put power into the line unless certain steps are taken to compensate for it.

Pi Network Tank Circuits

In the conventional transmitter pi tank we have two controls, customarily referred to as the "tuning" and "loading" controls. The tuning control is the one that resonates the tank circuit to the desired frequency. The loading control, when adjusted properly, permits the final amplifier stage to be loaded to the desired input. To a limited extent it can also be used to compensate for the reactance in the load. The clinker in this is that the reactance of many antenna-system loads may have too wide a range for the loading capacitor to handle. If you've ever been in the situation where it was impossible to load (or unload) the amplifier stage, the likely reason is that the load is too reactive to be handled by the tank circuit.

Such a condition can lead to some serious difficulties. While a correctly tuned pi network will offer good harmonic attenuation, an improperly adjusted tank may provide *no* harmonic attenuation. In fact, many Novices who receive second-harmonic violation notices for their 80-meter operation can lay the blame on poor loads and incorrectly adjusted tank circuits. This leads us to the real crux of the problem. How do we get a 50-ohm load on the various bands and frequencies desired?

Antenna Loads

As we said earlier, in order for a transmitter to see a 50-ohm load the far end of the 50-ohm coax must also see 50 ohms. The point where you feed the antenna has a certain impedance; in a half-wave dipole, for example, the impedance will be in the neighborhood of 50 ohms, depending somewhat on the dipole's height above ground. Also, at resonance there will be no reactance in the impedance. When we change frequency, the antenna is no longer resonant and reactance is introduced into the impedance. In turn, reactance is present at the transmitter end of the line. Whether or not the transmitter tank circuit can compensate for it will depend on the range of the loading capacitor.

How do we go about getting an antenna that will look like 50 ohms over a wide range of frequencies within a band — and, for that matter, on several bands? It isn't exactly easy.

For example, if we cut an 80-meter half-wave dipole for the center of the band, 3750 kc., it is possible to obtain a fairly good match for 50-ohm coax at that frequency and approximately 50 kc. each side of 3750 kc. However, at the band edges, 3500 and 4000 kc., the impedance

One of the toughest decisions for a newcomer to make is the kind of antenna or antenna system to use. What bands to use, how much space is required, what type of feed line, trap antennas vs. single-band dipoles — these are just a few of the problems. In this article, it is proposed to cut away some of the mumbo jumbo about antennas and provide some basic information to help the newcomer make the decision that best suits his need.

* Novice Editor

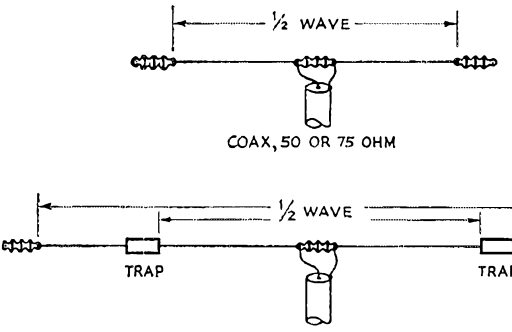


Fig. 1—At the top is a simple half-wave dipole using coax feed. At the bottom is a drawing of a trap dipole. When a signal is fed to this antenna, for example an 80-meter one, the feed line "sees" a more-or-less resonant antenna on 80. When the transmitter is switched to 40, the traps "divorce" the 80-meter portion and the feed line sees a resonant 40-meter half-wave.

will be very reactive and the mismatch between the coax and the feed point may be as high as 10 to 1. It would be difficult, if not impossible, for our pi network to handle that type of mismatch. Actually, there is no "simple" antenna, by ham standards, that can be coax fed on 80 meters and cover the entire band with a reasonable match. The 40-, 20- and 15-meter bands are narrow enough so that the pi tank will handle a coax-fed dipole under normal circumstances. However, a coax-fed dipole is essentially a one-band system so such an antenna is not the answer if we want to work "all" bands and all frequencies with a single antenna.

Trap Antennas

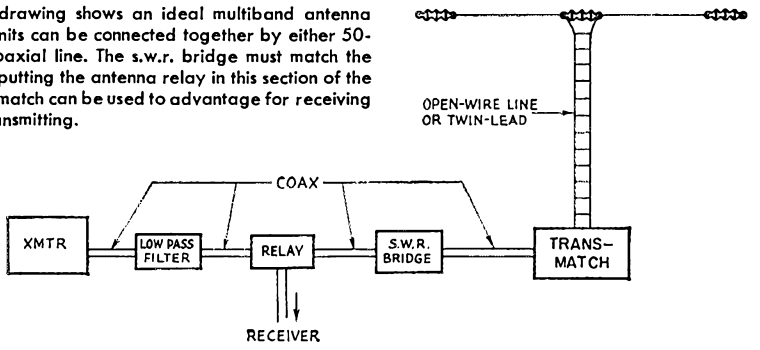
One type of multiband antenna with coax feed is the trap antenna, either horizontal or vertical. The horizontal variety is essentially a dipole with traps added to divorce parts of the antenna so the coax "sees" an electrically resonant dipole on the band in use. However, the trap dipole is no "broader" than a single dipole. Fig. 1 shows such a trap dipole antenna.

There are a couple of drawbacks to trap dipoles. First, a coax-fed single-band dipole is essentially a selective circuit, in that it tends to discourage undesired harmonics from being accepted and radiated. For example, a 40-meter harmonic would have a tough time in an 80-meter coax-fed dipole because the antenna and line are badly mismatched on 40. A trap system, however does not discriminate against such undesired signals. Also, traps introduce power loss, — probably not a great deal, but nevertheless loss. However, if you want to use coax line and have multiband operation, the trap dipole is an answer. On the other hand, a Novice may ask, "Is there a better multiband system, one without the trap losses and harmonic problems?" The answer is yes, but before describing it let's take a look at feed lines.

Feed Lines

Three common types of feed lines are used by amateurs: coaxial, Twin-Lead, and open-wire. Each has a certain amount of loss, with coax the lossiest, Twin-Lead next, and open-wire line the most efficient. An important point to keep in mind is that the greater the mismatch, or standing-wave ratio, on the transmission line the greater the line loss. Also, the loss in any line increases with frequency; the loss will be least at 80 meters and will become progressively greater as we approach v.h.f. or u.h.f. As an example, the loss in 100 feet of RG-58/U line at 144 Mc. is about 6 decibels. Translating this to power, if we had a transmitter that was putting out 100 watts only about 25 watts would reach the antenna, at the end of a 100-foot line, to be radiated. The remaining 75 watts would be dissipated as heat in the line! And, most important, this figure is based on the coax being *matched* at the antenna end. The mismatch or s.w.r. will depend entirely on the impedance of the transmission line and the impedance of the antenna. If there is a mismatch, the losses increase. On 80 meters, this same coax has a loss of less than 1 db. for 100 feet of line, so we could tolerate more of a mismatch.

Fig. 2—This drawing shows an ideal multiband antenna system. The units can be connected together by either 50- or 70-ohm coaxial line. The s.w.r. bridge must match the line used. By putting the antenna relay in this section of the line, the transmatch can be used to advantage for receiving as well as transmitting.



		ATTENUATION IN DECIBELS / 100 FT.								
TYPE	Z_0	3.5	7.0	14.0	21.0	28.0	50.	144	220	420
RG58/U	52.5	0.68	1.0	1.5	1.9	2.2	3.1	5.7	7.2	10.4
100W. OUTPUT		8	18	28	35	38	51	72	81	92
RG8/U	52.	0.30	0.45	0.66	0.83	0.98	1.35	2.5	3.3	4.8
RG59/U	73	0.64	0.90	1.3	1.6	1.8	2.4	4.2	5.2	7.2
RG11/U	75	0.38	0.55	0.80	0.98	1.15	1.55	2.8	3.8	4.9
TWIN LEAD	300	0.18	0.28	0.41	0.52	0.60	0.85	1.55	1.9	2.8
OPEN WIRE	—	0.03	0.05	0.07	0.08	0.1	0.13	0.25		

This chart shows the attenuation figures in decibels for common types of feed lines. Z_o is the nominal impedance. In the case of open-wire line, the impedance will depend on the size of the conductors and their spacing. The second line of the chart indicates the amount of power that would be lost in a 100-foot run of RG-58/U when properly matched. For example, on 21 Mc., the loss per 100 feet is 1.9 db. With 100 watts output from the transmitter, 1.9 db. represents a loss of 35 watts in the line. A mismatch will increase the line loss.

But don't overlook the fact that if the line and antenna are mismatched it may be impossible to make the amplifier load, even if the extra loss can be tolerated. The question that then comes to mind is: If we use a low-loss line so we can tolerate a high degree of mismatch, how can we make the transmitter see a 50-ohm load? The answer to this is to use a transmatch between the transmitter and antenna.

The Transmatch

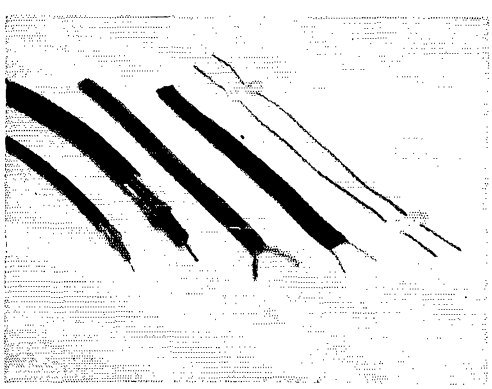
A transmatch is simply an adjustable r.f. transformer that converts an unknown load (antenna side) to a desired load (transmitter side). It consists of inductances and capacitances which can be adjusted to provide a perfect 50-ohm load for the transmitter *on any band or frequency.*

Let's take an example to show how a transmatch can do the job. The impedance at the center of an 80-meter dipole is between 50 and 70 ohms on 80 meters. On 40 meters, the impedance at the same point on this same antenna is about 4000 ohms. If we feed this antenna with 300-ohm Twin-Lead the mismatch on 40 would be on the order of 13 or 14 to 1. However, bear in mind that 300-ohm line has relatively low loss, so we can probably tolerate the high s.w.r. if the line is fairly short — less than 100 feet. Our only problem in making this antenna work on 40 is to take care of coupling the line to the transmitter. To do this the feed line is connected to the transmatch and the transmatch is then adjusted so that the transmitter sees a 50-ohm load. What we have now is an 80-meter dipole being used efficiently on 40, and our transmitter is working into the load it was designed for.

Now let's suppose that we feed this same antenna with 50-ohm coax. On 40, the mismatch would be 4000/50, or about 80 to 1! Because coax is not a low-loss line, the loss in the transmission line would be prohibitive. However, with Twin-Lead — or, even better, open-wire line — the loss is usually insignificant.

Also, and most important, a transmatch adds selectivity at the output of the transmitter. It will discriminate against any undesired harmonics or spurious signals. And, if the antenna switching is set up so that the transmatch is in the circuit on receiving, it will provide more selectivity for the receiver. In fact, a common problem for hams who live near broadcast stations is cross-modulation of 80- and 40-meter ham signals by the strong BC signal. A transmatch will provide enough selectivity in most cases to eliminate b.c. cross modulation when it occurs in the receiver's front end.

Many hams are reluctant to use a transmatch because it requires additional adjustments. However, the advantages are so great in a multiband system that any additional adjustments are more than worth the effort. With a transmatch, the antenna doesn't have to be a half wave long to work on any band. For example, we described a complete multiband system just recently[1] using an antenna only 100 feet long. Most hams can manage to get up a 60-foot dipole, either horizontal or in an inverted V



At the left are two examples of coaxial feed lines. The three lines at the right are balanced type lines, 70-ohm, 300-ohm Twin-Lead, and TV open-wire line in that order.

configuration, and such an antenna also will work on 80 through 10. One method of putting up a multiband system is to find two supports for each end of the antenna, cut a wire long enough to run between them, put an insulator in the center of the antenna and at each end, and attach open-wire or Twin-Lead feeders long enough to reach the station. That's all there is to it. Bear in mind that a dipole fed this way doesn't *have* to be a half wave long; it can be any length, and it will work. Of course it is always a good idea to make it as long as possible

(*Continued on page 142*)

[1] McCoy, A Complete Multiband Antenna System," *QST*, Nov. 1967.

On Decibels and Noise

Interpreting True Signal-to-Noise Ratios with Weak Signals

BY WILLIAM L. SMITH,* W3GKP

WHEN is a decibel not a decibel?

Ignoring all apparatus factors (nonlinear meters, overloaded amplifiers and the like[1]) which can cause errors, a db. may not be a db. when measured in the presence of appreciable background noise or signal which is not related to the quantity being measured. If this sounds involved, a numerical example may help.

Let us assume that you agree to help a local ham friend compare two antennas. You are going to use your superdooper sideband receiver, but you suspect the S-meter calibration. In addition, the S points are so crowded together that it is impractical to divide them up into fractions. However, you have found that when the r.f. gain control is retarded to the point where the a.v.c. becomes ineffective, the overall input-output characteristic of the receiver is linear. So you can measure relative signal levels by connecting to the speaker circuit an audio frequency voltmeter calibrated in "real" db.[2]

Your ham friend is a civic-minded type, and when it comes time for the test he decides to transmit with a milliwatt crystal oscillator, so as to create a minimum of interference on the band. You get your receiver all warmed up on the right frequency, and you set the controls so that the noise reads 0 db. on the audio voltmeter, which happens to be a convenient level and will make the subsequent arithmetic easy. Ham transmits on his old antenna, and you get a reading of +1 db. He transmits on his new antenna and you read +2 db.

Question: Is the new antenna 1 db. better than the old one? More arithmetic is needed to find out. You're going to have to convert those db. readings to relative power, so you need a db. chart,[3] a db. table,[4] a log table (found in nearly all math books), or a slide rule.

With no signal you set up so the noise reads 0 db., which we will consider a relative power of 1.0. On the old antenna the reading, which consists of both signal and noise, was +1 db. This corresponds to a relative power of 1.259. The noise part of this is 1.0, and the signal part is 0.259. The signal is weaker than the noise, even though it does move the meter "up." The signal-plus-noise to noise ratio is 1.259/1, but the signal to noise ratio is 0.259/1. The db. chart or table will show that the signal/noise ratio, expressed in db., is −5.9.

On the new antenna the reading was +2 db., corresponding to a signal-plus-noise/noise ratio of 1.585, and a signal/noise ratio of 0.585, or about −2.3 db. So when Ham changed his antennas and your meter went from +1 to +2 db., his signal actually went from −5.9 db. to

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[1] Years ago I used to make jokes about "1N34 db." These are values arrived at by converting relative readings on a diode field-strength meter into decibels directly. I was convinced that they were used by many amateur and some commercial antenna designers, and that a suitable conversion factor was:

2 db. (1N34) = 1 db. (real)

I am optimistic enough to think that this particular apparatus problem is no longer with us.

[2] A true-r.m.s.-reading instrument must be used in comparing noise with an amateur signal. This is not so critical in work with solar noise, which has essentially the same waveform as receiver noise. See Boomer, "Noise Considerations in Receiver Design," Part II, *QST*, June, 1965.— *Editor.*

[3] A chart for conversion of power and voltage (or current) ratios to decibels is given in all modern editions of the ARRL *Handbook*, Chapter 2, around page 41 in most issues.

[4] A conversion table reading to tenths of a decibel may be found in the back of the General Radio catalog and also in Peterson and Gross, *Handbook of Noise Measurement*, 5th Edition, p. 184–5. General Radio Company, West Concord, Mass. 01781 ($1.00)

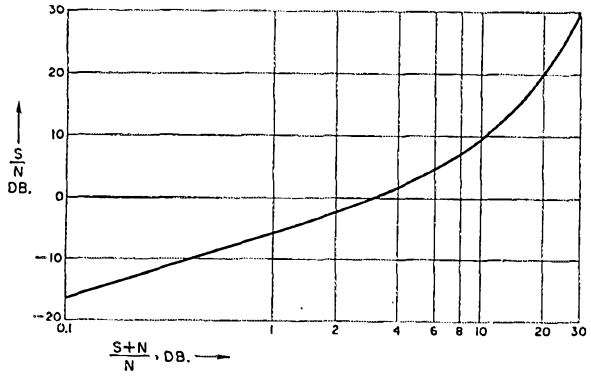


Fig. 1—Graph for converting indicated signal-plus-noise-to-noise ratios to true signal-to-noise ratios

−2.3 db. In other words, his new antenna is 3.6 db. better than the old. Quite different from that 1-db. report you were going to give him!

The trouble arose when we attempted to measure the signal in the presence of too much background noise. Any ordinary meter always reads S+N/N, not S/N. To check validity of readings, turn off the signal source and make sure the remaining noise reads way down. What constitutes an adequate ratio is hard to say, but with most apparatus measurements can be made in the range of 20 to 40 db. above noise without trouble. In a pinch even getting 10 db. above the noise will reduce the error to a fraction of a decibel.

The remedy in the case of the above example is obvious. Friend Ham should transmit with more power, or you should use a better antenna, or a better receiver front end, or both, so as to bring his signal up out of the mud.

In other situations the remedy may not be so easy to come by. Recently W4HHK and I attempted to compare receiving systems by measuring solar noise on 432 Mc. Here the sun noise runs just a few db. "above" the system noise. We can't ask the sun to QRO, and improvements in the receivers come hard, so measurements have to be made at low signal levels, and we are left with the problem of interpreting them. My antenna is bigger than Paul's, so it collects more sun noise. Let's say that on a given day I read the sun as 5 db. over the background noise, while Paul reads it as 3 db. Does this show that my system is 2 db. better than his? Back to the arithmetic!

Paul gets S + N/N = 3 db., or 2/1
S/N = 1/1, or 0 db.
I get S + N/N = 5 db., or 3.162/1
S/N = 2.162/1, or 3.3. db.

So my system is 3.3 db. more sensitive than his. Based on the relative areas of our antennas, mine should have 3.8 db. more gain than Paul's, so in this example I would be missing ½ db. somewhere.

The examples cited are problems involved in the addition and subtraction of powers expressed in relative db. Such problems can be solved by arithmetic, as shown, or by using a chart or graph made especially for this purpose. When I bumped into this the only chart I could

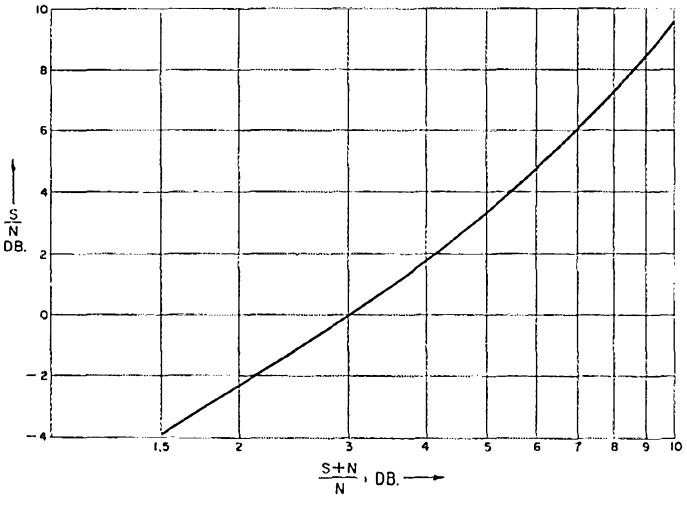


Fig. 2—Expansion of the most-used central portion of Fig. 1.

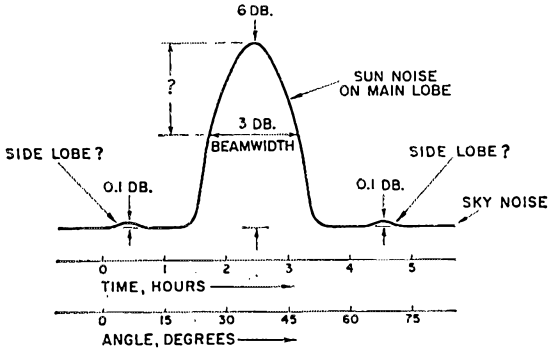


Fig. 3—Antenna pattern of a 432-Mc. parabolic-reflector antenna system made by observing solar noise, as it rises above quiet-sky noise as the sun moves across the beam when the antenna is in a fixed position.

locate was in the back of the GR noise handbook.[4] This chart is adequate, and since the Handbook is available for a nominal fee I will not attempt to describe it. However, it is a perfectly general chart, whereas we are concerned with a rather specific case.

In going from S + N/N to S/N or vice-versa we are always looking for a db. value corresponding to one power unit more or less than the one we entered with. I found it convenient to make up a chart specifically for converting S + N/N to S/N. It is shown in Fig. 1.

The method for making this from a db. table or log table should be obvious. A look at the Fig. 3. The sun moves through the sky at 15 degrees per hour (¼ degree per minute) at the equinoxes; about 8 percent less at the solstices. We convert the "time" scale to an "angle" scale. From this curve we would like to find the beamwidth at the half-power (3 db. down) point, and the side-lobe level.

Considering the side lobes first (if those little 0.1-db. bumps are side lobes) does the curve mean that they are only 5.9 db. below the main lobe? Certainly not! From Fig. 1 we get

	$S + N/N$	S/N
Peak	6.0 db.	= +4.7 db.
Side lobe	0.1 db.	= −16.4 db.

Difference: 21.1 db. So the side lobes are more than 20 db. down.

Now, let's find the "3-db." points. If we take these to be 3 db. below the peak, we get an erroneous excessive value for the beamwidth. (Besides, how would you do it if the sun was not up 3 db. to start with? Referring to Fig. 2, the correct procedure is as follows:

Peak of main lobe: S + N/N = 6 db. S/N = 4.7 db.
3-db.points: S/N = 1.7 db.
(3 db. less than above)
S + N/N = 4 db., or about 2 db. (indicated) below the peak.

I found this so useful that I made a special chart for it, shown in Fig. 4. This shows, for various ratios of S + N/N just how far down

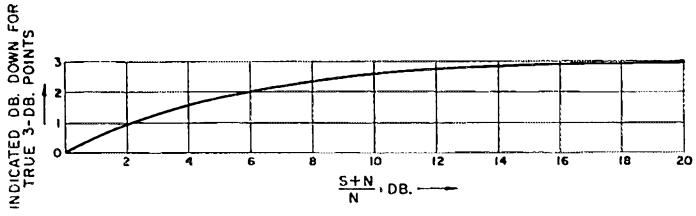
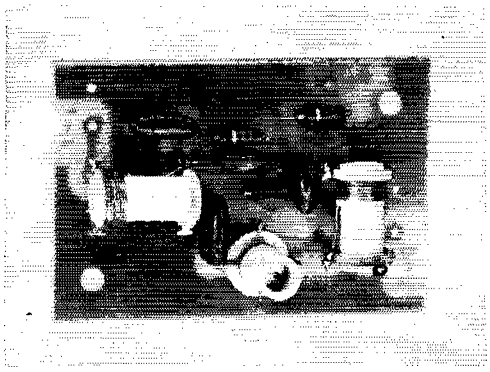


Fig. 4—Conversion table for true values of antenna response, to be used with information obtained from Fig. 3.

right-hand end of the curve shows that for values much above 15 db., S + N/N and S/N are so nearly equal that there is not much to worry about. From the left-hand end, which involves very low values, one may derive an interesting thumb rule: Any time S + N/N, expressed in db., is doubled, S/N has increased at least 3 db. Fig. 2 is an enlargement of the central or most-used part of Fig. 1.

These curves can be used to answer other questions arising from solar noise observations. One of the objectives of solar noise tests is to determine antenna patterns, using the sun as a noise source. To do this we set the antenna ahead of the sun, and allow the sun to drift through the beam, whereupon it will draw the antenna pattern (or at least something related to it). The resulting curve may look something like one must come on the curve to locate the "3-db." points. I find this less confusing than using Figs. 1 or 2 for this estimate. Perhaps others would like to have the same information plotted to show how many db. up from the baseline one must go to find the 3-db. points. Such a plot can be made simply enough by subtracting the 3-db.-down point of Fig. 4 from the S + N/N, and plotting the remainder versus the S + N/N.

QST



Surely one of the smallest items ever described, the K8AOE 2-meter preamp is only 1½ by 2¼ inches in size. As pictured, the input coil, L_1, is at the left side.

A 2-Meter FET Preamplifier

THE pictures tell most of the story of this preamplifier for the 2-meter band, sent to us by Fred Cupp, K8AOE/2, 27 Crescent Rd., Fairport, N. Y. 14450. So far, Fred has made three of these units, mainly for use ahead of commercial f.m. gear used on 146.94 Mc. In this service they make a marked improvement in the signal-to-noise ratio on the weaker signals. As much as 15 db. improvement in the level for 20 db. of quieting has been observed on some units, though it should be stressed that this order of improvement will not be obtained when the amplifier is used ahead of modern equipment that is in prime working order. Still it is likely that the preamp will help some, in weak-signal reception with all but the very best receivers.

The amplifier is assembled on an epoxy etched circuit board, layout of which is shown in Fig. 1.

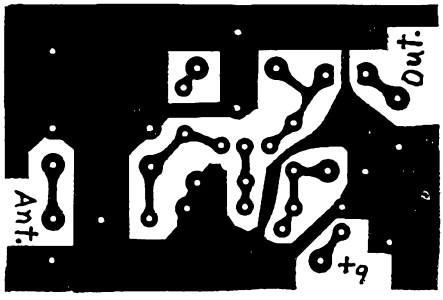


Fig. 1—Exact-size drawing of the etched circuit board for the 2-meter preamplifier. The foil side is shown.

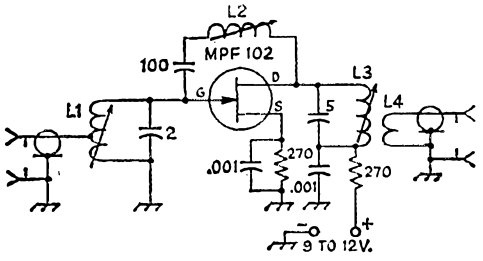


Fig. 2—Schematic diagram of the K8AOE FET preamplifier. The 0.001-μf. capacitors are disk ceramic; others are dipped mica. Resistors are ¼-watt. Brass-slug ceramic forms, ¼-inch diameter, are used for the coils. The coaxial fittings shown are not included in the unit, and may be used or not, to suit the installation.

L_1—5¼ turns, tapped at 1¼, No. 26 enamel.
L_2—9½ turns No. 34 enamel.
L_3—5 turns No. 26 enamel.
L_4—1¼ turns No. 26 enamel, at low end of L_3.

The circuit, Fig. 2, will be seen to be an FET version of the neutralized-triode amplifier, familiar to vacuum-tube oriented v.h.f. men. The mounting board is 1½ by 2¼ inches in size, so the photograph and layout are close to life size. The layout shows the foil side of the board.

The transistor is an MPF102, by Motorola, available for under one dollar. Gain will depend on the voltage applied. K8AOE says it is good for 19 db. We checked it ahead of a good Nuvistor converter, using about 8 volts of battery. Gain was 12 db., and there was a perceptible improvement in noise figure. —*W1HDQ*

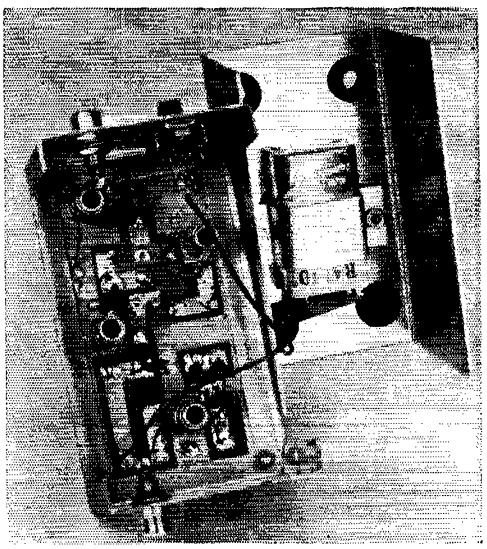
A 10-Meter FET Preamplifier

The cascode FET preamplifier described here is easy to build and get operating. For those who are looking for a useful weekend project, this should be worth consideration. Because many of the older ham receivers suffer from front-end insensitivity in the 28- to 30-Mc. range, an outboard preamplifier can often be used to breathe new life into tired old receiving equipment. Also, it is not an uncommon experience to own one of the newer receivers that has a weak front end as far as the upper frequency range is concerned. A preamplifier can be used effectively with these receivers too.

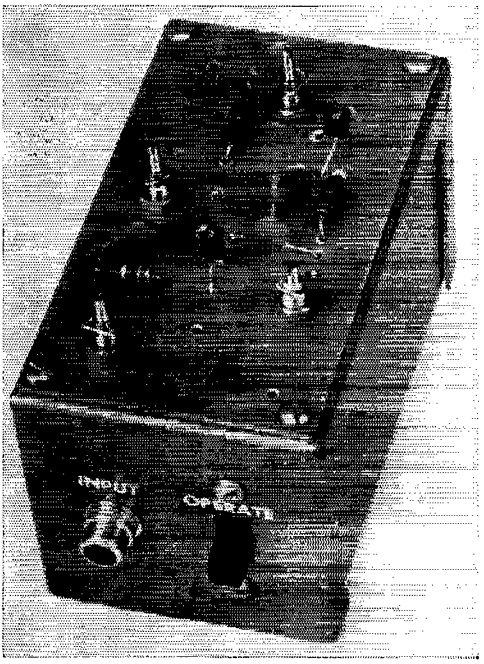
Although coil data was not compiled for some of the other ham bands where preamplifiers are useful — 21, 50, 144 and 220 Mc. for instance — this circuit-board pattern and the general circuit hookup itself should be adaptable to use on other frequencies. The cascode arrangement used is standard and should present no problems to the experienced builder should he wish to tailor it to some other frequency range.

Circuit Information

A schematic of the preamp is given in Fig. 1. Motorola MPF102 FETs are used at Q_1 and Q_2, but any JFET (N-channel) whose upper frequency limit is 60 Mc. or greater can be used with equal success in this circuit. The classic



The input jack and the on-off switch are mounted on one end of the box-upper left of photo—and the output connector is on the opposite end of the box, lower left.



The 10-meter FET preamplifier is housed in a Minibox. Most of the components are attached to an etched-circuit board which is mounted over a cutout on the Minibox cover. The input jack and on-off switch are on the front apron of the box. The output jack is on the rear apron.

Wallman configuration is used in this solid-state adaptation of the early circuit. Q_1 operates as a neutralized triode amplifier and is followed a common-gate stage, Q_2. L_3 is the neutralizing inductor. R_1 and R_2 are used as source-bias resistors and their values were chosen to provide a compromise between good noise figure, overall gain, and overload immunity.

Slug-tuned inductors are used throughout. The preamplifier is stagger-tuned to provide near-uniform response across the entire 10-meter band. The approximate gain of this unit is 35 decibels. Stability is good when the preamp is connected in a non-reactive low-impedance line of 50 or 75 ohms. If for some reason L_3 will not completely stabilize the circuit, the swamping resistor shown in dashed lines, R_4, can be added. Its value should be somewhere between 1800 and 10,000 ohms. Use only the highest value of resistance that will insure stability. The lower the resistance, the lower the gain and the worse will be the selectivity.

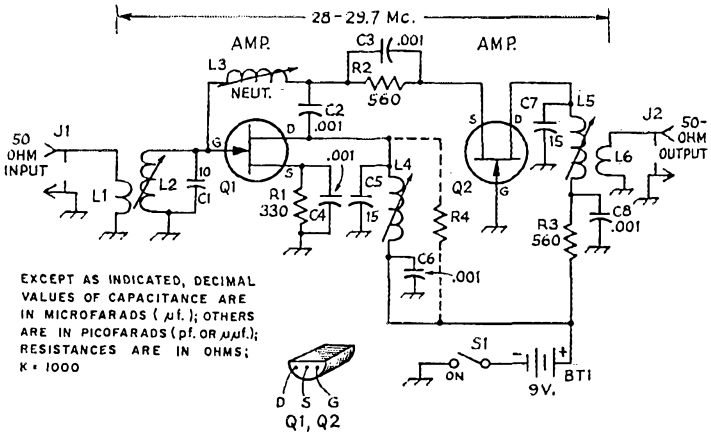


Fig. 1—Schematic of the 10-meter preamp. All capacitors are disk ceramic. Resistors are ½-watt composition.

BT_1—9-volt transistor radio battery.
C_1-C_8, inc.—For text reference.
J_1, J_2—Phono connector.
L_1—5 turns insulated wire over ground end of L_2.
L_2, L_4, L_5—17 turns No. 30 enam. wire, close-wound on ¼-inch dia. slug-tuned form (J. W. Miller 4500-2 form or 4503 1-3 μh. prewound inductor.*)
L_3—33 turns No. 30 enam., close-wound, on ¼-inch dia. slug-tuned form (J. W. Miller 4500-2 form) or J. W. Miller 5-9 μh. prewound inductor, 4505.
L_6—5 turns insulated wire over C_8 end of L_5.
Q_1, Q_2—Motorola MPF102 JFET or similar.
R_1-R_4, inc.—For text reference.
S_1—S.p.s.t. slide switch.

Construction Details

A 2¼ × 2¼ × 4-inch Minibox is used as a case for the unit. The cascode preamp is built on an etched-circuit board which is 2¼ inches wide and 4 inches long. It is mounted over a cutout on the Minibox cover, and is held in place by four 4-40 screws. A scale drawing of the circuit board is given in Fig. 2.

S_1, J_1, and J_2 are mounted on the same half of the Minibox that contains the circuit board. BT_1, a small 9-volt transistor radio battery, is attached to the inside surface of the other half of the box. A home-made aluminum U clamp secures BT_1 to the cover. Rubber feet are attached to the bottom of the box to prevent damage to table tops.

Ordinary masking tape was used to preserve those parts of the circuit board that are retained. The tape was cut into strips of the desired size, then pressed firmly in place with a dull instrument to assure that a good seal existed.[1] The masked-off board was then immersed in etching solution for approximately 30 minutes. Kepro ferric-chloride solution was used for this project. Vector etchant kits are also excellent for this purpose.

Tuneup

Connect the preamp in the coax line between the antenna and the receiver input terminals. Turn S_1 to ON and tune in a signal from a grid-dip meter or a signal generator. If the preamplifier is oscillating — as evidenced by "birdies," blank carriers, or popping noises as the coil slugs are adjusted, set the slug of L_3 (toward maximum inductance) for a position where the oscillation ceases. The next step is to tune in a signal at 28 Mc. and adjust L_2 for maximum gain. After this is done, tune L_4 for a peak at 29.7 Mc. L_5 should be peaked in a like manner at approximately 28.7 Mc. It may be necessary to readjust L_3 for best stability and noise figure after the foregoing procedure is completed.

The preamplifier should now be ready for use. It is important that the usual precautions be observed to prevent r.f. burnout of the input transistor. A good coaxial antenna relay is a *must* if proper isolation is to be had during the transmit cycle. The life span of BT_1 should be good because the entire circuit draws only four milliamperes during operation. — *WICER*

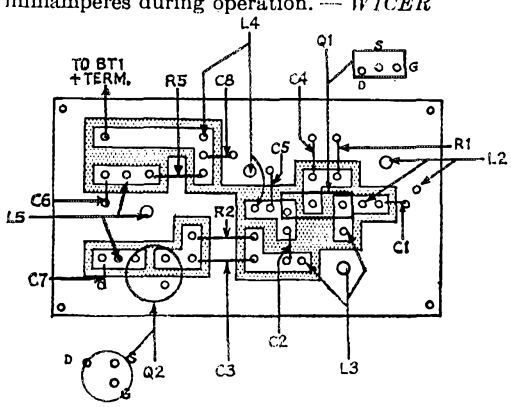


Fig. 2—A-half-scale drawing of the etched-circuit board showing placements of the parts. All coils are mounted under the board (copper side and inside the Minibox) as are C_1, C_5, C_8, and C_7. See text for location of S_1, J_1, J_2, and BT_1. All other components mount on phenolic side of the circuit board as shown in the photo.

*J. W. Miller Co., 5917 S. Main Street, Los Angeles, California 90003.

[1] The masking tape can be cut to the desired shapes much more easily if a strip of tape is first laid on a piece of kitchen-variety waxed paper as a backing. Strip off the waxed paper just before putting the tape on the copper.

The Clothes-Drier Quad

Cheap and Easy Conversion of Two Umbrella-Type Clothes Racks to a Popular Type of Antenna

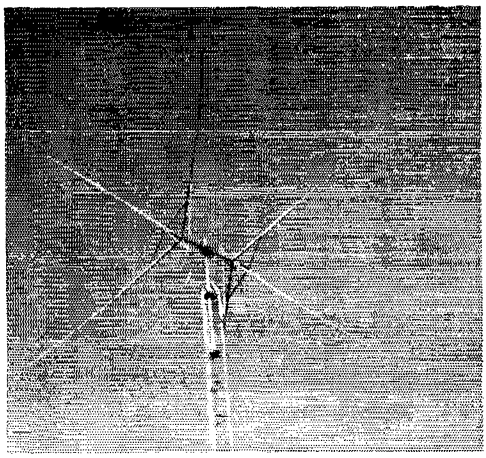
Here is a full-size cubical quad for one-, two- or three-band operation. Rigid in design, fabricated mainly of aluminum, it is lightweight and readily collapsible for ease of transportation and erection.

BY CARL L. BEDAL,* VE3DZB

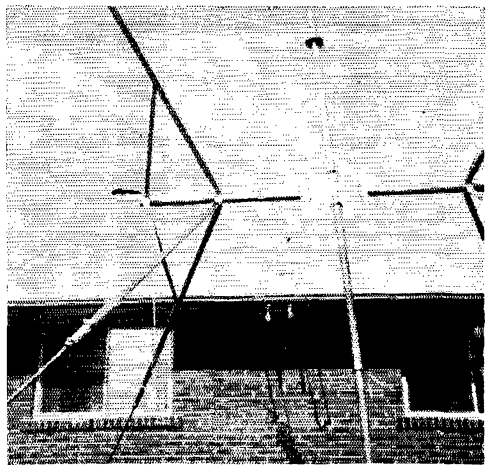
WHILE wandering about our backyard one evening, I noticed that the XYL's umbrella-style clothes drier had the configuration of a quad spider. It seemed to make sense that a household product constructed to withstand the onslaught of wet clothes should be able to withstand the ravages of weather if the product were used to make an antenna. Anyway, the idea of converting two clothes driers to a cubical quad seemed like a worthwhile project.

Beside presenting the builder with one quad spider, an all-aluminum, umbrella-style outdoor clothes drier offers two very important bonuses: one 6-foot long by 1½-inch diameter aluminum mast for the quad boom and some 150 feet of strong, nonstretchable, plastic-covered-rayon clothesline. However, since two spiders are needed, another drier identical to the first one must be bought. This purchase will yield two very important bonuses also: one aluminum mast, which can be used between the boom and rotor, and some more clothesline. Add sixteen gear-type hose clamps, eight lengths of ½-inch-diameter wooden dowel, some stranded copper wire for the elements, one insulator for each reflector plus an insulator for the tie point of the directors, some No. 12 solid copper wire or coil stock for the reflector coils, a 12 × 12 × 3/16-inch sheet of aluminum, four U-bolts, and you have the complete kit. The total cost is less than $35, even in Canada!

*355 Hollywood Ave., Willowdale, Ontario, Canada.



The 20-pound clothes-drier quad permanently installed atop a 30-foot tower. A TV rotor rotates the antenna through a thrust bearing.



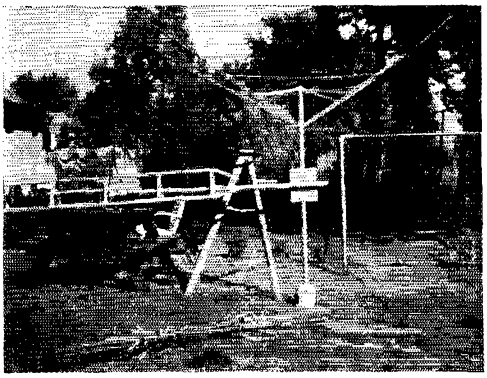
Close-up of the spiders and wooden extensions. Note the clothesline guys.

Construction

Assemble one of the spiders on the boom and extend the drier's arms to their normal position. Invert the whole assembly so that the four tips of the spider rest on a level surface, and the boom is vertical. Remove all but the longest length of plastic clothesline. Adjust the arms of this assembly so that the distances between adjacent tips are equal, and the figure formed by the remaining clothesline is a perfect square. Thread a length of the excess clothesline through the second hole in from the extremity of each arm, and firmly tie the cord to each arm. The guys formed by the cord are the primary set that insures a square configuration during and after construction. They are permanent and should need no further adjustment.

Once these guys are in place, remove the longer piece of clothesline from the extremity of each arm. This leaves room for installing and clamping the spider extensions. Then repeat the entire construction process for the other spider. Next, to accommodate the second spider, drill two holes in the free end of the boom (from first clothes drier). Locate the holes so that the arms of the spiders will be exactly in line when both spiders are mounted on the boom.

Use two hose clamps to hold a dowel in each channel-shaped aluminum arm of the drier. The arms of my particular model were 4 feet 6 inches long. For a two-band (10- and 15-meter) quad, I needed eight 6-foot lengths of dowel to cover the c.w. portion of each band. For three-band operation (10, 15 and 20 meters), one



In the foreground, a collapsed element; in the background, half the antenna installed on a tilt-over tower.

would need eight 9-foot lengths of dowel. Bamboo could be substituted if desired. Before the dowels are installed, wrap the base of each dowel in friction tape, and coat the dowels twice with spar varnish.

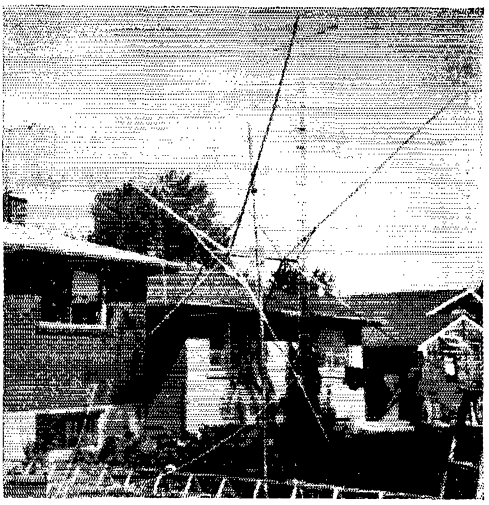
The elements can be made of No. 7 × 22 stranded copper wire that is precut according to the formula

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

where L equals the length of one side of the quad. Mark the wire with a drop of solder at the quarter-wave points. Thread each element wire through holes drilled at the appropriate points in the dowels. Secure the element wire to each dowel with a short piece of wire. The stringing of the elements can be accomplished easily by erecting one spider assembly at a time in clothes-drier fashion. One of the aluminum ground tubes supplied with each drier can be used as the anchoring device during this stage, or a tilted tilt-over tower can be used as shown in one of the photographs. Prior to the final assembly, the completed spider-element assemblies can be collapsed and removed from the boom.

[1] The spacing between the reflector and driven element can be closer if desired. Spacing in the order of 0.15 to 0.2 wavelengths is frequently used. — Editor.

[2] Hess, "Single-Line Feed for Tri-Band Quads," *QST*, August, 1959.



A dry run near the ground to insure that everything will fit together properly when the antenna is permanently installed.

Electrical Details

These details are orthodox; see the *Handbook* and articles on the quad published in *QST* over the years. The driers which were converted conveniently provided the author with an element spacing of one quarter wavelength[1] on 10 and 15 meters (i.e., using the maximum boom length of 6 feet). The quad is single-line fed[2] with 73-ohm coax. A porcelain insulator was attached to the common feed point, and a homebrew clamp with attached coax connector was wrapped around the insulator. To simplify erection, I decided to use coils in each of the reflectors, rather than the customary tuning stubs. Although only very rudimentary cut-and-try methods were used, the resulting standing-wave ratios on a homebrew meter were less than 2 to 1 from 21.0 to 21.35 Mc. and from 28.0 to 28.25 Mc.

Assembly

With a 10-foot pipe temporarily anchored in the ground tube, conduct a dry run for assembling the quad. Using a stepladder, attach the boom to a temporary mast with U-clamps and the aluminum plate. Proceed to attach the spider assemblies to the boom by sliding them on one at a time. Then flex the modified driers to full size, and bolt them in place. If you are doing this job alone, an extension of the boom, such as a broom handle, is a distinct aid during the operation.

Following this stage of the assembly, use can be made of the excess clothesline. By tying together the driven element and the reflector, you can employ the cord (some of it will need to be spliced) as a secondary set of guys to add rigidity to the structure. With a two-bander, it is advisable to tie a cord between the 10-meter points of attachment; i.e., between those of the

(*Continued on page 140*)

Hints and Kinks For the Experimenter

SWAN 350 MODIFICATIONS

EVER since I obtained my Swan 350 transceiver, I have been deeply concerned that the transmitter runs wide open in the TUNE-CW position, except when the final amplifier has been dipped and unloaded. The final tubes (6HF5 color television sweep tubes) are subject to damage or burn out unless fast action is taken during tune-up. According to the manufacturer's instruction manual, the transmitter shouldn't be in the TUNE-CW position under key-down conditions fore more than thirty seconds at a time. It's not too difficult to satisfy this requirement when operating the rig as part of a fixed station, but it is rather trying to load a mobile antenna in such short order; it can be done, but why gamble on losing a pair of final tubes or burning out an antenna loading coil? The following is my solution:

1) Remove the bottom cover of the transceiver.

2) Locate the REC-TUNE-CW switch, S_2.

3) Remove the white wire with violet tracer from S_2. Note that this wire comes from pin 9 of the balanced modulator, V_{13} (7360).

4) Wire a 1-megohm potentiometer (connected as a rheostat) in series with the white lead with violet tracer and the terminal on S_2 from which this wire was disconnected. Locate the plate which is used to cover the accessory-socket hole on the rear of the transceiver. Remove the plate and make a duplicate. Then mount the potentiometer on the new plate and attach the plate to the chassis. Finally connect two wires to the control and route them along the side of the chassis to S_2.

5) Locate the end of the 50-pf. capacitor, C_{1401}, connected to S_2, and ground it to the chassis with a short jumper wire.

With the modification described above and with S_2 in the TUNE-CW position, you can vary the cathode current of the final amplifier tubes from approximately 100 ma. to 600 ma. by adjusting the added potentiometer. Note also that it will no longer be necessary to touch the CAR BAL control in order to adjust the power amplifier stage.

Besides the changes discussed, there are two alternative ways to control the output of the final. The first is to use a fixed resistor in lieu of the 1-megohm potentiometer. The power amplifier meter will read about 200 ma. with a 500,000-ohm resistor and about 100 ma. with a 1-megohm resistor, provided the CAR BAL control has been adjusted according to the instruction manual. Note that this control must be varied in order to obtain full output (580 ma.). The second way is to disconnect the white wire with violet tracer from S_2 and to ground the end of C_{1401} as described in step 5 above. Then the CAR BAL control can be used to vary the cathode current of the final from 50 to approximately 600 ma., provided the transceiver is in the TUNE-CW position. This last modification may be the easiest of the three; however, frequent turning of the CAR BAL control may result in erratic operation of this potentiometer (evidenced by difficulty in balancing out the carrier for s.s.b. operation). — *Wayne D. Carpenter, W4JMU*

CLOTHESPIN FIRE ALARM

A FIRE alarm is a desirable safety device for the ham shack, but usually such a gadget is quite expensive. However, by modifying each leg of a clothespin as shown in Fig. 1, a simple fire alarm can be made using materials that cost less than a dollar.

Take an ordinary spring-type clothespin apart and drive a small tack partially into one of the wooden legs about 1⅛ inches from the fat end. Solder a flexible wire below the head of the tack and then drive the tack in the rest of the way. Note, however, it may be necessary to drill a small hole through the clothespin before the tack is driven in so as to keep the wood from splitting. Modify the remaining leg the same way and then reassemble the clothepin.

Tack the clothespin to a wall or bolt it to a piece of equipment. Open the clothespin and place a ball of candle wax or paraffin in its jaws. Wire the clothespin-switch in series with a bell or buzzer and a battery. If there is a fire the paraffin will melt, the switch will close and the the alarm will ring. Because the cost of the alarm is so low, there is no reason why every room in the house can't have fire protection. — *Stephen M. Sombar, WA0PRI*

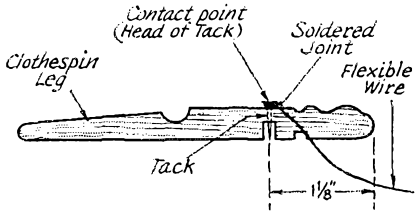
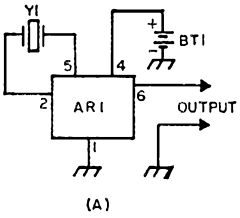
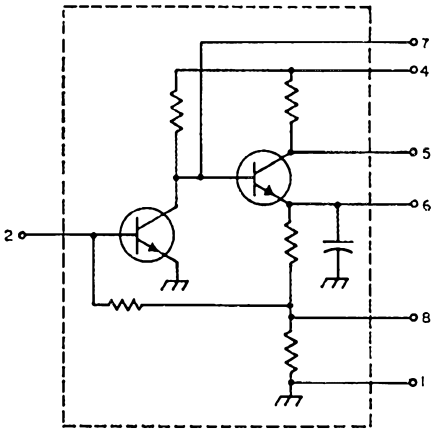


Fig. 1—By modifying each leg of a clothespin as shown, a simple fire alarm can be constructed.



(A)



(B)

Fig. 2—Schematic diagram of the crystal calibrator (A) and the WC 1146T integrated circuit (B).
AR_1—Westinghouse WC 1146T integrated circuit.
BT_1—Small battery, 5- to 12-volt range.
Y_1—Fundamental crystal.

SIMPLE CRYSTAL CALIBRATOR USING AN INTEGRATED CIRCUIT

A CRYSTAL calibrator circuit used by C. F. Inniss, K6QBF, is shown in Fig. 2A. The parts count is three, which is about the smallest number of components that a crystal oscillator can be built with. A Westinghouse WC 1146T integrated circuit is the heart of the unit. The WC 1146T is basically a direct-coupled, two-stage transistor amplifier (Fig. 2B) with negative feedback to assure stable operation over a wide temperature range. As shown in Fig. 2A, oscillations are caused by feeding back an in-phase signal from lead 5 (collector of the output transistor) to lead 2 (base of the input transistor). A crystal in this feedback path determines the oscillator frequency. If the frequency of the calibrator needs to be adjusted, capacitance can be added across the crystal to lower the frequency, or inductance may be added in series with the crystal to raise the frequency. — *W1YDS*

ELIMINATING BACKGROUND NOISE IN THE HAM SHACK

IF the XYL or kids create too high a background noise while you are working c.w., use a pair of "hearing protectors" such as those used by jet airport workers. These protectors are manufactured by the American Optical Company and are sometimes distributed by local gun dealers. The model 1200 has a headband for over-the-head mounting. Drill a small hole through the superior part of the "domes." Feed the leads from a small earphone, such as those that come with transistor BC sets, through the hole. If this doesn't cut out all the interference, use a tiny earphone of the type that plugs directly into the auditory canal, and put the protector over the whole works. — *C. A. Weed, M.D., WA1BDJ*

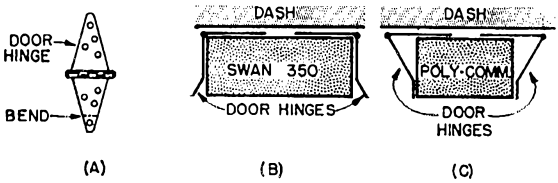
COMPONENT SOURCE

ONE source of parts for the beginner or those with limited finances is a junk yard. Many of the components I have used in my rig have been purchased at the low price of ten cents per pound from an iron and metal company. The parts, of course, are not new, but work well if cleaned and fixed up a bit. For a few cents there are many excellent power transformers just waiting to be bought and used. — *Mark Bauer, WA9MJT*

TRANSCEIVER MOUNTING BRACKETS

MY problem has been to find suitable mounting facilities for two transceivers that I use for mobile operation. I own a Swan 350 and I have a Poly-Comm 6-meter transceiver on loan from CD. I wanted some type of mounting brackets that would hold either rig, in spite of the fact that there is a difference of 2½ inches in the widths of the transceivers. In addition, I wanted to answer my wife's complaint that the Swan mounting bracket kept gouging her knee when no rig was in the car.

After a couple of experiments with plumber's pipe strap, I thought about trying hinges. Sure enough, by mounting a pair of 4-inch long triangular door hinges, I solved my problems. I didn't even have to drill extra holes in the hinges, as there were four holes to choose from for installing the rigs. To accommodate the Poly-Comm, the smaller of the two transceivers, I simply bent the hanging portion of the hinges slightly near the bottom, as shown in Fig. 3. When not in use, the hinges can be folded up and held against the dash with magnets or strips of tape. — *James Hoffer, WA8OVC*



(A) (B) (C)

Fig. 3—Two triangular hinges are bent as shown in A, and mounted under the dash. B shows the position of the brackets with the Swan 350 in place, and C shows the brackets with the Poly-Comm 6-meter rig installed.

Detecting V.H.F. Signals Too Weak To Be Heard

Practical Equipment for Moonbounce and Other High-Loss Paths

BY ALAN PARRISH,* K1KKP

Working with signals that are inaudible with normal v.h.f. receiving techniques has been a matter of long-time interest to the author of this article. In the hope of clarifying the somewhat vague information that has been available to amateurs in the v.h.f. field, he presents details of a practical system capable of resolving signals at least 15 db. below the minimum that is detectable by aural methods.

GIVEN the amateur power limit, there are two principal ways of overcoming the path loss on very marginal v.h.f. circuits. The more common of these is the use of large-aperture high-gain antennas. The second is to take advantage of unorthodox receiver designs, to obtain an effective bandwidth below the approximate limit of 100 cycles set by limitations of the human hearing mechanism and practical considerations of stability. From time to time mention is made in some amateur journals of clever designs that claim to do this, usually under the name of "synchronous detection." The seemingly amazing claim is made that an effective bandwidth is achieved that is much smaller than the actual bandwidth of the receiver i.f., which normally determines the system stability requirements.

Such claims are not unfounded, nor is the principle of the system new. It has been employed in various scientific measuring instruments for some time. Here we will show how this principle is applied to a practical receiver that has been used to obtain moonbounce echoes on 144 Mc. at K1KKP, using nothing more in the way of an antenna than two 10-element Yagis on 12-foot booms.

Many systems for detecting small signals in the presence of noise follow a development by R. Dicke[1] in 1946. This is based on comparing the total power (signal plus noise) in a narrow band containing the signal, with the noise power in the same band shifted so that the signal is not in it. In a superhet receiver this is done conveniently by shifting the local oscillator back and forth a few kilocycles. The comparison is made in a "synchronous" or phase-sensitive detector, following the envelope detector in the receiver. This amounts to nothing more than a reversing switch, operated periodically along with the frequency-shifting mechanism. A generalized representation of this system is shown in Fig. 1. Further discussion of the principles can be found in H. D. Olson's article in December, 1965, *QST*.[2] An advantage of this approach is that it eliminates, on the average, any variations in the noise level, such as transients and variations in receiver gain.

The block diagram of a synchronous v.h.f. receiver is shown in Fig. 2. Here the frequency shifting is shown applied to the oscillator of a crystal-controlled converter, although it can be done equally well in the main receiver oscillator. If it is done at the converter, the system can use a standard communications receiver, without modification, for most of the r.f. circuitry. This also means that only the outboard equipment, shown in Fig. 3, need be built to make a synchronous receiver. In my case, this was largely built of junkbox parts, and it could be transistorized easily.

Practical Circuit Details

There are a few special precautions that must be taken in construction, or in any redesign. At the top of the list is the need to keep any signal that is common to the reference and signal circuits at as low a level as possible, for it will register as a d.c. output, just like a received signal. Such d.c. "noise" can be balanced out in the d.c. amplifier, but its instability (resulting from line voltage variations, etc.), can be very troublesome when high d.c. gain and long integration times are used. It is best to eliminate this trouble at the source, with heavy decoupling of the plate supply leads and care in wiring heater circuits, to keep hum down. Otherwise no special care is called for in construction.

The phase-sensitive detector performs the task of the reversing switch of Fig. 1, and is nothing more than a diode-ring balanced modulator. The 6AL5 diodes shown in Fig. 3 could be replaced with good-grade semiconductors, if desired. To adjust the circuit, set R_1 so that the

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[1] Dicke, "Measurement of Thermal Radiation at Microwave Frequencies," Rev. Sci. Inst., 268–275, July, 1946.

[2] Olson, "Weak-Signal V.h.f. Reception," December, 1965, *QST*, p. 25.

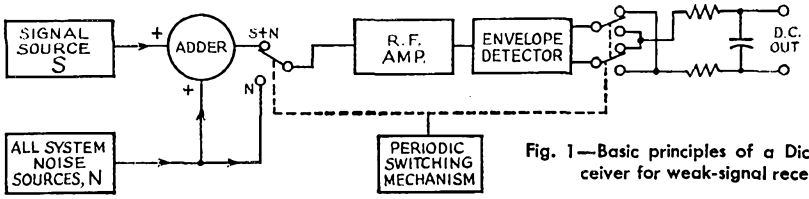


Fig. 1—Basic principles of a Dicke-type receiver for weak-signal reception.

voltages at J_1 and J_2 are equal, referred to ground. R_2 and R_3 are adjusted for minimum voltage from their arms to ground. These adjustments interact somewhat, and may have to be repeated a few times. Final balance is obtained by setting R_1 for zero output from the d.c. amplifier, as read on the output meter, M_1. A reference is obtained by shorting the d.c. amplifier input. Because of the high gain of the d.c. amplifier, this is the most sensitive indicator of balance. The adjustment is made with zero signal input from the receiver.

The 6AC7 pentodes were chosen for the d.c. amplifier in order to get high gain in a single stage, and avoid the inevitable problems associated with d.c. coupling of several triode stages. With this amplifier, integration times ($T = RC$, where R and C are the integrator values) of up to half a minute can be used, if M_1 is a 1-ma. meter or an Esterline Angus recorder. The stability of the system is such that it should be possible to use a 100-μa. meter and longer integration times, if desired. The r.f. filtering shown is needed only if the system is to be used for receiving your own echoes, to keep things from "running wild" when the transmitter is on, due to rectification in the grid circuit.

Relay K_1 serves to isolate the integration capacitor, C_7, during transmitting periods, allowing integration over several moon echoes. It is a normally-closed type, opened during transmit periods by the same voltage that actuates the antenna relay. It is not needed except in "radar" service.

Constants of the LC filter in the input of the d.c. amplifier, preceding the integrator, are chosen to cut off sharply at a few cycles, in order to pass slow-speed c.w. No RC integrator is used following the filter in c.w. work. The 100-henry inductors, L_1–L_4, are large surplus high-impedance audio transformers, with all windings connected in series-aiding. Some scrounging was needed to find these. If similar units cannot be obtained a cascaded RC filter could be made up instead, or it can be left out entirely if only long integration times are going to be used. Capacitors C_1–C_4 reduce the common-mode noise present in the phase detector output. This will not show up in the readout if the d.c. amplifier is balanced, but this is not the case in practice.

The signal voltage applied to the phase detector (measured at J_3) must be less than one-fourth of the reference voltage (measured at J_1 and J_2) to prevent overload. The output level from the phase detector can be maximized by limiting the bandwidth of the signal voltage from the receiver. This is done by the low-pass filter between the 6AV6 and 6J5 stages in Fig. 3, shown as F_1 in Fig. 2. It should be possible to get about 20 volts across J_1 and J_2 without serious distortion of the waveform.

To get maximum signal-to-noise ratio, the signal and reference inputs to the phase detector must be exactly in phase. To adjust this a moderately strong signal is applied to the receiver, and the signals present at J_1 and J_3 are displayed in Lissajous-figure form on a scope. If zero phase shift cannot be obtained by adjust-

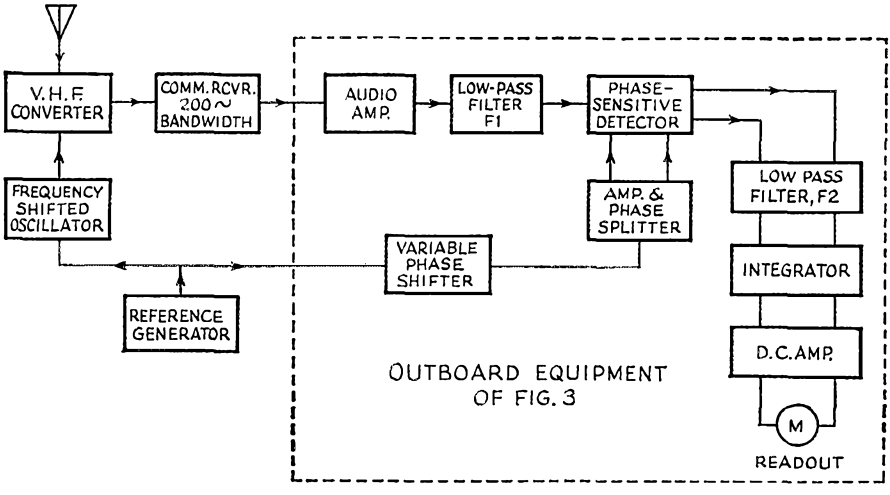


Fig. 2—Block diagram of the weak-signal receiving system for v.h.f. work.

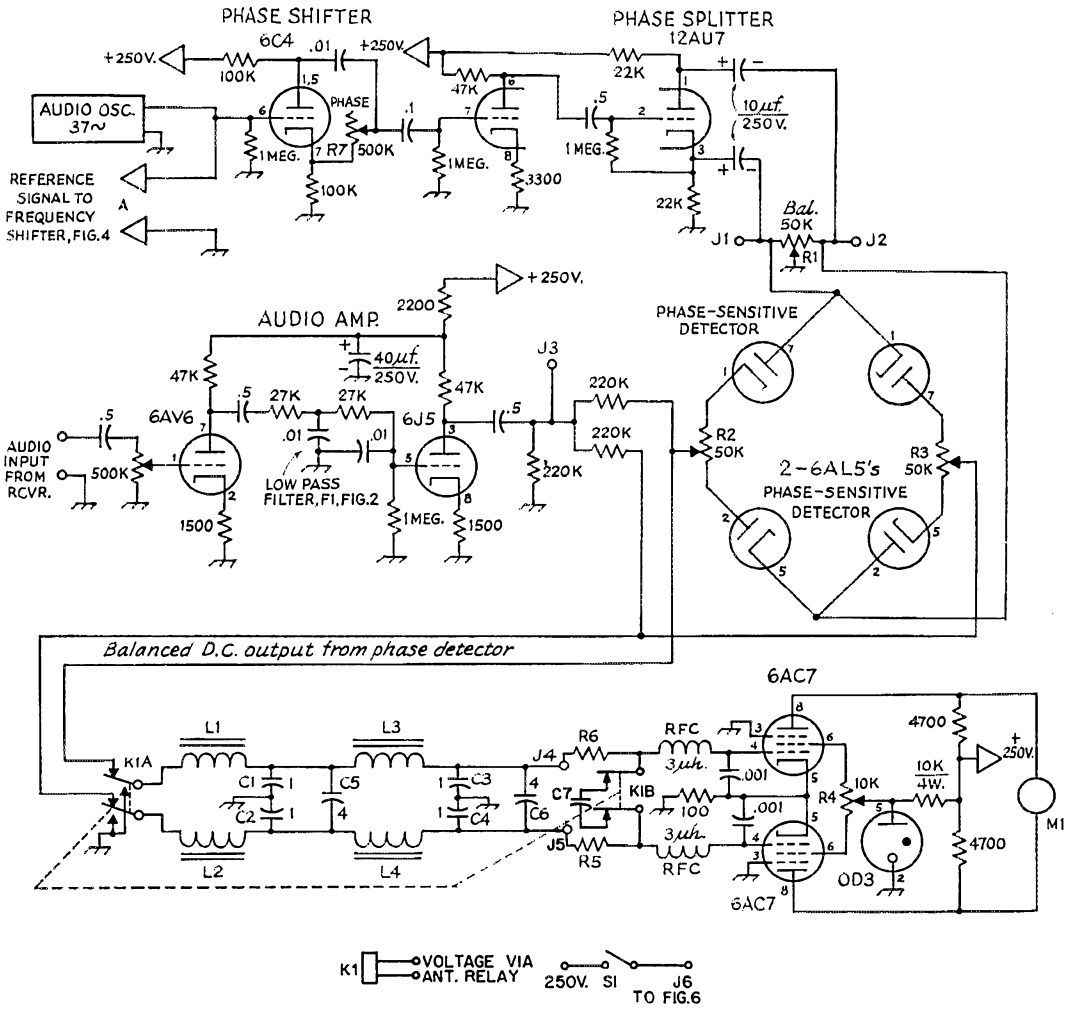


Fig. 3—Schematic diagram of outboard equipment used to adapt a conventional v.h.f. receiving system for synchronous detection. Unless otherwise specified, decimal values of capacitance are in μf., others in pf. Capacitors with polarity marked are electrolytic. Resistors are ½-watt.

C_1, C_2, C_3, C_4—1 μf., 200 volts, paper.
C_5, C_6—4 μf., 200 volts, oil.
C_7—Integration capacitor; for 10-second time constant 4 μf., 200 volts, oil. See text.
J_1 to J_6, incl.—Tip jack.
K_1—4PDT relay, coil rating same as station antenna relay. Contacts are shown in the receive position.
L_1, L_2, L_3, L_4—100 hy.; see text.
M_1—1-ma. meter, or chart recorder.
R_1, R_2, R_3—50,000-ohm control, linear taper.
R_4—10,000-ohm control, linear taper.
R_5, R_6—1.2 meg., for 10-second time constant; see text.
R_7—0.5 meg., log taper.
S_1—External contacts on antenna relay.

ment of the phase control, it will be necessary to change the values of the coupling capacitors in the reference circuits, to obtain the proper range of phase control. Once this is done, adjustment can be obtained simply by adjusting the phase control for a peak in the output indicator.

Frequency Shifting

Details of frequency-shifting circuits for variable and crystal oscillators are shown in Fig. 4. The upper circuit is used on my receiver, where the frequency shifting is done at the main variable oscillator. It cannot be used with a crystal oscillator. When the diode is forward-biased, the trimmer is effectively shorted across the tank, lowering its resonant frequency. Unfortunately the series resistance of the diode is enough so that it would lower the Q of a crystal, reducing the amplitude of oscillation; thus electromechanical switching must be used with a crystal oscillator, as in the lower circuit of Fig. 4. The Q of an LC tank is low enough so that the reduction due to the diode is not appreciable. With the crystal oscillator a small audio amplifier drives a chopper (such as an Airpax No. 175) to handle the capacitor switching. Any amplifier should do, as only a few milliwatts of

power are needed. This arrangement is used in the circuit blocked out in Fig. 2.

If the frequency shifting is done in the tunable oscillator of the receiver, the r.f. circuits in the receiver should be adjusted so that their response will be the same on both channels. Otherwise, slope detection of the noise will occur, and the balancing out of gain and noise-level variations will not be achieved. This point applies when shifting is done at the converter crystal oscillator, but the problem is not nearly as critical, for v.h.f. circuits are broadband by nature.

Some difficulty might be encountered as a result of changing drive level to the v.h.f. mixer, as frequency shifting occurs. This can be minimized by using a high crystal frequency to begin with. All these problems are aggravated if a large degree of frequency shift is used, and the optimum value seems to be around one or two kilocycles, for a 200-cycle i.f. bandwidth.

The fact that the post-detection bandwidth in this system is very small does not mean that the predetection (or i.f.) bandwidth can be any desired value. Ideally it should be the same as the signal bandwidth, but this is not practical for c.w. signals. A bandwidth of the order of 200 cycles is probably about optimum, if stability problems are considered.

Detection and Readout

The only other special precautions concerning the communications receiver have to do with the detector. First, the r.f. drive level to the a.m. detector must be quite high, on the order of 10 volts, so that the detector nonlinearities in the forward region do not degrade the signal-to-noise ratio. At the same time, the drive level must not be so high that the last i.f. stage is saturated, as this would wipe off the amplitude information we are looking for. Also, since the desired signal is a low frequency (the same as the reference frequency) the audio coupling circuitry must be able to pass it. This means that the audio to the 6AV6 stage in Fig. 3 should be coupled directly from the a.m. detector in the communications receiver, and not taken from the headphone jack.

The ideal readout device for this type of receiver is obviously a chart recorder. If one

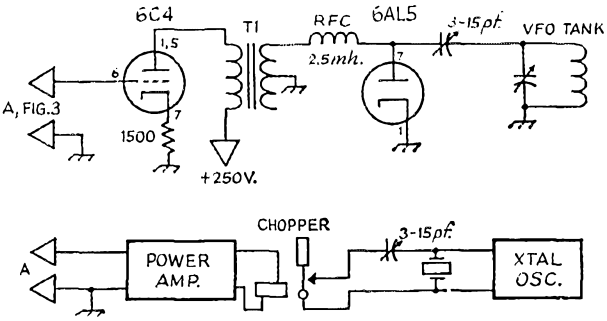


Fig. 4—Typical frequency shifting arrangements for a variable oscillator, A, and crystal oscillator, B.

cannot be borrowed or scrounged, a meter can be used, but there is a tendency for the observer to apply wishful thinking when he is taking readings! I used a meter readout, and a 20-second integrator following the filter for moon-echo observations during the summer of 1965. For this work, a timer cycled the system between receive and transmit at 2½-second intervals, and disconnected the integration capacitor, C_7 in Fig. 3, from the rest of the system while transmitting, so that any signal stored in it would not be lost. With this system it was possible to watch the sum of the echoes build up over many successive transmit-receive cycles.

Some sense of "just because the meter's moved over doesn't necessarily mean that there is a signal in there" remained; an ambiguity that could be resolved by coding the transmitted signal and then seeing if the code used is observed on a set of received echoes, which are combined together in the readout. The readout here is an oscilloscope intensity-modulated by the receiver output. The scope has a slow sweep initiated at the time the leading edge of the echo is expected. The combining is done by means of a time-exposure photograph of the scope face.

The synchronous receiver is sensitive to two frequencies separated by the amount of the local-oscillator frequency shift. A signal on one of these frequencies produces a net positive output of the phase detector, while a signal on the other results in a net negative output. Thus, when the receiver output is fed to an intensity-

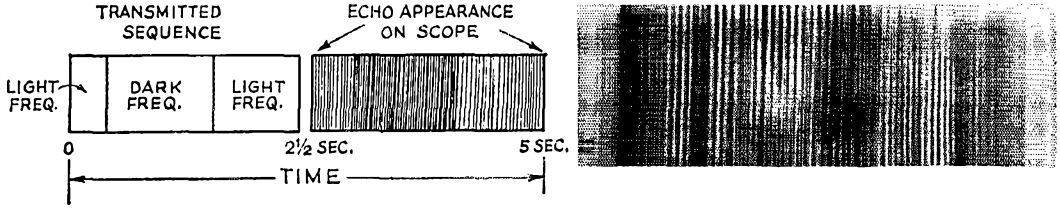


Fig. 5—The trick in observing the presence of moon-reflected signals, when each individual echo is obscured by noise, is to code the transmitted signal, send a large number of identically-coded 2½-second pulses, and then "stack" the echoes electronically. Random noise is reduced by this averaging process, while the coded characteristics of the echo show through. The sketches at the left show the timing process. Stacking is done by intensity-modulating a scope with the receiver output. The scope has a 2½-second sweep triggered at the beginning of the echo. Actual moon echoes well below the audibility threshold are seen at the right. The transmitter is frequency-shift keyed, as described in the text.

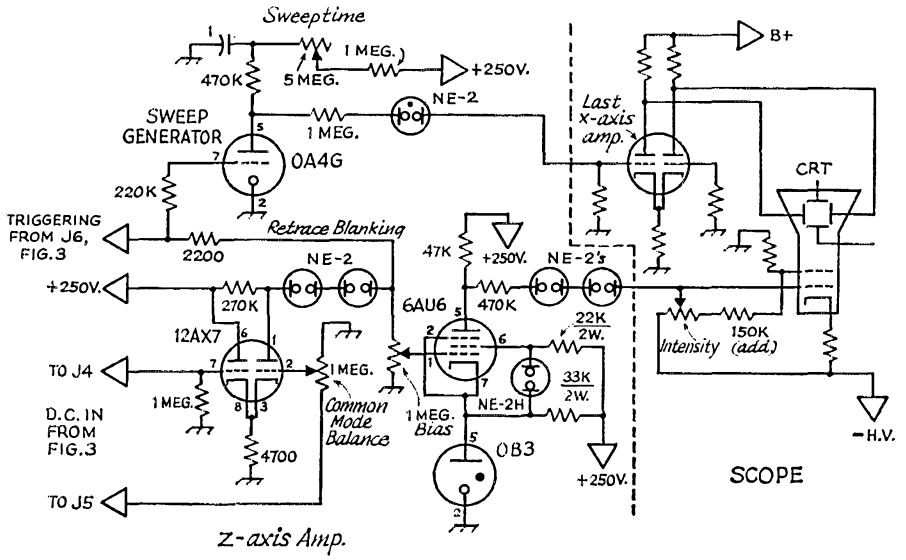


Fig. 6—Schematic diagram of the scope readout circuits. Actual circuit details of the scope, right side of broken line, depend on the scope used. Triggering and d.c. voltages taken from Fig. 3, are indicated at the left.

modulated scope, a signal on one frequency makes the trace brighter, and on the other darker. This implies that the optimum way to code the transmitter output is by frequency-shift keying. In the case of Fig. 5 the transmitter was on the bright frequency at the beginning of the 2½-second transmit period, the dark frequency in the middle, and on the bright frequency again at the end of the period. Consequently, the readout time exposure is expected to be bright-dark-bright, from left to right.

The coding and the transmit-receive cycle are controlled by a timing wheel, similar to the familiar "CQ wheel," and the code can be changed easily. It could be set up so that letters or words appeared on the readout in Morse code, and the system could be used for very slow-speed weak-signal communications, providing that the timing of the coding and the readout at the other end were properly synchronized.

The special circuitry needed to convert a standard scope to do this is shown in Fig. 6. This consists of a d.c. amplifier connected to the first grid of the c.r. tube through a string of neon bulbs, to effect the intensity modulation. The number of neons needed (only two shown in Fig. 6, for clarity) depends on the amount of high voltage used and the characteristics of the bulbs, and must be determined by experiment. The necessary slow sweep is obtained by the old-fashioned gas-tube circuit, using an 0A4G, also coupled into the scope.

In many scopes the last horizontal amplifier stage is directly coupled to the deflection plates. The output of the sweep circuit can be fed into the grid of this stage, through a single NE-2, as shown. The scope used here is an old Heath OL-1, which is representative of many inexpensive manufactured and kit instruments. The input to this equipment is taken from J_4 and J_5 in Fig. 3, and the retrace triggering from J_6. This also provides retrace blanking, by forward-biasing the 6AU6 stage when the transmitter is on. A 60-cycle signal is applied to the vertical deflection plates, so that the sweep will be a wide band, instead of a narrow line.

A sample of the moon-radar results, as photographed from the scope, is shown in Fig. 5. The exposure was *f*5.6 for 250 ASA film and 20 sweeps. The transmitter used was a 4CX250B amplifier, essentially as described by WØMOX in December, 1961, *QST*, running 900 watts input. The converter was a Nuvistor job with a noise figure of about 3 db. The antenna system was small, by moonbounce standards, being only a pair of 10-element Yagis on 12-foot booms, fed with home-made open-wire line.

During all the observations, a Collins 75A1 with 200-cycle bandwidth, and a tape recorder, were used, in case there were audible echoes. None were heard during the whole observation period, though occasional bursts have been heard on a similar setup in the past.

Verifying Performance

The actual performance of the synchronous receiver is more easily checked in the laboratory than by moonbounce tests, though it is still difficult because of the very weak signals involved. I did not have access to a calibrated signal generator with adequate stability, so the device shown in Fig. 7 was constructed as a test source. It uses a 500-kc. crystal oscillator (Barry Electronics, $6.50, surplus) feeding a tuned circuit at 144 Mc. via a 1N34 as a harmonic generator. Output from the harmonic generator is coupled to another tuned circuit in the other compartment of a 5 by 7 by 3-inch chassis by

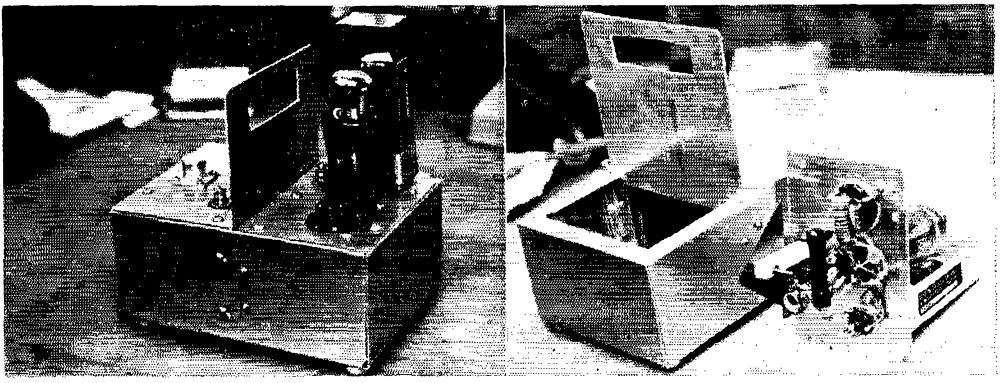


Fig. 7—Weak-signal generator used for testing the receiving equipment. Output is varied by moving the vane shown at the center of the assembly. The 500-kc. oscillator and voltage-regulator tube are at the right side of the vane in the assembled view, left. The interior is shown at the right.

two triangular capacitor plates, 1 by 1½ inches in size. The output connector is tapped half way down on the second tuned circuit, as shown in Fig. 8. The degree of coupling, and hence the output signal level, can be adjusted by moving the aluminum plate that separates the two compartments. The plate is held in position by a leaf spring arrangement, barely visible in the right portion of Fig. 7. The generator has no leakage, is very stable, and its output level can be adjusted smoothly down to zero, making it very useful in any kind of weak-signal receiver development work.

Tests with the generator indicate around 10 db. signal-to-noise ratio with 10 seconds integration time, when the signal has been reduced to the point where it can no longer be found in the receiver operated in the normal way with 200 cycles bandwidth. This serves to show what receiving equipment of this type will do, in terms of eliminating transients and variations in gain and noise level from the net output, allowing one to observe a very weak signal under less than ideal conditions. A 3-db. price is paid for this, as the signal is observed only half the time. This must be accepted when weak-signal work is done with long integration times, as otherwise a slight change in noise will mask the signal.

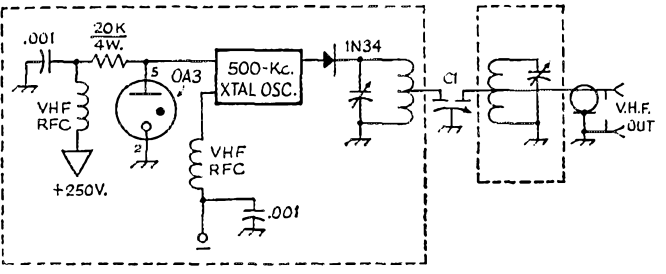


Fig. 8—Schematic diagram of the signal generator of Fig. 7. The two tuned circuits should be set up for the frequency band to be used. Taps are at the approximate midpoints. Fixed plates of C_1 are the two triangular coupling plates described in the text. The movable plate is the vane seen in Fig. 7.

A receiver of this type is obviously not an ordinary hamshack device, as it comes into its own only as the signal approaches inaudibility, yet its circuitry is no more complex than other modern equipment. Its chief usefulness is in propagation studies on e.m.e. or other high-loss paths. For such communications experiments it will indicate whether there is any signal coming in at all, when the signal is below audible level, and it will serve as a visual aid in copying very slow, weak c.w.

Appendix

The signal-to-noise ratio expected for the receiver described here can be calculated using the method developed by Dicke. The resulting formula is:

$$\frac{\text{signal deflection}}{\text{RMS noise deflection}} = \frac{P_{sig}\sqrt{\gamma}}{K\,Tn\sqrt{B\,2}}$$

where P_{sig} = coherent signal power at the antenna terminals

k = Boltzmann's constant, 1.38×10^{-23} $\frac{\text{joules}}{\text{deg. Kelvin}}$

B = receiver i.f. bandwidth

γ = RC, the integrator time constant

T_n = system noise temperature, which is (N-1) 290° plus the antenna temperature. N is the noise figure expressed as a power ratio.

The factor of 2 in the denominator appears because the signal is observed only half the time. The formula also works for an ordinary receiver followed by an integrator, if the effects of gain variation, etc. are neglected. In this case, the factor of 2 is dropped. QST

Technical Correspondence

TWO-TERMINAL OSCILLATOR

Technical Editor, *QST:*

For some time, we have been using a transistorized grid-dip meter made up especially for the range 100 to 4000 kc. Among other things, while it has been used with some degree of success in determining values of L and C much higher than those normally encountered in ham-band usage, it is rather difficult, and in some cases impossible, to couple the meter to certain types of universal-wound and closed-core ferrite inductors.

To determine resonance of LC combinations using such coils, it was decided to use an oscillator and check its fundamental by harmonic evaluation — that is, by the frequency differences in the higher order of harmonics. This called for some sort of oscillator with reasonably high-order harmonics and one which would oscillate over a wide range without the feedback problems normally encountered with the Hartley, Colpitts, or their several variations. Recalling ancient history, the old and largely forgotten dynatron came to mind. Unlike most vacuum-tube oscillators which depend upon some form of feedback to provide proper phase relationships and amplitudes, the dynatron, as some will recall, is a negative-resistance type of oscillator. The dynatron makes use of the undesirable tetrode characteristic of "secondary emission," caused by electronics being accelerated, by an above-normal screen voltage, to the point where they strike the plate with sufficient velocity to cause the plate itself to become an emitter. The introduction of the fifth element, the suppressor, prevents this from taking place (using normal and proper element voltages).

Most any receiving-type pentode having a separate suppressor connection can be made to "dynatron" if the screen and suppressor are tied together. Our final choice after experimenting was the 6AU6, but only because it seemed to work as well as some of the older glass 6-volt tubes and is currently available.

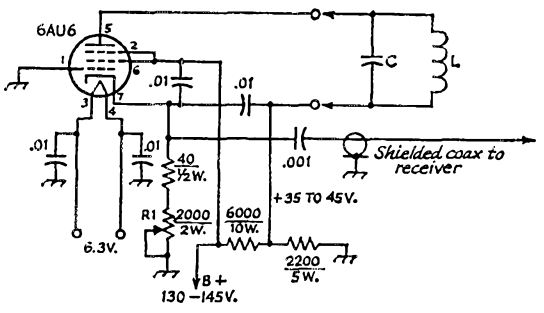


Fig. 1—Dynatron resonance checker. L and C form the tuned circuit whose frequency is being checked. Resistances are in ohms; capacitances are in μf.; capcitors can be disk ceramic. R_1 is a linear potentiometer.

With the constants given in Fig. 1, harmonics are audible in the 3.5-4-Mc. band, from the combination of 176 millihenrys and 0.002 μf. (8500 cycles); 176 mh. and 0.006 μf. in this oscillator configuration (5000 c.p.s., approx.) has harmonics audible in the broadcast band. The upper oscillating frequency limit appears to be about 2 Mc., depending somewhat on the Q of the resonant circuit. At this limit, the cathode resistance will be set somewhere near minimum. Little or no adjustment is required from the lower limit of frequency up to the lower end of the broadcast band (a frequency range of about 100 to 1), excepting that a minimal amount of cathode current should be used, consistent with oscillation, to provide the cleanest note. At the higher limit (2 Mc.), the note becomes somewhat ragged. In the practical application of the dynatron, the screen is run at approximately three to four times the plate voltage.

Secondary emission is not necessarily conducive to tube longevity, hence the need for keeping the voltages and cathode current down. In the circuit shown, maximum cathode current will be in the order of 12 to 14 ma. (at 2 Mc.), while 7 milliamperes is more than adequate for 5000 c.p.s. oscillations being checked in the broadcast band.

Determination of L or C may be made by the following:

$$L\ (\mu\text{h.}) = \frac{25330}{f^2\ (\text{kc.}) \times C\ (\mu\text{f.})}$$

$$C\ (\mu\text{f.}) = \frac{25330}{f^2\ (\text{kc.}) \times L\ (\mu\text{h.})}$$

— W. H. Fishback, W1IKU, Old Comers Road, Chatham, Mass. 02633.

THE NOISY-BLOWER PROBLEM

Technical Editor, *QST:*

A recent article[1] in *QST* described a carefully engineered approach to forced air-cooling of transmitting tubes. There is still a problem requiring a rough solution for the man who wants to provide a measure of cooling for the normally radiation-cooled tubes. This would permit him to "lean a little" on the tube manufacturers' ratings and still get normal life from his tubes.

Perhaps the simplest approach with an existing linear amplifier is along the lines of the one shown on pages 208-211 in the 1967 *ARRL Handbook*, using a fan in close proximity to the tube envelope. Second-hand Rotron Muffin Fans, available at prices ranging from $4.50-$6.00, are well suited to this application. These fans are rated at 100 c.f.m. with 14 watts input, which is more than adequate in most cases. However, at normal input most of these fans are objectionably noisy. Some of the noise is due, no doubt, to wear and some is inherent wind noise. In any event, it is possible to bring this noise down to an acceptable level, and at the same time have a reasonably good idea of the actual free delivery volume of the fan.

Noise and volume of air delivered are both directly related to fan speed. If we reduce the fan speed by reducing the applied voltage until the noise level is acceptable and then measure the volume as a direct proportion of the speed we can judge, roughly, the adequacy of the cooling. Measuring the speed is easy if you have a tachometer. Lacking this instrument, we can resort to a simple strobe device, as follows:

[1] Orr, "Forced-Air Cooling of Transmitting Tubes," *QST*, September, 1967.

If we take a 1-watt neon or argon lamp and connect a diode of adequate voltage rating in series with the lamp and the 117-volt a.c. line, the lamp will flash 60 times per second. If we put a chalk mark on the rotor of a fan, shining the neon light on the rotor would make the chalk mark appear to stand still if the fan were turning at 3600 r.p.m. Actually, since the maximum speed of an a.c. motor (other than the universal or brush type) is 3600 r.p.m. without friction or load, we cannot see a single mark. But if we reduce the fan voltage to somewhere around 75 volts we will see two opposing marks. This tells us the fan speed is 1800 r.p.m., which corresponds to half-volume delivery. Similarly, when we see three stationary marks we know the speed is 1200 r.p.m., and four marks show that the speed is 900 r.p.m. If these patterns of marks appear to rotate in the same direction as the fan turns, we know the fan speed is somewhat greater than that corresponding to the stationary pattern. If the patterns rotate the other way we know the fan speed is slower. So, for example, if we find the fan is quiet enough when we have two opposing marks rotating slowly the way the fan turns, we know the fan speed is a little more than 1800 r.p.m. and the fan is delivering somewhat more than 50 c.f.m.

I use the above example because this is the actual situation with my own linear using two 811As. It permits me to run a peak-envelope input of nearly 700 watts for a p.e.p. output of over 500 watts, with no show of color on the plates. Pieces of vector board are used as deflectors to direct the air stream over the tube envelopes. A 450-ohm resistor in series with the fan connected across the filament transformer primary drops the fan voltage to 70 volts, at which level the fan is barely audible in a quiet room. The tubes are run at zero bias with a calculated plate dissipation of 175 watts at peak and 230 watts average, for two tubes — nearly twice the manufacturers' rating. — *J. H. Ellison, W6AOI, 1720 Holly Ave., Menlo Park, California 94025.*

AIRCRAFT-REFLECTED COMMUNICATION

Technical Editor, *QST:*

I would like to make a few comments on the Technical Correspondence by W1QXG in the August, 1967, issue of *QST*. It occurred to me while reading this fine piece that a knowledge of the vertical pattern of the antenna would be desirable in planning this type of experiment. To this end I would recommend the article "Antenna Patterns from the Sun" by Bray and Kirchner in *QST* for July 1960. This article is well done and covers the subject in detail.

Patterns shown there indicate that for certain antennas, the second and third lobes of the vertical patterns may be only a few decibels weaker than the main lobe. Where reflections from aircraft are used between two amateur stations, the vertical pattern can be an important factor when considering shorter than optimum paths or using aircraft at higher altitudes. Admittedly, the measurements are not simple or easily made but the results are very worthwhile and apply to other types of amateur communications as well. Vertical patterns should be made in both directions, as outlined by Bray and Kirchner, since they can differ, depending on local terrain, ground conductivity, proximity of buildings or other antennas and other factors.

Preliminary tests here at K1QDR indicate that this is true to a significant degree. — *George B. Jones, K1QDR, 16 Amy Road, Framingham, Mass.*

IGNITION SUPPRESSORS

Technical Editor, *QST:*

In reference to W2PQG's hints, described on page 46 of *QST* for October 1967, on suppressing ignition interference in his 1967 Ford, I would like to comment on his statement that a combination of resistive plugs and resistive wire can cause engine malfunction. Since 1960 I have driven 190,000 miles using three cars: a 1961 Ford, a 1964 Mercury and my present car, a 1967 Ford. A five-band rig was installed in each car, and many enjoyable hours of mobile operation took place. Each car was equipped with resistive wire at the factory, and I replaced the original plugs with Champion XF-11Y resistor plugs. I have experienced no problems at all from this extra resistance in the ignition high tension circuit. Performance has been excellent. Once a year I have checked the wires going to the plugs and have replaced those cables that read over 15,000 ohms. The plugs were cleaned every 10,000 miles, and those showing wear were replaced. — *Earle E. Ferguson, WØSEV, 3005 15th St., Boulder, Colo.*

KEYED ANTENNA RELAYS

Technical Editor, *QST:*

In almost every discussion of break-in keying systems in the *Handbook* and *QST* the statement is made that no ordinary antenna relay is fast enough to follow keying, and therefore either a separate receiving antenna must be used, or a tube-type t.r. switch must be used with the transmitting antenna.

There seems to be a basic inconsistency here, in that if a mechanical relay is to be used it is automatically assumed that the antenna is to be transferred between transmitter and receiver, and the relay must therefore handle the full power output of the transmitter while following the keying. Of course, this requires a special type of relay, such as the magnetic reed switch. Now, in the case of the "electronic" t.r. switch, we suddenly forget all about switching the antenna between the transmitter and receiver, and merely connect and disconnect the receiver to and from the coaxial line, leaving the transmitter connected at all times. This is, of course, all that is necessary. There is no need to disconnect the antenna from the transmitter at all.

My point is simply that this can be accomplished easily with a very ordinary type of relay, as shown on page 22 of January 1960 *QST*. I have been using this method, with perfect results, for many years. The original relay is still in use, without having required any attention whatever. I can hear a breaking signal between my dots, with one antenna.

Since I have never heard of anyone else using this system, I must conclude that no one has tried it. In view of the statements in the *Handbook*, and in October and November *QST*, no one can be blamed for not realizing that a readily-obtainable relay can be used as a perfectly adequate t.r. switch. — *Robert V. McGraw, W2LYH, 9 Peg's Lane, Riverhead, N.Y.*

MICRO-TO

Technical Editor, *QST:*

I'd like to congratulate K3CUW and K2KFF on the design of their Micro-TO keyer described in August *QST*. I have just about finished my first working model and find it works much better than the $40 kit keyer I've been using for over a year.

I've made a couple of simple modifications to suit my personal preferences. Since I enjoy mobile c.w., this model was built to operate on two flashlight batteries. These supply sufficient voltage for the

flip-top, output gate, and relay. By changing R_9 to 10 ohms and C_4 to 300 μf., about 2.8 volts can be fed to the pulse generator and still be sufficiently decoupled. This does change the speed range slightly and it is necessary to shunt the speed control with 270K ohms. Otherwise, the keyer will run so slow that it will stall. C_3 is not needed, and the batteries are fed through an s.p.s.t. switch to the former junction of C_3 and R_9. Battery drain is about 50 ma. key up, and averages 70 ma. while sending.

The second modification was made in the monitor. To further simplify the construction and lower the cost, a Cordover module (CPO-4) was used. This will drive speakers from 3 ohms to 100 ohms equally as well and requires no output transformer. It was found necessary to add a 47-ohm resistor in series with the positive battery lead along with a 25-μf. decoupler. Otherwise, the tone is much too loud. — *Robert Patten, W4OZF (ex-W1GIV), 2311 W. Nassau Drive, Miramar, Florida 33023.*

TVI-MAKER

Technical Editor, *QST:*

For a long time I was plagued by a strange type of TVI that showed up as two narrow white horizontal stripes on the TV screen. The trouble was worse on Channel 2, but was also noticeable on 5. It was worse when I was operating on 40, but present when I operated on 20 as well. A low-pass filter on the transmitter and a high-pass on the affected set were of no help.

After much fruitless testing, I traced the source to a transformerless portable TV in the shack, which I had modified to keep the tube filaments at half voltage so that the set would come on almost instantly. This was accomplished by putting a diode across the power switch, of such a polarity as to cut off all B+ when the switch was open. Turning the set on (thereby shorting the diode) or unplugging it eliminated the TVI.

This same trick is used commercially by Westinghouse in their "Instant-On" sets and, in fact, this is where I got the idea. Presumably, suitable bypassing of the diode would eliminate the TVI, and maybe Westinghouse does this, but if not, here is a potential source of TVI for many hams. Anyone experiencing TVI with similar symptoms would do well to check for the presence of such a set in the vicinity. It doesn't have to be in the shack, as my next-door neighbor is also a ham, and the set in my shack was causing him TVI problems as well. — *John E. Becker, K9WEH, 2435 Birchwood Lane, Wilmette, Illinois 60091.*

"FLAT" PI TANKS

Technical Editor, *QST:*

It may be of interest that it is possible, with a properly proportioned pi network, for the load resistance (the resistive component of the load) to vary by as great a ratio as 2 or 3 to 1 while the input impedance, or load presented to the amplifier, remains within 10 percent of the design value.

A typical output network might be used to present a 5000-ohm load to the amplifier tube while feeding into a (hopefully) 50-ohm load. In this discussion, the load is assumed to be nonreactive — a rather large assumption, but one which can usually be realized with some effort.

If the output capacitor of our typical network is chosen so that its reactance at the operating frequency is approximately 91 percent of the load resistance of 50 ohms, variations of the load resistance from 33 to 83 ohms will result in input impedances ranging between 5000 and 5500 ohms (Fig. 2). By deliberately designing the network for 4500 ohms, a plus-or-minus variation of 10 percent might be obtained over an output load resistance variation approaching 4:1.

A computation based upon 1000 ohms to 50 ohms appears to be slightly better if the output capacitor has a reactance of 50/1.2, which indicates that the ratio increases somewhat as the impedance transformation ratio becomes smaller. A resistance-to-reactance ratio of 2:1 appears reasonable in a network having an impedance transformation ratio of 1:1, which might be met with in a transistorized rig.

The action in the circuit is easy to visualize. If we consider one extreme, the L network, where C_2 is equal to zero, an impedance transformation takes place. For instance, doubling the load resistance will result in cutting the input impedance almost exactly in half. This action is similar to a quarter wavelength transformer whose characteristic impedance is equal to the geometric mean of the input and output impedances.

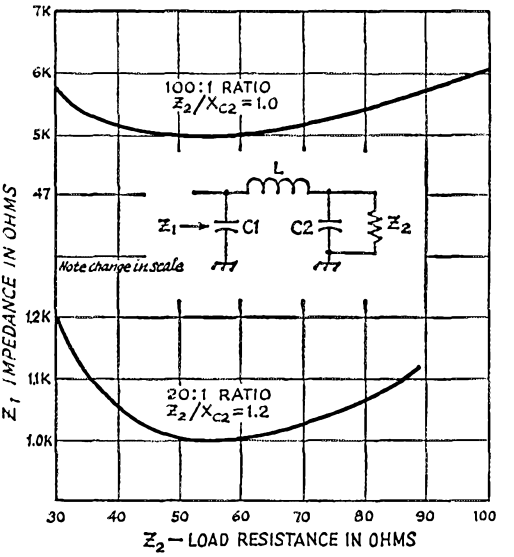


Fig. 2—Variation in resistance (Z_1) seen by generator as a function of output load resistance (Z_2) for two typical cases, after selection of optimum Z_2/XC_2 ratio.

In the pi network, however, if the capacitances are made large enough to dominate, the picture resembles a resonant circuit with a capacitive voltage divider, where an increase in load resistance results in an increase in input impedance. Obviously, at some point between these extremes there must be an area where one effect tends to balance the other.

When a change in load resistance takes place, the input capacitor must be re-resonated. The change, however, is even smaller than the change in input impedance, and is of the order of 3 or 4 percent.

The output capacitance of a pi network should be approximately as follows (for a 50-ohm load) in order to obtain the equalizing effect:

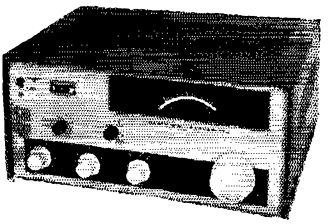
3.5-Mc. band — 900 to 1000 pf.
7-Mc. band — 500 pf.
24-Mc. band — 250 pf.
21-Mc. band — 150 pf.
28-Mc. band — 120 pf.

— *Henry S. Keen, W2CTK, 64 Schuyler Drive, Commack, New York 11725.*

Recent Equipment

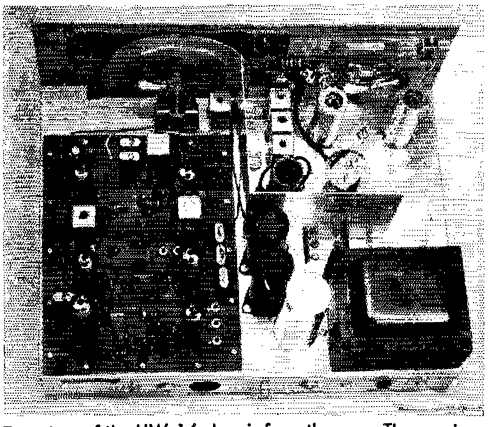
To acquaint you with the technical features of current amateur gear.

Heathkit HW-16
C.W. Transceiver



At least since the early 5-meter days — thirty-some years ago — the word "transceiver" has been taken to mean a combination in which as many circuits as possible are used for both sending and receiving. Also implicit in the term is the idea of sending and receiving on the same frequency, with a single tuning control serving for both. By these definitions the HW-16 is not a transceiver at all. It just happens to combine a separate transmitter and receiver in one box. However, the two are not *completely* separate; they have a common power supply, and the same tank circuit is shared by the transmitting final amplifier and the receiving r.f. amplifier.

Whatever you may wish to call it, the HW-16 is a rather unusual piece of gear. It is an integrated *Novice* station — almost exclusively so, since the self-contained transmitter, c.w. only, crystal controlled, operates in just the 80-, 40- and 15-meter bands, and the receiver covers only the low 250 kc. of each of the same bands. Furthermore, the receiver selectivity — 500-cycle bandwidth at 6 db. down — is too narrow for good phone reception, and there is no provision for detection of a.m. signals. Although an external v.f.o. can be connected to the transmitter for somewhat expanded c.w. work at the "General" stage, the set remains a specialized piece of equipment tailored to fit the Novice — the first station so designed that is available in kit form.



Top view of the HW-16 chassis from the rear. The receiver circuit board is at the left. The transmitter is the semi-enclosed section near the panel at the right. Speaker, phone, key, antenna and (if used) external transmitting v.f.o. all connect through jacks on the rear apron. The octal socket is an accessory outlet for supplying power and keying bias to the external v.f.o.

The overall circuit layout is shown in block form in Fig. 1. The transmitter has three tubes in the usual oscillator-multiplier-final sequence, the final being a neutralized straight-through amplifier on all three bands. The oscillator circuit is the electron-coupled Pierce with a fixed-tune low-C 40-meter plate circuit; when an 80-meter crystal is used enough drive gets by the 40-meter tank for exciting the next stage on 80 meters. For 40-meter output from an 80-meter crystal the plate circuit of the second stage is tuned to 40, as is also the final-amplifier tank circuit. A 40-meter crystal can also be used for 40-meter output, in which case all three stages operate on the same frequency. This is the most likely combination for Novice work, since there is no harmonic relationship between the Novice 80- and 40-meter bands. On 15 meters the second stage triples from a 40-meter oscillator frequency (using a 40-meter crystal) to drive the final amplifier on 21 Mc.

The final-amplifier tank circuit is a pi network with constants chosen to fit a 50-ohm resistive load. There is no loading adjustment, so if the antenna-system load doesn't happen to be close to 50 ohms it must be transformed to that value by some means external to the HW-16. The instruction book tells how to adjust the length of a coax-fed dipole for minimum standing-wave ratio in 50-ohm cable, an s.w.r. bridge being required for this. When the user has some other kind of antenna a transmatch is a practical necessity, if the transmitter is to be operated properly. The pi coil is tapped for the three bands, and various amounts of fixed capacitance are switched in in both the loading and tuning positions to obtain the proper network constants. The variable pi tuning capacitor has a maximum capacitance of about 50 pf.

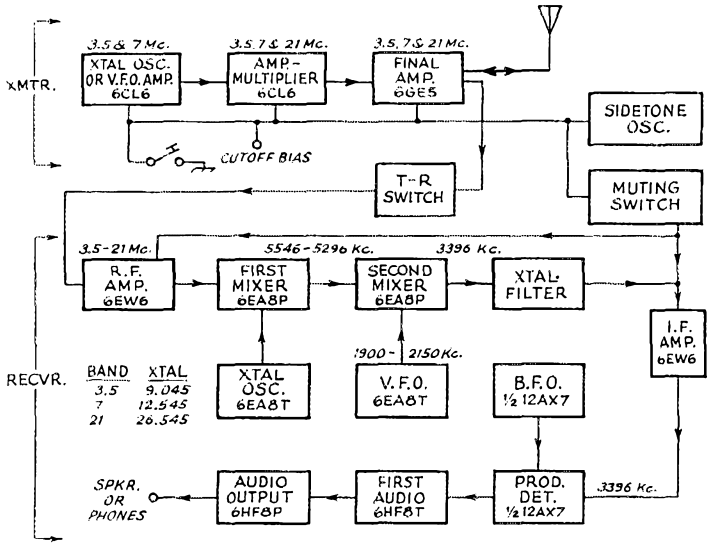


Fig. 1—Block diagram of the HW-16

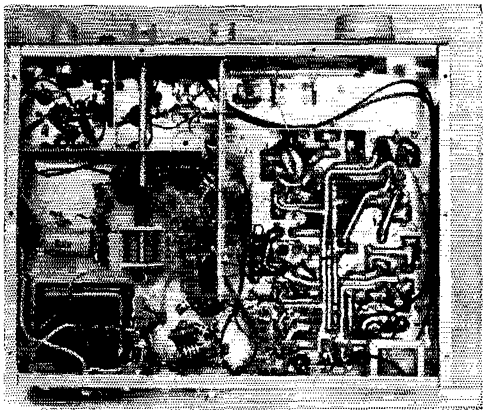
All three tubes in the transmitter are keyed by the blocked-grid method. A negative 150-volt supply furnishes the blocking bias. When the key is closed the bias is removed completely from the first two stages, but the final amplifier is left with a fixed operating bias through a voltage divider. There is no attempt at shaping the keying waveform, other than the regulation of the bias supply and such shaping as may be done by the r.f. bypassing and decoupling. As a result, the keying is a little hard, slightly more so on break than on make, but probably not enough to be remarked particularly by the operator at the other end.

The panel meter reads either relative r.f. output (the usual diode rectifier circuit) or final-amplifier cathode current. A potentiometer in the screen supply permits setting the d.c. input to 75 watts for Novice use. The power can be run up to 90 watts input by a General.

On the receiving side, the r.f. stage gets its signal through the transmitting tank circuit, as mentioned earlier. The built-in TR switch indicated in Fig. 1 is shown in more detail in Fig. 2A. The signal comes off the hot end of the pi network through a small (10 pf.) capacitor, an old scheme which has a new twist in being tied in with the transmitting-amplifier cathode-metering circuit. With the key open the plate current of V_9 is cut off and there is therefore no voltage across the 10,000 ohm resistor. CR_1 is nonconducting and the signal goes through the fixed capacitors to the grid of V_1. On closing the key, there is a voltage drop in the cathode resistor, making its upper end positive and forward-biasing CR_1, so practically all of the cathode current goes through CR_1 and the 15-ohm resistor shunting the meter. This brings point A practically to ground and prevents the transmitting r.f. from damaging V_1.

The receiver uses double conversion, with the first oscillator crystal controlled. The first-mixer output goes through a 250-kc. bandpass circuit in the 5.5 Mc. region to the second mixer, where it is combined with the output of the receiving v.f.o. to give the second intermediate frequency, 3396 kc. A two-crystal half-lattice filter provides the 500-cycle selectivity at this point, after which the signal is amplified by an i.f. stage and then detected. The product detector is a simple triode with the signal applied to the grid and the b.f.o. voltage fed to the cathode. There is then an audio voltage amplifier and finally a power amplifier, the two stages being handled by a multipurpose tube. There is no speaker in the set, but a connector is provided for an external one. The usual headphone jack is there, too.

As further proof that Novice needs are met, there is a built-in sidetone oscillator — the neon-bulb type — which operates whenever the key is pressed, plus the receiver muting system shown



The underside of the receiver board is at the right in this bottom view of the HW-16. The band switch runs down the center of the chassis. The variable capacitor at left center is the tuning control for the transmitting final-amplifier tank.

in Fig. 2B. With the key open the transistor is forward-biased, the transistor conducts, and point *B* is practically at ground, so the receiver gain is normal for the setting of the 200-ohm manual gain control. With the key closed the transistor is cut off, which is equivalent to inserting the 10K resistor between the bottom end of the gain control and ground, thus greatly reducing the receiver gain. The gain control operates on the r.f. and i.f. amplifier cathodes. There is no a.g.c. in the receiver.

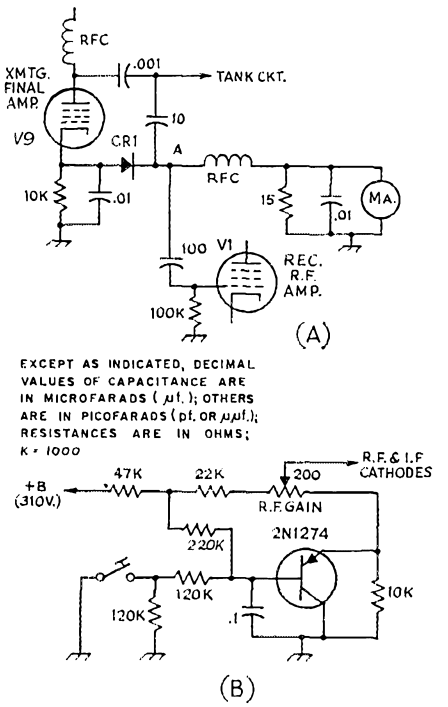


Fig. 2—A—Automatic transmit-receive switching circuit. CR_1 shorts the receiver input to ground when the transmitting final amplifier is operating, but becomes nonconducting while receiving. B—Muting circuit, using a transistor to switch extra cathode bias (voltage drop in the 10K resistor) into two receiver stages when the key is pressed. Point *C* is connected to the negative keying bias (about 100 volts) and the tone oscillator.

The Heathkit HW-16 C.W. Transceiver

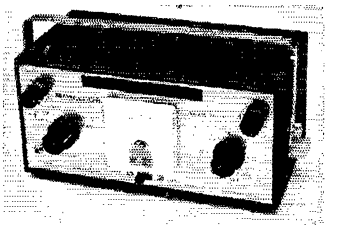
Height: 6½ inches.
Width: 13¾ inches.
Depth: 11½ inches.
Weight: 20 pounds.
Power Requirements: Operates on 120 volts a.c., 50/60 c.p.s.
Price Class: $100.
Optional Accessory: HG-10B v.f.o.
Manufacturer: Heath Company, Benton Harbor, Mich. 49022

The receiver dial is calibrated from 0 to 250 kc. in 5-kc. increments. To read the frequency of a received signal the dial reading is simply added to the frequency of the low edge of the band; i.e., if the set is on 7 Mc. and a signal is tuned in at 180 on the dial the freqcency is 7180 kc. The 250-kc. range is covered with 9½ turns of the knob, making an average of a shade over 25 kc. per turn — good spread for easy tuning.

A Novice who puts one of these kits together can get a taste of both "old-fashioned" chassis construction and printed-circuit wiring. The power supply and transmitter occupy about half the chassis and use conventional mounting and wiring. The receiver, however, is on a printed board — a distinct advantage for the Novice because the receiver is considerably more complex than the transmitter. The kit we tested was assembled by WA1GFW in 35 hours, a time which would hardly be possible had point-to-point wiring been used in the receiver.

A few statistics: Maximum output on either 80 or 40 meters measured just 50 watts, using crystals for the band in use. The 21-Mc. output, where a 7-Mc. crystal is used, was 20 watts. Harmonic suppression appeared to be quite good, the second harmonic from 80 meters being down 45 db. and the third down 55 db. From 40 meters, both the second and third harmonics were down 55 db. Although there is no low-pass filter in the set, there was no interference with a marginal Channel 6 signal with the transmitter on any band. — *W1DF*

The Monarch FSI-4



THE FSI-4 is a transmitter accessory for a.m. and c.w. rigs that put out 50 watts or less on the amateur frequencies below 54 Mc. It will measure power output, modulation percentage and v.s.w.r. The gadget can be used as a field-strength meter or as a modulation monitor. Included in the unit is an r.f. actuated on-the-air sign that will indicate whether or not a transmitter is feeding power to an antenna. To help prevent a transmitter from causing TVI, a multisection low-pass filter with a 55-Mc. cutoff frequency is provided.

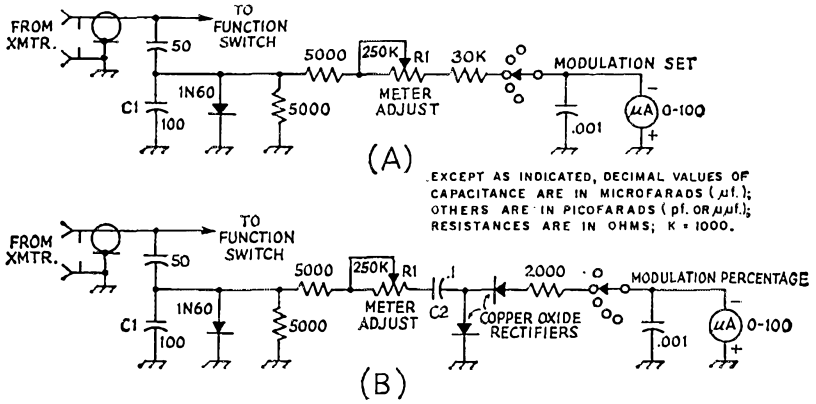


Fig. 1—The two circuits employed in the FSI-4 so that modulation percentage can be measured. Circuit A is used to set the meter at full scale for all carrier levels above 3 watts, and circuit B is used to indicate modulation percentage. Component labels are for text-reference purposes.

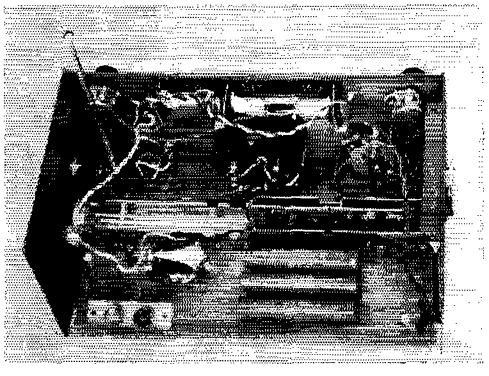
A built-in dummy consisting of three 150-ohm noninductive resistors connected in parallel is used during power measurements so that a fairly accurate reading of transmitter output can be taken. A sample of the transmitter output is taken from a capacitive divider across the FSI-4 input connector and rectified. The resulting d.c. is used to actuate a 0-100 microammeter. Two power ranges are provided: 5 watts and 50 watts.

The FSI-4 measures modulation percentage by comparing the level of an unmodulated carrier with the amount of audio present in the modulated signal. Figs. 1A and 1B show the two circuits employed. In A the unmodulated signal is rectified, and the resulting d.c. drives the meter. R_1, the METER ADJ potentiometer, is used to calibrate the meter at full scale (SET) for all carrier levels above the minimum required (3 watts) for a full scale reading. In B the modulated signal is rectified, and pulsating d.c. produced. The high-frequency variations in the d.c. are filtered out by C_1, while the audio-frequency variations are passed through a 0.1-μf. capacitor, C_2, and rectified. The resulting d.c. drives the meter to a level that indicates the modulation percentage.

A Monimatch type of reflectometer is used to indicate v.s.w.r. Less than 0.5 watt is required to get a reading at 29.6 Mc., but about 25 watts are needed at 3.5 Mc. The v.s.w.r. meter scale is calibrated from 1:1 to 1:3 and uncalibrated from 1:3 to 1:10 (full scale).

The FSI-4 can be used as a field strength meter by moving the FUNCTION switch to S.W.R. and extending the unit's collapsible whip antenna to full length. Two 1N60 diodes convert the signal picked up by the whip to d.c. A front-panel PHONE jack is wired in parallel with the meter terminals for monitoring the audio of a detected a.m. signal. Because the PHONE jack is connected across the meter, a.m. monitoring can also be done at the same time the FSI-4 is being used to measure v.s.w.r.

About one third of the components in the FSI-4 are involved in lighting the on-the-air sign. Fig. 2 shows the circuit. A sample of the transmitted signal is taken from a capacitive voltage divider across the FSI-4 input connector and rectified. Pulsations in the resulting d.c. are smoothed out by a 10-μf. filter capacitor. The d.c. voltage appearing across this capacitor is used to forward-bias a transistor that has a relay coil as its collector load. With forward bias applied, the transistor conducts and the relay contacts close, completing the path from an external 6-volt source to three pilot lamps located behind the



Inside view of the FSI-4. From left to right, across the center of the photograph, are the Monimatch and the TVI filter. The whip antenna for the field strength meter is in the upper left corner, and the three resistors that make up the built-in dummy load are at the lower right.

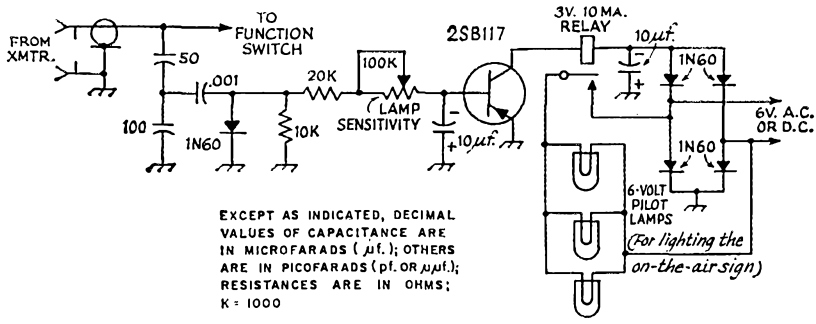


Fig. 2—Schematic diagram of the circuit used to light the on-the-air sign. See the text for details.

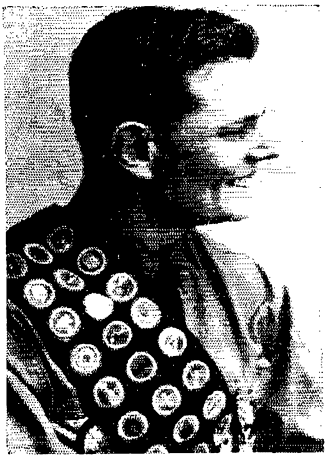
on-the-air sign. The 6-volt supply, which is also used to provide collector voltage for the transistor, can be either a.c. or d.c. A combination of rectifiers in conjunction with a 10-μf. capacitor permits only the correct polarity of filtered d.c. to be applied to the transistor. A LAMP SENSITIVITY control is included in the on-the-air-sign lighting circuit to adjust the voltage applied between the base and emitter of the transistor. To set the control the in-circuit resistance of the potentiometer is decreased until the relay kicks in. In order that not too much forward bias be applied, the control should not be advanced beyond this point. — *W1YDS*

Monarch FSI-4

Height: 4⅛ inches.
Width: 8⅝ inches.
Depth: 4¾ inches.
Weight: 3¾ pounds.
Power Requirements: 6 to 6.3 volts, a.c. or d.c. (only needed for the on-the-air-sign lighting circuit).
Price Class: $10.
Manufacturer: Monarch Electronics International, Inc., 7035 Laurel Canyon Boulevard, North Hollywood, California.

Strays

Think what a challenge it must be when one is deprived of three important senses — sight, speech, and hearing. This is what happened to Richard D. Joy, WN6YUB. In order to communicate, one must be able to listen, or to read the printed word. Being deaf, Rickey was unable to hear the spoken word but he was taught to listen to conversation by means of his fingers. With much patience, Rickey was taught to hear by placing his thumb lightly on the teacher's chin with his forefinger and the knuckles of his three remaining fingers resting on the throat, above and below the area of the "Adam's apple."



Richard D. Joy
WN6YUB

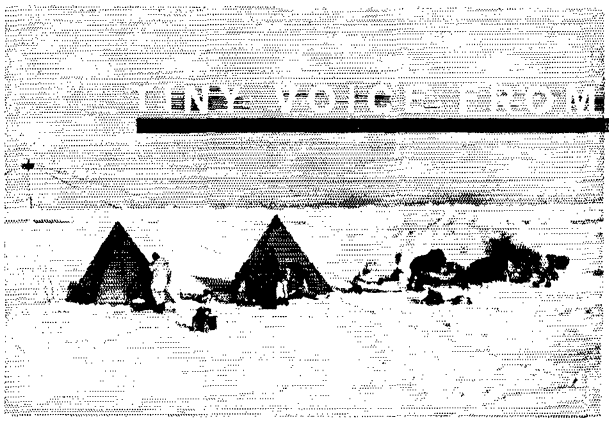
Soon he began using his own vocal cords. Naturally, his speech is somewhat difficult to understand when you first meet him but soon one grasps what he attempts to convey by voice. The next step was to learn Braille, which Rickey picked up easily.

Last month, Rickey, now 23, passed his FCC exam. When receiving, his sensitive fingers cover a modified loud speaker which he also uses to monitor his outgoing signals.

Learning the code and theory for the FCC exam was nothing difficult for Rickey. This astonishing young man has mastered other areas of work that would frustrate most of us. As a Boy Scout, he learned every one of the Tenderfoot requirements in the art of knot-tying in one lesson. Rickey went on to achieve the highest honor, elevation to the rank of Eagle Scout. He also earned 36 merit badges. His hobbies are, in addition to amateur radio, gymnastics, and his prowess as a wrestler has won him honors in the San Francisco bay area. He is an exceptional swimmer and topping it all, is quite at home on a pair of skis and has bowled several games better than his 162 average.

Let's not hear any grumbling about being too old, too young, too something or other, to achieve an FCC license or higher class of license. WN6YUB should be an inspiration to us all to stop grumbling get to work and move ahead.

(Thanks to W6MLZ for this story)



THE ARCTIC

BY DON POWELLEK,* VE8YL

Typical ice campsite on the polar cap. The "tape doublet" antenna and mast can be seen at the left of the photograph.

It was 0200Z on the 9th of April. Walt Peterson and myself had moved the radio equipment about a mile from our advanced camp at Krueger Island and had set up the equipment to make a contact with our base camp and WØQUU. The mountains of Krueger Island prevented the installation of the antenna directly at the camp. The weather was starting to come in on us; visibility was down to about a quarter of a mile, but we worked ourselves out into an open area and gave an ice report for the day.

We had reached the end of Nanson Sound and would start the following day to cross the polar ice to the north pole. We didn't know what conditions lay ahead, and with the weather moving in we didn't know if our communications would hold up, but as the days progressed and radio contacts were made, our confidence grew.

Plans for the expedition started when a group of Minnesota business men, a Canadian Air Force man, a news photographer, and an Arctic bush pilot decided to try for the North Pole via an overland route — the first attempt since Peary in 1909. Through donations of time and equipment from various U.S. and Canadian companies and the military, the group was finally ready for the attempt in March of 1967.

During the early planning stages of the expedition, we realized that the communications would be quite elaborate. We would need communications between the ice party and the base camp, and between the ice party and our support aircraft. The communications with the aircraft were necessary in order for our bush pilot, Weldy Phipps, to locate us and drop our supplies as we needed them. These then became our primary paths, and should these fail, we had back-up of frequency and equipment to allow the ice party to communicate directly with central communications in Cedar Rapids, Iowa through MARS and the Collins Radio Company. To supplement this path, we also communicated over the amateur bands to our QSL Manager, WØQUU, in St. Paul, Minnesota.

The KWM-2A transceiver was selected for the expedition, and three of these units were put through vigorous environmental tests prior to our leaving the states. One unit was left at Eureka, our base camp station, and was provided with a heavy-duty power supply, while the other two units were taken along in special wooden cases strapped to sledges on the ice party. Our antenna was a Hy-Gain tape doublet supported by three five-foot sections of aluminum tubing. The two doublet supported ends of the antenna were anchored using ice screws driven into the ice.

Our power source was a 500-watt a.c. Zeus generator from Antenna Specialties. The use of this equipment would be the first in high arctic communications. Never before had a.c. powered equipment been used on the polar ice in this portable fashion! We hoped we had selected the proper equipment and time proved that we had made the right choice.

The days were getting longer and soon we would

The author operating on the ice.

* Deputy Leader & Communications Chief, Plaisted Polar Expedition, 2119 East Clear, St. Paul, Minnesota 55119.

have twenty-four hours of sunlight. We found ourselves working eighteen to twenty hours a day trying to make good progress north, but our loads were heavy and bad ice conditions were approaching. We decided to split the party and send unneeded equipment back to base camp. Our spare KWM-2A and Zeus generator were returned.

Three days out from Nanson Sound and across the big lead, I made a very foolish mistake. I brought the transceiver into the tent where Ralph was preparing soup. The heat against the cold transceiver produced a frost accumulation that was at least one-half inch thick on both the inside and the outside of the unit. Before I could tune the transmitter, I had to physically scrape the dial windows with my fingernails in order to see the calibrations. It gives you an eerie feeling to see the transceiver full of ice and you wonder if this will be your last transmission. The melting and freezing of the frost finally produced a short in one of the trimmer capacitors. We were still able to operate, although indications on the meter showed we were only producing half power. Our base camp was able to read us, and the following day, Weldy flew out and we substituted a different unit and sent the iced-up one back to base camp for repairs.

The cold was penetrating, and every task that would normally take two minutes soon dragged into ten minutes. Many times I thought my hands would freeze solid trying to erect the antenna and getting the generator started in the evening when we set up our camp. Even with the cold, humorous incidents did occur. Once we were tied down in a typical arctic blow for two days, and during that time, the antenna was laid directly on the ice. To my amazement, our signal strength report from base camp was almost as good as when we had the antenna erected. The ice thickness on the Polar Cap is about thirty feet and is effectively "above ground."

During the second day of the blow, I moved out of the tent because the transmitter was not running properly, and I discovered our two Eskimo huskies, Eita and Rinti, had eaten the coax cable running from the transceiver to the antenna. They had literally chewed the cable into five pieces. I could imagine their hunger; they had not eaten for four days. As I looked at the pieces of coax lying on the ice, I chuckled to myself and hoped we would not get that hungry and end up eating our one remaining spare cable. I soon realized that I had but fifteen minutes to get a new cable strung before the next radio schedule. After that little incident, I made sure that the antenna was on the opposite side of the tent from where the dogs were staked.

Numerous other problems and incidents occurred before the expedition was over, and as each problem was solved, it gave a great sense of satisfaction. It wasn't until we returned to the states that we realized how many thousands of SWLs and hams had listened to our tiny voice. We were never really alone in that cold white forbidding arctic. QST

1968

Tentative dates for major ARRL operating activities.

January	*February*	*March*	*April*
6–7 VHF SS 13–15 CD (c.w.) 20–22 CD (phone) 28–28 Simulated Emergency Test	3–4 DX Test (phone) 3–18 Novice Roundup 17–18 DX Test (c.w.)	2–3 DX Test (phone) 16–17 DX Test (c.w.)	20–22 CD (c.w.) 27–29 CD (phone)
May	*June*	*July*	*August*
	8–9 VHF QSO Party 22–23 Field Day	13–15 CD (c.w.) 20–22 CD (phone)	
September	*October*	*November*	*December*
7–8 VHF QSO Party	12–14 CD (phone) 19–21 CD (c.w.)	9–11 SS (phone) 16–18 SS (c.w.)	

Address Delivered by Mr. Mohamed Mili, Secretary-General of the ITU, on 23 September 1967, at the Opening of the Annual Congress of the I.A.R.C.

Mr. Chairman, Gentlemen,

It is both a great honour and a great pleasure for me to learn that you have chosen me as Patron of the International Amateur Radio Club. I very much appreciate this honour for a number of reasons; first of all, because the amateur radio movement, which is spreading more and more throughout the world, has humanitarian aims which everyone acknowledges — aims which foster a sense of brotherhood among all mankind and all races, without any distinction whatsoever.

I am also conscious of this honour because of the many worthy and eminent people in every country of the world who support this movement. A number of them spring to mind at this moment whom I am not going to name as I am sure that I should forget several others. These people of note, scattered all over the globe and belonging to all countries, to all races, are known principally for their contributions to science. And it is indeed an honour for me to know that I am about to have a chance to collaborate with them in strengthening this fraternalism.

I am touched because, as Patron of this movement, I succeed my friend Mr. Gross,[1] who actually launched this international club and who continues, despite his new activities, to come unhesitatingly from Washington to give active proof of his enthusiasm for the amateur radio movement; but also because I succeed my friend the late Dr. Sarwate as well, whose premature death came at a time when the International Amateur Radio Club had just named him their Patron.

Dr. Joachim,[2] a great friend of mine whom I have known for a very long time — I still remember the 1959 Radio Conference at which Dr. Joachim was elected Chairman of an important committee — Dr. Joachim has just called to mind some remarks I made several years ago, to which I attach much importance because they concern youth movements.

For the young, age has no importance because we remain young as long as we are young in heart and spirit. I think the two outstanding characteristics of youth are enthusiasm and completely disinterested action. It is only young people who can simultaneously be enthusiasts in their actions and yet act in a completely disinterested manner. People who fulfill these two conditions remain young whatever their age.

Moreover, these two conditions go together: a real enthusiast is capable of tackling any sort of disinterested activity and achieving impressive, concrete results. Similarly, anyone who performs a completely disinterested action must perform it with enthusiasm. In my opinion youth, youth movements and the young spirit can be summed up in two words: enthusiasm and disinterested action.

Now, the amateur radio movement fulfills these two conditions perfectly and that is why I am very touched to be associated with a movement which is so close to my heart.

[1] Gerald Gross, W3GG/HB9IA, former Secretary-General of the ITU.

[2] Dr. Miroslav Joachim, OK1WI, president of the IARC.

Mohamed Mili

The amateur radio movement has of course been a disinterested movement since its creation, because radio amateurs seek no financial gain.

They carry out propagation tests which, even though strictly speaking they cannot be described as research, arouse our keen interest, give us pleasure and pave the way to quite valuable results in the development of radio communications.

That was true in the past and it still holds good today. You are technicians, so I am not going to remind you of all that the radio amateurs have accomplished in the technical sphere, but I have a few notes with me which recall that on 27 September 1923 the first two-way link was established by radio amateurs between the United States and France on a wavelength of 100 metres, disproving the theory current at the time that such links were impossible with low-power sets. Naturally that was a very significant achievement in the development of science.

Subsequently you accomplished something quite different: the linking of one point on the earth to another by using the moon as a passive relay and, still more recently, the use of the artificial satellites Oscar.

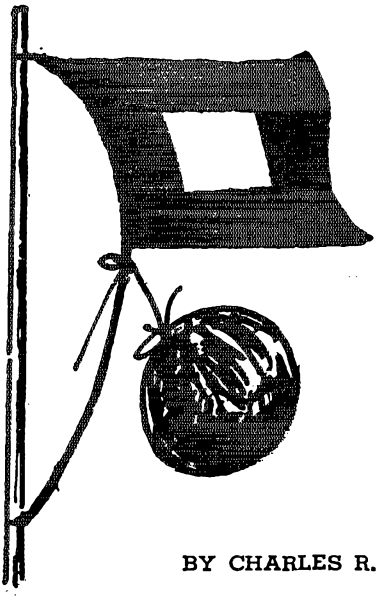
In brief, your movement is a scientific movement which has achieved solid results — results that have contributed to progress in the sciences and particularly in radio communications.

But there is another very important aspect too — the brotherhood of mankind; for your movement has rendered valuable service to all men.

A brief reminder of some of the headings which have appeared in newspapers will suffice to show how action taken by radio amateurs has benefited members of the human race, without any distinction whatsoever.

Let me quote one example: "Thanks to two radio amateurs in Nice, a sick person in Rio de Janeiro may be saved"; again: "Two radio amateurs help to save a life"; and yet another title, "When radio amateurs place themselves at the service of surgeons — the eye bank network". I found this story so

(*Continued on page 146*)



Amateur Radio and Distress Information[1]

BY CHARLES R. DEAN, RMCM USCG (Ret.),* W1EOL

On August 4, 1964, a maritime distress incident occurred where a Canadian motor sailboat, the *Jon Peer*, was in distress while enroute from Bermuda to Newport, Rhode Island. The first indication of the ship's difficulty was relayed to the Coast Guard Rescue Coordination Center (RCC) New Orleans, by an amateur operator, WA4ECY. The ship VEØMU was in contact with various hams on 14,265 kc. using s.s.b. This initial information enabled the Coast Guard to start the process of coordination necessary to bring this distress incident to a successful conclusion.

Some of the factors in this particular case included the diversion of a large U. S. Naval force which was in the general vicinity of the distressed ship by a Coast Guard aircraft, and contact first by a U. S. merchant ship and later by a U. S. Navy ship.

The following are highlights of the case from the files of the Atlantic Search and Rescue (SAR) Coordinator (Coast Guard New York):

At 2018Z on Aug. 4, VEØMU, working WA4ECY on 14,265 kc., advised that his ship had been in a severe storm for the last three days and felt that if the storm did not abate within the next twelve hours they would require assistance. The approximate position was 36.00° North 70.50° West. This information was relayed to RCC New Orleans who alerted a Coast Guard search and rescue teletype network on the East Coast.

Upon receipt of this information, the Atlantic SAR Coordinator assumed control of the case and started the processes of evaluating information being received from several radio sources, and passing information to the units who were capable of rendering assistance. This included diversion of a large U. S. Naval force in the area and start of considerable air and surface operations in an effort to locate and assist the *Jon Peer*.

At 1208Z on Aug. 5, W4GAE, who was currently in contact with VEØMU, advised the Coast Guard Radio Station, Jacksonville Beach, Florida, that the *Jon Peer* was disabled, but had the trouble fixed and was heading for Chesapeake Bay. The ship was requesting weather reports.

The Atlantic SAR Coordinator directed searching units to continue the search to verify the ship's position, and for aircraft to maintain surveillance when located until arrival of surface units.

At 1453Z, VEØMU, in contact with VP9BN and a ham in Pensacola, Florida, reported his position as 35.10° North 70.20° West as of 1225Z, in heavy weather.

At 1715Z a Coast Guard aircraft, one of the many engaged in the organized search, located the *Jon Peer* at 37.00° North 68.05° West and guided the U. S. merchant ship, *SS John Lykes*, to the scene. The *John Lykes* made a visual contact with the ship and stood by until the *USS Lookout* arrived on the scene.

At 2100Z, *USS Lookout* arrived on scene and sent over a small boat with fresh food and cigarettes. The *Jon Peer* was provisioned for 5 days and had fuel for 3 days.

At 2255Z, *John Peer* advised *USS Lookout*: "After checking my position, provisions and fuel I believe I will proceed around to Newport."

The *CGC Cherokee* from Norfolk was due to arrive on the scene Aug. 6. At this time, *Jon Peer* was equidistant from Norfolk and Newport, intended to proceed to Newport, and stated that no further assistance was necessary. *USS Lookout* was directed to advise *Jon Peer* that SAR units were being recalled and requested his estimated time of arrival at Newport. *Jon Peer* was also requested to notify Coast Guard New York upon his arrival Newport.

At 0115Z Aug. 11, *Jon Peer* arrived Newport, Rhode Island safely.

All of the information received by radio was reported by telephone to various units or intercepted after the intial alert by Coast Guard, FCC, and Navy radio stations. The Coast Guard says "thanks" and "well done" to all participating radio amateurs.

In view of the incident related above and many others that have occurred in the past, it would be beneficial for amateur radio operators, who are potential sources of distress information, to know most about distress procedures in other services, and whom to notify when heard.

Distress Information

Each year thousands of distress or potential distress incidents take place, and often the initial

* R.F.D. 1, Box L-21, Vinegar Hill Rd., Gales Ferry, Conn. 06335.

[1] This article was submitted and approved by the Coast Guard to try to help improve distress reporting procedures.

TABLE I

Frequency	*Purpose*
500 kc. (A1, A2)	International radiotelegraphy distress and calling.
2182 kc. (A3)	International radiotelephony distress and calling.
6204 kc. (A3)	Radiotelephony calling and safety frequency in the Pacific region West of 120° W, South of 30° N and North of 35° S, excluding the area of the Hawaiian Islands and Eastward.
8364 kc. (A1, A2)	International lifeboat, liferaft and survival craft.
121.5 Mc. (A3)	International aeronautical emergency frequency for v.h.f. band.
156.8 Mc. (F3)	International calling and safety frequency for the maritime mobile v.h.f.-f.m. band.
243.0 Mc. (A3)	International u.h.f. survival craft frequency and U. S. military common emergency u.h.f.

report of the trouble is by radio. The method of reporting, the frequency used, and the mode of communication varies. Although certain frequencies are designated for these purposes, International Radio Regulations (ITU Geneva 1959 Article 1381) states that;

"No provision of these Regulations prevents the use of a mobile station in distress of any means at its disposal to attract attention, make known its position, and obtain help." For this reason, amateur frequencies may at times be the only frequencies available.

The frequencies shown in Table I are internationally designated for distress and emergency purposes.

The following are alarm signals used only in a distress incident, which are internationally approved and recognized. They are normally employed on 500 kc. (A1) or 2182 kc. (A3).

"The radiotelegraph alarm signal consists of a series of twelve dashes sent in one minute, the duration of each dash being four seconds and the duration of the interval between consecutive dashes one second. It may be transmitted by hand but its transmission by means of an automatic instrument is recommended."

"The radiotelephone alarm signal consists of two substantially sinusoidal audio frequency tones transmitted alternately. One tone shall have a frequency of 2200 c.p.s. and the other a frequency of 1300 c.p.s. the duration of each tone being 250 milliseconds."

"The radiotelephone alarm signal, when generated by automatic means, shall be sent continuously for a period of at least thirty seconds but not exceeding one minute; when generated by other means, the signal shall be sent as continuously as practicable over a period of approximately one minute."

The purpose of these special signals is to attract the attention of the person on radio watch or to actuate automatic devices giving the alarm when there is no listening watch on the distress frequency.

There are three types of radio signals used internationally to indicate distress or emergency situations.

Distress Signal:

Radiotelegraphy: SOS (3 times)

Radiotelephony: MAYDAY (3 times)

"These distress signals indicate that a ship, aircraft or other vehicle is threatened by grave and imminent danger and requests immediate assistance.

Urgency Signal:

Radiotelegraphy: XXX (3 times)

Radiotelephony: PAN (3 times)

The urgency signal indicates that the calling station has a very urgent message to transmit concerning the safety of the ship, aircraft or other vehicle, or the safety of a person."

Safety Signal:

Radiotelegraphy: TTT (3 times)

Radiotelephony: SECURITE (3 times)

"The safety signal indicates that the station is about to transmit a message concerning the safety of navigation or giving important meteorological warnings."

The Alarm, Distress, Urgency and Safety signals are *not* to be transmitted except by authorization of the person responsible for the ship, aircraft or other vehicle and normally only on international frequencies.

Who Should Be Notified

The United States Coast Guard has specific statutory authority and responsibility for developing, establishing, maintaining and operating rescue facilities and for rendering aid to distressed persons and property (i.e., personnel, ships and aircraft, both military and civil) on and over the high seas and waters subject to the jurisdiction of the United States and may render aid to persons and protect and save property at any time and at any place at which Coast Guard facilities and personnel are available and can be effectively utilized.

In carrying out this responsibility the Coast

TABLE II

District	*Location*	*Tel. No.*
FIRST	J. F. Kennedy Federal Building, Boston, Mass.	223-6650
SECOND	Federal Bldg., 1520 Market St., St. Louis, Mo.	MA2-4615
THIRD	Governors Island, N. Y., N. Y.	264-5601
FIFTH	Fed. Bldg., 431 Crawford St., Portsmouth, Va.	393-6081
SEVENTH	1203 Fed. Bldg., 51 S.W. 1st Ave., Miami, Fla.	350-5011
EIGHTH	Customhouse, New Orleans, La.	527-6211
NINTH	Main P.O. Bldg., Cleveland, Ohio	861-0400
ELEVENTH	Hartwell Bldg., 19 Pine Ave., Long Beach, Calif.	437-2491*
TWELFTH	630 Sansome St., San Francisco, Calif.	556-9000
THIRTEENTH	618 2nd Ave., Seattle, Wash.	624-2902
FOURTEENTH	1347 Kapiolani Blvd., Honolulu, Hawaii	HOnolulu 5-8831
SEVENTEENTH	P.O. Box 3-5000, Juneau, Alaska	586-2680
SAN JUAN	Coast Guard Base, San Juan, P. R.	722-2174

* 437-2944 nights, Saturdays, Sundays and holidays.

Guard communications system is organized to provide for "prompt dissemination of distress information to all government and private agencies capable of rendering aid."

As an example, the following communication facilities are available in the Rescue Coordination Center (RCC) New York, which is operated for the Atlantic SAR Coordinator and N.Y. SAR Coordinator for the dissemination of distress information; similar circuits are available to the Pacific SAR coordination in San Francisco:

1) *Sartel Net:* A hot-line telephone net controlled by RCC New York, capable of direct contact with all major Navy, Air Force and Canadian East Coast commands as well as all the major Coast Guard Rescue Coordination Centers on the East Coast.

2) *Sarlant Net:* A landline-teletype network controlled by RCC New York composed of all Coast Guard Radio Stations on the East and Gulf Coasts, major RCCs, FCC and Navy control stations for their extensive radio direction-finder nets, and U. S. Air Force Air Rescue Service Headquarters, Orlando AFB, Florida.

3) *ICAO:* (International Civil Aeronautics Organization) teletype circuit which is capable of teletype transmission to and from any civil or military agency operating aircraft and all FAA (Federal Aviation Agency) and overseas aircraft control agencies.

4) Various other commercial and military teletype and telephone facilities enabling rapid dissemination or exchange of information with other government and civil agencies, including other countries.

Each RCC is equipped with similar, although not as extensive, communications facilities to conduct operations within their own individual areas of responsibility. Similar facilities are available on the West Coast through the "Pacific SAR Coordinator."

Table II shows the major Coast Guard Rescue Coordination Centers. You can also contact your local telephone operator who can connect you to the nearest Coast Guard units. These RCCs are well equipped to receive and evaluate any information concerning a distress or emergency incident and pass it on to the proper unit or command (or other country if necessary) capable of rendering aid.

Much precious time can be saved if information is promptly reported. The following basic information is required, if known, when a valid incident is to be reported. Do not try to handle it alone, call an RCC as soon as possible.

1) *Frequency* of the distressed station and time received.
2) *Identification* of the distressed station.
3) *Position or Location* of the station in distress.
4) *Nature of Distress* or difficulty.
5) Any other available information.
6) Full identity, phone number, of person reporting the information. It is especially advisable when reporting information that was received by c.w. that the person reporting state what experience he has in copying code. Many incidents reported as distress signals by inexperienced radio operators and short wave listeners have proven to be normal signals, not of an emergency nature, when heard by an experienced radio operator.
7) In the event you are in direct contact with the distressed unit, maintain contact so that other questions or information may be exchanged between the RCC and unit in distress.
8) If you are transmitting (on amateur frequencies) and are aware that a distress or emergency incident is in progress, *immediately cease* any transmissions which might interfere with the distress and listen on the frequency in the event you may be able to assist if communication difficulties arise.

If you are in doubt as to who to call, send a card to the nearest RCC listed in this article and they will advise you what unit may be contacted by you if you ever have valid distress information to relay. Do this now so that you will have the necessary information available to you before you might work a potential distress case. QST

Annual ARRL Novice Roundup

ATTENTION all Novices! Whether you're interested in beefing up your QSL and WAS totals, or outscoring your buddy in the next town, or simply giving your rig a good workout, here's your chance to participate in a contest designed especially for you. The 1968 Novice Roundup begins on Saturday, Feb. 3, at 1800 (6 P.M.) your time, and runs till Sunday, Feb. 18, at 1800 your time. You may work *any* other stations, from Novice to Extra Class, but your total operating time (which includes logging, listening, and changing bands) must not exceed 40 hours.

For an idea of how last year's WN/KN competitors made out, take a look at results of the 1967 Roundup beginning on page 61 of the July *QST*. Can you do as well — or better? Give it a whirl! And when it's over, be sure to send us a copy of your log. (Photos, too!)

ROUNDUP PERIOD

Starts	*Ends*
Feb. 3 1800 (6:00 P.M.) Local Time	Feb. 18 1800 (6:00 P.M.) Local Time

How to Participate

Just get on the air any time during the two-week period and contact as many stations as possible, exchanging QSO number and ARRL section. Non-Novices work only Novices, of course. "CQ NR" means CQ Novice Roundup and you can either answer such a call or call "CQ NR" yourself to get contacts. Here's an example. KNØBPO in Minnesota hears KN1QFC in the Western Massachusetts section calling CQ NR.

CQ NR CQ NR CQ NR DE KN1QFC KN1QFC KN1QFC K

KN1QFC KN1QFC DE KNØBPO KNØBPO KNØBPO AR

KNØBPO DE KN1QFC R HR NR 3 WMASS BK

KN1QFC DE KNØBPO R HR NR 1 MINN BK

KNØBPO DE KN1QFC R TNX ES 73 SK DE KN1QFC

On his next contact KNØBPO would send NR 2 (meaning contact number 2) then NR 3, NR 4, etc.

Scoring

A certificate is awarded to the highest Novice scorer in each ARRL section. Complete results will be in *QST*, including the scores of those non-Novices that enter as well. To obtain your final score simply add the total of your NR QSOs to the highest w.p.m. from your Code Proficiency certificate. Multiply the sum by the number of *different* ARRL sections (see page 6, this *QST*) worked during the contest. That CP certificate really helps out your score, and you still have time to qualify, so don't miss out. Full details on the Code Proficiency Program are on page 98.

Novices should keep a look out just above and below the Novice frequencies (3700–3750 kc.; 7150–7200 kc.; 21,100–21,250 kc.; 145–147 Mc.) for the higher-power Generals.

Log forms like the one in the sample are yours for the asking simply by writing to: ARRL Communications Dept., 225 Main St., Newington, Conn. 06111. Study the following rules, and then stand by for the fun of your Novice career, the ARRL Novice Roundup Competition! But don't forget to send us a copy of your log to make your entry official: logs must be postmarked by March 2, 1968.

(*Continued on page 138*)

SUMMARY OF EXCHANGES ARRL NOVICE ROUNDUP

Call. KNØBPO.. Section... MINN.....
(See page 6 QST)

BAND	TIMES ON OR OFF AIR	DATE, TIME OF CONTACT	MY NR SENT	MY SECTION	HIS NR RCVD	HIS CALL	HIS SECTION	NUMBER EACH NEW SECTION AS WORKED
80	1800	FEB. 3						
		1803	1	MINN.	1	KNØAKM	MINN	1
		1815	2		3	KN9WRX	ILL	2
	1835	1820	3		2	KN9ZDL	ILL	
15	1400	FEB. 6						
		1412	4		15	KN7MNL	NEV	3
	1425	1418	5		7	KN1QFC	WMASS	4

Summary: (Enter below on last sheet used)

Bands used.....80,15.....; Nr. diff. stns. wkd..5.....; Nr. diff. sections...4.....
Total hours operation....1:00.....; Code Proficiency award credit.....10.....w.p.m.
Type transmitter (tube line-up if home-built).....
Receiver.....; Antenna.....

SCORING:

....5....QSOs plus....10....c.p. points times....4.....sections equals 60

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

Signature and call.....
Address.....
.....

This is a sample log form that must be used by all contestants and also shows how to score. You can obtain these forms free by writing to ARRL.

January 1943

. . . Editorially, K. B. Warner reviews the past year. Things have indeed changed for the radio amateur. There are perhaps twenty-five thousand hams serving their country, at the front, on the seas and in numerous schools and laboratories. WERS has entered our lives.

. . . Clinton B. DeSoto, W1CBD, has a comprehensive article on the communications aspects of the Air Forces. The installations and activities of Scott Field are described and numerous photos nicely illustrate the text. Scott Field is the parent school for the A.A.F. He also visits the schools established in the Stevens Congress hotels in Chicago.

. . . Arthur H. Lynch, W2DKJ (now W4DKJ), has a 112 Mc. transmitter-receiver assembly. The receiver starts with a self-quenched 955, super-regenerative, and the transmitter is powered with an HY75. Sturdily built, it uses high-grade components.

. . . The Arabic telegraphic alphabet is described by W. H. Worrell, W8SKW. Arabic has many sounds, mostly guttural, for which there is no counterpart in the Latin alphabet. Glad to know I don't have to master this one!

. . . In the experimenter's section, Art Gentry, W6MEP, tells of his work on carrier current. He got a call from a FCC monitoring station saying that his signals were being copied. Evidently some radiation was taking place and he discusses this aspect.

. . . Capt. Samuel Fraim. W3AXT, tells about amateur radio and the Civil Air Patrol. Quite a lot going on. Submarine spotting is one important activity.

. . . In spite of the large number of meters received by the Signal Corps, there is still a need for many times the amount. Those wishing to send in their meters are asked to ship them to ARRL Hq.

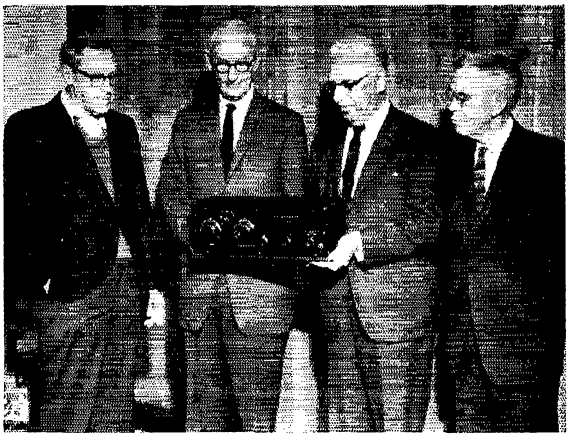
. . . No. 8 in the "Course in Radio Fundamentals" is presented by George Grammer, W1DF. As always there is a lot of good meat here.

. . . There is only about one full column in the Ham-Ads section. Most of the boys are looking for instruments. Things have indeed slowed down.

— *W1ANA.*

This month we note the death of Nikola Tesla. A great many old timers built "Tesla Coils." These were a source of high-frequency, high-voltage energy and many spectacular effects could be produced. Tesla himself sought to use this device for the transmission of power without wires. He built huge ones that could throw sparks a great many feet. His contributions to radio and power technology were prodigious. He was the inventor of the induction motor and the polyphase system of power transmission. He demonstrated a radio-controlled boat prior to 1900. Truly a genius.

From the Museum of Amateur Radio



Old-timers will remember this Type 225 ham receiver manufactured by the C. D. Tuska Company of Hartford, using the familiar detector and two stages of audio lineup. Clarence Tuska, co-founder of ARRL and first Editor of *QST*, formed the company after completing military service in World War I. On a recent visit to Newington he posed with three early employees of the company, now Hq. staffers. L to r., Don Mix, W1TS, Assistant Technical Editor; L. A. Morrow, Tuska's first employee (1920), now W1VG and Advertising Manager; Mr. Tuska; R. B. Bourne, W1ANA, chief engineer of the company in 1924–25, and now Museum Curator. Clarence, now retired and living in Princeton, N. J., was for many years patent attorney for the Radio Corporation of America. — *W1ANA*

• *For Public Service*

Announcing The 1968 ARRL

Simulated Emergency Test

January 27-28

During the SET

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.

Now is the time to *prepare* yourself with an emergency power source upon which you can depend. The ARRL Simulated Emergency Test (SET) will give you a chance to *test* the dependability of your emergency powered equipment and your own operating ability. Have you *registered* your facilities and availability with your ARRL Emergency Coordinator (EC) or RACES Radio Officer (RO)?

The SET is not a contest but a serious effort to test our local emergency plans and brush up on our procedures by participating in the principal facility for handling long-haul messages, the National Traffic System (NTS). Your EC or RO may conduct his local test any time in Jan. or Feb., but probably he will have it during the afternoon or evening of Jan. 27 or 28, so that actual liaison between the local group and the NTS Section net can be maintained. During this period, the normal once-per-day schedule of the NTS will be stepped up to handle the volume of messages generated by the SET.[1]

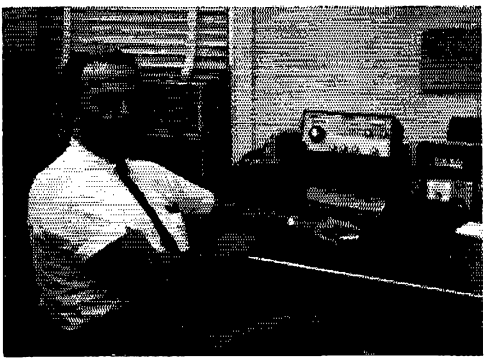
Check with your EC or RO about the SET, update your registration, and find out about his SET plans. The EC/RO will probably call a meeting and discuss the SET generally and encourage all present to get their emergency-powered equipment checked out for operation during the SET.

When the time arrives, be prepared to originate some messages, *in standard form*, one to your Section Emergency Coordinator (see opposite page) and others to persons outside the local area. Try to limit the text to 15 words or less, and include the word "test" before the precedence. Those of you who will collect messages at the Local level and maintain liaison with the Section NTS net, split the load if necessary, and promptly report into the Section net on the hour for your *thru* messages. Be alert for messages for your area during sessions of the Section net that begin on the half hour. Remember that the nets are operating on a time sequence so that liaison can be maintained with other nets according to the plan of the *Public Service Communications Manual*. Use your Section net for all messages out of your local area and avoid the practice of checking into nearby Section nets or cutting across normal routing channels, except for Test Emergency messages (very rare), because the checking into nets other than your own Local or Section net has the effect of robbing your local area of representation. If you find things going slowly, originate some additional messages or volunteer for assignments into the Region net, etc. If things get loaded up so that you have too much traffic for a session, you can hold the Test Routine or Routine messages until facilities are available. All net managers will be looking for net controls and liaison stations, so do not hesitate to volunteer and obtain some valuable experience.

Some net managers may announce for a particular session that there has been a power failure and only stations equipped for operation independent of commercial power may transmit during the session — so don't *you* get stuck with a stack of messages during a simulated power failure!

Good luck in the 1968 SET — *W1EEN*.

[1] Additional information on NTS operation is in the ARPSC section of this issue.



This is W5KR of Brownsville, Texas, EC for Cameron County. W5KR made numerous communications during the Hurricane Beulah emergency as related in December 1967 Diary of the AREC. (See also page 82).

Section Emergency Coordinators of the Amateur Radio Emergency Corps

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

ATLANTIC DIVISION				
Delaware	K3NYG	John L. Penrod	Eagle Nest Road, RFD 1, Blackbird	Townsend 19734
Eastern Pennsylvania	W3AES	Jonathan B. Balch	145 Third Ave.	Newtown Square 19073
Maryland-D.C.	W3LDD	Walter Carr	RD 2, Box 193	Havre De Grace, Md. 21078
Southern New Jersey	W2BZJ	Walter H. Grove, Jr.	P.O. Box 212	Pennington 08534
Western New York	W2RUF	Clara Reger	435 Best St.	Buffalo 14208
Western Pennsylvania	K3KMO	Al Brogdon	RD 1, Box 390-A	State College 16801
CENTRAL DIVISION				
Illinois	W9RYU	Harry J. Studer	705 Hillcrest Rd.	Milan 61264
Indiana	WA9GKF	David L. Peters	614 N. Columbia St.	Union City 47390
Wisconsin	W9NGT	Sherman C. Carr	756 W. Washington Ave.	Hartford 53027
DAKOTA DIVISION				
Minnesota	WAØIEF	Gary G. Hanson	719 North 18th Ave., E.	Duluth 55812
North Dakota	WAØAYL	David E. Beach	Apt. 7, 1116-19th Ave., S.	Grand Forks 58201
South Dakota	WØSCT	Lester R. Lauritzen	R. 3, Box 32	Centerville 57014
DELTA DIVISION				
Arkansas	WA5IIS	Dennis Schaefer	409 West Cedar	Brinkley 72021
Louisiana	W5BUK	John L. Robertson	2609 Halsey Ave.	New Orleans 70114
Mississippi	W5JDF	Charles R. Boone	1111 Mobley St.	Columbia 39429
Tennessee	K4RCT	Harry A. Phillips	5200 Oak Meadow Ave.	Memphis 38128
GREAT LAKES DIVISION				
Kentucky	W4OYI	George S. Wilson, III	2113 Old Cabin Rd.	Owensboro 42301
Michigan	K8GOU	Donald R. Van Sickle	20295 Westpointe Court	Southfield 48076
Ohio	W8OUU	James W. Benson	2463 Kingspain Dr.	Cincinnati 45231
HUDSON DIVISION				
Eastern New York	W2KGC	William L. Stahl	Shirley Ave.	Fishkill 12524
N.Y.C. & Long Island	K2OVN	John S. Brandau	1659 East 46th St.	Brooklyn 11234
Northern New Jersey	K2ZFI	John W. Banke	Main Rd., Box 177	Towaco 07082
MIDWEST DIVISION				
Iowa	KØBRE	Verlin B. Rowley	1008 So. Third St.	Fairfield 52556
Kansas	KØEMB	Norman Stackhouse	1409 Willow Rd.	Newton 67114
Missouri	WØBUL	Charles O. Gosch	711 South Oakland	Webb City 64870
Nebraska	KØOAL	V. A. Tony Cashon	Box 488	Chadron 69337
NEW ENGLAND DIVISION				
Connecticut	W1PRT	John R. Barber	19 Bidwell Parkway	Bloomfield 06002
Eastern Massachusetts	W1AOG	Donald F. Guptill	17 Park St. Ct.	Medford 02155
Maine*	K1DYG	Herbert A. Davis	RFD 1	Franklin 04634
New Hampshire	K1QES	Donald W. Morgan	Bayview Ave., Box 65	Laconia 03246
Rhode Island	K1LII	Chester P. Tammany	119 Owen Ave.	Pawtucket 02860
Vermont	W1V8A	Harry A. Preston, Jr.	RFD 1	Charlotte 05445
Western Massachusetts	K1IJU	C. Norman Peacor	RFD 1	Monson 01057
NORTHWESTERN DIVISION				
Alaska	KL7GEF	Ross M. Harp, Jr.	Box 4-1160	Anchorage 99503
Idaho	K7THX	Everett J. Jordan	1029 Airway	Lewiston 83501
Montana	W7RZY	Harry Roylance	P.O. Box 621	Harlowton 59036
Oregon*	K7WWR	Dale T. Justice	2741 Firwood Lane	Forest Grove 97116
Washington	W7UWT	Raymond H. McCausland	2812 Hayton St.	Bremerton 98310
PACIFIC DIVISION				
East Bay*	K6LRN	Richard Wilson	107 Cordova Way	Concord 94521
Hawaii	KH6GHZ	Meade M. Padgett	1804 Holapa St.	Honolulu, Oahu 96818
Nevada	WA7BEU	L. L. "Mike" Blain	560 Cherry St.	Boulder City 89005
Sacramento Valley	WB6HWB	Donald F. Stromsted	6435 Orange Ave., Apt. 14A	Sacramento 95823
San Francisco*	WA6AUD	Hugh Cassidy	77 Coleman Dr.	San Rafael 94901
San Joaquin Valley	WA6BUH	Howard W. Bobbitt	3907 E. Princeton Ave.	Fresno 93703
Santa Clara Valley	W6VZE	Charles E. Glidden	1037 Capuchino Ave.	Burlingame 94010
ROANOKE DIVISION				
North Carolina	WA4LWE	Walter B. Thomas, Jr.	P.O. Box 608	Pilot Mountain 27041
South Carolina	WA4ECJ	Richard H. Miller	403 Hancock St.	Beaufort 29902
Virginia	K4LMB	Ethel M. Smith	2012 Rockingham St.	McLean 22101
West Virginia	W8IRN	Robert F. Johnston	Rt. 7, Box 525	S. Charleston 25303
ROCKY MOUNTAIN DIVISION				
Colorado	WØSIN	Charles M. Lotterell	430 South Swadley St.	Denver 80228
New Mexico	K5KTQ	Phillip K. Freedman	10420 Bellamah Ave., N.E.	Albuquerque 87112
Utah	W7WKF	McCarroll Petersen	4815 Yorktown Drive	Salt Lake City 84117
Wyoming	K7NQX	Glen R. Blackburn	1739 East 22nd	Cheyenne 82001
SOUTHEASTERN DIVISION				
Alabama	W4FPI	W. Taylor Benton	P.O. Box 14	Opp 36467
Canal Zone	KZ5MV	Marvin G. Flynn	Box 1087	Albrook AFB
Eastern Florida	W4IYT	Andrew C. Clark	41 Lenape Drive	Miami Springs 33166
Georgia	W4DDY	W. Homer Connell	2608 Apricot Lane	Augusta 30904
West Indies (P.R.-V.I.)*	KP4DV	Albert R. Crumley, Jr.	P.O. Box 10073	Caparra Heights, San Juan, P.R. 00922
Western Florida	W4IKB	G. D. McKechnie	1000 N. Sixth St.	Chipley 32428
SOUTHWESTERN DIVISION				
Arizona*	W7FKK	Floyd C. Colyar	3411 West Pierson St.	Phoenix 85017
Los Angeles	K6QPH	Alan A. Brubaker	1779 El Rey Road	San Pedro 90732
Orange	WA6ROF	Jerry L. Verduft	6372 Cymbal St.	Yorba Linda 92686
San Diego	W6SK	J. D. Campbell	3235 Idlewild Way	San Diego 92117
Santa Barbara	K6GV	Frederic L. Patterson	P.O. Box 115	Simi 93065
WEST GULF DIVISION				
Northern Texas	W5PYI	James M. Cotten	208 East Oak	Weatherford 76086
Oklahoma	K5ZCJ	Lawrence G. Russell	11322 East Fourth Place	Tulsa 74128
Southern Texas	K5QQG	E. Wayne Smith	1601 Ruth Ave.	Houston 77004
CANADIAN DIVISION				
Alberta	VE6FK	Don Sutherland	444-25th Ave. N.E.	Calgary
British Columbia*	VE7FB	Harold E. Savage	4553 West 12th Ave.	Vancouver 8
Manitoba	VE4JC	James Riddle	291 Marlton Cr.	Charleswood 20, Winnipeg
Maritime	VE1HJ	F. R. Fraser	12 Albert St.	Dartmouth, N.S.
Ontario	VE3EUM	Harry Walker	956 Lakeshore Blvd.	Burlington
Quebec	VE2ALE	Joseph Unsworth	98 Galt	Dorion
Saskatchewan	VE5CU	W. H. Parker	1008-10th St. E.	Saskatoon

* SCM acting as SEC in the absence of an appointed official.

AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART,* W1NJM

Order in Nets

ONE of the reasons nets don't accomplish as much as they could during a given time is that in all too many cases neither the control station nor the participants are familiar with the methods used to maintain order. There is too much extraneous comment and too little exercise of NCS authority to keep the net on the track.

Of course some nets are "informal." They are in no rush, everybody is friends, the net is in effect just a gum-beating session of good guys, and all they need a control station for is to sort of keep track of whose turn it is to talk next because, unlike an eyeball session, only one person can talk at a time.

You can compare nets with club meetings. Most club meetings are somewhat along informal lines, and this is the way most memberships want it. Members make wise cracks from the floor without bothering to be recognized, the order of business goes from committee and officer reports to old business to new business then back to old business because someone forgot something, then maybe a late committee chairman shows up. In most club meetings, Roberts Rules of Order take a severe shellacking.

Same way in nets. Most of the rules for net operation set down in the Operating Booklet, the Public Service Manual and the League's Operating Manual are ignored, to a greater or lesser extent, in most nets. It's all right, if that's the way you like it.

But sooner or later, some of the members, whether it be of a club or a net, are going to get weary of all the horsing around and want to get the business part of it over with — either because they aren't inveterate yakkers, or because they *are* and want to get the business over with so they can yak. In any case, just plain bull has no place either in a club meeting or a net session. Before or after, yes. During, no.

Most nets will operate the way the net members want it. There are quite a few, however, who would *like* to operate in a businesslike and proficient way but just don't know how. The members don't know how to report in, how to list their traffic, when to transmit and when not to transmit, exactly what to do when they are dispatched to another frequency, and a whole host of other things. The control operator also can foul up a lot of procedure by inept handling; in fact, in order to have a good, businesslike net session you have to have an adept NCS and members who know just what they should and should not, can and cannot do. (The same applies to club meetings as to chairman and members, come to think of it.)

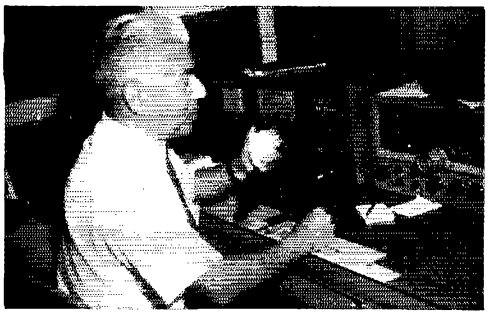
Space here does not permit full detail about this — and even if it did, the procedure would vary with requirements and circumstances. But we would like to point out some phraseology from the little booklet "Operating an Amateur Radio Station" which, if observed as a general principle, can go a long way toward laying the foundation for successful network operation. It says, among other things, that "the authority of the NCS is absolute, its decisions are final and its instructions are strictly complied with." In other words, you argue with NCS *after* the net or not at all: *during* the net you carry out his orders as best you can. NCS are also exhorted to (1) call the net promptly at the appointed time, (2) keep a written record of the situation and traffic list of each member, (3) know where each members is located and what traffic he can handle, (4) excuse each member *promptly* when he is "clear" and (5) convey your instructions in a clear, cool, calm manner — as though you know exactly what you're doing (even if you don't).

But even the best NCS is in trouble if the net members don't behave themselves, so here are some maxims for the amateurs who report into nets: (1) Transmit only when invited by the NCS to do so, even though you only wish to "help" (such help he can usually do without), (2) be there on the dot when the net begins, (3) respond promptly when the NCS calls you — don't fall asleep, (4) pay attention to the procedure used and follow it closely and (5) save all personal remarks and other conversation until the net is over.

Any of the above look familiar? It should, most of it is in the Operating Booklet — along with a lot more valuable information on network operation. Read it, sometime. — *W1NJM.*

Above are officers and guests of the Lake Amateur Radio Association of Traverse, Fla. From left to right: W4BP, Secy.; W4VDY, V. Pres.; W4MVB, SCM EFla.; K4OAB, Pres.; K4UYN, EC Lake County, Fla.; W4YPX, Net Manager of the Florida Amateur Sideband Traffic Net.

* Communications Manager.



XE2PNE, operating station XE2NE during Hurricane Beulah. The Mexican Field Day started on Sep. 16, but about half way through the contest they began to hear other hams talking about Hurricane Beulah. The tide rose and the group was forced to relocate and operate under actual emergency conditions. All commercial communications had been disrupted, but XE2NE continued to operate, maintaining communications with the outside world. Personnel and materiel requests, plus numerous other messages, were handled by the amateurs, who had the only communications for several days.

National Traffic System

The announcement for the 22nd Simulated Emergency Test (Jan. 27–28), in this issue, pertains to operation mainly at the local level while in this part we will discuss the accelerated operation of NTS.

Since the 1963 SET, NTS has operated to facilitate the handling of the traffic generated by the local tests. Great strides have been made since then, and we now have a plan that can be used to advantage if we become involved in a wide-scale emergency. Although we cannot simulate many of the conditions of a real emergency, we can generate a number of messages to many different places and learn our capabilities, not to mention train ourselves so we can operate as a team.

This is the second time that full-scale NTS operation based upon interlaced two-hour cycles will be used. The operation *starts* in mid-afternoon by local time to facilitate liaison with the local tests and *finishes* early enough to save "midnight oil" except for a few TCCers. There will be two eight-hour periods of operation in each area, each consisting of six NTS cycles based on ½-hour sessions of the Section and Region nets and 1-hour sessions of the Area nets. The sequence for a single cycle is: ½-hour session of the Section net (S1); ½-hour session of the Region net (R1); 1-hour session of the Area net; ½-hour session of the Region net (R2); ½-hour session of the Section net (S2). You can see how the six cycles are interlaced by observing the *Cycle Chart*. The same information is presented in the *Echelon Chart* for use during SET operation. Times are shown for each of the three NTS Areas, so use the one applying to your area and check WWV for correct GMT if necessary. The S1 and R1 sessions will contain a representative for the *thru* messages who will report to the next session of a higher level net. The S2 and R2 sessions are primarily for distribution of messages from the previous session of the higher level net. The Net Control Station is expected to change at the beginning of each scheduled net session, therefore it is important to observe the time schedules. If the traffic load for a station becomes too great to handle during the assigned net session, the way to obtain relief is to handle only the higher-precedence messages or to, divide the message load prior to taking it to the next level net.

NTS 1968 SIMULATED EMERGENCY TEST SCHEDULE

Cycle Chart			*Net Starting Times in GMT* Eastern Area	Central Area	Pacific Area	*Echelon Chart*		
S1	—	—	1900	2000	2200	—	S1	
R1			30	30	30		R1	
A	S1	—	2000	2100	2300	—	S1	A
	R1		30	30	30		R1	
R2	A	S1	2100	2200	0000	—	S1	R2 A
S2		R1	30	30	30		S2	R1
S1	R2	A	2200	2300	0100	—	S1	R2 A
R1	S2		30	30	30		S2	R1
A	S1	R2	2300	0000	0200	—	S1	R2 A
	R1	S2	30	30	30		S2	R1
R2	A	S1	0000	0100	0300	—	S1	R2 A
S2		R1	30	30	30		S2	R1
	R2	A	0100	0200	0400	—		R2 A
	S2		30	30	30		S2	
		R2	0200	0300	0500	—		R2
		S2	30	30	30		S2	

Above schedule is for handling *all* precedences except EMERGENCY or TEST EMERGENCY.

All amateurs participating in the SET are urged to originate at least two messages, one to the SEC of your Section and another to a person in a distant ARRL Section (preferably on behalf of a third party). All messages relating to the SET should have TEST inserted before the precedence and also in the text of the message if it deals with an *unreal* situation.

Let's all volunteer for assignments and make it easier for the net managers. See you in the SET. — *W1EEN.*

October Reports:

Net	*Sessions*	*Traffic*	*Rate*	*Average*	*Representation (%)*
1RN	62	589	.364	9.5	92.9
2RN	59	371	.478	5.9	93.2
3RN	62	498	.431	8.0	100
4RN	59	695	.514	11.8	91.9
RN5	62	818	.419	13.2	92.1
RN6	62	1517	.879	23.8	100
RN7	41	387	.317	9.4	35.3
8RN	61	624	.377	10.2	98.9
9RN	61	476	.430	7.8	93.4
TEN	62	698	.614	11.0	83.1
ECN	30	85	.205	2.8	75.6[1]
TWN	29	264	.323	9.1	62.2[1]
EAN	31	1753	1.284	56.5	98.4
CAN	31	1255	1.017	40.4	100
PAN	31	1305	.860	42.1	96.8
Sections[2]	2142	12,722		5.9	
TCC Eastern	124[3]	786			
TCC Central	93[3]	634			
TCC Pacific	124[3]	849			
Summary	2885	26,326	EAN	15.2	82.2
Record	2464	30,735	1.408	12.3	—

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

[2] Section and Local nets reporting (71): AENB, D, H, M, O, P, R, S, T (Ala.); OZK (Ark.); NCN, SCN (Cal.); HNN (Colo.); CPN (Conn.); FMTN, WFPN (Fla.); GSN (Ga.); QIN (Ind.); ILN, TNT (Ill.); Iowa 75; KRN, KTN (Ky.); LAN (La.); PTN (Me.); MDD, MDDS, MEPN, Termite (Md.-Del.); WMN (Mass.); M6TN, QWN, Tri-County (Mich.); MSN, MSPN (Minn.); MNN, MTTN, PHD (Mo.); NJPN, PVTN (N.J.); Roadrunner (N. Mex.); NLIVHF, NLS, NYS (N.Y.); NCN, NCSB, THEN (N.C.); BN, OSSB (Ohio); OPEN, STN (Okla.); EPA, EPEN, PFN, PTTN, VHFTN, WPA (Pa.); SCN (S.C.); TEX (Texas); BUN (Utah); VTNHN (Vt.-N.H.); VN, VSBN, VSN (Va.); WSN (Wash.); WVPN (W. Va.); BEN, WSBW (Wis.); APSN (Alta.); BCEN (B.C.); RPQ (Ont.-Que.).

[3] TCC functions performed not counted as net sessions.

Another "Great Experience," CEØAE holds a weekly schedule with K9SLQ and enables a mother in Bluffton, Ind., to talk to her son who is stationed on Easter Island nearly 7,000 miles distant.

K3MVO issued a 3RN net certificate to W3ATQ. K5IBZ sez things picked up a little in all categories last month but there is plenty of room for improvement; the switch back to 80 meters and the time changeover went smoothly. W9VAY is the new chairman of the *Central Area Staff*, replacing W9JUK. K7JHA issued a net certificate to WA7DMA. The late session of RN7 has been deleted and in its place is an earlier session prior to the meeting time of the section nets. W9QLW reports traffic about the same as last month and welcomes W9USR and W9RGB. WØLGG is very pleased with the report; KØORK is doing very well since he became RM for Minn. WAØHUD and WAØELO are doing excellently representing the Dakotas; WAØELO has helped a number of times with CAN liaison. VE3BZB has started a late session and hopes to have enough incoming traffic to maintain interest in the new session. W6VNQ issued PAN certificates to K6CDW & WB6PCQ.

Transcontinental Corps: W3EML sez October was a good month with the highest percentage of successful functions for any month in 1967 and all functions reported. Speaking of dependability, K8KMQ has worked one TCC function per week from Nov. 1964 through Oct. 1967 with only three misses, two of which were covered by prearranged substitutes. TCC certificates were issued to WA2GQZ and WA8OCG. W9JUK reports that the gang did a sweet job for Oct., and they are to be commended. W7DZX appreciates the prompt reports from all station functionaries.

October TCC reports:

Area	*Functions*	*% Successful*	*Traffic*	*Out-of-Net Traffic*
Eastern	124	96.7	2082	786
Central	93	93.6	1307	634
Pacific	124	95.2	1724	849
Summary	341	95.2	5113	2269

Oct. TCC roster: Eastern Area (W3EML, Dir.) *W1s* BJG EFW EMG NJM, *W2s* GKZ MTA SEI, *K2s* RYH SSX, WA2BLV, WA2UWA, *W3s* AIZ EML NEM, K3MVO, *W4s* DVT NLC ZM, *W8s* ICH UM, K8KMQ, *WA8s* CFJ KUW OCG, VE2UN. Central Area (W9JUK, Dir.) *W4s* DIY OGG, K4BSS, WA4WWT, WB4AIN, W5KRX, W8FAW/Ø, *W9s* CXY DYG JUK QLW VAY, WA9NFS, *WØs* LCX ZLN, *KØs* AEM YBD, *WAØs* DOU MLE. Pacific Area (W7DZX, Dir.) *W6s* BGF EOI BRG EOT HC IDY IPW TYM VNQ, *K6s* IBI LRN, *WA6s* BRG ROF, WB6HVA, *W7s* AAF DZX HMA ZIW.

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Other Net Reports:

Net	*Sessions*	*Check-ins*	*Traffic*
Hit and Bounce	31	445	931
75 Interstate	30	1223	547
20 Interstate	22	351	3547
Eastern Area Traffic	30	420	351
7290	44	1602	1294
North American	26	671	579
QTC	22	306	220
Mike Farad	52	386	313
Clearing House	22	295	244
New England Teenage	31	327	172

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Diary of the AREC and RACES

On Aug. 1, seven RACES members were alerted for back-up communications during a racial incident in Providence, R. I. A 6-meter antenna had been previously installed at the hospital and three amateurs were alerted for possible duty there. The others stood watch during the night but were not needed. — *W1KPM, RO Barrington, R. I.*

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On Aug. 19, there were 47 messages handled by 8 amateurs during a joint civil defense — CAP drill. The drill was very successful and received a high rating from the Air Force. — *W0JAN/7, EC/RO Snohomish County Washington.*

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On Sep. 30 at 1200Z, sixteen Quebec amateurs provided communications for a car rallye with 8 different check points. There were two different 2-meter repeaters utilized, plus a 75-meter link. Twenty-six different cars entered the rally. Communications were very good for the event, which ended about 2230Z. Also that day *Exercice Simulee*, organized by Civil Protection, utilized the communications of four amateurs in the La Providence & St. Hyacinthe area of Quebec. The 2-meter operation was greatly appreciated by the coordinator of Civil Protection and was a worthwhile experience for the amateurs. — *VE2ALE, SEC Quebec.*

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On Oct. 4, 5 & 10, the Boeing Employees Amateur Radio Society Net assisted in a search effort for a missing aircraft in the Cedar Lake area. K7TTS was in operation by 4 P.M. the first afternoon. WA7GYD operated mobile with the search party. The amateurs secured about 7:30 P.M. the next day but the aircraft was not located until the 10th. At this time the BEARS net was called again to handle a number of messages pertaining to the clean-up operation of the crash. Seventeen amateurs participated in the activity on 75 meters. — *W7RJW.*

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On Oct. 10, a disaster drill based on a simulated tornado with an ensuing fire and explosion was held in Louisville, Ky. There was one RACES group operating on 6-meter f.m. and another on 6-meter a.m. Sixty messages were handled by the f.m. group during the exercise, which involved a number of participating organizations and communications groups. — *W4NQA, EC Jefferson County, Ky.*

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The following services were performed by the West Coast Amateur Radio Service Net from Oct. 10 to 27: K6EEY on Oct. 10 reported two accidents to WB6UXP, who relayed the information to the Highway Patrol. On Oct. 12, W6GLX reported a fire in Griffith Park, and

W6DEJ called the fire department. On Oct. 13, W6HCE reported a traffic accident east of Barstow, and WB6INO called authorities. On Oct. 14, K6SWG reported an accident on San Mateo Bay Bridge, and W6YRK called the Highway Patrol. On Oct. 15, WB6CBW reported an accident near Vallejo, and WB6ILK called authorities. On Oct. 18, K5SSO reported that a car had gone into the center divider fence on a freeway near Los Angeles; WB6DQZ called the Highway Patrol. On Oct. 19, W6JSB reported an accident near San Mateo; K6KZI called authorities. On Oct. 21, K2VTW/mobile reported two accidents, and K6KZI and K6OEZ called the Highway Patrol. On Oct. 22, WA6QNN reported an accident with one person bleeding profusely; WA6HYU called authorities, requesting an ambulance. The ambulance arrived in fifteen minutes, and plasma was administered. At last report, the injured persons were recovering and possibly saved by the prompt arrival of aid requested via amateur radio. On Oct. 24, W6ORS reported an accident with injuries near Las Vegas, Nev.; K6KIH called the authorities. On Oct. 27, WB6ADC/mobile reported a freeway accident with injuries near Los Angeles, and K6AEH called the Highway Patrol. On Oct. 21, four amateurs used 2-meter equipment to communicate for a geological field trip consisting of nearly 150 geologists on four different buses. Contact was maintained along the route, and speakers described geological features. The communications substantially reduced the number of stops required. One of the buses had a flat tire but because of the communications, appropriate action was taken without interrupting the course of the trip. — *WB6IZF.*

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On Oct. 12, at 10 P.M., a section of West Virginia experienced a flash flood caused by a bulldozer accidentally opening an old mine shaft. Water covered the main section of Montgomery, there were fires caused by electrical shorts, and normal communications with Charleston were out. The Kanawha County AREC, consisting of 16 amateurs, provided emergency communications between the Kanawha and Montgomery County c.d. headquarters. Messages were handled pertaining to the water level, fire fighting and requests for additional equipment, or supplies, and at one time a traffic accident was reported; W8WHQ/mobile transported the injured man to the hospital. The flood waters receded, and the group secured at 1:30 A.M. The following amateurs participated: *W8s* CLX HZA IRN PQQ WHQ ZHN *K8s* KRW SNW UDF WMQ YBU, *WA8s* EHI ICZ LAL LFZ PWM. — *W8IRN, SEC W. Va.*

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On Oct. 14, 21 & 22, seven amateurs furnished the communications for the Pacific Invitational Grand Prix auto races in San Diego. — *WB6RPC.*

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From Oct. 23 to 29, twenty AREC members manned a booth at a fair in Augusta, Ga. W4DV/4 originated 140 messages. Also, during a civil defense alert eleven AREC members manned the c.d. center daily, maintaining a 24-hour watch on Sat. and Sun. Communications were maintained with state district headquarters, statewide communications using the Ga. SSB net and GSN. Ten mobiles using 2-meter f.m. equipment connected via a 250-watt repeater were also available. All the c.d. messages were quickly handled and more could have been passed if it had been available. — *W4DDY, EC Richmond County Ga.*

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On Oct. 24, the Falls City (Nebr.) Amateur Radio Club held a surprise *simulated emergency* at the local airport. Within 23 minutes from the announcement, KØJKS/Ø was in operation and contact was made with WAØDFS on 75 meters — *WAØDFS, EC Richardson County, Nebr.*

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On Oct. 28 from noon to 3:30 P.M., six amateurs assisted the Folk Fair Parade Committee in keeping horse-drawn carts coordinated through downtown Milwaukee. *K9KJT, EC Milwaukee County, Wis.*

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The following Halloween patrols were reported: The Barrington R.I. RACES, represented by 6 amateurs, made over 50 observations which were referred to police. The activities of the RACES crew had a quieting effect on the community.

In Plymouth, Mich., 8 hams with seven mobile units assisted fire and police for a "spook nite" operation utilizing 6 and 2 meters.

In Dayton, Wash., six hams successfully used 10 meters to communicate from the fire department to mobile units.

In Ottawa Hills, Ohio, K8UZT organized a group of 6-meter f.m. mobiles which became known as the "spook patrol." The local police were surprised at the deterrent effect accomplished.

The Wireless Society of Vienna, Va., used 50.4 Mc. to coordinate their mobiles and relay pertinent information to the police via a 2-meter link. K4OKM and WA4BTS organized this very effective operation.

The Lenawee County, Mich., AREC was out in full force with 12 mobiles patrolling. The 14 amateurs received a *well done* from the local police chief.

In Plattsburgh, N. Y., the local RACES utilized 2 meters with a unit at police headquarters and the EOC at the fire department. The 14 amateurs who held this exercise were credited with holding the vandalism to a minimum.

In Chadron, Neb., nine amateurs used 75 meters to send reports to WØFLO, the club station near police headquarters. Major distruction incidents were quickly relayed to police and gratitude was expressed by the police chief for the support received from the Pine Ridge Amateur Radio Club.

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On Nov. 3 at 4:30 P.M., the West Florida Phone Net was activated for emergency communications because of the six recorded tornado touch-downs in the Pensacola-Milton area. W4NOG operated under very difficult conditions arising from intermittent power and heavy lightning. WA4IZM did a splendid job as NCS during the crucial hours. There were about 15 casualties but no deaths. The following amateurs were known to have participated in this activity: *W4s* CYG IKB KCA RKH UVF, *K4s* COV LOY QOJ SOI, *WA4s* DED EPH IMC IZM SIB WAR ZFK, *WB4s* BYI EER HXY, W7VLC/4, WØFPA/4. — *W4IKB, SEC Western Fla.*

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On Nov. 11, twelve AREC members provided parade communications for a Veteran's Day parade in La Puente, Cal. Ten mobile units operated on 2-meter f.m. along the parade route and in the formation area. Net control station was located near the judges' stand. Traffic control was handled by Los Angeles County RACES, which utilized a.m. equipment. There was no need for liaison between the groups, but some of the AREC mobile units were prepared for this with a.m. equipment on the RACES frequencies — *WA6JXG.*

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Also on Nov. 11, the Kentucky AREC held an exercise in cooperation with a cave rescue organization. K4UDZ, using battery-powered 2-meter f.m. equipment at the cave mouth, communicated with W4OYI at the rescue base camp a mile away. Traffic was then passed to W4LUB/mobile, assisted by W4TOY & W4BEJ, on 2 and 75 meters. W4YOQ, manned by WA4FMY and others, handled the requests for supplies and personnel utilizing the Kentucky c.w. net and the Kentucky Traffic Net. Rescue units came to the scene, conducted a careful search of the cave and collected specimens for study, all actions coordinated by AREC communications. Thirty-one amateurs participated in this successful operation. — *W4OYI, SEC Ky.*

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At 0045Z on Nov. 12 the Guam Typhoon Emergency Net was activated on 20 meters because of approaching Typhoon *Gilda.* Fifteen Guam stations and others from surrounding islands checked into the net under the direction of KG6AQI. KG6ALY became the weather information station because of his proximity to forecast facilities and made reports which were nearly 3 hours ahead of information being broadcast by commercial sources. Several ships at sea took evasive action on the basis of the information obtained from this net. Six of the stations had standby emergency power in case of commercial power failure. At 0030Z Nov. 13 the typhoon passed north of the island and the net secured at 0407Z — *KG6AQI/WAØPQF.*

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Forty-two SEC reports were received for the month of September, representing 15,522 AREC members. This is nine fewer reports and 4,596 fewer members than reported for Sep. 1966. Sections reporting: Ala, Alta, Ark, BC, Colo, Conn, Del, EFla, EMass, Ga, Ind, Ill, La, LA, Mar, MDC, Me, Mich, Miss, Mo, Mont, Nebr, Nev, NC, NLI, NNJ, Ohio, Okla, Ont, Que, Sask, SBar, SCV, SDak, SNJ, STex, Tenn, Utah, Va, Wash, WNY, WPa. QST

ELECTION RESULTS

In five ARRL divisions, mail balloting has resulted in the election of two new directors and three new vice directors and reelection of three directors, two vice directors.

Gilbert L. Crossley, W3YA scored 2591 votes to 1142 for Carl E. Anderson, K3JYZ; 1079 for Earl H. Mann, W2SEI; and 822 for Allen R. Breiner, W3ZRQ to retain the directorship in the Atlantic Division which he has held since 1954. Delta Division Director **Philip P. Spencer, W5LDH/W5LXX** secured a third term with 1046 votes to 732 for H. Eugene Banta, W4SGI. In the Midwest Division, incumbent director **Sumner H. Foster, WØGQ** tallied 1427 votes to 807 for former director William J. Schmidt, WØOZN to win a second term.

On the vice director side, **Max Arnold, W4WHN** was reelected with 961 votes to 806 for Floyd C. Teetson, W5MUG in the Delta Division. **Charles C. Miller, W8JSU** continues as vice director from the Great Lakes Division, scoring 2206 votes to 1903 for Charles C. Whysall, W8TV.

Alban A. Michel, W8WC/W8SMQ was elected as director for the Great Lakes Division from a field of six. The tallies:

Alban A. Michel, W8WC	1115
Dana E. Cartwright, W8UPB	905
James W. Voorhees, W8EGR	759
John E. Siringer, W8AJW	685
Leonard M. Nathanson, W8DQL	485
R. J. Jones, Jr., W8GXR	196

The new director is 63 years old, and operates a general contracting business. He also has a farm and some timberland in upper Michigan and a cattle farm in Kentucky.

OM Michel has served several terms as president and vice president of the Greater Cincinnati Amateur Radio Association and is a past president of the Ohio Valley Amateur Radio Association. He's also radio officer for Hamilton County Civil Defense. In addition to the clubs above, he belongs to OOTC, QCWA, and the Radio Society of Great Britain. He obtained his first amateur operator license in 1916, and his present call in 1922.

Pacific Division amateurs elected **J. A. Doc Gmelin, W6ZRJ** as director by 1130 votes to 855 for Hugh Cassidy WA6AUD and 497 for Larry M. Reed, W6CTH: Harry M. Engwicht, W6HC, director for the past decade, was not a candidate. Doc, 39, lives in Cupertino, California and teaches electronics and math in Sunnyvale's Fremont High School. He's been an assistant director of the Pacific Division and section communications manager of Santa Clara Valley since 1962. He's a past president, past secretary and past treasurer of the Santa Clara Valley Amateur Radio Association, past president of the Merced Amateur Radio Club and the Northern California Traffic Association. He was vice chairman of the 1965 ARRL National Convention and was active in Project Oscar. Doc serves as alternate radio officer for Santa Clara County RACES and holds appointment as ORS, OBS and OO and is also a member of AREC and the A-1 Operators Club. He has been licensed since 1947.

Atlantic Division members elected **Harry A. McConaghy, W3EPC** as their vice director; the figures looked like this:

Harry A. McConaghy, W3EPC	2424
Jesse Bieberman, W3KT	1727
Harold C. Smith, WA2KND	964
Walter O. Carr, W3LDD	283
Karl W. Pfeil, W3KJJ	250

OM McConaghy is 58, lives in Bethesda, Maryland, and owns the H. R. Rudolf Co., which does customer engineering services in the marine field. He is a retired commander in the USNR. He operates 80 through two meters, c.w., a.m. and s.s.b. The holder of W3EPC since 1934, Mac also holds W2PKC.

Ralph V. Anderson, KØNL, of Holton, Kansas, has been picked as vice director of the Midwest Division in a close election. The figures:

Ralph V. Anderson, KØNL	860
Charles O. Gosch, WØBUL	842
Ronald M. Schweppe, KØEXN	278
Warren C. Dennis, KØBND	250

Patrick Volpe, W1LEL, watches while his brother John, Governor of Massachusetts, signs Senate Bill 132 making amateur call letter license plates available for a reservation fee of two dollars. In 1966 the amateur plates had been caught up in a catch-all "vanity plate" bill, with a nine-dollar charge being added to the normal six dollar registration fee. Pat says that the "Dear Abby" column last spring helped to focus lawmakers' attention on the good done by amateur radio: it's an ill wind, etc., etc. . . !

The joint Pacific Southwestern Division Convention in Los Angeles last September paid tribute to two amateurs who turned out to be the youngest and oldest applicants for Charter Life Membership in the League — and who come from the same town of Huntington Beach! Here, l. to r.: ARRL President and CLM WØNWX; CLM Dona L. Field, WB6TRW; CLM John E. Greer, K6HQJ; Southwestern Division Director and CLM W6KW; Pacific Division Director W6HC. (Photography was by W6UEI and W6RW.)

Andy, who is 58, is a retired cryptographer with a lively interest in amateur radio, printing and music. He's been an assistant director of the Midwest Division, 1966–1967 and the Atlantic Division, 1965–1966. Andy is past president of the Washington (D.C.) Mobile Radio Club and still managing editor of *Autocall*, the publication of the Foundation for Amateur Radio in the Washington area. He's emergency coordinator for the AREC in Holton and a member of Air Force MARS. Andy was first licensed in Onedia, Kansas, in 1929 as W9BWV; he has also held W9NL, W3JRT and W3NL.

The new vice director of the Pacific Division (replacing incumbent Ronnie Martin, W6ZF, who chose not to run) is **G. Donald Eberlein, W6YHM** of Los Gatos, California. Don got 1544 votes to 926 for David P. Baker, W6WX. OM Eberlein, 47, is a research geologist for the U. S. Department of the Interior. He's been an assistant director of the Pacific Division since 1957, and was section communications manager of the Santa Clara Valley 1956–1958. Don is a past vice president, Central California Radio Council; past president of the Raritan Valley Amateur Radio Club; past vice president Northern New Jersey QSP Club; and past vice president, Society of Amateur Operators. He's alternate radio officer for Santa Clara County RACES, a member of AREC and the A-1 Operator Club, holds ORS, and was first licensed in 1937 as W2JKG.

In the Canadian, Dakota and Southeastern Divisions, the elections were completed earlier without balloting, because only one candidate was nominated by the members and was found eligible under the Articles of Association and By-Laws. Noel Eaton, VE3CJ, Charles G. Compton, WØBUO and Charles J. Bolvin, W4LVV were reelected as directors of the respective divisions, with Colin C. Dumbrille, VE2BK, John M. Maus, WØMBD and Albert L. Hamel, K4SJH as vice directors.

EASIER I. D. ADOPTED

The Federal Communications Commission has changed its rules for identification of amateur stations essentially as proposed in Docket 17377, effective January 15, 1968.

Under the revised Section 97.87 (a), stations will send their own calls at the beginning and end of each transmission, and at intervals of not more than ten minutes during a QSO. The call of the station at the other end, however, now only has to be sent during the final transmission. In effect, this change legalizes the practice of "tail ending" used extensively in DX work, contests and traffic nets.

Another change relieves mobile and portable operators from the necessity to give their geographical location when operating on phone. In other words, after the middle of January you can say: "W1XYZ, this is WB2XXX portable three," and be legal in doing so.

A third change involves amateurs outside the three-mile limit. Instead of signing "/MM" or "/AM" and giving their coordinates, maritime and aeronautical mobile stations on c.w. will follow the call with "/R1" "/R2" or "/R3" to show the Region as defined in the International Radio Regulations, Geneva, 1959. (Roughly, Europe, Africa, the Near East and all of the U.S.S.R. are in Region 1; the Americas including Hawaii are Region 2, and the rest of the world — Asia and Oceania — are Region 3.) On phone, the word "Region" replaces the letter R and the word "mobile" replaces the slant sign.

Finally, the new rules clear up prior confusion by stating flatly that the required identifications on radiotelephone shall be in the English language (even though it is okay to use another language for the body of the conversation).

Here is the revised text:

Section 97.87 is revised to read as follows: Section 97.87 Station identification.

(a) An amateur station shall be identified by the transmission of its call sign at the beginning and end of each single transmission or exchange of transmissions and at intervals not to exceed ten minutes during any single transmission or exchange of transmissions of more than ten minutes duration. Additionally, at the end of an exchange of telegraphy (other than teleprinter) or telephony transmissions between amateur stations, the call sign (or the generally accepted network identifier) shall be given for the station, or for at least one of the group of stations, with which communication was established.

(b) When an amateur station is operated as a portable or mobile station, the operator shall give the following additional identification at the end of each single transmission or exchange of transmissions:

(1) When identifying by telegraphy, immediately after the call sign, transmit the fraction-bar $\overline{DN}$ followed by the number of the call sign area in which the station is being operated.

(2) When identifying by telephony, immediately after the call sign, transmit the word "portable" or "mobile," as appropriate, followed by the number of the call sign area in which the station is being operated.

(c) When an amateur station is operated outside of the 10 call sign areas prescribed in Section 97.51(b) and outside of the jurisdiction of a foreign government, the operator shall give the following additional

identification at the end of each single transmission or exchange of transmissions:

(1) When identifying by telegraphy, immediately after the call sign, transmit the fraction-bar DN followed by the designator R 1, R 2, or R 3, to show the Region (as defined by the International Radio Regulations, Geneva, 1959) in which the station is being operated.

(2) When identifying by telephony, immediately after the call sign, transmit the word "mobile" followed by the designator Region 1, Region 2, or Region 3, to show the Region (as defined by the International Radio Regulations, Geneva, 1959) in which the station is being operated.

(d) The identification required by paragraphs (a), (b), and (c) of this section shall be given on each frequency being utilized and shall be transmitted by telegraphy, using the International Morse Code, or by telephony, using the England language. The use of a nationally or internationally recognized standard phonetic alphabet as an aid for correct telephony identification is encouraged.

NEW BREAK FOR G.I. NOVICES

Headquarters asked FCC what could be done for a Novice who was sent to Viet Nam right after acquiring his license. The answer is good news indeed:

"This is in reference to your letter concerning Novice Class licensees whose licenses expire while on military duty overseas.

"Upon return to the United States such licensees may file applications for renewal of their Novice Class licenses. The application must include a statement showing the beginning and ending dates of their tour of duty overseas. — *James E. Barr, Chief, Safety and Special Radio Services Bureau, FCC.*"

At the Quarter Century Wireless Association's 20th Anniversary Banquet in October, John Di Blasi, W2FX, president emeritus and charter member #1 of QCWA, had the honor of presenting certificate #5401 to his own son John Jr., W2QNR.

A-2 STILL OK FOR NOVICES ON 2

The Report and Order in Docket 15928, incentive licensing, inadvertently limited Novices to A-1 emission on 145–147 Mc. An Errata released November 21, 1967 corrects section 97.7 to read:

"97.7 Privileges of operator licenses . . . (d) Novice Class . . . (2) Radiotelegraphy operation in the frequency bands 3700–3750 kc., 7150–7200 kc., and 21.10–21.25 Mc., using only type A-1 emission and 145–147 Mc. using radiotelegraphy emissions as set forth in section 97.61, is authorized . . ."

STATE LEGISLATURES TO MEET

In a western state last year, a bill got through the legislature and was signed before amateurs realized it, raising the price of call letter license plates about 500%. To help prevent further such happenings in this or other fields, we present here a list of states whose legislatures will be meeting in 1968:

Alaska	Arizona	California
Colorado	Delaware	Georgia
Hawaii	Kansas	Kentucky
Louisiana	Maryland	Massachusetts
Michigan	Mississippi	New Jersey
New Mexico	New York	Oklahoma
Pennsylvania	Rhode Island	South Carolina
South Dakota	Virginia	West Virginia

Amateurs, particularly in the capital cities, should take steps to watch bills affecting our ham activities. If doubt arises about a particular bill, send a copy to headquarters for appraisal.

QSL BUREAUS CHANGE HANDS

The Hampden County Radio Association, Inc. has taken over operation of the ARRL W1/K1/WA1/WN1 QSL Bureau from the Providence Radio Association, who asked to be relieved. The address is: Hampden County Radio Assn., Inc., P.O. Box 216 Forest Park Station, Springfield, Mass. 01108.

H. L. Pat Parrish, K4HXF, who formerly operated the W5 Bureau, now assumes management of the W4/K4 Bureau, backed by the Catawba Valley Amateur Radio Club. The Frye Amateur Radio Club, W4AM, of Chattanooga, resigned because the building in which the bureau was located is to be torn down! The new address: ARRL W4/K4 QSL Bureau, H. L. Parrish, Jr., K4HXF, RFD 5, Box 804, Hickory, N. C. 28601. (WA4s/WB4s/WN4s continue to receive cards through Richard Tesar, WA4WIP, 2666 Browning Street, Sarasota, Florida 33577.)

Joseph Gonzalez, KP4YT, has resigned as manager of the KP4 QSL Bureau. Mrs. Alicia G. Rodriquez, KP4CL, has been appointed manager; the address continues to be P. O. Box 1061, San Juan, Puerto Rico 00902.

A hearty "Well Done" to these volunteers who have done so much, and "Welcome!" to the new crews.

Harry Engwicht, W6HC, who ended his stretch as director from the Pacific Division on January 1, 1968, presents cover plaque awards to Will Alexander, WA6RDZ (left) and George T. Daughters, WB6AIG, co-authors of "Solid-State Receiver Design with the MOS Transistor" which was adjudged by ARRL directors as the best article in the April 1967 issue of QST. The third co-author, Wes Hayward, W7OI, was not present for the ceremony but does receive an identical plaque.

AMATEUR TOWERS APPROVED

On four or five occasions in the past there have been tower cases which reached the State Supreme Court and achieved a good deal of publicity within the ranks of amateurs. For every one of these, however, there are perhaps several hundred, solved through the more desirable approaches of cooperation, good will, respect for the rights of others, and just plain patience.

The town of Newport, New Hampshire has an ordinance which says in part that radio towers may only be permitted by the Board of Adjustment where they are deemed essential to the public convenience and welfare. Though the framers of the rule probably had broadcasting structures in mind, the ordinance was thought to apply to amateur towers contemplated by Bill Halleck, K1LMS for land he owned in Newport.

In slow, careful negotiation and with the help of ARRL's legal kit, K1LMS has now been issued a "special exception" permitting him to place two 70' towers on his land. While municipalities should not try to regulate amateur radio per se, they do have the right to insure that towers are safely constructed. They may require amateurs to obtain a building permit and to observe rules about location or construction. K1LMS has shown once again that reasonable men working together usually arrive at a reasonable solution.

Other amateurs facing similar problems may obtain a legal kit from headquarters.

MINUTES OF EXECUTIVE COMMITTEE MEETING

No. 319

November 18, 1967

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., met at the Headquarters offices of the League in Newington, Connecticut, at 1:30 P.M., on November 18, 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, and Carl L. Smith, WØBWJ; and General Manager John Huntoon, W1LVQ. Also present were Treasurer David H. Houghton, General Counsel Robert M. Booth, Jr., W3PS, and Hudson Division Director Harry J. Dannals, W2TUK.

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

Arkansas DX Association, Little Rock, Ark.; Freeport Area Amateur Radio Club, Freeport, Illinois; GLERC Amateur Radio Club, Marietta, Georgia; Harborfields Amateur Radio Club (H.S.), Greenlawn, New York; Madill Amateur Radio Club, Madill, Oklahoma; Pittsfield High School Amateur Radio Club, Pittsfield, Mass.; Randolph Amateur Radio Association, Winchester, Indiana; Santa Clarita Amateur Radio Club, Saugus, California; Simi Valley Radio Club, Simi, California; The State Line Amateur Radio Club, Harper, Kansas; Sterling Twp. High School Amateur Radio Club, Sterling, Illinois; Talcott Mountain UHF Society, Avon, Connecticut; Tamaqua Area Side Band A. R. Association, Tamaqua, Penn.

On motion of Mr. Huntoon, unanimously VOTED that the League approves IARU proposals relating to admission into membership of the Radio Club of Honduras, the Central Radio Club of Bulgaria, and the Association des Radio-Amateurs Ivoiriens.

On motion of Mr. Compton, unanimously VOTED that Life Membership in the League is conferred upon the following members:

Frank Baxter, Jr., W3SKL, Donald Littrell, W4VBH; Stanley Black, K7ZIN, Ernest Okonski, W2VUN; Emory Burnett, K3KTH, Francis Riffle, W3IXB; Merton Christgau, WØSBO, Martin Rosenthal, VE3MR; Charles Collins, W6OQI, Dr. Karel Slatmyer, Jr., W8LAO; Richard Frost, WA6RPY, Aaron Solomon, VE1OC; William Graham, WA6LDV, Merrill Swan, W6AEE; Robert Harmon, W7KSB, Horst Thiem, WB6KID; Col. Oscar Heinlein, W7BIF.

The Committee next engaged in extended discussion concerning the matter of slow-scan television authorization in the major amateur bands, FCC Docket 17736. On motion of Mr. Smith, unanimously VOTED that the League supports the proposals in Docket 17736, but requests (1) that the authorization for slow-scan emission be on a temporary basis for two years so that its use may have full evaluation by amateurs generally; (2) that if and when the Commission acts favorably upon the League's request for a 100-kc. exclusive c.w. subband 144.0–144.1 Mc. the slow-scan authorization will be deleted from that portion; and (3) that the Commission indicate more specifically what procedure is to be followed by amateurs for call sign identification during slow-scan operation.

There being no further business, the Committee adjourned at 5:15 P.M.

JOHN HUNTOON
Secretary

1968 ARRL National Convention

San Antonio, June 7-9

Next summer it will be "QRD San Antonio" for all hams and their families. Dual attractions will be the 1968 ARRL National Convention and HemisFair '68, The World's Fair of 1968. The convention will be held at Municipal Auditorium downtown San Antonio, June 7, 8 and 9. HemisFair '68 will be open from April 6 to October 6.

A busy program of exhibits, meetings, demonstrations, technical talks and special events is now being developed by the convention committee of the San Antonio Radio Club, according to George Munsch, W5VPQ, club president. The convention chairman is Roland Belk, W5LLS, with M. D. Harris, K5PAE, assisting.

Registration for the convention can be made to Registration Chairman, Gene Jank, W5EJT, 100 N. Winston Lane, San Antonio, Texas, 78213. Pre-registration price is $14 including a buffet, dance and banquet.

Facilities for visitors to San Antonio during HemisFair '68 will be the most extensive in the city's history. However, millions of visitors are expected and in order to assure satisfactory accommodations submit your reservation early. Arrange your summer vacation now to include a trip to San Antonio the first week of June '68.

For your enjoyment, the convention committee is planning the most complete ARRL National Convention ever. Enjoy as a bonus the opportunity to see HemisFair '68 — The World's Fair of 1968 — whose theme will be "The Confluence of Civilization in the Americas." You'll find here the magnificent pavilions of 30 nations and as many industries. These, the Alamo and the heart of one of America's most picturesque and historic cities, are all just a few steps from the convention site.

Starting April 6 you are invited to contact and/or visit the San Antonio Radio Club station, W5SC, "Voice of HemisFair '68," which will be operated from the HemisFair site for the duration of the fair by amateurs of the San Antonio area.

Watch future issues of *QST* for more detailed information on the convention.

Hamfest Calendar

Nevada— The Southern Nevada Amateur Radio Club, Inc. will host its third annual SAROC at Hotel Sahara, Las Vagas, Nevada on January 4, 5, 6, and 7. Technical talks, MARS seminar, major amateur radio exhibits, special ladies program, and entertainment that only Las Vegas can present. Hotel Sahara has extended a special room rate of $10 plus room tax per night for SAROC participants. Registration is $10 and includes three cocktail parties, admission to technical sessions and exhibit area, late show in Sahara's Congo Room, safari hunt breakfast, plus a good time. QSP QSL to southern Nevada Amateur Radio Club, Inc., P.O. Box 73, Boulder City, Nevada 89005.

COMING A.R.R.L., CONVENTIONS

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. J.

Strays

QST notes the death of Hugo Gernsback at the age of 83. He will be remembered by all old timers as the founder of the Electro-Importing Company and *Modern Electrics* magazine. The E.I.Co. was about the only source of supply for ham gear in the early 1900s.

— *Modern Electrics* became the *Electrical Experimenter*. *Radio Amateur News* followed and, with the advent of broadcasting became *Radio News*.

— The E.I.Co. catalogues were the "bible" for hams in those days and the descriptive matter was practically irresistible. The League museum has a very fair sampling of his early products including the "roller shade" variable condenser, the sliding-plate condenser, electrolytic interrupter, 100-miles wireless coil, tuners, loose couplers, detectors, etc.

— The writer visited the E.I.Co. at 233 Fulton street, New York in 1913 and remembers high shelves loaded with goodies and clerks wearing derby hats and high stiff collars. The platinum points for spark coils were very low in price but one needed a magnifying glass to see them, practically! The old catalogues and early *Modern Electrics* magazines are prized by collectors.

— Last September, Mr. Gernsback was unable to attend the annual convention of the Antique Wireless Association but sent a taped message of greetings. His voice was clear and vibrant and his thoughts enjoyed by all. He had almost prophetic vision in the field of science and most of the wonders he predicted have come to pass.

— W1ANA

I.A.R.U. News

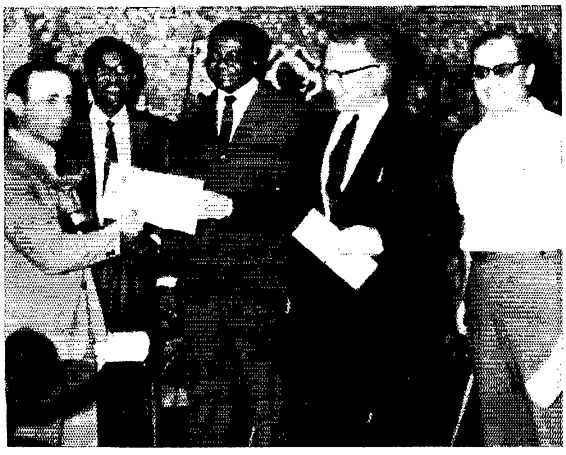
INTERNATIONAL AMATEUR RADIO UNION

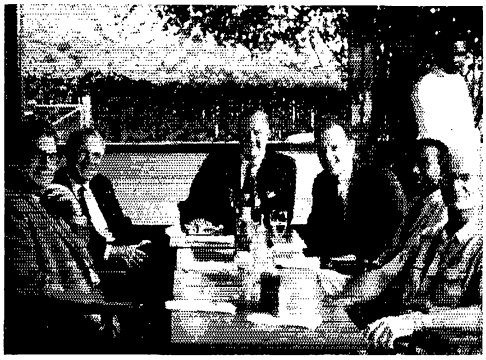
CCIR SEMINAR IN RADIO-COMMUNICATIONS AT GENEVA

Some 34 delegates from 21 countries now have a better knowledge of the amateur radio service, as a by-product of a seminar sponsored recently by the ITU in Geneva. The CCIR (International Consultative Committee on Radio) sponsored a radio-communications seminar in Geneva in early November, which was attended by W1IKE on behalf of IARU/ARRL. The purpose of the seminar was to acquaint delegates from some of the newer countries with the latest developments in radio-communications techniques, for better communications and more economical use of the radio frequency spectrum. Jack Herbstreit, director of CCIR, is WØIIN/HB9AJI, and a number of the other CCIR personnel taking part in the seminar were radio amateurs. Three of the seminar delegates were amateurs — EA5EJ, ZS6ZU, and W1IKE. The International Amateur Radio Club, whose president is Dr. M. Joachim, OK1WI, held an open house for the delegates and, besides demonstrating the amateur station 4U1ITU, distributed copies of the Stanford Research Institute Report.

AUSTRIAN AND CHILIAN RECIPROCITY

The United States has entered reciprocal operating agreements with Austria (November 21, 1967) and Chile (November 30, 1967). These agreements which became effective 30 days after the above dates, bring the total number of such U.S. agreements to 32. A full tabulation appears elsewhere in this department.





In September ARRL's General Counsel, W3PS, visited Nairobi and met with officers of the *Radio Society of East Africa*. Pictured above, l. to r., are Derek Kent, 5Z4XI, Secretary of the RSEA; Ron H. Munro, 5Z4HW/-G3PZD, president of the RSEA; Robert M. Booth, Jr., W3PS, ARRL General Counsel; Jerry T. Plemmons, 5Z4KN/WA6PKN; Mohamed Koor (awaiting license); and E. Robson, 5Z4ERR, world-famous DXer.

LUXEMBOURG RECIPROCAL NOTES

The Reseau Luxembourgeois des Amateurs D'Ondes Courtes reports that amateurs seeking reciprocal operating permission in Luxembourg should apply to Monsieur E. Raus, Director de l'Administration, Administration des P. & T., Luxembourg — Ville. The application should include the applicant's full name, date and place of birth, amateur call sign, modes of emission and bands to be used, time period for which operating permission is sought, LX address, a statement of whether operation will be fixed, mobile, or both, and a photocopy of present amateur license and mobile authorization, if any.

VOA BROADCAST TO BRAZIL

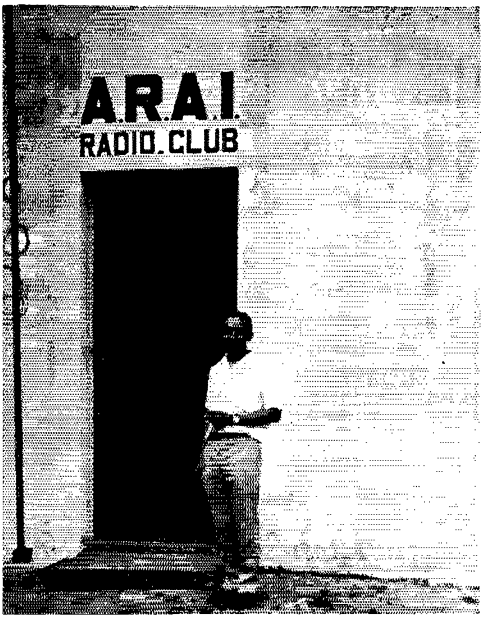
The Voice of America has established a weekly program for radio amateurs in its Brazilian service, every Saturday evening at 2245 GMT on 11.955, 15.250, and 17.805 Mc. The program began on March 4, 1967 when, by special authorization, Brazilian stations were called by VOA on its frequencies, listening for replies in the amateur bands. The program has become so

At a reception in Monrovia, Liberia, on Saturday, September 9, 1967, ARRL staffer W1IKE presented the First Place C.W. DX Competition certificate to EL2Y, Gasper Cayatano. Left to right above are EL2Y; Sewell Brewer, EL2S, president of the *Liberian Radio Amateur Association;* Samuel Butler, EL2L, Minister of Communications for Liberia; W1IKE; and Tony D'Aponte, EL2AK, who had just received an Award from the Spanish IARU society.

W1IKE spent a weekend in September at the home of 9G1ED in Accra, who is seen operating his station here, with 9G1DY looking on. 9G1ED had never worked a Connecticut station before, but with some kibitzing from W1IKE, worked three in short order.

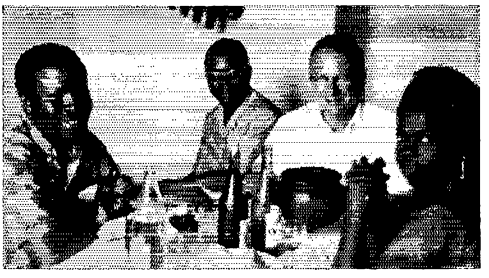
At the time this photo was taken (early September 1967) this young man, EL2NG, was Liberia's newest radio amateur.

Joe Adebayo-Browne, 5N2AAJ, was the first Nigerian licensed radio amateur. He was W1IKE's host during September in Lagos, and they had a chance to discuss at length the problems of encouraging the growth of amateur radio in Africa.



The *ARAI* is the IARU society in the Ivory Coast, complete with its own club-rooms. Here is TU2AF, who was a visitor to the ARRL in July, and who in turn entertained W1IKE in Abidjan during September.

This is not the entire amateur population in the Niger Republic, but a substantial portion of it. From l. to r., at the home of 5U7AL, are 5U7AM, 5U7AH, 5U7AL, and 5U7YL. W1IKE was behind the camera for this picture, and later on, behind the controls of 5U7AL for an interesting 3½-hour stint as a guest operator at a rare DX station.



In Abidjan, Ivory Coast, W1IKE having lunch at the home of TU2AZ. L. to r., TU2BB, TU2AZ, W1IKE, and the XYL of TU2AZ.

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, **Austria,** Belgium, Bolivia, Canada, **Chile,** 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: Bermuda, France, Germany, Israel, Luxembourg, the Netherlands, Senegal 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: 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 8F.

popular, that at times, several Brazilian broadcast stations have provided simultaneous rebroadcasts. Recently, on the occasion of the annual convention of *Liga de Amadores Brasileiros de Radio Emissao*, John Huntoon, W1LVQ, ARRL/IARU Secretary sent greetings to the Brazilian amateurs.

ITALY ISSUES COURTESY OPERATOR LICENSES

According to *Associazione Radiotecnica Italiana*, foreign amateurs may be issued operator licenses by the Italian government. The operator license, called "patente" is issued for the lifetime of the holder and permits him to operate a licensed station of an Italian amateur. Station licenses are available only to Italian citizens. Assistance may be obtained by writing *A.R.I.*, Viale Vittorio Veneto 12, Milano.

PARTNERS OF THE ALLIANCE RADIO NETWORK

Recently information about the work of radio amateurs in connection with the sixth anniversary of the Alliance for Progress was entered into the U. S. Congressional record by Representative Kornegay of North Carolina. Coinciding with a meeting in Lima, Peru, of the American Coordinating Committee of the Partners of the Alliance, a special station, OA4SIX, was set up on 14.230 Mc. The station made contact with 35 U. S. states, 13 countries of the hemisphere, and over 18 other countries around the world. A permanent Partners radio network to meet every Saturday from 7 to 9 A.M. is now in the planning stage. QST

Amateur radio in Indonesia has long been banned, but the recent change in governments may soon make it possible for the ban to be lifted. During September these four hams got together for a ragchew in Djakarta. L. to r.: PK1HN, VE7IR, W6DOK, and PK1SH (these fellows were still using their previous prefixes, rather than the currently-assigned 8F). PK1SH is secretary of Persutuan Amatir Radio Indonesia, an amateur radio society which is presently investigating the possibility of membership in the International Amateur Radio Union.

« Opposite are photos of amateur radio in Africa. In September W1IKE visited seven countries in western Africa, meeting with IARU and telecommunications officials, while W3PS visited Kenya. Both trips were part of the IARU campaign to strengthen amateur radio worldwide.

Correspondence From Members-

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

BETTER OPERATING PROCEDURES!

¶ When will we all learn to respect others on the air? In the recent DX Contest, I was very disappointed to hear so many immature operators (lids). Several DX-stations on ten meters were working U. S. amateurs by call districts to ease congestion. ZS9L, in particular, had a tremendous pile-up on him, and a friendly W9 suggested working the call districts individually to him. This he proceeded to do, but several WB6s, not liking the idea, kept QRMing the frequency and calling out of turn. — *V. C. Nunn, WA4WSW, Louisville, Kentucky.*

¶ Tonight I turned on the qualifying run. It was nigh impossible to copy. There were at least a dozen stations on your transmission on 80–40 plus the QRN and QSB was the worst I ever heard. Lately, I have heard more and more stations trying to cover all your transmissions; no doubt they are among those who are very put out over the new license structure. I firmly believe all hams should take one week of copy on eleven meters, hi. Then they would wholeheartedly approve of the League's efforts and new FCC rules. — *Patrick A. Kelly, WA8VPE, Flint, Michigan.*

¶ At 2151 GMT October 22, 1967 W6RW's "CQ CD" was twice answered by an anonymous "ARRL go to hell." It seems to me that this illegal, cowardly, and likely, mentally-disturbed act is symptomatic of a thankfully-small group of individuals in our society who cringe under flat rocks in the legitimate fear that public exposure will cause them to be ridiculed and minimized.

The privilege of dissent is one to be more highly regarded than the privilege of licensed amateur radio operation. So I urge that individual to please take the cure: object if you wish, allow yourself to be confronted and don't blow it for the rest of us with infantile QRM. — *E. W. Farley, WØDAK, St. Paul, Minnesota.*

¶ What has happened to the FCC monitors? Last night I heard a WB4 on 75 phone swearing to high heaven about an s.s.b. station causing QRM. A few of his friends joined in the cussing out of the lid. I heard him causing deliberate QRM, but the WB4 shouldn't be causing such a ruckus by foul language usage. I think the FCC should be made aware of both of these hams. — *Larry Brown, WA9RLF, Morton Grove, Illinois.*

¶ Why can't OOs monitor W1AW and notify these guys who QRM the frequency when code practice is being transmitted? I know there is no regulation which specifically forbids it as long as it is not "willful" (although I wonder sometimes), but perhaps a friendly note might wake them up.

Last night I was going to tape the 5 w.p.m. portion to use as an accurate and impartial code test for Novice and Technician examinations coming up. Despite turning the preselector down to attenuate weak sigs, switching in both a 400-cycle mechanical filter and 200-cycle audio filter, there was a WB practically zero beat. To top it off, the W2 he was working replied "Sri OM — missed most of that due to *QRM — W1AW is about on same freq"!!* — *Roy C. Brown, WA2TWS, Flemington, New Jersey.*

¶ Although I have been a ham for over 48 years, I just became interested in RTTY. While I enjoy this mode very much, I feel that I must comment on the discourtesy and/or ignorance of other amateurs who cause undue interference on those who are trying to communicate on RTTY.

The culprits are those whose c.w. signals are right on top of a teletype QSO. It is extremely difficult to copy c.w. through a teletype signal, but is almost impossible to print through a strong interfering c.w. signal.

Since the RTTY enthusiasts only use about 20 kc., it seems to me that there are plenty of other frequencies for the c.w. man.

Therefore, I would like to suggest that a little courtesy, such as the average amateur would like from others, be shown to the RTTY man by staying off the frequencies normally used for the RTTY mode. — *Robert Palmer, W8PY, Allen Park, Michigan.*

¶ During the Alaska flood I was handling a large load of traffic on the Fairbanks Disaster Net. That week proved to be very rewarding and informative. Rewarding, because public service is justification of the existance of amateur radio, and informative because it pointed out some of the stupidity, lack of courtesy, and liddish operating practices of some hams.

When a large scale disaster strikes, why not just stay off the air rather than satisfying selfish desires to ragchew and work DX? If you want to help out on an emergency net just sit and listen until there is traffic for your area or you are needed to relay, but don't get on the net and ask if you can help. It just fouls things up. — *Paul P. Cook, III, W7CSK, Seattle, Washington.*

¶ Tonight I went on as usual and heard a couple of hams in contact on the frequency. I called the station that I had the schedule with and he immediately came back with a request to move down 3 kc. I had to ask for a repeat before I could get the new frequency because immediately both the other stations jumped in at once saying — "What's the matter with them, coming on our frequency? After all we have been here for two hours." I just don't understand this attitude. We were on "their" frequency for at the most 30 to 45 seconds. When a schedule is set up it is necessary to pick a frequency and call there, at that time, regardless. Don't other hams work schedules any more? Or are these just refugees from CB that I have been running into lately? We have changed our calling frequency a

number of times in the last year. It seems that the old time ham politeness is disappearing. Today they demand that you get off "their" frequency. — *Gordon H. Coles, W6AIZ, Pomona, California.*

[EDITOR'S NOTE: See Editorial, page 9, December 1967 *QST*.]

INCENTIVE LICENSING — Continued

¶ The hue and cry over incentive licensing has produced much heat and some light. It seems to me that most of the objections to upgrading one's code and technical proficiency are based on lack of apparent need for such skill; the s.s.b.-only DXer doesn't need c.w. and the 80-meter man doesn't need to know about v.h.f., etc.

But these arguments could be used with equal logic, and effect, to oppose all liberal arts courses in our high schools and colleges. How do you explain to your future accountant why he must study Roman history, or to your future secretary why she must study algebra? The answer is that you don't; you give them the "incentive" to do so, and they thank you for it later.

Until reading "Correspondence From Members" (page 90, Nov. 67 *QST*) I found most of the views of my fellow League members constructive, whether they were pro or con incentive licensing. But I now feel compelled to say that for every unfortunate individual who calls you a "dirty bunch of lids" there are fifty rational amateurs who have supported you wholeheartedly if silently. The ARRL has nothing to fear from this type of attack. And the enterprising, well-rounded amateur has nothing to fear from incentive licensing.

The only logical argument against it is laziness. — *James W. M. Monde, W1OKG, Stratford, Connecticut.*

¶ Incentive licensing — what good? Some will do it for prestige, most will forget what they boned up on, 99% won't use it, just buy commercial stuff. And, a lot of prospective hams won't become hams. — *E. J. Greer, K8CKW, Athens, Ohio.*

¶ If the lamenters spent half the time and effort preparing themselves for the Advance or Extra Class examination than they do bellyaching they would have nothing to lament. — *William C. Thomas, W4CG, Fort Myers, Florida.*

¶ As a novice who has recently seen full amateur privileges removed to two steps further away, who has found the code a dull and all but impossible chore, and who has found the increasing demands of business cutting operating to 6 hours a month, let me say a word about incentive licensing:

If I had wanted an easy way I would have been a CBer. — *David Cameron, WN4FRT, Asheville, North Carolina.*

¶ You are a "professional" organization — controlling the amateur; founded by professionals, run by professionals, staffed by professionals, and influenced by professionals.

In the three years that I have been licensed, I have not heard, read, or experienced one good thing the ARRL has done for the amateur. The expensive equipment I purchased in hopes of enjoying a lifetime of hobby is now a loss. I am a non-professional. I cannot compete with the professional and thus will lose ½ of my phone operating space as a result of incentive licensing. In the years to come, I will lose it all as I am convinced that you have no intent to cease in your increasing effort to completely dominate and control the now so-called "amateur" radio . . . — *Hugh Vandegrift, Huntsville, Alabama.*

¶ I just want to tell you that I've finally come to my senses and realized how much you guys in the front office are doing to keep amateur radio a proud, stiff and well-disciplined, yet warm and friendly fraternity. I opposed the licensing system rather bitterly, fearing one of the worst fiascos since the rotary rectifier.

But, as anger burned in my face, I picked up October's *QST* to find a beautifully-sensible plan enabling all amateurs to be once again proud of their call. Imagine my surprise when I found myself swearing to become an Extra before the end of next Summer! I haven't felt this excited since I put out my first Novice CQ!! — *Chris Allen, WA9JFW, Alton, Illinois.*

¶ I am a Novice only since last April, and a member of the ARRL. I am flatly opposed to the incentive licensing endorsed by the League. I can't help but feel that this distracts from amateur radio as a hobby, and makes it a battle of prestige. The person who is an Extra Class license holder wants to feel he is superior to others more than he wants an extra 25 kcs. Why should amateur radio, a hobby, be classified and divided like military ranks?

I realize that ideally this system should promote the technical aspects of amateur radio. But can't a person have this knowledge as a General Class holder? This system will segregate and discriminate. Isn't that what causes riots and racial problems? — *D. Alwin, WNØRKF, New Ulm, Minnesota.*

¶ ARRL looked after the phone operators 100% with the Amateur Extra and Advanced license, but where did the c.w. operator drop to with the Advanced license?? He dropped completely out of all DX competition with the loss of the best parts of the c.w. bands, while the advanced phone operator was being well protected on his DX frequencies. Shame on you ARRL, I thought you were representative of all operators regardless of mode of operation. I am really surprised in your actions. I'm selling out. — *O. T. Webb, Jr., K4ADT, Morganton, North Carolina*

[EDITOR'S NOTE: The c.w. subband idea was *not* introduced by ARRL. Although not the only proponents, *CQ* magazine editorially suggested restricted c.w. bands (March 1964) and *73 Magazine* did likewise (May 1964).]

¶ I am disgusted with the attitude of some members. Suggestions are normal but policy-making should be left to those who have the experience. Any deviation from this only serves to down grade the organization. Without the assistance from the League through the years the hams would be using land lines instead of the air waves. . . . — *Robert E. Flanagan, WA1HAU, Dorchester, Massachusetts.*

¶ I can't believe you guys. This incentive licensing has got to be the greatest setback in amateur radio. The QRM is almost unbearable as is, unless both parties use a kw. What's going to happen to message handling? Phone patches will become a thing of the past when the QRM is doubled. I shudder to think of a pile-up during a contest. I hope that everybody who opposes this insane action is writing in so the ARRL will realize that you're not doing amateur radio a service by supporting this and maybe we can get that docket reversed before it goes in to effect. — *Bob Daly, WA2AXR, Floral Park, L. I., N. Y.*

Incidentally, re incentive licensing: The FCC was right. You were right. In any case, the issue now is settled. So why do you still give space to those protesters who are acting like a bunch of spoiled crybabies? — *I. Howard Leveque, Sr., W5HHV, Glenmora, Louisiana.*

[EDITOR'S NOTE: This is a question we often ask ourselves. But the Correspondence Department of *QST* is an attempt to present a cross-section of comments received at HQ. — pro or con, reasoned or emotional, IBM-type or hand-scrawled.]

In a letter in November, 1967, *QST*, WA6TFZ said, in a word, that he was either too lazy or too set in his ways to up his grade, and then called the League a "dirty bunch of lids"!! He then said he would get support from other Generals. He doesn't get mine. I have been a General for seven months and plan to go Advanced very soon and to Extra as soon as I meet the time requirement.

But I would be ashamed to say that I learn the theory just to pass the test and then to forget it; I learn it to know it and to be a better operator. . . — *Kenny Reynard, WA5QPA, Baton Rouge, Louisiana.*

During the past year there has been much talk over the docket on incentive licensing. As of now I wish to go on record as favoring the League's stand on this matter. Unless a gentle prod is used on the hams in this country, I believe that our fraternity will stand still. This is just basic human nature. Incentive has made this country great. And I think that ham radio will benefit from this new docket. — *Bob Doerr, WA8MEE, Detroit, Michigan.*

At first I was very much angered by the passage of Incentive Licensing and the League. After more careful study and consideration and examining the facts more closely I came to realize that it is a good thing and definitely will help in possibly saving amateur radio. — *Paul S. Vydareny, WB2VUK, N. Tarrytown, New York.*

I am happy to see incentive licensing pass and I will be up to take the test next time it comes. What is so difficult about learning a little about electronics? What is so difficult about practicing the Morse code? Surely if you have not got enough gumption to do that, you should be CBing. I wish some people would grow up and realize the best things in life are not easily attained. — *Mike R. Harlin, WA7AID, Salt Lake City, Utah.*

PUBLIC SERVICE

During Hurricane Beulah, members of the Amateur Radio Service performed extremely helpful services to the operations of the Weather Bureau when all commercial communications between our Brownsville, Texas station and the public failed. We believe the loyalty and dedication of these operators should be recognized.

When Hurricane Beulah crossed the coast near Brownsville, Texas, on September 19, 1967, Mr. Art Ross, W5KR started transmitting from our Brownsville office and established contact with the San Antonio Radio Club Station W5SC. When commercial telephone and telegraph facilities failed, the amateur radio link proved to be the only means of communication from Brownsville Weather Bureau from September 19th until Sunday, September 24th, when commercial teletype and telephone services were restored.

In San Antonio, the San Antonio Radio Club members set up a station at the Weather Bureau office and maintained constant contact with W5KR of Texas Southmost Amateur Radio Club in Brownsville. This traffic included Brownsville weather and radar observations which were then transmitted on teletype circuits to other concerned Weather Bureau offices by San Antonio Weather Bureau.

These radio amateurs also provided Weather Bureau hurricane warning information to Civil Defense agencies, the Texas Department of Public Safety, the Red Cross, and to other cities in South Texas affected by Beulah.

Throughout the history of Amateur Radio, operators have come forward willingly and eagerly with their own equipment to meet our unforeseen emergency communications needs. The performance of amateur radio during these critical days of Beulah ranks among the finest in our long association. — *George P. Cressman, Director, Weather Bureau.*

QN SIGNALS

Those "QN" signals for traffic net use are so familiar that we take them for granted, sort of like scrambled eggs for breakfast. The ARRL *Operating Manual* says (p. 33) "The QN signals for amateur net operation were introduced in the late 1930s by W1UE (now W4IA) to lighten the burdens of net control operators."

Now, W8FX offers some additional details about their probable origins:

"The QN signals were first thought out in late 1939 in the basement of Kenneth F. Conroy's (W8DYH) new place at 18030 Waltham (Detroit, Mich.) by W8AKN, W8DYH, W8RX and myself. The QN signals were first published in the DARA Bulletin in the fall of 1939 and later in the DARA Hamfest booklet of the Ypsilanti hamfest April 28, 1940.

"We of DARA had a heck of a time trying to get the ARRL to adopt these QN signals. . . . Why I remember this so well is that we had some really wild Q signs figured out that we never publicized — like QNH: 'come on over, my husband isn't home.'(!) When the ARRL finally did adopt the sigs, they were exactly the same as we had been using before WW-II but they were not adopted by the ARRL until after WW-II."

I would greatly appreciate receiving any further correspondence about this, and particularly I'd like to get a copy of the 1939 *QMN Bulletin* or any earlier publication by anybody showing similar signal lists for traffic net use.

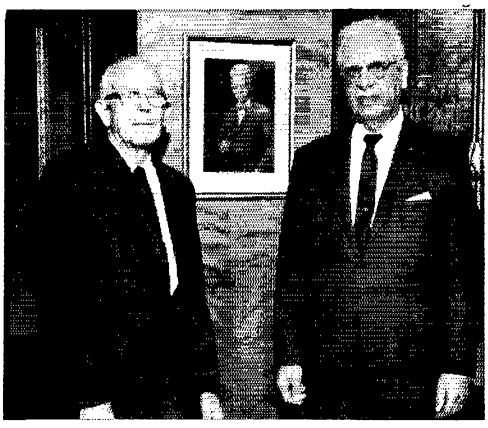
In the absence of contrary evidence, Tate's claim of credit for QMN's origination of the signals stands unchallenged! — *George Thurston, W4MLE, Tallahassee, Florida.*

[EDITOR'S NOTE: The *Operating Manual* reference originated without W4IA's knowledge, and appears to be in error. W4IA, in 1947 the League's Asst. Communications Manager, did introduce the QN signals officially as ARRL-approved.] QST

IMPORTANT NOTICE
Changes of Address

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

Strays



Clarence D. Tuska, (r.) ARRL cofounder and first secretary, recently visited Hq., providing the opportunity for this photo of him with Raymond W. Woodward, W1VW. So far as is known, Ray is the only still-active member of the old Hartford Radio Club whose activities gave birth to ARRL in 1914.

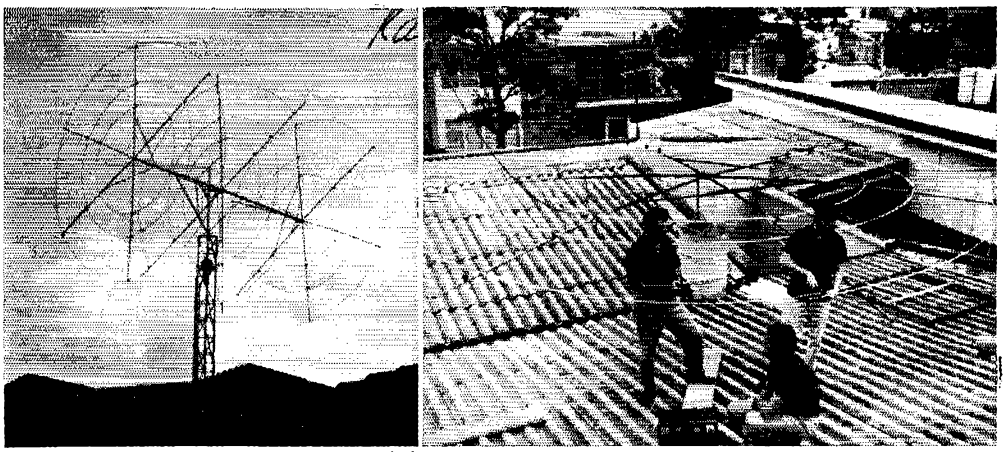
Say, what happened to all this help-thy-fellow-ham tradition? In July we ran a Stray pointing out that the International Mission Radio Association would like some help in providing equipment for such overseas people as Peace Corps workers, missionaries, and so on. Brother Carmen received only two replies to that item. If you'd like to help IMRA help others, please write to Brother Carmen, C.M., WB2TUO, Box 1865, Albany, N. Y. 12201.

—•••—

Recently, the mid-west chapter of ARMS (Amateur Radio Missionary Service) held its annual meeting and hamfest near Mankato, Minn. ARMS is an international organization which handles emergency traffic from isolated missionary stations, provides liaison between interested U. S. stations, and provides needed equipment for missionary stations. Their international headquarters is at Philadelphia College of the Bible, WØLSF president, Ames Iowa.

Seasons Greetings From the Hams of the ARRL/QST Staff

Roland B. Bourne	W1ANA
Bob Hill	W1ARR
F. E. Handy	W1BDI
Doug DeMaw	W1CER
Jean DeMaw	W1CKK
Bob Rinaldi	W1CNY
Laird Campbell	W1CUT
George Grammer	W1DF
Bill Owen	W1EEN
E. P. Tilton	W1HDQ
Lewis G. McCoy	W1ICP
R. L. Baldwin	W1IKE
J. A. Moskey	W1JMY
John Huntoon	W1LVQ
Lance Johnson	K1MET
George Hart	W1NJM
A. M. Wilson	W1NPG
Murray Powell	W1QIS
Chuck Dean	K1QQX,
Don Mix	W1TS
Perry F. Williams	W1UED
L. A. "Pete" Morrow	W1VG
R. L. White	W1WPO
C. R. Bender	W1WPR
Walter Lange	W1YDS
Ellen White	W1YYM
Miriam Y. Knapp	W1ZIM
Lillian M. Salter	W1ZJE
Bill Dunkerley	WA2INB
Bill Smith	WB4HIP
Louise Moreau	WB6BBO
John Troster	W6ISQ,
Rod Newkirk	W9BRD
Maxim Memorial Station	W1AW
ARRL Headquarters Operators Club	W1INF



The "circular cylindrical" antenna shown above (1.) was constructed by Raul Mejia M., HK4TA. He reports that the antenna performs well, is resistant to high winds and bad weather. The circular elements are made from ½-inch aluminum tubing and are formed on the ground. The lengths are determined by using conventional formulas for quad element lengths. The photograph on the right shows HK4TA, HK4PJ, and HK4BAJ adjusting the antenna with a grid-dip meter and a communications receiver.

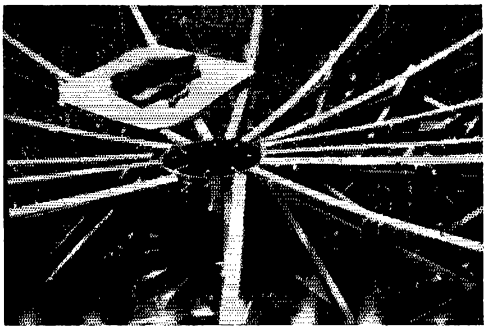
The World Above 50 Mc.

CONDUCTED BY BILL SMITH,* WB4HIP

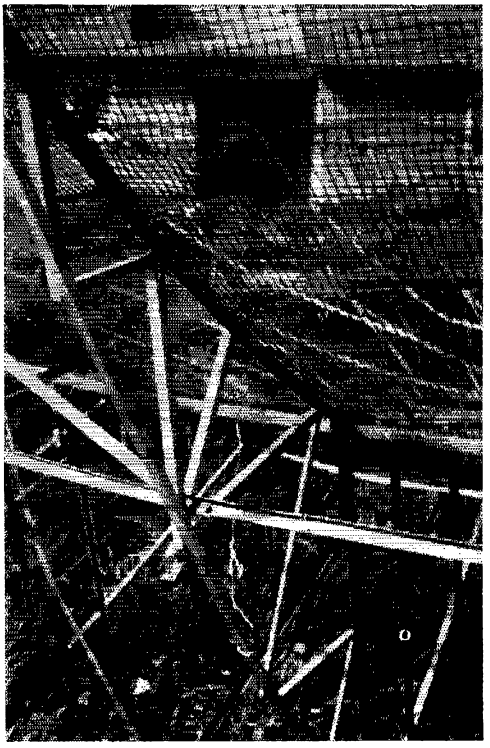
Plain Language E. M. E.

OUR correspondence indicates an ever-increasing interest in amateur space communications. For those turning skyward for new adventure in v.h.f., the possibility of working e.m.e. seems indeed exotic. At my request, Mike Staal, K6MYC, has agreed to offer his guidelines for developing a successful e.m.e. system. These are the result of much work, Mike having traveled both unsuccessful and successful avenues. The discussion is not intended to illustrate a cut-and-dried system that must be used, but rather to point out what equipment is being used, and in some instances, how successfully. We hope this will stir your imagination and interest in e.m.e. communications.

The station at K6MYC is probably as basic and simple as one should consider for e.m.e. To illustrate how little is actually required, the following is *all* that is needed and used at K6MYC. An SBE-34 s.s.b. and c.w. transceiver is used with a receiving converter and transmitting mixer for 144 Mc. The only thing unusual is a common local oscillator tripled to 130 Mc. permitting transceive operation on 144. The transmitting converter is similar to that on page 159 of the ARRL *V.H.F. Handbook*. The receiving converter is an old, much-modified Ameco tube-type with a 6 db. noise figure. A 50-ohm pad is used between the SBE-34 and the transmitting converter to swamp most of the 40 watts of 14 Mc. output. The converter output is 5 watts which drives a *linear* amplifier through a relay. The 5 watts is adequate to drive a pair of 4CX250Rs in the WØMOX configuration (December, 1961, *QST*) to one-kw. input. The amplifier delivers 650 watts which is fed through thirty feet of ½-inch heliax to coaxial switches at the antenna. Two relays are used at the antenna, one for the transmitted signal and the other for double protection of the FET preamp located in the same housing. Belden 8214 carries the preamp output to the receiving converter. A 1-Mc. crystal oscillator running into a tunnel diode provides both calibration at 144.000 and a weak-signal source, which is absolutely necessary for observing receiving-system performance. A noise blanker, 60-cycle audio filter and tape recorder are occasionally used. That is it, aside from the antenna and mount. Compare your station with the aforementioned and you'll probably find



Careful examination of this photo will reveal some construction ideas for the hub of a parabolic reflector. The dish belongs to W3SDZ.



W3SDZ used hardware cloth for the covering on his 432-Mc. dish. Note the construction of the struts and supports.

*Send reports and correspondence to Bill Smith, WB4HIP ARRL, 225 Main St., Newington, Conn. 06111.

very little keeping you from beginning in e.m.e. work except the antenna.

The bare minimum gain required from the 144-Mc. antenna is 20 db. over a dipole. This does not mean that echoes are not possible with slightly less gain, but for any hope of reliability through the moon's cycle, 20 db. is the line when using "normal" receiving systems.

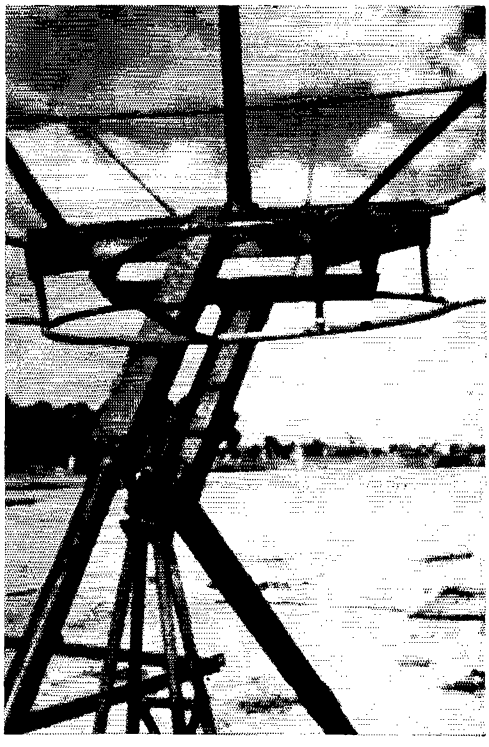
Now about the antenna. To my knowledge, no one has yet been satisfied with the performance of Yagis on an e.m.e. circuit. W6DNG used them but has since changed to an extended expanded collinear which he says is the best of more than 50 e.m.e. antennas he has tried. F8DO has a Yagi array, but doesn't feel it is performing as well as it should. However, short Yagis of 4 or 6 elements may be the answer if you must try them. VE3BZS/VE2 has an array of sixteen, 4-element Yagis and is now doubling that number. He's had some success in hearing his own echoes. K6HCP, using two 26-foot boom Yagis, ran several hours of tests over a period of days with K6MYC with completely negative results. Transmitting at K6HCP and listening at K6MYC produced nothing. The opposite was also tried without success although K6MYC could hear his own echoes.

The antenna at K6MYC is a 160-element collinear which I believe is producing close to the theoretical 24 db. gain. Echoes can be received almost anytime during the moon's 28-day cycle, assuming the Faraday rotation (polarization rotation in the ionosphere) is correct. We will discuss Faraday rotation later as well as the 28-day cycle, which is related to sky temperature (cosmic noise) at various "look" angles. F8DO, VE3BZS/VE2, ZL1TFE, ZL1AZR, WB6DEX, and of course VK3ATN have all heard K6MYC on e.m.e. WB6KAP has an antenna almost identical to K6MYC's and has had equally good results.

The cubical quad looks good since it fits into the low-*Q* class with collinear types. ZL1TFE heard signals with four 5-element quads patterned after those by W1CER and modified by W7FS. Don't rule out expanded quads as they should be quite practical. Size and weight seems to be their chief drawback.

Rhombics, the king of the h.f. antennas, seem to have a place in v.h.f. circles as well. This antenna does not allow much moon time each month, but the gains achieved can be extremely high, at much less cost than most other arrays. VK3ATN uses four rhombics stacked one above the other with six-foot spacing between for his 2-meter e.m.e. antenna. The antenna is 342 feet long per leg and has an apex angle of about 10 degrees. The gain is calculated at 33 db., over perfect ground, but actual gain is probably closer to 27 to 30 db. VK3ATN has been very successful using this antenna and 150 watts input. The LaPort rhombic is being tried and seems to have possibilities. ZL1AZR has a single-layer one and has copied K6MYC and possibly VK3ATN. More layers or a side-by-side configuration may be in order. The antenna is only 70 feet long. The disadvantages of rhombics are immobility and low elevation angles.

All of the antennas thus far discussed have been linearly polarized. Now let's consider some sort of circularly-polarized antenna. First a definition of circular polarization is in order; let us use the helix to simplify the explanation. Since a helix has no linear element, it theoretically radiates equally in all planes and the wave is launched in the direction of the spiral. Depending on whether the helix is wound clockwise or counterclockwise, the antenna would be called right- or left-hand



Shown is the hub assembly of the VK3ATN dish. The declination and hour angle drive motors are yet to be mounted as is a 16-inch diameter bearing.

This is one of the more than 20 steel tubing trusses being used in the 50-foot dish at VK3ATN. The 20-foot long trusses weigh 30 pounds each and are within ⅛-inch tolerance of a parabolic curve.

circularly-polarized respectively. For point-to-point communication using helices, both antennas should be wound the same direction. When listening for one's own echoes, a right-hand signal radiated at the moon will return left-hand. This means that to hear your own echoes the direction of circularity must be switched. Circular polarization can also be achieved with properly phased crossed dipoles orthagonally mounted.

WB6DEX currently uses nine 20-element crossed Yagis, but runs only the horizontal 90 elements when testing with another station using horizontal polarization. Otherwise he would lose about 3 db. by putting half of his power into the vertical elements. However, if both stations used 180 elements circularly-polarized arrays, 3 db. would be gain on both ends -- obviously very worthwhile.

Also the problem of long term fading due to Faraday rotation would be eliminated. This polarization mismatch can cost as much as 20 db. when using linear-polarized antennas. Helix antennas have not yet been successfully used for a two-way amateur e.m.e. contact as far as I know, but maybe W8JK's helix will intrigue some of you who need a new challenge. (See W1CER's article on page 20, November, 1965 *QST*.)

Certainly one antenna that should not be overlooked is the parabolic reflector, be it circular or cylindrical. However, dishes of a useful size at 144 Mc. are impractical for the average amateur, but at 432 and higher the picture brightens. (K2UYH described a homebuilt dish in the August, 1966 *CQ*.)

To summarize on antennas, my personal experience tells me circularly-polarized antennas for 432 and above, if at all possible, and below 432 shoot for maximum gain in a low-*Q*, linear polarized array.

Now let's look at a smaller but still important component in the e.m.e. station, the preamp. It may not be entirely necessary if your converter has a noise figure of 3 db. or less, but if located near the antenna the preamp can reduce feedline losses on receiving and possibly lower the system noise figure a bit. The noise figure to aim for at 2 meters is 2 db. You can try for less, but don't expect a noticeable increase in sensitivity, because the lowest sky temperature encountered at 144 Mc. is about 1.9 db. At 432 and above cosmic noise is less and very low-noise devices become more useful. It is doubtful that your system will be cosmic-noise limited. On 144 and 432 transistors appear to be the way to go, and more specifically, FETs or the steadily improving MOS dual-gate FET. Many types and brands are available for under $2. Many good preamp circuits have been published, but most lack protection for the transistor. A pair of diodes, typically 1N100s, back-to-back at the input to ground will save much grief. If you insist on using regular bipolar transistors, be sure to build a good stripline filter to help eliminate overloading of the transistor by strong local stations in the broadcast band and higher. Normally a filter is not needed ahead of a FET.

Little need be said about the balance of the converter except that crossmodulation (overload) of the mixer stage can sometimes be a problem. The use of FETs as mixers is a current solution. Recently RCA began marketing a dual-gate MOS FET pair that look ideal for converters, a 3N140 front end and a 3N141 mixer. Both are under $2 and may be the best yet for 144 and 220.

Next month we'll look at methods used during e.m.e. tests and pass along some time-saving hints. Also a thorough examination of the problems encountered is in order, as is a discussion of antenna mounts and drive mechanisms. In the meantime, you should read W6UGL's article, "The Moonbounce Problem, 28 Mc. and up," on page 20, September, 1963, *QST*.

Roanoke V.h.f. Convention

The Roanoke Division ARRL Convention, uniquely all v.h.f., held in Duncan, South Carolina, was successful with some 250 in attendance. The convention was sponsored by the Greenville V.h.f. Society and featured talks by W4HJZ, VK3QV, W3GKP, W1HDQ, members of the East Coast V.h.f. Society and ARRL Roanoke Division Director W4KFC.

Convention Chairman Rick Cruickshank, WA4LTS, says plans are to make the convention an annual affair. Additional plans are being formulated on the east coast for a two-day v.h.f. convention in late March or early April, but more on that later.

Congratulations to the Greenville V.h.f. Society for a difficult job well done!

OVS and Operating News

50 Mc. conditions continue to be good through the medium of *Es*, but DXers are disappointed in the lack of F_2. The period of October 8–10 was widely reported as being excellent for *Es* with just a taste of aurora being added on the 9th for stations in the more northern latitudes. WA1DPX, Massachusetts,

During the November Roanoke Division V.h.f. Convention discussions such as this one on space communications were popular. Seated left to right are K4QIF, K2LME, KØGJX and W4HJZ.

David Rankin, VK3QV, Melbourne, Australia, (hand on map) was one of those attending the Roanoke Convention. Seated next to VK3QV is WA4YKN; standing are WN4FUV, W4NUS and W4VHH.

worked 9s and 4s via *Es* on the 8th, and then the next evening worked 1s, 2s, 3s and 8s on aurora. W8CVQ, Michigan, also reported the same aurora. K4FKO, at Oak Ridge, Tennessee, heard or worked stations in all call areas except the 7th via Es on the 8th when stations as near as 300 miles distance were heard. Several CQs on 2 meters produced nothing. At the same time, K7ICW, in Las Vegas, was working K4AXV, South Carolina, on double-hop *Es*. K4AXV was the only double-hop station heard at K7ICW, but numerous single-hop stations were observed during the period. Other *Es* reports were received from WA9FIH, Illinois; K4WHW, and K4EAO, Alabama and WA4FJO in Florida.

Ionospheric scatter is being well exploited. K7ICW reports frequent contacts with WØJXK/7 in Idaho over a 700 mile path; K7MWC, Washington, 1050 miles; K6RIL, WB6NMT, 300 to 450 miles; W5SFW, Texas, 900 miles, and others. The new and increasingly popular s.s.b. transceivers are responsible for many an introduction to 50-Mc. scatter, although some operators fail to recognize the phenomena.

The m.u.f. peak seems to be hovering around 44 Mc. according to K7ICW and K6EDX, K7ICW has heard Japanese and Philippine commercial stations in the 40 to 42-Mc. range and numerous South Americans between 30 and 40 Mc. He comments that WAØIQN's suggestion that the current sunspot cycle peaked in October may have been correct. K6EDX offers, "this fall will probably go down as the time when more 50-Mc. men listened to more noise but heard fewer *F2* signals than ever before." He has spent many hours since mid-August observing the 30 to 50 Mc. spectrum and says the California to Central and South America path has peaked near 42 Mc.; to Asia as high as 44 Mc. but more commonly between 36 and 38 Mc., and to the east coast around 40 Mc.

From the Canal Zone, KZ5TS (K3YGC), reports working Chilean stations CE3BM, CE3QG, CX6BW, and CX9AJ with 10 watts and a 28-Mc. beam. No U.S. stations have been observed.

There have been some isolated reports of South Americans having been worked from the United States on *TE*, but the over-all prospects for 50-Mc. appear grim. Perhaps March will be better.

Don Hilliard, WØEYE, found his mailbox full of inquiries about his beacon transmissions as reported in the November column. The signals, beamed east, are activated between 0200 and 0400 GMT, and 1300 to 1400 GMT daily.

144 Mc. meteor jockeys were disappointed that the November Leonids did not produce the spectacular shower of 1965-66, but contacts were made, and some of the bursts lasted up to one minute or more. Early reports include contacts between WA9DOT, Wisconsin, and K1HTV, Connecticut on s.s.b. and c.w. contacts between K4YYJ, North Carolina, and WØLCN, Minnesota, and VE3BPR, Ontario. K2GUG in New York worked W4WDH, Georgia, and W5GVE/4, Alabama, while VE3EZC, Ontario, was exchanging reports with the Alabaman and WØLER in Minnesota. From Texas, K5WXZ, clicked with W3GKP in Maryland, and W1YTW in Maine worked K4EJQ, Tennessee, K1BKK, Vermont also worked K4EJQ, and WØLFE, Mo. And what is no doubt a "first," wife-husband team WN9UHB and W9VWY in Illinois worked K1HTV on a 77 second burst using s.s.b.! Comments around the circuit included K4IXC's "not very productive" and "nothing doing" from WØEYE. When the shower peaked is not too certain, but all of the reported contacts were made on either the 17th

220- and 420-Mc. STANDINGS

220 Mc.				WA2HQE	8	4	280
W1BU	14	5	600	K2HQL	8	4	250
W1HDQ	12	5	450	W7PUA/2	7	4	500
W1AJR	12	4	480	W2YPM	6	3	300
K1JLX	11	4	615	WA2DTZ	6	3	200
K1UGQ	9	3	400	WA2TOV	5	3	140
				K2GGA	4	4	383
K2CBA	16	7	660				
W2AOC	15	5	530	W3MMV	11	5	410
W2SEU	12	5	450	W3RUE	11	5	470
W2DZA	12	5	410	K3CLK	9	4	—
W2NTY	12	5	300	W3FEY	8	4	296
K2DZM	12	5	400	K3IUV	9	3	310
W2LWI	12	4	400	W3SZD	5	4	300
K2KIB	12	4	300	W3UJG	4	2	350
K2ITQ	11	5	265				
K2ISA	11	4	300	W4HHK	12	4	550
K2ITP	10	5	265	K4QIF	8	4	450
K2AXQ	9	3	240	K4SUM	8	4	402
K2JWT	6	3	244	K4EJQ	6	3	500
K2UUR	6	3	210	W4GJO	6	2	1000
WA2BAH	6	3	200	W4TLV	6	2	500
K2DIG	4	3	140	WA4BYR	6	2	420
K2YCO	3	2	200	W4GOO	6	2	415
				W4RFR	5	2	665
W3ARW	17	8	600	W4TLV	4	2	500
W3FEY	11	5	350				
W3RUE	10	5	480	W5RCI	16	5	725
K3IUV	10	3	310	W5ORH	11	3	700
W3LCC	10	3	300	W5AJG	7	3	1010
W3JYL	8	4	295	W5SWV	7	3	525
W3NG	7	4	350	W5HTZ	5	3	440
W3JZI	4	3	250	W5UKQ	5	2	600
				W5ML	5	1	350
W4TLC	5	1	315				
				W6GDO	2	2	493
W5AJG	3	2	1050	K7ICW	3	2	165
W6GDO	2	2	100	W7JRG	2	2	420
K7ICW	4	2	250				
W7AGO	2	1	160	W8YIO	11	6	560
				W8TYY	9	5	580
K8AXU	11	5	1050	W8IFX	8	5	470
				K8REG	7	4	300
W9OVL	6	3	475	W8FWF	6	4	450
W9JCS	6	2	340	W8JLQ	6	3	275
WØEYE	4	2	175	W8RQL	6	3	270
				K8AXU	5	3	660
VE3BPR	3	3	300				
420 Mc.				K9UIF	13	6	700
W1BU	13	3	390	WA9HUV	12	6	500
W1AJR	12	4	410	W9AAG	12	6	600
W1OOP	11	3	390	K9AAJ	11	5	425
W1UHE	10	4	430	W9BRN	9	5	340
K1JLX	10	4	385	W9JAB	9	4	608
W1HDQ	10	3	250	WA9NKT	9	3	400
W1QWJ	10	3	230	W9OKB	8	4	430
				W9OJI	6	3	330
W2BLV	13	5	460				
K2DZM	10	4	390	WØDRL	10	4	550
W2OTA	10	4	300	WØNXF	5	3	375
K2CBA	9	7	220	WØEYE	5	2	425
W2VCG	9	4	280	WØENC	2	1	400
WB2EGZ	9	4	260	WØPHD	2	1	225
WA2EUS	9	4	220				
K2UUR	9	3	280	VE3BPR	7	4	600
				VE3EZC	6	4	510
K2YCO	8	6	500	VE3AIB	5	4	450
K2ACQ	8	5	525	VE3BQN	5	4	447

The figures after each call refer to states, call area and mileage of best DX.

2- METER STANDINGS

W1J8M	33	8	1398	W5SWV	20	5	960
W1AZK	33	8	1384	W5WAX	18	7	1310
K1HTV	32	8	1252	W5MIL	17	6	700
K1ABR	31	8	1330	W5BEP	16	9	1090
W1AJR	25	7	1130	W5KFU	15	5	1360
K1BKK	25	7	1275	WA5MFZ	12	6	1225
W1HDQ	24	7	1040				
W1MEH	24	6	1000	W6GDO	17	4	1325
W1MMN	22	8	1200	W6WSQ	16	6	1390
K1WHT	22	7	1030	W6NLZ	12	5	2540
K1WHS	19	7	1030	WB6KAP	12	4	1120
K1UGQ	19	6	1250	K6HMS	11	5	1240
K1JIX	18	6	800	W6DNG	9	5	5850
K1MTJ	16	5	1225	K6JYO	9	4	1240
K1OYB	16	5	1225	W6ZL	6	4	1400
				K6HCP	4	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	8	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
WB2PXB	20	7	1025	W8LOF	34	8	1060
W2UTH	20	7	880	K1CRQ/8	32	9	850
K2YCO	20	7	850	W8SVI	31	8	1100
WA2PMW	19	6	1090	W8EHW	31	8	860
K2DNR	18	6	1010	W8BK1	30	8	1240
WA2LTM	17	7	730				
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	34	8	1210
K3OBU	21	7	930	W9YYF	31	8	1050
W3LNA	21	7	720	W9IFA	31	8	1050
K3CFA	21	6	950	W9PBP	29	8	820
K2RTH/3	20	7	1200	W9OJI	27	8	910
W3BDP	19	7	1100				
W3MFT	19	6	600	WØBFB	45	10	1350
				WØDQY	41	9	1300
W4HJQ	39	9	1150	WØNXF	40	10	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
K4IXC	36	8	1423	WØENC	32	7	1250
W4ZXI	34	8	954	WØMOX	27	7	1300
K4EJQ	33	8	1100	WØLER	22	8	1100
W4FJ	33	8	1050	KØEMO	20	7	1125
W4MNT	32	8	1225	WØCUC	20	6	1403
W4CKB	30	8	1300	WØLCN	19	6	1000
K4YYJ	27	8	925				
W4AWS	26	8	1350	KH6UK	2	2	2540
K4QIF	25	7	1100				
K4MHS	24	8	1000	VE1CL	8	5	800
W4VLA	24	8	900	VE3DIR	39	9	1300
WB4HIP	19	7	1119	VE3AIB	29	8	1340
K4SUM	17	6	653	VE3BPR	25	8	1150
				VE3EZC	25	8	1150
W5UGO	42	10	1398	VE3ASO	19	7	850
W5RCI	41	9	1280	VE3AQG	18	8	1300
K5WXZ	35	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				
K5TQP	27	7	1254	VK3ATN	2	2	10417

The figures after each call refer to states, call area and mileage of best DX.

or 18th except for K5WXZ-W3GKP. From observations, the peak was rather broad on the 17th and 18th with K5WXZ pouring good bursts onto the east coast all three days. The reports indicate many strong pings, but little in the way of sustained bursts beyond a few letters.

The Quadrantids shower is due the first week of January and has in the past produced some fairly good results. The period of January 3rd and 4th is especially worth observing.

VE3EZC found sporadic meteors productive on November 30 when he worked WB4NIP, Va., and W5DRH, Okla.

Efforts to interest VP7DD in 144 Mc. were apparently unsuccessful, but FG7XT on Guadaloupe tells W3GKP he is interested in 144. However, the distances involved would probably make a U.S. to Guadaloupe contact difficult. It sounds like another one for the kw. at K4IXC.

W2AZL reports an interesting observation over the New Jersey to Illinois path. W2AZL and W9JZR ran a series of schedules in late October during which the Illinois station heard Carl almost constantly on what sounded to be ionospheric scatter, similar to that observed on 50 Mc. The tests were conducted around sunrise and resulted in an October 29th contact. W2AZL is now running similar tests with KØMRS in Iowa.

Elsewhere around the country, a good tropo opening developed from Maine to Virginia on October 31 and November 1st. The best DX reported was between K4QIF at Portsmouth, Virginia and W1YTW, Kittery, Maine. The tip-off to the session was a stationary front situated along the affected area. This apparently ceased near the Virginia-North Carolina border as K4YYJ at Salisbury observed nothing unusual. W1VTU in Connecticut, with 7 watts input, was able to work WB4HIP, Virginia. Conditions were also good on 432 as we shall see later.

The aurora previously mentioned in the 50-Mc. report was also noted on 144. K8DEO, Ohio, worked KØGJX, South Dakota, and WA8VHG, Michigan, and K3CFA, Pennsylvania, either heard or worked Connecticut, Michigan, Ohio, Illinois and Missouri.

W6DNG has been at it again — e.m.e. that is. He reports working F8DO twice recently for the sixth and seventh times, and his *25th* contact with OH1NL! Good work, Bill, but DX hogs on 144?

K7ICW finds a preamp using the Union Carbide FET UC734, a $1.10 version of the 2N4416, improves the noise figure of his 417A converter by 2 or 3 db.! And friends of W8PT may now find him at Route 4, Box 447A, Pickens, South Carolina 29671, probably signing K4GL.

220, 432 and 1215-Mc. activity is apparently at a low ebb. The east coast tropo opening on October 31 and November 1 was responsible for a number of contacts on 432. Stations in Rhode Island, Massachusetts, New York, New Jersey, Maryland, Delaware, Pennsylvania and Virginia got in on the fun. K4SUM at Alexandria, Virginia worked 8 states during the session with the best DX being W1QXX in Arlington, Massachusetts over a 402-mile path. K1OWM, Ipswich, Mass., says he, W1JBA, W1PYT, W1WNK and K1NLO are building towards 432. W4FJ, Richmond, Virginia, has his 4X150 tripler feeding a 10/10 skeleton slot and is working on a 4CX300 final. And at Liberty Center, Indiana, W9BRN is completing a kw. final. By the way, that 13-element Yagi he was shown working on in November, page 100, checked out at 9 db. WB4DQN is looking for a R-634/MRQ-7 schematic.

WØPFP and KØCQA, both of Ames, Iowa, have an easy way to modify the cathode cavity in the APX-6 and we hope to have the details next month. WØPFP has also acquired an 8-foot dish. At Somerville, N.J., WB2ZQR has an APX-6 and wants schedules. WA9HUV has a 6½-foot dish 45 feet in the air at Elmherst, Illinois. He says he has 20 watts output on 1296.04. QST

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

We'll kick off the new year with word from an old friend. As we've always said, everything happens to our poor pal Grommethead Schultz — everything and anything. Bumped into him downtown last week. As usual lately, a tattered copy of the latest ARRL *License Manual* peeked out from his hip pocket.

"But Grom, we thought you had it sewed up. A month ago you said you were all set for your Extra. 'Nothing to it.' That's what you said, OM. 'Nothing to it.'" He looked forlorn, much more beat than usual. Even his boppin' was out of sync. Over an anchovy pizza he spun one of his saddest tales.

Schultz told us how he tackled the Extra with his usual scientific cunning. Sleep-learning. That's right, snooze study. Rigged himself question-and-answer tapes and bedded down at night with the hi-fi going. Nothing to it. By daybreak Grommethead was an electronic encyclopedia. It was mostly QSB by noon, of course, but FCC has a morning session. Neat!

The night before his exam he turned it up *loud*. So loud he had a rough time dozing off. But he counted sheepskins and that did the trick. Next morning he grabbed an egg, some coffee, his slipstick and confidently headed for the Friendly Candy Company.

Says he sensed something was wrong as soon as he sat down at FCC. Never sent such code in his life, the rockin'est, sockin'est, swingin'est stuff you ever heard. It had the R.I. and half the class jumpin' and stompin' for more. "GO, man!" they shouted. "*Hit* it!" Three YLs in front screamed and swooned. But then came the questions. None of the answers seemed to fit. Like . . .

8. **How does amateur TVI usually affect television reception?** *She's leaving home after living alone for so many years,* wrote in Schultz.

10. **What is the meaning of the time constant in a resistance-capacitance circuit?** *Will you still need me, will you still feed me, when I'm sixty-four,* answered Grommethead.

33. **How should a wave trap be connected to a receiving antenna circuit to attenuate an interfering signal?** *I'm fixing a hole where the rain gets in, and stops my mind from wandering,* Grom scribbled.

58. **What are aurora-reflected v.h.f. signals? If such a signal is heard, what does it sound like?** *Lucy in the sky with diamonds,* he wrote.

78. **Give some proven methods of harmonic reduction in transmitters.** *I get by with the help of my friends, yes with the help of my friends,* explained Schultz.

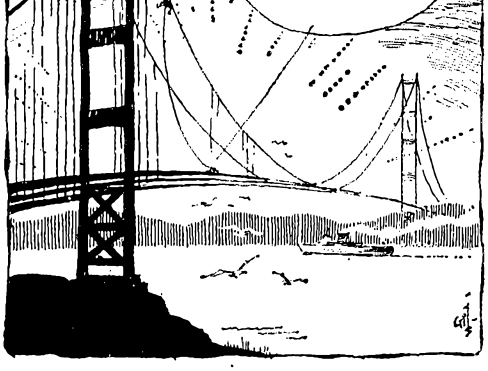
You can see how it went. He didn't make it. Not only did Grommethead flunk; on leaving the place he hopped a chair and hollered *It's certainly a thrill/You're such a lovely audience/We'd like to take you home with us/We'd love to take you home.* The Inspector, a stern duffer with furry eyebrows, chased him down the stairs.

What went wrong? You ought to know Grommethead's nephew Humboldt Schultz to fully appreciate the answer. On that last fateful night Hummy, a real swinger, finally got fed up with the technical tripe on Uncle Grom's stereo. He cut in the Beatles instead.

What:

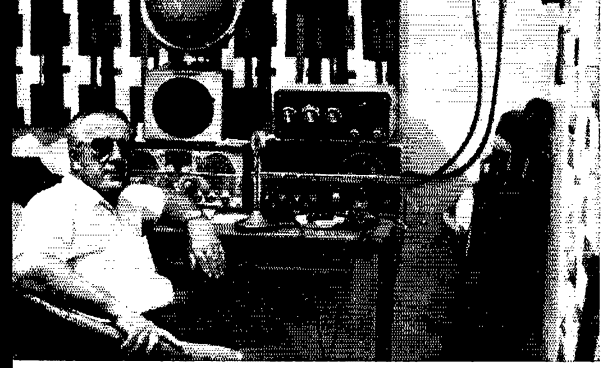
'Sixty-eight should be just great for amateur radio's fast-growing DX camp. The rank-and-file is rediscovering that QRP and simple whips or dipoles can earn rapid DXCC memberships via 21 and 28 Mc. in the present propagational prosperity. Getting *your* share of quick and easy DX booty? . . . Twenty's still *the* band, though, and it's time to tune in the key clique after last month's 14-Mc. phone documentary. . . .

20 c.w. enthusiasts **Ws** 1DAL 2MEL 3HNK 3JZJ/9 4NXD 4YOK 4ZSH 7POU 7VCB 8YGR 0CVZ, **Ks** 3MNJ 4HQK 4EX 4TWJ 4UTI 9UCR 0DEQ 0RHK, **WAs** 1CYT 1DJG 1FHU 2LOR 2WIJ 3GJU 4WWT 5AER 5PUQ 6JDT 7BOA 7BOB 8MCQ 8SLW 9QBM 9SXQ 9THB 0FRM, **WB2RJJ**, **DL4PV** and **I1ER** socialize with **APs** 2AR (14,061 kc.) 1500 GMT, 5HQ (47) 2, **BV2A** (29) 14–16, **CEs** 3CB (70) 0, 3EX 3QP (24) 0, 0AE (41) 14, **CM2s** OM (21) 23, WS, **CN2AQ** (40) 21, **COs** 2KG (65) 21, 2RL 16, 3BU (85) 22, 3CS 6AH 6PP (73) 23, 8AY (49) 23, **CP5AA** (24) 0, **CRs** 6AI (30) 22, 6CH (4) 21, 6CK (43) 22, 6DA 6EI 6FA 7CH (26) 21, 7IZ (63) 5, **CTs** 1IQ 1IT (44), 2BO (21), 3AS 22, **CXs** 1BZ (67)



— Reprinted from Sept. '65 *QST* thanks to WA3FPM.

*7862-B West Lawrence Ave., Chicago, Ill., 60656.



7Q7EC is found near 14,210, 21,300 or 28,600 kc., depending on which band has the best path Statesward. Ewing expects to leave Malawi next month for Oklahoma and W5GIQ.

21-22, 1DZ (47) 23, 2AL 2AM (36) 23, 4UT 22-23, **DMs** 2BOK (39), 2DML (39), 3LGG 4ZJJ (13), 5CL 17, **DU1OR** (36) 12, **EAs 6BH** (49) 1, 8CG 8FF (78) 3, 8HO (25) 0, **EIs** 2BB (2), 8BN (16), **ELs** 2AF (18) 22, 2D (76) 22, 2J (30) 2, 2Z (78) 22, 9C (1), **EP2s** BQ (50) 14, MK (4) 21, **ET3FMA** (45) 17, F9VN/**FC** (8) 23, **FB8s** XX (15) 13, YY (4) 8, ZZ (43) 16, **FG7s** XF (23) 5, XT, **FK8BG** (90) 7, **FM7WO**, **FO8s** BU BV 14, **FP8s** AP (22) 3-4, CT (81) 22-1, **FR7s** ZD (7) 12, ZF (70) 12, ZQ/g (70) 16, **GC3SHZ/p** (21) 20, **GD3AIM** (75) 0, **HAs** ISB 2KRB (25), 2MM (34), 3MB (24), 3MJ (50), 4KYB (50), 5DH (23) 4, 5DI (23), 6KNB 7LC 7PP (30) 2, 8KUC (7), 8UG (30), 8UU (23), 9KOB (40) 5-6, ØKDR (25), ØLL (33), **HBs** 4FD ØAG 23, **HCs** 1ZA 3, 2RT (35) 3, **HIs** 4ARM (1), 8IBC (32), **HKs** 2DP (38), 5ARR (20), 5YC 22, 7AHM **ØAI** (40) 4, **HL9KT** (18) 12-13, **HM1AP**, **HP1s** AC (30) 23, BR (5) 19, **HR4ET** (40) 4-5, **HZs** 1AB 3TYQ (19) 5, **IS1s** PEM (26), SEL 23, **IT1s** AQ (15), AUT GSA (58), PST, **JAs** 1AFA (30) 12, 1DOD (19) 13, 1EVM (13) 12, 8DIO 23, ØCCE ØDJE ØOX, **JT1s** AG (32) 13, AJ (15) 14, KAA (50) 3, **JW5YG** (9) 23, **JX2s** HF (95) 23, XF (65) 21, **KGs** 4CX (21), **6AAY** (21) 6, **6NAA** (60) 12, 6NAC (82) 14, **KL7s** BJM FRX FRY 8, FRZ 2-7, MF, **KM6BI** (10) 7, **KP4s** ABD 22, BAC BBN (65) 22, BCL (79), DAR, **KR6s** AR (17) 22, FQ (15) 23-0, JM, **KS4CF** (40) 5, **KV4s** AA (78) 23, CI (3) 22, EY, **KX6s** DB ER (60) 15, FA (71) 7, **KZ5s** EM (79) 23, FX QA (21), GN (30) 0, SF, **LUs** 1ZA (20) 22, 2ZI (55) 21, **LX2BQ** (88) 0, **LZs** 1BC 1FP 1KAA (25), 1KPG (30), 1KSA (16), 1KSV (21), 1UR (19) 4, 1ZA 4, 2EA (29), 2KSL (70) 21, 2ZX 3, **M1VV** (10), **MP4BFK** (41) 0, **OA4s** KF (15) 23, QN 11, QZ (49) 5-6, **OD5LX** (5) 4, **OH0s** AA (2) 2, NM (26), **OXs** 3BS 3CJ (25) 3, 3MB (33) 23, 3PZ (63) 0, 3LP (2) 1, 3SA (9) 0, 3UD (44) 1, 4AA (12) 1, **OYs** 4RV (30) 11, 5NS (30) 23, 7ML (12) 9, **PI1KM**, **PJs** 2ME (47) 1-2, 2MI (70) 1, 3CJ 11, 3CL (41) 15, **PZ1s** AH (15) 4, AP (78) 22, AX (40) 10, BL (54) 23, **SLs** 6BU (28) 6-7, 7BZ, **ST2SA** (34) 20, **TAs** 1AM (10) 15, 1AV (55) 7, 1IB (80) 23, 1KT (54) 19, 1SK (74) 23, 1VY (2) 20, 2BK (16) 6, 2FM (29) 1, 2OB (38) 23, **TF2WKM** (35), **TGs** 4VH (30) 19-2, 9AC (25), 9EP (108) 6-7, **TI2s** AB (50) 23, NR (13) 5, PAS (1), PZ (23) 23, **TJ1s** AJ (30) 15, QQ (4) 23, **TR8AI** (18) 7, **UAs** 1KAE (45) 11-12 of Antarctica, 1LV/**UAØ** (35) 11-12, 1ZM/mm (23) 5 aboard icebreaker *Lenin*, 2AC (54), 2DL (33), 2DM 4, **2KAH** 2KAQ **9BV** 9DN **9FN** 9FV **9HM** (35) 3, 9JO 9JH (80) 2, 9KEJ 9KQA (35) 1, 9KUK (11), **9KYB** (6) 2-3, 9ND (45) 2, **9NJ 9NS** 9OK 9OO (17) 4, **9PP** 9VB (14), 9WS ØAG (40), **ØCU ØEH** ØEN (80) 12, **ØEQ ØER ØIK** (24) 3, **ØKBA** 23, **ØKAE** ØKAD (30), **ØKFS ØKJA ØKQU ØKYA** (12) 14, **ØKZB** (53) 22, **ØLJ** (5) 12, **ØMT** (5) 19-20, **ØMX ØQP ØRD** (62) 23, **ØSK** (10) 12, **ØSN ØZI** (79) 5, **ØZB ØZU** (66), **U5ARTEK** (14), **UB5s** DV KAS KBA KCG (33), KDS (35), KED (48), KIX ML (35) 4, MN OF WL (5) 3, XY (35), ZO, **UC2s** AA AR BF KBC (58) 5, KMZ OI OZ TA WE (35) 3-4, WJ (52), WP (3), XW (60), **UD6s** AM AS (70) 18, BV (30) 23, BZ (66) 4-5, CE, **UF6s** AM (26) 4-5, BG FN (47), HG HS VN, **UG6s** AB (2) 3, EA (53) 3, KAB (6) 7, WJ (19) 0, **UH8s** AD BK (25) 6, CI (10) 7, DC DH DI (48) 3, KBA (32) 11, KBV (44) 7, **UI8s** AG (60) 4, AK (10) 5, AM (5) 8, AX CM IK (63) 1-2, IZ KAA (97) 7, KAB 3, KAD (2) 14-15, KNA (75) 12, LC (16) 2, LK (40) 3, MU (20) 19, UG (63) 6, **UJ8s** AB (19) 3, AV (30) 5-6, KAA (20) 6, **UL7s** AA (44) 3, BF (50) 6, CG (5) 2, FM (24) 7, GQ GW (14) 0, HV (25) 2-3, JE (32), JJ (50) 1-2, JT KAD (58) 12, KAM (48) 1, KAR (26) 5, KFD 11, KKB (73) 9, LA (9) 4, LJ (68) 4, MC (26), OA (20) 20, RQ (12) 3, WS (53) 7, XG, **UM8s** AP (5) 2, IE KAM (48) 1, **UN1s** AE (28) 4, BR (69) 7, KAM (25) 12, **UO5s** AW (30) 19, DN GN KRU PK (60) 2, UPOL-15 (23) 6 on polar ice, **UP2s** BI (16), CZ (31) 7, DX (26), KBC (32) 3-4, KBA (68), KNP (3) 4, NK (50) 14, NV, **UQ2s** AN (5) 5, GA (45) 4-5, KCR (30), KFG LL, **UR2s** BV (11) 5, KAB KBC, **UT5s** BN BQ EH FI (43), KAJ KKA KSA LF (20), VQ (13), **UVs** 3BC/-Antarctica (36) 4, **9AB** (27) 7, **9CU** (4) 22, 9OV (55) 12, **UWs** 9DB (33) 3, 9GU 9OU (25), 9PT (15) 9, ØBX (40) 3, ØIF (50) 0, ØIG ØIZ (40) 12, ØSU (13) 12, **UZ9ZA**, **VE8s** BE (15) 3, DG MB ME (28) 4, WW, **VKs** 1LN (45) 7, 1VK 8HA (5) 17, 8UK (20) 11-12, 9GN 8, 9RJ (29) 11, 9XI (25) 14, **VPs** 1MV (10) 12, 2AD (50) 12, 2GLE (30) 22, 2AZ (41) 21, 6AM (50) 22, 6PJ (80) 21, 6WD 10, 7ER (29), 7NQ 8JD (75) 23, 8JF (5) 2, 8JG (40) 20-23, 8IY (31) 2, 9BDA 16, 9BY (20) 18, 9CX (47), 9EP (25) 18, 9FF (23), **VQs** 8BJ (12) 11, 8CC (45) 15, 8CG (95) 19, **9B** (31) 22, 9JW (17) 3-4, **VRs** 2DK (27) 10, **2ER** (35) 11, **4CR** (19) 12-13, **VSs** 5LX (50) 22, 6FX 9AJM (50) 3, 9AWA (25) 20, 9MB (46) 11, **VU2s** DIA (60) 11-12, GM (15) 1-2, GW (16) 1, JN (36) 2, LE (10) 1, NQ (19) 2, QM (43) 2, TS (32) 18, XEs 1BL 1DDM 7, 1EK 1H (55), 1KD 1XQ (50) 7, 1ZV (57) 0, 2KF 6, ØYL, **YOs** 3YZ 7DO (54), 8AP 8FZ (22) 3-4, 9AEM (15), **YS2OB** (25) 1, **ZB2s** BE (20) 18-0, F (33) 23, **ZC4s** CI (35) 1, GB, **ZDs 5G** (58) 13-14, 5X (35) 19, 8HAL (35) 1, 8RC (9) 21, **ZEs** 1AE (30) 18, 1BF (17) 5, 5JJ (50) 4, 8JV (32) 14-15, **ZPs** 5JB (69) 23, 5OG (32), 6AW, **ZSs** 3HF (72) 20, 3LU (50) 22, 3T (20) 20, 9M (70) 14, 9Q (10) 15, 3A2CL (48) 16, **4S7s** LB (50) 1-2, NE (31) 2, 4U1ITU (8) 21, 4X4s CJ (27) 5, SW VE WN (33) 3, YY, **5N2AAJ** (59) 4-5, **5R8AM** (30) 4, **6W8s** CQ (32) 1, DQ (7) 0, DW (35) 21, **6Y5s** AR (7) 22, ET JD (31), **7Xs** 2ED (65) 22, 2OK (30) 8, 2PY (29) 3, ØAP (79) 8, **7Z3AB** (60) 21, **9E3USA** (38) 21, **9G1HM** (21) 23, **9H1I** (90) 7, **9J2s** AB (62) 22, MX (5) 5, W 19, **9M8II** (45) 15, **9V1s** LG (51) 15-16, OJ (17) 15, **9X5SA** (16) 4-5, **9Y4s** TR (22) and TW (27) 1. That's a *lot* of beepin'.

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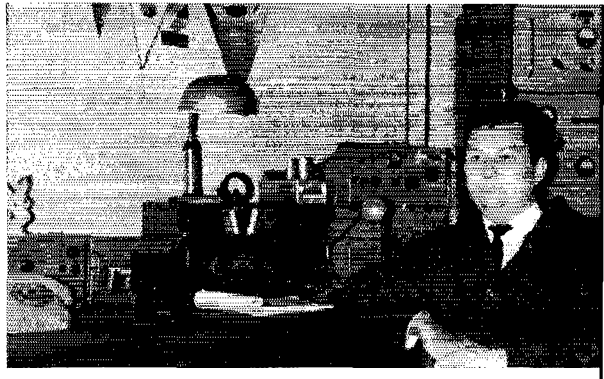
In due course we'll revisit other DX ranges via the logs of (20 phone) **W3HNK**, Ks 4HQD 9UCR, **WAs** 1DJG 6JDT 8MCQ, **WBs** 2RJJ 4EWU, **KP4DBJ**; (15 c.w.) **Ws** 3HNK 3JZJ/9 4YOK 5QGZ 7POU 7VCB 8YGR 9LCG 9LNQ ØCVZ, Ks 3MNJ 4HQK 4IEX 9UCR, **WAs** 1CUN 1CYT 1DJG 1FHU 1GXE 2LOR 4WWT 5AER 5PIF 5PUQ 7GFT 8JRL 8MCQ 8SLW 9MQI 9QBM, **WBs** 2LDX 2RJJ 2ZNZ 4EFE 4EWU, **WNs** 1HHO 1HVL 1ION 2APH 3HRV 4GSS 8VZS 9TIL ØRJY ØRVK ØRVR, **DL4PV**, I1ER; (15 phone) **Ws** 2DY 3HNK 4YOK 4ZSH 6MUR 8YGR 9LNQ, Ks 3MNJ 4TWJ 9CSM ØDEQ, **WAs** 1CYT 1DJG 2LOR 5PIF 5PUQ, **WBs** 2LDX 2RJJ 4EWU, **DL4PV**, **KP4DBJ**, P. Kilroy; (10 c.w.) **Ws** 2MEL 4YOK ØCVZ, K4IEX, **WAs** 1DJG 1FHU 5MIN 8MCQ, **WB2s** RJJ ZNZ; (10 phone) **Ws** 4YOK 6MUR 8YGR, **WAs** 1DJG 1GGN 2LOR 5AER 5MIN 5PUQ 8MCQ 9MQI, **WBs** 2RJJ 4EWU, **DL4PV**; (40 c.w.) **Ws** 3JSJ/9, 4YOK 7VCB 8YGR, K4IEX, **WAs** 1CNU 1FHU 1GGN 8PVN 8MCQ, WN0RJY; (40 phone) K4HQD, **WAØPTC**; (80 c.w.) **Ws** 1SWX 6MUR, **WAs** 1FHU 1GXE 8MCQ, WN1ION; (160 c.w.) W1BB, **WA1FHU** and others to file. Which reminds us that the January 13th-14th week end is reserved for 160-meter transoceanics as described in November's "How's". Good fishin'!

Where:

AFRICA — "There is no point in QSLing direct to VQ9JW," says John's QSL manager G3ONU, "because the Aldabras have no scheduled mail service. S.a.e. (self-addressed envelopes) and IRCs (International Reply Coupons) will receive direct response from my address, others via bureaus." G3ONU was VE3CLV in '64 . . . . . "VQ9TC and I have decided that I will handle QSLs for *all* his contacts," advises W4HUE. Doc will use the bureaus unless s.a.s.e. (self-addressed stamped envelopes) or s.a.e. plus IRCs are supplied . . . . . "I now have all 7Q7GB logs," discloses W5UBW, willing to respond direct if postage is covered . . . . . K4YMJ is attempting to arrange completion of Silent Key ZS9G's QSLing. "I offered Mrs. Baird my assistance because she still receives requests for Dave's cards." . . . . . Those 9I3 calls commemorated Zambia's third independence anniversary. Zambian hams, retaining their regular suffixes, signed that prefix for nine days in late October. Radio Society of Zambia offers an award to the 9I3 who shipped out the most QSLs for this activity . . . . . K6GMA, QSL agent for VS6AZ and ZL3AB, takes on North and South American QSL responsibilities for ZS5PG as of December 1, 1967 . . . . . *DX News-Sheet* hears that W2CTN may still have records for the VQ1GDW operation of CX9AAN. OM Watts also recommends FR7ZD as QSL route for FB8s XX and ZZ, REF for FB8YY, and W4MYE for FB8WW . . . . . LIDXA's organ says ST2SA now can convert IRCs okay, so kindly include same with your QSLs to Sid.

ASIA — "YA1KO will QSL all stations worked and logged," declares W7WDM, QSL aide to Hans. "It will be greatly appreciated if cards are accompanied by at least 8¢ airmail postage as all mailings must go by air." . . . . . K6EBB notifies, "I'm QSL manager for VS9AJM as of September, 1967, but may be able to help confirm earlier QSOs." . . . . . "If contacts send self-addressed stamped



YO2BB's potent homespun 807 hundred-watter is launched by a 100-ft.-high 2-element 3-band quad in Timisoara. George runs a crystal-controlled converter ahead of that BC-342N. (Photo via B. Colapietro)

envelopes I guarantee QSLs," promises K8WXV/KG6, frequent operator of Iwo's KG6IC. "I always try to QSL everybody anyway." . . . . . LIDXA's *DX Bulletin*, acknowledging that AP2AD's QSLing is somewhat behind schedule, has assurance from Ahmed that the job will be completed. AP2AD welcomes IRCs to help defray his postage bill . . . . . "I can give reasonably fast service on VU2GW QSLs," writes K3MNW, Ranga's QSL tender for QSOs dating from June 1, 1967. S.a.s.e., of course.

OCEANIA — "VR4CR appreciates the help of U. S. DXers in covering QSL postage costs," finds WA1DJG. "Despite this assistance QSLing has cost Arthur about a hundred dollars over the past three years." Plenty DX-pensive on the Australian scale . . . . . K1UHY emphasizes that s.a.s.e. is a must for W/Ks, IRCs from others, when seeking his 9M8RS-9V1MS pasteboard services . . . . . W1LVQ and WB4EFE report that K2DQ and WB6TDI have no connection with FO8 and/or VR3 QSL matters.

EUROPE — "Bob of TF2WKE went QRT August 31, 1967, and I hold his logs," informs WA2FJW, requiring the customary s.a.s.e., or s.a.e. plus IRCs. "Since then I've received requests for QSLs to confirm October TF2WKE QSOs. Perhaps the call already has been reassigned." . . . . . "I'm manager for SV0WM as of November 15, 1967," records K9CSM . . . . . SV0WL advises, "W2CTN is managing my QSLs for QSOs after September 24, 1967. I have quite a backlog to dispose of here on Crete, so answers to cards sent direct to me may take a while until I work the pile down." . . . . . "Those desiring my help with SP5AKG QSLs must send s.a.s.e.," says W1RLV. "Mounting expenses make this necessary. Cards received via the bureaus are airmailed to SP5AKG for handling at his end." . . . . . K9BNF claims this same policy in assisting OK1AKO with Stateside QSLing for QSOs after October 20, 1967 . . . . . No outbound mail from Bear Island till May, according to *DX News-Sheet*, referring to multiband voice and code work by JWs 2BH and 5UL.

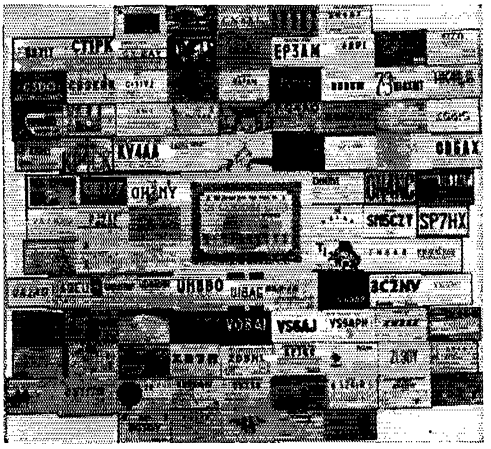
HEREABOUTS — From PJ5s BS and BD (KØs GZN and GZO): "An XYL of our postal clerk who is a ham will take care of our QSLs so that they will not pile up as they did before. We should be able to give good service. Though we mentioned the need for s.a.s.e., forty per cent of all previous QSLers did not enclose them. With thousands of QSOs to confirm we will have to answer non-s.a.s.e. requests via bureaus this time." . . . . . Ontario DX Association's *Long Skip* notes that VE3ACD handles QSLs for AP2MR, FY7YD, I1s PEG PLH, PY4BEX, VPs 1LB 1LL 1LP 2AA 2KD 8JD, 4X4TP; VE3EUU assists PJ2MI, PZ1BW, VP2s AL LA LT ML, 9Y4VP; and VE3DLC helps VPs 2SAG 6LS 8JI, 6Y5CB and 8R1S . . . . . K4HQD finds KG4CX plenty QRL with Guantanamo QSL bureau duties . . . . . Reminder: The *Call Book* now includes a multipage listing of QSL managers as well as a stop-press section for late QTH arrivals, and W6GSV publishes a *QSL Managers Directory* that could net you new ones . . . . . KZ5MF, concluding a Stateside vacation, gets prompt QSL service via WN4DWN in response to

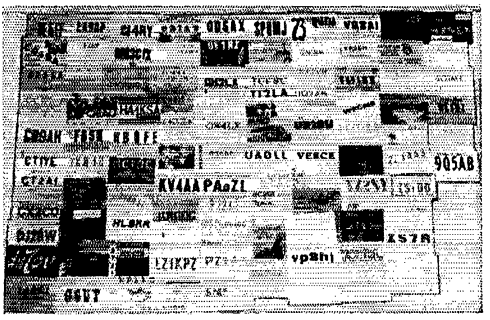
VU2FN was runner-up to VU2KV for India in the '67 ARRL DX Test's voice session. Stan radiates from New Delhi. (Photo via W1YYM)

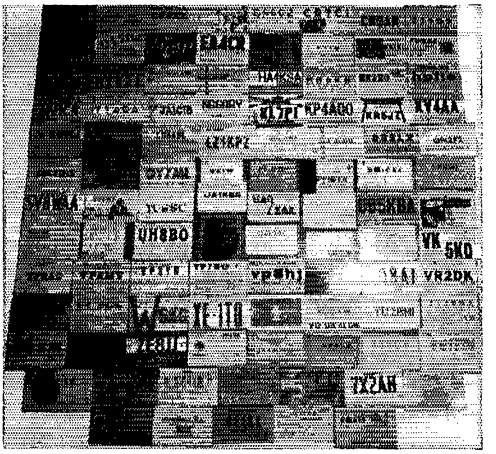
s.a.s.e. . . . . KP4BDJ (W1MBX) accepts QSLs through the Puerto Rico bureau, via his Connecticut home QTH or, quickest, by way of the address in the roster to follow. "I am amazed at the number of contacts who say I'm their first KP4." . . . . . "I have not been QSL manager for stations other than CT3AR, KS6BH, KZ5AY and 3AØDX," declares K6CYG who sometimes is sent cards for other DX points . . . . . W4GZD designates K7UXN as QSL rep for his QSOs from VP5RS (after February '66 only), VP7CC and ZD8CC . . . . . "Anyone still needing my confirmations can obtain them through W9SZR," writes HI8XAL. "All first-time QSOs now have been QSLd, and big packets were shipped to bureaus in September." . . . . . Your "QSLers of the Month" this month turn out to be CEØPC, DL9KRA, EP2MK, FG7XX, FK8AB, GC2FZC, GD3FBS, HBØAG, KG6SA, KL7MF, KV4AM, ON4s BV LV, PX1NV, PZ1CQ, TF2WJN, TG9EP, VKs 3OP 5FM, VP6WD, VQ8s CB/a CBB CBR, YU5DP, ZD3G, ZE2KL, ZL2QM, 5I3KJ and 9H1AG, as well as QSL tenders Ks 6ENX ØTCF, WA9HJM, WN4DWN and JA1AG, all commended for especially snappy service by "How's" contributors Ws 1DAL 1SWX 3DPR 8IBX, Ks 1STW 4HQD ØDEQ, WAs 2HIU 5MIN 6JDT and WN4GSS. Any swifties you'd like to salute herein? . . . . . *'Alpl* The following italicized brethren seek assistance toward confirming QSOs with stations listed: *W2DY*, CR7CM, KR6HP, MP4BBA, 9Q5DL; *W6EUF*, 9M2GH '63; *W7POU*, HC8JU, VPs 2MZ 8GQ 8IE; *K2AGU*, 3V8EU '66; *WB2RJJ*, PY0CZR; *VO2JM*, CR7IZ '64, OX3UD '60, EL6E, HI8RVD, UF6FN, 7X3CT and 9Q5QR, the last five in '65. Any 'alp? . . . . . W8AFN's experience indicates you may have to wait for the cards of EP2BQ, F9UC/FC, OD5LX, VK2BRJ/9, VU2GW and 4Z4AG but they did eventually come through . . . . . VE3BS dubs Ken Holbrook of Maryland S.w.l. of the Month due to an exceedingly thorough and informative report of daylight 160-meter reception . . . . . Don't forget to keep a set of s.a.s.e. on file with your local ARRL Bureau branch. Not a bad New Year's resolution, b'gosh.

SOUTH AMERICA — VE2AGH states, "I'm QSL manager for VP8JN starting with QSOs of November 6, 1967. S.a.s.e., or s.a.e. with two IRCs, will obtain direct reply, other answers to go via bureaus." . . . . . W1WPO of ARRL's DXCC Desk hears that W4EXO has no FY7 QSL arrangements despite spurious indications contrariwise . . . . . As previously mentioned, CX2AM discontinued his QSL service for VP8 stations. *DX News-Sheet* says British hams can reach VP8s DJ HZ IA JB JC JD JI and JM via G3NMH . . . . . WB4EFE finds WB6SSO disclaiming any CEØ QSL arrangements . . . . . Let's inspect the mailbag's current crop of individual QTH specifications while bearing in mind that each recommendation is necessarily neither complete, accurate nor "official." . . .

CT2AN, J. Botelho, Av. de Belem 450, Ponta Delgada, Azores
DU1VM, Box 4082, Manila, P. I.
FB8s WW XX YY ZZ (see preceding text)
FO8BS, H. Coste, P.O. Box 910, Papeete, Tahiti
GB5QM/mm, ARALB, P.O. Box 7493, Long Beach, Calif.
HC1TH, T. Hoke, Box 583, Quito, Ecuador
HK3AQL, C. Santos R., P.O. Box 584, Bogota, Colombia
HS3NT, N. Technical School, Chiengmai, Thailand
ex-KL7FMM, J. Corson (WA1ALT), Westinghouse Rep., 432nd AEMS, Box 25-295, APO, San Francisco, Calif., 96237
KM6BI, Box 43, FPO, San Francisco, Calif., 96614
KP4DBJ, W. Revas (W1MBX), U.S. NavComSta., Box 36, R-48, FPO, New York, N. Y., 09550
KP6AP, Ed DeYoung (K6CAA), 1942-A Iwaho Pl., Honolulu, Hawaii, 96819
KS6BX, P.O. Box 458, Pago Pago, U. S. Samoa
LU2AJL/W3, J. Lentino, M.D., Prince George's Hospital, Cheverly, Md., 20784
OK1AKO (W/Ks via K9BNF; see preceding text)







Ws 1DGJ 5LZG and K9JJR, filing "DXCC" Nos. 50, 51 and 49 respectively, give us a wall-eyed view of who's who in DXland. Golly, who alone has confirmed more "new ones" for the gang than old reliable KV4AA?

PJ2CQ, Box 415, Curacao, Netherlands Antilles
PY0s DX SP, Box 842, Recife, Pernambuco, Brazil (or via LABRE)
SV0WL (via W2CTN; see preceding text)
ex-TF2WKE (via WA2FJW)
TI2AB, A. Bonilla, P.O. Box 386, San Jose, C. R.
TJ1AJ, Box 5209, Doula, Cameroon
TR8AI, P.O. Box 177, Libreville, Gabon
VO2JM, J. Earle, P.O. Box 303, Goose Airport, Labrador, Canada
VP5RS (via K7UXN; see preceding text)
VP8JN (via VE2AGH; see preceding text)
VR1L, Ocean Island, Central Pacific
VS9AJM (via K6EBB; see preceding text)
VU2AJ, B. S. Dutt, Overseas Communications Service, NIC Bldg., Parliament St., New Delhi 1, India
XE0IR (to K7GHZ)
YA1KO, H. Koski, Harza Engineering, Kandahar, Afghanistan, c/o USAID, APO, New York, N. Y., 09668 (or via W7WDM)
YN1GLB, P.O. Box 1849, Managua, Nicaragua
YV5ANE, G. Gallaraga, P.O. Box 1595, Caracas, Venezuela
ZS5PG (via K6GMA; see preceding text)
ex-ZS9G (via K4YMJ; see preceding text)
ZS9O, Box 45, Francistown, Botswana
5V1KG, *Yasme* Foundation, P.O. Box 2025, Castro Valley, Calif.
5V4s AP EG EW, P.O. Box 33, Atakpame, Togo
7Q7EC, E. Canaday (W5GIQ), P.O. Box 16118, Jackson, Miss.
7Q7GB (via W5UBW; see preceding text)
9G1KG, *Yasme* Foundation, P.O. Box 2025, Castro Valley, Calif.
9Y4JR, Box 862, Port of Spain, Trinidad
9Y4PL, Box 1167, Port of Spain, Trinidad

AP2MR (via VE3ACD)
CE3ZN/0 (to CE3ZN)
CE0PC (to WB6GOV)
EL9A (via W8WRP)
FP8DK (to K7GHZ)
FP8DW (to W6AM)
HI8XAL (via W9SZR)
JW2BH (via NRRL)
K4IIF/KV4 (via K4DSN)
ex-KX6BK (to KP6AP)
OF9ZAA (to DJ3KR)
OX3WX (via OZ2BA)
PY0AQB (to PY7AQB)
PZ0AA (via VRAS)
SV0WM (via K9CSM)
TU2BQ (via DJ6LGA)
VK8UG (via VK8TF)
VP2ME (via W3KAU)
VP2VM (via G5FH)
VP6AO (via VE3DLC)
VP7CC (via K7UXN)
VQ9TC (via W4HUE)
VU2GW (via K3MNW)
WB6NMT/KH6 (to WB6NMT)

9I3AB (via W6BAF)
9J2MX (via RSZ)
9L1JJ (to G3HZP)
9M8MS (via K1UHY)
9V1MS (via K1UHY)

These data were received from generous **Ws** 1SWX 1WPO 1YYM 2DY 2MEL 4YOK 7DQM 7POU 7UVR 9ZEN, **Ks** 4HQD 9UCR, **WAs** 1DJG 5PUT, **WBs** 2YJS 4EFE, **KH6**BZF, Columbus Amateur Radio Association *CARAscope* (W8ZCQ), DARC's *DX-MB* (DL3RK), *DX Newssheet* (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), Japan DX Radio Club *Bulletin* (JA1DM), 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), Ontario DX Association *Long Skip* (VE3DLC), Southern California DX Club *Bulletin* (WA6GLD) and VERON's *DXpress* (PA0s FX LOU TO VDV WWP). Y'all do come again.

Whence:

EUROPE — REF invites world-wide participation in the 1968 French Contest to be held (c.w.) from 1400 GMT on the 27th of this month to 2100 the 28th; and (phone) on February 24th-25th, same times. F HB LX ON 9Q5 9U5 and 9X5 stations will work the rest of the world, exchanging the usual RST001, RST002, etc., serials at three points per QSO (no "T" on phone, of course). For final score multiply QSO points by this assortment of band-multipliers: each French department (indicated by two figures after a French call), Belgian province and Swiss canton (indicated by letters after calls), DUF countries (similar to prefix areas such as FC FO8, etc.) and the African prefixes mentioned. Entries go to REF, B.P. 42-01, 75 Paris RP, France, without undue delay . . . . . The 1967 French Contest drew 222 c.w. and 52 phone entries from non-French participants. For our side Ws 4SNU 2MEL 3HQU 2LYO 4HOS 6MSM, WA4LSA, K3RIW/3, Ws 4JUK 2NCG 7BTH and 7YEX finished in that sequence on c.w.; K2JFV and WB2QXX ran one-two as the Stateside phone team. Canada's sole representative was VE1AE, c.w. Country highs on code were posted by CR6DX, CT1OI, DM3VGO, DL1TII, EA2CR, G3ESF, HA1ZII, HB9AGH, HI8XAL, JA1MIN, LA2Q, LZ1BK, OD5LX, OE3AX, OH6VR, OK2QX, OY2H, OZ1LO, PA0WDG, SM5BNX, SP8MJ, UAs 2KAP 3UJ 9AB, UB5HS, UC2WP, UD6AM, UF6BD, UH8BO, UI8AI, UJ8AB, UL7IQ, UP2AN, YO3JW, YU1EXY, ZS5UP and 4U1ITU; on voice by CRs 6DX 7JA, CT1NL, DL1IP, EA3HL, G3HDA, HA4KYB, HB9PG, HI8XAL, I1PHN, JA1CIB, LA5RJ, LX1BW, OD5FB, OH2AA, OK1MP, ON4PL, OZ3SK, PA0EEM, SM5BMN, SP8BFJ, UAs 2KBD 3KBO 9BE, UC2BF, UR2KAG, VK2APK, YU1HQR, 4U1ITU and 9U5BB. *Ouch* — U.S.S.R. participants outfiled W/Ks by the lopsided score of 85 to 14. Can we do better this year? Remember, the French Test can be a shortcut to REF's DPF, DTA and DUF sheepskins. Also check with Diplome Olympique REF, BP 139, 38 Grenoble, France, for details

on a certification acquired through working five stations in Isere Department (No. 38) including one Grenoble station, between December 1, 1967, and February 29, 1968 . . . . . "I'm now custodian of the Worked All GI award," notifies GI6TK, pioneer North Ireland DXer . . . . . K3CUI points out, "Commemorating the 50th anniversary of Russia's revolution, the Soviet Federation of Radio Sport has established the SSSR-50 award which requires working fifty U-stations between November 1, 1967, and December 31, 1968. For operators outside the U.S.S.R. and Europe, these 50 QSOs must include contacts with five union republics, and one each in Moscow and Leningrad. All bands and modes may be used. A certified list of QSOs with the fifty QSLs should be sent to Central Radio Club, Box 88, Moscow." . . . . . RSGB's 1966 21-28-Mc. Telephony Contest saw our boys finishing in this order: Ws 4ORT 3AZD 3HQO 3BYX, K5MDX, WB2MDH, Ws 8QID 4VWU 9LK1 ØMGI 5EQT/5 6YMV, K1YRB/2, W2JKH, WA2SQE, W3CBF, K5PGS/5, WB6MVK and WA9FZR. Reflecting the sunspot splurge, RSGB says response was up 300 per cent from the 1965 affair. Watch out *this* year! . . . . . W2ECO finds OK1KUL hungering for 21-Mc. QSOs with New Jersey counties Cape May, Cumberland, Hunterdon, Mercer, Ocean, Salem, Sussex and Warren . . . . . HYJ and YF visited pleasantly with W8TXT in Ohio . . . . . HBØAG, formerly HB9AG, augments HBØLL's Liechtenstein output on 14 through 28 Mc., code and phone, after a 19-year layoff . . . . . GB5QM/mm, no run-of-the-mill marine mobile, was huge *Queen Mary* en route California retirement. Got your souvenir QSL from Associated Radio Amateurs of Long Beach?

ASIA — "I usually stay around 28,560 kc., 2200-0100 GMT, mostly week ends and some week days," remarks KG6IC (K8WXV). "I'm mostly working phone patches for the boys here who really appreciate it because of the isolated duty. But I do like to help out guys who need Volcano. Only three stations here, and my tour ends in August." . . . . . YA1KO (W7DWY) writes W7WDM, "Ten meters is picking up for the U.S. east coast and 15 is open to Sevenland. My new location isn't as good as the old airport spot due to closer mountains. Kandahar is fascinating, and the whole country is so interesting I'm certainly glad we came." Plenty of W/K/VEs are glad, too, Hans . . . . . "Just arrived in Thailand for a year or so," reports WA1ALT. "I'm very interested in getting on the air." Unfortunately for Jack and other amateurs over there, HS-land keeps itself on the ITU/FCC Ban List . . . . . "VU2GW is on c.w. daily near 14,023 kc., 0100 and 1130 GMT," observes K3MNW. "Ranga is QRV for Statesiders after concluding skeds with W4BGO and myself. I may also be able to help toward QSOs with VU2DIA of the Andamans." . . . . . "VS9AJM, one of the last legal Aden stations, expects to QRT this month," notes K6EBB . . . . . "EP2MK (JA1GXT) has finished his work in Tehran," writes EP2CI (JA1BHD) to W1WPO, "but I will continue active." . . . . . HZs 1AB 3TYQ and 7Z3AB keep Saudi Arabia rollin' on 20 c.w. . . . . WAØSBB samples the DX end as KA9CG . . . . . KAs 2EP 9MF 2SF 2JP 2DO 2IJ 2DJ 2HH and 2DW came through in that order among '67 FEARL Field Day competitors.

AFRICA — "7Q7GB is back in the States for eight months or so," acknowledges W5UBW. "He plans to return to Malawi for a two- or three-year stay." 7Q7EC comes back to W5GIQ next month without plans to return. Meanwhile Ewing can be found on 20 sideband after 1330 GMT during the week, on 10 or 15 meters at 1700-1900 . . . . . "VQ9JW plans to be active from the Aldabras until March," learns G3ONU . . . . . ZD3G (WA6LBP) shut down in late August after nine kiloQSOs and 188/140 countries worked/confirmed . . . . . The Worked Zambia Award is available to W/K/VE/VOs who confirm contacts with ten 9J2s on 7 through 28 Mc. Check with RSZ Awards Manager, Box 332, Kitwe, for the fine points; 9I3s, for example, will count double . . . . . Africa addenda from DXtensive literature of aforementioned clubs and groups: ZD5X still specializes in 40- and 80-meter DX with his homemade 150-watter, AR-88 and 102-ft. wire. Vic worked 150 and 71 countries on those respective bands from 5H3HD. . . . 5N2ABG, a regular on 10, 15 and 20, DXperiments with various skyhooks on 80 this season and is president of NARS. Neighbor 5N2s ABF and ABI, an OM-XYL team, try code and voice on 10 through 20. . . . 9L1JJ (G3HZP) sidewinds on 14 and 28 Mc. with 90 watts and a trap dipole. . . . 3V8BZ hunts Nevada and Wyoming almost daily, 28,585 kc. at 1600 GMT. . . . VQ8CD is a fresh Chagos challenge. . . . Additional crystals should let ST2SA bounce about a bit on 20, 15 and 10 c.w. . . . An FB8-5R8 group hangs out on 14,140-14,180 kc. around 0300-0400 GMT but they usually scram when the party gets rough. . . . 5X5FS, a Uganda veteran, avoids pile-up pressures while concentrating on Ireland skeds with his NCX-5 and fixed 3-el. beam. 5X5JK is reported active on 10 and 15, and G3FGP is at the Kampala embassy. . . . Togo really came out swingin' in October with a multiband barrage by the Colvins as 5V1KG, supported by resident 5V4s AP EG and EW on sideband around 14,155 kc.

HEREABOUTS — The rumble and the roar? They're setting pins for the annual joint meeting of Northern and Southern California DX Clubs due the 27th-28th of this month in Fresno's Del Webb Towne House. Contact W6AQA or WA6EPQ for reservations — sponsoring SCDXC invites *all* DXers to attend — so's not to miss the power-packed program now in preparation . . . . . "An old-time homebrewer needs only two stations," corrects W2MEL. "The one he builds will be the one that works." . . . . . WA1FHU protests that phones south of the border are roughing up too much of the 7-Mc. c.w. slot, also that the 160-meter gang ought to give W1AW's bulletin transmissions a break . . . . . WN1HVL figures 500 QSOs in six months is good on-the-job Novice training . . . . . HH3DL keeps Haiti handy on 14,336 kc. after 2300 GMT week days. "For DX I sometimes move to 14,130 kc. where copy is better for lower power," he writes from Port-au-Prince. "I have daily schedules with W4PGS at 2245-2300 GMT." W1WPO recently received his DXCC application . . . . . VO2JM's peppy 50-watter has a 165/98 worked/confirmed DX record up Goose way . . . . . "We'll be active on Bonaire several months this time," promise PJ5s BC and BD (KØs GZN and GZO), a dynamic OM-XYL DX duo. "Taking along two Swan 350s, one with v.f.o., so we should have lots of fun on 10, 15 and 20, possibly 40 and 75 meters as well." . . . . . W3DPR went back to W8IBX after eleven months and 130 countries on a simple wire . . . . . KP4DBJ (W1MBX) knocks 'em dead with his new SB-200 linear, 2-element beam for 20, and dipole on 15. Willard's on Navy duty . . . . . Man, HI8XAL logged 15,898 different stations in QSOs from December, 1964, to June '67, including 8864 W/Ks and 771 Canadians. Fred expects to be in Thailand come August, hamming status in doubt . . . . . "I'll be signing KP6AP in the ARRL DX Contest next month," warns K6CAA. Ed was KX6BK in '63 . . . . . PY7AQB fired up PYØAQB from an Atol de Rocas lighthouse project in November . . . . . K6CQF slides into NCDXC's *DXer* editorial slot . . . . . Among active VP8s are IE, So. Georgia; JD, So. Orkneys; IY, So. Shetlands; FL HZ IA JB JC JH JM, Falklands; IU JF JG and JI, Antarctica. Their favorite phone haunt seems to be 14,125 kc. or so . . . . . HK3RQ thinks Malpelo is ripe for more propagational probing . . . . . W6AM rang up 330 QSOs as FP8DW in October . . . . . In the *CARAscope* W8ZCQ stresses that DXcessive s.s.b. gain in pile-ups only reduces one's readability and reputation . . . . . JA4BJO galloped off as grand champ in Long Island DX Association's 1966 DX steeplechase with 223 countries. W6PQT, G3ESF, ZL1KG and CX9CO were other continental winners. We'll miss the hearty competition of W6PQT, a late Silent Key. QST

KG6IJ, with K4CFC and KH6GEM pumping, poured forth 522 Bonins & Volcano Islands phone contacts in the 1967 ARRL DX Contest. (Photo via W1YYM)

Feedback

We ought to award fur-lined QSL shoeboxes or something to readers who solved our little picture puzzle in last month's "How's". The captions on pages 83 and 85 are transposed.

—•••—

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.

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

S.A.W.R.C.

THE lexicographers have managed to so efficiently define words in cold blacks and whites that only the basic meaning is present. In most cases, the precise definition in the dictionaries is sufficient, but when we come to words like anniversary and birthday, only those whom the words affect can truly define them. To each of us, these are personal events flavored with memories peculiar to each one celebrating it.

To historians, June might connote Waterloo, D-Day, or the first YL in space. Traditionally, June is the month of graduation, brides, and roses. In the history of YL amateur radio operators, June is the birthday of the South African Women's Radio Club, and June 1967 marked the 15th anniversary of this second oldest YL organization in the amateur ranks.

SAWRC was founded on June 2, 1952. At that time they were the only YL club in the southern hemisphere. The first Organizing Council was made up of Iris Hayes, ZS2AA, president; Muriel Neill, ZS5KG, vice-president; Marie Cormack, ZS6KK, and Diana Green, ZS6GH, were joint secretaries, with Marie the editor of *YL Beam*, the club magazine. These gals held office for the first six months. The organization began with an enrollment of 33 members and more than doubled by the end of 1952. By June 1967, membership total had risen to about 120 YLs with operators in England, Australia, U.S.A., Denmark, and Germany on the roster.

Government of SAWRC affairs is unique in organization planning, for the constitution provides that each of the six divisions will hold office each year in rotation. By this action, responsibility for the welfare and activity of the club is distributed fairly among all the licensed South African women operators.

One of the best ways of holding any group together, whether it is the office gang or a nation wide organization, is through a magazine. *YL Beam* began as an 8 page issue and has increased to 17 or 19 pages, published bimonthly. The Christmas edition runs close to 30 pages. The 1953 Organizing Council appointed Marie Cormac, ZS6KK, as editor. Toni Bauman, ZS6YL, held that office for five years, and the present editor is Diana Green, ZS6GH, with Toni as the designer of the cover. Printed news and correspondence of the world wide membership has made this publication the backbone of the club.

SAWRC was granted affiliation with the South African Radio League, in 1954. The two groups work closely together with the women's group assisting the SARL in all ways. In turn, the League magazine features a "YL of the Month" column, as well as news of the members.

When it comes to contests, SAWRC offers some very tempting awards to licensed YLs who participate in the League contests. Trophies are the Iris Hayes Phone, donated by ZS2AA; Irvine c.w., donated by ZS6GH; 40 Meter Pearl Trophy, given by ZS4NG: Edie Bennett 80 Meter Phone, and a new s.s.b. trophy donated by SAWRC.

Certificates sponsored by this very active group include "Worked all YL," and "Key Keen Klub." The latter is strictly for c.w. gals, and it is a challenge to acquire enough contacts for that third "K." Custodian is Margery Snyman, ZS1RM.

Anniversaries and birthdays are a time when we remember the past, celebrate the present,

VE7BBB. Eva Green, incoming president of the BCARA. A member of ARRL, YLRL, SSB 887, CHC 421, ORP 159, Evas OM is VE7AGC, and her stepson is VE7SV.

*YL Editor *QST*. Please send all news notes to WB6BBO's home address; 1036 East Boston St., Altadena, Calif. 91001.

and look forward to a shining future. The SAWRC has observed its 15th birthday as a club, while the membership celebrated their "Crystal" anniversary. Now, in 1968, these gals of the southern hemisphere, with their global membership, can happily and truthfully say "Age here sweet 16."

1967 YLRL "Howdy Days" Results

Summer is over. We are trying to adjust to autumn, settle into school routine, make sure the fall cleaning is finished and the storm windows ready to go up. We've reviewed the vacation for the skeenteen zillionth time and wonder who was doing what while we were summer lazing. Result? YLRL "Howdy Days," the most relaxed contest in all amateur radio. It gets us in the mood for the big ones to come, and at the same time we renew old contacts and make new ones. September 26, 27, 28, 1967 results were:

Winners:

YLRL — Jan Burgess VE3BII.....197 points.
Non YLRL — Jeanie Hunting, K4RHU..... 74 points.

Logs submitted:

VE3BII	197
VE3EZI	167
WA8ARJ	134
K4RNS	115
W2OWL	82
K8ITF	75
K4RHU	74
WAØPWY	73
WA2GPT	71
WA8ENW	70
K8PXX	70
WA8EKQ	64
K7UBC	62
K9LUI	60
WA9HLW	58
W5LUZ	57
DJ2YL	57
K8TVX	52
K8VCB	47
W7GGV	46
WA9FRS	41
KØEPE	39
WA3AZU	33
K6VFE	30
W4EHW	19
WØJUV	11

Iris Hayes, ZS2AA

South Africa's first licensed YL got her ticket because she wrote a letter. When her children were very small she was unable to leave them alone on the farm, and the enforced stay at home made her an avid SWL. One day, she tuned across 40 meters and heard two OMs chatting. They said that they would welcome a report from anyone listening, and Iris obliged. Her report was acknowledged over the air, and the men went on to suggest that she learn the code and become the first woman in South Africa to hold a station license. That was as much as Iris needed, and the studying began. She learned her code the hard way, with the help of a scout book and then by singing her children to sleep in dots and dashes. Her system was successful despite grave doubts on the part of her OM regarding her sanity. She applied for her license in 1937, and ZS2AA was "born."

ZS2AA, Iris Hayes.

Her first love is amateur radio, but Iris is also deeply interested in gardening, music, and stamp collecting, with first day covers as a specialty. She is very involved in public affairs and was president of the local Red Cross for 22 years. She is also a member of the Board of Directors of the Maderia Home for the Aged.

When the South African women decided to form a radio club, Iris added another "first" to her honors by becoming the first president of SAWRC. She is also sponsor of an award for YL participants in the SARL contests.

Diana Green, ZS6GH

Love of people, plus love of travel, plus love of amateur radio equals ZS6GH, president of SAWRC and current editor of *YL Beam*. Diana, like so many of us, became interested in radio through listening to the operators on the air. Unlike most of us, she learned the code and could copy 8 w.p.m. before

(*Continued on page 148*)

ZS6GH, Diana Green.

Operating News

GEORGE HART, W1NJM, Communications Manager
ELLEN WHITE, W1YYM, Deputy Comms. Mgr.
Administration: LILLIAN M. SALTER, W1ZJE — *DXCC:* ROBERT L. WHITE, W1WPO
Contests: ROBERT HILL, W1ARR — *Training Aids:* GERALD PINARD
Public Service: WILLIAM A. OWEN, W1EEN

Get in the Set. Elsewhere in this issue you will find an announcement of the annual ARRL Simulated Emergency Test, held in October past years, in January this year. In the ARPSC section is also information on NTS participation in this annual activity.

We invite and urge the participation of all active amateurs in the SET. The dates are the weekend of Jan. 27–28. As everybody knows, successful emergency communications are largely a function of the extent of emergency preparedness. The SET is no ordinary emergency drill; it is a time when our facilities are tested under simulated emergency conditions to determine how they would stand up under the *real* thing. Ordinarily, the uninitiated would find the proceedings pretty mysterious.

How then, you might ask, can I participate? Well, largely by *listening*. Emergency nets will be in operation all over the place, especially Saturday and Sunday evenings, but during daylight hours too. Try listening on your local nets; they are listed in the net directory. Perhaps you will hear the net control say that an outlet in your city is needed; if so, your known presence on the net frequency would be welcomed. Otherwise, it is best to learn by listening and stay off the net frequency.

In all your other weekend on-the-air pursuits, it is likewise requested that you keep a wary ear out for SET operation. This is not just another contest; it is not a contest at all. It is a bona fide ARRL-sponsored activity designed to test our public service facilities and to demonstrate to the public that we are aware of and active in our preparations for emergency. NTS nets will be running extraordinary sessions, seldom-heard AREC nets will be active with a vengeance. Give them a break, just as you would in a real emergency. The public will be listening.

Copy W1AW. You might say that W1AW is "Official Bulletin Station No. 1." The latest news about amateur radio affairs appears on W1AW first, addressed to all radio amateurs. New bulletins are prepared each Thursday and mailed out that night to OBS appointees. But W1AW puts the bulletins on the air two to four days before it is received by OBS; the only way to keep up with the rapid movement of affairs these days is to *copy W1AW* and make sure you have the latest (and correct) dope. OBS have been urged to do this, so they will not have

OPERATING EVENTS (Dates in GMT)

ARRL-IARU-SCM-Affiliated Club-Operating Events

January	February	March
4 **Qualifying Run, W6OWP** 6 **LO Time** (League Officials, only). 6-7 **VHF SS** (p. 59 Dec. *QST*). 6-8 Virginia QSO Party (p. 132 Dec. *QST*). Arkansas QSO Party (p. 104, this issue). 11 **Qualifying Run, W1AW** 13-15 **CD Party** (c.w.)* 20-21 VE1 Contest, c.w. (p. 138, this issue). 20-22 **CD Party** (phone)* 26-28 Old Old Timers Club QSO Party (p. 43 Oct. *QST*). 27-28 **Simulated Emergency Test** Arizona QSO Party (p. 130, this issue). French Contest, c.w., (p. 92, this issue). VE1 Contest, phone (p. 138, this issue). * League Officials and Communications Dept. Appointees only.	2 **Qualifying Run, W6OWP** 3 **LO Time** (League Officials, only). 3-4 **DX Test** (phone) 3-18 **Novice Roundup** (p. 64, this issue). 10 **FMT** (p. 97, this issue). 16 **Qualifying Run, W1AW** 17-18 **DX Test** (c.w.) 23-25 QCWA QSO Party (p. 100, this issue). 24-25 YL/OM Contest, phone (p. 92 Dec. *QST*). French Contest, phone (p. 92, this issue).	2 **LO Time** (League Officials, only). 2-3 **DX Test** (phone) 7 **Qualifying Run, W6OWP** 9-10 YL/OM Contest, c.w. (p. 92, Dec. *QST*). 16 **Qualifying Run, W1AW** 16-17 **DX Test**, c.w. 18 W1EIA High Speed Code Test June 22-23 **Field Day**
FULL DX COMPETITION RULES APPEAR P. 60 DEC. *QST*.		

Here's a happy threesome! On the left is **KH6IJ** holding two of the new personalized DX Test plaques attesting to his winning phone and c.w. performance in the 1967 ARRL DX Competition. Joining the presentation ceremony (in the center) is **KH6ETG**, president of the Honolulu Amateur Radio Club (affiliated over 20 years!) and on the right a great big smile from the Hawaii SCM (Asst. Dir., et al)—the personable **KH6BZF**. Full rules for the 1968 event appear in December *QST*, page 60, QRV?

to await the mail before they can start transmitting the new bulletin.

We advise you to do so also. It will prevent the dissemination of a lot of misinformation when something important happens. Oh, we admit that the new bulletin information isn't very often earthshaking, and the new bulletins don't *always* come out right on schedule because important news doesn't always break on Thursdays. Occasionally, W1AW carries news of important happenings in the amateur radio world: new FCC rules, director election data, satellite info, emergency frequency clearances, announcements of various upcoming events.

Headquarters receives many requests from amateurs and others requesting to be put on the mailing list for the weekly "official bulletin." This bulletin is mailed only to OBS appointees and affiliated clubs. It is usually in postcard form, leaves here in the late Thursday mail. It *should* serve primarily as a confirmation copy of what was already received over the air direct from W1AW. Amateurs interested in what's going on would do well to make it a nightly habit to take a listen to W1AW bulletins (see schedule elsewhere on these pages), and ignore the scuttlebutt on the air. — *W1NJM*.

RESULTS, SEPTEMBER FREQUENCY MEASURING TEST

The September 9, 1967 FMT, open to all amateurs, brought entries from 189 participants who made a total of 800 measurements. Of these 57 ARRL Official Observers submitted 279, and 132 Non-OOs made 521 readings. All taking part have received individual reports of their readings. The standings accredited to the more precise in each group appear below; all listed show ability of the highest order in Frequency Measurement.

Following is a report of the standings of the FMT leaders in this test. In consideration of the minimum possible error, due to 'doppler' and unavoidable factors, we accredit as of equal merit all reports where computations show 4/10ths parts per million or high accuracy. Our direct comparisons with the umpire's readings otherwise establish this order of listing.

Observers	*Parts/ Million*	*Non-Observers*	*Parts/ Million*
W2AIQ W4JUI W5FMO W6GDO W6GQA	(0 to .4)	W1PLJ K3LPP W3PYW W4VWS WA6ZOY W8LZY WA9GOP	(0 to .4)
W3BFF	.6	R. Ireland	.5
W3MVB	.6	WA2ANU	.8
W4CMP	.7	W5UJF	1.0
W3TMZ	.7	W5PQY	1.2
W6CBX	.8	W4CTT	1.3
W4NTO	1.6	WAØDKA	1.4
W3RDZ	2.0	W3PT	1.7
VE6HM	2.6	K6MZN	2.9
K4HDX	3.1		
WA9ITB	6.0		

FREQUENCY MEASURING TEST FEBRUARY 10 (GMT)

ARRL invites every amateur to try his hand at frequency measuring when W1AW transmits signals for this purpose starting at 0230 GMT, Feb. 10. *CAUTION:* Note that since the date is given in Greenwich Mean Time, the early run of the frequency measuring test actually falls on the evening previous to the date given. *Example:* In converting 0230 GMT Feb. 10 becomes 2130 EST Feb. 9. The signals will consist of dashes interspersed with station identification. These will follow a general message sent to help listeners to locate the signals before the measurement transmission starts. The approximate frequencies used will be 3506, 7027 and 14,067 kc. About 4½ minutes will be allowed for measuring each frequency, with long dashes for measurement starting about 0236. It is suggested that frequencies be measured *in the order listed*. Transmission will be found within 5 or 10 kc. of the suggested frequencies.

At 0530 GMT, February 10, W1AW will transmit a second series of signals for the Frequency Measuring Test. Approximate frequencies will be 3551, 7100 and 14,171 kc.

Individual reports on results will be sent to all amateurs who take part and submit entries. When the average accuracy reported shows error of less than 71.43 parts per million, or falls between 71.43 and 357.15 parts per million, participants will become eligible for appointments by SCMs as Class I or Class II OOs respectively.

This ARRL Frequency Measuring Test will be used to aid qualification of ARRL members as Class I and Class II observers. Present observers not demonstrating the requisite average accuracy will be reclassified appropriately until they demonstrate the above-stated minimum required accuracy. Class I and Class II OOs must participate in at least two FMTs each year to hold appointments. SCMs (see listing, page 6) invite applications for Class III and IV observer posts, good receiving equipment being the main requirement. All observers must make use of cooperative notices, reporting activity monthly through SCMs, to warrant continued holding of appointment.

Any amateur may submit measurements on one or all frequencies listed above. No entry consisting of a single measurement will be eligible for *QST* listing of top results. Listing will be based on over-all *average* accuracy, as compared with readings made by a professional lab.

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 Jan. 11 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 Jan. 4 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 Jan. 11 becomes 2130 EST Jan. 10.

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

DX CENTURY CLUB AWARDS

From October 1, through October 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

DL6EZA....221
W5CLZ....220
WA8HFN...200
JA1FDU....199
UT5HP....184
WA4LSK....181
W4GRG....180
SM5BGM...177
K5QHS....172
W6BPO....161
WA6SOV...153
W3CES....147
W4RJC....145
WA0ELM...143
9H1AG....137
UL7CG....125
W1LZI....122
W1NIY....121
W4GRN....121
W7POU....121
UP2UK....120
XE1KD....120
ZD8WZ....119
UL7KBK...115
W9YVM....113
W2GRD....112
KG6AOX...110
G3HC.....109
UP5BZ....109
WB2ZKJ...109
DM2CGH...108
WA8DCH...108
DM2AQL...107
HA6NC....107
UA1BT....106
LA8SJ....105
W9MIJ/1...105
CE6EF....104
CR6GS....104
K1NKZ....104
K3FTH....104
UA3HIV....104
UA6GD....104
HA4KYB...103
HC1TH....103
UA4QP....103
WB6AIVK..103
DL9JL....102
K8ILK....102
VE6UV....102
W2QIP....102
W5QBV....102
W9AEM....102
WA9OVU...102
HA2NU....101
K1STW....101
VE5JU....101
WB2NSG...101
W5TXN....101
WA8THV...101
DJ4JT....100
F9DH.....100
G3UQR....100
K1BOM....100
K1YXK....100
K5SUS....100
KØJHE....100
UA9FM....100
WA2AHG...100
WA2HGL...100
WA6ZQU...100
WB6IFA...100
WB6NHF...100
WB6TWG...100
W7LRV....100
WA7EVO...100

Radiotelephone

DL6EZA....207
W1JMT....206
WA8HFN...200
K5QHS....151
W2IHH....135
SM5BGM...131
WA0ELM...125
DJ7CX....124
WA6SOV...123
HA5DU....122
W5CLZ....121
W3MDJ....119
WA8OSE...119
VK9BS....115
W4ZNI....110
W4GRN....108
ZD8WZ....108
K1NKZ....104
K4MAM....104
K4PUZ....104
VE4BJ....104
WA9IWN...104
WB2ZKJ...103
WA8DCH...103
HAT.....102
G3RBB....101
K2CPR....101
WB6MVK...101
F5AN.....100
G3UQR....100
K4JXZ....100
KR6KQ....100
WB2NSG...100
WB6TWG...100
W7LRV....100
W9HQF....100

Endorsements

Endorsements issued for confirmations submitted from October 1, 1967 thru October 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.

330
W3EVW

320
DL3BK
K9ECE
W4BBR
W6MVL
W9RCJ
WØTJ

310
W1WDD
W3PN
W5IYU
ZS6LW

300
F9MS

HB9JG
VK2JZ
WØAUB

280
F3AT
K6SOK
WB2CKS
WB2FMK
W4IKL
W4NO
WA4WIP
W6BCT
W9QQN

260
DJ7CX
K2KBI

K3UZY
K4ZCP
K5LIL
ON4QJ
SM6AEK
W4ZXI

240
K6ALH
LA1K
VE2BCT
W3PVZ
W4ID
WA4LXX
W6NUU
W7UVR
WA8LSO
WØGNX

220
VE7EH
W1JMT
W1YRC
W6KNH
W7AZG
WA9NUQ
YU1BCD

200
DL7DE
F8TM
IT1AQ
K2LGJ
K8DBW
K9RNQ
LA9HC
OH1VA

SM6CKS
SP6RT
W2HDW
W4DII
W4FPW
WA8HFN
WA9IVL

180
K7CAD
K9GSV
LA9HC
OE3SJW
OZ4FF
VE4DB
WB2KTO
W4USQ
W7NNF

WØHNA

160
DJ5JK
HA5FE
JA3BG
K1EUW
W1EJE
WA1DJG
W2JKH
WA6AUD
WB6MLG
WA9JDT
WAØHVR

140
CE6EZ
DJ6LD
K1EIN

K1QZV
K9JLJ
UW3CX
VO1HH
WA2COF
WA2JWV
WA2LOR
WB2YQH
WB2PWU
W3IWS
WA3BHY
W6GEB
W7PSO
WA8QXC
WA9NHQ

120
DL7MQ

K4KSB
K6BAG
K7STK
K7TCL
K8CBK
WK8GQG
K9JPJ
UP2UK
VE3ACU
WA2OIL
WA4HTR
W6QFU
W6ZGZ
WA9GXL
WØCQC
WØEXS
WAØIBJ

Radiotelephone

320
GI3IVJ

310
K9LUI
W5IYU
WØBMQ
ZS6LW

300
WA5EFL
WØTJ

280
JA1DM
W3YZI
W8IJZ
W9JT

260
K3UZY
K4CAH
K6EIV
K6SOK
W2QKJ

WA4WIP

240
K5DFZ
OZ3SK

220
DL1PM
VE3CTX
VE3MR
W1SEB
W6KNH
WA8HFN
XW8AX

VE3RE
WB2NIC
W3PN

200
K9RNQ
K9GZN
OE3SAA
SM5VS
W2EYB
WA4MUB
W5OBS

ZS4OI

180
DL7DE

160
VE3BLD
W1MZB
WA2CGD
W4BHG
WA6AUD
W7UVR
ZL1AAS

140
CE6EZ
DJ3CN

DJ4VZ
K4SDW
VE3CUS
VE4XN
W2QDY
WA2COF
WB2PWU
W3CES
W3LNE
WA3BHY
W6PTS
ZF1GC

120
K1QMV
K7TCL
KH6FQB
VE5FO
WB2KTO
WB2VZM
W4MLF
WA4HTR
WA4WHP
WB6UJO
WØYZQ

practice purposes, the order of words in each line may be reversed during the 5 through 13 w.p.m. texts. 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 November *QST*.

Jan. 3: *It seems to Us*, p. 9
Jan. 9: *An "Obsolete" 50-Mc. Mobile Receiver*,* p. 11
Jan. 16: *Break-in C.W. With S.S.B. Equipment*,* p. 20
Jan. 19: *A Simple and Inexpensive Approach to Building Quads*, p. 42
Jan. 25: *Amateur Radio Public Service Corps*,* p. 72
Date Subject of Practice Text from *Understanding Amateur Radio*, First Edition
Jan. 26: *Harmonic Output*, p. 79
Jan. 29: *The Voice Band*, p. 80

*Speeds will be sent in reverse order, highest speed first.

OCTOBER CD PARTIES

"Lots of sections, lots of fun" was the way W3EIS put it, and that about sums up one of the most prolific CD affairs on record. No less than 12 c.w. hotshots cracked the 200K barrier, with old Party hands W1BGD/2 and K2EIU/5 finishing just a couple of gasps apart and K1LPL close behind — and it was the same three, in the same order, landing win-place-show in the A3 (or should that be A3a?) fracas! Not content with setting a new high-score mark on c.w., Pete went right out and did likewise on phone, becoming only the second CDer to cop 100 grand via that mode. The other member of the 100K club, K2EIU/5, tied BGD in number of exchanges but fell five sections short of tying for the brass ring.

A highlight this time was the appearance of W3PZW/-VE8, who delighted the gang with an ultra-rare CD multiplier. (But where's your log, Dick?) Note also the frantic c.w. battle between WNY rivals K2KTK and K2KIR, and another tremendous effort by the crew at W6RW.

The following are high *claimed* scores, total QSOs, sections, and hours of operation. Final adjusted results will appear in the January *CD Bulletin*. — *W1AW*

C.W.

W1BGD/2	295,560-814-72-20
K2EIU/5	293,760-809-72-20
K1LPL	282,450-800-70-20
K2KTK	273,350-774-70-20
K2KIR	272,995-762-71-19
K4PUZ	248,200-726-68-18
W1EOB	233,945-652-71-18
W9RQM	233,580-680-68-16
K4BAI	226,125-668-67-20
W8SH (K1ZND, opr.)	223,080-669-66-20
W4DVT	212,450-600-70-18
W1MX (K4BVD, opr.)	203,450-619-65-20
WB2RKK	181,350-551-65-19
W2SE1	177,480-515-68-19
3C7BDJ/4	177,140-514-68-20
K4RIN	173,195-513-67-17
W6NKR	171,020-496-68-18
WA2UWA	165,660-502-66-15
WB4AIN/4	161,040-483-66-16
W5DTR	152,425-463-65-17
W9NPC	150,720-465-64-18
W4YE	140,075-424-65-10
W2MTA	138,900-456-60-17
W0INH	136,300-418-64- 8
K3HKK (K3AHT, opr.)	135,780-431-62-14
WB2UFV	132,060-420-62-16
W4LK	132,000-400-66-16
W3EIS	126,750-384-65-11
W1EEN	120,600-396-60-16
WB2NZU	119,180-400-59-14
WA7DMA	118,730-379-62-19
W2FEB	117,180-368-63-17
W5BUK	116,870-377-62-14
K8HKM	114,985-374-61-20
W7CAL	114,975-358-63-10
K1HHN	111,925-401-55-19
W4SQE	111,600-355-62-15
W8FAW/0	109,305-341-63- 5
W2KAT/3	104,400-342-60-16
K0AZJ	103,395-335-61- 7
WB2FAJ	103,240-350-58- 9
WB4GTS	102,920-325-62-13
W3EEB	102,860-343-59-14
W6BVB	102,400-313-64-14
K3HNP	102,365-342-59- -
WA3BLE	102,315-354-57-10
W9YT (K9ZMS, opr.)	102,080-312-64- 3
W6RW (W6s DGH DQX, WB6OLD)	350,385-987-71-20
WA8CFJ (WA8s CFJ KUW)	157,170-500-62-16

PHONE

W1BGD/2	120,960-371-64-15
K2EIU/5	111,510-371-59-20
K1LPL	84,425-300-55-14
K2QDT	74,205-287-51-13
W1FJJ	69,390-251-54- 9
W8FAW/0	58,250-227-50- 6
K9LBQ/9	56,680-211-52- 5
W9NPC	56,160-210-52-16
W9RQM	54,600-203-52- 9
K4PUZ	53,520-219-48-10
K8HKB	49,440-200-48- 9
WA2UWA	48,000-200-48- 8
W9EGQ	47,750-184-50- 9
K1HHN	47,520-210-44-18
W6DGH	46,060-181-49- 9
WA8UPI	39,790-170-46-11
W2CRS	38,250-170-45-16
WB2RKK	36,490-171-41-15
K4TTN	33,750-150-45-13
3C7BDJ/4	32,560-141-44-12
W3HNK	31,080-143-42-11
K3HKK (K3AHT, opr.)	30,530-135-43- 7
WA4KWC	27,300-140-39-11
WA5IIS	26,450-109-46- 5
K2AGZ	24,480-129-36- 7
W6YRA (WB6QMF, opr.)	23,600-113-40-12
WB2UFV	22,050-120-35 - 8
K8HLR (multiopr.)	33,400-160-40- 4

W1AW SCHEDULE, JANUARY 1968

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 January 1, 1968.

*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.

At the combined Pacific-Southwestern Division Convention in Los Angeles last September, this group of ARRL officials lined up for a photo after the ARPSC meeting. Each one holds an ARRL leadership appointment or office. Left to right are WB6JFO, WA6BRG, K7JHA, W6VNQ, K7NHL, W6HC, WB6BBO, W7DZX, W6BHG, W6LRU, K6QPH, W6WRJ, K6UMV, WA6ROF and WA6KZI.

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for October Traffic:

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
K6BPI	5666	1766	1577	189	9198
K5TEY	17	1139	761	11	1928
W5OBD	25	918	916	2	1861
W6RSY	37	914	766	122	1839
K0ONK	155	822	789	17	1783
W7BA	3	697	625	67	1392
WA4SCK	43	537	493	9	1082
W6GYH	176	457	424	10	1067
WA7DXI	46	529	407	42	1024
WB6BBO	66	438	390	2	896
K5BNH	31	436	241	121	829
K6IBI	23	387	358	29	797
K9IVG	9	440	331	7	787
W0DQN	25	377	375	2	779
W0LGG	12	401	337	12	762
WB6GGL	3	358	330	28	719
K2KQC	0	326	326	0	652
W0IES	0	321	320	1	642
WB2NKN	10	310	290	20	630
W3EML	37	340	244	3	824
W7ZIW	18	310	288	7	623
WA1EEJ	62	295	251	11	619
W0LCX	38	272	264	8	582
W3VR	97	241	216	14	568
WB2RKK	18	267	260	22	567
W7HMA	54	243	241	2	540
WA0DOU	8	263	263	0	534
W6EOT	1	263	262	1	527
WA2IGQ	23	248	230	18	519
W4ILE	53	227	156	68	504
Late Report:					
K5BNH (Sept.)	41	473	317	81	912

More-Than-One-Operator-Stations

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
K4BV	637	0	0	0	637

BPL for 100 or more *originations-plus deliveries*

K7NQX 258	WA6BYZ 130	W3TN 116
WA0OCW 241	WA8AUZ 128	WA8COA 111
K0ZSQ 208	WA2TBS 127	W2OE 110
WB4HKP 161	K7CTP 122	WA4VEK 110
K0AKK 144	W8IV 122	WA8FSX 104
WB6TYZ 138	WA6KZI 119	WB4FDT 103
WA8MCQ 136	W5SRW 118	W6MLF 102
WA9CCP 132	WA1FVH 117	

More-Than-One-Operator-Stations

W0ZLN 145	Late report:
K4CG 114	K4CG (Sept.) 135

BPL medallions (see Aug. 1954, p. 64) have been awarded to the following amateurs since last month's listing: WA1FVH, W2SEI, WA5NYY, K6IBI, W9EET.

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.

Contest Brief

Following the disqualification of the June VHF QSO Party entry of WA9JFM, the Wisconsin winner (taking the certificate award) becomes WA9HNJ of Appleton. Leo's winning total represents a 6-meter-only-operation netting 102 exchanges in 31 sections for 3162 points.

To our chagrin we note a call error in the Md.-D.C. DX Test scores (p. 59, Oct. 1967 *QST*). That nifty 857-K sum belongs to none other than W3EKN.

Strays

1968 QCWA QSO Party

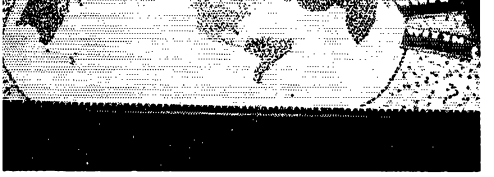
Starts: 2200 GMT Friday February 23, 1968. *Ends:* 2200 GMT Sunday, February 25, 1968. This year's party is being sponsored by the Washington Chapter of QCWA. Only members are eligible for the QCWA certificate and plaque donated by the National Headquarters, and only contacts with other members will count toward this award.

Overseas members can be contacted. This year, to add interest, a simple point scoring system will be incorporated. Count one point for each QCWA member worked. (Repeats on other bands or modes do not count, nor do non-members.) Multiply the points by the sum of the states, Canadian provinces and countries other than the U. S. and Canada in which a member was worked, for the final score.

Your log should show in this order: Date/Time in GMT, Station worked, contact number sent and received, RST/RS reports, Band, QTH, Name, and QCWA number.

Activity will be found near the following frequencies: *cw:* 7025, 14025, 21025, 28025 kc. *Phone:* (a.m. and s.s.b.) 3810, 3950, 7210, 14210, 21310, 28510 kc. *RTTY:* 7105, 21140 kc.

Mail your log by March 20, 1968 to Donald McClenon, W3EIS, 11310 Cedar Lane, Beltsville, Maryland 20705.



Those long New England evenings, while W1WPO chased rare ones last winter, presented other opportunities for XYL W1YYM to "DX." For instance, this coffee table was tiled in various shades of pebble tile, to conform with the projection of the ARRL map (which hangs in the shack!). This is a useful as well as entertaining and educational addition to any ham's living room. The major continents of Australia and Africa are done in black, South America in a deep green, the North American continent in brown and the major land areas of Asia in pink or yellow. No fair counting those islands to see if they're all there! *(photo by W1BGD)*

How Much Better is Best?

BY W. NIGHMAN,* W4ZSH

In any competitive endeavor some individuals win, some lose. The margin of victory is usually not appreciated, nor are many of us aware just how far back in the pack the bulk of the contestants are. An intuitive respect is awarded to those legendary figures who have a history of winning year after year.

In the field of contest activity, I examined the results of the ARRL DX test scores in the c.w. portion. Many sections do not have enough entries on which to base conclusions. I chose the Eastern Pennsylvania region because it boasts many entries, and I know some of the DXers personally. Let's see how they rated in Fig. 1.

In the years 1957 through 1966, the second place winner averaged only 73.2% as many points as the high scorer! Poor competition? No indeed, because he posted a score 131% *higher* than the number three man. The number four man was no slouch either, although his score averaged only 44.8% of the winning one. Contestants five through ten constitute the "pack" with closely matched scores. The rest are pretty far back. Number 15 averages 12.2% of the winner's score. Should we feel sorry for him? Hardly. Although his percentage of the winning score doesn't look too impressive, he is a top-notch operator — about halfway up the list of contestants — and is head and shoulders above the average amateur in this activity.

This brings us back to our rating question. If number 15 is so good, how much better is number one? A clue is that the curve on which their "grades" fall turns out to be a logarithmic function as shown by Fig. 1.

In case anyone thinks this is unique, it isn't. In *The World of Mathematics*,[1] a comparison was made over several years involving the test scores of gifted mathematics students — scores which spanned their entire college instruction. The results are similar. It wouldn't surprise me at all to be told that regardless of the activity (which it can be scored), the top man is so outstanding most of us can hardly realize how vastly better he is.

A salute to the winners, and may you fare well in the coming fray! QST

* 8806 Overhill Rd., Richmond, Va. 23229.

[1] Newman *The World of Mathematics* Simon and Schuster, 1956.

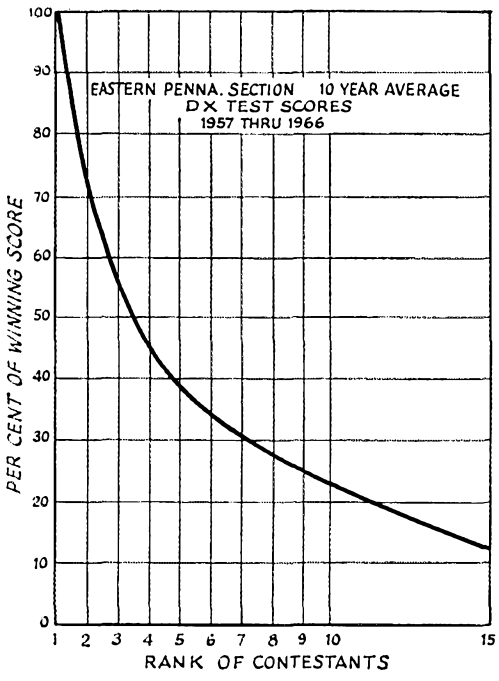


Fig. 1—Rank of the top ten contestants in the DX Contest (c.w. only, 10-year average).

Strays

Worthwhile club projects? The Massassoit Amateur Radio Club shows one way to do the job. As a club project, they modified an electric clock so that it could be read in Braille, built an electronic keyer and tune-up device—all for one very appreciative blind ham. Here are the club officers making the presentation to Roger Cicchese, WA1CDQ. From the left, Francis Barrows, K1CEZ, Pres., Don Benecchi, W1WLZ, who promoted the project, WA1CDQ, and at the right, Roger's friend, Norman Grise. *(Photo courtesy of The Brockton Enterprise).*

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—SCM, John L. Penrod, K3NYG—RM: W3EEB. I wish everyone a Happy and Prosperous 1968. Endorsements: W3FPJ as OVS. W3EEB broke the 100k total in the recent CD Party. WA3FFU has a new Galaxy 5. WA3DDW is now Extra Class. WA3CDV and K3GVS are now active on 2 meters. The Del. ARC operated W3SL portable in Sussex County during the Del. QSO Party. The region and state c.d. directors wish to congratulate the amateurs who operated during CDEX on a job well done. W3WR visited Illinois for the holidays. W3FEG vacationed in Florida. W3BAV is 2-meter mobile. K3MPZ was chairman for the Christmas Greetings from the Vets Hospital this year. K3HXX is active again on 10-meter c.w. K3NYG shares his shack with WN3IQV, his young YL. DSMN reports QNI 42; DTMN reports QNI 48, QTC 20. Traffic: W3EEB 112, W3DKX 18, WA3FYS 12, K3NVV 7, K3SLV 7, K3NYG 6, WA3FFU 4, WA3-DUM 3, W3HKS 3.

EASTERN PENNSYLVANIA—SCM, George S. Van Dyke, Jr., W3ELI—SEC: W3AES. RMs: W3EML, K3YVG, K3MVO, W3MPX. PAM: K3MYS. V.H.F. PAM: W3FGQ. EPA, QNI 404, QTC 312; PFN, QTC 135; PTTN, QTC 242; EPAE&TN, QTC 315; EPA V.H.F., QNI 209, QTC 119. OO reports were received from W3KEK, K3PSW, K3TXG and W3NNC; an OBS report from WA3AFI; OVS reports from K3MSG, WA3-BIV, W3FEY and K3VAX. The following are results of EPA members in the recent FMT (the number following the call is parts per million accuracy of best measurement): K3LPP .3, W3JET .3, W3KEK 1.6, W3BFF .6, K3ZSK 8.3, K3EMA 27.5, K3NOX 55.2, K3PSW 42.3, W3-ADE 13.1, K3RIV 23.6, W3PT .6. WA3EXW was in the hospital. WA3INC is doing so well he had to order another batch of QSLs. W3AES still is begging for ECs. The BPL was made by W3EML and W3VR. K3VAX is working at the Drexel club station. W3ID finally got his antenna up. W3FEY worked W1GAN on 432 Mc. K3YVG reports the traffic slump is very bad. WA3BSV made the mistake of checking in and announcing it was his birthday. He got swamped with birthday traffic. When the snow falls Florida calls, or at least so says W3CUL. K3-WEU has been on extensive speaking tours in behalf of ham radio. W3HNK has a new SB-301 and 401. WA3-EMO has an SB-401 and a new dipole antenna. He came in 8th from the bottom in the recent contest but says wait until next year. W3EML's vertical antenna is going to wear out in the box. He needs an antenna party to get it up. Any volunteers? WA3FPM has been real busy on the soccer team. The EPA section had a planning meeting; minutes were sent to all appointees. A dinner meeting is planned for April in the Reading area. Keep Saturdays open as long as you can until the final word is passed. W3AES is chairman of the affair. New officers of the Delaware Lehigh Amateur Radio Club are K3RDT, pres.; K3QDV, vice-pres.; WA3ATK, treas.; WA3BQX, secy.; WA3FGS, corr. secy. Let's all be ready for the SET in January. Traffic: W3EML 624, W3VR 568, K3-MYS 446, W3FGQ 302, K3MVO 236, W3AIZ 207, WA3-CTP 160, K3YVG 148, KØWEU/3 141, K3NSN 138, K3VBA 126, WA3EMO 124, WA3GLI 106, WA3AOJ 100, K3WAJ 89, WA3CKA 88, K3PIE 78, WA3AFI 76, WA3-EEC 66, W3MPX 66, K3BHU 65, WA3EXB 58, WA3EXW 58, W3FPC 58, K3TNL 54, W3KQE 36, K3KTH 34, WA3-CQO 33, K3WEU 32, K3RUA 26, K3FSV 23, K3MDG 23, W3HNK 21, W3JKX 20, W3OY 20, K3FOB 17, WA3-FPM 16, W3ABSV 12, K3HLN 12, W3RV 12, W3ADE 11, WA3HGX 8, W3KJJ 6, W3OML 4, W3ID 3, W3AES 2, WA3BIV 2, WA3BJQ 2, W3EU 2, W3FEY 2, WA3GYT 2, WN3HMU 2, WA3IAZ 2, WA3INC 2, W3KEK 2, K3MSG 2, K3PSW 2, K3TXG 2, K3VAX 2, W3YPF 2.

MARYLAND-DISTRICT OF COLUMBIA—SCM, Carl E. Andersen, K3JYZ—SEC: W3LDD.

Net	Freq.	Time	Days	Sess.	QTC	QNI Avg.	Mgr.
MDD	3643	0000Z	Daily	30	178	5.9	K3OAE, RM
MDDS	3643	0130Z	Daily	31	33	4.1	W3ZNW,RM
MEPN	3920	2300Z	M-W-F	21	60	28.2	K3NCM, PAM
		1800Z	S-S				
MTMTN	145.206	0030Z	W-T-S	27	15	10.5	K3NOQ
		0100Z	T-F				
CVTN	145.615	0200Z	Sn-F				WA3CFK
AREC	3820	2300Z	Sn	5			W3LDD, SEC

Endorsed appointments: WA3EOP, as OVS; W3EIS, K3CYA as Class I OO; W2NIY/3 as ORS and Class IV OO; W3WY, W3PZW, W3BWT as ORSs. New AREC members: WN3IQX, W3LQP, W3DYA, W3RXP, WA4-KCT/WA3FXJ, K3VZP, WN3HYG, K3WRQ, K8JLV/3. As the result of an accident W3RE is in a Staten Island, N.Y. hospital. Our flying MDD RM is again in Florida. WN3IXI has joined the MDC Novice ranks. The W3TMZ Coop reports 2650 QSOs in the CQ DX Contest. WA3-CCN is QRL with new construction of which a 60-ft. tower with a 6- and 2-meter beam atop is complete. WN3HUJ is awaiting his new General Class ticket. W3TN is back to normal with another BPL. We received a winterizing report from W3JZY up on his mountain. K3NCM is studying for his Advanced and Extra Class tickets. WA3GAU has a new SB-301 on order from Santa. Watch for W3EOV/mobile. WA3GLP and WA3GDB teamed up for the V.H.F. Contest. W3MVB reports bagging a kw. pound elk. That's DX? Sorry to report the passing of W3PSP's XYL on Oct. 27. Another antenna farmer, W3-CBG, is growing a 50-ft. tower to support his new antennas. W3BWT has returned from a too-brief visit to the Bahamas. W3TXQ has completed a 2-watt transistor transmitter and is building a transistorized receiver. W3-GKP is operating 3.6 RTTY f.s.k. WA3HNG and WA3-FRL are looking for 2-meter chess players. K3ORP reports 374 mobile contacts on a recent trip to Charlotte, N.C. K3WUW and W1ARR/3 have negotiated the Extra Class hurdle. If you like a good contest try the FMT from MDC and beat these: W3PYW 0.1, W3MVB 0.6, W3TMZ 0.7, WA3AJR 4.7, K3AAF 4.7, W3ATQ 6.1, W3-DUZ 11.9, W2UZN/3 17.8, W3MSR 25.8, WA3GTX 52.6 and W3MHB 65.4. Our newest EC is W3DFW from Allegany County. Traffic: (Oct.) W3TN 260, K3JYZ 112, W3-CBG 102, WA3EKP 101, W3PQT 71, W3ATQ 44, W3ZNW 39, WA3ERL 35, K3LFD 31, K3GZK 28, K3QDC 25, K3-OAE 22, K3TBD 22, W3EOV 18, WA3HEN 17, W3ECP 16, WA3CBC 11, WA3CCN 10, WA3GAU 7, K3ORP 7, WA3GDG 6, WA3GLP 4, W3JZY 4, K3NCM 4, K3VHS 4. (Sept.) W3ZNW 42.

SOUTHERN NEW JERSEY—SCM, Edward G. Raser, W2ZI—Asst. SCM: Charles B. Travers, W2YPZ. SEC: W2BZJ. RMs: WA2KIP, WA2BLV. PAM: and NJPN Net Mgr.: W2ZI. All OPSs please note: NJPN has changed frequency after 23 years from 3900 to 3930 kc. 687 stations checked in in October with a traffic total of 198. The regular annual confab was held at New Brunswick Oct. 29. WA2KIP was reelected manager. While on the West Coast recently I met with former ARRL Directors W6MLZ and W7ZC and 6RN Manager WB6BBO. W2-PEV, asst. net mgr., did a nice job taking care of things for NJPN. SEC W2BZJ reports that WB2ADE is in the hospital and resigned as EC for Cape May Co. He did a fine job and attended the SCARA meeting recruiting new AREC members. WB2APX has been appointed in his place. WB2MNF has been appointed EC for the Haddonfield Area; W2ORS EC for Camden Co. The Gloucester Co. ARC has acquired the call W2MMD, a deceased member's call, replacing WA2NGI. The club now holds code and theory classes in Pitman High School. WA2TSZ is TVI chairman. WA2UVB was first-place winner in the Annual Md.-D.C. QSO Party for this section. W2BAY and WA2HJF both received their Extra Class tickets. K2ARY is faithfully transmitting Official Bulletins. WB2ZBR received his General Class ticket. W2LVW reports Gloucester Co. AREC nets are in full swing. W2EET, W2VMX and W2VCX made good scores in the recent FMT. WA2-ANL moved to Bridgeton and is back on the air. W2ZI joined Navy MARS; his new call is NØHTW. The DVRA held its Annual Clam Bake Oct. 11 on its club grounds. K2PI won a prize at the Hobby Show for his old gear exhibit. K2SNK is back on the air at a new location. W2KGM is a new OPS. Traffic: (Oct.) WA2BLV 137, W2-CKF 80, K2SHE 23, W2ZI 22, K2JJC 8, WA2ANL 5, W2ORS 2. (Sept.) WA2BLV 121, WB2MOQ 32, W2CKF 14, W2ORS 3. (July) WB2MOQ 191.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2RUF. PAM: W2PVT. RMs: W2EZB

and W2FEB. The NYS G.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 on Mon. The NCS and mgr. of the QTC Net, W2BBX, advises that the net now operates on 7265 kc. Mon. to Fri. at 1900Z. K2-KQC, mgr. of the NYS Post Office Net, reports that the net now has 58 members and meets daily at 2145Z on 3912 kc. K2KQC and W2OE made the BPL. K2KQC renewed as Erie Co. EC. K2KIR, W2MTA and W2QHQ were endorsed as ORSs. K2LCT was appointed OBS and WN2-BQQ OVS. The Northern Chautauqua ARC, K2PCQ, elected W2FUL, pres.; WB2VVX, vice-pres.; WB2VVW, secy.; WN2CTJ, treas.; K2OAD, K2LZV and K2JQT, directors. WB2VSL was elected editor of the *Eastern Area Tfc. Net News-Letter*. The Central District RC, WB2ZCA elected WB2AVY, pres.; W2PRY, vice-pres.; WA2ANE, secy.-treas. W2WZQ is trustee. WA2HSB reports that Plattsburgh RACES had its annual Goblin patrol with the police dept. on 2 meters. Participants were WA2s HSB, SNW, CRC, JOH, YKT, TRI, GLA, JKA, DAC, JPM, K2YKC, WB2ZOO, WB2WBW, WN2-AXM and AG1CP. W2AWK, Onandaga County EC, reports 30 members. The AREC Net operates the 1st and 3rd Mon. on 29 Mc. at 0100 GMT. K2DNN has the Valiant back on the air. The BARRA elected W2PVL, dir.; K2GUG, pres.; W2PVL, treas.; K2ISO, secy. WA2ZZZ handles the newsletter and W2EUP is primarily responsible for the repeater. Chemung County AREC elected WA2HFL, pres.; WA2FJJ, vice-pres.; WA2ZBD, secy.-treas. and K2DNN continues as EC. K2VOX finished his homebrew two-speed antenna rotor. The Fulton ARC held its tenth annual birthday party. The Chenango Valley ARC *Newsletter* reports that W2QHH has worked every county in the U.S., all 3079 of them! WB2QKQ was appointed Asst. EC for Onandaga Co. W2SEI, K2-DJD, K2LGJ and W2PZI passed the Extra Class exam. Last month we reported that the RARA (Rochester) had 37 new members. This month the club reports 21 more! Traffic: (Oct.) K2KQC 652, W2SEI 356, W2OE 354, WA2-NDC 230, W2RUF 133, WB2VSL 126, W2FEB 92, W2-MTA 91, WB2QYE 85, WA2HSB 78, K2RYH 75, WB2GAL 71, W2HYM 69, WB2SMD 35, K2IMI 29, WA2ANE 27, W2RQF 25, W2BLO 13, K2OFV 13, W2FCG 12, K2BWK 11, WA2AWK 8, W2CFP 7, W2PVI 7, WA2GLA 4, WA2YNS/2 4, WB2VND 3, W2EMW 2, WB2NNA 1. (Sept.) W2HYM 89, W2BLO 3.

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. Western Pennsylvania amateurs are reminded that petitions will be accepted from Jan. 1, 1968, until Jan. 31, 1968, nominating some worthy amateur for the William G. Walker, W3NUG, Memorial Award. Nominating petitions should give a brief but detailed history outlining the basis for nomination of the amateur. This award is given each year in memory of William G. Walker, W3NUG, to some deserving amateur in Western Pennsylvania. Send nominating petitions in triplicate to John F. Wojtkiewicz, W3GJY, 1400 Chaplin Street, Conway, Penna. 15027. The *Spark Gap* reports the following new officers for the Two Rivers ARC: K3QHM, pres.; W3OFM, vice-pres.; K3-CHD, secy.; WA3AZY, treas. K3CHD has erected a new tower and beam. W3SYR has a new HT-37. WA3GXO has a new SB-110 on 6 meters. The *Kilo Watt Harmonics* reports the following new officers for the Steel City Amateur Radio Club: K3VSL, pres.; K3ZVB, vice-pres.; K3LIP, rec. secy.; W3ZDW, treas.; W3NSX, corr. secy. WA3BGE is currently operating from the Case Institute of Technology Radio Club station, W8EDU. W3-GJY now has 314-311 DXCC total and 647 confirmed for WPX. K3KUS is teaching in Australia and has the call VK3ARR. W3MFB, WPA RM, reports 30 sessions, 382 QNI and 193 pieces of traffic for Oct. Traffic: W3NEM 214, WB2TNB/3 184, WA3BLE 148, W3LOS 112, W3MFB 106, W3KUN 80, K3HKK 56 (K3AHT, W2KAT ops.), K3ASI 30, K3SMB 21, K3HCT 16, K3PYS 13, K3RZE 12, WA3EPQ 10, W3LOD 7, K3SJN 7, W3YA 6, W2KAT/3 4, W3UHN 4.

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	*Freq.*	*Times*	*Days*	*Tfc.*
IEN	3940 kc.	1400Z	Sun.	10
ILN	3760 kc.	0000Z	Daily	201
NCPN	3915 kc.	1200Z	Mon.-Sat.	136
NCPN	3915 kc.	1700Z	Mon.-Sat.	228
Ill. PON	3925 kc.	1700	Mon.-Fri.	453
Ill. PON	50.25 Mc.	2000	Mon. & Thurs.	2
Ill. PON	145.5 Mc.	2000	M.W.F.	141
TNT Net	145.36 Mc.	2100	Sun.-Fri.	

The Ninth Regional Net had a Traffic count of 476, according to W9QLW. WA9KRL, W9JZL, W9CNC/KØBLB, K9BAR, W9GUO, WA9PEL, WA9POR, WA9QXT, K9-KEP, W9SEH, W9TGN, WA9UAG, W9ZQT, W9WYB, K9WMP, W9JUV/K9OSO, W9REC, WA9RVY, W9RWD and W9WKL participated in the recent FMT. K9TXJ was appointed OBS. K9TVA is now W4ROA with his QTH in Miami Shores, Fla. K9HVE's new call is W4-NXF. WN9TQG was featured in the Allis Chalmers *AC Scope* full edition house organ. This column's sympathy is extended to the family and friends of W9BTK and W9HOW, who recently passed away. WA9UHA was elected pres. of the Evergreen Park High School Amateur Radio Club. K9IMZ is a helicopter pilot in Viet Nam. K9JXV and WA9BKA are attending Southern Illinois U. W9GCQ is experimenting with his solid state 2-meter transceiver. The Central Illinois Radio Club (Bloomington) helped city police with mobiles on Halloween. WA9-QXT received his WAC certificate. W9LRV celebrated his 87th birthday Oct. 27. W9QWM was first-place winner in the Annual D.C. QSO Party. W9VHD is now on 2 meters with a Pawnee. W9UZE is bringing in the tough ones with a new linear. K8HGT/9 passed the Extra Class exam and is waiting for his 9 call. K9KIP soon will depart for the South Pacific. W9IZF is now using RTTY on 20 meters. K9HDZ has a new 40-ft. tower and TA 33 Jr. beam. WA9EXP is working on a repeater with K9ICY and K9DLI. K9DJG and W9USR showed slides of their European trip at the last meeting of the RARA (Rockford). K9RAS is mobiling on 10 meters with a Gonset G-28. For information on the Sesquicentennial QSO program, contact Mr. L. Wollen, c/o Illinois Sesquicentennial Bureau, Myers Bldg., Springfield, Ill. 62701. A very distinctive card has been designed and all Illinois amateurs are invited to participate in this project. Our sympathy is extended to WA9CCP (PAM) upon the recent passing of her mother. New Novices heard were WN9WBP, WN9WCC. WN9WCD and WN9WDT. The Chicago Suburban Radio Assn. held its annual banquet Nov. 4. W9-AZP mobiled to W6-Land and back. Mark your calendar now for the Central Division ARRL Convention in Springfield Aug. 3 and 4. WA9CCP is the recipient of the BPL award this month. Traffic: (Oct.) WA9MHU 238, WA9CCP 177, W9NXG 170, K9KZB 163, W9JXV 141, W9EVJ 128, WA9QXT 114, WA9OTD 113, W9DOQ 107, WA9BRO 77, K9AVQ 74, W9LDU 69, K9BTE 60, WA9-SFB 51, K9KOI 41, W9YCH 41, WA9PFB 40, WA9PPA 36, WA9POZ 34, W9HOT 28, WA9LDC 26, WA9SPA 26, W9DBO 19, W9PRN 19, W9IDY 16, K9HKJ 8, K9HRC 8, K9HSK 7, K9HVS 6, WA9UHA 5, K9RAS 2. (Sept.): K9HKJ 19, WN9TOC/WA9TOC 3.

INDIANA—SCM, William C. Johnson, W9BUQ—Asst. SCM: Mrs. M. Roberta Kroulik, K9IVG. SEC: WA9GK.

Net	*Freq.*	*Time*	*Tfc.*	*Mgr.*
IFN	3910	1330 Daily 2300 M-F	301	K9IVG
ISN	3910	0000Z Daily 2130 M-S	532	K9CRS
QIN	3656	0100Z	242	W9HRY
IPON	3885	1300Z Sun.	93	K9EFY
IPON	50.7	0200 M-T		WA9NLE

W9PMT, mgr. of the Hoosier V.H.F. Net reports net traffic as 159. W9KAG reports River Forecast Net traffic as 42. K9YST reports White River Valley AREC Net traffic as 10. QIN honor roll: W9VHY 30, W9BDP 27, WA9KHO 27, WA9FDQ 24, WA9QLW 23, K9HVY 22, WA9VZM 21, W9UQP 20, WA9JUK 15, W9QLM's traffic was the same as last month. Bloomington ARC provided communication for the Fair Ladies' Air Race with a station on 3910 and 50.4. Lake County ARC's new officers are W9MDE, pres.; WA9BBC, vice-pres.; WA9RNT, secy.; W9PUB, treas.; WA9SSV, editor of *Short Skip*. The Indiana Radio Club Council's new officers are K9OXA, chairman; W9DNQ, vice-chairman; WA9LTI, secy.; W9IMU, treas.; W9HZI and K9KFM, directors. The Indianapolis Red Cross ARC has moved into its new building. W9WKN is RTTY on all bands. *Reminder*: The Simulated Emergency Test, Jan. 27-28. K9JSF lost his tower in the windstorm Oct. 12. K9HIS has moved from 8-Land back to Indiana. *Amateur radio exist because of the service it renders.* A BPL certificate went to K9IVG. Traffic: K9IVG 787, W9QLW 266, W9HRY 211, K9FZX 171, K9JUK 135, K9HYV 131, WA9VZM 127, WA9LTI 105, K9CRS 68, W9KOH 66, WA9KAG 58, W9BUQ 48, K9EFY 46, K9VAY 46, W9YYX 41, W9CMT 40, W9VAY 34, W9-BGI 32, K9CBY 31, K9WGN 30, W9GBR 29, W9DKR 26, K9EOH 24, WA9KVP 24, K9RWQ 22, K9QVT 20, W9-DZC 18, WA9GJZ 18, K9ZLB 18, K9ILK 17, W9BDT 16, W9CUC 16, W9RTH 16, W9FWH 15, W9HWR 15, W9-TKZ 14, WA9DYI 13, K9HZY 13, W9PMT 13, W9SNQ 13,

W9FJI 11, W9URQ 10, W9DOK 8, K9STN 8, K9IIV 7, WA9JIX 7, W9LG 7, K9YFT 7, W9ZZR 7, W9BNX 5, WA9DBK 5, K9UEO 5, K9UHQ 5.

WISCONSIN—*SCM, Kenneth A. Ebneter, K9GSC*—SEC: W9NGT. RM: WA9MIO. PAMs: W9NRP, WA9QNI, WA9QKP.

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*Mgr.*
BWN	3985 kc.	1300Z	Mon.-Sat.	344	189	W9NRP
BEN	3985 kc.	1800Z	Daily			WA9QKP
WSBN	3985 kc.	2315Z	Daily	1186	257	WA9QNI
WIN	3662 kc.	0111Z	Daily			WA9MIO
SWRN	50.4 Mc.	0300Z	Mon.-Sat.			W9JZD
SWRN-2	145.35 Mc.	0230Z	Daily			WA9IZK

Net certificates have been sent to WA9KFJ, W9RTP and K9SLS for WSBN, W9KWJ and W9ESJ for BEN. New appointment: WA9RAK as ORS. Renewed appointments: W9DYG as ORS, K9LGU as OPS, K9GSC and W9HWQ as OVSs. FMT results show W9DJE with 6.9 p.p.m. error. K9VIY is new in Mineral Point from Ill. W9DTE was first-place winner from Wis. in the Md.-D.C. QSO Party. W9YQH is now W7ETA in Utah. New officers of the West Allis Radio Amateur Club are K9BTQ, pres.; WA9KRF, vice-pres.; WA9GAK, secy.; W9TPO, treas. WA9RAK is alt. NCS on CAN. W9YT is using a new *R-4B* and *T-4XB* combination. WA9EZU has a modified HX-20 operating s.s.b. on 6 meters. W9ESJ has his 1-kw. linear finished. W9IRZ spent two weeks of Oct. in Hawaii. Traffic: (Oct.) WA9QKP 268, W9IFS 161, W9DYG 151, W9ESJ 150, W9CXY 137, WA9NVY 123, WA9QNI 118, WA9RAK 87, W9ABH 49, W9NRP 47, W9CBE 46, W9-KMM 45, K9KSA 43, W9AYK 37, W9DXV 36, K9FHI 32, W9DND 28, W9YT 21, WA9NBU 5, K9ZMS 4. (Sept.) W9CXY 145.

DAKOTA DIVISION

MINNESOTA—SCM, Herman R. Kopischke, Jr., WØTCK—SEC: WAØIEF. RMs: KØORK, WAØEPX. PAMs: WAØMMV, WAØJKT. MSN meets daily on 3685 kc. at 0030Z. MJN meets Tue.-Sun. on 3685 kc. at 0100Z. Noon MSPN meets Mon.-Sat. on 3945 kc. at 1800Z. Sun. and holidays at 1500Z. Evening MSPN meets daily on 3945 kc. at 2315Z. Minn. Wx Net meets daily on 3850 kc. at 2400Z and 3690 kc. at 0100Z. Net change reminder: MSN and MJN now meet on 3685 kc. and both MSPNs meet on 3945 kc. In addition, Evening MSPN now meets at 2315Z. It is hoped these changes will make the nets more efficient. Congrats to new OO, WØOFS, and new OPS, WØBUC. KØORK and WØOFS recently received their Extra Class tickets. KØUIJ received his Masters Degree in Elementary School Administration from Bemidji State College in Aug. WAØEZQ operated mobile in Colo., Ariz. and Calif. while vacationing in that area. Mel worked as far as Australia, but had only one contact back into Minn. WØPAN is now on the air in Bloomington with an NCX-5. Piconet conducted a successful "Flood Drill" along the Mississippi between Red Wing and the Iowa border in Oct. Our thanks to WAØMMV for a swell monthly *Minn. Section Newsletter*. Why not send Clarence a buck donation and see what you have been missing? Now that call letter license plates are available for more than one car and for joint ownership cars, we hope many more amateurs have taken advantage of this special privilege granted us by the State Legislature. Traffic: KØORK 345, KØZRD 231, WAØJKT 96, WAØOEJ 48, WAØMMV 45, WØBUC 42, WØTCK 33, WAØODB 26, WAØPXT 25, WØMFW 23, KØFLT 19, WAØLVK 19, WAØDOT 16, WAØKFJ 16, WAØPPY 15, WAØATO 13, WØBUO 12, WAØHRM 12, WAØJPR 10, WØKLG 10, WØKNR 10, WAØDFT 8, WØHEN 8, WØKJZ 7, WØSZJ 7, WAØQAK 6, WØUMX 6, WAØNQH 4, WAØFFU 3, WAØEZQ 2, WØPAN 1.

NORTH DAKOTA—SCM, Harold L. Sheets, WØDM—SEC: WØAYL. OBS: KØSPH. PAM: WØCAQ.

RACES	6:30 P.M. Mon.-Fri.	3996.5 kc. KØSPH SO
PON	9:00 and 5:30 P.M. Sun.	3915 kc. WAØHUD Mgr.
NDN (c.w.)	9:00 P.M. Tue., Thurs., Sat.	Sat. 3635 kc. WAØELO and WAØHUD NCS
Goose River	A.M. Sun.	160 meters WØCDO NCS
N.D. WX Net	7:00 A.M. Mon.-Sat.	3996.5 kc. WAØGRX and WAØMND NCS (YL)

WAØJPT has been working on a six-element tri-bander and tower. WØNMV is putting up a new Mosley and reorganizing his ham shack. KFGO will be cooperating with the Weather Net and RACES again this winter during storm emergencies. WAØOVT has an SBE-33 working now. WØDM swapped for a SBE-34 and worked it portable from WØTXQ's QTH in Minnesota with FB results. WAØMSJ, KØSPH and WØKSL took part in the state-wide civil defense exercise. WAØMSJ moved upstairs at the home *QTH*. The Bismarck Club meets at homes of the members. WØDM visited KØSPH in Fargo. The SR-150 has been reworked and is putting out a good signal. WØCZL writes that the NDSU is holding theory and code meetings for the Novice Class. WAØFNS is president of the club. WAØOGN is attending school at NDSU and operates WØHSU to keep in touch with his brother, WAØMSJ. WAØOAT spent a few days in Grand Forks during the NDEA convention in Fargo. KØSPH took part in the ARRL QSO Party and ran up a score of 12,500. Work has been started on reorganizing the Fargo Radio Club. WØCAQ has been appointed PAM and is helping as NCS alternate with RACES. WØGFE is busy telephone relaying. Any volunteers for appointment as OO in the western part of the state?

RACES	24 Sessions	165 ck-ins	119 msg.
PON	10 Sessions	175 ck-in	16 msg.
NDN	12	72 QNI	55 QTC

WØBIH is back home from a bout in the hospital. Traffic: WAØELO 208, WAØHUD 93, WØEFJ 41, KØSPH 41, WØKSL 20, WAØAYL 12, WØDM 12, WØPZK 7, W9QNI/Ø 4, WØBHT 2, WAØGZA 2, WAØJPT 1.

SOUTH DAKOTA—SCM, Seward P. Holt, KØTXW—SEC: WØSCT. RM: WAØAOY. S.S.B. Net Mgr.: KØBSW. NJQ Net Mgr.: WAØLLG. Dr. Robt. Johnson, Huron, son of WAØKDM, has passed the Novice test. WAØIPF now has antennas for all bands. We are happy to hear that KØHAF is returning to So. Dak. Congratulations go to WAØOVR on the arrival of a new daughter. WØCRD and WØTLD, Extra Class license holders, are teaching beginners and advanced amateur classes at Watertown Vocational School. WAØIPR has resumed his studies at Wahpeton. WAØLLG KØTXW, WAØPMB and WAØMFZ motored to the Sioux Falls auction Oct. 30. All amateurs who know him wish KØMOA a speedy recovery from his recent accident. NJQ Net: 268 QNI, 44 QTC, 49 informals. S. Dak. C.W. Net: 65 QNI, 13 QTC, 13 sessions. So. Dak. SSB Net: 1103 QNI, 72 QTC and 171 informals. WØZWL started the So. Dak. WX Net as of Nov. 1 at 0800 CST. Traffic: WAØRIQ 97, KØVYY 56, WAØLLG 47, WAØAOY 39, WØSCT 28, WAØPNB 25, WAØFJZ 7, KØKOY 6, WAØBZD 4, WAØBWJ 2.

DELTA DIVISION

ARKANSAS—SCM, Curtis R. Williams, W5DTR—SEC: WA5IIS. PAM: WA5PPD. RM: W5NND. The ARC at the U. of Ark. has elected WA5LKL, pres.; WA5LTA, vice-pres.; WA5CAA, secy.; K5TCK, treas.; W5LPS, *chief engineer*, WA5BRB, *chief* operator (*club* call, W5YM). The SE Arkansas ARC publishes *The Grid Drive* monthly with excellent editorials and other

THIRD ARKANSAS QSO PARTY

January 6-8, 1968

The North Arkansas Amateur Radio Society of Harrison announces its third Arkansas QSO Party and invites all amateurs to participate.

Rules: 1) The time will be the 30-hour period from 2200 GMT January 6 to 0400 GMT January 8, 1968. 2) No time limit or power restrictions. 3) Arkansas stations score 1 point per contact and multiply by the number of states, Canadian provinces and foreign countries worked during the contest period. Outside stations score 5 points for each Arkansas station worked *and multiply* the total by the number of counties in Arkansas worked during the period. 4) Stations may be worked once on each band and each mode. 5) A certificate will be awarded to the highest-scoring station in each state, Canadian Province and foreign country (with 100 or more points). 6) General call: "CQ ARK". Arkansas c.w. stations should identify themselves by signing de (call) ARK K. Phone say "Arkansas Calling." 7) Suggested frequencies are a.m. 3825 7225 14,225 21,220 28,560; c.w. 3525 7025 14,025 21,025 28,025; s.s.b. 3975 7275 14 325 21.425 28,650; Novice 3735 7175 21,110. 8) Arkansas stations send QSO number, RS(T) and county, all others send QSO number, RS(T) and state, province or country. 9) Logs and scores must be postmarked no later than January 30 and sent to the North Arkansas Amateur Radio Society, c/o Sam C. Housley, Route 4, Harrison, Arkansas 72601.

information about club activities. New Novices in Arkansas are WN5TEW, WN5TOX, WN5TCL, WN5SZB, WN5TAF, WN5SYG, WN5SZE, WN5SYV, WN5SYX, WN5SZX, WN5TAX and WN5SWR. Congratulations to WA5OFT and WN5RTG on passing the General Class exam. WN5RTG worked 45 states and 35 countries as a Novice. Net reports (Oct.):

Net	*Freq.*	*Time*	*Sess.*	*Traffic*	*QNIs*	*Mgr.*
OZK	3790	0100Z	31	63	223	W5NND
ARSN	3815	0030Z	30	72	743	WA5PPD
APN	3885	1200Z	26	32	624	K5ABE
APON	3825	2130Z	22	182	356	W5MJO

Support amateur radio emergency preparedness; check into one of the above nets and join the AREC. Your help is needed. Traffic reports are appreciated. Traffic: W5OBD 1861, WA5KEF 306, W5DTR 158, W5NND 117, W5MJO 104, K5VBF 39, WA5PPD 36, WA5LYA 24, WA5TLS 18, WA5OWZ 9, K5GKN 8, WA5QPI 8, WA5-KQU 6, K5TYW 6.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—SEC: W5BUK. RM: W5CEZ V.H.F. PAMs: WA5DXA, W5UQR.

Net	*Freq.*	*Days*	*Time GMT*	*Net Mgr.*
LAN	3615	Daily	0030 & 0300	W5MBC
Delta 75	3905	Sun.	1330	WA5EVU
LaPon	3870	Sun.	1300	W5KC

LAN needs outlets in the New Orleans and Shreveport areas. The Annual La. QSO Party will be held Jan. 27 and 28. WA5OJG, besides having a new HW-12A, is helping two Novices to pass the General Class exam. W5GHP, of LAN fame, is riding subs out of Portsmouth, Mass. K5ANS, on new inheritance from Texas, is riding high with a nice traffic total on LAN. W5EA is having power supply trouble with his BC-348. W5-ZBC reports the Shreveport-Bossier area has a 2-meter repeater 1200 feet up. WA5KLF reports a new addition to the Monroe ranks, WA5TKO. K5WOD and K5ELJ operated during the CDEX-67 RACES exercise. WA5FRU has about finished his new ham shack and the Springhill ARC may have a new communications center if city building plans materialize. The GNOARC has a new RTTY station in operation. W5-MXQ says the Jefferson ARC held a Steak Fest. WA5-EID won a contest for La. on 160 meters recently. W5MCC urges more of the gang to try v.h.f. W5JFB built a 15-meter quad from *QST*. WA5JVL will operate club station W5HGT at La. Tech. W5OAR is the secy.-treas. of the OARC of Slidell. WA5CKJ is now NCS for the OARC Health and Welfare Net which meets on 50.55 Mc. Wed. K5AGI is RTTY Mgr. of the club. W5LDH, our Division Director, presented the CLARC with its Certificate of Affiliation recently. The Baton Rouge gang had a bang-up fall supper recently with K5SNE in charge of arrangements. K5ARH won the Illinois QSO Party for Louisiana. Yours truly can be found on 3900 each week-day morning at 1230 GMT. Traffic: (Oct.) W5CEZ 255, K5ANS 141, K5MXQ 131, WA5OHH 45, W5EA 18, WA5EID 17, WA5STM 16, W5-ZBC 16, WA5DXA 11, W5MCC 10, WA5KLF 8, W5JFB 4, WA5OJG 2. (Sept.) K5ANS 115.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—SEC: W5JDF. Hope all the Mississippi hams will bear with me as I have sold my house, do not have an antenna up at the new QTH and will be off the air until I get a new setup. Had a very nice report from WA5JWD. I would like to commend the following new Novices: WN5TDE at Walls, WN5TCT at Pascagoula, WN5TCB at Hattiesburg, WN5TBA at Ashland, WN5SZH at Vardaman, WN5SYR at Columbia, WN5SZA at Starkville, WN5SWX at Clarksdale, WN5SUE at Biloxi. Also congratulations to the new higher-ranking calls: WA5-TEF Booneville, WA5TDP Vicksburg, WA5SZU Keesler AFB, WA5STK Forest, WA5SSD Biloxi. K5TYP, at Keesler, and the group in Columbus are doing a fine job with traffic. When the tornadoes hit the Gulf Coast I was very proud of the way the amateurs responded to the call for help. K5TYP spear-headed his effort. Check into our nets: Gulf Coast Sideband daily 3925 kc. 1730 CST; Mississippi Sideband daily 3888 kc. 1815 QST; Mississippi C.W., daily 3647 kc. at 1845 CST.

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.	0030	26	1433	235	WA4CGK
TPN	3980	Mon.-Sat.	1245	31	1264	129	W4PFP
		Sun.	1400				
ETPN	3980	M-F	1140	22	498	43	WA4EWW
TN	3635	Daily	0100	31	422	202	K4UWH
TCN	3980	1st. Sun.	1330				W4OGG

The Tenn. Council of Clubs will present an award at the Crossville Picnic to the outstanding Tennessee club FD participant. The winner will be determined by the council. WA4TEM reports that the RAC of Knoxville will hold code and theory classes beginning Jan. 5. AREC members in Washington County manned the communications center during a c.d. exercise on Oct. 27-29. WA4YDT has a new SW-250 on the air. WA4-CGK, PAM TSN, wishes to express his appreciation to the net members for their excellent cooperation. As usual W4DIY is working on everything and nothing is working. WA4TWL reports much DX on 10 meters. Silent Key information should be sent to the SCM or ARRL for listing in *QST*. All ARRL affiliated clubs are urged to take advantage of the training aids available from Hq. Appointments: W4SQE as EC Davidson County; WB4AQZ as OBS. Traffic: W4OGG 232, W4-RUW 161, WA4YDT 158, W4DIY 124, K4UWH 96, W4-SQE 94, WA4YEM 94, W4WBK 74, K4TQL 67, K4PUZ 36, WA4YHO 36, WB4EKI 26, WA4CGK 24, WA4EWW 24, W4PFP 20, WB4FCE 16, WA4KHD 16, WA4TWL 15, W4TZJ 14, WB4BGU 13, W4PRY 12, W4TYV 8, W4PQP 7, WB4DJP 3, WB4EHK 2, W4SGI 2.

GREAT LAKES DIVISION

KENTUCKY—SCM, Lawrence F. Jeffrey, WA4KFO—SEC: W4OYI. Endorsements: WA4AGH as OPS, OBS and OO. W4JSH as EC. W4GSH and WA4OMH as OVS. K4YZU as OPS.WA4YQE as EC. K4ZQR as OO.

Net	*Freq.*	*Days*	*GMT*	*QNI*	*QTC*	*Mgr.*
KRN	3960	M-F	1130	377	40	K4KIS
MKPN	3960	Daily	1330	203	51	K4TRT
KTN	3960	Daily	0000	905	548	WA4AGH
KYN	3600	Daily	0000/0300	490	402	W4BAZ

W4BAZ says we badly need stations on KYN from Bowling Green and Lexington. WB4CJM is temporarily QRT for lack of a v.f.o. WA4VEC has his activity curtailed because of studies at Center College. WB4-FOT is working on WAS, DX and traffic nets. W4ADO is building an 813 linear amplifier and working DX. WA4WWT is QRL with school but finds time for 9RN, CAN and KYN. WA4WTN is busy with MARS traffic and KSN. WB4BKG is active on FCATN and V.H.F. PON. W4CDA, WA4BZS, K4KIS and K4NYO cleared CD traffic from Danville during the drill. W4YOK/4 is chasing DX and helping with Owensboro traffic. WB4AIN is TCC to EAN and QRL with school but still managed a big score in the CD Party. K4KWY operates 6-meter mobile in northern Kentucky. W4SMU is a member of IMRA. The KRC members attended a class in disaster services, according to WB4BKG. W4-JUI and W4CMP consistently turn in good FMT performances. WA4AGH QNIs KYN with a 0.9 watt transistor rig. Traffic: (Oct.) WA4DYL 255, W4BAZ 223, WA4WWT 150, W4NBZ 145, WB4AIN/4 130, WA4VUE 113, WA4AGH 107, WA4KFO 107, WA4UAZ 63, K4MAN 51, K4TRT 41, WB4AGO 40, WA4WTN 33, W4CDA 32, W4OYI 30, WA4GHQ 26. W4RCE 26, WB4BKG 19, WA4GMA/4 19, WA4WSW 19, W4YOK/4 17, WA4VEC 15, WB4BTM 13, K4HOE 11, K4VDO 9, W4ADO 5, W4BTA 4, W4KJP 4, WB4FOT 3. (Sept.): WA4WSW 50, WA4VEC 27, WA4GMA 17, WB4CJM 16.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: K8GOU. RMs: W8FWQ, W8RTN, WA8OGR, K8KMQ. PAMs: W8IWF, K8JED, V.H.F. PAMs: W8CVQ, W8-YAN. Appointments: W8AUD, W8EU, WA8OGR, W8-PBO as ORSs; K8JED as OPS; W8DSW, K8JED, WA8OLD, WA8RFU as OBSs; WA8DHP as OVS. Silent Keys: W8AM, K8SWQ. BPLers: WA8MCQ, W8IV. Net reports:

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*Sess.*	*Mgr.*
QMN	3663	2300	Dy	916	496	31	W8FWQ
WSSB	3935	0000	Dy	994	90	31	K8AYJ
PON-DAY	3935	1500	M-Sat.	377	298	26	WA8OGR
PON-CW	3645	2400	M-Sat.	189	62	26	VE3DPO
UPEN	3920	2230	Dy	398	24	31	K8ZSM
BR	3930	2230	M-F	782	86	22	W8ZBT
M6MTN	50.7	2400	M-Sat.	305	35	26	WA8LRC
MTN	3605	0245	Dy	21	83	22	WA8QAF
Lenawee 2	145.36	0200	Dy	232	28	27	WA8AAQ
Wayne-AREC	7160	0130	M-W-F	???	6	21	WA8VOG
MEN	3930	1400	Sun.	276	14	5	W8ZBT
Tri-Co AREC	146.94	0100	Fri.	???	8	4	W8VWY
SW Mich 2	145.26	0100	Tue.	66	00	5	W8CVQ
SRARS	50.4	0200	Thurs.	40	??	4	????

New officers: Adrian ARC—WA8DVB, pres.; WA8QWB, vice-pres.; K8HSJ, secv.; W8MQN, treas. Fordson Electronics Communications Club—WN8VPQ, pres.; WN8-WUP, vice-pres.; WN8YAI, secy.; WN8WVA, treas. Milford ARC—K8SWW, pres.; WA8YFT, vice-pres.;

WA8CTF, secy.-treas. Motor City RC—WA8DHP, pres.; WA8IML, vice-pres.; WA8VIF, secy.; W8SKC, treas. W8NOH is in bad shape in the hospital, badly burned in a gasoline explosion. WA8UUA/3, in Edgewood Arsenal, Md. will be fully activated. WA8SUR is ham-of-the-month at Hills ARS. W8PT leaves for South Carolina permanently. W8JXU got the annual ham-of-the-year award at the E. Tawas Hamfest. At the S.E. Mich. ARA meeting there were two spark transmitters activated with dummy loads, K8DX's and one other. WA8NYK got SEMARA's annual ham-of-the-year award. The Mich. Six-Meter Club operated at Veterans' Hospital using W8ADR/8. The DARA, SEMARA and HVARA all went to Edison's Atomic Plant in Monroe. W8LL and WA8VFE have new Knight 2-meter transceivers. K8BVP, WA8NPH and K8PWA have HA-1200 2-meter transceivers and K8SKZ has a W8LN 2-meter linear. The CMARC will sponsor the ARRL Convention in Lansing, Apr. 26 and 27. Traffic: (Oct.) WA8OGR 311, K8KMQ 297, WA8MCQ 263, K8MXC 177, WA8ORC 162, WA8MAM 136. W8IV 122, W8QQK 120, W8JTQ 118, W8IWF 113, K8ZJU 99, WØGXQ/8 87, K8CKD 84, WA8IAQ 80, K8ETU 73, WA8SQC 68, W8FX 59, WA8LRC 56, W8RTN 55, W8IUC 54, WA8KME 53, W8CQB 45, W8FWQ 42, W8ICH 42, K8JED 42, W8IBB 41, W8TDA 34, K3KRX/8 28, W8YAN 26, WA8PZT 22, WA8LXY 21, W8WVL 21, W8MRM 20, W8BEZ 18, WA8UWQ 18, WA8GTM 17, W8AUD 14, WA8KRH 13, WA8TSB 13, K8QLL 11, WA8LKI 10, WA8PII 10, W8MWG 9, W8TBP 9, W8DSE 8, WA8JDF 8, W8EU 7, W8UFS 6, K8VDA 6, W8SS 5, WN8WHG 4, W8ZHB 3, W8MPD 2, WA8VHG 2. (Sept.) K8HLR 45, K8CKD 14, WA8KME 13, W8CNL 10, W8MPD 8, W8DSE 4, WA8CXF 3.

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	Mgr.
BN	625	472	61		3580	0000 & 0300Z	WA8CFJ
OSN	163	66			3580	2325Z	WA8PMN
OSSBN	1721	2871	57	18.3	3972.5	2345Z	K8UBK

The Buckeye Net (BN) meets every day at 7 and 10 P.M. EST; its slow-speed session, the Ohio Slow Net (OSN), at 6:25 daily. All Ohio amateurs are cordially invited to check in; when you hear the net control station call CQ BN, just give him a call and get full particulars on net operation. He or another experienced station will be pleased with your interest and eager to help you get started. He'll explain net procedure, what Q signals you need to know, how to handle a message and he'll introduce you to the rest of the members. Try it once; if you like it, we'll be glad to have you as a regular BN member. This also goes for the other nets. G2MI and his XYL visited with W8YGR. WA8VZQ received his General Class license and has a new T-150A. WA8WZQ received his General Class license and has a new Swan 500. The 1968 officers of the Miami County ARC are W8BZX, pres.; WA8MVV, vice-pres.; WA8SYL, secy.-treas. WA8VNU received his CP-25. WA8OCG had his quad blown down. K8RXD is stationed in Guam with the Navy. WA8LVY is stationed in Germany. The Buckeye Short Wave RA of Akron acquired a new emergency trailer. K8ONA spoke on amateur radio and showed the ARRL movie of the Alaska Earthquake. Canton ARC's *Feedline* tells us Brunnerdale Seminary ARC received its club call, WA8YUQ, with W8GYR as trustee and its code classes graduated WA8VJR as a Technician, WN8VJW, WN8VLG and WN3IHN/8 as Novices, the club members are going to compete with the members of Massillon ARC each year in ARRL's Sweepstakes contests. W8LZE and his XYL spent two weeks touring S.E. England. WN8ZBA is a new Novice. Massillon ARC's *MARC Newsheet* informs us the club's code and theory classes are conducted by W8VYU, K8EKG and K8QHJ, all holders of Extra Class licenses. W8QXQ put up a 40-ft. tower and a tri-bander. From the Six Meter Nomads' *Amateur Extra* we learn that K8YMG is stationed at Ft. Monmouth. The Treaty City ARA's *The Beam* states W8ARW was named Operator of the Month. WA8RUO is now General Class, WA8HZK moved to Greenville and WN8YZZ is a new Novice. *Smoke Signals*, from the Indian Hills RC, says the club held a clambake with a good turnout. Minutes of the Ohio Council of Amateur Radio Clubs states that W8PVX has joined the Silent Keys. Springfield ARC's *Q-Fire* says the club's 1968 officers are WA8IGD, pres.; W8DCJ, vice-pres.; K8IIS, secy.; W8WAU, treas.; and WA8NNV is away at college. Southeast ARC's *Ham-Fax* tells us WA8PPD is out of the hospital and back to work. WA8AUZ, WA8COA and WA8FSX made the BPL in Oct. A new appointee is K8VCW as ORS. Traffic: (Oct.) WA8CFJ 371, W8UPH 366, WA8FSX 363, K2SSX/8 301, W8IMI 273, WA8VNU 264, WA8AUZ 236, W8NAL 200, WA8PQL 199, W8QZK 180, W8GVX 168, W8ERD 148, K8ONA 144, WA8TYF 131, W8OUU 119, W8OE 166, WA8COA 116, WA8SED 103, W8WDU 102, W8QXQ 99, K8UBK 99, WA8CXY 98, WA8QFK 96, W8LVT 89, WA8NTA 87, W8UDG 82, W8DAE 79, WA8OCG 77, W8CHT 76, W8QCU 74, WA8UPI 66, WA8LAM 61, K8VCW 59, W8TV 58, K8BYR 57, W8GOE 47, W8WEM 47, W8VND 40, WA8WEC 39, WA8PPK 38, W8SZU 35, W8LZF 25, W8RYP 25, W8QYR 23, WA8SHP 22, W8HII 20, W8LT 18, WA8MVV 16, WA8KPN 15, K8LRK 15, WA8MHO 15, W8FGD 14, K8LFI 14, W8ARW 12, W8SVC 12, K8VZI 12, W8DQD 11, W8FRV 10, W8LAG 9, W8EEQ 8, WA8OVC 8, K8DDG 7, WA8AJZ 4, K8LXA 4, WA8PRR 2, K8RXD 1, W8WEG 1. (Sept.) WA8DWL 43.

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. Appointment: WB2SOA as OBS. Auction Night was held in Oct. by the Schenectady Club with the usual large turnout. W2AZH, W2CXX and WA2AHC were auctioneers. The Albany Club also featured its auction, so lots of gear changed hands in the capital district. Also in Troy, the RPI Club, W2SZ, checked out its new ham freshmen under the helm of WA2PJL. The club's lounge is newly renovated and antennas are overhauled for winter operations. Closing his QTHs in Mass. and N.Y.C., K2QBW is now a resident of Hartsdale. Welcome to E.N.Y. Congratulations are extended to WB2NKN on making his first BPL on Oct. traffic. WB2VYS won first place in the Md.-D.C. QSO Party in Aug., according to secy. W3DVA. Again, our congrats. WA2WGS turned in a score of 41K for the Oct. CD Party. WB2WBA is seriously considering amateur TV on 432-Mc. AFSK on 2 meters and a 432-Mc. converter are the projects under construction by WB2VUK. Paul is very interested in RTTY. WB2YQU reports a new Drake 2-B and 417A converter for 2 meters. The Dutchess Co. V.H.F. Society has started a club project of building converters using F.E.T.s per Sept. *QST*. Not to be outdone by its fellow clubs up north, the Poughkeepsie Club held its auction in Oct. Traffic: WB2NKN 630, WB2UHZ 259, W2EAF 112, W2ANV 42, WA2FYE 40, WB2VYS 33, W2-ODC 29, K2SJN 24, WA2WGS 24, W2URP 19, K2HNW 10, WA2JWL 6, WB2YQU 4.

NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—Asst. SCM: Fred J. Brunjes, K2DGI. SEC: K2OVN. PAM: W2EW. Traffic nets:

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.* All times shown above are local. Happy New Year one and all! WB2ZEL made CP-25 and was elected pres. of the Chaminade HSRC. W2GKZ received a Transcontinental Corps certificate for his work with TCC traffic. Congratulations to K2YOR, who passed the Extra Class exam. WB2PTS made WAS and is now looking to snag QRP members in this area. About 200 members and guests attended the 20th Anniversary of the QCWA at which time plaques were presented to 51 surviving charter members out of the original 54. Also, the QCWA has now issued 240 certificates to those licensed for 50 years or more. W2PF has received both of the above awards. WB2DZZ finally got a 75/80-meter long-wire up so he could play with traffic in between assignments at N.Y.U. WA2JZX reports that his brother-in-law received the call WN2CEM so there are three hams in the family now. According to K2JFE, of the Staten Island ARA, K2KQZ represented a wonderful demonstration of amateur TV at a recent meeting. W3-DVA tells us K2VGR took 1st place for the section in the Md.-D.C. Annual QSO Party. W2UAL's new vertical worked so well in the CD Party that he could hardly wait for the 1967 SS. WA2QJU, at Columbia, is getting all wrapped up in exciting electronics courses now that he is a junior. WB2WFJ is net mgr. of the Beantown Net while studying at Northeastern in Boston. Congratulations to WB2ZNZ, who received his General Class ticket. WA2VES is a new Technician. The Five-Towns RC came in first in the 5-transmitter class (3rd year in a row)! The Long Beach HSRC is putting up a new set of antennas so listen for its station, WB2-PVL. K2QBW, who has been with NLI since 1957, recently moved to Westchester and the E.N.Y. section. WB2DQB, W2TUK's brother, has now picked up the

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Zero-Signal Plate Current	250	225	mA
Max Signal DC Plate Current	455	370	mA
PEP or CW Plate Output Power	400	500	W
Third Order Intermodulation Distortion	−36	−38	dB
Fifth Order Intermodulation Distortion	−54	−46	dB
Filament Voltage	2.5	2.5	V
Filament Current	10.0	10.0	A
Warm-up Time (to half power)	250	—	ms

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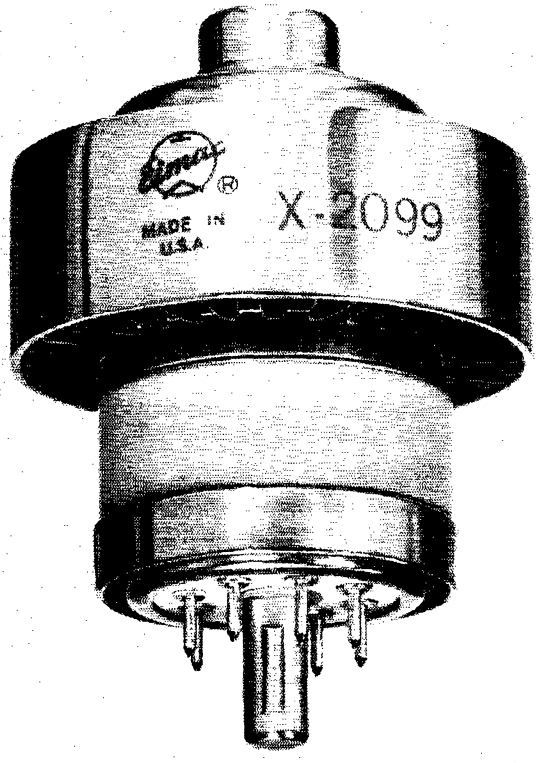

A question only serious hams should answer...

by Jack Quinn, W6MJG

How come you are still asking for our obsolete book? The one called "The Care and Feeding of Power Tetrodes." Look, we've already mailed out over 100,000 copies of the thing. It's just got to be in the hands of every amateur who ever went on the air. Don't get me wrong, I'm happy you find it useful. But now you should be asking for our *NEW* book, "The Care and Feeding of Power Grid Tubes."

It so happens that right now on my desk is a pile of these new books. They're really pretty interesting. You see, one of the fellows on our staff—Bob Sutherland, W6UOV—took it upon himself to incorporate the answers to over 400 questions asked of us in a year's time. In fact, he has spent just about every spare moment away from his shack, preparing this new pocket-size book. I couldn't believe that it has almost 200 pages. Bob said he just got carried away. He has expanded the original book, which we published back in '46, so that in its new form it covers all types of power grid tubes in RF and AF service. Even has graphs and things like that.

Now you're probably wondering, where can I get it? Thought you'd never ask. Right this minute there is another pile of these books at your nearest Eimac/Varian distributor, or your favorite technical bookstore. Figuring all the time we've spent in getting them ready for you, they're really a bargain at $3.95 each. If it's inconvenient to get to the distributor or the bookstore, write me, and I'll send your request along to the book retailer.

Jack Quinn
Division Marketing Manager

Eimac
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call W2DRL. W2IYX is the Radio Officer for Huntington. W8ZRY has transferred to Turkey with the USN. W2HAE is at WGSM week ends on a part-time basis. K2HTX has a G76 Gonset in the new Falcon. The gang from the Larkfield RC went over to the Raritan Bay auction this fall. K2OKW has everything back on the air after the short-lived battle with a couple of lightening bolts. WA2RUE is serving aboard the USS *Ramsey* and plans to get some traffic going on 20 meters under the call WA2RUE/MM. Since quite a few of his shipmates are from the N.Y.C. area, he would like to sked some of you guys. Traffic: (Oct.) WA2FTS 306, K2UBG 174, WB2UQP 118, WB2ZEL 114, WA2GPT 111, WB2AEK 67, W2GKZ 58, WB2ZET 46, W2EW 42, WB2QIL 42, WB2JJW 40, WB2RQF 36, WB2PTS 33, WB2YHK 30, WA2LJS 24, WB2DXM 17, WB2MZE 10, W2PF 10, W2EC 8, WB2ALW 6, WB2DZZ 6, K2IDB 6, WB2TWH 6, WA2RUI 5, WA2BAF 2, WB2CHM 2, WA2JZX 2.

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	3930 kc. Ex. Sun.	6:00 P.M.	W2PEV PAM
NJ Phone	3930 kc. Sun	9:00 A.M.	W2ZI PAM
NJ PON	3930 kc. Sun.	6:00 P.M.	WA2TEK PAM
NNJ AREC	50,300 kc. M thru F	8:00 P.M.	WA2KZF PAM
ECTN	146,700 kc. Ex. Fri.	9:00 P.M.	WB2IYO PAM
PVETN	145,710 kc. Daily	7:30 P.M.	K2KDQ Mgr.

All times shown local in effect. New appointments: W2BSC and WB2DDQ as ORSs; WB2UFV as OPS; WB2RKK as OBS; WA2BNF and K2DEL as OVS. Endorsements: W2BVE as RM for NNJ; WA2TEK as OBS; W2CVW and WA2RIN as OVSs; W2BVE as ORS. W2LWP has been elected pres. and K2KFP act. chairman of the New Bronx Amateur Radio Telephone Organization. Good luck to the group. The Annual NJN Net Meeting in New Brunswick resulted in the reelection of WA2KIP as net mgr. and W2BVE as asst. net mgr. WB2RKK will take over as editor of the *NJN Bulletin*. The Annual Phone Net Dinner was a big success with a good turnout. K2GPK is up to 97/116 with his 90-watt QRP station. K2VAC joined Air Force MARS and K2ZFI joined Army MARS. WB2ZGP reports the Woodbridge C.D. Unit assisted the police on "Mischief Nite," as did the Bloomfield and Englewood groups. WB2BCA was selected Junior Citizen of the Month by the Passaic Optimist Club. WN2CWP was chosen as "Acting Mayor for a day" by the City of Englewood. WA2CRF passed the General Class exam and is back on 2 meters. K2KDQ, K2YWA, WA2MOD and WB2BCA are all planning 2-meter RTTY. WB2ZSH is using a Valiant and an HQ-170A at his station. WB2VLC is enjoying 75-meter s.s.b. W2JDH has his center-fed Zepp working on all bands. W2ABL is using a new Drake T4X. We regret to learn of the sudden passing of WA2QHK. He will be missed by his many friends. All N.N.J. stations are urged to participate in the SET exercise. Contact your SEC, EC or SCM for the details. Traffic: (Oct.) WB2RKK 567, WA2IGQ 519, WB2UFV 353, WA2TBS 265, K2KDQ 118, W2BSC 115 WB2DDQ 97, W2LQP 90, K2DEL 81, WA2ASM 75, W2EWZ 67, WA2TEK 56, WA2ACJ 55, W2PEV 50, WB2PXO 47, WB2NSV 35, WB2CGI 30, W2DRV 27, WB2ZSH 25, WA2KZF 22, WA2WGR 19, WB2BXK 17, WB2BCS 16, WB2ZCJ 16, WA2TNA 15, W2BVE 14, WB2VLC 13, K2EQP 12, W2TFM 12, WB2JWB 11, K2ZFI 11, WA2NJB 10, WB2BCA 7, WA2CCF 6, WB2KPD 6, W2ABL 5, K2MFX 5, WB2ZGP 5. (Sept.) W2CVW 28, WB2NSV 25, WA2TEK 23, WB2BCS 3.

MIDWEST DIVISION

IOWA—SCM, Owen G. Hill, WØBDZ—Asst. SCM: Bertha V. Willits, WØLGG. SEC: KØBRE. PAM: WØNGS. RMs: WØTIU, WØSCA. WØTGQ has a new 2-meter transceiver and also is working on his own solid state computer. WØEIT is building a new 1-kw. 2-meter s.s.b. linear. WØEMA has now moved back to Iowa from Minnesota. WØOSC has been on the sick list. WØJAQ sends bulletins M.W.F. at 1825Z on 3975 kc. FMT reports were received from ARRL with reference to KØCQA and KØRTN activities in the test. Seems like more of the Class 1 Observers should participate. WAØINC, Blackhawk Co. EC, reports the AREC groups meets Sun. at 1800Z on 28,670 kc. WAØATA passed the General Class exam and continues to experiment on v.h.f. while recuperating from a heart attack which he had in July. The Tri-State ARC is conducting regular classes for Novices. Some net reports are missing this month because they were not received here by the deadline, which is the 7th of the month. The Iowa 75-meter Net reports QNI 1132, QTC 107, in 25 sessions. Traffic: WØLGG 762, WØLCX 582, WØCZ 166, WØVAU 110, W8FAW/Ø 77, WAØDYV 60, KØKAQ 36, WØEMA 30, WØJPJ 15, WØNGS 11, WAØMIT 9, KØEXN 7, WØGQ 7, WAØJUT 5, KØBRE 4.

KANSAS—SCM, Robert M. Summers, KØBXF—SEC: KØEMB. PAM: KØJMF. RM: W.ØMLE. V.H.F. PAM: WAØCCW, WØHAJ, WAØLSH. The Kansas Post Office Net now meets at 1230 CST Mon.-Sat. on 7255 kc. and 0830 CST Sun. on 3955 kc. QKS now meets daily at 0100Z and 0400Z on 3610 kc. WØPRI, WØVRZ and KØGZP have been on the sick list. KØYRQ has completed his move to K.C. and now uses a T4X, an R4X, a Swan 500 and a homebrew 4-1000A. WAØCCW reports that v.h.f. activity is increasing. V.h.f. nets totaled 41 sessions, reported 276 QNI and 20 QTC, of which 83 QNI was for the Kansas PI Net; 2 sections reported with 8 QTC. Zone AREC Nets 7, 10, 13 and 14 totaled 134 QNI. The Kansas WX Net reports big QNI 720 and 25 QTC; the Kansas C.W. Net, QKS, 57 sessions, QNI 360, QTC 114; the Kansas EC Net QNI 45 and QTC 2. KSBN reports 33 sessions, QNI 722, QTC 185; Kansas Phone Net QNI 249, QTC 38; KPON 31 sessions, QNI 396, QTC 38. The ACARA Net, Wichita, meets at 7 P.M. Sun. on 145.35 Mc. We understand WØUWN has a new Duo-Bander. K5OJD, ex-Ø, still is flying around Viet Nam. New officers of the Kans.-Nebr. Radio club are WØWXY, pres.; KØNBT, vice-pres.; WØCWQ, treas. The Salina Club helped the Salina PD in the annual Spook Patrol on Oct. 31. The Hambutchers reports QNI 658, QTC 186. I hope that is correct as the card met with the elements. We regret to report KØTFK as a Silent Key. Traffic: WAØMLE 185, KØJMF 147, WØLXA 130, KØBXF 97, KØEMB 87, WØPSN 73, WAØLLC 68, KØLPE 67, WØINH 66, WØCGZ 56, WAØKDQ 50, WØCWJ 48, WAØCCW 37, KØGII 24, KØUVH 22, WØAVX 19, WAØJOG 12, WAØKDJ 12, WØILB 9, KØMRI 7, KØYRQ 5, WØFDJ 4.

MISSOURI—SCM, Alfred E. Schwaneke, WØTPK—SEC: WØBUL. I am sorry to report that KØURE, well known on 75-meter phone, is now a Silent Key. The following stations renewed appointments: KØAEM as EC of St. Louis and St. Louis Co. and ORS; WAØEMS as OPS and OBS; KØFPC, as ORS; KØLGZ as ORS; WØJBK as ORS. WAØEMS received his Extra Class license. WØGAX won first place for Mo. in the Md.-D.C. QSO Party. WØJBK won first place for out-of-state in the Phone and C.W. Tenn. QSO Party. WAØQFI, Parkway HS ARC, is erecting a 50-ft. tower with a three-element beam. The *Zero Reaters ARC News* is now one year old. WØKY, C.D. Dir. of St. Louis Co., KØAEM, WAØEFB and WAØKBZ, are conducting code and theory classes for about 50 prospective Novices. St. Louis RACES holds 2-hour simulated emergency drills each month. WAØENI, WAØHTN and WAØIHV participated in the Sept. FMT. WAØPUL has a new HQ-110. KØJPJ now has 7 receivers for OO operations. KØVXU is at Lackland AFB, Tex. WAØPFU visited KØBXI to work in the DX Contest. KØHGW, now WB6YNW, married and moved to San Diego. KØJPS has been working traffic with Keesler AFB, Miss.

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MEN	3885	2330Z	M-W-F	31	188	4	WØBUL
MON	3585	0100Z	Daily	—	—	—	WØTDR
MNN	7063	1900Z	M-Sat.	26	83	81	WØOUD
MoSSB	3963	2400Z	M-Sat.	22	479	128	WØRTO
MTTN	3940	2300Z	M-F	20	244	113	WAØELM
MoPON	3810	2100Z	M-F	21	277	174	WØHVJ
QMO	7075	2200Z	Sun.	5	15	3	WAØFKD
PfD	50.4	0130Z	Tu. (GMT)	5	106	14	WAØKUH

Traffic: (Oct.) KØONK 1783, WØZLN 283, KØYBD 203, KØAEM 199, WØEEE 128, WØOUD 127, WØHVJ 122, KØRPH 116, WAØKUH 97, KØJPS 76, WAØJIH 62, KØFPC 44, KØREV 40, WAØQOA 36, WAØRMW 31, WAØFMD 29, WAØPYJ 28, WØBUL 25, WAØELM 23, WØRTO 21, WAØPFU 18, KØLGZ 16, KØORB 14, KØGOB 13, WAØOZO 10, WAØQLN 9, KØVVH 8, WØAMO 5, KØJPJ 4. (Sept.) WAØPUL 2.

NEBRASKA—SCM, Frank Allen, WØGGP—SEC: KØOAL. Monthly net reports for Oct.: Nebr. Emergency Phone Net, WAØGHZ, QNI 1047, QTC 48. Nebr. Morning Phone Net, WAØJUF, QNI 900, QTC 56. West Nebr. Phone Net, WØNIK, QNI 607, QTC 24. Nebr. C.W. Net, (NEB), WAØGHZ, 1st session QNI 50, QTC 97; 2nd session QNI 128, QTC 84. NEB needs representation badly in the northeast, northcentral and northwestern parts of Nebraska. AREC C.W. Net, NACN WAØEET, QNI 15. Nebr. AREC Phone Net, WØIRZ, QNI 184, QTC 5. Dead End Net, WAØMCX, QNI 205, QTC 13. Nebr. Storm Net, WAØKGD, 2330Z session QNI 1187, QTC-140: 0030Z session, QNI 921, QTC 121. Novice Operators Net (NON), WAØORO QNI 57, QTC 9. ECs are reminded to start preparations for the SET. WAØGVJ has passed the Extra Class exam. KØQIX won first place

in the Md.-D.C. QSO Party in Aug. Three stations in Nebr. made the BPL: WAØDOU, WAØOCW and KØAKK. Traffic: WAØDOU 534, WAØOCW 452, WAØGHZ 278, KØAKK 188, WØLOD 110, WAØQMZ 88, WAØOMY 86, WAØHWR 65, WAØGVJ 49, KØJTW 40, WAØIBB 32, WAØIXD 28, WAØOHO 28, WØSAI 27, WAØLOY 26, KØKJP 25, WAØBOK 24, WAØDXY 21, KØODF 21, KØDGW 18, WAØOQX 18, WØAGK 12, WØGGP 12, KØIXY 12, KØRRL 12, KØUWK 10, KØHNT 9, WØHTA 9, WAØKHE 9, WØVEA 9, KØVTD 9, WØNIK 8, WØRJA 8, WØEJO 6, WØBFV 5, WØCXH 5, WØHOP 5, WAØIBL 5, WAØJUF 5, WØCRK 3, KØUDW 3, WØPHA 2, WAØPSN 2, WØWKP 2, WØYFR 2.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, John J. McNassor, W1GVT—SEC: W1PRT. RM: W1ZFM. PAM: W1YBH. Net reports for Oct.:

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*
CN	3640	Daily	18:45	31	379	479
CPN	3880	Daily	18:00	31	494	136
		Sun.	10:00			

High QNI: CN—WA1HSN, W1RFJ, W1ZFM and W1WCG. CPN—W1YU 31, WA1FVH and W1GVT 29, WA1EEJ 27, K1CWO 24, K1BOP 22, W1YBH 21, K1SRF 20, WA1BDA 17 and WA1CYV 16. SEC W1PRT suggests more active participation in EC work for 1968. The Candlewood ARA-sponsored Conn. QSO Party was the best ever this year—ideal for making the Conn. Counties Award. W1WHQ advises the Conn. Council has IRCs at 10¢ each. The Eastern Area Traffic Net meets on 3900 kc. at 0030 GMT; the New England Teen Age Net on 3885 kc. at 7 P.M. W1QV announced the award of the Director's Plaque to K1KLO. New officers: Hartford County ARA—K1JFN, pres.; K1OXQ, vice-pres.; K1LDG, secy.; WA1GNG, treas.; WA1FJF, act. mgr.; WA1EEU and W1HDQ, directors. Southington ARA—W1WHR, pres.; W1AGJ, vice-pres.; W1EFW, secy.; W1IOB, treas.; W1GVZ, exec. comm. The Hartford County and the Hampden County Clubs joined forces to produce the Conn. Valley ARRL Night. It was my pleasure to attend this fine and informative meeting which is expected to become an annual event. ARRL was very well represented by W1LVQ, W1HDQ, W1ICP and W1EEN. WA1FNJ installed full break-in. K1QPN has a complete new mobile station. Congratulations to: WA1FVH, Oct. BPL; WN1IQJ, only Novice Traffic report; WA1FGN, Conn. Counties Award; K1TKS, elected chief op. for W1YK, Worcester Tech.; WN1IVG, a new Novice and W1WV, a Class I OO for 36 years and still active at it! A New Year's Resolution: Get the ARRL *Course in Radio Fundamentals* and follow it to completion for greater enjoyment of our hobby! Happy New Year! Traffic: (Oct.) W1EFW 341, WA1FVH 288, WA1HSN 279, WA1FNJ 181, W1WCG 131, W1KAM 87, WA1FGN 86, W1AW 72, W1BDI 67, WA1GGN 50, WA1GFW 45, WA1HEW 34, W1GVT 33, W1YU 27, K1LMS 23, W1CTI 20, W1QV 18, K1SXF 18, K1PJQ 13, WA1GIX 12, K1SRF 12, K1BOP 11, W1YBH 9, W1CUH 7, WN1IQJ 7, W1BNB 6, K1YGS 5, W1CHR 2, K1TKS 2. (Sept.) K1TKS 24, WA1HEW 10, W1CUH 4.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—W1AOG, our SEC, received reports from ECs W1s RPF, AWA, UJF, K1s ERO, HHN, WA1DXI. The 6-Meter Crossband Net had 17 sessions, 140 QNIs, 10 traffic. W1PEX is on 2. W1NF took part in the National C.D. Drill. EM2MN had 67 QNIs, 74 traffic. K1s OUM, DZG, YUB took part in C'DDX-67. W1DMD won a bronze medallion and first-place award for N.E. in the '67 Nebraska Centennial QSO Party. W1MP-ARO has the call W4MP now. W1s UMM and UQB, the Mugford twins, showed up at the meeting of the South Shore Club. K1ODK, formerly of Wayland, has his old call, W6ZYC, back in Los Altos, Calif., and is on 20 s.s.b. WA1ETC is active in the Avon AREC Net on 6. K1BGK was in the hospital. WA1GBT is on 75. W1OFK is getting settled in his new QTH in Plymouth. W1AAR is on 2 and 6. W1HIL keeps skeds with the old gang. W1ALP held his annual LO-Nite at his QTH with W1s AOG, EAE, OFK, DOM, PEX, K1PNB and WA1DRO present. W1OJM is back in Foxboro for the winter. W1s DDO, PLJ and K1CCL took part in the Sept. FMT. K1WXC moved back to N.Y. and now is K2QBW. W1SIV and his XYL visited W1OFK, also WA1DRO. K1OWM, W1JBA, W1PYT, W1WNK and K1LNQ are working on a tripler for 432. K1FFE completed his "master plan" F.E.T. converter for 2. K1FJM is back in college at W1YK. K9AQP/1 is working on F.E.T.s for preamps for 2 and 6. WA1DPX worked some DX on 6 during an opening. K1-FWF's brother, WA1HUY, has his Tech. Class license. The Wellesley C.D. Net meets Sun. at 1400 GMT on 2. Net certificates have been sent to K1MED, WA1DWS, W1JBA and WA1FYI as members of the 6-Meter Crossband Net. K1VZX has been very active on 15. W1ALB is

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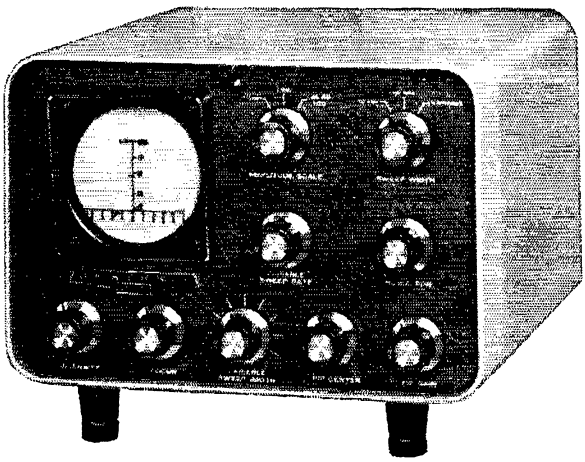

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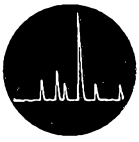

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SB-620 SPECIFICATIONS — RF AMPLIFIER: Input frequencies: One of the following: 455 kHz, 1000 kHz, 1600 to 1680 kHz, 2075 kHz, 2215 kHz, 2445 kHz, 3000 kHz, 3055 kHz, 3395 kHz, 5000 to 6000 kHz. **Frequency response:** ±0.5 db at ±50 kHz from receiver IF. **IF frequency:** 350 kHz. **Sensitivity:** Approximately 10 uv input signal provides a visable signal (40 db mark) at full pip gain setting. **Spectrum analyzer:** Test signal input frequencies up to 50 MHz. **HORIZONTAL DEFLECTION: Horizontal sweep generator:** Sawtooth sweep produced by neon lamp relaxation oscillator. **Sweep Rate (Approximate frequencies):** 10 kHz preset: 0.5 Hz. 50 kHz preset; 2 Hz to 2.5 Hz. Variable: 5 Hz to 15 Hz. **Preset sweep width:** 10 kHz preset: 10 kHz. 50 kHz preset: 50 kHz. **Variable sweep width:*** 455 kHz (10 to 100 kHz); 1000 kHz (50 to 100 kHz); 1600 kHz (50 to 500 kHz); 1680 kHz (50 to 500 kHz); 2075 kHz (50 to 500 kHz); 2215 kHz (50 to 500 kHz); 2445 kHz (50 to 500 kHz); 3000 kHz (100 to 500 kHz); 3055 kHz (100 to 500 kHz); 3395 kHz (100 to 500 kHz); 5200 kHz (100 to 500 kHz); 6000 kHz (100 to 500 kHz). **Resolution:** 1 kHz. Note: Resolution is defined as the frequency separation between two equal adjacent signals such that the intersection between their respective pip indications is 30% below the apex amplitude. **Amplitude scales:** Linear: 20 db (10:1) range. Log: 40 db (100:1) range. —20 db Log: (Extends calibrated range to 60 db). **POWER SUPPLY: Type:** Transformer operated; fused at ½ ampere. **Low voltage:** Full-wave voltage doubler circuit, using four silicon diodes. **High voltage:** Full-wave voltage doubler circuit, using two selenium diodes. **Bias voltage:** Full-wave bridge circuit, using four silicon diodes. **Power requirements:** 120 or 240 volts AC, 50/60 Hz, 40 watts. **GENERAL: Tube complement:** (1) 3RP7 CRT, high persistance (yellow trace with screen filter). (1) 6AT6, detector vertical amplifier. (1) 6AU6, IF Log amplifier. (1) 6EA8, sweep oscillator, mixer. (1) 6EW6, RF amplifier. (1) 6EW6, IF amplifier. (1) 12AU7, horizontal, push-pull amplifier. **Diode complement:** (8) Silicon diodes, low voltage rectifier, DC filament rectifier. (2) Selenium diodes, high voltage rectifiers. (1) Silicon diode, voltage-variable capacitor. **Dimensions:** 10" W. x 6⅝" H. x 10½" D.

*These sweep widths are minimum values. Actual sweep width ranges will be greater than those listed, depending on the receiver IF frequency for which unit is wired.

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waiting for an SB-101. The Whitman ARC held an auction and a transmitter hunt. We will be able to get license plates with our calls on them for only $2.00 extra. W1KBN has organized "The Beantown Net" on 3892 kc. at 2400Z. WB2WJF/1 is net mgr. W1MX has the beam fixed. W1FJI has a dipole for 40. K1OWM has a 2-meter ground plane up 90 feet. WN1IOB is on 15 and 40. A meeting to set up a New England Chapter of OOTC was held and temporary officers are W1DFS, chmn.; W1AOG, secy.-treas. K1KRG and K1PNB are trying to stir up interest in a club in the Pepperell & Townsend area. W1DOM is a new OBS. Appointments endorsed: W1AOG as SEC, OBS, ORS; K1OWM, K1FWF, W1OFK, WA1BFD as OVSs; W1MME as EC, OBS, OPS; WA1BFD as OPS. ARRL presented the Hamquest Grand Award gavel to the Danvers ARA at a banquet and meeting. WAIs FXV and CRA are now Generals. WN1HFN is on 80. The W1-AEC Club held an auction. K9AQP/1 put his 20 milliwatt s.s.b. transmitter into beam and worked 10 miles. W1IF1 has an 18 AVQ vertical antenna. The Medford c.d. group took part in CDEX-67. EMN reports 210 QNIs, 195 traffic. Traffic: (Oct.) WA1EYY 406, W1EMG 302, W1OJM 261, WA1DRS 112, WA1FKQ 94, WA1FAD 86, WA1FSI 85, W1DAL 81, W1KBN 63, W1EAE 53, WA1HXF 36, W1MX 33, K1CLM 29, W1CTR 24, WA1DRO 23, K1OKE 23, W1PEX 21, W1AOG 18, W1FJI 16, W6JCF/1 15, WA1-DPX 14, K1VOK 14, W1DOM 13, K1YUB 11, W1AEC 8, K1LCQ 8, WA1DJC 2, W1CT 1, WN1IOB 1, K1OWM 1. (Sept.) WA1DRS 51, W1EAE 43, K1HHN 20, WA1GCH 11, K1LCQ 10.

MAINE—SCM, Herbert A. Davis, K1DYG—SEC: K1DYG. PAM: WA1FLG. RM: W1BJG. Traffic nets: The Sea Gull Net operates Mon. through Sat. on 3940 kc. at 1700; the Pine Tree Net daily on 3596 kc. e.w. at 1900. WA1FLG is the new PAM and we hope all stations will help him out so that he can do a nice job for the net. W1YA, at the U. of M. in Orono, is active on the air and the nets. The club includes WA1FCM, K1TMJ and K1MWA. K1TMK is on mission service in Uruguay and doing well. Things are picking up on the PTN with a little more traffic moving and K1WQI is back as NCS. NCSs on PTN are W1GU, WA1BEB, K1TZH, K1WQI and W1BJG. There is quite a group on 2 meters Sun. morning: WA1FLG, W1DBC, K1SIV, W1TZN/M, K1-DTX and K1DYG. Traffic: W1BJG 146, W1GU 69, K1WQI 27, W1YA 12, WA1CSQ 9.

NEW HAMPSHIRE—SCM, Robert C. Mitchell, W1-SWX/K1DSA—SEC: K1QES. PAM: K1APQ. RM: Still open. Endorsements: K1AC as ORS and K1DWK as EC. Appointments: W1ALE as OVS. New hams: WN1-IOO, WN1IOM, WA1IPD, WN1IPK, WN1IQI, WA1IQN, WN1IQZ. 6-Meter Crossband Net certificates were issued to K1HFW, K1DWK and W1KKB. Homework has priority at UNH with WA1FSZ after an EE degree. The MVAREC held its annual dinner meeting in Concord. The following attended: W1ALE, WA1AMG, WA-1DLI, K1DWK, K1EEH, K1EXY, WA1HAT, K1KQJ, K1LEY, K1MVA, W1NNL, W1NNM, K1NQR, K1OXO, K1QES, W1SWX, K1YCD and many XYLs. K1APQ reports 754 check-ins and 95 traffic for GSPN. W1DYE took first for N.H. in the Md.-Del. QSO Party. K1DWK reports 137 check-ins and 11 traffic for the MVAREC. There will be no N.H. QSO Party this year because of the inactivity of the Concord Brasspounders. K1QES reports 96 check-ins and 12 traffic for NHEPN. K1LNU and K1QPS are heard often from their mobiles. K1UZG reports 105 check-ins and 63 traffic for VTNHN. A Happy New Year to all of you. Traffic: (Oct.) K1BCS 308, WA1EUJ 36, K1PQV 33, W1MHX 30, K1QES 10. (Sept.) WA1EUJ 20.

RHODE ISLAND—SCM, John E. Johnson, K1AAV —SEC: K1LII. RM: W1BTV. PAM: W1TXL. V.H.F. PAM: K1TPK. RISPN report: 31 sessions, 382 QNI, 67 traffic. The Newport County RC reports that club certificates were awarded to WA1HJM No. 76 and WA1-IJC No. 75. The club auction was a huge success and the club hopes to raise enough money to get an s.s.b. rig. WA1HBG, of the club, recently passed the exam and is now a General Class licensee. The W1AQ Club of Rumford reports that the building program is progressing at a rapid rate, according to K1HMO and K1LII of the committee. A class will begin to instruct members for the General Class ticket. Those taking part are WNIs HXN, ICO, ICR, ICQ, HXP, HM and ICP. WA1EEJ worked VP9WB on 75 meters. He also handled traffic from WB2BDJ, of the Brookhaven National Laboratory, and recently visited K1OQG and WA1FVH in Connecticut. K1LXQ has been active on 10 meters. K1AMG has been logging DX on 20-meter c.w. WA1-CVF is now attending college. Traffic: WA1EEJ 619, W1TXL 150, W1YKQ 99, K1VYC 34, W1BTV 29, K1TPK 16.

VERMONT—SCM, E. Reginald Murray, K1MPN—

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*NCS*
Gr. Mt.	3855	2230Z	M-S	716	45	W1VMC
VL Pone	3855	1400Z	Sun.	225	0	W1UCL
VTNH	3685	2330Z	M-F	105	63	K1UZG
VTCD	3990½	1500Z	Sun.	39	10	W1AD
VTSB	3909	2230Z	M-S	715	85	W1CBW
		1330Z	Sun.			

Congrats to K1UZG/1 and W1BD/1 on their fine showing in the 1967 ARRL Field Day results (pgs. 65 and 68 Dec. *QST*). Welcome to new Novices WN1JJE Bennington, WN1IOH Bradford, WN1IPY Woodstock, WN1IQE Brattleboro, WN1IQD Putney; also congrats to WA1IGB Burlington, WA1IHN Fair Haven, WA1IQK Burlington and WA1IQV St. Johnsbury. K1IJJ, Bart #1, has WAS on s.s.b. and is working toward DXCC. Good luck to W4SCY, Bart #2; hope he has a nice winter in Fla. Happy New Year to all. Traffic: K1BQB 321, W1FRT 19, K1UZG 15, K1MPN 13, WA1GUV 4, K1IJJ 2.

WESTERN MASSACHUSETTS—SCM, Norman P. Forest, W1STR—RM W1DWA reports 31 sessions and 145 pieces of traffic handled, 77 more than last year. Those reporting were K1AEC, W1DVW, K1WZY, WA1GWV, K1IJV, W1DWA, W1BVR, W1STR, WA1HEC. Other nets which may be heard are as follows:

Net	*Freq.* (Mc.)	*Time*	*Days*	*Mgr.*
WMN (c.w.)	3.560	1900	Dy	W1DWA
WMTN (c.w.)	3.560	1900	M-W-F	K1IJV
WMPN	3.913	1815	M-Sat.	K1DGQ
HCRAPN	28.990	2100	Wed.	W1IC
CVVHFN	145.050	2100	Mon.	W1QWJ

W1OOP will be guest speaker at the HCRAI Jan. 5 with his usual excellent treatment of a v.h.f. topic. WA1ARF, of *Feeding Hills*, is operating from Elsmere Ice Island, according to W1DGJ. K1DGQ now operates the new WMPN as of Dec. 1, 1967. You are invited to call in. The VARC Club expects to have a talk by a Channel 22 engineer on v.h.f. transmissions. The date is Jan. 12. K1IJV reports good progress on WMTN with WN1HHO, WN1HHA and WA1GWV going great and all very active. New appointments: W1LJQ as EC Northampton, W1IC as OBS. W1IC has taken over as net mgr. for the Central New England Phone Net. W1DVW, Amherst, reports that WMN (c.w.) needs more activity in the Franklin and Northern Worcester County areas for improved coverage. Traffic: W1IJV 134, W1DVW 87, K1AEC 51, W1DWA 51, WA1GWV 46, W1BVR 44, W1WZY 42, WA1EYF 31, W1EOB 28, WN1HHA 25, WA1HEC 23, W1ZPB 13, W1MNG 11, W1YK 8.

NORTHWESTERN DIVISION

ALASKA—Acting SCM, Albert F. Weber, KL7AEQ—Asst. SCM: John P. Trent, KL7DG. SEC: KL7GEF. OBS: KL7CAH. KL7GAC reports from Annette Island and S.E. Alaska that the S.E. Alaska Emergency Net meets on 3850 Mon. at 0230Z. This frequency is monitored on a 24-hour basis, and all check-ins are welcome. KL7GBA is back at Annette Island after a hospital stay in Seattle. KL7TI and KL7EQG, of the Annette FAA, are both antenna-constructing. KL7EQG is working on a quad. KL7EQA got a doublet up and is on 75 these days. KL7FHX reports a new crop of Novices coming from his classes out at Eilson MARS. KL7GEF reports that the Northland ARC began tall code classes with 30 potential Novices. KL7NR, the club station, is working for WAS. KL7FRZ reports that DX is great on 20 c.w. in the Haines area. KL7CAH reports that the Sourdough Net will shift frequency to 3915 kc. effective Jan. 2, 1968. The Arctic ARC recently did its annual stint shepherding the Equinox Marathon. KL7DIY is at Stanford working on a Ph.D. W8KNC still is holding his breath for that 6-meter break that is sure to come. KL7FKX and KL7EVO report that the only signals they hear on 6 are military tactical stuff. KL7DJ1 is back in Fairbanks for the winter and looking for v.h.f. openings. Your new SEC is going to be looking for ECs and AECs in just about all areas. How about some volunteers? KL7EWH is the new EC for the Fairbanks area. Thanks to all for the news. Traffic: KL7CAH 137, KL7FRZ 2.

IDAHO—SCM, Donald A. Crisp, W7ZNN—SEC: K7THX.

FARM Net	Tues.-Sat.	0200 GMT	3935 kc.
ISN	Tues.-Sat.	0130 GMT	3593 kc.

The newly-elected FARM Net officers are K7KRO, mgr.; W7JHM, chief net control. W7KHM and W7BAA are Silent Keys. The newly-elected Idaho Radio Amateurs, Inc. officers are W7YUX, pres.; W7ORJ, secy.-treas.; W7HOV, vice-pres.; W7YON was given the Ham of the Year Award. K7NDX is installing a 2-meter repeater station near Orofino. W7ICO is working DX

MODEL 410 VFO — SWAN 500 TRANSCEIVER — 117XC POWER SUPPLY — MARK II LINEAR

Illustrated above is a complete Swan station for SSB, AM, AND CW. You can transmit and receive on all 5 bands with your 500 transceiver, and when used with the Mark II linear amplifier, you're at the legal power limit. Switch in the Model 410 outboard VFO and you're all set for separate transmit and receive operation. Yet this complete home station, with proven Swan performance, reliability, and craftsmanship is yours for substantially less than any other comparable equipment.

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5 BANDS—480 WATTS
This deluxe model offers many extra features including selectable upper and lower sideband, 100 kc crystal calibrator, automatic noise limiter, and factory installed accessory socket for addition of Model 410 external VFO. Features crystal lattice filter with shape factor of 1.7 and ultimate rejection of better than 100 db . . . providing excellent selectivity and superior audio quality..... **$495**

MODEL 410 FULL COVERAGE EXTERNAL VFO
Eight tuning ranges of 500 kc each. When used with the Model 22 dual VFO adaptor, the 410 provides separate transmit and receive frequency control.
Model 22 Adaptor..$25 **MODEL 410..$95**

MODEL 117XC MATCHING AC POWER SUPPLY
Includes speaker and phone jack..... **$95**
PLUG IN VOX UNIT.....$35.00

12 VOLT DC POWER SUPPLY
MODEL 14-117 .....$130

CRYSTAL CONTROLLED MARS OSCILLATOR
5 Channels, Model 405X, less crystals **$45**

MARK II LINEAR AMPLIFIER
5 bands, 2000 watts PEP input. Uses two Eimac 3-400Z triodes. With tubes..... **$395**
MATCHING POWER SUPPLY.....$235

See the complete Swan home station at your dealers today.

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ELECTRONICS Oceanside, California

on 10 meter c.w. with QRP power. W7KHI was reported in the hospital. K7CPC has a new 80-10-meter station set up at his new QTH at Idaho Falls and is active with QQ work. An Idaho c.d. exercise was held Oct. 25-29. A few of the stations that participated were WA7EWV, K7THX, W7ZNN, K7NDX, WA7CBW, W7CVJ, WA7CTS and WA7EDT. FARM Net report for Oct.: 23 sessions, 631 check-ins, 60 traffic handled. ISN report for Oct.: 17 sessions, 88 check-ins, 29 traffic handled. Traffic: WA7BDD 110, W7ZNN 23, K7OAB 22, K7OQZ 7, W7GGV 6, W7IY 6, W7IUO 3, WA7EWV 2.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—SEC: W7RZY. PAM: W7ROE. Section Nets:

Montana Traffic Net	3910 kc.	0000 GMT	M-F
Montana Section Net	3950 kc.	1700 GMT	Sun.
Great Falls AREC	3910 kc.	1630 GMT	"
Missoula Area Emerg.	3890 kc.	1600 GMT	"
Montana PON	3885 kc.	1515 GMT	"
Montana RACES	3996.5 kc.	1600 GMT	1-3 Sun.

Endorsements: K7NXA as EC. W7ROE has been appointed as PAM. K7BYB was active in the Fish Derby held on the Missouri River. Meetings of the state AREC groups were held at Butte, Helena and Great Falls. The SEC presented a film and tape program on the ARPSC. If your club would like to see this presentation on AREC-RACES-NTS, write to the SEC or SCM. The Great Falls RACES has a new TR-4 and amplifier for the c.d. station. K7EGJ is the R.O. for Cascade County. W7FL is transferring to John Day, Ore. Mont. PON traffic: 14. The Montana Section Net was started Nov. 5. This net is for contacting the LOs in the state and initiating more ARRL activities. All interested amateurs are invited to check in. Traffic: WA7DMA 324, K7DCH 46, K7PWY 39, K7EGJ 32, WA7IPL 5, W7FL 4, W7FIS 1.

OREGON—SCM, Dale T. Justice, K7WWR—RM: W7ZFH. PAM: K7RQZ. Section nets inviting your participation:

Net	*Freq.*	*Time*	*Days*	*Net Mgr.*
AREC	3875 kc.	0300Z	Daily	WA7AHW
BSN	3985 kc.	0130Z-2000Z	Daily	K7IFG
OSN	3585 kc.	0200Z	Tue.-Sat.	W7ZFH

Please note the new frequency for the Beaver State Net, effective Jan. 1, 1968. WA7AHW reports for the AREC Net for Oct.: Sessions 31, check-ins 785, traffic 23, contacts 80, QSTs 3, maximum number of counties 19. New appointment: K7OUF as ORS. Mert uses an SB-101 and a pair of 4-400As at 1 kw. and an HQ-160 on all bands. K7SXW is trying to find a better way to tie down his antenna after the last windstorm. W7AJN, past SCM, is ragchewing on 40-meter c.w. WA7EZJ and K7OUF send in their first reports. RTTY activity is picking up with K7UXK, K7WWR, K7YQM, WA7ADW, W7IE and W7IAN all active on 80 meters. WA7FQM is on with a new rig, as is K7WSW. New General Class stations are WA7GVV in Grants Pass and WA7FNO in Forest Grove. WA7CIP has a "V" beam antenna up for 40 through 10 meters. W7ZFH reports for OSN for Oct.: Sessions 21, check-ins 108, traffic 34. Traffic: K7RQZ 369, K7OUF 113, W7ZFH 77, WA7BYP 75, K7IFG 74, W7ZB 64, K7NTS 60, K7WWR 55, WA7EES 32, WA7GLP 26, WA7DPK 25, W7BNS 20, K7QLZ 19, W7DEM 18, K7KPT 11, W7KTG 6, W7MLJ 6, WA7CIP 1.

WASHINGTON—SCM, William R. Watson, K7JHA—SEC: W7UWT. RM: K7CTP. PAM: W7BUN.

NTN	3970 kc.	1930Z Daily	QNI 864	Traffic 400	Sess. 31
WSN	3575 kc.	0300Z Daily	QNI 349	Traffic 358	Sess. 31
NSN	3700 kc.	0400Z Daily	QNI 486	Traffic 216	Sess. 31
WARTS	3970 kc.	0200Z Daily	QNI 1159	Traffic 117	Sess. 20

SEC W7UWT holds a weekly EC net on AREC frequency 3930 Sun. at 1700Z. The BEARS Club has Search and Rescue organized with an FB guide for members written by W7CJL. Formation of a statewide council of clubs is underway with W7HJW acting as coordinator. Promotion is under way to have Washington State Amateur Week proclaimed during the second week of Sept. 1968. This will coordinate the Washington State QSO Party and various other club programs. PAM W7BUN is working on a Washington State certificate executed by the Governor for those who qualify. Plans are now in progress to have the original bill for license plates restored at the next legislature, or back to the $5 fee. Response from legislators has been encouraging. Is your club affiliated with ARRL? If not, why not join and realize the many benefits the League offers. The NW Tech Net, 3970 kc., Sun. at 3 p.m. local time, has had an all-time record of check-ins. New appointees: W7HJW as OBS, WA7EDQ as

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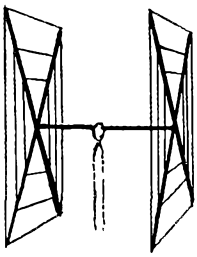
QUADS

Worked 42 countries in two weeks with my Gotham Quad and only 75 watts . . . W3AZR



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.

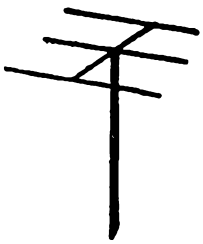
Now check these startling prices — note that they are *much lower* than even the bamboo-type:

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



Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new! full size (36′ of tubing for *each* 20 meter element, for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ⅞″ and 1″ aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

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!

V40 vertical for 40, 20, 15, 10, 6 meters $14.95

V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters $16.95

V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters . . . $18.95

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ORS, K7YDZ and W7EDQ as ECs. Endorsements: K7CTP as ORS; W7PGY as OPS; W7LFA as OPS. The Clark County Club is working on its new shack. The Tacoma Club is working on its slate of officers for 1968. The Spokane Club elected K7BFL, pres.; K7JJY, vice-pres.; W7PUL, secy.; K7BFI, treas. W7AMC is back on 2 meters with the c.d. W7BTB is sporting a new Swan 500. OO W7AXT reports signals are improving. The WSN Net has an election under way for manager. W7MCW is adding a linear to the SBE-34. W7IEU reports the AREC frequency is being used for Snohomish County emergency drills. Traffic: (Oct.) W7BA 1392, WA7DXI 1024, W7ZIW 623, W7HMA 540, W7DZX 493, W7KZ 336, W7PI 314, K7CTP 279, WA7DZL 236, W7JEY 164, K7PXA 136, K7MCA 91, W7MCW 90, WA7EDQ 76, W7BTB 65, K7JHA 64, K7THG 59, K7KPA 58, WA7BZY 55, K7VNB 54, W7IEU 46, W7UWT 40, W7APS 22, WA7HKR 22, W7BUN 20, W7AMC 13, W7AIB 12, W7GYF 10, K7MGA 10, W7AXT 9, WA7HSJ 9, W7RXH 9, W7UU 9, WA7FXB 8, K7JHA 8, WA7DBQ 5. (Sept.) K7KPA 73, WA7GVP 46, K7SUX 23, K7MGA 9.

PACIFIC DIVISION

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: WA7BEU. New officers of the Las Vegas Radio Amateur Radio Club are K7RKH, pres.; WA7ESM, vice-pres.; WA7DUG, secy.; W7AKE, treas.; K7PPE and K7USR, directors. W7FJN, W7VYC, K7PPE, K7RKH and K7ZOK provided communications for a Boy Scout exercise and received commendations from the Mayor of North Las Vegas. Members of the Nevada Amateur Radio Association and Nevada Amateur Radio Society of Reno are planning for an ARRL Convention in 1968. Two-meter f.m. on 146.94 Mc. is monitored around the clock in the Reno area. WA7BEU has a Model 19 teletypewriter operational. WA7CQS and W7YRY each have a Model 15. W6FB/W7OX reports visiting with WA7EGV, who spent the past 17 years in 7Z-Land. K7YYQ received back a QSL card over 30 years old which was sent as W6KMN. W7YRY has been telephone relaying for KJ6 stations. W7PRM has a new beam and tower. W6BPI and his XYL, W7PBV, were hosted to a breakfast by W7PRM. Traffic: K7OHX 5, WA7BEU 4, W7PBV 2.

SACRAMENTO VALLEY—SCM, John F. Minke, III, WA6JDT—ECs: WB6MXD, K6RHW, WB6RSY, W6SMU, WA6TQJ. RM: W6LNZ.

Net	*Freq.*	*Time*	*Days*	*Mgr.*
NCN	3630	0300Z	Daily	WB6HVA
NCN/2 (Slow)	3630	0430Z	Daily	WB6HVA
Yolo Co. CD	146.94	0300Z	Wed.	WA6TQJ
SCEN	146.25	0500Z	Wed.	K6IKV
Nevada Co.	145.80	0300Z	Wed.	W6ZUZ

W6ZJW, who spends 95 percent of his time on c.w., has been operating a little s.s.b. on 10 meters. The McClellan ARS has suspended meetings because of the loss of a meeting place and diminishing attendance. The Nevada Co. ARC meets the 3rd Tue. of each month at 8 P.M. at Watt Park F.D., opposite the Nevada Co. Fair Grounds in Nevada City. The North Hills RC meets the same time at the Community Center in Fair Oaks. The Golden Empire ARS in Chico still is looking for a meeting place. WB6RSY was QRT for Internal Revenue School in San Francisco. RM W6LNZ seeks c.w. traffic men in Northern California for outlets in NCN. WB6MXD has become involved with the Western Country Cousins and is NCS Fri. at 9 P.M. on 3970 from Crescent City. W6NKR is a new grandfather. ORS W6AF is a Silent Key. W6DOR bought a new home and is building an s.s.b. rig for 6 and 2 meters. Traffic: (Oct.) W6LNZ 148, WB6QZZ 20, WB6MXD 14, WB6EAG 4, W6VUZ 4. (Sept.) WA6TQJ 14, W6NKR 2, W6VUZ 1.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD—The Tamalpais Radio Club had a breakfast at Taylor Park in Marin County Nov. 12. WA6SBA is putting out the club paper for the Tam Club. WA6BYZ is a new ORS in San Francisco and handles traffic for the NCN. He made the BPL in Oct. for the second month in a row. W6GQA continues to put together the longest string of FMT participations in the ARRL and had his usual good report in the latest test. W6AFQ is back home in Santa Rosa after a trailer trip to Arizona. W6WLV reports his new antennas make more bands available to him. Hal was active in the c.w. portion of the recent CD Party. W6DXA is home again after a short trip to the hospital. W6DTV reports that amateurs helped in Halloween patrols in Sonoma County on two evenings. WA6WHC is pres. of the University of California Radio Club. W6BB, K6JFY is leading the students working for the Extra Class license. K6UJW

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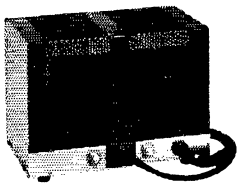
MORE MUSCLE!

DRAKE L-4B LINEAR AMPLIFIER

No increase in price! Amateur Net . . . **$695.00***

- Two new Eimac 3-500Z tubes give 1000 watts total plate dissipation
- Built-in RF directional watt meter calibrated 300 and 3000 watts forward and 300 watts reflected
- Vernier plate tuning control
- Front panel AGC threshold adjustment and stand-by switch
- Epoxy finish and eye-ease panel

Frequency Range: Ham bands 80 thru 10 meters. All frequencies 3.5 to 30 Mc covered with some retuning of coils ● **Plate Input:** 2000 watts PEP-SSB, 1000 watts DC on CW, AM and RTTY. Class B grounded grid with inverse feedback ● **Drive Requirements:** 100 watts PEP-SSB, 75 watts CW, AM and RTTY ● **Input Impedance:** 50 ohms. Broad band tuned input for low distortion, high efficiency ● **Output Impedance:** Adjustable Pi-Network matches 50 ohm line with SWR not to exceed 2:1 ● **Built-in Antenna Relay** ● **Two Taut-band Suspension Meters** ● **Quiet,** low velocity, high volume blower ● **Power Requirements:** 230 V, 50-60 C, 15 amps or 115 V, 50-60 C, 30 amps ● **Tubes:** Two 3-500Z ● **L-4B** 13 1/16"W, 7 7/8"H, 14 3/16"D. **Wt.:** 32 lbs. ● **Power Supply** 6 3/4"W, 7 7/8"H, 11"D. **Wt.:** 43 lbs.



*Power Supply is included in price of L-4B. Solid State, excellent dynamic and static voltage regulation. Separate for a more flexible installation.

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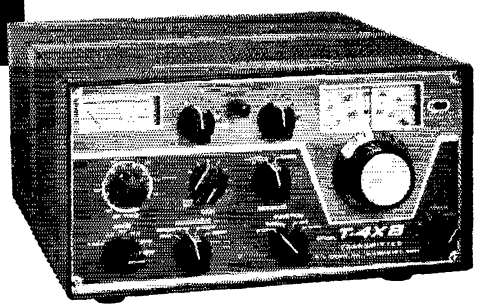

- PA cage has removable top
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● **Solid state linear permeability tuned VFO** with 1 Kc read out and 100 cycle stability ● **Covers ham bands 80, 40, 20 and 15 meters** completely and 28.5-29 Mc of 10 meters ● **160 Meters and general coverage** to 30 Mc with accessory crystals (excluding 2.3-3.0 Mc, 5.0-6.0 Mc and 11.0-11.5 Mc) ● **Will transceive** *with R-4, R-4A, or R-4B Receivers* ● **VOX or PTT** ● **Adjustable pi network** output matches 52 ohms with SWR 2:1 ● **Transmitting AGC** prevents flat topping ● **Operates SSB** (upper or lower), **AM** (controlled carrier modulation) and **CW** (semi break-in with sidetone). Easily adaptable to **RTTY** ● **Input Power:** SSB and AM—200 watts PEP, CW—200 watts, a conservative rating ● **11 Tubes, 3 Transistors, 12 Diodes** ● **Power Requirements:** Model AC-3, AC-4, DC-3 or DC-4 power supply ● **Dimensions:** 5 1/2"H, 10 3/4"W, 11 5/8"D, overall length 12 1/4", **Wt.:** 14 lbs.

For more information, see your distributor, or write:

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visited WB6UJO during Nov. Many San Francisco section stations were active in the Sweepstakes. W6BIP has a Henry 2K linear for some heavy duty DXing. K6OJO received the Marine Ham of the Year Award at the club's annual dinner. K6ING is maritime mobile on the SS *Santa Leonor* and looks for Marin contacts around 21,400 kc. at 0000-0200Z. W6DTV is organizing emergency activities in Sonoma County, expecting the usual winter conditions on the Russian River. K6JGX runs weekly schedules with KH6-Land to check on the college activities of his harmonic. WA6JUL and XYL Jeanie added a bouncing boy to the family. WB6PVV won the 2-meter hunt at the Bay Area Hamfest. WB6-MFL and K6PPO came in second in the race. Traffic: (Oct.) WA6BYZ 229, W6KVQ 186, W6WLV 74, WB6-IMO 19, WA6AUD 14, K6TZN 13, W6BWV 12. (Sept.) WB6IMO 6, K6TZN 6.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—The Fresno Amateur Radio Club has a net going on 10 meters every Mon. at 9 P.M. on approximately 28.650 kc. Everyone is welcome. The Tulare County Amateur Radio Club has a net on 2 meters every Tue. at 7 P.M. with the input frequency at 145.22 Mc. and output at 146.7 Mc. The repeater call is WB6OPG. K6KOL has a new Parks 2-meter converter. WA6QCY is on 40 s.s.b. WA6YEP is teaching code every Fri. night in Room T400, Fresno Jr. College. W6NRO has a 75A-2 receiver. WB6RBC is heard on 10-meter s.s.b. W6FIR, one of the last "homebrewers," bought a Swan 500. W6PPO is active in the Weather Net on 75 s.s.b. mornings. WB6QDL has a Galaxy V Mark II. W6TRP has his tower up and a beam installed and is active on all bands. K6KOL is running a kw. final. Every Tue. night at the Veterans Hospital, in Fresno, WB6OCJ operates the rig installed at the hospital, and telephone relays for the patients. Anyone who wants help should contact WB6OCJ. WB6UYG is active on 6 and 2 meters. W6ONK is now living in Auberry. W6-JUK is running a Galaxy line mobile. K6VFE is using a TR-3 transceiver. W6PXP is doing a great job telephone relaying overseas. Traffic: W6ADB 289, WB6HVA 239, WA6SCE 161, K6KOL 145, WB6TFU 21, W6ARE 4.

SANTA CLARA VALLEY—SCM, Jean A. Gmelin, W6ZRJ—Asst. SCM: Ed. Turner, W6NVO. SEC: W6VZE. RM: W6QMO. WA6LFA is active on NCN and is NCS on NCN2 Fri. W6YBV is active on the nets. W6HC is now a life member of the IEEE. Harry is TCC on Wed. nights. W6BPT is active on the SARO Net and has been attending various club meetings. WA6HVN is very QRL with SCCARA and Red Cross communications work. W6DEF is busy trying to get more interest in AREC and other ARPSC work and working hard in the traffic nets. Hal attended the NCN dinner in Turlock. W6PLS made the 45-w.p.m. certificate with the Connecticut Wireless Association and now has DXCC on both phone and c.w. Gene is active as EC in Half Moon Bay. W6AUC has been busy on phone. W6NVO is busy with work but did find time to attend the Greater Bay Area Hamfest. W6BVB made a fine score in the October CD Party. Bob works NCN. W6ACW attended the NCN dinner. W6RFF is QRL with college work but finds time for a little traffic and is busy putting up a new beam. WB6IZF attended the Greater Bay Area Hamfest along with No. 1 son, WB6RYV. W6YZC is back in the section after several years in the Boston area, and is on mobile at present. W3DVA, ex-K6UJF, reports that W6CLZ was the Santa Clara Valley section winner in the Md.-D.C. QSO Party. W6QIE is very busy with Navy MARS traffic, but did find time to run the code session for the Greater Bay Area Hamfest. WA6DVV, the Fremont High School station, is operated regularly on 15 meters with many new states being added to the list. K6DYX is on an around-the-world cruise and on last report was in Panama. The SCCARA held its annual auction with a nice turnout. The West Valley Radio Club also held an auction in Oct. with WA6YDF handling the affair. Herb also headed up the SCCARA auction. The Santa Cruz Radio Club is setting up a radio theory class to upgrade any interested amateurs in the Santa Cruz area. The club meets at Cabillo College. The Foothills Club held an auction in Oct. and was busy making plans for the coming season. Traffic: W6RSY 1839, W6YBV 126, W6DEF 76, WA6-LFA 58, W6HC 54, W6PLS 30, W6ZRJ 22, W6AUC 14, W6BVB 10, W6ACW 6, W6RFF 4.

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. K4GHR received a first-place certificate for the North Carolina section in the Annual Georgia QSO Party. New officers of the Brightleaf ARC are W4IBT, pres.; W4NXY, vice-pres.; W4OMW, secy.-treas. and editor of the FB bulletin *Ham Chatter*. From W3DVA:

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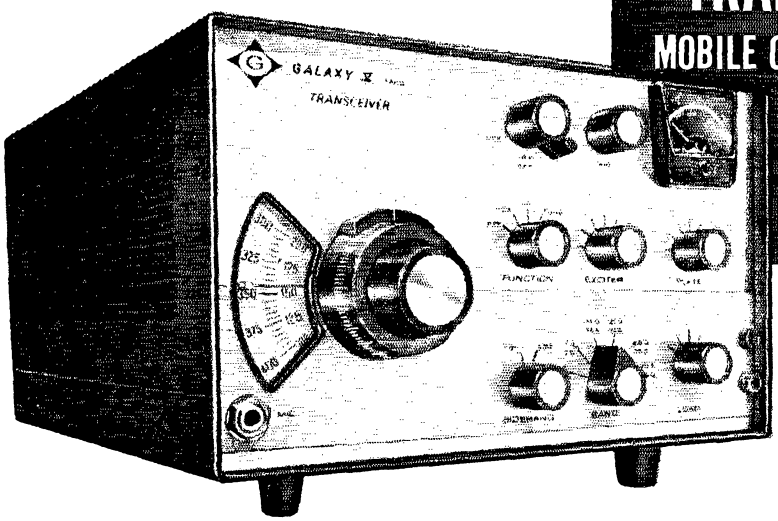

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"The first place winner of the Annual Md.-D.C. QSO Party, last Aug., for your section was WA4FFW." WB4BGL says the Forsyth ARC is planning licensing classes this winter. WB4EQW now has an Apache TX-1 transmitter. W4OSG is closing down the station prior to movement "overseas." WA4KWC has built and is enjoying the Heath HD-IO keyer. W4NAP is experimenting with antennas at his new QTH.

Net	*Freq.*	*Time*	*Days*	*QTC*	*Mgr.*
THEN	3865 kc.	0030Z	Daily	198	WA4GMC
NCN(E)	3573 kc.	2330Z	Daily	117	W4IRE
NCN(L) (Sept.)	3573 kc.	0300Z	Daily	78	WA4CFN
SSBN	3938 kc.	0030Z	Daily	65	WA4LWE

Traffic: (Oct.) WB4BGL 244, W4RWL 156, W4EVN 97, WA4VNV 75, W4ZZC 68, WA4CFN 55, K4EO 37, W4FDV 33, K4TTN 28, WB4GHG 22, WA4ZLK 21, K4CDZ 19, WA4FJM 17, K4CWZ 16, W4BNU 12, W4YMI 11, K4GHR 9, K4PKE 9, WA4KWC 6, W4ACY 3, W4NAP 1. (Sept.) W4EVN 67.

SOUTH CAROLINA—SCM, Clark M. Hubbard, K4LNJ—SEC: WA4ECJ. Asst. SEC: W4WQM. RM: K4LND. PAM: WA4EFP.

SCN	3795 kc.	Daily	0000Z/0300Z	Oct.	Tfc.	139
SCSSBN	3915 kc.	Daily	0000Z	Oct.	Tfc.	152

The Roanoke Division V.H.F. Convention, organized by the Greenville V.H.F. Society, was a grand occasion. The directors, along with W1HDQ, V.H.F. Editor, were in attendance and added to the fine program. Thanks to WA4LTS, convention chairman, and all the members for their hard work. The S.C. Phone Net wants all to know that it meets on 3930 kc. every day during the daylight hours and will handle traffic on any mode. WN4GJS is burning up 40 meters. Would like to see a lot of s.s.b. net members polishing their keys on the SCN. WN4HUU is Anderson County's newest Novice. Anderson Radio Club's new officers are WA4QKQ, pres.; WB4AMR, vice-pres.; W4RSK, secy.-treas.; WB4AQF, act. mgr. Traffic: WA4APD 80, WB4BZA 62, WA4NWI 59, W4FFH 36, WA4UDC 31, W4NTO 30, K4LNJ 28, W4WQM 28, W4FVV 14, W4JA 13, W4UMV 13, WB4DUU 9, WA4HFA 8.

VIRGINIA—SCM, H. J. Hopkins, W4SHJ—SEC: K4LMB. PAM: W4OKN. RMs: WA4EUL, K4MLC. WB4FDT is sporting a new ORS and his first BPL. WN4GTG, in Williamsburg, is the first Novice to submit a traffic report in several years. WB4DOY has earned a VSBN certificate. Net managers and net members should plan to spend extra time for the extended sessions during the forthcoming Simulated Emergency Test. The Virginia QSO Party will take place the week end of Jan. 6. Listen for W4EXI mobiling in several counties. W4YZC is on the air from Charlottesville and settled in a new job as high school principal. K4BAV reports from Viet Nam—so far, so good. The SET should be the last week end in January and full details will appear in Jan. *QST*. This is an event in which every amateur in the section can and should participate. Simply monitor these frequencies on your local area nets:

Section-wide nets
3680 kc.
3935 kc.
3835 kc.

Traffic: (Oct.) W4NLC 281, W4DVT 240, K4TSJ 201, W4ZM 184, K4KNP 182, W4RHA 175, K4CG 174, WA4OUS 141, WB4FDT 124, WB4DRB 113, WB4GTS 80, K4FSS 71, K4MLC 68, WA4EUL 65, W4OKN 52, WA4JJF 48, WN4GTG 43, W4MUJ 43, WA4PBG 37, WB4DOY 30, W4QDF 28, W4TE 24, WA4WFQ 24, K4LMB 21, W4SHJ 19, K4ITV 18, W4YZC 13, W4KX 8, W4BZE 7, K4GR 6, W4KFC 5, W4MK 4, W4JUJ 2, W4WG 2, W4ZAU 2, WA4FIJ 1. (Sept.) K4CG 180, W4IA 32, WB4HIP 8, K4ITV 4. (Aug.) W4IA 31.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8IRN. RMs: W8HZA, K8TPF. PAMs: K8CHW, W8IYD. The following amateurs assisted in the Montgomery Flood emergency: K8YBU, W8CLX, WA8EHI, W8HZA, WA8ICZ, W8IRN, K8KRW, WA8LAL, WA8LFZ, W8PQQ, WA8PWM, K8SNW, K8UDF, W8WHQ, K8WMQ and W8ZHN. W8IRN attended the ARPSC-8RN meeting in Columbus. WA8IMY, WA3FKB, W8GUL, K8LGS, WA8LZC and WA8KQX provided communications for the WVU Homecoming Parade and a new SB-200 linear has been added to the WVU club station. The MARAAC visited the Monongalia Wireless ARC. WA8HSB won the Md.-D.C. QSO Party for West Va. WA8LAL has been appointed RACES Officer for the West Va. C.D. WA8TWR and WA8OPM are active in the WVN, c.w. K8BIT renewed OBS and OPS and K8-

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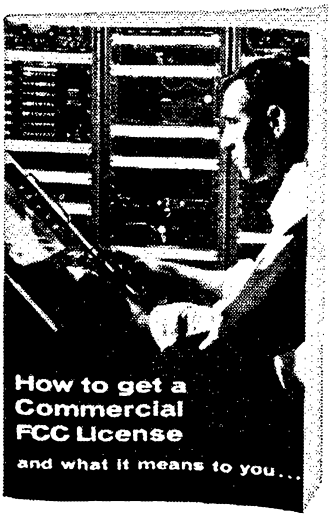

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MQB renewed OPS appointments. WA8VQT and WA8WIX are new ECs for Calhoun and Nicholas Counties. W8CLX has high-power t.m. on 29.6. New officers for the MARAARC are W8BOK, pres.; WA8NWN, vice-pres.; W8JM, secy.; WA8EQI, treas.; K8MYU, act. mgr. The WVN Phone Net held 22 sessions with 617 stations and 115 messages. Traffic: W8SQO 209, WA8POS 150, W8HZA 72, WA8RQB 63, K8MYU 62, WA8TWR 36, W8IMX 32, K8BIT 25, W8GUL 25, W8CKX 16, WA8YSB 16, K8MQB 12, WA8LAL 8, W8IYD 5, K8CHW 3, W8IRN 3, W8JM 3, WA8NDY 3, W8QZO 2, WA8UFX 2, K8WWW 2, WA3FKB/8 1, WA8FIE 1, WA8IMY 1, W8LFW 1, W8NTV 1, WA8OPM 1, WA8PWM 1, W8RZM 1, K8SVG 1, WA8VEA 1, W8VYI 1, W8VYQ 1, WA8WCK 1.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Richard Hoppe, KØFDH—Asst. SCM: Albert E. Hankinson, WAØNQL. SEC: WØSIN. PAM: WØCXW. RM: WAØLCM. With the let-up of the summer's horrendous QRN season, network activity is beginning to recover nicely. Special congratulations go to WØDQN and WØIES, both of whom earned BPL cards for their splended efforts with our Colorado Weather Net. Many thanks are due KØDCW, the retiring net manager of our High Noon Net, for his devoted and successful job of maintaining this important net over the past years. The new manager is WAØNJZ, and we wish him the best of luck in his new position. The Columbine Net continues to be the leader in both traffic and QNI in our section, showing a QNI of 976 and a QTC of 365 for Oct. I only wish we could lure some of these traffic fiends onto our c.w. nets! Rather deep concern has been expressed regarding a proposal before FCC concerning slow-scan equipment on our lower bands. The Denver Radio Club is trying to ascertain the facts involved and make its wishes known to the FCC prior to the dateline for comments. Traffic: WØDQN 779, WØIES 642, KØZSQ 431, WAØMNL 206, WØKAU 124, WAØJEV 84, WAØALW 76, KØDCW 45, WØUAT 37, WAØPGM 36, KØZIJ 19, KØECR 16, KØIGA 11, WØLEK 10.

NEW MEXICO—SCM, Kenneth D. Mills, W5WZK—Asst. SCM: Marty Petsonk, WA5MCX. SEC: K5KTQ. PAM: W5DMG. Everyone who took his exam passed after the nine-week code and theory class held by the Albuquerque Radio Club. Those passing the Novice test were Nelson Ingersol, David Ellis, Joe Ross, Ed Hair and R. C. Banghart; those passing the General were Roger McFarling, Robert Moyer, Larry Garcia and Dennis Ray. Congratulations, fellows! Teachers for the course were WA5PBP, W5QPW, W5FJE, W5NON, W5OKJ, W5MHT. K5KTQ is rebuilding the AREC program in the state. All those who have at one time or another signed up for AREC are requested to do so again; all those who have never signed up are urged to do so for an effective program. WA5FJK has accepted the job as Route Manager. W5PNY reports that he is the sponsor of a new radio club at Los Alamos High School. Get the club affiliated, Harry. Traffic: (Oct.) WA5MCX 201, WA5FJK 152, W5SRW 118, WA5RBU 68, W5DMG 29, WA5JNC 23, K5DAB 21, W5NON 11, W5NUI 7, WA5MIY 6, W5BRV 5, K5HTS 5, WA5BLI 3.

UTAH—SCM, Gerald F. Warner, W7VSS—SEC: W7WKF. RM: W7OCX. Traffic Nets:

BUN	Daily	7272 kc.	1930Z
UARN	Sat.-Sun.	3987.5 kc.	1500Z

The changeover into Mountain Standard Time for the above nets was effected smoothly this time at the end of Oct. First-place winner in the Md.-D.C. QSO Party for Utah was K7SQD. W7KSB has applied for a lifetime membership in the League. New interest in the OO appointment has been generated, with two new applicants. It's been some time since Utah had an OO. Traffic-handling reports also are on the increase. Keep the traffic reports coming, fellows. With the new year at hand, let's improve Utah's rank in the national listings. New NCS for BUN: WA7GMJ. Congrats to the Utah ARC for winning the UCARC FD trophy. Traffic: W7OCX 181, W7GPN 57, K7SOT 46, WA7BME 33, K7RAJ 28, WA7ICG 27, K7ERR 16, W7VSS 8, W7FYR 5, WA7ENF 2.

WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: K7NQX. 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. W7KHI has left the state and is now in Boise, Idaho. Note the appointment of a new SEC; hope you will give Glen all your cooperation. W7HLA is settled in his new QTH. The Casper Club has

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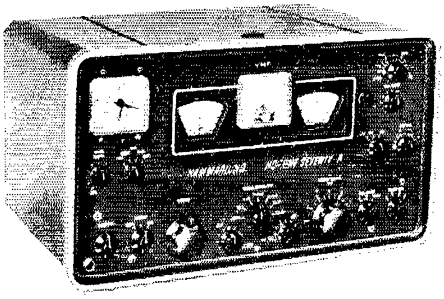

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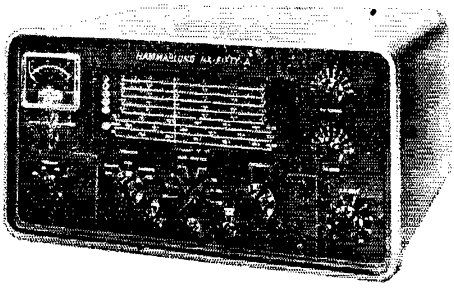

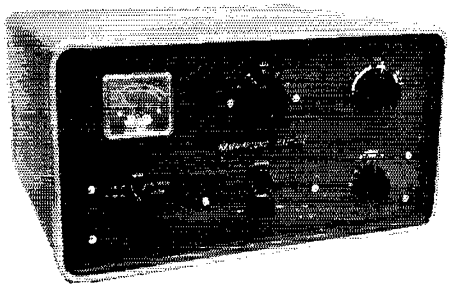

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started a club newspaper. W7VDZ is on the air s.s.b. now with the rig he got from W7YWE. K7ANW is in Antarctica operating under his own call, KC4. Officers of the UW Radio Club in Laramie are WA7BSS, pres.; WA7CGK, vice-pres.; WA7BIL, secy.-treas. W7BXS has been keeping skeds with his newly-licensed daughter in California. Traffic: K7NQX 490, WA7CLF 269, K7KSA 69, W7TZK 56, K7ITH 51, WA7DNZ 31, WA7BPO 30, K7HHW 23, K7VWA 19, K7QJW 18, WA7EDC 16, W7NKR 13, W7HLA 12, K7SLM 12, WA7HAB 8, K7YPT 6, WA7BYG 4, K7OAF 4, K6UVJ/7 3, WA7GCG 3, K7POX 3, WA7BFV 2, W7BKI 2, WA7FKF 2, K7OWT 2, K7RFL 2.

SOUTHEASTERN DIVISION

ALABAMA—SCM, Edward L. Stone, K4WHW—SEC: W4FPI. PAM: WA4EEC. RM: WA4EXA. WA4YYV was selected as the outstanding operator on AENT for the third quarter of 1967. WB4DQW is a new Alabama OVS. K4KJD is now Class I OO. Old-timers, missing from section activity for some time and now back with us, are Bill and Lil Bankstone, W4DFE and K4DSO. Six-meter activity is on the rise in the Huntsville area with W4USM, K4YUD, K4OAH, WA4FHY and W4HFU all on a.f.s.k. RTTY. Montgomery has three new s.s.b. rigs on 6. Nov. net activities:

Net	*Freq.*	*Time*	*Day*	*Sess.*	*Ave. Tfc.*	*Ave. QNI*
AENB	3575	0100 0400	Daily	53	2.1	4.7
AEND	3725	2330	Daily	23	1.6	4.9
AENH	50.7	0200	Sun.-Tue.	9	2.3	16.8
AENM	3965	0030	Daily	31	8.8	46.1
AENP	3955	1230	Daily	26	1.8	7.5
AENR	50.52	0115	W-F	9	.25	10.
AENS	50.35	0030	M-W	6	5.3	5.
AENT	3970	2230	Daily	33	3.8	12.1
AENO	50.54	0115	T-Th.-Sat.	12	.5	11.7

Traffic: WA4FYO 258, W4FVY 220, K4AOZ 140, WB4DIN 126, WA4VEK 118, WA4PIZ 106, K4NUW 95, WA4UXC 95, WA4EXA 83, K4BSK 70, WB4EKJ 62, WA4FNR 58, K4WHW 49, WA4YYV 42, W4MKU 39, WA4EEC 37, WA4BQI 36, WA4VUG 30, WB4EKK 27, WA4ROP 20, K4GHX/4 18, WA4AZC 12, K4HJM 11, K4UUC 10, WB4CYU 9, WB4BLX 8, W4FPI 8, WA4GGD 8, K4KJD 8, WA4OCL 8, W4DGH 7, WA4ZFA 6, WB4AUI 5, W4LYJ 4, WA4WLD 4, K4RCE 3, WA4DBQ 2.

CANAL ZONE—SCM, Russell E. Oberholtzer, KZ5OB—Asst. SCM: John S. Catanzaro, KZ5JC. SEC: KZ5MV. ECs: KZ5AD and KZ5IK. PAM: KZ5WR. RMs: KZ5FX and KZ5MW. OBS: KZ5OA. These are the current appointees for this section. A few vacancies exist. The Canal Zone Emergency Net has been meeting on phone since Oct. with very good participation. It meets on 7.090 Mc. each Thurs. at 0000Z (Wed. 1700 EST). The CARC Emergency Net also has been meeting with good participation on 28.9 Mc. each Wed. at 0000Z (Tue., 1700 EST). All KZ5s are invited to join. VR6TC and his XYL from Pitcairn Island, were house guests of KZ5WI. A dinner in their honor was held at the Elks Home on the Atlantic side. MARS members and their families had a picnic at Rancho Ramos. The CZARA is planning a Las Cruces cruise in Feb. KZ5CT and KZ5SA visited hams in several states. KZ5GC is in a new QTH with a Swan 500. Welcome to new ham KZ5ON. Traffic: KZ5SF 258, KZ5TS 129, KZ5JC 72, KZ5WH 69, KZ5SS 54, KZ5IK 51, KZ5FN 45, KZ5AD 30, KZ5OA 30, KZ5OB 30, KZ5SN 30, KZ5WR 18, KZ5FX 6.

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. Well, fall is here and traffic activity is picking up again. The Net Manager's job for QFN has passed to Western Florida and W4BVE for the last half of the year but WA4OHO still will maintain net records. The Gator Net has a new trial session at 1730Z on 7115 kc. If it is successful it will become a regular thing. The Tampa Hamfest was the big event of October. The HARC did an outstanding job as usual and the turnout was good. Field Day results indicate that the Duval County clubs were the big winners of the *Florida Skip* trophies. The Fort Myers gang and Gainesville also scored well. Traffic: (Oct.) WA4SCK 1082, K4BV 637, W4ILE 504, WA4NEV 293, WB4DSP 286, W4FPC 237, WB4HKP 198, W4SDR 144, WA4FGH 137, WA4YII 124, WA4PWF 74, W4AKB 73, W4MVB 70, WA4IJH 69, WA4OHO 60, WA4HDH 56, W4KHY 56, W4TRS 49, W4YPX 49, W4OGX 47, K4COO 43, W4NGR 43, W4SMK 43, W4DVO 38, W4LAD 38, K4DAX 37, WA4CIQ 31, WA4TWD 31, W4VDC 31, WA4NBE 29, W4EHW 28, WA4EYU 28, WA4FJA 28, W4IYT 24, W4FP 23, K4IEX

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21, W4GUJ 20, W4IE 19, WB4DDO 17, W4PBK 16, K4QCG 16, K4LPS 15, K4ENW 14, W4CWI 13, W4VPQ 13, W4BKC 12, K4BLM 11, W4DFZ 10, WB4ADN 9, WN4FLW 9, K4SJH 9, W4TJM 8, K4DSN 7, WN4FSF 7, W4MSH 7, K4SCL 6, K4EBE 5, WA4WZZ 3, WA4YRU 3. (Sept.) W4ILE 392, WA4BGW 56, W4GUJ 38, WA4IJH 37, K4HQK 21, W4DFZ 11.

GEORGIA—SCM, Howard L. Schonher, W4RZL—Asst. SCM: James W. Parker, Sr., W4KGP. SEC: W4DDY. RM: W4CZN. PAM: K4PKK. WN4HLX is active in Weston with most activity on 21 Mc. pending a more selective receiver. W4HYW is running an HX-30 and an HA-20. New officers of the Ga. S.S.B. Assn. for '68 are WA4WQU, pres.; W4BOL, vice-pres. K4HQI reports a good E opening on Oct. 8. 50-Mc. signals from 1, 2, 3, 4 (Fla.), 5, 8, 9, Ø were heard with a short opening on the 9th and 13th. The Athens V.H.F. Society held a demonstration on 420-Mc. gear, including beams. GSN reports all 62 sessions conducted with NCS reports complete. 477 stations checked in with 303 messages handled. New stations on 2 meters: WN4EYY, K4TQU, WB4EMQ and K4PZS. WB4HIG is new in Cleveland. W4LRR is working on p.p. 5934 to use with a Clegg 22. WA4YPR cleaned house to prepare for the SS. W4HYW participated in the Ø and Pa. QSO Parties. Traffic: W4FOE 440, WA4RAV 288, WB4AJR 181, W4FDN 114, WA4LLI 28, W4RZL 20, W4DDY 18, K4AJF 8, WA4JES 6, WA4VVF 6, K4JFY 5, W4YE 4, WB4EMF 3, K4TXK 2.

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.	2300Z	Daily	31	630	46
QFN	3651 kc.	2330/0300Z	"	62	—	—

Pensacola: K4DOT and WA4EPH are new OOs. W7BNR4 and WB4DHZ are new ORSs. WB4DHZ and WA4EPH are new OPSs. K4BSS is looking for 160-meter activity. Fort Walton: WB4GYX passed the Extra Class exam. He is active on QFN late session. W4UXW's XYL now has the call WB4HTT. WA4WAX and WA4IYH went mobile on 2-meter f.m. Defuniak Springs: WA4IZS has a fixed station on 146.94 Mc. now. K4KHV and WA4ZGI installed f.m. mobiles. Panama City: New PCARC officers are W4YUT, pres.; and WA4JIM. WA4IMC and WA4VIY. WA4IMC renewed ORS, OPS and OVS appointments. K4VFY is NCS on 4RN, RN5 and CAN! Chipley: WB4FLK joined Army MARS. Marianna: WA5FKW received the new call of WB4HXY. Apalachicola: K4BNK has a kw. s.s.b. rig at the Weather Bureau radar station, but can't put it on the ham bands! He uses a Cheyenne/Comanche at home. Madison: WA4GHE has the 6-meter beam up 45 feet and is looking for skeds. Traffic: (Oct.) K4VFY 319, K4BSS/4 182, W7BNR/4 74, WA4JJM 48, WB4DHZ 40, WB4GYX 24, WA4EPH 18, WA4EOQ 10, W4IKB 6. (Sept.) K4BSS/4 186, W4IKB 22.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Floyd C. Colvar, W7FKK—PAM: W7CAF. RM: K7NHL. OOs: K7RUR, K7OIX and W7CAL. OBSs: K7MTZ and K7VOR. It is with deep regret that we report the passing of W7CIC. The second Arizona QSO Party, sponsored by the Saguaro High School Amateur Radio Society, will be held from Sat., Jan. 27, 1968, 2100 GMT to Sun., Jan. 28, 1968, 2100 GMT. All amateurs are invited to participate. W7DQS has renewed as ORS. Congratulations to W4KLQ/7 on being the highest scoring Arizona station in the Maryland-District of Columbia QSO Party! We wish to thank the following stations for the fine work they are doing in the interest of amateur radio: K7NHL, RM and Manager of TWN; K7RUR, K7OIX and W7CAL, OOs; W7DQS, ORS; K7MTZ and K7VOR, OBSs. K7RUR is moving to 6-Land. With the new FCC regulations just announced, this department has received many reports from various clubs throughout the state announcing plans for starting new and additional code and theory classes this coming season. Those interested should contact the local clubs. Traffic: K7NHL 391, K7MTZ 35, W7FKK 19, W7DQS 8.

(See Arizona QSO Party Box on page 130)

LOS ANGELES—SCM, Donald R. Etheredge, K6UMV—SEC: K6QPH. Newly-appointed Asst. SEC is K6AVQ. Kudos to W6GYH, WB6BBO, WB6GGL, WA6KZI and W6MLF on earning BPL certificates in Oct. So. Calif. QCWA's 1968 officers include K6GMA, chmn.; W6FVO, vice-chmn.; K6GIL, secy.; W6GH, historian; W6HS, dir. The new West Valley RC now has a permanent home; write WB6TYW for information. WB6AEL has a new "mill." WA6KZI is now an RM. WB6SCK

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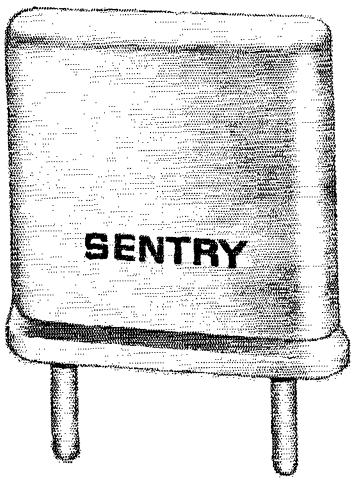

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ARIZONA QSO PARTY

January 27-28, 1968

The second Arizona QSO Party, sponsored by the Saguaro H. S. AR Society, and approved by the Arizona SCM, will take place as follows:

Rules: 2100 GMT Saturday January 27 to 2100 GMT Sunday January 28. All amateurs are invited to participate. Stations may be worked once per mode on each band. Arizona stations count 2 points per QSO multiplied by the number of states, provinces and countries. Out of state stations count five points per contact multiplied by the number of Arizona counties worked (14 possible). Exchange contact number, signal report and state, province and country. Foreign stations send nr. and RS(T). Arizona stations send signal report and county. An extra 100 points bonus will be given to each station if substantial proof of ARRL membership can be provided. (This bonus will be added on at contest Headquarters. A certificate will go to the top two scorers from each state, county or province and to the scorer from Arizona. Logs must show date and time in GMT as well as contest number signal report and location. Totals must be made on the last log sheet for credit. Suggested frequencies: c.w.; 3600 7072 14,060 21,060, 28,100; a.m., 3990 7280 14,220 21,275 28,600; s.s.b.: 3960 7230 14,310 21,340 28,700 as well as all Novice bands. Reports must be sent promptly to WA7FIK, c/o The Saguaro H. S. AR Society, 6250 N. 82nd St., Scottsdale, Arizona, 85251.

recently earned a section net certificate for traffic participation. WB6KGK has applied for RACES membership. W6YRA is beginning code and theory classes at U.C.L.A. WB6KIL reports 230 countries worked. K6QPH is /7 in Wyoming for a while. W6QFK, SGVRC, runs code practice on 145.30 and 29.63 Mc. each Mon. at 8:30 P.M. local time. The Palisades ARC now has the call WB6ZDI, W6IZY is now in KH6-Land operating. K6CKM is now a resident of Palmdale. W6RW is in the building stages of a triband quad. J & B Radio Supply was recently burglarized with the result of our losing an amateur distributor. Jim has a list of serial numbers and equipment stolen that is available by writing K6CSO. W6BHG recently added a poodle to the household. OO W6PCP is now prexy of the PARC. WB6ZDI. W6NML is restoring a Model A. Monterey Park ARC now has the call K6GIP. WB6KKU has a new Galaxy V and vertical antenna installed. ORS W6FD recently received an endorsement for code proficiency at 45 w.p.m.! An updated club listing of all radio clubs in the L.A. area is being accumulated. All clubs should send information on mailing address, meeting time and dates to WA6OKZ. Traffic: (Oct.) W6GYH 1067, WB6BBO 896, WB6GGL 719, WA6KZI 447, W6QAE 437, W6MLF 256, K6CDW 202, W6OEO 149, W6MLZ 93, W6BHG 91, K6ASK 52, W6FD 50, W6HUJ 42, WB6OLD 41, W6IVC 32, WB6KGK 30, W6DQX 29, WB6TMC 28, K6LJ 24, W6AM 22, K6EA/O 22, WA6WKF 18, WB6QMF 15, WB6AEL 14, W6USY 10, K6KA 9, W6DGH 8, K6UMV 8, W6YRA 8, W6PCP 7, WB6SXY 7, W6TN 5, W6LVQ 3, WB6KIL 2, WB6OUD 2, WB6SLG 2, W6OI 1. (Sept.) WB6TMC 73, WB6KGK 19, WB6KIL 2.

ORANGE—SCM, Roy R. Maxson, W6DEY—WB6MWL, OVS, advises the 6-Meter AREC Net, 50.4 Mc. at 8:30 P.M. Wed., is gaining new members. To aid in handling written traffic K6MCA has a new tape recorder, per K8PWE. The Desert AREC Area has 3 new members, K6OFQ, WN6YOE and W6JNM, per EC WA6TAG. WB6BTE and WB6NOE announce a new harmonic, 8 lbs. 1 oz., arrived Oct. 21. Newport ARC's new officers are WB6MTX, pres.; W6SYC, vice-pres.; W6CTB, secy.; VE7BPI/6, treas. A 2-Meter AREC Net started Nov. 19 on 145.8 Mc. with WB6CQR, EC, per SEC WA6ROF. The time is 8:30 A.M. Sun. K6IME is now RM, K6IBI and the Hughes RC station have joined Navy MARS. The pres. and vice-pres. of the Desert RATS are WB6QAH and WA6TAG. W6FB mobiled to Fort Huachuca, Ariz., seeing Jim Lamb (former Technical Director at ARRL Hq.) for the first time in 30 years. He also mobiled to Reno, Nev., visiting WA7EGV and K7YYQ and gave the latter a QSL card from 1934 when he was W6KMN. Traffic: K6IBI 797, WB6TYZ 319, WA6ROF 144, K6MCA 134, WB6RJX 128, WB6JFO 110, WA6RQK 53, WB6UTC 49, WB6VQE 31, K6IME 26, W6WRJ 21, K6GMA 6, WB6MWL 5, WB6TIF 4, WA6OQM 3, W6FB 2.

SAN DIEGO—SCM, James E. Emerson, Jr., WB6-

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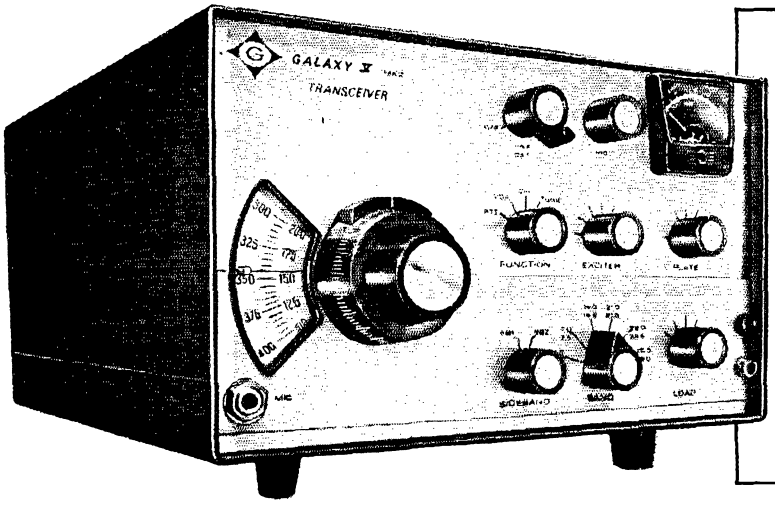

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GMM—Asst. SCM: Tom Wells, W6EWU. ARL Sixty and most sincere thanks to all who nominated, campaigned and voted for me in the recent SCM race. I shall do my darndest to live up to your trust. Special thanks to W6LRU, who did a fine job as SCM these past 14 years. I was a student in both the Novice and General code classes under him. He now holds Advanced and Extra theory and code classes at Midway High Mon. nights. WA6TAD advises we are the first WB to become an SCM. The Sun. morning San Diego ARPSC Net moved to 3905 kc. Why not join them? W6RT and W6QJW have traffic skeds daily with the hospital ships *Repose* and *Sanctuary* off RVN. Recent returns from RVN are WA6-KHN, staff officer; MCRD Electronics School; WB6-OPA, Chop at W6YDK/NØANP; WB6LXG, attending Comm. Chief's School at MCRD. The RTTY bug has bitten WA6COE. Watch for him on the bands soon. We understand that WB6NMT has moved next door to OBS K6BPI and is doing FB sending in OVS reports along with writing a v.h.f. article for a coming issue of *QST*. The second vacation of the year for W6SK netted him a deer in Nebraska. WA6QAY moved to Poway and is setting up shop there. The San Diego City Fire Dept. now boasts 5 hams in its ranks, including the SCM. Much DX and QTC in '68. Traffic: (Oct.) K6BPI 9198, W6EOT 527, W6VNQ 493, W6BGF 331, W6QJW 137, W6LRU 115, WB6-GMM 79. (Sept.) WB6NMT 4.

SANTA BARBARA—SCM, Cecil D. Hinson, WA6-OKN/WØCUG—SEC: K6GV. First, let me report that your SCM plans to depart Jan. 1 for Costa Rica and Cocos Island aboard the sailing clipper *Swift of Ipswich*. I will have aboard a TR-3 and I plan to work 7.255 and 14.280 Mc. The purpose of the trip is a ham vacation as well as looking for the treasure that is supposedly buried there. As I cannot spend the time for the complete voyage, there is need for an alternate operator aboard. Further, there is need to pass traffic to Santa Barbara, which is the home port of the *Swift*. I would be pleased to hear from anyone who could hold skeds on 20-meter s.s.b. K6YHF assumed the president's chair at the Satellite ARC when both WB6LDW and WA6UUA had to resign. The following in Santa Barbara have new antennas: W8UVJ, WN6WQF, WB6TTL, WB6NOW and W6DFZ. Our SEC reports that during the recent Ventura Co. fire WB6LNF and K6GOS maintained communications for the Red Cross. W6NLJ who is the c.d. director for Lompoc is in Iceland for three months. Traffic: W6OED 10.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. L. Harbin, W5BNG—Asst. SCM: E. C. Pool, W5NFO. SEC: W5PYI. PAM: W5BOO. RM: W5LR. Now I know the old saying "the squeaking wheel gets the grease" is true. I got results when I started squeaking. News from New York and Old Mexico came in, also much local news, some of it good but one item I regret to give you. W5WXY is now a Silent Key as of Nov. 6. Her passing has brought much grief to all the members of the XYL organizations in this area as she was instrumental in starting that organization. Bernice was very active in traffic and emergency nets as well as helping many XYLs become interested in amateur radio. K5BNH has been appointed secy. for the 7290 Tfc. Net and is doing an FB job as asst. net control. Bea reports 44 sessions with 1602 stations and 1294 messages handled. Congratulations, Bea, on making the BPL in Sept. and Oct. The Ft. Worth KC Club is furnishing chairs by donations from club members of $5.00 per chair. Call letters of the donor will be placed on the back of the chair. The Central Tex. ARC has elected WA5PUP, pres.; WA5-QPE, vice-pres.; WA5PPX, secy.; W5GLY, treas.; and WA5BPM, Radio Officer. The Richardson ARC is cooperating with a CB club by holding joint meetings and charity drives. W5ILR is now TF2WKP and is active on 10 and 15 on week ends. Thanks, Ed, glad to hear from you. WA5DCR is in Mexico and waiting for his call from that country. W5GWR, now in Beaumont, was a recent visitor at this QTH. W5PQY is a new OO for the NTX section. WAØISO/5 has been appointed ORS. Traffic: (Oct.) K5BNH 829, WA5AGH 106, W5-PBN 50, WA5QQR 31, WA5QQQ 21, W5JSM 14, W5LR 14, W5BNG 4. (Sept.) K5BNH 912.

OKLAHOMA—SCM, Daniel B. Prater, K5CAY—Asst. SCM: Sam Whitley, W5WAX. SEC: K5ZCJ. RM: W5QMJ. PAM-75: W5PML. Oklahoma County Civil Defense had its RACES communications truck on display at the State Fair in Oklahoma City this year. The members of the Central V.H.F. Club had a lot to do with getting the unit operational. Units in the truck cover 80 through 2 meters. WA5DZP picked up a new TR-4 and is working DX on s.s.b. WA5LBI is kept busy holding phone schedules overseas. K5MIB moved to Shelbyville, Ind., and is looking for Oklahoma contacts

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on 14.250. WA5OUJ, in Fort Supply, is looking for 2-meter contacts. K5DLE now has his Extra Class license. WA5GVH received his General Class license recently. OA5NYR is a new member of the Aeronautical Center ARC. W5MFX reports he had no trouble making 2-meter t.m. contacts while in Stillwater for a couple of days. W5YJ, State University Radio Club station, is very active on 80 through 2 meters. W5FKL has his new Swan 500 working on MARS frequencies now. W5PML reports he has a new granddaughter. Traffic: K5TEY 1928, WA5IMO 94, W8VDA/5 93, K5DLP 66, WA5KNR 50, W5MFX 23, WA5DZP 21, WA5OHX 21, W5OLB 21, W5PML 4, W5EHC 2.

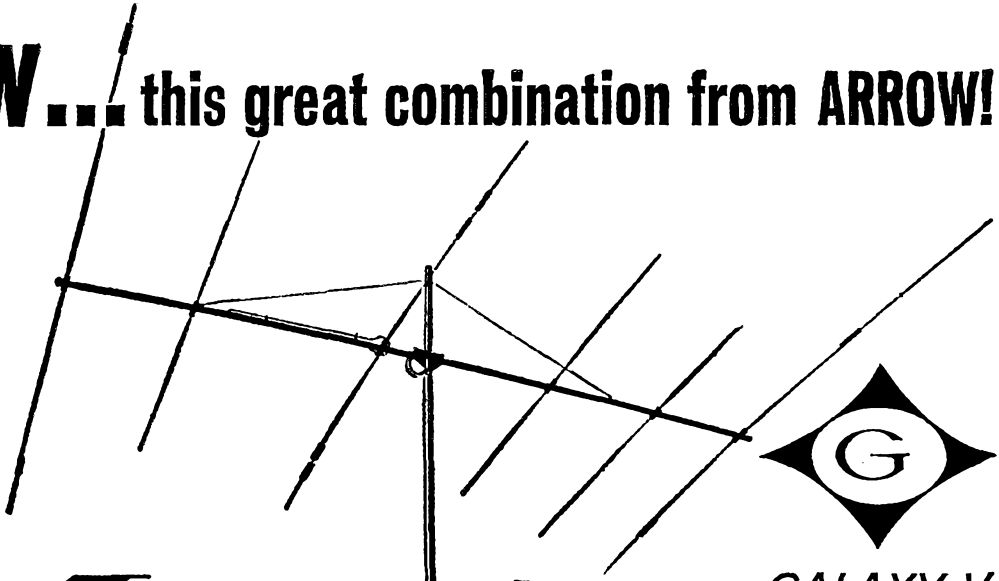
SOUTHERN TEXAS—SCM, G. D. Jerry Sears, W5-AIR—SEC: K5QQG. PAM: W5KLV. RM: W5EZY. K5IQA was first-place winner of the Annual Md.-D.C. QSO Party as informed by W3DVA. W5ONG, long-time EC for Victoria County, has resigned and W5-ONQ has been appointed EC on W5ONG's recommendation. Clarence has contributed many years of service as EC for which the amateurs in the area are grateful. WA5QKE is the new OPS for the Conroe Area. WA5-ABU, formerly Washington County EC, is RM3 aboard the USS *Mansfield*, and says he hopes to have a ham station aboard in the near future. WA5QKE is QSL Manager for CX8DV. EC W5TFW reports the Beaumont Club has 14 in the Novice Class. Jim Manse, *formerly* WB2WNH/5, *now is* W5QJA *in* Houston with an T4X/R4A. His XYL, formerly WB2YOZ, is now WA5TOW. The new San Jacinto Club has a new meeting room aboard the Battleship *Texas* and is working on a 450-Mc. repeater, advises WA5RPZ. WA5OYG has a new HW-12A. The Houston Harris County Hamfest was attended by 350 to 400. W5DNE won the 2-meter and 75-meter field strength contests. K5WYN is back from a trip to Missouri and Illinois. WA5MIN advises, "Guys with big antennas, be sure they are well guyed." One of his guys broke and cracked up his 20-meter beam and 10/15-meter quad. WA5KHE is on with an HT-41 linear and hopes to go RTTY soon. A note from W5NGW says that many foreign stations don't have to be coaxed to mail cards to U.S. hams. If you have QSOed a DX station recently you may have a card at the Bureau. Send an SASE and find out to P. O. Box 9915, El Paso, Tex., c/o K5QVH. WA5EDF was in the hospital as the result of an auto accident. W5BRM and WA5KPQ are both out of hospitals after surgery. W5RIH missed the Houston Hamfest as he slipped in the bath and was in the hospital for several days. Army is one of the oldest hams active in the So. Texas area. Traffic: (Oct.) K5HZR 221, WA5MBC 202. K2EIU/5 111, WA5QKE 111, W5AC 94, W5BGE 75, WA5GZX 66, W5-AIR 56, W5ABQ 49, WA5IQL 42, W5KLV 42, W5EZY 38, W5QJA 38, W5TFW 15, W5AQN 14, K5HMF 14, K5QQG 8, W5YCK 4. (Sept.) WA5GZX 6.

CANADIAN DIVISION

ALBERTA—SCM, Harry Harrold, VE6TG—SEC: VE6FK. APSN-PAM: VE6ADS. ECs: VE6SA, VE6SS, VE6XC. VE6PL. VE6AFQ. ORSs: VE6BR, VE6ATH, VE6ATG. OPSs: VE6HM, VE6SS, VE6ADS, VE6AFQ. OOs: VE6HM, VE6TY. OBSs: VE6HM. VE6AIF. It is with regret that we record the passing of VE6ASN, of Warner, Alta. Yours truly had the pleasure of attending the Oct. meeting of the Border Area Radio Club, including a turkey dinner supplied by VE6ASN and his mother, VE6AUG. The Vulcan County Radio Club is running classes again this winter; also Calgary is looking for a good class this winter. No reports have been received from the Edmonton, Red Deer and Medicine Hat Clubs on their winter activities. Things are shaping up in Lethbridge for a good 2-meter net on 146.7 Mc. The ARLA and affiliated clubs of the ARLA will take on the International Glacier-Waterton Hamfest next year. Time and place will be announced at a later date. Lethbridge and Calgary hams helped the city police on Halloween. Traffic: VE6ATG 49, VE6HM 49, VE6FK 17, VE6SS 7, VE6KS 4, VE6AFQ 2, VE6FV 2.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB —The British Columbia Emergency Net's winter schedule on 3650 kc. at 0230 GMT. Net Mgr. VE7ASY welcomes all c. w. operators. VE7LL was flown out of his QTH *and is in the hospital at* Alert Bay. The Beaver Valley ARC has a real fine certificate. Instructions to earn this should be made by letter to the Beaver ARC, Box 413, Fruitvale, B.C., Canada. VE7BEX has been working on Para-lympic sports so was away from home most of the summer. From Prince George comes news of the forming of the Fort George ARC with VE7BXC, pres.; VE7BCF, secy. The club has its records from the code and theory class. VE7BWO, VE7BWP and VE7BXC. VE7CN and VE7AV played a big part in this. The BCARA's officers are VE7BBB, pres.; VE7-ABS, secy.-treas. The Kamloops ARC has been picking

now... this great combination from ARROW!



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The very ultimate in tribander performance—exclusive Hi-Q traps are individually pretuned at the factory for the very best performance on each band. Exclusive, time-proven Beta Matching System provides optimum gain, maximum F/B ratio, all-weather peak performance and the additional advantages of the antenna being at D.C. ground.

SUPER THUNDERBIRDS are mechanically superior; featuring extra husky boom-to-mast bracket for masts from 1" to 2½". This new bracket tilts down for easy maintenance. All tubing ends are slotted for rugged adjustability.

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5 BAND TRANSCEIVER / MOBILE or FIXED STATION

- Smallest size (6" x 10¼" x 11¼").
- Hottest transceiver—special new six-crystal lattice filter.
- Complete 80-10 meter coverage.
- Both upper and lower selectible sideband.
- Highest stability. Drift less than 100CY in any 15 minute period after warmup.
- The personal drift chart of every Galaxy goes with the unit to its new owner!

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up its membership and has a net Wed. on 3780 kc. at 0400 GMT. VE7ARZ is in the fried chicken business. New members of Class "A" are VE7BSV and VE7BRO. VE7BCJ is now signing VE8MIL. VE7KN's new receiver is 14 tubes and he claims 14 knobs, one for each tube. VE7BLO is in the hospital confined to a wheel chair. He has a grand collection of certificates and awards. Traffic: (Oct.) VE7ASY 50. (Sept.) VE7ASY 111.

MANITOBA—SCM, John Thomas Stacey, VE4JT—SEC: VE4JC. PAM: VE4EX. RM: VE4EI. OPS: VE4EF. ORSs: VE4LG, VE4NE. OVSs: VE4HI, VE4RE. OBS: VE4QJ. Nets: Phone, 3760 daily at 1900 central; C.W., 0100Z daily on 3615. I would like to thank those who recommended that I serve the section for another term. Applications for OO and OPS appointment would be very much appreciated. The UMARS is active in the Canadian University Net (CUPN) on 14.150 Tue. and Thurs. at 1800Z. VE4CS is secy.-treas. of the CARF. VE4HI, VE4HJ, VE4HK and VE4EI assisted the West Kildonan Police for the Halloween Goblin Patrol by means of 2-meter t.m. mobiles. VE4JI is active on 20 hunting DX. VE4NE still is having fun mastering his keyer. The Brandon ARC has its code and theory classes going again. The MARC is rebuilding itself along Provincial lines and hopes to have the framework completed early in the new year. Two-meter t.m. continues to grow in popularity in Winnipeg. How about making New Year's resolution to report to the SCM monthly? Traffic net reports: Phone, sessions 31, QNI 548, QTC 13; c.w., sessions 31, QNI 157, QTC 70. Traffic: VE4EI 61, VE4JT 56, VE4NE 26, VE4LG 24, VE4YC 13, VE4XN 10, VE4FO 7, VE4UM 6, VE4EF 4, VE4QJ 4, VE4GN 3, VE4NW 3, VE4RV 3, VE4JA 2, VE4MK 2, VE4PA 2, VE4RB 1.

MARITIME—SCM, J. Harley Grimmer, VE1MX—Asst. SCM: R. P. Thorne, VO1E1. SEC: VE1HJ. I would like to take this opportunity to wish everyone a very Happy and Prosperous New Year. All VE1 amateurs are reminded that the Fourteenth Annual VE1 Contest takes place Jan. 20-21 (c.w.) and Jan. 27-28 (phone), rules same as last year. It is with regret that we report the passing of VE1HY and deepest sympathy is extended to his family. New amateurs in the Halifax area are VE1AEJ and VE1AGU. High scorer in this section in the 1967 Md.-D.C. QSO Party was VE1AE. Congratulations to the Keith Rogers Memorial ARC on its FB Field Day score. VO1EL, VO1FP and VO1EO are active on 2 meters. W6AM was a recent visitor to VE1WL's shack after having operated in FP8-Land. VO1CB has been on the air from the Netherlands signing PAØXKB. APN reports QNI 253, QTC 24, sessions 31. Traffic: VE1AMR 21, VE1AAX 19, VE1ARB 18, VE1MX 7, VEØMD 2.

ONTARIO—Acting SCM: Rees Powell, VE4DJK—Last month we completed a study of the OFN and after careful deliberation have recommended that the local clubs accept the responsibility for net participation on both voice nets and have asked each local club to appoint volunteers to call in each night. This would completely cover Ontario for both amateur and 3rd-party traffic without changing anything. VE3EUM, our SEC, is in search of ECs and we have given him total responsibility for his job. We have not listened on the c.w. nets but have asked VE3ATI to help us with the c.w. nets. We will be sending a questionnaire on RTTY before this appears in print. The Ottawa Convention was really successful and congratulations to all in charge and to all those who attended, and a special mention of the RSOs, who were there in strength and are doing such good work in Ontario for all amateurs. The DOT Forum indicated that better times are ahead for amateurs and the regional officers are almost autonomous and so the RSO can really help its local people now. Thank you all for making your SCM's job easy by your tolerance for someone who is just learning. Congratulations to VE3BJK, who won high place in our section in the Maryland QSO Party in Aug. If you're mobile or fixed and need help call "CQ Emergency" on "3790" in Ontario and you will get an answer. It's really the gathering frequency, especially when only two stations are on the band. Traffic: VE3BBQ 149, VE3EBH 88, VE3DBG 73, VE3AWE 67, VE3BZB 58, VE3BUR 34, VE3DW 26, VE3MO 17, VE3EHL 9, VE3VD 7.

QUEBEC—SCM, J. W. Ibey, VE2OJ—SEC: VE2ALE. RM: VE2DR. PAMs: VE2BWL, VE2AGQ. We hope VE2AJD has fully recovered from a serious auto accident. VE2AUH is now employed in Montreal. VE2BVV and VE2AGP did well in the W/VE Contest. VE2BPU reports his SB-101 is working nicely and VE2CK had a busy Oct. with W/VE scores to count. VE2CP is a reliable traffic man on 3535 kc.; and so is VE2PJ, also newcomers like VE2DCW and VE2BYS. The AREC Net, on 3580 Sun. at 6 P.M. local time, is back to par

Gateway

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★ HOW TO BECOME A RADIO AMATEUR

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Anyone starting out in amateur radio will find these publications a necessary part of his reading and studying for the coveted amateur radio operator's ticket. Written in clear, concise language, they help point the way for the beginner. Tried and proven by thousands upon thousands of amateurs, these ARRL publications are truly the "Gateway to Amateur Radio."

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FOURTEENTH ANNUAL VE1 CONTEST

Jan. 20-21 and 27-28, 1968

All VE1 amateurs are invited to participate in a contest sponsored by the New Brunswick Amateur Radio Association. The contest is divided into two sections, phone and c.w. The highest scoring contestant in each section will be awarded permanent possession of an engraved cup, the NBARA Trophy. A special certificate of recognition will be issued to any participant submitting logs showing 25 or more valid contacts.

RULES: 1) The c.w. contest will begin at 2400 GMT Saturday, Jan. 20 and end at 2400 GMT Sunday, Jan. 21. 2) The phone contest will begin at 2400 GMT Saturday, Jan. 27 and end at 2400 GMT Sunday, Jan. 28. 3) Any and all amateur bands may be used but only c.w. to c.w., or phone to phone contacts will count. Any contestant may participate and be eligible for awards in both sections. 4) The same station may be counted but once for credit (in each section) regardless of band used. Mobile, portable, and home stations covered by the same station license constitute the same station. 5) The general call is "CQ VE1." 6) Exchange signal reports, county, province, and operator's name. Local QTH is not required. 7) Logs should show band, type emission, signal reports, country, province, time, and date. Logs not showing this information IN FULL will be disqualified. 8) Score one point for information received and one for information sent and confirmed. Multiply total points by the number of individual counties worked in the three provinces to determine final score. For contest purposes Sable Island will be classed as part of Halifax County. 9) Decisions of the contest committee will be final. Logs must be postmarked not later than Feb. 5 and should be in committee hands not later than Feb. 13. Forward all entries to: Contest Committee, P. O. Box 366, St. Stephen, N. B., Canada.

after a try at several times and frequencies during the summer. We welcome section news from VE2ASU Les activités du Radio Club de Québec sont nombreuses cette année et les amateurs de la région de Québec ne manquent pas d'enthousiasme. Les cours de radio pour les futurs amateurs sont sous la responsabilité de VE2BUB, VE2DFR, VE2BSO et VE2BWL. Notre ami VE2AYN accomplit des merveilles sur le 2 mètres. Grâce à l'excellence de sa station et de son QTH, il peut facilement déclencher la répétitrice du Mont Orford VE2TA. Celle de Québec, VE2VD, est très occupée et on peut y entendre régulièrement les stations telles que VE2APC, VE2BVC, VE2AJS, VE2BUB, VE2BPT, VE2OX, etc. L'Association Provinciale de Radio Amateur (RAQI) vous invite à vous prévaloir du service d'émission des plaques d'automobile (VE2). Son exécutif vous demande aussi d'adviser vous-même le Ministère des Transports lorsque vous changez d'adresse et de QTH. The very best to you in 1968. Traffic: VE2DR 101, VE2BWL 53, VE2OJ 52, VE2PJ 52, VE2ALE 44, VE2BRD 36, VE2BVY 33, VE2EC 26, VE2CP 23, VE2WM 11, VE2BBY 4, VE2CK 4, VE2DCW 4, VE2AGQ 3. QST

Novice Roundup

(*Continued from page 64*)

Rules

1) *Eligibility:* The contest is open to all radio amateurs in the ARRL sections listed on page 6 of this *QST*.

2) *Time:* All contacts must be made during the contest time indicated elsewhere in this announcement. Time may be divided as desired but must not exceed 40 hours total.

3) *QSOs:* Contacts must include certain information sent in the form as shown in the example. QSOs must take place on the 80-, 40-, 15-, or 2-meter bands. Crossband contacts are not permitted. C.w. to phone, c.w. to c.w., phone to phone, phone to c.w. contacts are permitted. Novices work any amateur stations eligible; non-Novices work only Novices. Valid points can be scored by contacting stations not working in the contest, upon acceptance of your number and section and receipt of a number and section.

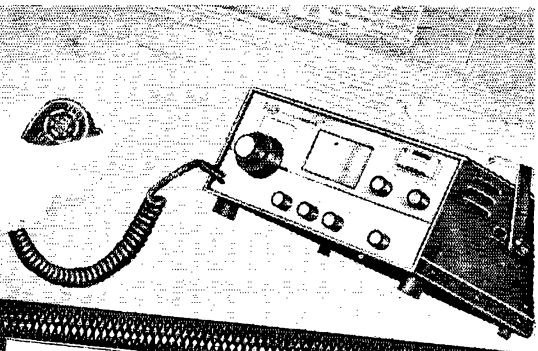
(*Continued on page 140*)

"Duo-Bander 84"

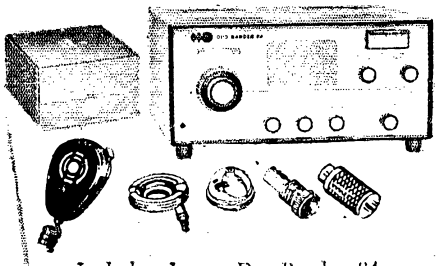
80-40 Meter
SSB Transceiver
Ham Net $159.95
WRL CHARG•A•PLAN $8 Monthly

NOW —GO MOBILE 300 WATTS

AT AN AMAZING SAVINGS!



A Complete 80-40 Meter MOBILE PACKAGE!



Includes 1 ea.: Duo-Bander 84, DC384 Power Supply, one Bandspanner Antenna, BDYF Mount, 350C mic, Mic. Plug, PL 259 Plug, UG176/U Reducer and 25' RG58/U coax Cable. All supply cables are included.

ORDER: ZZA-103 package ($15 monthly)..Regularly $299.95 WITH BONUS COUPON...$279.95. ($14 monthly)

A Complete 80-40 Meter FIXED STATION PACKAGE!

Includes 1 ea.: Duo-Bander 84, AC48 250 watt supply, 80/40 Duo-Doublet Antenna kit, 350C mic., Mic. Plug, PL259 Plug, UG-176/U Reducer and 100 ft. RG58/U coax cable.

ORDER: ZZA-104 Package ($11 monthly)...Regularly $225.00 WITH BONUS COUPON...$205.00 ($10 monthly)

ORDER: ZZA-105 Package (same as above with 300 watt AC supply)...Regularly $255.00 WITH BONUS COUPON $235.00 ($12 monthly)

SAVE $20.00

WITH THIS BONUS COUPON!

This coupon may be applied against the package ZZA-103, ZZA-104 or ZZA-105 regular prices, provided there are no trade-ins involved, and will reduce the regular package cost by $20.00.

Only one coupon may be used.
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A GREAT RIG... AT AN AMAZING PRICE!

Designed for the Amateur whose interest is 80 and 40 meter SSB. Here's Power to make good contacts...a Selective Receiver...Stability...Compactness (only 5x11¼x10"). A GREAT value at the regular price ...NOW SAVE $20.00 on a package with the BONUS COUPON. Purchase yours NOW with our easy, monthly terms, too!

Look at these DUO-BANDER 84 FEATURES!

• 300 watts PEP-SSB • Rugged-Reliable Printed Circuitry • 2k-Hz Dial Calibration • Dual-Speed Vernier VFO tuning • E-Z One-Knob Tune-Up — "Just Peak Output" • Built-in Speaker • Mobile Bracket supplied • Combination "S" and Output meter • Crystal Lattice Filter.

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Please ship me the following:

- ☐ Duo-Bander MOBILE Package ZZA-103 @ $299.95
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- ☐ Duo-Bander Fixed Package ZZA-105 @ $255.00
- ☐ Your FREE 1967 HAM Catalog
- ☐ I am enclosing one BONUS COUPON as I have no trades. Deduct $20.00 from the regular package price above.
- ☐ My check or Money Order for $_____ is attached.
- ☐ Charge it to my WRL charge Acct #_____

Name_____

Address_____

City_____ State_____ Zip_____

(Continued from page 138)

A Novice may operate in the Novice portion of the competition until he *receives* his General Class License, then *must* operate as a non-Novice entry.

4) *Scoring:* Each exchange counts one point. Only one point may be earned by contacting any one station, regardless of the frequency band. The total number of ARRL sections (see page 6 of this *QST*) worked during the contest is the "section multiplier." Yukon-N.W.T. (VE8) also counts as a multiplier. A fixed scoring credit may be earned by entrants who hold ARRL Code Proficiency certificates. If an entrant does not hold a CP award he can apply for credit by attaching to his Roundup report a copy of qualifying run from W6OWP, January 4, or February 2, or from W1AW, January 11 or February 16. CP credit equals the w.p.m. speed indicated on the latest certificate or sticker held by the entrant. The final score equals the "total points" plus "Code Proficiency credit" multiplied by the "section multiplier."

5) *Reporting:* Contest work must be reported as shown in the sample form. Reporting forms and a map of the United States will be sent free upon request. Indicate starting and ending times for each period on the air. All Roundup reports become the property of ARRL and must be postmarked not later than March 2, 1968.

6) *Awards:* A certificate award will be given to the highest-scoring Novice in each ARRL section.

7) *Disqualifications:* Failure to comply with the contest rules or FCC regulations are grounds for disqualification. ARRL Contest Committee decisions are final. QST

The Clothes Drier Quad

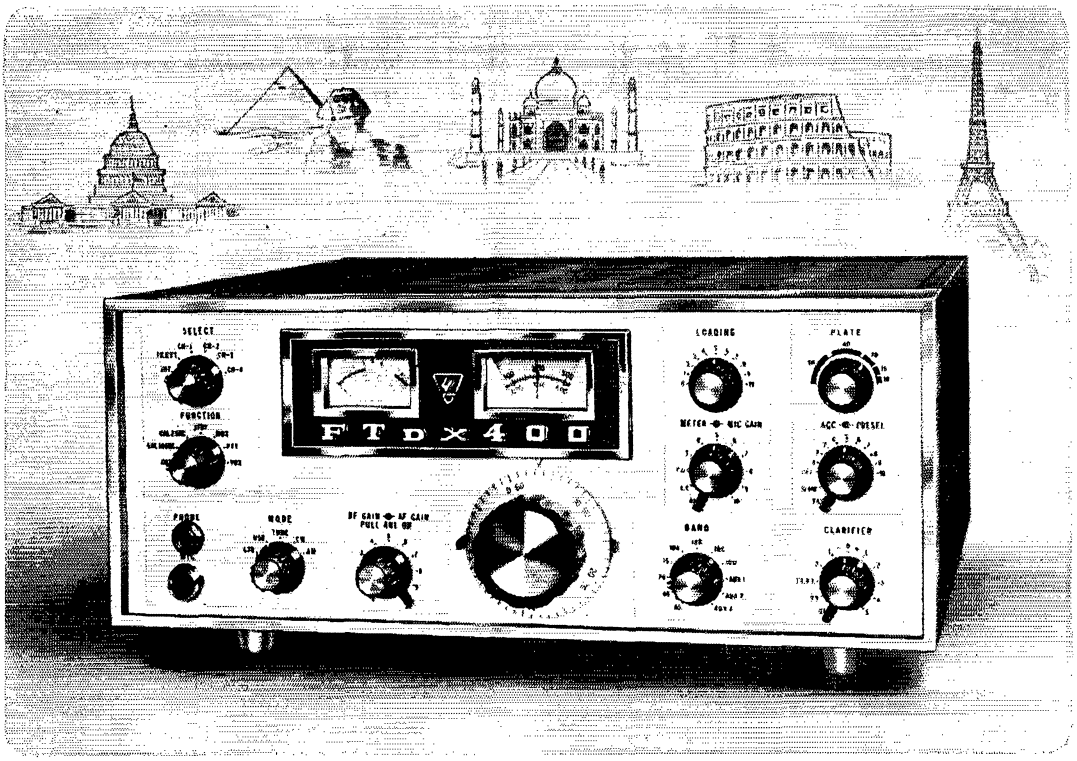
(Continued from page 41)

driven element and those of the reflector. With a three-bander, it will probably be necessary to use both outer and inner guys as described by Hess.[2] After all the guys have been installed, adjust the coils in the reflectors for maximum front-to-back ratios while the coils are as high as possible off the ground.

Once the dry run has been completed, mark the length of each secondary guy and dismantle the antenna. Then repeat the dry-run procedure, but this time, at the tower or Field-Day site. Since all the bulky parts fold up and are lightweight, there should be no problem. Attaching the secondary guys is a real trick, but with careful planning — by sliding and rotating the boom — you can accomplish it. It must be admitted, however, that a fold-over tower or telescoping mast makes this part of the job easier! For the one-man, top-of-tower installation, it will be necessary to tie these guys in the center as the boom is rotated.

Results

Used in conjunction with the author's 75-watt input a.m. and c.w. transmitter, the clothes-drier quad has made, on more than one occasion, contacts possible with JA, ZS, ZL, VK and UA stations. In the days of s.s.b., it's a real comfort to receive a QSL with a 5 × 8 signal report on it from a CR7. The clothes-drier quad was put up in August 1966 as a permanent installation on a 30-foot tower. A year later, it underwent its first annual checkup and was assessed to be in A-1 shape. QST



TOMORROW'S TRANSCEIVER TODAY BY YAESU

FTDX-400

Latest arrival on the American scene, Spectronics presents the FT dx 400. Yaesu engineers have looked into the future to provide the present day amateur with a complete station in one package.

The usual "accessories" are standard equipment in the FT dx 400. Features built-in power supply, dual calibrators — 100KC and 25KC, break in CW with sidetone, fully adjustable VOX system, four switch selected crystal controlled transmit channels in addition to VFO positions, and varactor controlled clarifier offers receiver offset tuning capability.

Remember, all these extras are included in this new imported transceiver. Check the specs and ask your local dealer for a demonstration dx trip with the FT dx 400.

$599.95 including power supply and all accessories except speaker.

SP-400 matching speaker **$14.95**

DEALER INQUIRIES INVITED

SPECIFICATIONS

FREQUENCY RANGE: 3.5-4Mc, 7-7.5Mc, 14-14.5Mc, 21-21.5Mc, 28-30Mc (3 more 500KC receiver bands can be added).
FREQUENCY STABILITY: Less than 100 c/s drift in any 30 minute period after warm up.
ANTENNA IMPEDANCE: 50 to 120 ohm unbalanced.
MAXIMUM INPUT: 500W P.E.P. SSB, 440W CW, 125W A.M.
CARRIER SUPPRESSION: —40db
SIDE BAND SUPPRESSION: —50db (at 1,000 c/s)
DISTORTION PRODUCT: Down at least 25db
AUDIO BANDWIDTH: 300-2,700 c/s
RECEIVING SENSITIVITY: 0.5uV,. S/N 20db (14Mc SSB)
SELECTIVITY: 2.3Kc (—6db), 3.7Kc (—55db)
IF AND IMAGE RATIO: More than 50db
AUDIO OUTPUT: 1 watt @ 5% distortion
OUTPUT IMPEDANCE: 8 ohm, 600 ohm
TUBES AND SEMICONDUCTORS: 18 tubes, 9 transistors and 33 diodes
POWER SOURCE: AC 117 volts, 50/60 c/s
DIMENSIONS: 15¾" wide x 6¼" high x 13¾" deep
WEIGHT: 50 Pounds

SPECTRONICS

BOX 356 • LOS ALAMITOS, CALIFORNIA 90720

Why a Transmatch?

(*Continued from page 33*)

and get it up as high as possible. Also, if possible, make it at least ¼ wavelength long at its lowest operating frequency — about 60 feet for 80 meters, for example.

A Few Notes

Many hams are reluctant to use open-wire line because of the problems in getting it into the shack from outdoors. One simple answer to this is to bring the line to the entrance — window sill, doorway, or whatever — and at that point attach 300-ohm Twin-Lead (which is insulated) and run the Twin-Lead in to the transmatch. The fact that the two lines are not alike is of no concern because the load at the antenna side of the transmatch is going to be some unknown value anyhow.

You may have read or heard that you must use coaxial lines in order to avoid TVI. Don't believe it. If you have a well-shielded transmitter and use a low-pass filter with it you won't have any harmonics coming out. Ask yourself this simple question: "If I don't have any harmonics coming out, what difference can the kind of transmission line make?" The answer is, of course, "No difference."

One of the beauties in using a transmatch is that the coaxial line between it and the rig can always be matched, and this matched section is where you put your low-pass filter. This eliminates any danger to the filter from excessive voltage or current caused by a mismatch.

One typical Novice question is "If my transmitter loads properly and I have no TVI problem, do I need more matching between the transmitter and antenna? I am using coax feed. What good would it do me to pay for the additional complexity of changing from band to band?" The answer to such a question depends on several factors. Is the harmonic attenuation — not TVI, but low-frequency harmonics — adequate? This could be a problem the Novice isn't aware of. As to the complexities of band changing, this will depend on how much the Novice desires to work other bands.

What we have tried to do in this article is to show the reader the problems and the recommended cure. There is nothing new about the multiband system using tuned feeders; it has been used for many years, and the interesting thing about it is that it is still the best multiband system. For further information it is recommended that the newcomer study *Understanding Amateur Radio* and *The A.R.R.L. Antenna Book* to gain a better insight as to how antennas work. QST

Silent Keys

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

W1CJ, Ralph Dennis, Montgomery, Vt.
W1GJL, Maurice Grenier, Waltham, Mass.
W1HIX, Ralph Powell, Stow, Mass.
W1QMU, Martin Rossiter, N. Easton, Mass.
W1ZSD, Lewis Atwood, Newburyport, Mass.
W2AB, William French, Princeton, N. J.
K2HPX, William Grunow, Jr., Egg Harbor, N. J.
W2JHC, Cecil Spencer, Salisbury Ctr., N. Y.
W2OKK, Ray VanNostrand, Amityville, N. Y.
WA2PPR, Louis Marchese, College Point, N. Y.
WA2SRT, N. David West, Valatie, N. Y.
K2UQK, Robert Westcott, Jr., Bridgeton, N. J.
W2UXC, Loyal Lecuyer, Plattsburgh, N. Y.
W2WBE, Raymond Fenwick, Neshanic Station, N. J.
W3IXX, Lawrence Krauss, Washington, D. C.
W3SCX, Stanley Yagel, Sharon, Pa.
W4CUX, L. C. Mabb, Alpharetta, Ga.
W4DVK, Edward Hoge, Ft. Lauderdale, Fla.
W4HDC, Herbert La Morder, Oldsmar, Fla.
K4HH, A. Evan Feightner, Naples, Fla.
W4IJR, James Best, Elizabethtown, Ky.
W4LMR, Harold Slaydon, Martinsville, Va.
W4YHA, Merton Taylor, De Land, Fla.
W5NZ, Maurice Brooks, Metairie, La.
WN5RAT, Lee Pulliam, West Memphis, Ark.
W6AF, Amos Fuller, Oroville, Calif.
K6AXF, D. Roy Glanton, San Diego, Calif.
W6CRF, Vernon C. Edgar, Vallejo, Calif.
ex-W6KYV, Dave Kennedy, Los Angeles, Calif.
W6PQT, C. B. McKnight, Sylmar, Calif.
W6YQH, Lloyd H. Boxx, Long Beach, Calif.
W7BAA, L. William Gushwa, Coeur d'Alene, Idaho
WA7DSB, Dorothy Olson, Olympia, Wash.
W7EKT, Heman F. Luse, Spokane, Wash.
W7KHM, George Stoughton, Boise, Idaho
W8BTU, Earl H. Graham, Princeton, W. Va.
W8CHK, Ken Fields, Conneaut, Ohio
W8CPI, Russ Hibbard, Niles, Mich.
W8DJA, Vondell A. Bowen, Alpena, Mich.
WA8HTA, Harold Wirschiny, Dayton, Ohio
W8PRO, Goebel K. Ball, Williamson, W. Va.
WA8SIO, Clayton Conklin, Toledo, Ohio
K8SWQ, Lin Service, Saginaw, Mich.
WA8TGK, Roland Howard, Fremont, Ohio
W8UYL, Donald Volzer, Jr., Canton, Ohio
ex-W9AXG, Louis Corridori, Mobile, Ala.
K9BAW, Luther Chapman, Birdseye, Ind.
WA9CDX, Walter Bayer, Chicago, Ill.
K9EZD, Eric Leufstedt, Chicago, Ill.
W9FKO, Carl Wiseman, Bartonville, Ill.
W9OSP, Ora Koch, Hampshire, Ill.
W9TLF, Martin Carpentier, Aurora, Ill.
K9UXX, Charles Barger, Logansport, Ind.
W9ZLL, Lawrence Patterson, Ingleside, Ill.
WØCOC, Benoit Berg, Denver, Col.
WAØDOJ, John W. Green, Des Moines, Iowa
KØKKY, Earl J. Tolbert, Denver, Col.
F8DJ, Jacques Oemichen, Paris, France
GI3JFX, R. E. Peake, Belfast, N. Ireland
GI3KVQ, S. K. Orr, Dungannon, Co. Tyrone, N. Ireland

Cavity Amplifier for 1296 Mc.

(Continued from page 19)

been done. Be sure that adequate air flow is provided, especially if the plate input is to be near maximum ratings. If there is to be no cowling around the tube fins an air stream of some 150 c.f.m. from a low-pressure blower across the area of the tube fins is required. With an enclosure confining the air flow to a path through the fins a 30 c.f.m. high pressure blower should suffice. In either case it does no harm to have more. If you have a quiet blower it probably is not enough!

Connect a 50-ohm termination to J_1 and apply plate power, preferably at a lower voltage than the maximum that will be used eventually. Apply drive, and tune the input circuit for maximum plate current, and the output circuit for maximum output. A suitable indicator is an incandescent lamp connected at the end of a 50-foot length of RG-58 cable. This will be so lossy that it will look like 50 ohms, regardless of the termination, and the lamp will show relative output. Maximum output may not coincide with minimum plate current.

Once the amplifier appears to be working normally, plate voltage may be increased, rechecking the tuning adjustments for each change in plate voltage. Use a value of cathode resistor that will result in about 50 ma. plate current with no drive. With 1000 volts on the plates do not operate the amplifier for more than a few seconds at a time under key-down conditions. With a normal c.w. keying duty cycle you can run up to 400 ma. plate current. With s.s.b. you may run up to 600 ma. peak current, or a 300-ma. indicated meter reading during normal voice operation. With the expected 100 watts output, with 300 to 400 in, the RG-58 cable should melt in a few minutes. This is not a very satisfactory method of measuring output, and some reliable power-indicating meter should be used for at least an intermittent check, if at all possible. QST

Mr. Mohamed Mili Speech

(Continued from page 60)

interesting that I read it over again. Thanks to some of you, a man somewhere in the world had his failing eyesight restored. For a human being eyesight is a very precious thing.

Your movement is therefore a magnificent one which brings men closer together — a movement which, in addition to its contribution to scientific progress, as Dr. Joachim has just emphasized, fosters the fraternalism which is the very basis for the maintenance and strengthening of peace.

Yesterday I happened to read an article written by one of you, Mr. Peter Schröeder.[3] It was written in 1957 — just ten years ago — and published in the ITU Telecommunication Journal in January

[3] Dr. Peter Schröeder, W1PNY, who wrote a doctoral dissertation of the IARU. See also the item on p. 28 of October 1967 *QST*.

(Continued on page 148)

(Continued from page 146)

1958. In that article Mr. Schröder attempts to define the aims of the amateur radio movement and in conclusion I cannot do better than repeat two sentences at the end of the article which, in my opinion, provide a perfect definition of your movement.

This is what the author said: "One of the most significant aspects of the I.A.R.U. lies in its role as a force for world peace and understanding. It has already been noted above that the furthering of international fraternalism was a stated objective of the Union, and to this aim it has consistently adhered since the organization was first devised a quarter of a century ago."

Once again I thank you for giving me this opportunity to make my humble contribution to this international fraternity and it is my hope that the radio amateur movement will progress, expand and prosper as it deserves. QST

YL News and Views

(Continued from page 95)

she touched a key. ZS6FH, Ray, taught her to send and to increase her code speed. The license was acquired a year after she left high-school.

Diana's parents wanted her to teach music, but she wanted to become a journalist. There was little opportunity in that field at the time, so she became a legal typist instead and later, a bookkeeper. She has spent many months overseas meeting amateurs in British Columbia, Canada, the United States, England, and Eire.

DX hunting is one of ZS6GH's favorite on the air activities and has resulted in WAC-YL, DX-YL, Lads 'N Lassies, WAYL (ZS) certificates and has piled up 120 countries confirmed out of 140 contacts.

Recipient of the SARL Merit award, a Scroll and Silver Jug, for meritorious service from SAWRC, Diana is not the only member of the Green family who has been honored by the South African award.

Coming Events

YL-OM Contest will be February 24, 25, 1968 for c.w., and March 9, 10, 1968 for Phone. See December YL News and Views for rules.

YLRL International Convention. Sponsored by the Colorado YLs. Denver, Colorado, June 13–16, 1968. New Year's Resolution #1 for every YL, whether she is a YLRL member or not, should be to mark the calendar, and begin plans for this very special event. The gals are really working hard to make it something everyone who attends will remember, and those who don't will regret their decision not to go.

ARRL National Convention for 1968 will be held in San Antonio, Texas June 7, 8, 9. The Alamo YL club is to host the YL activities. There will be a program for licensed YLs, a full program for the ladies with plenty of everything for all the gals who attend. QST

Feedback

In "YL News and Views" *QST*, November 1967, Claire Bardon, secretary YLRL for 1968 has her call listed incorrectly. It should read W4TVT.

YLRL dues have not been changed. The dues are still $3.00 per year, not $3.50 as listed in the November 1967 issue.

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 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 non-commercial 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.

AUCTIONFEST. Broward ARC, February 17th. Turn your used equipment into cash. Bargains unlimited. Location: Chaminade High School, 500 North 51st Avenue, Hollywood, Florida. Doors open at 8:00 AM. Auction begins 9:00 AM.

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.

DAYTON Hamvention April 26, 1968: Wampler Arena Center, Dayton, Ohio. Sponsored by Dayton Amateur Radio Association. Informative sessions, exhibits, hidden transmitter hunt, and ladies program for the XYL. Watch the Ham Ads for information, or write Dayton Hamvention, Box 44, Dayton, Ohio 45401.

ROCHESTER, N.Y. Headquarters again for the big Western New York State Hamfest and VHF Conference Sunday, May 11.

MOTOROLA used FM communication equipment bought and sold. W5BCO, Ralph Hicks, 813B No. Federal Hiway, Fort Lauderdale, Florida.

PRE-WORLD WAR I operators will find many of their old buddies are members of the Old Old Timers Club. Pictures and thumbnail sketches will also appear in the coming Bluebook. We welcome all applicants whose first wireless contact was more than 40 years ago but give special consideration to those pre-World War I Pioneers including Charter Membership. Write to W5VA, Secretary of the Old Old Timers Club, P.O. Box 840, Corpus Christi, Texas 78403.

WANT Callbooks, catalogs, magazines, pre-1920 for historical library. W4AA, Wayne Nelson, Concord, N.C. 28025.

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:

DUMMY Loads, 1 KW, all-band, $7.95; wired, $12.95. Ham Kits, P.O. Box 175, Cranford, N.J. 07016.

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 $3.00 Ppd. 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 unused 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.

QSLS?? SWLS?? Personalized made-to-order. Samples 25¢. DeLuxe, 35¢ (refunded). Sakkers, W8DED, Box 218, Holland, Michigan 49423. (Gospel QSL samples 25¢).

QSLS. New catalog, 10¢. Filmcrafters, Box 304, Martins Ferry, Ohio 43935.

QSLS "Brownie" W3CJI, 3111 Lehigh, Allentown, Penna. Samples 10¢. Catalog 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 QSLs 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-J, Atascadero, California 93422.

RUBBER Stamps $1.15 includes tax and postage. Clints' Radio, W2UDO, 32 Cumberland Ave., Verona, N.J. 07044.

QSLS, 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.

QSLs, 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 Vesely, 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, John K4NMT, Box 198T, Gallatin, Tenn. 37056.

QSLS's: Quality with service. Samples free. R. A. Larson Press, Box 45, Fairport, N.Y. 14450.

QSLS'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, 240 West Kinney St., Newark, New Jersey 07103.

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 Garra, Lehighton, Penna. 18235.

QSLS by Jansen, K2HVN, samples 25¢. 860 Atlantic Street, Lindenhurst, N.Y. 11757.

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. 9140.

QSLS by K1FF, $2.00 for 100. Others at reasonable prices. Samples 25¢ deductible. Box 33, Melrose Highlands, Mass. 02177.

QSLS, samples 20¢. Fred Leyden, 454 Proctor Ave., Revere, Mass. 02151.

QSLS. Gorgeous rainbows, cartoons, etc. Top quality! Low prices! Samples 10¢ refundable. Joe Harms, WA4FJE/W3COP, 905 Fernald, Edgewater, Fla. 32032.

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 in. letters. Ray, K7HLR, Box 1176, Twin Falls, Idaho 83301.

HUNDRED QSLS, $1.25 and up, postpaid. Samples, dime. Holland, R3, Box 649, Duluth, Minnesota 55803.

WHO will print QSLs, red and black, on glossy white in 1" Old English type for me? J. Olszowka, 5253 S. Luna, Chicago, Ill. 60638.

COLORFUL QSLS. Free samples. WA8NYB Print, 645 Reynard, Cincinnati, Ohio 45231.

CANADIANS: Best used gear list in Canada. Free Etco, c/o Marv, VE2ANN. Box 744, Montreal 3.

CANADIANS: For sale—Johnson Courier 500W. amp. In top condx. with new spares. VE3OU, 64 Barrie St., Galt, Ont. P., Canada.

CANADIANS: HT-44 and SX-117 for sale. Mint condx. VE3-FCR, Apt. 221, 25 Bridesburg Dr., Weston, Ont., Canada.

FOR Sale or trade: Seven 833A, three 250th, six 100th. All new and unused. VE2ZM, 142 Sherbrooke St., Beaconsfield, Que P., Canada.

CANADIANS: Eico 753, $265.00; HP-23 power supply, $60.00; Mohawk recvr w/matching spkr, $210.00. All like new and complete with manuals. Solid state VFO goes with Eico, not installed. Harry Hardham, VE2FW, 5560 Albert, Pierrefonds, Quebec, Canada.

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 5-7003.

WE buy all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co., Box 516, Hempstead, N.Y.

GOODIES. Cash for Teletypewriters, parts. List. Typetronics, Box 8873, Ft. Lauderdale, Fla. 33312.

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.

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.

INTERESTING Sample copy free. Write: "The Ham Trader," Sycamore, Illinois 60178.

WANTED: For personal collection: Learning the Radiotelegraph Code, Edition 4; How to Become a Radio Amateur, Edition 9; The Radio Amateur's License Manual, Edition 2, 11, 12. WICUT, 18 Mohawk Dr., Unionville, Conn. 06085.

RTTY gear for sale. List issued monthly. 88 or 44 Mhy toroids, five for $1.50 postpaid. Elliott Buchanan & Assoc., Inc. Buck, W6VPC, 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.

WE'RE Trying to complete our collection of Callbooks at Headquarters. Anyone have extra copies of Government Callbooks 1922-1925 and Radio Amateur Callbooks 1928-1934? ARRL, 225 Main St., Newington, Conn. 06111.

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.

WANTED: Military and commercial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y. 13902.

JOHNSON Ranger and P/W, like new, $169.00. Also Instructograph code instructor, complete 4/all tapes, best offer. Floyd Scott, 66 W. North Ave., Northlake, Ill. 60164. Phone 312-562-0674 after 5 PM.

POWER Supply, adjustable 6-12 volt at 100 Ma., short-proof; regulation 0.1%, ripple 10 mv, 3x3 in. p.c. card; 6.3 VAC input. Assembled, $12.00: kit, $7.95 p.c. board and schematic, $3.00. Listening, Incorporated, 6 Garden Street, Arlington, Mass. 02174.

SELL: Johnson Valiant, $190 or your best offer; 275 w. Matchbox, $20.00; Electro-Voice 611 microphone, $15.00; Heath MT-1 and MR-1 with AC and DC power supplies, $125.00; DX-20 with three crystals, $25.00; Drake 2B and 2BQ, $175.00. Write: Dale M. Johnson, K9VUJ, P.O. Box 151, Ettrick, Wisconsin 54627.

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.

ESTATE Liquidation. SSAE brings list of quality equipment. Paradd Engineering, 284 Route 10, Dover, N.J. 07801.

TR-4, $480.00; AC-4, $83.00; DC-3, $123.00; R4-A, $330.00; T4X, $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.

PRINTED Circuits. Build the modern way. 10¢ stamp for catalog. Harris Co., P.O. Box 985, Torrington, Conn. 06790.

HEATHKITS, Marauder, $150.00; Mohawk with 6M conv., $100. All in exclnt condx with manuals. Smitherman, 109 Elliott, Oak Ridge, Tenn. 37830.

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.

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.

SQUEEZE Keyer (WØEPV ckt) Kit, $69.50: complete keyer, $89.50. Brown paddle, $16.95. Satisfaction guaranteed. Jimmy Moss, W5GRJ, Box 442, Natchitoches, La. 71457.

NAVY LM-13 crystal frequency indicator and AC power supply. Rack mounted. Spare crystal and tubes. Original calibration book. In exclnt condx. Price $65.00. Capt. C. G. Barany, 1520 Woodcliff Ave., Catonsville, Maryland 21228.

FOR Sale: B&W 6100, like new, $289.00; HW-12, in gud operating condx, $79.50. You pay shipping. Robert F. Dukes, 834 Butler, Bolivar, Tenn. 38008.

COLLEGE Bound: HT44 plus P.S./150, SX-177 Clegg 99'er, in exclnt condx. Peter Williams, 615 Marview Terrace, Cincinnati, Ohio 45231.

COLLINS 3510-2, Hallicrafters CRX-3, Hy-Gain 23 and 5BDT Eico 666 tube-tester Mosley TT-31 complete portable antenna with case. W1USP. Best offers. 617-934-2342.

MINT Condx: Hallicrafters SR-500 w/a.c. supply. First $325.00 gets all, including Shure 440-SL PTT. W6FBS, 8411 Yolanda Ave., Northridge, Calif. 91324.

SELL: R-390, R-390A, 51J4, 51S1 receivers. W2ADD.

DAH-DITTER. New integrated circuit automatic keyer. Fully self-completing. Built-in AC supply and keying monitor. Isolated relay output. Completely assembled, ready for operation. Price $34.95. See your distributor or order direct. Free brochure. M & M Electronics, 6835 Sunnybrook, N.E., Atlanta, Georgia 30328.

WRL's Used gear has trial-tradeback-guarantee terms. SB-34, $284.95; 650 & VFO, $89.95; HQ-170AC, $239.95; HQ-110A, $159.95; 753, $119.95; SB-300, $249.95; SR-150, $269.95; SX-110, $99.95; SR-46, $99.95; G-76, $99.95; 75S-1, $299.00; 62S-1, $589.00; Thor 6 and VFO, $169.95. Request free "bluebook", hundreds more. WRL, Box 919, Council Bluffs, Iowa 51501.

RTTY: Model 19, $175.00. Inquire. HA-1 type mercury relays, $5.00 postpaid. K3MNJ, 8361 Langdon St., Phila., Penna. 19152.

WANT: January 1920 QST. W2DTE, 29-29 213 Street, Bayside, L.I. N.Y. 11360.

NEW Heath DX-60A, HR-10, excellent physical/electrical condition: $125.00, GR-34, $75.00; SX-111, $175.00. Both are new, never used. First check takes. WB6UVH, RT 1, Box 1746, Meadow Vista, Cal. 95722.

SELL Or trade for radio equipment Silvertone wooden clarinet. WAØJTB, 427 Delaware Way, Sterling, Colorado 80751.

HAMMARLUND HQ-110A with matching speaker. New in May and perfect condx. F.o.b. in factory cartons: $75.00. J. F. Walker, 37 French Rd., Rochester, N.Y. 14618.

XMTER, Johnson Invader, AM-SSB 200W PEP, $275.00 K2-LDY, Box 37, Far Hills, N.J. 07931.

TEN Novice crystals, all bands $10.00. WB4FJO, Sherm, 1509 Carolina, Kingsport, Tenna. 37664.

HEATHKIT DX-60A, HR-10 combination, xtal calibrator, manuals, Novice xtals, extra 6146. Well-built, in mint condition. $100.00, plus shipping. S. J. Mitchell, WAØPIN, RR #1, Dakota, Minn. 55925.

SELL: Eico 753 transceiver, 751 P.S., PTT microphone, manuals, $160.00. R. Vlach, WAØQMP, Benson, Minnesota 66215.

WANTED: Pair of J. W. Miller No. 6200 antenna matching coils, dimensions of Form ⅜" by 2½". W4ISS, 2643 Hillcrest Ave., Augusta, Ga. 30904.

SELL: Viking Ranger, Viking 6 & 2, NC-303 receiver, new, Tecraft Nuvistor converter, Thorne Baker, K2TEM, 24 Brighton Street, Staten Island, N.Y. 10307. Tel: 212-YU4-2437.

SELL: Microwave test equipment, TS-147 A (easily modified to "D"), in xclnt condx, with manual, $85.00. IM-81/UPP Standing Wave Indicator, $22.50. WB2PLY, Box 207, Princeton Jct., New Jersey 08550.

FOR Sale: HQ-170C, in vy gud condx: $170.00. Call WB2-RYZ. Tel: 516-WE8-9070. Mark Thierman, 39 Marian Lane, Jericho, L.I., N.Y. 11753.

TOOOOBES. Tranzeesters. New, guaranteed. 6CW4, $1.40; 811A, $4.25; 6146B, $4.00; 6146A, $2.55. Also transistors. Write needs. Free catalog. Note new address. Vanbar Distributors, POB 91-Z, Paramus, N.J. 07652.

COLLINS 32V-2 and B&W single sideband generator. Best offer over $150.00. Local deal only. Bud Lawrie, W2OLV, Red Bank, N.J. 07701. Tel: 747-9738.

HT-37, SX-101A and speaker. SWR Bridge, Vibroplex Bug, Astatic D-104 mike, manuals, all exclnt condx. All for $300.

WA6JNS. 4647 Alveo, La Canada, Calif. 91011. Tel: (213)-790-7407.

GONSET Linear GSB-201, in mint condx. 2000 watts PEP. $250.00. W2CMD.

HQ-180, immaculate, excellent operating condition. Best offer takes. WICKT, 65 Rogers Ave., West Springfield, Mass. 01089.

QUAD Parts, Kits, Accessories. Fiberglass spreaders, $6.00. DeLuxe bamboo, 12½ foot spreader, $2.25. 25-foot spreader, $5.00. Varnished. Quad Kits: $39.95 up. Complete quads, $59.95 up. Skylane Products, 406 Bon Air, Temple Terrace, Florida 33617.

CHIPPEWA KL-1 wanted, with power supply preferred. K1-IPR, 22 Darbrook Road, Westport, Conn. 06880.

GONSET 201, $200.00. Gary A. Stilwell, W6NJU, 8114 Irondale, Canoga Park, Calif. 91306.

6 MTR Converter, 3 FET transistors, 14 Mc. output. $8.50 F.o.b. Bill Deane, 8831 Sovereign Road, San Diego, Calif. 92123.

SWAP: New fender Jaguar custom electric guitar and reverb amp, for a 75A-4 or 75S3B. Melvin Brafford, 115 Cypress Road, Sterling, Va. 22170.

WANTED: Prop-pitch motor. Gear train with steel output gears, any voltage. Condx, price? Al Henderson, Box 268, Kingsville, Ohio 44048.

CHRISTIAN Ham Fellowship now being organized for licensed amateurs for Christian fellowship. Gospel tract work among hams. Christian Ham Fellowship Callbook, $1.00 donation. Free information: write Christian Ham Fellowship, 5857 Lakeshore Drive, Holland, Mich. 49423.

WANTED: PL172s. Have 4CX1000As. Trade only. W8QBG, George Portell, 20711 Hunt Club, Harper Woods, Mich. 48236.

HEATH SB-110A, SB-600, HP-23, carefully wired, factory-aligned, mint condition: $325.00. K8YSG, 1767 Hoyt, Muskegon, Michigan 49442.

HT-37 excellent no-drift, $200.00. WB2YJS, Mike Tarnowsky, 24 Middletown Road, Montvale, N.J. 07645. Tel: (201)-391-6450.

DRAKE R4-A, MS-4, new condition, $300.00. P. A. Trout, Apt. 904, 11215 Oak Leaf Drive, Silver Spring, Maryland 20901.

FOR Sale: Collins AC supply 516-F-2. Like new condx. Used only 2 hours for testing rig. $75.00. R. R. Heaton, K9RDL, 5735 Winthrop Ave., Indianapolis, Ind. 46220.

DRAKE 2B, Q-multiplier, calibrator, shortwave and 10-meter crystals, perfect: $199. Knight T-150, VFO, phone, $59.00. Hy-Gain 3-element Tribander, $49.00. K9HDP. Tel: 545-9807. Jensen, 4062 N. Wallace, Indianapolis, Ind. 46226.

WANT: Collins F455J21 (2.1 KHZ.) mechanical filter for 75A-4. Have extra F455J15 (1.5 KHZ) and F455J31 (3.1 KHZ) units for swap or sale. Bill Du Hart, W4VMS, 3846 Winona Dr., Pensacola, Fla. 32504.

SB-34. Like new, used approximately 30 hours. Includes luggage case, mike, SWR/power meter, a.c. and d.c. cables. $345.00. Shipped in original cartons. Must sell for college expenses. Jeffrey Loesch, 1928 N. Nevada, Colorado Springs, Colo. 80907.

SACRIFICE: 13 tubes, 5-813; 4-811; 2-866; 2-1625. $39.50. Large prop-pitch motor new, converted, $49.95; 16-inch record turntable Radiotone portable, built-in amplifier, $49.95. 15 year run of QSTs (1951-1966). Make an offer. Surplus relays meters, other odds and ends. All $20.00. F.o.b. Los Angeles, Calif. 90028. Ernie Molinari, W6FLR, 6218 Lexington Ave., Hollywood.

STATION Sellout: Heathkits SB-300, SB-400; HQ-10. Hy-Gain 18AVQ vertical cabling, microphone, headset, key, manuals. Mint condx. Guaranteed. Neatly wired by engineer who has no time to ham. $425.00 (firm price) takes package. Tel: (404)-255-3725. WB4EPM, 4670 Canyon Creek Trail, Atlanta, Georgia 30305.

SELLING: HQ-170 RX w/spkr, vy gud, $175.00; 7 in. 'scop $75.00; versatile Eico 720 fixed/mobile w/modulator, xtal, mike, PTT, ac/dc p/s, whipload ant., etc. Like new condx, $98.00. Interesting KW rig in 6 ft. cabinet, w/exciter, $395.00. Write for details to B. G. Day, W1JRU, 287 Thompsonville Rd., Suffield, Conn. 06078.

GROUNDED Grid filament chokes, 30 amp., $4.00, ppd USA 48. William Deane, 8831 Sovereign Rd., San Diego, Calif. 92123.

WANTED: IRE-IEEE publications. TPI, Box 67, Palo Alto, Calif. 94302.

WANTED: Electronics Instructor. General ticket indispensable. Theory and workshops. Science. Camp Lake Placid, N.Y. Write Lothar Eppstein, 440 West End Avenue (4B). New York, N.Y. 10024.

COLLINS KWM2 with 516F2 supply $700.00. Collins 30L1 linear, $350.00. Collins 312B4 console $160.00. All are in perfect condx. Rex Bassett, W4QS, Box 4163, Fort Lauderdale, Florida 33304. Phone 305-564-8729.

SELL: HQ-170A receiver, $200.00; Heath Marauder transmitter, $170.00, both mint. Perfect Johnson Thunderbolt 2 KW-PEP, extra 4-400A, $210.00. Heathkit: Hamscan $55.00, Monitor 'scope, $40.00. WA2SZM, 67-48 181 St., Flushing, N.Y. 11365.

HAMMARLUND Station: HX-500 transmitter (100 watts SSB output); HQ-170C receiver; HXL-1 linear. Complete with cables and manuals. Also Hallicrafters HA-6 Transverter, with power supply. All are in mint condx. Will ship in orig nal cartons. Best offer on package or individual items. Inquire K1-OPA, 9 Benedict Road, Worcester, Mass. 01604.

GOING Sideband! National NC-303, $225.00; Apache, $150.00; Lafayette HA-225, $75.00. Call or write Arthur Malatzky-WB2WFJ/1, P.O. Box 254, 21 Forsyth Street, Boston, Mass. 02115. Tel: 617-247-8306.

SELL: Heath SB-400 built by experienced kit-builder, beautiful condx. $230.00. Drake 2-B and all accessories, also beautiful condx. $180.00. WA5HEP, 241 Bayside, Corpus Christi, Texas 78411.

EICO 720, perfect, $60.00. 75A-2, $175.00. ART-13, nice, unmodified, $25.00. K8ZID. Tel: (614)-254-4172.

COLLEGE Expenses. Must sell Clegg Venus/P.S., 6 months old. First check or money-order received for $400.00. You pay shipping. WA8NJR, Dennison Hall, Miami University, Oxford, Ohio 45056.

2 and 6 meter transmitter, 50 watts. Lettine 262, plus VFO and a 2-meter converter Ameco Model CN-2, $100.00. Heathkit HO-10 'scope, $40.00. Rodin, 159 Cathedral Avenue, Hempstead, L.I., N.Y. 11550. Tel: (516)-IV-1 9844 days.

QSTs: June 1953 through December 1965, except 1958. 4 bound volumes. September 1921 through August 1924; all 1922 except Jan., Feb., Oct. Shortwave Craft: 1933-1934, all comp., most of 1932 and 1935; Radio Craft, most of 1933 and 1934 and 1935; Shortwave Radio, Nov. 1933 through October 1934; others. Best offer. F.o.b. Mobile, Alabama. H. E. Sanders, 70 North Reed Avenue, Mobile, Ala. 36604.

SELL: Heath Mohawk RX-1 receiver with manual, excellent condition. $150.00. *Will ship REA collect.* K4DX, *5020 North* 24th St., Arlington, Virginia 22207.

DRAKE R-4A and Johnson Invader in excellent condition. Both for $500.00. Sorry, pick-up only. WA8NNL, 1134 West Giles, Muskegon, Michigan 49445.

COLLINS 32S-1 transmitter, including 516-F power supply in mint condition. Priced to sell: $325.00. Bill Kusack, W9QEE, 735 Elmore St., Park Ridge, Ill. 60068.

$99.00 price plus shipping for quick sale. Hammarlund HQ-100C, excellent condition, unmarked panel, recently aligned, manual included. Steve Mintz, W2AZO/1, 19 Everett St., Cambridge, Mass. 02138.

29 Year old radio and TV sales and service business for sale. Owner now 65, retiring. Only store in town. Great opportunity for a qualified TV man. Al Tatrault, W2HAA, 139 Main St., Northport, L.I., N.Y. 11768. Phone 516-261-6336 or send SASE.

WANTED: Military, Commercial, Surplus, Airborne, Ground, Transmitters, Receivers, Testsets, Accessories. Specially Collins. We pay cash and freight. Ritco Electronics, Box 156-I, Annandale, Virginia 22003. Phone 703-560-5480 collect.

75A4 owners: New Collins PTO 70E-23. Originally cost $175. Sell for $39.00. Richard E. Mann, 430 Wilmot Road, Deerfield, Ill. 60015.

HQ120, receiver, gud condx, $65.00. G. F. Bevilacqua, RD #1, Elizabethtown, Penna. 17022.

TELETYPES. Buy Model 28s. Sell all other models and parts. Used or reconditioned, like new. Richard Gjadny Corp., 22 Rome Street, Farmingdale, L.I. 11735.

ESTATE Of KL7GO. Complete bound volumes of QST, 1946 through 1962, no 1952. Complete bound volumes CQ, 1950 through 1964; unbound copies of QST 1963 to date; CQ, 1965 to date. Write: Lola Harvey, Box 1125, Kodiak, Alaska 99615.

WANT: Gianinni Microtorque potentiometers. Must be linear taper. Thompson, 5 Palmer, Gorham, N.H. 03102.

NEED Call License Plates from ten states to complete display. Your used ones appreciated. Chuck Crisler, WA5ERC, 154 Ronald Boulevard, Lafayette, Louisiana 70501.

VIBROPLEX Key $10.00 postpaid. Trade ham gear or cash for good banjo. W7AST, 1109 South 2nd, Hamilton, Montana 59840.

APACHE and Mohawk, excint condx; $200 takes both. J. Craig, W6VNH, 6 Muier Way, Berkeley, Calif. 94708.

HP-13, never been used, excellent, $55.00. New Webster 20 mtr. mobile antenna, $20.00. John Caulfield, 3630 West Pine, St. Louis, Mo. 63108.

WANTED: By former employee, now collector, Atwater-Kent "breadboard" BC receivers and parts for same. Franklin Atlee, K2PI, 1011 Eldridge, W. Collingswood, N.J. 08107.

COLLINS Kilowatt station, mint. 32S-1, 75S-1 with noise blanker, 516F2 power supply, 30S-1, 312B-3, TA-33, Hy-Gain Roto-brake, 10C mike, Eico signal generator, bugs, assorted coax. No shipping, sry. Sell 30S-1 separately, $1800 for whole package. WA3AQK, 407 Greenwood Drive, Greensburg, Penna. 15601. Tel: 412-834-7799.

CONTEST Winning NCX-5 with NCX-A and calibrator. One year old. Paid $825, sell for $550. Central Electronics 100-V, the ultimate in transmitters; will run transceive with Drake R-4 series for an unbeatable combination. $375.00. All equipment guaranteed mint condition. All inquiries answered. K9-VVZ, 1506 Woodmont Drive, South Bend, Indiana 46614.

NOVICE Station: Eico 720 and 10 xtals, $50.00; Hallicrafters SX-99, $59.00; Knight R-100, $50. Complete station $150. Ex-WN3ENT, Bob Hajdak, 4 Homer St., Greenville, Penna. 16125.

KNIGHT R-100, excint condx, $135.00. Simpson, 304 South 9th, Bozeman, Montana 59715.

SELL: HW-32 and crystal calibrator. Perfect, $85.00. F.o.b. WA0JTB, 427 Delaware Way, Sterling, Colorado 80751.

SELL: Mint Eico 753 with 751 a.c. supply, $200.00. F.o.b. Darien, Conn. Nat Wadsworth, 1 Edgerton Court, Darien, Conn. 06820. Phone 203-655-4629.

SELL: HW-32, 20 mtr. xcvr; HP-23 supply, plus all accessories, $105.00. Needed for college expenses. WB2PAR, Tom Bellamore, 1090 Arlington Rd., New Milford, N.J. 07646.

75A-4, 6 Kc filter, $39.00; new 4-125As, $10.00, New 4-250As, $12.00. Used 4-1000A, $20.00. Guaranteed. *Want:* HP525A, DZ loop. WA5SKI, Lewis Trailer Park #3, Columbus, Miss. 39701.

FREQUENCY Meter BC-221Q a.c. supply, $50.00; Knight grid dip G-30, factory wired, $15.00; Clegg 99'er, $69.00. BC-342 a.c. supply, $35.00. All excint condx. F.o.b. Huntsville, Ala. Kirchhuber, W4NLI, 280 Broadview, Huntsville, Ala. 35810.

HRO-50T with AA, AC, B, C, and D coils and manual: $175.00; BC-221-T frequency meter with voltage regulated AC PS in battery compartment, $60. Both immaculate; no junk! Mark Holland, P.O. Box 1342, Leesville, Louisiana 71446. Area code (318)-238-1045.

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 meet any advertised cash price on most 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, Mo. 64730.

SIXER: HW-29A and GP-11 power supply. In excellent condition. $50.00 for both. Eugene Chester, K9FOQ, 6821 W. 11th St., Indianapolis, Ind. 46224.

EICO 460 'scope, factory wired, new condx, with manual, costs $139.95. Asking $95.00; Eico 145A signal-tracer, meticulously wired, mint condx with manual: $18.00. Both above F.o.b. Santa Fe. Johnson RF actuated Signal Sentry, c.w. monitor (for full break-in c.w.). Mint, with instructions $17.00 postpaid. Superex COM-S Communications headphones, new, $11.50 postpaid. John Catron, W5DZA, 826 Ranchitos, Sante Fe, N.M. 87501. Tel: 505-982-0894 evenings.

NCX-3 National SSB 80-40-20 meter transceiver with NCX-A a.c. power supply, speaker. *Mint condition. Seven month* National warranty, original carton, manual. $290.00. WB2ZXZ, Alan Rosenfeld, West Hempstead, L.I., N.Y. 11552. Tel: (516)-IV1-7021.

NATIONAL NCX-3 and NCX-A. Hardly used, in mint condx. $225.00. R. Brook, WA2PPE, 534 W. 11th St., NYC, NY 10025.

GONSET Communicator IV. 144 Mhz, guaranteed in mint condx: $169.00. Bob Pierce, K1TKZ/5, 324 Maison deVille, Mississippi City, Miss. 39562.

OLD QSTS, January 1928 through January 1934. 50¢ each. W6GPB, 522 Third, San Rafael, Cal. 94901.

AU Desespoir! DX-60, $50.00; HG-10, $25.00; HQ-100C w/clock, $100. Manuals. WB6PCV, 3022 Wynwood Lane, Los Angeles, Calif. 90023.

SELL: Vibroplex bug. In gud condx: $8.50. Ship ppd. in U.S. WNØSVO, 1626 Cadet, Lawrence, Kans. 66044.

BIRD Thruline Model 43 wattmeter: few new 3 in. panel meters for above line sections, $15.00. W4API, Box 4095, Arlington, Va. 22204.

FOR Sale: Collins 32S-1, 516F2, 75S-1 with 500 cps filter, 312B4, EV-727 ceramic mike. All latest mods. Excint condx. $750.00. J. C. Eastwood, 633 Stardust, Richardson, Texas 75080.

NATIONAL NCX-5 Mk2, VX-501, NCXA, XCU-27, all with walnut cabinets, mobile cabinet for NCX-5, never used Linear systems 500-12 DC supply, 10DA-UG8, SR-90D, $600 all. P. Sherry, 15 Eldridge St., NYC 10002.

TRANSISTOR Sale, sample assortment of twelve new transistors, $1.00. Factory packaged 2N321, 2N323, 2N406, 5/$1.00; 2N1370, 25¢ ea. 2N522A, 18¢ ea. Other types available, free list. WA5FYF/5, Pritchard, 303 Sneed, Lubbock, Texas 79406.

JANUARY CLEARANCE: HRO-60 with 6 coils and cabibr., $199; SBE33, $189.00; Lampkin 105B and 205A $200 pair, or $125 each; 312B-4-$135.00; HA6 with A.C.-$179.00; SX101 Mark III-$149.00; SW240-$179.00; SW-140-$119.00; HR-20-and HP23-Clean-$225.00; HW22A w/calib.-$99.00; Monitor M-40 30/40 FM 12V dc.-$59.00; SBE-33-$189.00; SX122-$185.00; HR20-$69.00; UT1-$17.50; LSA3 W/12V.D.C-$125.00; AF67-$32.50; Lampkin 150B and Lampkin 205A-$200.00 pair or $125 each. FREE LIST! HOWARD RADIO, Box #1269, Abilene, Texas 79604. Tel: AC 915-OR2-9501.

HAM With General Class license, high school graduate minimum. To teach radio to campers at outstanding co-ed camp in Pocono Mountains. Must have own equipment. Excellent salary and benefits. For information, write New Jersey YMHA-YWHA Camps, 589 Central Ave., East Orange, N.J. 07018. Tel: 201-OR4-1311.

SALE: Hickok 605 tube-tester, Hickok 288X sig. gen, Collins MP-1 mobile supply. Make offers. Herbert F. Halbig, W2SMB, 303 Fifth St., Liverpool, N.Y. 13088.

VERY Good, clean, National NCX3, $170.00; Hallicrafters HA-6 and P-26 power supply, $120.00; Clegg 99'er transceiver, $60.00; Elmac AF68, $50.00. Philip Schwebler, W9GCG, 4536 N 50 St., Milwaukee, Wis. 53218.

WANTED: Hammarlund Super-Pro SP-400X. State price, frequency coverage and details of condition. Have ARC-3 transmitter and receiver for sale. $15.00 each. O. W. Weiss, WØCYP, 8944 Crest Oak Lane, St. Louis, Mo. 63126.

QST 1949-1952 in binders. 1948, 1958, 1959. CQ 1950-1953 in binders. 1958-1960 less one issue. 1961, 1964-1967 complete. Best offer. Howdy Wheeler, W6DXZ, 1225 S. Third, Arcadia, Cal. 91006.

CLEAN Bargains: Meteor SB-175 with PTT mike, $54.00; PSA-63 AC p/s with PTT relay, $26.00; HA-5 VFO (new), $39.00; Johnson 275W Matchbox, $28.00; RME DB-23 Preselector, $22.00; HD-11 Q-mult., $10.00; Signal Sentry, $6.00; SX-24 rcvr, $25.00. W1HUM, I. J. Hemingway, 12 Sunset Terrace, West Hartford, Conn. 06107. Phone 203-521-9523.

SELL: National NC-155, Heathkit DX-20. WA3DNP, Markowitz, 115 West Brown St., Norristown, Penna. 19401.

BEST BRASS, Stainless Steel threaded, washer, hardware. See November ad. Lists 10¢ (stamps). Walt, W8BLR, 29716 Briarbank, Southfield, Mich. 48075.

SELL: Gonset G-76 with AC and DC supplies, 80-6 meters, 100 watts. WB2PYE, 325 Wilson Ave., Westwood, N.J. 07675.

LAFAYETTE HE-45A 6-meter transceiver, good condition, with HE-61 VFO, 4 crystals, AC and DC power cords, mobile mount, Cush Craft squalo, less mike. Best offer over $60.00. Paul Wing, K1WVX, 148 Morgan St., Holyoke, Mass. 01040.

SELLING: HQ-145C, $150.00; Valiant, $140.00; BC-221 frequency meter, $50.00; CE-20A plus VFO, $100; HT-37, $195.00. Wanted: Drake DC-3. K9FWF/9, 114 N. Orchard, Madison, Wisconsin 53715.

FOR Sale: Amateur equipment, parts and tubes. Power supplies. 1700VDC 360 Ma. supply. For more information write: Alan Robinson, 6651 Forward, Pittsburgh, Penna. 15217.

HUSTLER w/75-20-15 resonators, $25.00; HG-10 VFO, $20.00. Will deliver between Boston and New Haven. Paul Gough, Box 263, Wallingford, Conn. 06492.

HAMMARLUND HQ-170C, $175.00; Elmac AF-67 and power, $50.00; PMR-6A and power, $40.00 Ship collect. W4DGY, 3441 Cliff Rd., Birmingham, Ala. 35205.

SELL: 600 watt SSB and CW transmitter; also AM 10 thru 80 meters. C-E 600 linear ampl., Heath SB-10 and LAF. VFO HA-90. Excint condx. Best offer over $195.00. Will sell separately. Lyman R. Blossom, WA3COD, 517 Filbert Road, Orefland, Penna. 19075.

WANTED: Collins 312B5 PTO or 399C-1 PTO. Also want mobile transceiver. K3BHB, 903 Western Ave., Neannette, Penna. 15644.

JOHNSON Valiant, in great condx: $140.00; SX-122, like new, $140.00; D-104 mike, $20.00. WA1HEC, 55 Oak St., Indian Orchard, Mass. 01051. Tel. (413)-543-4639.

FOR Sale: Collins KWM-2 and 516F-2. New condition. $750.00. Kenneth Noller, Box 202, Arcadia, Ohio 44804.

SELL Hewlett-Packard 430C microwave power meter. List $600, best offer, excint condx, recently calibrated to standard. K8KTL, James Dempsey, 7120 Garden Road, Cincinnati, Ohio 45236.

MOHAWK with speaker, Near perfect. Best offer. Jack Schlosser, 413 Ridge Crest Drive, Richardson, Texas 75080.

FOR Sale: 125 back issues of QST, CQ, 73; 1963-1967 plus 3 binders, 12 miscellaneous ARRL publications. Best offer. Art Champagne, Jr., WA1BFK, 24 Northview Dr., South Windsor, Conn. 06074.

SELL: SR-160 PS-150 AC, HW-22, HP-23-ACPS. Webcor Musicman stereo recorder, Hornet beam. Randall N. Wolf, Main St., Akron, Pennsylvania 17501.

TWOER, new, unmodified, $45.00; 144 Mc converter, as in ARRL Handbook, half-completed, $31.00 worth of parts with suggested power supply, for $25.00. Heathkit Novice transmitter AT-1 with matching AC-1 antenna tuner, $20.00. Heathkit HD-11 Q-multiplier $12.00. Jim Laning, 553 West F Avenue, Kalamazoo, Michigan 49001.

TOROIDS, 88 mhy, unused, center-tapped, 5/$1.50 postpaid. Heath Sixer, $25; SP-400 Superpro with p/s, $55; Knight SWR bridge, $11; Ameco CN144W, 2-meter Nuvistor converter with p/s, $35; Hallicrafters HA-8 modulation indicator, $8.50; AR-22 rotator, $22.00; RTTY page paper $5.50/case. Dow-Key coax relay, $10.00; Globe Chief 90A, $35.00; Mosley TA-33, $40.00; Astatic D-104 mike with grip-stand, $20.00; Heath TC-2 tube-checker, $15.00; Viking tape-deck #75 with preamp, $45.00. Wanted: NC-300, Gonset Communicator for 2. Mono AM tuner, Ham-M. Stamp for list. Van, W2DLT, 302Z Passaic, Stirling, N.J. 07980.

LEFT TV Business. Will trade new Heath color generator IG-62 for comparable ham gear. W2WLJ, 17 Coleman, Berlin, N.J. 08009.

SELL: Brand new Star-Line xmtr, rcvr, 50M converter. Never used. Cost over $1000. First $800 takes. Yager, Box 176, Prospect Heights, Illinois 60070.

WANTED: Low frequency coils for HRO-5 (surplus military coils series CNA 47000, will work). Need coils: J, 50-100 Kc, H, 100-200; G, 180-430; F, 480-960; E, 900-2050. Taulman, W5BLU, 1721 N. Tierney Rd., Fort Worth, Texas 76112.

HEATH Sixer, brand new! $40.00. Blum, Broadus Route, Miles City, Montana 59301.

FOR Sale: HRO-60 with coils A, B, C, D, E, F, AC, AD and 100/1000 kc. calibrator. Condition is excellent. $245.00 F.o.b. Chicago. Jack West, 6747 N. Octavia, Chicago, Illinois 60631.

SALE: HT-37, full 10-meter coverage and SX-101A, both units perfect condx. $375.00; Eico 717 with Vibroplex paddle. Like new, $50.00. WA3EPB, 703 3rd Ave., Lester, Penna. 19113. Tel: (215)-521-9358.

MINT Condx: HT-37, $195.00; Drake R-4 and MS-4, $275, homebrew table-top linear (4-811As), $90.00. Will consider any reasonable offer. Dick, WA9AVN, 114 E. 3rd St., Arthur, Illinois 61911.

JOHNSON 1000 watt Matchbox with meter, used very little. Will ship in original carton, with manual: $100.00 or will trade for Multi-Elmac station, complete. Wilber L. Cox, 810 Pendleton Ave., Anderson, Ind. 46014.

WANTED: For KWM-1. Mobile mounting trays (2), D.C. power supply (1), and A.C. power supply. Send SASE with asking price to R. D. Martin, K7NFZ, 4023 E. Campbell, Phoenix, Arizona 85018.

HT-44 and power supply, $250.00; SX-117, $225.00; HT-45 and power supply, $275.00; SX-115, $325.00; SR-42, and VFO, $150.00; Gonset Sidewinder, $150.00. All like new condx. W4MVC, 10 Carlen Ave., Asheville, N.C. 28804.

JOYSTICK Variable frequency antenna systems solve space problems. Available immediately. SWL Guide, 218-S Gifford, Syracuse, N.Y. 13202.

WANTED: Johnson Courier 500 W. linear in good condition. Details to T. V. D. Heuvel, 2601 Woodley Place, Washington, D.C. 20008.

SELLING: HT-37, $200.00; CE 20-A with VFO and VOX, $100; BC-221, best offer. K9ZMS, 175 Amber Trail, Sun Prairie, Wisconsin 53590.

HRO-60, xtal cal, spkr, 8 coils for 100 Kc to 54 Mc, $289; HQ-180 C, spkr, 540 KC-30 Mc. $169.00; HC-10SSB converter, $100; SP-600, $349.00. T. C. Howard, 46 Mt. Vernon St., Boston, Mass. 02108. Tel: (617)-742-0916 or (617)-742-0048.

SELL: Eico 730 transmitter, $50.00; 720 modulator, $40.00; Globe HG-303 transmitter, $40.00; Globe V-10 VFO, $35.00; Hallicrafters receiver R-45/ARR-7, $75.00; Johnson Challenger, $60.00; Lafayette HE-45b with VFO, $55.00; HE-45a, $45.00; oscilloscope Philco S8200 3", $50.00. Alan Hill, 129 No. Arlington Ave., East Orange, N.J. 07017.

32V-3 xmtr, $160.00; HRO 50R1, $140.00; Squires-Sanders noise-blanker, new, $45.00. For builders: National XR63 slug-tuned, 1" coil forms. Try and find 'em. New, $1.00 each. Want: Calibrator for 75A2, Collins knob. Any accessory coils for old type HRO's. W2DYU, 360 Marlboro Rd., Englewood, N.J. 07631.

FOR Sale: Excellent, like-new condx, B&W 850A pi-net kw. tank coil, $25.00; GP-50 grid tuner, $6.00; P&H electronics TT2B, $6.00; Simpson Model 260 VOM, $25.00; new 4-250, $15.00; used 813, $5.00; used 833A, $15.00. Will ship postage paid insured. KICYY, 64 Elm St., St. Albans, Vermont 05478.

NCX-5, $350.00; VX-501 ext. VFO, $150.00; NCXA AC power supply, $60.00; linear systems Century DC supply, $90.00; NCL-2000 linear, $350.00; Heathkit SWR meter, $8.00; Heathkit dummy load, $10.00; Hallicrafters T-O automatic keyer and Vibroplex key, $50.00; Hy-Gain lightning arrester, $10.00; 2 Eimac 3-400Z's with sockets and chimneys, $50.00. Tubes never used, all else in mint condx! Will deliver expensive items in NYC area. WA7BGZ/2. Tel: (212)-269-0425.

LAFAYETTE HE-74 VFO, latest model, like new, $30.00. A. Wilson, Box 392, East Brewster, Mass. 02640.

SELL: National 183D, $170.00; Johnson Navigator, $60.00. N. Crandall, WA4VDN, 409 Court St., Edenton, North Carolina 27932.

WANTED: Copy "Marine Radio Manual" by Strichartz. Will pay $5.00. W6CJ, 5000 Los Feliz Blvd., Los Angeles, Calif. 90027.

SELL: Swan 400, 410 VFO, AC power supply, $400.00. Mint condx, less 20 hours operating time. WA5HGC, 3405 Pitt, N.E., Albuquerque, New Mexico 87111.

COMANCHE, Cheyenne, AC supply, RME 10-80 Preselector. All are in perfect condition. Will take first best offer over $100 or sell individually. K9SFI. Duane Brummel, 2716 Gregory St., Madison, Wis. 53711.

SALE: Collins 75S-3, perfect, $350.00; Collins Autotune transmitter, 200 watts AM and CW, 40 and 80 meters, with power supply, $50.00. Eico 723 60-watt c.w. transmitter, $25.00. K9IFL, Box 576, Winona Lake, Indiana 46590.

SALE: Hallicrafters SX-130 receiver, $125.00; Heathkit DX-100B, $85.00; CN-144 converter and PS, $35.00. Hy-Gain 80-10 meters trapped dipole, $25.00. I will ship. WA9WGG, 18275 Surrey La., Brookfield, Wisconsin 53005.

SELL: Apache xmtr and Mohawk rcvr with speaker. In excint condx. $300 firm. Purchaser pays shipping. Nine 10 ft. sections steel antenna mast, Mosley 10-15-20 beam, ant. rotor. $120.00. Ken Hamilton, W6OXB, 7604 Larkspur, Stockton, Calif. 95207.

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SWAN 350, p/s, speaker, D-104 and G mic., Drake 1000-LP, $370.00. WB2MBC, 71 Indian Drive, Woodcliff Lake, N.J. 07680. Tel: (201)-391-9347.

GALAXY 300, PSA-300 supply with clock, VX-1 VOX, all for $200. Peter Hansen, W8TWA, 2137 Earhart Road, Ann Arbor, Michigan 48105.

COLLINS KW1, ideal for CW or diehard AM, reworked, sturdier components, etc. Best offer and truck will take it away. Write Ercolino, W2BDS, 63 Wickapecko Drive, Asbury Park, N.J. 07712.

LINEAR: Pair 4-400As GG in Hallicrafters cabinet similar HT32B, self-contained power supply, band-switching. $100. F.o.b. Fostoria, Ohio. Bill Taylor, K8TBW, Rte 4, Fostoria, Ohio 44830.

"HOSS-TRADER" Ed Moory promotes January clearance sale on new equipment with factory warranty: Drake T4-X, $319.00; Drake L-4 linear, $549.00; R4-A, $319.95. Package deals: New Eico 3 band transceiver kit, Model 753 and new Eico 751 supply, and speaker. Regular price $249.00. Cash price: $169.95. Package deal on new Mosley Classic 33 Beam and demo Ham-M rotor, $199.00; new displayed Model BTI 2000 Watt Linear, $649.00; Demo Swan 500, $419.00. New TR-4 displayed model, $449.00. New NCX-5, $449.00. Special Rohn 50-ft. foldover tower, prepaid, $189.50. Demo Ham-M rotor, $94.50. New Collins 75S-3B, $725.00; displayed Swan Mark II linear, $439.00. Fantastic special, new National VX-501 VFO, ($249.95) cash price: $139.00. Ed Moory Wholesale Radio Co., P.O. Box 506, DeWitt, Arkansas. Tel: 946-2820.

MODEL 14 typing reperforator, $50.00; 14 TD, $50.00. Model 19 table, T-23/ARC-5, $15.00. BC-733, $6.00. RA-74-D, $25.00. SASE for list of others. Wanted: TM 11-2357K, TM 11-2583A, Model 15 typing unit, 15 or 19 cover, R-19/TRC-1, DM-21-X, DM-66. Trade TS-174/U frequency meter for CV-89/URA-8A. W4NZY, 119 North Birchwood Ave., Louisville, Kentucky 40206.

SELL: Johnson Viking II and Knight VFO together, in good condition: $85.00. Johnson Directional Coupler, Drake LPF, and Dow-Key coax relay mounted on aluminum panel for use with above Viking II, all in good condition, $35.00. W3SUR, Hammersand, 5980 Leebel Road, East Petersburg, Pennsylvania 17520.

SELL: 730 Modulator, $35.00; HW-12/HB AC supply, $85.00; T150 kit; HE-71 2-meter converter, $15.00. UTI AC supply, $18.00. PV50 preamp, $10.00. K3WMH.

COLLINS 75A4, serial 3703, with 3 Kc. and 500-cycle filters. Very little used. In perfect condition. One owner. $475.00. WØLPB, 900 South Fairview Ave., St. Paul, Minn. 55116. Tel: (612)698-2559.

HRO-50T, gud condx, AA, B, C,D coils, 100 kc. calibrator. $125.00 or your best offer. Joe Nester, W3KUN, Emporium, Penna. 15834.

RADIO Control equipment. Send for list. Knight R-100A with S-meter, $60.00. Lafayette Precon, $30.00. WB2AXH, 94 Brittle Lane, Hicksville, N.Y. 11801.

SELL: National VHF converters 2 and 1¼ meter, excellent, w/manuals, $28.00 each. Also Eico 710 GDO, vy gud w/manual, $25.00. "Bob", 726 Cypress Drive, Franklin Square, N.Y. 11010.

CRYSTALS Airmailed: SSB, Nets, MARS, Marine etc., Novice .05% crystals $1.50. Custom finished etch stabilized FT-243.01% any kilocycle or fraction 3500 to 8600 $1.90 (five or more this range $1.75 each), (nets ten or more same frequency $1.40). 1700 to 3499 and 8601 to 20,000 $2.75 with overtones supplied above 10.000. 10.001 to 13.500 fundamentals $2.95. Add 50¢ each for .005%. Add 75¢ each for HC-6/u metal miniatures above 2000. Builders crystals and crystal groups from QST and all ARRL publications. Ask us. Be specific. Write for order-bulletin and listings. Crystals since 1933. C-W Crystals, Marshfield, Missouri 65706.

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MARAUDER, HX-10 transmitter, 200 watts SSB, AM, CW, RTTY. Brand new, used two hours. Absolutely perfect. Dave Barbour, 2200 Grant Building, Pittsburgh, Penna. 15219. Tel: (412)-471-9900 (days).

FOR Sale: SunAir t5A HF transceiver, 40W, 2-18 mhz; Pyre 4 chan. HF rcvr; type PTC 941; Pyre 4 chan. HF transmitter, type PTC 931, 60W., 1.6-14 mhz; Carter Genem tor 24V/420V 7.5 amps; CSA amplifier CHA20, 20W with microphone; dynamotor 28V power supply; Narco modulator power unit, model V24 MP-2; LF receiver, type R-11A 28V, 190-550 khz. Best offer. Keystone Helicopter Corp., Hangar G6, Philadelphia Int'. Airport, Philadelphia, Penna. 19153.

COLLINS KWM, AC and DC power supplys. Mobile Mount, 312B-5, MM mike, Warrior, Supreme SSB-6B with HP20. Central Electronics multiphase RF analyzer. Heath Ham Scan, Tunner Dipper, Ameco CN-2, Gonset BC6M, 24-hr. clock; TS323UR, BC221AK, OAP-1, other items too numerous to mention. Send bids to Mrs. Robert Graham, 524 S. Ninth St., Columbia, Penna. Att: K3IEC.

DRAKE T4-X, AC-4 combination, new, $350.00. No trades, sry. Larry Wilson, WØKVE, 215-3 De Long Drive, Marion, Iowa 52302.

ESTATE OF WA3GNQ. For sale: HW-32, $90.00; HR-10 with HRA-10-1, $55.00; Eico Signal Generator No. 324, $25.00. Don Harris, 3 Jonathan Road, Rexford, N.Y. 12148.

SELL: Facsimile transceivers, TT-1E/TXC-1, excellent condition with manual, $65.00. Timefax paper, 19¾" wide x 250', $2/roll. WB2PLY, Box 207, Princeton Jct., New Jersey 08550.

FOR Sale: Johnson Valiant, factory-wired, in excellent condition: $200.00. Cliff Spring, 487 Hawthorne Ave., Uniondale, N.Y. 11553. Tel: (516)-1V3-4335.

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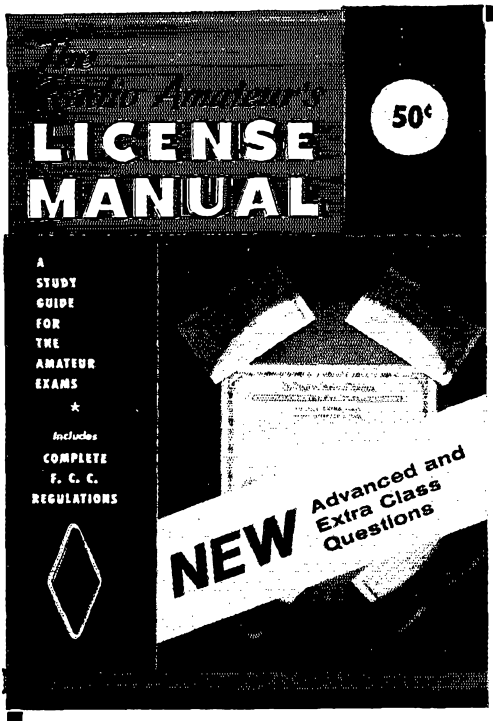

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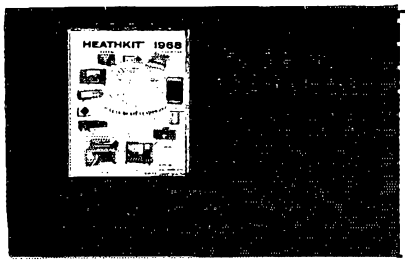

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