10 reasons to buy Hallicrafter's new SR-400 Cyclone

<table>
<thead>
<tr>
<th>FEATURE</th>
<th>Hallicrafters SR-400</th>
<th>Collins* KWM-2</th>
<th>Drake* TR-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Input</td>
<td>SSB=400 watts CW=360 watts</td>
<td>SSB=175 watts CW=180 watts</td>
<td>SSB=300 watts CW=260 watts</td>
</tr>
<tr>
<td>Accessory &quot;dual receive&quot; VFO available</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Noise Blanker</td>
<td>Yes</td>
<td>$135.00 Accessory</td>
<td>No</td>
</tr>
<tr>
<td>Receiver Incremental Tuning</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Built-in notch Filter</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Sharp CW Filter</td>
<td>Yes 200 cycles</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>.3 uv for 10 db S/N</td>
<td>.5 uv for 10 db S/N</td>
<td>.5 uv for 10 db S/N</td>
</tr>
<tr>
<td>1 kHz dial readout</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Carrier Suppression</td>
<td>60 db</td>
<td>50 db</td>
<td>50 db</td>
</tr>
<tr>
<td>Unit Price</td>
<td>$799.95</td>
<td>$1,150.00</td>
<td>$599.95</td>
</tr>
</tbody>
</table>

*Data from published specifications.

Now: can you think of one reason why you shouldn't?

Superb sensitivity, 400 watts RF, 200 cycle CW selectivity, receiver incremental tuning, 1 kHz readout, amplified automatic level control, exclusive notch filter! There's even the HA-20 dual receive VFO for sensational, award winning DX operation. No matter what specifications or features you choose as a standard of comparison, the exciting new SR-400 fixed/mobile transceiver is unsurpassed. Unsurpassed feature for feature. Unsurpassed for rugged dependable performance in all environments. Unsurpassed in value and versatility. Prove it to yourself. Write for complete specifications in a four page brochure. See your Hallicrafters' distributor today.

SR-400 Cyclone Transceiver

HA-20 VFO


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Visit your E-V distributor to see this remarkable new microphone today. And when difficult QRM must be faced squarely, stand up and fight back with the microphone with a backbone (and CV-D)—the new Electro-Voice Model 676 dynamic cardioid!

\textsuperscript{a} Pat. No. 3,115,207

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Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports are also desired by SCMs for inclusion in QST. ARRL Field Organization station appointments are made only in areas shown on official SCM service maps. Groups of substation members, usually from traditional Class licensees or higher, may be appointed OBS, OVS, OBS, OOB and OBS. Technicians may be appointed OBS, OBS or V.H.F. PAM. Novices may be appointed OVS, SCMs desire application leadership posts of SEC, BEC, RM and PAM where vacancies exist.

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W7FW
W7FW

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W3FO
W3FO
W3FO

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W1FL
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W1FL

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W9XW
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the advancement of the radio art and of the public welfare, for
the representation of the radio amateur in legislative matters, and
for the maintenance of fraternity and a high standard of conduct.

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ARRL AND THE DEMOCRATIC PROCESS

Democracy, according to one authoritative dictionary, is "a theory of government which, in its purest form, holds that the state should be controlled by all the people, each sharing equally in privileges, duties and responsibilities and each participating in person in the government, as in the city-states of ancient Greece. In practice, control is vested in elective officers as representatives who may be upheld or removed by the people."

Not stated, but implicit in this definition, is the essential difference between democracy and other forms of organization or government. It is that the power, the sovereignty, the "ownership" of a democratic institution is vested in its members or citizens. They may be apathetic or indifferent in the exercise of that power, but it is always there. Those who are elected or appointed to run the organization do so quite literally at the pleasure of the members.

No elected official or representative can allow himself to forget this basic fact of life very often or for very long. If he is to be truly effective, he must do three things well: reflect assiduously what his constituents conceive to be their best interests, represent the best immediate and long-term interests of the organization or society as a whole (which are not always the same thing), and, finally, sustain the confidence of his constituents that he is doing both.

These are not easy to do. There are always conflicts of interest and differing points of view to be reconciled, and misinformation and misunderstandings with which to contend. The ideal democratic representative is a veritable paragon of wisdom and balanced judgment, and he is a rare bird indeed.

So it is with the League. We elect our Board of Directors which has overall responsibility for managing our affairs as an organization. The Board functions through an Executive Committee, a group of officers and a headquarters staff — all of whom are responsible to the Board. Few of us as League members are completely in accord all the time with everything our management does. And at times some of us are in rather violent disagreement.

However, because our Board members are elected from each of sixteen divisions and serve for two-year terms, we have an exceptionally sensitive kind of democracy. It takes only ten members in any division to initiate a change by nominating a replacement director. By and large, for fifty years we amateurs have functioned very effectively through this our organization. As in any democracy, we will continue to be effective only to the extent that each of us concerns himself directly in the affairs of the League and exercises his opportunity and responsibility as a member to elect the best qualified representatives, to keep himself as accurately and fully informed as possible, and — most important — to be committed, not apathetic.
Even more than our correspondence, the continuing heavy purchase of License Manuals indicates a substantial back-to-the-books movement in preparation for higher-grade tickets. Early applicants confirm that mere memory won't suffice; you have to "know your stuff." To provide an additional working tool for the individual as well as class instruction, we commence this month (page 64) a six-part series by W1DF organized as a course of study in logical progression, with Handbook and other outside references. (Note to already-Extras: as we've found—to our chagrin on one question!—it is mighty useful as a refresher.)

Speaking date? Talks on amateur radio have great appeal to local Rotary, Lions, PTA, women's clubs, high schools and other community groups—great for your club, too. Hq. can help with material—films, suggested talk for modification to your style, etc.

Year-end League membership figures have changed only in fractions of a percent the past several years, and 1967 was again practically a standoff, with only a 0.2% domestic (Canada/U.S.) membership increase. Not as much as we'd all like to see, but not bad in view of a dues rise and a decline in total licensees.

You 25-year Extra Class types worried about loss of DXCC or other award credit when changing to 2-letter calls should cool it. There's no problem. By the way, we'd like to run a listing in QST of old 3-letter and new 2-letter calls; please send us yours—separately from any other correspondence. A postcard will be fine.

Seen the new ARRL bulletin prepared especially for affiliated clubs? If not, get your club secretary to pass it around at the next meeting. It's intended as a news and idea medium for members as well as officers.

FCC is now monitoring some CB channels 24 hours a day to search for violations. A couple of ham frequencies with idiotic goings-on could use the same surveillance.

It Hertz, but with FCC and the military now also deserting the reactionary ranks, we're saying "uncle" and will gradually be shifting to the new frequency term.

Overleaf (as the Gs say), our editorial treats the principles of the democratic process in the League. It is timely to mention the practical application as well. For the annual Board of Directors meeting is in early May, and thus now is not too soon to convey to your ARRL representative your views on topics and problems of the day.

Citizens Band clubs responding to our recent survey were unanimous in wanting to know more about amateur radio. This points up an opportunity to invite interested CBers to amateur radio club meetings and license classes, or volunteer to put on a program on ham radio at a CB club meeting. Check the ARRL Training Aids list for appropriate films. Many clubs report successful recruitment of CBers into amateur ranks—and they make good hams, too.
A Look At Integrated Circuits

What Are They? How Can They Be Used in Ham Radio?

BY DOUG DeMAW,* W1CER

Articles like this could become obsolete before having a chance to reach the printing presses. With the giant strides being taken each day in the solid-state field, it is conceivable that such a thing could happen. However, it should be quite some time before the topics discussed here become relegated to the archives of ancient practices. Therefore, it is hoped that this presentation will not only be timely, but that it will help the reader to understand integrated circuits and their potential uses.

The IC Device

An in-depth discussion concerning the actual mechanics of IC (integrated circuit) fabrication will not be given here, but it is important that the reader know what is contained in the basic module, and how ICs differ from other solid-state components. As the term "integrated" implies, many components are incorporated into a larger unit, or formed into a whole, when an IC module is manufactured. For the purpose of simplification let's regard an IC as a collection of diodes, transistors, resistors, and capacitors, all built up on a single piece of semiconductor material, or "substrate." The exact number of individual items represented on a single piece of material, or "chip," is dependent upon the intended application. In other words, a particular integrated circuit might have but one diode and two transistors on its chip, or it could have as many as 15 transistors, 20 resistors, 8 diodes, and 11 capacitors (hypothetical) contained thereon.

The basic IC chip is a single crystal, or wafer, of n- or p-type silicon. Through a complex manufacturing process, impurities are introduced (diffusion process) into different areas of the basic silicon wafer. By introducing n- or p-type materials in this manner, diodes and transistors are formed. Resistors are formed by making ohmic contacts to certain sections of the basic semiconductor chip. A coating of insulating oxide is added to the chip after the diodes and transistor elements are formed. This coating is used as the dielectric material when the capacitors, if required, are formed on the wafer. The basic structure of a simple integrated-circuit device is shown in cross-sectional form in Fig. 1.

A detailed description of the manufacturing process and the philosophy used in IC fabrication is treated in RCA Linear Integrated Circuits. The book contains a wealth of information concerning IC techniques.

ICs are packaged in two basic styles of container, each requiring a different mounting technique when installed in the circuit. Many integrated circuits are housed in standard TO-5 transistor cases, using as many as 10 or more leads for circuit connections. Other IC modules are housed in flat-pack style packages, some with 14 or more connecting leads.

Electrical Properties

At this time, most ICs contain bipolar transistors, though some companies have begun to...

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There's a lot of talk these days about integrated circuits. Many regard ICs as the electronic building blocks of this era. Here's a look at what integrated circuits are, what's involved in using them, and how they might be used in some typical radio circuits. We'll let you, the reader, draw your own conclusions regarding their usefulness in amateur applications.
use FETs in some of their models. A significant feature of having two or more transistors on a common chip — the same benefit applies to diodes on a common wafer — is that they exhibit similar characteristics. That is to say, they are closely matched units by virtue of their being formed at the same time, under the same conditions, and on a uniform single crystal of silicon. When discrete (individual) diodes or transistors are used in a circuit which requires close matching of characteristics (such as in balanced-modulator circuits, discriminators, cascode amplifiers, and similar), it is a difficult task to find like semiconductors. The same situation exists when it comes to IC resistance and capacitance elements. When considering their absolute values, the tolerance range may be quite wide, but the resistors or capacitors on a specific IC substrate will be closely matched to one another in characteristics, a vital consideration in circuits requiring precise electrical balance. Additionally, with all components on the same wafer any changes in characteristics which are brought about by temperature variations will usually cause all values to change by equal amounts, or nearly so. This makes it less difficult to maintain circuit balance, a requirement that is hard to realize when using discrete resistors, capacitors, diodes, or transistors.

In some instances the overall cost of a piece of equipment can be reduced by the use of integrated circuits. This of course depends upon the number of outboard components that are needed to complete a particular circuit. Ordinarily, bypass and decoupling capacitors must be added externally to an IC stage. The built-in capacitors are necessarily of the low-capacitance type because of limitations imposed by the smallness of the silicon chip. For this reason, large values of capacitance — in the pf. and upper pf. range — must be added externally. The same holds true where high values of d.c. resistance are concerned, or where power-handling resistors are needed. In r.f. and audio circuits, input and output transformers must also be added as outboard components. Therefore, there can be instances when it costs no more to use discrete components for, say, an i.f. amplifier stage requiring a specified power gain, than it would were an IC put to work in the same kind of circuit.

Physically, and in terms of man hours, the IC's advantages may outweigh any small increase in cost over a discrete-component circuit. Because of the modular format, servicing is more rapid when ICs are used. Construction time is greatly reduced in comparison to that which is possible with conventional parts. Schematic diagrams are easier to follow, especially by beginners, when IC symbols are used. Circuits can be repeated with greater reliability when integrated circuits are used. The foregoing features are especially useful where club projects or other group efforts are concerned.

There are some minor disadvantages connected with the use of integrated circuits, especially when one attempts to use the IC for some purpose other than its intended one — specifically, if one uses an IC in such a way as to utilize its components as discrete elements. An example of such a circuit is given in Fig. 3 where an i.f. amplifier module is treated like a collection of separate components and made to serve as a crystal-controlled converter. In this instance, because all of the solid-state components are on the same chip, isolation between the oscillator and the rest of the circuit is rather poor. This means that oscillator harmonics are difficult to isolate — a circuit complication when it comes to image rejection and the reduction of spurious responses. Improvisation of other circuits, where the IC elements are used as discrete units, can lead to similar problems unless the builder is careful in his design work. These words of warning are not given to discourage the reader from trying new ideas with ICs, for there are a vast number of possibilities when it comes to using some ICs for unintended applications. The field is actually wide open as far as ham projects are concerned.
Fig. 2—Representative schematic diagrams of a few IC types which are useful in amateur radio work. The CA3002 at A can be used as a product detector, a.m. detector, or i.f. amplifier up to 11 Mc. At B, an IC which can be used as a cascade r.f. or i.f. amplifier up to 100 Mc., as a video amplifier, or as a 40-mw. class-B audio amplifier. Diodes shown in dashed lines are "bonus" elements (see text) which must be considered during circuit design work. A diode array, CA3019, is shown at C, and is useful as a balanced modulator or mixer. A complex operational-amplifier IC (CA3020) is shown at D. It is useful as an audio amplifier or driver (500 mw.), and is useful to 6 Mc. Differential-amplifier ICs are shown at E and F. Both are good as i.f. or r.f. amplifiers into the v.h.f. region.
Another matter which must be taken into account when using integrated circuits for unconventional applications is the existence of diode junctions and additional capacitances (Fig. 2B) which exist but are not shown on the manufacturer's data sheet in schematic form. These "bonus" components are not troublesome when an IC is used as intended. They must be taken into account, however, when designing unusual circuits in which the IC's elements are used as separate transistors, diodes, resistors, and capacitors.

or to connect external bias resistors to that part of the circuit.

"Operational amplifiers," as they are called, consist for the most part of cascaded differential amplifiers of the type just described. In simple terms, the operational amplifier is a very-high-gain direct-coupled amplifier. Its response characteristics are established through the application of external feedback. Because of its characteristics, the "op amp" is particularly useful in broad-band amplifier circuits. It can be used to provide shaped response curves—flat, broad, or peaked. These features make the operational-amplifier IC especially useful in i.f., video, and audio amplifier circuits. It is also used in the mathematical circuits of computers for differentiation, integration, and analog comparisons. An operational amplifier is more complex than a differential amplifier as can be seen in the representative circuits of Figs. 2A and D.

Many other circuits are available in integrated-circuit form. Among the available types are diode arrays, flip-flops, transistor arrays, Darlington arrays, and many others.

Some Mechanical Considerations

Integrated circuits are available in two general package styles—the multi-lead TO-5 transistor case, and the dual in-line plastic "flat-pack" enclosure. With either type the matter of mounting can be solved in several ways: by using perforated board and push-in terminals, etched-circuit boards, or sockets that are designed expressly for ICs. The latter, unfortunately, are extremely expensive at this time, costing several dollars each in single-lot quantity. Just recently, Cinch-Jones Co. has released some 6-, 8-, and 10-terminal sockets for TO-5 style ICs. These sockets sell for less than one

A "sink" is defined as a place where energy from several sources is collected or drained away.

Simple mounting techniques for IC can be worked out. Here a TO-5 type IC is connected to a perforated board by means of 10 push-in terminals. Circuit connections are made on the opposite side of the board.

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dollar each and are numbered 6-ICS, 8-ICS, and 10-ICS, respectively.

When installing ICs in circuits where plug-in techniques aren’t used, it is important that care be given to the matter of soldering. As with other semiconductor devices, excessive heat can cause damage. Always use a light-duty soldering iron and employ a heat sink on each IC lead when soldering it into the circuit.

**Amateur Applications**

Actually, there are few ham radio circuits in which ICs could not find practical application. For example, ICs are available for use in cascode v.h.f. and h.f. amplifiers, for r.f. and i.f. circuits, a.m. and product detectors, video amplifiers, audio amplifiers, balanced modulators, and multivibrators. This list barely scratches the surface when it comes to naming possible uses. A complete list is far beyond the scope of this article. Some typical circuits which are designed around RCA and Motorola integrated-circuit modules are given in Fig. 3. Representative circuit diagrams of the individual ICs are given in Fig. 2

**Some Experiments**

The circuits of Fig. 3 represent some common uses for ICs. The i.f. amplifier at D has a manual gain control, $R_1$, for setting the level of output. A.g.c. could be applied to terminal 7, rather than a manually-set bias voltage, if automatic gain control provisions are desired. A similar circuit, using a Motorola MC-1550GIC, was used in the i.f. stage of the 141-Mc. converter which was described in September 1967 QST, page 11.

Treating the elements of a MC1550G as discrete units, the 160-meter converter circuit of Fig. 3E was worked out. It performed well, but required a high-Q input circuit to minimize image

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**Fig. 3**—Block representations of integrated circuits with the additional components required shown in schematic form. At A, a typical hookup for an IC product detector. The circuit at B shows a basic arrangement for using a CA3019 as a balanced modulator. The null controls have not been added, simplifying the illustration. A typical audio amplifier arrangement for a CA3020 is shown at C. $R_1$ can be a 500-ohm center-tapped primary to 8-ohm secondary transformer. Up to one watt of output is possible, but with some distortion at the higher levels. An i.f. or r.f. amplifier can be built by using the circuit at D. A manual gain control, $R_1$, establishes operating bias for the CA3028, thus controlling the overall gain of the stage. A.g.c. can be used at terminal 7 instead, if desired. The circuit at E shows how an IC can be treated as a group of discrete components to form a special hookup. In this instance a Motorola MC1550 functions as a 160-meter crystal-controlled converter.

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responses caused by oscillator harmonics, a condition discussed earlier in this article. A photo of the converter is shown. Other ICs should lend themselves to discrete-circuit adaptations too. The main limiting factor here is the designer's imagination.

An excellent example of how flip-flop ICs can be put to good use can be seen in The Micro-TO Keyer circuit (QST, August 1967, page 17).

In Conclusion

Examples of IC applications have been given in thumb-nail-sketch form in this article. The possibilities are practically without limit. A full description of any given integrated-circuit device can of course be found in the manufacturer's data sheets and application notes. Such considerations as frequency limits, temperature ranges, gain figures, distortion percentages, operating voltages and currents, and recommended signal-voltage levels will be listed there. It is a good idea to consult the data sheets before launching into a new project.

Here at least are some of the facts concerning ICs. The decision whether or not to try some IC design work will of course be up to the reader. It is hoped that some of the IC mysteries which may have existed in the reader's mind have been solved here. It is safe to proclaim, for sure, that ICs are here to stay. They will play an ever-increasing role of importance in amateur equipment design in the years to come.

NEW BOOKS


A primary purpose of a book like the RCA Transistor Manual is to provide technical data on the manufacturer's products — a most useful function, and one of unquestionable value to anyone engaged in circuit applications of those products. Such technical data interests the amateur, too, but probably of equal interest is the fact that the Manual is growing into a most useful exposition of fundamentals and practical applications of semiconductors. The purchaser of this new edition gets what amounts to a 160-page textbook which not only treats transistors, diodes and thyristors from a device standpoint but also runs in much down-to-earth how-to-use-it information that too often doesn't get into books. Chapters on the MOSFET and thyristors have been added in this new edition. In addition to expansion of the earlier subjects to bring them into line with current technology.

As icing on the cake, there is a 74-page section of circuits — circuits for broadcast and f.m. receivers, high-and low-power hi-fi amplifiers, power supplies, battery chargers, controllers for speed and heat, and of special interest to the amateur — transmitters, miscellaneous small pieces of equipment, and an electronic keyer. A most welcome feature of this section is that each circuit is accompanied by a discussion of its operation.

The data section covers more than 400 active transistor types in detail and lists capsule data on some additional hundreds now discontinued (the mortality is high in the semiconductor field) with, in many cases, recommended replacement types. There is also data on thyristors, silicon diodes, and tunnel diodes. A helpful chart for selecting particular types for particular purposes is included.

Contact at Sea, by Peter B. Schroeder. Published by the Gruen Press, 171 E. Ridgewood Ave., Ridgewood, N. J. 154 pages, including bibliography and index, 5 1/2 x 8 1/2, 36 illustrations, hard cover. $9.95.

The first practical use of wireless was in the maritime service. Where better, then, for ardent radio historian (and amateur — W1P NY) Schroeder to turn his current attention than to the early days of drama on the high seas? A professor of history at the University of Connecticut, with a consuming interest in radio regulation, he pinpoints early problems and their solutions, as background to an appraisal of present-day marine communications. International radio conferences get substantial treatment. For the layman, the text makes engrossing reading; for the serious student, appendices and an extensive bibliography round out the volume.

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The Army Loop in Ham Communication

Tests in Comparison with Other Antenna Types

BY LEWIS G. McCOY,* WI1CP

A recent article in *Electronics* described a military antenna that has created considerable interest in amateur circles, both in on-the-air comments and in mail to Headquarters. The antenna, a vertical loop designed for use in the 2.5- to 5-Mc. range, is said to have very high efficiency for its small size. The antenna is in the form of an octagon with five-foot sides, and is approximately 12 feet in width. In normal operation the antenna is set up with the base four feet above the ground, making the top about 16 feet high.

The antenna was designed for quick portability for use in Vietnam. The aim was to design an antenna that could be quickly dismantled or assembled, would pack into a small space, and would be an efficient performer. It was stated in the article that the antenna performed as well, or better than, a full-size dipole 40 feet in the air. No wonder amateurs are interested!

The photographs show our version of the antenna, built to see how well it would perform in tests against various 80-meter antennas. Figs. 1A and 1B show the schematic of the antenna and matching network.

In any antenna that is physically small for the frequency, the radiation resistance will also be smaller than a full-size antenna. As the antenna is reduced in size, the radiation resistance also gets smaller and smaller. According to the formulas for small loop antennas, the radiation resistance of this loop is on the order of 0.5 ohm or less. In order for such an antenna to work at reasonable efficiency, the ohmic losses must be kept as low as possible. This means large conductors, low resistance joints and connections, and any other precautions that can be employed to reduce ohmic resistance.

In our model, 11⁄4-inch-diameter aluminum tubing, the same as in the military version, was used for the loop. For connections at the joints, the tubing was flattened, filed smooth,

*Technical Department, QST.


and the pieces then bolted together at each joint with three 11⁄4-inch-diameter aluminum nuts and bolts, as in Fig. 3.

In order to reduce losses, the military antenna used the matching circuit shown at Fig. 1B. This is a completely capacitive network: a network with inductances would have added to the

![Fig. 1 — A—Drawing of the octagonal loop; B—The matching network. In matching, a 50-ohm s.w.r. bridge is inserted in the coaxial line and the network adjusted to a 1-to-1 match.

C1A, C1B—Approximately 650 pf. per section, each section consisting of two 325 pf. variables in parallel.

C2—Approximately 500 pf., two 250 pf. variables in parallel.

The interest aroused by a loop antenna described in *Electronics* a few months ago sparked a trial by ARRL HQ of a home-built version. The proof of an antenna is in the communication it produces, so several commonly-used 80-meter antenna types were compared with the loop in direct A-B tests. Here is a report on the results.
Fig. 2—The loop mounted on a guyed 2 x 3. The sides of the loop also were guyed as the antenna tended to be "flappy," in even light winds.

losses. Although a combination of fixed mica and air-spaced variable capacitors was used in the military version, it was discovered in our setup that the mica capacitors available to us heated up considerably at a power level of 150 watts. Air variables therefore were used throughout.

Testing the Loop

Our loop was set up exactly as described in the *Electronics* article, with the bottom four feet above ground. The antenna was matched to 50 ohms at 3980 kc. Three other antennas were used for comparison. The first was a full-size dipole, fed with 6-inch open-wire feeders, with the antenna about 60 feet in the air. The second antenna was an inverted V 100 feet long overall, center-fed with open-wire line. The top of the inverted V was deliberately installed at the same height as the top of the loop, 16 feet above ground, and the ends were brought down to four feet, the same as the bottom of the loop. One other antenna was used, a 30-foot high, base-loaded vertical, fed with 50-ohm coaxial line. All antennas were very carefully matched to 50 ohms at 3980 kc. A four-position coaxial switch was used so that switching could be accomplished instantly.

Several hundred tests were made, both listening and transmitting, over a four-week period. In no instance did the loop outperform the 60-foot high dipole. In listening tests the difference was of the order of three S units. This difference also showed up on transmitting—in fact, several stations accused us of turning on a linear when we switched to the dipole!

The difference between the loop and the inverted V was not so marked, but in most instances the V outperformed the loop by about one S unit. Usual transmitting reports were S6 on the loop, S7 on the V, and S9 or more on the big dipole.

The vertical produced some very interesting results. During the daytime the vertical was very poor compared to the other three antennas. In fact, in some instances, with S6 to S9 reports on the other three antennas, we weren't even heard on the vertical. However, after dark it was another story. Signal strength on the vertical came up to a par with the full-size dipole, actually surpassing it on some long-range (over 1000 miles) contacts.

Because the *Electronics* article had emphasized that the loop did a better job than a full-size dipole, we did considerable head scratching. Finally, we called Kenneth Patterson, designer of the loop, a call which brought forth some very interesting information. Mr. Patterson quickly pointed out that our problem was most likely in the ohmic losses in the joint connections. In the military version, special sleeve clamps are used over each joint to insure adequate "skin" contact. In addition, the joints are gold-plated! The gold plating reduces deterioration of the connection and provides excellent contact. This could very well be the difference between the performance of our unit and the military version. Also, for the mica capacitors used in

(Continued on page 190)

2 The joint resistance could be eliminated entirely if a single section of tubing, of the same overall length, could be bent in a circle, since in the amateur case it would be unnecessary to provide for rapid assembly and disassembly.

Fig. 3—This view shows the joint connections. In the military version, 45-degree elbows are used and the elbows and joints are gold-plated.
Interpreting 50-Mc. M.U.F. Tendencies in the Current Sunspot Cycle

Required Reading For H.F. DXers, Too

BY ROBERT B. COOPER, JR.,* K5EDX/W5KHT

The first solid F-layer 50-Mc. DX of the current sunspot cycle occurred over the four-day period December 31, 1967 to January 3, 1968. With this rise in the usable frequency (m.u.f.) to or above 50 Mc., an entirely new generation of 6-meter enthusiasts discovered the wonders of a form of radio propagation that has been largely missing from the v.h.f. scene for eight years or more.

Discussions on the air that followed these openings convinced this observer that most of the older 50-Mc. operators have not taken the time to bone up on what makes $P_2$ tick, and there were indications that even some of the more experienced may be rusty on 50-Mc. propagation tricks. Since at best, 50-Mc. openings are short-lived, and spread far apart on the calendar, you don't have to miss very many to be left out in the cold completely.

On the further observation that all too often many 50-Mc. stations are not on the air when they should be (i.e., when the band is open), this report is presented in the hope that there will be on hand when the band shows promise during the current cycle.

There are really only two relevant questions for the avid 6-meter operator wanting an answer:

1) When will the band be open?
2) In which direction will it be open?

The answer to the first is in three parts.

A) Certain types of openings tend to be recurring in nature. They repeat themselves in a regular fashion, with a predictable formula, as certain influences on the layer continue to exist.

B) The influences which cause the unusually high m.u.f. can be detected; therefore, they result in 50-Mc. band openings. You are not fortunate to detect their presence before the first opening, you can usually detect their continued presence after a few days, and can nearly surmise whether the band will continue to open for a day or two more. (In the meantime, you can safely ascertain whether or not a partial opening, occurring on a Tuesday, for example, will repeat itself on Wednesday. This should trigger a reflex instinct telling you to do what you can to be absent from work on Wednesday!)

C) Certain conditions that trigger 50-Mc. openings via the F' layer are likely to repeat themselves 27 to 28 days after their initial appearance. So the mere fact that you missed a rare opening to the Caribbean and Hawaii on January 1 should not cause you to lose hope. There is a better-than-even chance that conditions will repeat themselves January 28-29, and then again in February. More about this shortly.

The answer to the first question is not so simple. But here's the basic reason you have reason to believe that such an opening is likely, and have made arrangements to be near the rig, your being on tap. The main factor is usually the most important factor of all.

Certain influences that are known to induce openings in the $F_2$ layer, resulting in an unusually high m.u.f., are more likely to cause openings in certain radio paths (i.e., North America to South America) than over other radio paths.

Because the $F$ region of the ionosphere exhibits different characteristics in the northern hemisphere during the fall than the spring, or in the winter than the summer, we can reasonably expect openings of a different nature in the fall than in the spring, etc. The influences we have mentioned may occur at any time of the year. But the reactions such influences cause will differ for North American observers as the time of year varies.

ESSA Charts, Sunspot Counts, and All That Jazz

For more years than I can recall, the Central Radio Propagation Laboratory (now the Environmental Science Services Administration) has published a fine set of monthly charts in booklet form, predicting the m.u.f. for virtually every part of the world, as a function of time of day, for three months in advance. These consist of a set of maps showing continental outlines and major island groups, overprinted with sets of squiggly lines. The lines are numbered and purport to show the highest frequency that the $F$ layer will reflect back to earth for that point above the globe, for that time of day. As nice as these charts are, they have no real practical value to the 50-Mc. enthusiast who is endeavor-

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* 3918 East Fire, Fresno, California 93726.
ing to determine if the band will open a week from next Tuesday. Primarily, they are prepared for the commercial h.f. radio circuit user, who must have virtually 100-percent reliable communications between two distinct points on the globe. The charts make no allowance for the unusual influences which cause the 50-Mc. band to open briefly, and that is all that we are concerned with here.1

Everyone on 6 kicks the phrase “sunspot count” around quite glibly. But what does it mean? And how high must the count be before the 50-Mc. band opens? Let me put it this way. The count is made daily, and averaged (for the month) at the end of each calendar month. The daily count itself has no direct bearing on 6-meter conditions. If someone advises you that an observatory counted 200 sunspots this morning, don’t break a toe running for the 6-meter rig. It probably doesn’t mean a thing. Next week the count may drop to 35 for a day or two. The count is important only when it is in proper perspective, and that is when it takes as a long-term 13-month average. Here is how it works.

At the end of each month the daily observed (i.e., visually counted) sunspots are averaged together. The sunspot cycle is based upon the smoothed sunspot numbers. A smoothed number is an average of the observed monthly numbers over a 13-month period. Since the smoothed average is always centered on the middle month of the 13-month period, the true count (the smoothed average) is always behind the current month by at least 6 to 7 months.

Solar observers also release a smoothed sunspot number forecast. The forecast is centered on the current month: taking the six months’ actual count just past, and predicting what the count will be for the six months to come. This forecast number is the one we hear kicked around most often; it is a combination of the past, present and future. And even the best of us have trouble with the future. So the sunspot count is probably not a very good method of telling us what to expect. At least not tomorrow, or the next day. Or next week. Is it useless?

No, not at all. Keep in mind that ionization of the F layers is a cumulative thing. It builds up day by day, sort of like a trickle charge on a battery. As long as the average number of sunspots observed continues to climb, the trickle charge builds the ionization higher and higher, until something comes along to short-circuit the charge, such as a solar flare and following magnetic disturbance. Then the ionization process is degraded for as long as the disturbance lasts. When the disturbance dissipates, the ionization process begins anew, usually starting near the point where it left off before the disturbance occurred.

As a matter of purely academic interest, 6-

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1 Rule-of-thumb for use with ESSA Predictions: If the m.f. indicated for a given month is 44 Mc. or higher, the peak days of that month are worth watching for 50 Mc. DX.

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meter operators during the 1956-57 peak of the last solar cycle observed that the smoothed sunspot count had to be 120 or above for the 50-Mc. band to propagate on a regular basis (i.e., at times other than when there was a disturbance imminent or in progress) 6-meter signals between such regular points as the East Coast and Europe, East and West coasts of North America, or West Coast and Hawaii-Japan.

Since there is serious question as to whether the smoothed sunspot count will ever get that high during the current cycle, we must rely on the so-called disturbed conditions to influence the 50-Mc. band. And that brings us to our true topic.

**Observe-Analyze-Operate**

When the sunspot count is above 120, it doesn’t take an analyst to “predict” that the band will open. Simply being around every so often is sufficient; the band will probably be open, at least for a limited time, almost daily.

This is not true during the pre-120 count period, however. At the present time, 50 Mc. opens only when some form of catalyst disrupts the normal course of events in the F region. This may occur once a month, or perhaps just a half dozen times during the remainder of the entire cycle. We have no accurate way of knowing. But we do know that if (A) happens, (B) is sure to follow. (A) in this case is a solar flare, or magnetic disturbance. And (B) is an open band on 50 Mc.

**Check WWV, WWVH**

In addition to broadcasting highly-accurate time signals, ESSA stations WWV and WWVH transmit regular reports of observed solar activity. Through an interconnected network of h.f. radio circuits, solar observatories all over the globe share their information. WWV also reports to its listeners the current observed radio propagation conditions: more about this shortly. Of the two services, the solar observations are the more important because they give you the first warning that something unusual is going to happen to our ionosphere. Such warnings run from 12 to 24 hours ahead of the actual occurrence–adequate warning in most instances.

This service is given over WWV at 10 minutes past each hour, and WWVH at 40 minutes past each hour, on A2 code, at about 7 words per minute. Table 1 lists the symbols that may be included, in groups, in a report at 19 and 49 minutes after the hour, and further explains the sequence transmitted for your interpolation.

Let’s assume that you tune in WWV at 10 minutes after the hour, or WWVH at 40 minutes past, and hear this message sequence, always transmitted ahead of the regular time and voice identification, which are given just before 20 minutes after or 50 minutes after:

GEO DDD EEE EEE UT 2AD 888

What does it mean? First of all (see Table 1) GEO announces that what follows is a geo alert.
TABLE I
WWV-WWVII Geo-Alert Symbols and Meanings

There are three sets of meaningful symbols. First symbol after the identification, GEO. This letter is repeated three times.

E — No alert — nothing unusual expected.
I — Flare expected — general type.
S — Proton flare expected — more severe type.
T — Magnetic storm expected, usually following an observed flare.
U — Flares and magnetic storm expected. Usually one flare has already occurred, which will cause a disturbance, and another flare is expected.
V — Proton flare and magnetic storm expected — same as U.
H — Strut warming.
D — Strut warming and flares expected.
B — Strut warming and proton flare expected.
M — Strut warming and magnetic storm expected.

Second symbol transmitted, repeated three times. (Report on an actual observed flare event.)

M — Event began between 00 and 06 UT the day before issue of alert (all days UT).
T — Event began between 06 and 12 UT.
H — Event began between 12 and 18 UT.
S — Event began between 18 and 24 UT.
I — Event began between 00 and 04 on day of alert.
E — No alert (no observed event).

Third symbol transmitted, repeated three times. (Report of an observed disturbance, such as follows an event as reported first symbol.)

U — Event began day before alert, 00-06 UT.
A — Event began 06-12 UT.
B — Event began 12-18 UT.
D — Event began 18-24 UT.
N — Event began 00-04 day of alert.
E — No alert (no observed event).

A typical report is GEO DDD EEE EEE UT 2 AD 080. Of this, only GEO D (DD) E (EE) E (EE) has any bearing on solar activity and disturbance reports. See text.

Since each letter symbol is transmitted three times, what we really have is:

GEO D E E UT 2AD 080

The "D" is the first symbol. Using Table I, we see that it indicates there is stratospheric warming (start warming), and that flares are expected. The "E" is the second symbol, here indicating that no actual observed flare has been reported. The second "E" is the third symbol, also indicating no observation; in this case, no observed disturbance. The "UT 2AD 080" has no bearing on propagation or solar conditions. This refers to UT time correction, so can be forgotten in our situation.

In this particular report, we have knowledge that a flare is probable. Apparently solar observers are witnessing a sunspot or complex of spots which are similar to others in the past which have produced flares. And since any type of flare will probably cause the F layer to do erratic and unusual things within a period of from 24 to 48 hours from the time it occurs, you should be on your toes.

Once you have your first warning that a flare has occurred, then what? At this point you should begin checking WWV as often as possible for the regular propagation reports given every five minutes, and continue to check on the 19- or 49-minute-after geo alerts.

Soon after the flare actually occurs the symbols transmitted will change to GEO T I E for example. This indicates that a magnetic disturbance is expected (T); the flare that can be expected to cause the magnetic disturbance occurred between 00 and 04 UT of the day that you are hearing the report (I); but that magnetic activity is normal at that point (E).

As soon as energy from the flare reaches earth (from 12 to 24 hours after the flare), radio conditions will become disturbed. The F layer will begin to gyrate wildly, oscillating or pulsating up and down. This will cause the familiar flutter fading on signals propagated via the F layer, especially the North Atlantic path signals which pass fairly close to the magnetic north pole.

WWV responds by alerting its listeners with reports every five minutes of the observed radio conditions on the North Atlantic path. These are transmitted on A2 code just ahead of the voice announcements at each five-minute mark period.

As Table II indicates, the warning usually consists of one or two letters, followed by a number. N stands for normal (i.e., no disturbance); U for unsettled (i.e., disturbance present). The following number indicates the relative quality of the North Atlantic path, 1 being terrible and 9 being excellent. When this report switches from N to U, most of us hope the number following the U will sink as low as 3. A U/4 indicates a pretty severe disturbance. The more severe the disturbance, the wilder the oscillations in the F layer, and the better the chances for a high MUF, as the disturbance subsides.

Usually WWV must still be sending U4, 5 or 6 for the 6-meter band to open under disturbed conditions. If the disturbance is short-lived and conditions rapidly return to normal (i.e., N5, N6, N7) 50 Mc. probably will not be widely affected.

So with WWV sending U something, what next? The first impact of the solar flare energy may be an auroral display and disturbance,
upsetting as this energy is to our magnetic balance around the magnetic north pole. More northerly stations should experience a 50- or 144-Mc. auroral opening. If the disturbance is especially severe, the auroral conditions will be noticed at more southerly latitudes. Of course, this is also a tip-off as to the severity of the $F_2$ unbalance for the following day.

So much for the disturbance itself. Now what directions will the band open? It was a common rule of thumb during the 1946-49 and 1956-60 cycle peaks that a disturbance would result in South American openings for U. S. 50-Mc. stations, following the break-up of the disturbance. Since our 50-Mc. experience extended back only to 1946, we naturally expected more of the same in the current cycle. While we are just barely into the present cycle, as far as 50-Mc. openings go, it may be that this rule is due for some modification.

For example, a minor disturbance reported November 18-19 resulted in driving the transcontinental m.u.f. from around 40 Mc. peak daily average to between 43 and 45 Mc. This condition lasted until November 30. A repeat disturbance of a minor nature December 20 again drove the m.u.f. up on east-west paths, again from an average of 40 to a peak of 45 Mc. following the disturbance.

The major disturbance between December 30 and January 3 drove the m.u.f. up again from an average of around 40 Mc. to above 50. Typical paths worked were: December 31 — W5 to KP4; W1, 2, 3, 4, 8 to VP2, PJ2. January 1 — W6, 7 to W1, 2, 3, 4; W6-7 to KH6. January 2 — W4, 5, 6, 7 to KH6. January 3 — W3, 4, VP7 to W6; TI to W6; TI to KH6; W5, 6, 7 to KH6.

These are basically east-west paths with the exception of the very first day after the storm when the southern Caribbean area was worked from W1-3, 8. At the same time, however, KP4 was being worked by western W5, which is an east-west path. So, clearly, there is no pat answer to the direction question. If you have reason to expect disturbed conditions, listen often, call CQ often, and use Table III for generalized beam headings, if you are new to the game.

| TABLE III |
| Oct. 15-Feb. 15 (No allowance for E-layer propagation) |
| 0700—0900: Northeast-east-southeast. |
| 0900—1000: East-southeast. |
| 1000—1100: Southeast-south. |
| 1100—1300: Southeast-south-southwest-west. |
| 1300—1500: Southwest-northwest. |
| 1500—1700: Southwest-northwest. |
| Feb. 15-May 15 (No allowance for E-layer propagation) |
| 0700—1100: Southeast-south-southwest. |
| 1000—1300: Southeast-south-southwest. |
| 1300—1500: Southwest. |
| 1500—1900: South-southwest (TE plus $F_2$). |

27-28-Day Repeat

The sun rotates to its axis once every 27 days, approximately. A particular sunspot or complex of spots which faced the earth on, say, January 1, will again face the earth on January 28-29, provided the spots still exist. Thus it is always wise to mark your calendar around 27-28 days after an observed event, to remind you to check for a recurrence.

Use the 10-Meter Band

Many old-timers on 6 listen or operate a great deal on 10, also. The two bands are not dissimilar; 10 meters is simply open more often! You can often spot a 6-meter opening in the making by observing what is coming through on 10 meters. As ionization becomes more intense, 28-Mc. skip shortens and the m.u.f. moves upward in frequency. Reference is made to drawings on the facing page. For simplicity, this uses two points separated by approximately 2500 miles on the globe: Fresno and Miami.

At 0700, I can hear 10-meter signals coming through from Miami. This tells me the m.u.f. from Fresno to Miami is 28.5 Mc. or more at this time, on this 2500-mile ratio path (A). At 0730 PST I am hearing 10-meter signals from Pensacola, Fla., 1800 miles, and on my SP-600 I can detect signals at 35 Mc. from the Miami area (B). At 0800 PST 10-meter signals from Houston are coming through, 1550 miles. On 35 Mc., Atlanta, 1850 miles, is coming through, and I am hearing Miami-area stations as high as 43 Mc. (C). At 0830 PST, 10-meter signals are heard from Amarillo, 1000 miles, 35-Mc. signals are in from Houston, 43-Mc. signals are from Atlanta — and low and behold, 50 Mc. is open to southern Florida!

Now what transpired in that 90 minutes? The m.u.f. between Fresno and Miami rose from 28.5 Mc. to over 50 Mc. I had been listening for
the entire period on 10 meters, I would have followed the skip in, closer to me, from Miami to Amarillo. Listening only on 35 Mc., I would have detected Miami-area signals at 0730, the skip shortening up to Houston by 0830. And had I been monitoring only 43 Mc., the Miami signals would have appeared at 0800, and by 0830 skip would have shortened up to Atlanta.

This is very useful information.

In the case of transcontinental F-layer work on 50 Mc., we know from experience that the openings are centered around 0600-0615 PST, or 1100-1115 EST. If the opening has not occurred by 0815, the band probably will not open that day. The m.f. may stop at 43-45 Mc., and stay there for an hour or two. In short, there is an optimum time for 50-Mc. openings over any given path. If the optimum time comes and goes without an opening, you can usually go about your business for the day.

There are two excellent spot frequencies which every die-in-the-wool 6-meter man should be able to monitor in his shack: 35.58 and 43.58 Mc., where radio paging services operate 24 hours a day with moderately high power. Nearly all of these pagers run a series of voice announcements ("... 201 call your office, 445 call Dr. Jones, 632 contact Tom Smith...") followed by voice announcement of their call letters and location. Message sequences are short, and voice identifications regular and as close together as every 30 seconds, making for quick and easy identification. Of the two, 43.58 is obviously the better, but both are useful.

If you live in an area where you have local occupancy on these channels you might try 35.22 or 43.22, also paging channels. You certainly don't need a special receiver to listen in on these frequencies. There are many low-cost printed-circuit 6-meter converters, and simple 6-meter converter circuits, which will operate fine in this range, feeding into your receiver as an l.f., by simply plugging in an appropriate crystal and grid-dip the r.f. coils and l.f. output coil to the proper frequencies. By monitoring 43.58 in particular, you can almost always be 30 minutes or more ahead of a band opening on 6 meters or, negatively, tell yourself the band simply is not going to make it that day.

**Some Generalities**

If the present sunspot cycle reaches an honest smoothed count of 120 or more, we can probably expect reasonably regular transcontinental, KI6, JA, European and African openings on 6, without the aid of a disturbance, during the period November 1 to February 15.

Single-hop $F_2$ (2000-2500 miles) will normally peak on any given east-west path when the local time at the midpoint is between 10 and 11 a.m. Remember that some areas are close to either eastern or western edges of time zones, and allow accordingly.

(Continued on page 190)

*A secondary peak sometimes develops about 2 hours later, or about 11:15 local time.—error*
A Three-Transistor Receiver

The FET as a Regenerative Detector

BY WALTER F. LANGE, W4YDS

Even in this age of crowded bands and sophisticated communications systems, there is room for the lowly regenerative receiver. The unit shown in Figs. 1 through 6 is a simple receiver that should be easy for most anyone to build, regardless of his experience. Plug-in coils are employed, eliminating the complexities of wiring a band switch. No test equipment is required, as nothing needs to be aligned; once the unit is constructed, it should work without any difficulty.

Self-contained flashlight cells are used, making the receiver immune to power blackouts. Since the supply voltage is only 9 volts, there is no shock hazard for the beginner to worry about. Being battery operated and entirely transistorized, the receiver has no power transformers or filaments to heat up and cause drift.

The receiver is more useful than a superhet for checking intruders that are supposedly in the ham bands, as the three-transistor unit has no converter stages to generate spurious signals that may give a false indication of the frequency of an incoming signal. Coverage of 160 meters is provided, a feature left out of many higher-priced commercial receivers. Sensitivity of the receiver is such that a.m., c.w. and s.s.b. signals of 0.1 \( \mu \text{V} \), or greater are audible in the headset. All-in, the receiver does a surprisingly good job for the small amount of circuitry involved. It doesn't have the selectivity or signal handling capability of a good superhet, but after all, you usually get what you pay for.

Referring to Fig. 2, the components between points A and B form a filter to attenuate broadcast-band signals. This filter greatly reduces the chances of front end overload by nearby broadcast stations. In locations where there are no powerful broadcast signals, the filter may be left out. Points A and B should then be connected together.

A field-effect transistor (FET), which has high input impedance, is used as the regenerative detector, \( Q_1 \). With suitable circuit modifications a conventional n-p-n transistor will work, but its low input impedance will load down the tuned circuit, resulting in some loss of selectivity, and the detector will tend to overload easier. The FET detector uses the Colpitts circuit, doing away with the need for winding a tickler coil or tapping the main inductor. The detector is tuned by bandspread capacitor \( C_3 \) and band-set capacitor \( C_6 \). One amateur band occurs in the frequency range of each plug-in coil. In each case capacitor \( C_3 \), in series with the bandspread capacitor, has been chosen so that the amateur band in question occupies the entire tuning range of the bandspread capacitor.

Regeneration is controlled by varying the source bias of \( Q_1 \). Although only one regeneration control is normally found in regenerative receivers, two controls are provided here to make

Although the superhet is by far the most popular receiver in use today, the regenerative receiver still has a place in the ham shack. Its simplicity makes it an ideal beginner's project as well as an easy-to-make standby unit for the advanced amateur.
Fig. 2—Circuit diagram of three-transistor regenerative receiver. Fixed resistors are 1/2-watt composition. Capacitors marked with polarity are electrolytic; those marked with an asterisk are dipped silver mica; other fixed capacitors are disk ceramic. Components not listed below are numbered for reference.

BT1—Six 1.5 volt flashlight cells (size D) in series.
C1—9-180-pf. mica compression trimmer.
C2, C9, C14—See Table I.
C8—50-pf. variable (Millen 19050).
C7—140-pf. variable (Millen 19140).
J1, J2—Insulated tip jacks.
L1, L2—See Table I.
Q1—Field-effect transistor (Motorola MFP104).
Q2, Q3—N-p-n transistor (General Electric 2N3860, 2N2925, 2N3391A, 2N3403, or 2N3405).
R5—10,000-ohm control, linear taper.
R3—100,000-ohm control, linear taper.
R6—10,000-ohm control, audio taper, with S1 attached.
RFC1, RFC6—10 µh. (Millen 34300-10).
RFC2, RFC3—33 µh. (Millen 3300-33).
RFC4—5 µh. (Millen 34300-5).
RFC5, RFC7—2.5 mh. (Millen 34300-2500).
RFC8, RFC9—68 µh. (Millen 34300-68).
S1—S.p.s.t.

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

adjustment easier. \( R_4 \) is for coarse adjustment and \( R_2 \), one-tenth the value of \( R_3 \), is for fine control. An electrolytic capacitor, \( C_5 \), bypasses both controls for audio; without it, the detector would be rather insensitive. RFC6, C11, RFC7 and \( C_{13} \) form an r.f. filter in the drain circuit of Q1 to keep r.f. from reaching the base of the first audio amplifier, Q2. A 4700-ohm resistor, \( R_9 \), is used as the detector load, rather than an expensive inductor or transformer. Volume control \( R_9 \) varies the amount of signal reaching the base of audio output stage Q2. Q3 should have a high-impedance headset (2000 ohms or more) as its collector load. The headset leads are kept from acting as antennas (creating hand-capacity effects on the higher bands) by being isolated from the power supply and Q3 with r.f. chokes.

Construction

The receiver layout is uncrirical and you can vary it considerably to suit your own requirements. However, don't alter the detector circuit too much, if you expect it to have the same band coverage as listed in Table I. If you are a new-
Table I

Coil and Capacitor Data

Capacitors are dipped silver mica (values are in picofarads) mounted in the coil form close to the base of the form. Coils are close-wound with enameled or Yxled copper wire on 1-inch diameter 5-pin coil forms (Millen 45005). For winding details see Fig. 3.

<table>
<thead>
<tr>
<th>Coil</th>
<th>Range</th>
<th>Me.</th>
<th>C₂</th>
<th>C₃</th>
<th>C₄</th>
<th>L₁</th>
<th>L₂</th>
<th>Wire Size</th>
<th>Dimensions, inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1.63–2.55</td>
<td>68</td>
<td>1800</td>
<td>short</td>
<td>4₁₂</td>
<td>4₁₂</td>
<td>No. 26</td>
<td>7₁₂</td>
<td>3₁₁₂</td>
</tr>
<tr>
<td>II</td>
<td>2.45–5.6</td>
<td>68</td>
<td>1300</td>
<td>68</td>
<td>3₁₂</td>
<td>35₁₂</td>
<td>No. 24</td>
<td>7₁₆</td>
<td>3₁₈</td>
</tr>
<tr>
<td>III</td>
<td>4.90–10</td>
<td>68</td>
<td>680</td>
<td>22</td>
<td>2₁₂</td>
<td>18₁₂</td>
<td>No. 20</td>
<td>11₂</td>
<td>19₂</td>
</tr>
<tr>
<td>IV</td>
<td>9.70–18</td>
<td>22</td>
<td>220</td>
<td>12</td>
<td>2₁₂</td>
<td>9₁₄</td>
<td>No. 20</td>
<td>11₂</td>
<td>19₂</td>
</tr>
<tr>
<td>V</td>
<td>16–25.7</td>
<td>100</td>
<td>12</td>
<td>12</td>
<td>2₁₂</td>
<td>6₁₂</td>
<td>No. 20</td>
<td>11₂</td>
<td>19₂</td>
</tr>
<tr>
<td>VI</td>
<td>20–30</td>
<td>68</td>
<td>18</td>
<td>18</td>
<td>2₁₂</td>
<td>5₁₄</td>
<td>No. 20</td>
<td>11₂</td>
<td>19₂</td>
</tr>
</tbody>
</table>

To construct the receiver as shown in the photographs and become familiar with its operation, you must have gained some experience, you will be in a better position to make changes, if you want to.

The receiver is built on a 13 × 5 × 3-inch aluminum chassis with a 13 × 7-inch aluminum plate serving as the front panel. If you don’t have the tools to cut a piece of sheet aluminum to the specified size, a commercial bottom plate will serve nicely.

Referring to Fig. 4, center C₄'s tuning shaft 2 inches from the right edge of the panel, and center C₅'s tuning shaft 5₁₂ inches from the same edge. Bolt the capacitors to both the panel and the chassis, being careful not to damage the plates at the front of the capacitors with mounting screws that may be too long. Attach two 1-inch ceramic pillars (Millen 31001) to a 5-contact tube socket (Amphenol 78RS5) and position this assembly half way between C₅ and C₆ so that pin 3 of the socket is closest to the front panel. Before bolting the pillars to the chassis, put a soldering lug (to be connected to pin 3) under the ceramic insulator nearest the front panel, and slide a flat washer under the other insulator. Space terminal strips TB₁ through TB₄ 2½ inches apart, with the first mounting hole 1 inch from the left edge of the chassis and 1½ inch from the rear. Fasten these terminal strips and the battery holders to the chassis with the same screws.

Install C₄’s dial mechanism on the front panel using two ⅝-inch 6–32 threaded spacers. Attach C₅'s dial so that it indicates 0 at maximum capacitance and 10 at minimum capacitance. All the dials except the one for C₅ are from Millen's 10005 series.

By close inspection of the photographs and the schematic diagram, it should be easy to wire the chassis. The circuit runs from left to right in the schematic and from approximately right to left in the rear view of the chassis. Using Fig. 5 as a guide, connect transistor sockets to the appropriate terminal strips. Solder the center lead of each socket directly to the terminal lug shown and use short lengths of wire between the remaining leads and lugs. Use a heat sink, such as an alligator clip, when soldering the last end of each wire to be secured, otherwise the lead may come undone from the first connection. Make all the remaining connections as short and direct as shown in the photographs.

Referring to Fig. 3 and Table I, begin constructing the coils by drilling four holes in each 5-prong form with a No. 50 drill. Each hole should be drilled above the prong to which the end of the coil will be terminated. Wind L₁ first and then L₂. Scrape the ends of the coils with a knife or razor blade, so that good electrical contact can be made to the prongs. It will be easier to get tight windings if the wire spools are held in a vise while the coils are being wound. Wind the coils at a distance from the vise, keeping the wire taut. After L₁ and L₂ have been put on the form, install C₂ (if applicable), C₄ or a short, and C₃ in that order. Push the capacitors down to the base of the coil form, keeping the connecting leads as short as possible. Carefully solder the coil prongs. Wipe away any rosin from the prongs with a cloth dipped in alcohol. To protect the coils, it may be desirable to spray them with clear lacquer or coat them with coil dope.
Before turning the set on, check the wiring carefully with the schematic diagram and the photographs. Be especially careful that the batteries and transistors are installed correctly; note that the negative side of the supply is connected to the chassis.

**Use**

The audio output stage works best with high-impedance headphones (connected to $J_1$ and $J_2$) although lower-impedance phones will work, at reduced output. To check out the receiver, connect an antenna to either antenna terminal and run a ground lead to the set. Plug coil II in the receiver and set the 0 to 10 band-set capacitor dial at 7.5. With $C_8$ at this setting, the bandspread capacitor should tune from approximately 3.5 to 4 Mc. Turn the audio gain control full on. With the fine regeneration control, $R_5$, at about midrange, advance the coarse regeneration control, $R_6$, until the receiver starts to oscillate. The point at which the detector begins to oscillate is easy to recognize, as a thumping sound is heard and the background noise increases. Then, by tuning the bandspread capacitor, it should be possible to hear signals.

It will be necessary to vary the regeneration controls for optimum reception of different signal types (a.m., c.w. and s.s.b.), strengths and frequencies. For a.m. reception, advance the regeneration controls to the point just before where the detector oscillates. This is the most sensitive operating point for a.m. signals, and the selectivity of the circuit is better than at lower settings of the regeneration controls. Very strong signals, which may cause "blocking," may be reduced by backing off either $R_2$ or $R_3$ or both or by reducing the antenna coupling by connecting the antenna to the receiver through $C_9$ and opening up the plates of the capacitor as much as required.

The most sensitive setting of the detector for code reception is with the regeneration controls advanced just beyond the point of oscillation. However, very strong signals may overload the detector and become impossible to tune in at low beat notes. This can be overcome by further advancing the regeneration controls or by reducing the antenna coupling as described above. Note that if the regeneration is pushed too far, a point may be reached where an audio squelch will be heard. For satisfactory operation of the receiver, be sure the regeneration controls are set below this point.

S.s.b. is tuned in with the regeneration controls set at the same point as for c.w. The bandspread capacitor should be tuned very slowly through

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**Fig. 4**—Top view of the regenerative receiver. The two eight-lug terminal strips at the lower right support the components of a broadcast-band filter. Antenna and ground input terminals are located beside the filter at the edge of the chassis; the connector is a cut down screw-type terminal strip soldered to a standard lug-type tie-point. Of the four parallel terminal strips next to the filter, $TB_1$ and $TB_2$ support the regenerative detector, $Q_1$. $TB_3$ supports the first audio stage. $Q_2$, and $TB_4$ supports the output stage, $Q_3$.

**Fig. 5**—Interior view of the chassis. Three double battery holders (Keystone type 176) support the receiver power supply. The two r.f. chokes at the upper right are $RFC_5$ and $RFC_6$. March 1968
the signal until the voice becomes intelligible. Overloading is conquered in the same manner as for code reception.

Best use of the two regeneration controls will be obtained by following this procedure: Set the band-set capacitor, \( C_b \), for the desired band coverage. Turn \( C_3 \) and \( R_2 \) to midrange. Set \( R_8 \) at the point where the detector just starts to oscillate. Tune \( C_5 \) and adjust \( R_2 \) as required. In some cases the fine regeneration control may run out of range; it will then be necessary to readjust \( R_8 \) to bring it back in the ballpark.

Two undesirable effects may be noticed with this receiver, especially at the higher frequencies. If an inadequate ground system is used, the receiver will exhibit band-capacitance effects. Also, as with any regenerative set, an antenna blowing in the wind can cause the frequency to change. If the latter difficulty becomes serious, an indoor antenna might be called for. Lighter antenna coupling and coaxial feed will also reduce the effects of antenna movement on the detector.

The bandspread system used in this receiver was set up with the amateur bands in mind. Other bands are spread out to a lesser or greater degree. Table II shows the approximate settings of the band-set capacitor, \( C_b \), for spreading each high-frequency ham band over the tuning range of the bandspread tuning capacitor, \( C_5 \). How accurate each setting is, of course, depends on how closely the coils are duplicated.

### Possible Modifications

In order to keep costs down, no cabinet was used to house the receiver. The set should perform well in most locations without one. However, in some spots, a.c. pickup may be a problem. By using a metal cabinet, there won't be any need to worry about hum, and the set will look more attractive. A cabinet having a hinged cover is the most desirable, as it will facilitate coil changing.

If additional coverage is desired, more coils can be constructed. In order to cover the broadcast band, three plug-in coils will likely be required because of the small size of \( C_b \). In addition, it will be necessary to disconnect the b.c. filter to prevent severe attenuation of the broadcast signals. It may be possible to tune the 6-meter band if an appropriate coil is constructed; however, performance will probably not be too satisfactory at v.h.f.

In order to achieve optimum \( Q \) with easy-to-make close-wound coils, three sizes of wire had to be used. However, if you don't mind the slightly more difficult job of space winding the coils, you can save yourself the cost of two spools of wire. Using the same dimensions and turns count given in Table I, wind coils II through VI with No. 26 wire, being careful to equally space the turns.

<table>
<thead>
<tr>
<th>Table II</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coil</strong></td>
</tr>
<tr>
<td>I</td>
</tr>
<tr>
<td>II</td>
</tr>
<tr>
<td>III</td>
</tr>
<tr>
<td>IV</td>
</tr>
<tr>
<td>V</td>
</tr>
<tr>
<td>VI</td>
</tr>
</tbody>
</table>

If you are a Novice and want more bandspread for the Novice frequencies, use a smaller value of capacitance at \( C_4 \) than that listed in Table I. Try a 10-pf. capacitor in coil II and 8-pf. capacitors (3- and 5-pf. units in parallel) in coils III and V. If this change is made, the setting of the band-set capacitor for the amateur band in question will be different than that listed in Table II.

Since the current drain of the receiver is less than 3 ma., just about any size of 9-volt battery can be used to power the set. However, the author prefers a bank of ordinary flashlight cells, as they are available at more stores than any other type, and will last a long, long time in this receiver.

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.
Novice or General—TVI Can Be Tough!

BY LEWIS G. McCoy,* W1ICP

With the upswing in the sunspot cycle the 15- and 10-meter bands are seeing more and more activity. Many General Class hams — and, of course, Novices — haven't been around long enough to "discover" these bands under their wide-open conditions. When we approach the height of a sunspot cycle these bands open up for worldwide communication, and therefore attract many amateurs who otherwise would work only the lower frequencies.

All this is great, and there's lots of fun to be had. Unfortunately, there can be some bitter along with the sweet — TVI. The harmonics from a transmitter usually get weaker as the harmonic number increases; for example, the 2nd harmonic would be strongest, the 3rd slightly weaker, the 4th weaker still, and so on. In 100-, 80-, or 40-meter operation it is actually difficult to find a harmonic strong enough to cause television interference because the harmonics are high-numbered. On the other hand, the low-numbered harmonics from 20, 15 or 10 meters can easily be strong enough to cause quite severe interference. What this means is that when you operate on these higher bands in an area that has TV Channels 2, 3, 4 or 6, you must make sure that there is no harmonic "leakage" from your station.

Fundamental Overloading

In dealing with TVI there are two basic problems, your equipment's faults and the television receiver's weaknesses. Let's discuss the TV set first.

When a TV receiver is operated near a transmitting antenna — by "near" we mean within a few hundred feet — it is possible for the fundamental signal from the transmitter to overload the r.f. stage of the TV set. Your fundamental signal — the one you're using for communication — is on a frequency completely different from the TV channel frequencies, but if the r.f. stage of the TV set is overloaded by this signal, the stage actually generates many spurious signals which can cause TVI. The TVI may take the form of crosshatching in the picture, audio interference, or both. Usually, so many spurious signals will be generated that interference will appear in all channels. Incidentally, when interference is present in all channels, or in channels that are not harmonically related to your fundamental, it is a good indication that the TV set itself is at fault, or at least partially so.

To overcome fundamental overloading, the front end of the TV set must be made more selective so it will reject undesired signals, or at least attenuate them to the point where they cannot cause TVI. Bear in mind that such interference is not the fault of the transmitter. It is true that if you don't go on the air there will be no TVI, but curing fundamental overloading is the responsibility of the set owner. You have to use the utmost tact in dealing with set owners to convince them of this, since a TVI situation can quickly get out of hand.

The cure for the trouble is the installation of a high-pass filter on the TV set. A high-pass filter is a combination of coils and capacitors that will permit signals above its "cutoff" frequency to pass through but will attenuate any signals below the cutoff frequency. When used with a TV receiver the filter is installed between the antenna leads and the TV tuner, directly at the tuner. TV signals can get through the filter without being attenuated, but any signals below Channel 2 are stopped.

Harmonics or Spurious Signals

One thing the high-pass filter won't do is to stop a signal that is above the filter cutoff frequency. If your transmitter has harmonics actually in one or more TV channels they will go through the filter and cause TVI. To attenuate harmonics coming from your rig you need a low-pass filter. Like the high-pass, the low-pass filter is a combination of coils and capacitors, but it passes signals below its cutoff frequency. Fig. 1 and the photographs show a low-pass filter that is easy to build, as described a little later on.

* Novice Editor.

Many of the teeth of the old TVI dragon have been pulled since those days when practically every TV receiver was in a fringe area. But he's not impotent by a long shot! With the sunspot cycle opening up the 10-meter band some precautionary measures are called for if your operating is moving up along with the m.n.f.
For a low-pass filter to be effective, all of the signals coming from your rig must be fed through the filter, not around it. This means that the rig must be in an r.f.-tight enclosure, with good shielding techniques used wherever there is any chance of harmonic leakage. In the process of generating a desired output frequency, a whole family of undesired frequencies also is generated in the transmitter, usually. We only want one frequency, but it is the nature of the beast to produce many undesired ones, referred to as "spurious" signals. If we don't bottle up all those signals so that the only path for r.f. to leave the transmitter is via the low-pass filter, we can run into TVI problems.

How Much Shielding?

The "tightness" of the shielding required in a transmitter depends primarily on the strength of the TV signal at the receiver's antenna terminals. It is possible that a radiated harmonic won't cause TVI, simply because the TV signal is so strong that it isn't bothered. However, because you never can quite depend on what a neighbor has for a set or antenna system, it pays to have your equipment "clean."

One mistaken assumption that many Novices and Generals make is that commercially-built transmitters they may own will have adequate shielding. As a matter of fact, very few commercial rigs have what we would call really harmonic-proof shielding. While most gear these days is in metal enclosures, this in itself is no guarantee of good shielding. For good shielding, all r.f. stages, particularly the final amplifier, must be completely enclosed in metal. The enclosure can be made of perforated metal to allow ventilation, but when we say completely enclosed, we mean just that.

There are certain things to look for that will tell you whether the shielding is adequate. For example, if a perforated metal box is installed around the amplifier, are all corners and the top and bottom clean of paint? For the enclosure to be r.f. tight you cannot have paint on the surfaces in contact. The top, bottom and sides of the enclosure must have clean metal-to-metal bonds, with any holding screws no more than a few inches apart.

Aside from the shielding, are all the leads coming into or going out of such enclosures shielded and bypassed? Is there a bottom plate on the chassis? And does the bottom plate have clean metal-to-metal contact? Are the leads to the meter or meters shielded and bypassed? These questions give you a few of the things to look for.

One of the best methods to check for harmonic leakage is with your own TV set. First, make sure that you have a properly-installed high-pass filter on the set. By "properly" we mean installed as close to the tuner as you can mount the filter. If you mount the filter on the back of the set at the antenna terminals it is possible that there will be sufficient antenna lead length between the filter and the tuner for this lead to pick up your fundamental.

The next step is to check the harmonic leakage from the rig. Connect the transmitter to a dummy load — one of the shielded variety, not a lamp load, unless the lamp is in a shielded box. The transmitter and TV set should be near each other, preferably in the same room. Load up the rig into the dummy and then check the harmonically-related channels on the TV set. If even a slight trace of interference shows up you will have some work to do on the rig. The first step is to install a low-pass filter between the transmitter and the dummy antenna. This may clean up the interference when using the dummy load, but even if it does it is still a good idea to check the rig for weak spots or harmonic leakage.

A good testing instrument is the TV receiver itself. Solder the ends of a 1-inch diameter loop of insulated wire to the conductors at one end of a piece of 300-ohm Twin-Lead long enough to reach from the set to the rig. Connect the other end to the receiver, along with the regular
antenna. You may find that the TV picture is weakened appreciably; if so, shorten or lengthen the test lead by about 12 inches.

With the transmitter running into the shielded dummy load, move the test loop around the rig, checking such spots as meter openings, a.c. leads, knob shafts, and so on. If any spots have appreciable leakage, as shown by the TV screen, additional shielding or lead filtering will be required to stop it. The BCI-TVI chapter of the Handbook describes various techniques of lead filtering.

Making Your Own Low-Pass Filter

You can either buy or build your low-pass filter. For those interested in building their own, the unit shown in Fig. 1 and the photographs can be put together in an hour or so.\(^1\) Two 2 1/4 × 2 1/4 × 5-inch aluminum Miniboxes are used to house the filter. The boxes are mounted end-to-end as shown in the photograph.

![Circuit diagram of the low-pass filter](image)

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**Fig. 1—Circuit diagram of the low-pass filter.**

- **C\(_1\), C\(_4\):** 50-pf variable [Hammarlund APC-50 or similar].
- **C\(_2\), C\(_3\):** 140-pf variable [Hammarlund APC-140 or similar].
- **J\(_1\), J\(_2\):** Coax chassis fitting, type SO-239.
- **L\(_1\), L\(_4\):** 4 turns.
- **L\(_2\), L\(_3\):** 7 turns.
- **L\(_5\):** 8 turns.

All coils are 1/2-inch inside diameter, 8 turns per inch, No. 12 or 14 solid wire.

The coils are all wound with either No. 12 or No. 14 solid wire and they all have an inside diameter of 1/2 inch. A wooden dowel or a drill bit can be used as a form for winding the coils.

The filter should be adjusted by means of an accurately calibrated grid-dip meter. Wire up the filter except for L\(_3\) and L\(_4\). Short the inner conductor pin on J\(_1\) to chassis at its inside with a metal clip; then couple the grid-dip meter to L\(_1\) and adjust C\(_1\) for a dip at 37.5 Mc. Do the same thing at the L\(_5\) end of the circuit. Next, couple the grid-dip meter to L\(_3\), set C\(_2\) and C\(_4\) at maximum capacitance (plates fully meshed) and vary the turn spacing on L\(_3\) until the circuit is resonated at 29 Mc. You may have to reduce the amount of capacitance slightly on both C\(_2\) and C\(_4\) to hit 29 Mc. Next, remove L\(_3\) and install L\(_2\) and L\(_4\). Without the short on J\(_1\), and without touching the capacitors, adjust L\(_2\) by varying the turn spacing to resonate at 37.5 Mc. This is the circuit formed by C\(_1\), L\(_1\), L\(_3\), and C\(_2\). Make the same adjustment at the L\(_5\) end of the circuit. Now replace L\(_3\), and a distinct resonance should be found at any coil at approximately 41 Mc, which is the cutoff frequency of the filter. This filter should handle the legal limit of power in a matched coaxial line (s.w.r. of 1 to 1). Variables with larger plate spacing could be used for greater are-over-protection. In such case a larger enclosure would probably be required.

Other Considerations

If you have carefully gone over your rig and stopped any harmonic leakage, the low-pass filter should take care of any harmonics in the line from the transmitter. Then, with a properly installed high-pass filter on the TV set you shouldn't have any TVI. Unfortunately, however, there is one other cause of TVI that is tough to clean up, particularly in a weak TV signal area. This is harmonic generation due to a rectifying contact between two conductors in the area of the transmitter or nearby TV set. Any corroded or poorly-connected metal surfaces can act as a rectifier—for example, loose or corroded connections in your antenna system. Whenever a strong r.f. field causes a voltage to exist at such a connection, the r.f. will be rectified and harmonics of the fundamental signal will be generated. These harmonics can be radiated in sufficient amplitude to cause TVI. It is a simple enough matter to go over all your antenna connections or the connections in the TV antenna system. However, such bad connections can exist in house wiring, plumbing, or anywhere that two metals are in contact. An article some years back\(^2\) treated this type of TVI in great detail, covering methods of locating and curing the trouble, and it is recommended reading for anyone with such a problem.

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\(^1\) The filter described here is based on the image-parameter method of design. For one adapted particularly to 14-meter operation, with rejection points at the second and third harmonics, see Wetherhold, "A Ten-Meter Harmonic Filter," QST, September, 1967. It is based on modern filter design methods.

INTERDIGITAL BANDPASS FILTERS FOR AMATEUR V.H.F./U.H.F. APPLICATIONS

High-Q Filter Construction Made Easy

BY REED E. FISHER W2CQH,* ex-W3VSB

The v.h.f. enthusiast often uses a high-Q coaxial filter ahead of his converter, to prevent blocking and crosstalk from nearby TV or f.m. stations. Another v.h.f. man may want a similar filter to "remove the garbage" from his homebrew 2-meter s.s.b. exciter. These single or multiple-section filters are usually laboriously fabricated using conventional circular coaxial construction, and may give questionable results, since the optimum degree of coupling at input and output, and between filters, is usually arrived at by tedious experiment.

The strip-line interdigital 1 filter, designed by modern filter theory, eliminates most of the above trials and tribulations. Multiple-section filters are easily constructed in a few hours, and will work the first time with little or no adjust-}

2 Forum Court, Morris Plains, N.J. 07960.
1 Webster: "Interdigital—To interlock, as with the fingers of folded hands."

Fig. 1—Mechanical details of the 432-Mc. bandpass filter.

The filter has a "maximally flat" or Butterworth response, which means that there are no loss ripples in the passband. It was used to reject the oscillator and image frequencies of the author's s.s.b. upconverter for 28 to 432 Mc.

The filter consists of six interdigitated rectangular rods centrally located between two ground planes. The four ½-inch square open ended rods


Fig. 2—Bandwidth and insertion loss with the 432-Mc. filter.
approximately ⅛ wavelength long constitute the high-Q resonators. The two larger rods, whose open ends are soldered to BNC coaxial connectors, are low-Q coupling sections. One end of each rod is drilled and tapped for an 8-32 machine screw so that it may be securely attached to an end wall. The top and bottom ground planes are ⅛" brass or aluminum, fastened to the drilled and tapped end walls by several 4-40 or 6-32 machine screws. It is important that a ground-plane screw be located near the center-line of each rod, since large r.f. currents are flowing in this region. Note that no “side walls” are required. The ground planes overlap the coupling rods by an amount sufficient to prevent any radiation loss.

In the first model built, the rods were plain stock brass and the ground planes were ⅛ inch thick aluminum. This gave a 1.4-db. midband (432 Mc.) insertion loss. A second model, constructed by W2CCY, with silver-plated brass rods and ground planes exhibited a 0.5-db. insertion loss. Tuning screws were included in the first model, but it was later found that if all four resonators were made precisely the same length, subsequent tuning was unnecessary.

The filter can be scaled to any other frequency by changing the rod length, but keeping the center-to-center and ground plane spacings the same. For example, the rods would be approximately 20 inches long in a filter tuned for 144 Mc. The 3-db. bandwidth would remain at 2 percent, i.e. 2.9 Mc.

Since the resonators open ends are loaded by “fringing capacitance”, their lengths are always slightly less than one quarter wavelength. It is difficult to compute this capacitance and hence accurately predict what the reduction of rod length will be. However since the resonators are easily removed, they can be pruned to the correct length after the filter is initially tested.

When the 3-db. bandwidth of a filter is made

Fig. 3—Structural details of the 1296-Mc. filter are similar to those of the 432-Mc. model, except that three circuits and cylindrical conductors are used.

Fig. 4—Performance characteristics of the 1296-Mc. filter larger, the midband insertion loss will decrease. A three-resonator filter centered near 1296 Mc., with an 8.5 per cent 3-db. bandwidth, is shown in Figs. 3 and 4. This filter gives a 0.4-db. insertion loss, using plain brass round rod construction. It is placed at the output of a 2C39 tripler to remove the 432-Mc. feedthrough. This was a “four-hour special” that worked the first time with no tuning.

It is hoped that this article will remove most of the heartaches usually associated with the construction of v.h.f. and u.h.f. bandpass filters.

Interior view of the 432-Mc. filter, with the top cover removed. Four square brass rods, grounded at alternate ends, comprise the tuned circuits. Larger rectangular rods at each end are the input and output coupling devices, connected to BNC fittings. End plates are ⅛-inch brass. Top and bottom covers are ⅛-inch. Sides are left open.
A Stable Outboard B.F.O.

Proper b.f.o. performance is essential for good c.w. and s.s.b. reception. Some receivers have b.f.o. circuits that are unstable, both electrically and mechanically. Another b.f.o. fault that is sometimes encountered is that of insufficient output. A third bugaboo, and one that is annoying to beginners, to say the least, is the matter of proper b.f.o. adjustment with respect to the i.f. passband of the receiver. Some receivers do not have any markings on the front-panel b.f.o. control to tell where to set it for upper- or lower-sideband reception. That is to say, the operator has to experiment with the settings of the control in order to find the right relationship to "zero" for satisfactory reception... often time consuming and frustrating.

By using a crystal-controlled beat oscillator, it is possible to correct the ills mentioned in the foregoing paragraph. A working example of such a circuit is given in Fig. 1. The unit is built to operate "outboard" and can be powered from the receiver's accessory socket. If the receiver does not have one, it should be a simple matter to add an outlet.

Two crystals are used, $Y_1$ and $Y_2$, permitting upper- or lower-sideband reception by merely switching one of two crystals into the circuit by means of $S_1$. A level control, $R_1$, enables the operator to vary the b.f.o. injection to the second detector of the receiver so that the desired ratio between i.f. and b.f.o. signals can be obtained. A s.p.s.t. switch, $S_2$, is part of the $R_1$ assembly and is used to place the b.f.o. in standby when it is not being used.

This circuit was designed for use at 455 kc. It could be used at higher i.f.s., but $C_1$ would have to be made smaller in capacitance to provide the proper feedback for the oscillator. Oscillator $V_{IA}$ is a standard Pierce type, is easy to get operating, and should work well at higher crystal frequencies, too.

There is nothing stringent to observe as far as layout and wiring rules are concerned. Any small Minibox or similar container can be used to house the circuit. If desired, it can be built into the receiver—space permitting—to become a permanent part of the equipment.

The level and lower-upper sideband controls are mounted on the front of the b.f.o. chassis for easy accessibility. $J_1$, the output jack, is located on the rear wall of the box. A $\frac{3}{4}$-inch diameter rubber grommet is also on the rear of the case and is used as an outlet for the power cable which connects the b.f.o. to the receiver's accessory outlet.

**Using The B.F.O.**

The proper crystals for the b.f.o. will have to be chosen according to the actual i.f. of the receiver. Some receivers use a 455 kc. center frequency, while others call for 456 kc. Actually, there isn't much difference when it comes to selecting $Y_1$ and $Y_2$. The receiver can always be realigned to match up with the b.f.o. crystals, provided they're not too far removed in frequency. War-surplus type FT-241A crystals were used in this model. If the receiver calls for a 455-kc. i.f., order a crystal for 456 kc., and another for 454 kc. In other words, pick a crystal that is one kilocycle higher than the i.f., and another that is one kilocycle lower than the i.f. This will be satisfactory for most applications. If a
Fig. 1 — Schematic of the b.f.o. Capacitances are in pf., unless otherwise indicated. Resistence in ohms. K = 1000.
Capacitors are disk ceramic. Fixed-value resistors are 1/2-watt composition.

Ci — See text.
J1 — Phone jack.
R1 — 10,000-ohm linear-taper carbon control.
RFC — 2.5-mh. r.f. choke, 50-ma. rating, or greater.
S1 — S.p.d.t. single-wafer phenolic rotary. (Slide or toggle switch suitable also.)

455-kc. i.f. is being used (center frequency), it is helpful to have a 455-kc. crystal on hand for aligning the i.f. The crystal can be plugged into the b.f.o. and the i.f. transformers then aligned for peak response. Crystals in this range are available (±5 c.p.s. tolerance) for $1.75 each, ground to your specifications. 1

To feed the b.f.o. signal into the station receiver, mount a phone connector on the rear apron of the receiver's chassis. Use a short piece of shielded audio cable, or miniature coax line, and route the b.f.o. signal to the secondary side of the last i.f. transformer. Using "gimmick" coupling, wrap two or three turns of the center conductor of the b.f.o. cable around the connecting lead which joins the i.f. transformer secondary to the detector tube's grid, or to the r.f. side of the detector diode. Make sure that the two wires are insulated from one another so that a short-circuit will not occur. Ground the shield braid of the b.f.o. cable where it enters the receiver and again at the end which is near the detector circuit. If more b.f.o. injection is needed, increase the number of wraps of the gimmick coupler until the desired performance is obtained. R1 should be somewhere near midrange during this adjustment.

This b.f.o. can also be used in s.s.b. exciters to serve as a carrier generator for upper and lower sideband operation. Crystals Y1 and Y2, however, would have to be chosen to match the passband characteristics of the crystal-lattice or mechanical filter being used. R1 could be used as a carrier-insertion control if this were done, routing some of the b.f.o. signal around the filter and into the mixer for c.w. and a.m. operation, or for tuneup purposes when desired.

— W1CB

Feedback

The resistor to the oscillator base in W3MOO's transmitter ("An Unusual R.F. Amplifier Circuit," January QST, page 40) lost a K somewhere along the line. It should have been 100K instead of 100 ohms.

This item should probably be headed "Feedback," but in this instance the story of the man sending in the correction is more interesting than the item itself. In connection with W3GKP's piece, "On Decibels and Noise," in January QST, p. 35, WB2FCX points out that in writing about "signal-plus-noise to noise" ratio, we should have expressed it as \( S + N \)

But who is WB2FCX? Thereby hangs a tale. He could be one of the world's first v.h.f. DX men. Operating under the self-assigned call W2, in Brussels, Belgium, Rudy put a 50-Me. signal into

Spain — in 1925! There's a story that could stand some retelling.

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When it comes to thinking up "different" things to do in ham radio, W3GKP takes a back seat to nobody. His latest effort has been to learn to copy code on a teletype machine. This is a good way to improve one's code copying ability and teletype keyboard skill, but Bill says progress is slow. His teletype-machine copy netted him a 10-w.p.m. ARRL Code Proficiency Certificate in October, and a 15-w.p.m. sticker in November. He had a 20-w.p.m. copy in the Qs c.p. file as this was written.

Being a skilled c.w. man for many years, his showing of the 10-w.p.m. wallpaper at a recent Rock Creek club meeting caused much amusement. (From W3GKP OVS report, via W1HDQ)

March 1968

35
An Experimental All-Electronic VOX System for S.S.B.

Instant Voice Break-In Without Relays

BY H. ROMMEL HILDRETH, M.D.,* KØHZF

Instant c.w. break-in — the ability to bear signals in the spaces between dots and dashes — has been with us for some time. The only comparatively recent development has been the introduction of the t.r. switch, which permits the use of the same antenna, rather than separate antennas, for transmitting and receiving. However, KØHZF is the first, to our knowledge, to conceive the idea of applying the same principle to voice communication. Here, advantage is taken of the lapses inherent in speech waveform, just as the c.w. system makes use of spaces between characters. We've had an opportunity to listen to Rom in action, and can vouch for the effectiveness of the system.

An ideal VOX system would have the attributes of land-line telephone. That is, it would be possible for the listening operator to interrupt the transmitting operator while he is talking. This is not possible with the conventional system using a VOX relay. The transmitting operator cannot hear the breaking station unless he makes an abnormal pause in his speech.

If an oscilloscope tracing of continuous speech is observed, it will be seen that there are numerous valleys in the pattern. These valleys represent intervals during which the output from a modulated transmitter would be zero. During these intervals, it would be possible to hear snatches of a breaking operator's voice, if the various change-over operations could be performed in this brief space of time. Obviously, these periods are not long enough to permit a VOX relay to operate. This article discusses the essential points of an electronic system that is fast enough to take advantage of these lapses in speech, and provide S.S.B. phone operation closely approaching that of the home telephone.

The Problem

The matter of antenna change-over is taken care of quite simply by the use of a t.r. switch, so that portion of the system will not be discussed. The remaining problems to be solved are those of muting the receiver during intervals when energy is being transmitted, and suppressing residual noise from the transmitter during intervals when no energy is being transmitted. The latter may have to include cutting off the audio and carrier generator, and suppressing "hash" from those stages generating diode noise, depending on details of the equipment used. Obviously, the switching must be done at points in the circuit that will permit practically instantaneous operation. Switching cannot always be done at the most logical points because of lag introduced by the time constants of capacitor/resistor combinations which are essential to the normal operation of the equipment and therefore cannot be eliminated.

In the author's case, Collins S-Line equipment was used as the guinea pig. Since it was desirable to avoid any disturbance of the original wiring, an arrangement was worked out whereby all modifications necessary to try out the system experimentally could be made either through external jacks that this equipment affords, or by means of tube "test" adapters. These adapters, sold by almost all of the mail-order electronics houses, are used by simply plugging the adapter into a tube socket and, in turn, plugging the tube into the adapter. The adapters come in two styles. One type has a simple exposed contact for each tube pin. In testing work, this type is designed to provide a means of measuring the voltage at any desired pin without digging under the chassis. But it also makes it possible to connect any external circuitry in parallel with any tube element. The second type is similar, except that the exposed terminals are in the form of miniature closed-circuit jacks. This type is intended to be used for making current measurements, since the jacks provide a means of inserting a meter in series with any tube element. In our application, it is useful for inserting circuitry in series with any element without disturbing the original wiring. The jack, or series, type can be used for a parallel connection as well as a series connection, of course, but it is a little more expensive than the parallel,
or voltage-measurement, type. Miniature probes are available to fit the jacks of the series adapters.

Receiver Muting

In the 758-3, muting is accomplished by biasing some of the tubes to cutoff. This is the "normal" or stand-by condition. Muting is removed by grounding a point on a voltage divider across the bias supply. This is done by turning the panel switch from stand-by to operate or, remotely, by grounding a lead plugged into the muting jack at the rear of the receiver. When the 328-3 and 758-3 are used together normally, the VOX relay in the 32 controls the muting through a cable connecting the muting jack on the transmitter to the muting jack on the receiver. Muting and recovery in the 758-3 is practically instantaneous if the a.g.c. is switched off.

In the electronic system, a transistor, Q1, Fig. 1, is used as the switch across the receiver muting jack. Q1 is driven by Q2 which, in turn, is driven by a voltage taken from the cathode (Pin 5) of the 6AL5 VOX rectifier in the 328-3. A voltage as high as +60 can be measured at this point, depending on the voice level and setting of the VOX gain control. Q2 goes into saturation at 5 volts, so even a small voice signal, the muting is positive and abrupt. The switching time of the muter is so short that one can hear the receiver in operation even between syllables.

The connection to the cathode does not require opening of the circuit, so the parallel type of adapter can be used in the 6AL5 socket in making the connection to Pin 5.

Audio Control

Audio is cut-off by applying cutoff bias to the audio cathode follower, V2A, in the 328-3. The additional voltage is provided by a 22.5-volt battery which is switched across a resistor in series with the tube's normal bias. The switch, in this case, is a 2N4220 FET transistor. When the muting switch of the 758-3 is open, (receiver muted) -23 volts normally appears across the muting jack. This voltage is applied as cutoff bias to the gate of Q6 to open the FET switch. With the switch open, normal bias is fed to the grid of V2A through the 470K resistor. When Q1 switches the muting terminal to ground, the gate of Q6 is also grounded, and the FET switch closes, placing the 22.5-volt battery across the 470K resistor, which cuts off V2A.

The connection to Pin 9 of V2 is made by use of a series adapter. Care should be used in making connections to the probe to make sure that the negative side of the 22.5-volt battery is connected to the side of the probe that goes to the grid of V2A.

Carrier-Generator Control

Carrier generation is controlled by applying cutoff grid bias to Pins 2 and 7 of V5, the second mixer in the 328-3. The control-circuit arrangement is exactly the same as that used for the audio, with Q4 and Q5 as separate switches for the two grids. The connections to Pins 2 and 7 are made similarly, using a series adapter.

Hash Suppression

It took a good bit of work to untangle this problem. Bias control of the 6146s in the final

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1 Latest word from the author is that the cheaper MFP102 is equally satisfactory.
amplifier in the 328-3 was tried first, but it proved to be unsatisfactory because of the long time constant introduced by capacitors and resistors in the existing circuitry, which could not be eliminated except by alteration of the original wiring. It was found that hash could be suppressed by reducing the screen voltage to a level that would assure plate and screen cutoff by the normal fixed bias supplied to this stage. So the problem was attacked from this angle.

Fortunately, the screens of the 6146s, and the screen supply voltage are brought out to separate jacks at the rear of the chassis. These two jacks are normally connected together internally with a jumper. The jumper is designed to be opened if the 328-3 is used with the Collins 6- and 2-meter converter. Removing this jumper permits a switch to be inserted between the two jacks.

The screen switch, $Q_5$, is a 40318N transistor rated at 300 volts. Since the base of this transistor is nearly 300 volts above ground when the transistor is conducting, it is obvious that it cannot be connected directly to the control transistor, $Q_1$. The simplest form of isolation appeared to be a triode vacuum tube.

When the receiver is muted, -25 volts from the muting circuit biases $V_1$ to cutoff. The 1.5-volt battery then biases $Q_3$ into conduction, and screen voltage is applied to the 6146s. When $Q_1$ grounds the muting terminal, it also grounds the grid of $V_1$ and $V_1$ conducts. The increased voltage drop across the 5000-ohm base resistor drops the base voltage, $Q_3$ goes almost to cutoff, and the screen voltage drops to about 30 volts. At this voltage, the normal operating bias is sufficient to cut off 6146 screen and plate current. Connections between $Q_3$ and the screen and screen-supply jacks are made through phono plugs.

No switches are shown for the control batteries. The drain is so low that battery life will be close to shelf life, even if small-size cells are used.

**Adjustment**

The exciter should be tuned up on the desired band in the normal manner before connecting the control circuitry. The VOX relay should be closed permanently by inserting a shorted phono plug in the p.t.t. jack. The VOX time-constant control must be turned fully counterclockwise. If the Collins station-control box is in use, its function switch should be turned up to normal. The VOX gain control should be advanced until the receiver $S$ meter fluctuates when the operator speaks into the microphone at normal voice level. If the gain is turned up too high, acoustical background noise will keep the receiver muted. If it is not turned up sufficiently, the receiver will not mute. A bit of experience will guide the operator to an adjustment where signals may be heard between words, or even between syllables. The incoming signal must be strong enough, of course, to override the acoustical sound of the operator's own voice. If a click is heard as the receiver recovers, it can be minimized by adjustment of the ANTIVOX control.

If one wants to avoid disconnecting the control circuitry for initial tune-up, a series of switches can be used to restore normal operation. The author uses a d.p.d.t. switch in the $Q_5$ circuit, one pole to open the battery circuit while the other shorts the collector to the emitter. Simple s.p.s.t. switches are used in series with the batteries in the FET control circuits. A d.p.s.t. switch is used, one pole to open up the connection to the base of $Q_5$, while the other pole opens the heater circuit of $V_1$.

**Conclusion**

The system has worked well enough over a considerable length of time in this experimental setup to demonstrate that the principle is thoroughly practical and effective. Transceive operation has presented some problems that have not as yet been resolved. It is hoped that this article will inspire others toward efforts to help solve these problems, as well as toward simplification and improvement. The author feels sure that anyone who has once operated with a system of this type will never be satisfied again with push-to-talk, or conventional VOX operation.

The control system works equally well when the 30L-1 linear is added. In normal operation, the antenna-relay control places cut-off bias on the 811A grids on standby to avoid unnecessary plate dissipation. With electronic t.r. switching, this control is lost. The author solved this problem with the control circuit of Fig. 2. This circuit is actuated by $Q_1$ in Fig. 1. The switch transistor, $Q_5$, performs a function similar to that of the relay control in normal operation. A voice signal causes the switch to close, reducing the bias on the final-amplifier tubes from cutoff to the normal operating value. With no voice signal, cutoff bias is restored.

In the normal condition, approximately 120 volts is used as cut-off bias in the 30L-1. This is much more than is actually required to achieve cutoff. To reduce the voltage that the switching transistor must handle, the 220-ohm resistor, $R_1$, is shunted across the relay-control jack. This reduces the stand-by bias to about 16 volts.

(Continued on page 148)
The Realistic DX-150

The DX-150 is a solid-state receiver with continuous coverage from 535 kc. to 30 Mc. in four bands. Nineteen bipolar transistors and thirteen diodes are used in a single-conversion superheterodyne. Among the receiver's features are a product detector, an a.g.c. circuit with selectable time constants, an i.f. noise limiter, an a.f. noise limiter, and electrical bandspread. Included in the set are a b.f.o. pitch control, r.f. and audio gain controls, an antenna trimmer, an a.g.c. time-constant switch, a receive-standby switch, a loudspeaker, a headphone jack, and an S meter. The receiver can be operated from either 115 volts a.c. or 12 volts d.c.

Circuit Details

A block diagram of the DX-150 is shown in Fig. 1. Q₁ and Q₂ form a cascode r.f. amplifier, CR₁, a 1S73 diode across the base-to-emitter junction of Q₁, prevents the reverse emitter-to-base voltage rating of Q₁ from being exceeded if, for example, an overly large signal from an adjacent transmitter is developed across the receiver's input circuit. The 535-ke. to 30-Mc. output of Q₂ is fed to the mixer, Q₃, where it combines with the v.f.o. signal to produce an i.f. of 455 kc. A buffer amplifier, Q₇, is used to isolate the v.f.o., Q₉, from the mixer. Depending on the band in use, the v.f.o., a Hartley circuit, operates 455 kc. above or 455 kc. below the frequency of the signal to be received. CR₁ is used to stabilize the oscillator.

The mixer is followed by two 455-ke. i.f. stages, Q₄ and Q₅, C₁, CR₂ and R₁ in the collector circuit of Q₅ (Fig. 2) form an i.f. noise limiter which is basically of the Bishop type, although in this case unsymmetrical. C₁ is kept charged to the peak signal level through CR₂, which is therefore back-biased and essentially nonconducting until a short-duration noise pulse momentarily exceeds the bias voltage stored in C₁. The excess pulse voltage is short-circuited through CR₃ and C₁, thus eliminating the noise peak. The a.f. limiter, to the right of C₂, is the conventional carrier-operated a.n.l. circuit for a.m. reception. The two limiters are switched in or out simultaneously by the two sections of S₁.

CR₄ is used as both an a.m. detector and an a.g.c. rectifier. In the latter application (Fig. 3) a signal appearing across the secondary of the last i.f. transformer is rectified by CR₄ and a negative d.c. voltage is developed from the top of C₂ to ground. This voltage forward-biases Q₅, causing the transistor to draw collector current through R₄ and R₅. As the voltage drop across these two resistors increases, the voltage drop across R₁₀ and R₁₁ decreases because all four resistors are in series across the supply voltage. Since the forward base-bias voltage for Q₄, Q₅ and Q₆ is taken from the arm of R₁₁ (the manual gain control) the gain of the controlled stages is reduced. Two a.g.c. release times, slow and fast, are available. For slow release, C₂, a 200-μf. capacitor, is switched from the collector of Q₂ to ground. Additional a.g.c. action is obtained from Q₇: the forward bias for this transistor is the voltage drop across R₄; and as the drop increases, Q₇'s collector current also increases. This results in a larger negative voltage drop from the top of R₁₂ to ground, higher emitter bias (reverse bias) for Q₁ and Q₄, and reduced gain for the two stages. The apparent reason for this dual a.g.c. system is that the circuit permits the receiver to

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handle a wider range of signal strengths without overloading than the usual a.g.c. circuit which only controls base bias. The a.g.c. circuit is left on all the time.

Because Q3’s collector current, and therefore its emitter current, increases with the signal level the emitter line of Q3 is a good spot for an S meter.

Once the audio from a detected a.m. signal reaches S11, it is fed through the audio channel, Q13, Q14, Q15 and Q16, to the loudspeaker. Only one transformer is used in the string, the output stage being a single-ended Class B circuit. A 200-mf. capacitor is used to couple Q13 and Q15 to the speaker in the set or to an external speaker or set of headphones via the phono jack. The jack disconnects the set’s speaker when a phone plug is inserted.

For c.w. and s.s.b. detection, i.f. and b.f.o. signals are fed to a bridge-type product detector consisting of four diodes, CR6 through CR9. A buffer amplifier, Q17, is used between the product detector and a Hartley type b.f.o., Q16. Either u.s.b. or l.s.b. signals can be copied by turning the b.f.o. pitch control to the proper setting. Since the gain of the product detector is less than the gain of the a.m. detector, an extra audio amplifier stage, Q12, is used between the product detector and the receiver’s audio channel.

For a.c. operation of the receiver, a step-down transformer is used to feed a full-wave rectifier. This is followed by a capacitor-input filter, a transistor series regulator with a Zener diode reference element, a series dropping resistor, and another Zener. D.c. for the audio stages is taken from the capacitor-input filter while d.c. for the rest of the set is taken from the second Zener mentioned above.
Fig. 2—Schematic diagram of the I.F. noise limiter, CR₃, the a.m. detector, CR₄, and the a.f. noise limiter, CR₅. Resistances are in ohms; K = 1000. Component labels are for text-reference purposes.

Fig. 3—Schematic diagram of the DX-150 a.g.c. system. Capacitance values are in microfarads (µf), resistances are in ohms. The circuit is discussed in the text.
For battery operation of the set, a power switch on the back of the receiver is used to bypass the transformer and rectifiers and to permit the d.c. to be fed directly into the capacitor-input filter. Connection to an external battery or batteries is made through a three-prong socket on the rear of the receiver. To extend the life of the batteries, the power switch is wired so that it disconnects the dial lights when battery power is being used.

When thrown to STD BY, a REC-STD by switch on the front panel removes voltage from all the stages in the set except the audio channel. This switch is wired in parallel with a connector on the back of the receiver. By wiring the connector to the transmitter send-receive relay or switch, the user can control the transmitter with the receiver.

**Performance**

The sensitivity of the DX-150 is as good as most of today's sets; when the short-wave bands are open, it should be possible for the listener to copy a multitude of signals even with a small random-wire antenna. However, strong signals on the DX-150 have a tendency to cross-modulate the signals adjacent to them. This is especially noticeable on the broadcast band; backing off the r.f. gain control does little to clear it up. After a short warm-up, the receiver exhibits little drift. The receiver does change frequency when it is bounced up and down to simulate mobile operation.

The r.f. gain-control and antenna-trimmer settings affect the receiver tuning; this is particularly annoying on the 10-meter band. S.s.b. signals that vary widely in strength (QSB) sound a little bit distorted. The noise limiters, which cut down noise at the expense of some audio distortion, are helpful for a.m. reception, but do not seem to be useful for c.w. or s.s.b. Depending upon the frequency, it takes a signal of 10µw. or less to get a meter reading of 89. The meter is easily pinned.

Image rejection was found to be 46 db. at 3.5 Mc., 49 db. at 7 Mc., 18 db. at 14 Mc., 13 db. at 21 Mc., and 0 db. at 28 Mc. These figures are quite in line with what is to be expected from a single-conversion receiver having a 455-ke. i.f. While checking the image rejection of the DX-150 on Band D (13 to 30 Mc.), we found the image to be on the low side of the signal when the set was tuned to 14 and 21 Mc.; however, it appeared that the image shifted to the high side when we checked the receiver at 28 Mc. Since it is not possible for the image frequency to move from one side of the signal to the other, what happened? Apparently the manufacturer mistakenly aligned the high end of Band D at the image frequency—something that's easy to do because the image and the desired signal are both about the same strength.

**Mechanical Details**

The receiver is attractive in appearance; the front panel, an extrusion of brushed aluminum, is contrasted by a dark gray cabinet. Good-sized solid aluminum knobs are attached to the controls. Two string-driven dials that have negligible backlash are used to tune the DX-150: a multicolor slide-rule dial for general coverage, and a circular bandspread dial for the Citizens Band and the five amateur bands between 3.5 and 29.7. It takes one turn of the bandspread knob to tune between 40 and 60 kc. of the 3.5-, 7- and 14-Mc. bands, 150 kc. of the 21-Mc. band and 430 kc. of the 28- Mc. band.

As can be seen from the photographs, the wiring is very neat, and the parts are easy to reach if servicing is necessary. Most of the components in the set are mounted on either of two printed-circuit boards.

The instruction manual, written primarily for the short-wave listener, contains little information that is of interest to hams. It does, however, include a tiny but useful schematic of the receiver.

Among the accessories available for the DX-150 are an external communications-type speaker (SP-150) and a 12-volt d.c. portable power pack. The latter includes all the necessary plugs and cords for operation of the receiver from eight D cells (supplied) or from the outlet for an automobile cigarette lighter. There is sufficient space in the pack for storing a complete set of spare batteries. Eight D cells are said to be capable of operating the receiver for 100 continuous hours.

— W1YDS
Two-tone Generator
with
Scope-Sync Output

BY FRANK W. NOBLE,* W3QLV

It is possible to obtain a synchronized wave envelope pattern from an s.s.b. transmitter using a single audio tone, but the procedure involves temporary carrier insertion and the transmitter is not operating normally when tested. On the other hand, if two independent tones are fed to the microphone input, it will not be possible to get a stationary pattern by synchronizing the scope with either input. While it is possible to rectify the r.f. and use the envelope to synchronize the scope, the sync will not be as "tight" as desirable because the envelope is slow rising, and also will vary in amplitude with audio level adjustments.

Suppose two tones are related so that their frequencies are always in the exact ratio 2/1. Calling the lower tone \( f \), the higher frequency will overtake the lower by one cycle in \( 1/f \) seconds regardless of the value of \( f \). Hence if we derive a pulse from \( f \) and apply it to the scope's external-synec terminals we will obtain a stationary pattern.

In our circuit, Fig. 1, we derive a pulse from a master oscillator, a 2-kc, symmetrical multivibrator, and use it to synchronize a second symmetrical multivibrator at 1 kc., one-half the frequency. The external scope sync is taken from the 1-kc, m.v. plate, where the wave is fast-rising and the level is constant. The problem of converting a square wave to the required sine wave is solved by the use of a two-section resonant filter employing 50-cent surplus 88-mh. toroidal coils. The total harmonic distortion should be considerably less than 0.1% using the circuit shown. Distortion is not detectable on the oscilloscope by any means we could devise.

In Fig. 1, \( V_1 \) is the master oscillator at 2 kc. The positive grid return improves the timing accuracy over that which would be obtained with the more conventional ground return. The grid resistors and coupling capacitors largely

1 Available from Riteo Electronics, 7292-C Little River Turnpike, Annandale, Va. Other sources will be found regularly in Ham-Ads.

Here is a simple method for making a two-tone test pattern "stand still" on the scope face. It makes use of the fact that a harmonic of a tone will always be integrally related to the fundamental frequency. Although exact harmonic relationship between the two tones is ordinarily avoided in using the two-tone test for spectrum analysis (because it is desirable to be able to distinguish frequency components arising from audio harmonic distortion from others present in the signal spectrum), its use for wave-envelope checking introduces no problems that are not present with any two tones.

*10004 Belhaven Road, Bethesda, Md. 20034.
Fig. 1—Circuit of the two-tone test-signal generator. Fixed resistors are 1/2-watt composition. Capacitors in filters are mylar or paper; others are silver mica. Power supply capacitors are electrolytic.

**CR**—Silicon rectifier; 20 ma. or more, 300 to 500 p.p.v. depending on transformer secondary voltage.

**J₁, J₂**—Any type of shielded chassis-mounting connector.

**L₁, L₂, L₃, L₄**—58-mh. toroid (see text).

**R₁, R₂, R₃**—250,000-ohm linear control.

**S₁**—S.p.d.t. toggle.

**S₂**—S.p.s.t. toggle.

**T₁**—Power transformer, 115 to 150 volts, 15 ma. or more, with 6.3-volt, 0.6 amp. filament winding.

Determine the frequency, and for this reason the capacitors are silver mica, 5 percent tolerance, and the resistors are ohmmeter-matched. V₁, operating at exactly half the frequency of V₂, is also a positive-grid-return mv. Here the positive return is used because it improves the synchronization, and also because variation of the grid potential is a very convenient way to control the free-running frequency of V₂. The sync pulse from V₁ is coupled to the arm of R₁ through a small capacitance. Synchronization occurs when the free-running frequency of V₂ is slightly less than half the frequency of V₁. Since the frequency range of V₂ is large, the values of the grid resistors and coupling capacitors in this stage are not critical as to absolute value, but the values should be equal. The capacitors should be of good quality for long-term stability; silvermica capacitors are used for that reason.

Simple cascaded resonant circuits are used to filter out the harmonics in the square waves. The "level" pots, R₄ and R₅, feed a simple parallel resistive adding network which terminates in the output jack, J₂. The "level switch," S₅, connects or disconnects a small shunt resistance. When the resistor is connected, the level is about right for a crystal mike input; when disconnected, the level is higher for connection to a later stage.

The power supply uses a half-wave rectifier and RC filter. Since the circuit is very tolerant of supply voltage, any small transformer which will deliver 20 ma. at 150 volts or less, and 6.3 volts at 0.6 amp., will suffice. The supply shown produces 115 volts d.c. at 13 ma. Any silicon rectifier having a rating of 20 ma. or more and a suitable p.p.v. rating for the transformer can be used.

The small coupling capacitors into and out of the audio filters were chosen to discriminate against hum while having little effect on the desired signals. Values near those specified should be used. Otherwise, more filter may be needed in the B supply, or signal attenuation may occur.

The mechanical layout is so non-critical that it is not included. The unit described was built complete with its power supply on a 5 × 7 × 3 inch aluminum chassis.

**Initial Adjustment**

To set the unit up, connect the tone output to the vertical amplifier and the sync output to the external-sync terminals on the scope. Bring
both level pots up and adjust the scope sync control for a stationary pattern. Then adjust $R_1$ to make the pattern lock in at a frequency ratio of 2 to 1. This can be checked by running the level pots up and down to check that the periods of the two sine waves are in the ratio $2/1$. Once this adjustment has been made, it should not be necessary to reset it over considerable periods of time.

The next operation is to tune the filters. This is done by adding and subtracting capacitance, in steps of about 0.005 μf, with the object of maximizing the output. The values given in the circuit are close, but the toroids have a high Q and the capacitors have large tolerance ratings, so a bit of experimenting is in order. We used mylar capacitors because they are physically small and their long-term drift is presumed to be lower than paper units. They are expensive and may be unnecessary.

\(^2\) An alternative method would be to take outputs separately from $R_2$ and $R_5$, applying one to the vertical and the other to the horizontal amplifier in the scope. $R_1$ should then be adjusted for the 2/1 Lissajous figure. — Editor.

**Using The Generator**

To obtain the two-tone pattern in a transmitter test, connect the r.f. output to the vertical plates of the scope as usual, and feed sync from the generator to the scope external-sync terminals. Feed the generator output to the audio input on the transmitter. Starting with a single tone, set the audio gain in the transmitter to give a power output of about one-fourth the maximum rating. Now bring up the second tone to equality with the first. The proper adjustment is indicated when the minimum amplitude of the pattern is exactly zero. Adjustments either side of this point will increase the minimum amplitude. Note that the synchronization is rock stable because the sync pulse is steep and is unaffected by any adjustments in the audio levels.

Since the distortion in the generator output voltage is below visibility in a scope presentation, any perceptible distortion of the wave envelope pattern must be the result of trouble in the audio, the r.f., or both sections of the s.s.b. transmitter.

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**Strays**

Amateurs (Stargazing type) of the Kansas City Astronomy Club on November 12, 1967 observed a rare event — a grazing occultation of the planet Saturn. The group used two sites separated by about one mile with inter-communications provided by amateurs (radio type). Shown is W6HSK using a 2-meter f.m. Walkie-Talkie to contact W9PB at the other site. Such communications provided the amateur astronomers a means for last minute planning and consultation, and a warning as the event started.
Stopping Telephone Interference

BY IRVIN M. HOFF, * W6FFC

An article in this magazine some time ago about telephone interference 1 reminded me that many people are still bothered with this problem. A simple solution exists, but apparently it is not well known, not even to telephone company personnel themselves in many localities. A review of the equipment being used by the telephone company today will reveal the reason for this interference and how it can easily be stopped.

In the early 1950s, the model 500 series telephones began replacing the model 300 line. These newer phones are readily identified with respect to the now-obsolete 300 series. The part you hold in your hand while talking is rectangular rather than triangular, the 500 has a “bell-loudness” control on the underside, the dial is quite large with the numbers on the outside circumference, and usually the model number is stamped on the underside in ink. There are several models, with the standard non-dialing 500 having a blank plastic panel in place of the dial. The 501 was designed for party-line use. The 500B set is the one most generally found in home use at the present time.

All of the model 500s have special networks installed that offer a form of automatic level control both for talking and listening. To quote from the AT&T directly:

“...The 500 series sets were designed to provide substantial volume improvement on long loops and at the same time to be applicable on very short loops without introducing crosstalk and side-tone problems.”

All sets have a 425A, 425B, etc., network that includes an induction coil, a 2-mF. talking capacitor, a 3-element side-tone balancing network, a 0.4-mF. ringing capacitor, and a dial filter consisting of a 0.1-mF. capacitor and a 50-ohm resistor. This network shapes the response to the familiar 300–3000 cycles for best transmission of the voice spectrum. Also included in the 425 assembly is the heart of the model 500 — the 311A “equalizer” circuit. (Not all model 500 series telephones have this equalizer, but for all practical purposes we can assume that yours does!) Without this equalizing network, severe crosstalk could result on short line lengths where the phone is not far from the central office.

The network consists of a tungsten filament with a thermistor bead in proximity, both enclosed in a glass envelope, and a silicon carbide varistor bridged across the filament to protect it from excessive current. The action of this circuit is extremely interesting, and again we refer to AT&T for a description:

“The filament is in series with the microphone, and the thermistor bead in series with a loss-limiting resistor shunts the earphone. The loss characteristic of the equalizer is controlled entirely by the d.c. line current through the set. The tungsten filament has a rising resistance-characteristic curve and inserts a combined battery supply and a.c. transmitting loss which is small at 27 ma., less than 1 db. at 10 ma., and about 1 db. at 75 ma. or more. The thermistor bead is heated by the filament and because of its inverse temperature characteristic introduces a corresponding receiving loss that tracks closely with the transmitting loss.”

Thus, the volume of the 500 set is about 5 db. higher at long distances from the home office than the 300 series sets. On local phones close to the home office there is practically no difference between the performance of the two sets.

Nearly every amateur running any power at all has been held responsible at one time or other for some form of interference due to the powerful signal from the transmitter being picked up by the 110-volt a.c. line — or an “antenna” of some type — and then rectified in some manner. Usually a well-placed bypass capacitor will solve the problem. On the rare occasions when an amateur would bother one of the older model 300 sets, the local phone company would send out a man armed with a few small disk ceramic capacitors which he would put across the terminals of the carbon button microphone. This would solve 99 percent of the problems. It is sad to learn that most phone companies even today still send men out with small disk ceramic capacitors to

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QST for
put across the carbon button microphone—a technique that just does not work at all in a majority of cases where the model 500 is being used.

The truth is that most phone companies still have not learned the reason why the model 500 phone is peculiarly susceptible to this type of interference or what to do about it. The "varistor" in the equalizing network is little more than a pair of voltage-sensitive diodes in parallel, with one reversed. As anybody who has worked with r.f. interference can tell you, a rectifier will demodulate the audio from the carrier, and this audio will be passed along to the earphone or whatever subsequent circuit you have. In other words, it is the varistor in the 311A network that does the dirty work, and it is here that one should concentrate. Referring again to Mr. Balmer's article, he and his friends in the local phone company came to this same conclusion by empirical testing. Their answer to the problem was to order a special 425 network through the phone company that had some of these exotic parts left out. While this works, it minimizes some of the unique features of the 500 set. It is also quite a nuisance to get the phone company to special-order (or stock) such an item.

A far more simple solution exists.

A pair of high-current (75-ma. or more) 2.5-mh r.f. chokes is all that is needed to stop this interference. Installed inside the telephone itself, one in series with each side of the line and as close to the network as is convenient, they will prevent the r.f. from reaching the varistor. It follows that the r.f. can hardly bother the carbon-button microphone either. Since the microphone is hooked to a cord about 3 feet long, in extreme cases the carbon button should still be bypassed with a 0.01-mf. disk ceramic directly at its terminals for complete elimination. The use of the r.f. chokes will also eliminate the problem with respect to the "Princess" telephones. Mr. Balmer mentions that they were unable to do anything about that type of phone.

The best thing to do, however, is to call the local phone company and tell them to send a man out with a "1542A inductor." This consists of a terminal block and two r.f. chokes built into a small case. It usually is installed in place of the baseboard terminal block, but at this location it seldom does much good, if the radio transmitter is located in the same building. With a pair of diagonal pliers ("claws") the serviceman can clip off the corners of the plastic container and then mount the unit inside the dial telephone underneath the dial itself. This can also be done for wall telephones. Usually, the phone company is so relieved to discover exactly how to solve your problem that they will be only too happy to try your suggestion. This also enables them to take care of similar problems of interference from the local broadcast stations and other transmitting services.

The 1542A inductor is much too large to fit inside the small "Princess" telephones, and here the 2.5-mh. r.f. chokes can easily be used.

In every instance of which I have heard, the phone company has been extremely cooperative, but usually not very successful. Inquiries to the home office for some reason have usually brought no good answers. Sending a man out to try the usual methods (installing numerous disk capacitors) is expensive and time consuming, besides keeping the employee from doing other work. So, even if you do not happen to have telephone interference yourself, you might call the engineering supervisor of the local phone company to see if he has read this article. I have found in several communities that many people are bothered by local broadcast transmitters and the phone company often has not been able to solve the problem adequately. Although they have various types of inductors designed to be installed on the outside of the house where the phone lines enter, or at the baseboard in place of the usual terminal block, in many instances they make no noticeable improvement, being too far from the actual trouble-causing element, the varistor.

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2 All the telephones in the writer's house in his former location in the 8th call area were "fixed" by this method, including a wall phone, a "Princess" phone, and several desk phones.

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If you are interested in shortwave listening, the 1968 edition of the World Radio TV Handbook is available for $5.95 from Giller Associates, Inc., P.O. Box 239, Park Ridge, N. J. 07656. This 340-page manual, 6¼ x 9¼ page size, is an authoritative listing of nearly everything that happens in the shortwave broadcasting bands. It gives comprehensive details on frequencies, languages and programs, country-by-country. Also available from Giller Associates are a number of the ITU documents. For example, Volume 1 of the 1967 International Frequency List, showing all frequency assignments except amateur between 10 and 4995 kc., is available for $4.00. If you're interested in this sort of thing, and don't want to order directly from ITU in Geneva, write to Giller for its ITU flyer.

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HEADQUARTERS VISITS

The League Headquarters building is open to visitors Monday through Friday, 8:30 to 4:30, on a "drop-in" basis, and at other times by appointment. The headquarters is on Main Street (Conn. Route 176 and 170-A) about a mile north of the center of town, and about 3 miles west of Conn. 15-U. S. 5, the Wilbur Cross Highway. (For W1AW visiting hours, see the schedule on page 99.

March 1968
SCR NOISE

Technical Editor, QST:

In Hints and Kinks in the December issue, KIMET describes a motor speed control using a silicon controlled rectifier (SCR). It's a very handy gadget for the uses described in the article, but one thing must be pointed out: No responsible amateur should use the device without proper filtering of the a.c. leads. The amateur using the speed control without filtering has no right whatsoever to complain about noise on the a.c. power lines from domestic appliances or other apparatus, since he's then generating lots of noise himself.

The output from the motor-speed control is shown in Fig. 1. Due to the steep rise when the SCR fires, the device generates a wide spectrum of noise, which of course propagates along the power lines.

![SCR firing point set by R2](image)

**Fig. 1 — Typical SCR waveform.**

A filter like that in Fig. 2 has proved to be sufficient to keep the noise out of the power line. The entire device with filter must of course be completely screened, to confine the noise where it should be—in a grounded box.

![Filter circuit for SCR control](image)

**Fig. 2 — Filter circuit for SCR control.**

$C_1$: 300-500 µF, ferrite or iron slug
$C_2$: 0.1 µF (see text)

When using the speed control with motors or tools with a power consumption of less than 50 watts, $C_1$ and $C_2$ should not be larger than 0.05 µF in order not to disturb the wave form too much. — Kjell Strom, SM6CPJ, Goteborg 8, Sweden.

MICRO-TO KEYER REVISITED

Technical Editor, QST:

Several builders of the Micro-TO keyer (QST, August, 1967) have described a latching condition of the relay following the completion of a letter, and also an inability to make dashes at slow speeds. Both effects are caused by excessively high voltage drops in $C_{R1}$ and/or $C_{R2}$, with the result that a small current can flow through $Q_2$ and thereby hold the pulse generator off. W11KU was the first to suggest a remedy: add a 100K resistor from the base of $Q_2$ to ground. For those building the circuit from scratch, a better solution would be to use a low- or medium-gain switching transistor for $Q_2$, rather than a 2N3643. The only requirements on any of the transistors in the circuit are that they be silicon and have a beta greater than 10. (I've measured betas of 390 on some 2N3643's). W11KU also suggests by passing both sides of the relay coil to ground with .01 µF capacitors, since some r.f. can couple into the keyer on the input lines.

Note that the line or dent on the I.C.'s is by pin 8, rather than between pins 1 and 8 as shown in the schematic.

I welcome letters from anyone having trouble getting his keyer running, and would be glad to help prospective builders locate any hard-to-find components. — Chet B. Opat, K3CUW, Baltimore, Md., 21201.

"BREAK-IN C.W. WITH SSB EQUIPMENT"

Technical Editor, QST:

Sometimes, in trying to cover a lot of material as succinctly as possible, important details get covered up. Three such items came to mind almost simultaneously with the publication in November 1967 QST of the article having the above title. The first concerns zero-beating. With most grid-block keyed rigs, zero-beating is trivial: tie a 50K to 500K pot and a straight key in series across the key line and put the straight key on a board under your operating table. Adjust the pot for a comfortable zero-beat level in the receiver. I mounted the pot in a control-unit box because I was afraid that the desired signal level would require a different pot setting on each band. Such has not been the case, and the pot could easily be inside the rig, or down on the foot-switch board. The only problem with this scheme is that when the linear amplifier is being keyed along with the exciter, the zero-beat signal takes on a T4 quality, but with a little practice it's as usable as a T9 signal.

The second detail involves keying the extra mixer stage to eliminate feedthrough on the higher bands. Any tetrode, pentode, or pentagrid tube has a maximum screen voltage rating which must not be exceeded under any circumstances, even if you don't think you're drawing any screen current. Thus, whenever you cut off a screen-grid stage (as I did with the 12BA7 mixer in the SR-150), make sure the maximum screen voltage (100 volts for the 12BA7) is not exceeded under key-up conditions. This means that wherever a screen is fed from a dropping resistor a fixed voltage source must be used instead. In the case of the 12BA7 in my transceiver, I merely added a 10K resistor from screen grid to ground. The gain of the stage is probably slightly less now, but that's one of the reasons for an r.f. level control.

If you use a relay for keying the linear along the lines suggested in the article, keep in mind that mercury-wetted relays need a little bit of Tender Loving Care, such as a 100-ohm resistor and 0.1 µF capacitor in series across the relay contacts. See page 44, October '67 QST.

If you have a latching condition of the relay following the completion of a letter, it has been pointed out to me that the Collins 308-1 is a grounded-grid rig, not grounded-cathode, as I had mistakenly stated. — George W. Hoppinsey, Jr., K3KIR/K1WJD, No. Syracuse, N. Y., 13212.
HIGH-GAIN TRIODE OF FORTY YEARS AGO

Technical Editor, QST:

The UV206 and its larger brother UV208 came out of the laboratory and into production during 1921. They appear to have been designed for converting spark transmitters to continuous-wave operation. The very high transformer voltages available caused the UV206 to have the rather unusual characteristics given in Table I. This tube was considered somewhat of an engineering wonder in its day. D.C. plate power to r.f. load power conversion efficiencies approaching ninety percent are reported under what are now called extreme class C conditions. Unfortunately, most of the information is only suitable for prediction of oscillator performance. Measured characteristic curves of a nearly new sample of the UV206 are shown in Fig. 1.

Before the invention of quartz-crystal frequency control there was no particular need of a high-gain amplifier. Nevertheless, the UV206 appears well suited to this use. Consequently, a test setup was made. The well-shielded driver is a pair of UV201 receiving tubes in a push-pull Hartley circuit. It provides equal voltages of opposite phase which are applied respectively to the grid of UV206 and the neutralizing condenser. A neutralization balance better than 60 db. is secured. This is sufficiently in excess of stage gain to insure stable operation. The load, consisting of sixteen 75-watt lamps calibrated at 60 cycles, is connected across part of the plate coil having 960 microhenrys total inductance. The operating frequency is 750 kc. Table II gives the results. As may be expected, the power gain compares favorably with a modern-day screen-grid tube and good efficiency is achieved. Examination of the shape of the output voltage wave by means of an oscilloscope indicates the distortion is less than five percent. The color of the plate shades from orange at the center to dull red at top and bottom. It would appear that the limit of tube capability has not been reached under the test conditions.

The very low plate-to-filament capacitance should allow the UV206 to operate well as a grounded grid amplifier. Does anyone have more information on the designer, number made, where manufactured and used, etc.? I would be much interested to secure, by loan or otherwise, a second UV206 tube so that a push-pull arrangement could be tried: and will be pleased to learn of anyone having, or knowing, the whereabouts of same, or a UV206 tube.

—Grote Reber, ex W9GFX, Radio Observatory, P.O. Box 203, Delaware, Ohio 43015

COMING A.R.R.L. CONVENTIONS
June 7-9 — NATIONAL, San Antonio, Tex.
June 29-July 1 — Saskatchewan Province, Saskatoon.
June 29-30 — Rocky Mountain Division, Cheyenne, Wyoming
June 29-30 — West Virginia State, Jackson's Mills.
August 3-4 — Central Division, Springfield, III.
August 31-September 2 — Southwestern Division, Phoenix, Arizona
October 12-15 — Hudson Division, Tarrytown, N. Y.

March 1968

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TABLE I
Nominal Characteristics of the UV206.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grid to Plate</td>
<td>12.0 ± 0.2 pf</td>
</tr>
<tr>
<td>Grid to Filament</td>
<td>7.2 ± 0.3 pf</td>
</tr>
<tr>
<td>Plate to Filament</td>
<td>0.9 ± 0.1 pf</td>
</tr>
</tbody>
</table>

**Filament**

11 volts, 143/4 amperes

- Characteristics at 100 ma, Plate Current: 390
- Plate Resistance: 0.24 megohm
- Amplification Factor: 1.62 millimhos
- Transconductance: 1.62 millimhos

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TABLE II
Typical Performance

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate Potential</td>
<td>20,000 volts</td>
</tr>
<tr>
<td>Plate Current</td>
<td>110 milliamperes</td>
</tr>
<tr>
<td>Output</td>
<td>1690 watts</td>
</tr>
<tr>
<td>Plate Efficiency</td>
<td>77%</td>
</tr>
<tr>
<td>Grid Bias</td>
<td>15 volts</td>
</tr>
<tr>
<td>Peak to Peak Excitation</td>
<td>350 volts</td>
</tr>
<tr>
<td>Grid Current</td>
<td>29 ma</td>
</tr>
<tr>
<td>Input</td>
<td>2.6 watts</td>
</tr>
<tr>
<td>Gain</td>
<td>28 db</td>
</tr>
</tbody>
</table>

---

GMT CLOCK FACE

In DX work the use of Greenwich Mean Time is a must. There are various time conversion charts, but all leave something to be desired. Each time you wish to use GMT, you have to read the time on the station clock and then do some figuring. Twenty-four-hour clocks are available, but they are quite expensive.

Since most hams have 12-hour clocks in their stations, why not modify these clocks to indicate 24-hour GMT? I solved this problem by developing the clock face shown in Fig. 1.

Fig. 2 shows the parts that make up the gadget. Cardboard, plastic, metal or thin wood can be used. After the parts are assembled, part 2, a movable ring, indicates the correct time division when its tab is set above the proper label (i.e., DAY or NIGHT). When the tab is moved to DAY, the GMT hours corresponding to 6 A.M. to 6 P.M. EST are shown; when the tab is moved to NIGHT (Fig. 1), the GMT hours corresponding to 6 P.M. to 6 A.M. EST are shown. To build the face, proceed as follows:

1) Disassemble your station clock, and paint out the figures 1 to 12. Be sure not to cover the hash marks that indicate minutes. Reassemble the clock and measure the diameter of the clock face. The diameter is indicated by ‘‘D’’ in Fig. 2.

2) Using a protractor to measure 30-degree angles, lay out part 1. Cut out twelve 5°-by-5°-inch rectangular openings and one circular opening with a diameter equal to ‘‘D.’’

3) Using a protractor to measure 15-degree angles, lay out part 2. Cut out a circular opening with a diameter equal to ‘‘D’’ plus ¼ inch. Label the ring. The times shown are for Eastern Standard Time (i.e., 1700 GMT will be in the 12 P.M. slot when the ring tab is at DAY, and 0500 GMT will be in the same slot when the ring tab is at NIGHT). For CST move all figures 30 degrees counterclockwise from where shown; for MST move all figures 60 degrees counterclockwise from where shown, and so forth.

4) Make two copies of part 3. Since the ring rotates inside part 3, two thicknesses of material must be used to provide room for the ring to rotate.

5) Make one part 4.

6) With the ring in place, temporarily put all the pieces together. Make sure that the ring rotates easily. Do not settle for a sloppy fit; otherwise your GMT figures will not show properly through the openings in part 1.

If everything fits well, glue parts 1, 3 and 4 together (with part 2 in place). As shown in Fig. 2, label part 1 ‘‘NIGHT’’ and ‘‘DAY.’’

8) Arrange a suitable mounting to hold the face on the front of your station clock.

When you operate in the daytime, reach over to the clock and move the tab to DAY. At night, move the tab to NIGHT. Since there aren’t any figures on the clock face itself, you now should be able to read GMT at a glance. — W. R. Carruthers, VE3CEA.

Fig. 1—The GMT clock face installed on the kitchen clock. The original numerals on the clock have yet to be painted over as described in the text.
NOTES ON THE KNIGHT-KIT TR-108

In the October QST write-up of the TR-108 transceiver, it is mentioned that the spotting signal is very weak. The low output is due, I believe, to some errors on pages 24 and 25 of the assembly manual. R55, a 68-ohm resistor, is shown connected between pin 3 of V3 and pin 1 of TS11. The latter pin is eventually connected to the spot switch and the send-receive relay. However, part of this hookup does not agree with that shown on the schematic diagram.

Referring to Fig. 3, remove one end of R55 from pin 1 of TS11, and connect this lead to ground lug C or D of V3. TS11 and the orange wire going from it to pin 1 of TS4 can be removed or left intact; they serve no useful purpose. As a result of this modification you should have a spotting signal of more adequate output.

Fig. 3—Sketch showing part of the underside of the TR-108. Spotting in the transceiver is greatly improved by disconnecting one side of R55 from TS11 and returning the lead to ground lug C or D of V3.

![Schematic Diagram](image)

Fig. 4—Circuit for regulating the tunable oscillator plate voltage in the TR-108. C11, R7, and V1 are original parts. CR1 is a 67-volt, 1-watt Zener (Sarkes Tarzian VR67).

An improvement can be made to the TR-108 receiver by regulating the plate voltage of the tunable oscillator, V1B. As shown in Fig. 4, connect a Zener between the plate of the tube and chassis ground and change R7 to a 2-watt unit. Prior to this modification, during mobile operation my receiver drifted whenever the battery voltage changed. — Frank Morrisino, KILMY

A SAFETY PRECAUTION FOR THE SCR MOTOR-SPEED CONTROL

The SCR motor-speed control in the "Hints & Kinks" column of December 1967 QST could very well become a death trap! I strongly suggest that the box be grounded to the power line via a three-prong plug (Amphenol 160-11) at the end of a three-wire cable, and that a three-contact female socket (Amphenol 160-2) be used at the output. — Herbert M. Rosenthal, W2PJV

SEPARATING KIT PARTS

While putting together electronic kits, I have often found it to be quite a problem to store resistors, capacitors and other small parts, so that any particular component could be located without difficulty. I recently solved this situation during the construction of my HW-32A. As shown in Fig. 5, I placed vertical strips of masking tape (sticky side up) about two inches apart on a piece of cardboard. This permitted all the small components to be stuck to the tape until they were needed. — Jack C. Andrews, W9YWE

![Circuit Diagram](image)

Fig. 5—W9YWE's method of separating kit parts.
The First Novice WAC

I recently read in QST that a Novice had worked DXCC before going on to get his general license. Several Novices have done this before and it is not an uncommon feat for them to get a WAC.

In the early 1950s, the first Novice received the WAC award. Since it has been about 15 years, the truth can now be told about the very first Novice to work all continents. He received no award, no publicity and only a few hams are even aware of his untold feat.

Wilbur had received his call WN2—, during the first week in July. He was the first Novice in his state to be licensed, as the newly created Novice license was only a few months old. A second-hand S3B receiver and a pair of 6L6s set him up on 7182 kc. while a dipole from the garage to the apple tree pounded out a cool 25 watts.

For Wilbur it was a long, hot summer of hundreds of QSOs. He was on forty c.w. day and night and, if necessary, ate his meals with his left hand while the right pounded out c.w. on the J38 key.

At first his parents were happy that their 17-year-old son had a hobby that kept him off the streets, but about the middle of August they realized that ham radio might become a problem. In just one month Wilbur was to start his freshman year at State U, where he had been accepted by the skin of his Novice teeth.

Two weeks before he was to leave for the ivy-covered dormitory walls of State U, Wilbur was given some cold words, words that would put fear into the heart of any Novice.

"No ham radio till next June and if you don’t buckle down and make good you can forget amateur radio," stated Wilbur’s dad.

Well, Wilbur was supposed to put all his gear into wooden boxes to be stored in the attic until June, but the germ in his brain was too much for a mere flesh-and-blood Novice. He carefully packed his S3B and a pair of cans into the bottom of his trunk just before he left for college. When his mother wanted to check the number of shirts he had packed he was in shock till the crisis passed.

Wilbur settled into his dorm room without any further difficulty except that he noted two rules in the list of several thousand, or so it seemed, which all students must adhere to:

1) No ham radio equipment
2) Curfew at 12:00 for all Freshmen

Any violation could result in expulsion from the University.

About the middle of November on a very dark night at 2 A.M., a thin piece of wire slowly crawled down the outside wall of the dorm. If you followed this wire up to its source you would see a figure sitting under a blanket slowly tuning for DX. You can’t stop a Ham!

*711 Broad St. S.W., Gainesville, Ga. 30501.

BY DR. J. MICHAEL BLASI, W4NXD

"A FAINT ORANGE GLOW WAS CREEPING INTO THE DORM WINDOW."

Wilbur kept his listening confined to weekends when his roommate was at home. He had his QSTs sent to him at college and this also helped to feed the flame.

Thanksgiving vacation found Wilbur back at home with a C-average and an idea in the back of his mind. While his parents were out of the house our hero set about to build a single 6L6 rig for 80 c.w. from the transmitter that had served him well all summer. It was small, but that 10 watts would get him on the air for at least two hours each week.

It wasn’t easy, but if you strained your ears you could hear WN2—/2 about 3 A.M. each Saturday. He even worked a WN4 once.

One Saturday about 4 A.M., the 80-meter Novice band seemed a bit funny to Wilbur as he fired up his 6L6; the signals had a funny “ping” sound to them. He called CQ and turned the gain up to catch a chirpy signal calling him. It was SP6—in Poland. Wilbur was paralyzed for a second. He recovered his wits and exchanged 560s before the final 73.

Now another station was calling WN2—/2. It was ZS5—calling his first WN2. Wilbur was in another world. This couldn’t be true. His forehead was damp as he logged the two contacts.

It came to him; 80 meters was wide open. A 589 from a WN7 in Oregon was next for Wilbur’s potent 6L6.

A JA1 was calling CQDX 20 kc. up from his frequency. Did he dare try to keep his string going? You bet he did. A 339 from Tokyo was copied a few minutes later.

Power does strange things to mortals for

QST for
Wilbur, having signed with the JA1, called a QRZ DX which is not heard very often on 80 meters, especially from the Novice end of the band.

Rules are made to be broken and evidently the LU2 in Argentina had not known about this as he called WN2—/2.

Fifty minutes before, Wilbur had been lowering a piece of #22 wire out of his window: now he was floating somewhere between heaven and earth. A check of his log showed five continents worked in less than an hour. Was it possible? Could he get that WAC before the sun came up and his thin aerial must be pulled up?

He tuned his receiver down into the general band and prayed for his S3SB to perform the last part of the miracle. At 3500 kc. he heard VK—- calling CQDX. This was almost 200 kc. from his frequency in the Novice Band and a faint orange glow was creeping in the dorm window. It was now or never. Wilber called that VK2 for five straight minutes, the longest in his life. Up went the gain of his receiver, and then nothing; but then a faint QRZ, QRZ de VK2—-. The room was much lighter now and only minutes remained before the wire must come up.

Wilbur called the VK2 twice, signed his own call five times and swallowed hard. There it was WN2—/2 de VK2—-, tax call, ur rst 459 . . .

The first Novice WAC and on 80 meters with only 10 watts!

At first he couldn’t sleep, but then the rest that only a ham who has worked DX knows came over him.

It was early afternoon when someone pounded on Wilbur’s door and yelled, “Telephone!”

He threw on a robe and slowly walked to the phone booth at the end of the hall.

“This is Western Union calling, I have a telegram for you from the American Radio Relay League in Connecticut. Do you want me to read it to you?”

“Er, ah, yes,” stammered Wilbur, suddenly wide awake.

MR. WILBUR—
RADIO WN2—/2
ROOM 325
STATE UNIVERSITY
DEAR OM:
WIAW HAS MONITORED YOUR SIGNAL ON THE 80 METER NOVICE BAND EARLY THIS MORNING STOP CONGRATULATIONS ON FIRST NOVICE WAC STOP WE WILL SEND PHOTOGRAPHER FOR COVER STORY IN QST STOP PLEASE WIRE COLLECT YOUR CONFIRMATION OF THE ABOVE STOP.

Wilbur could not believe his ears. This was the moment of a lifetime, the dream of every ham. Then he remembered the dormitory rules he had broken, his college career and the words of his father.

“Do you wish to reply now,” asked the operator?

“Yes,” said Wilbur. “Please inform them of the following. ‘You have made a mistake. My last ham activity was in September on 40 meters!’ ”

It must have been dusty in that phone booth, because something got into Wilbur’s eyes and caused both of them to fill with tears.

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**Strays**

First-Day Covers Still Available

When the Amateur Radio First-Day Covers were processed in Anchorage on December 15, 1964, we gambled and had a few extra undressed covers prepared, because orders for the first-day covers were still coming in and we didn’t want anyone to be disappointed. We still have some of these left. They are all singles, undressed but carrying the stamp and the official first-day cancellation, and they will be mailed to you in an envelope. Prices are $3 each, three for a dollar. Send your orders to ARRL Hq., 225 Main Street, Newington, Conn., 06111.

Shown left is W1ZL’s 14-Mc. quad after an ice storm. After seven days of frosty cold weather, the antenna thawed and returned, with no ill-effects, to its original shape as shown in right photo.

March 1968 53
The War
on Hampathy

BY JOHN W. FULLER,* K4HQQ

You may not agree with the author's conclusions, and amateurs whose professions are psychology, psychiatry or motivational research may want to enhance or take issue with these ideas. However, the author admits he may be guilty of generalization and over-simplification; but at least he has some interesting ideas as to what makes us tick in this amateur radio hobby of ours.

Ham's are reputedly an enthusiastic lot. The XYLs will agree, with resignation. At this very moment though, one of us is about to find himself staring glassy-eyed through his S-meter, wondering "What the devil am I doing?"
Or, after the ninth QSO in a row consisting of "Tux OM ur KST 599 in Pottscrg Pa Name Irving Hw?" another will angrily snap the toggle switches to "off," and muttering, join the wife in the living room as she pastes trading stamps in a book.

Why does this happen? What can be done? Recent statistics indicating a decline in new amateur licenses have brought to mind the possibility of saving — and in some cases, salvaging — amateurs who've been around for awhile, yet are beginning to lose interest. First, let's examine the reasons for taking out a ticket in the first place. Something attracted us to the hobby, and several possibilities exist. Among the more common: a natural transfer of interest from commercial communications or engineering; a fascination with the idea of talking with people in foreign countries; the science of electronics;

*a 1775 Leon Rd., Apt. 10, Jacksonville, Fla. 32216


a desire to meet people; the prospect of being able to communicate with anyone, anywhere, from anywhere (boat, car, etc.; and the glamour of it all.

Our second step in searching for a solution to ham apathy, or to coin a term, "hampathy," is in defining how much of us spend our time with ham radio once the "Novice passion" has subsided. Once more, and with tongue in cheek, categorizing is necessary:

Group I

The Traffic Net Operator. This gentleman decorates his walls with clipboards and net schedules. A four-tiered basket on his desk squeeaks with pounds of paper. Life is regular for him, because he is net control on Tuesdays and Thursdays at 1830 on the Sons of Godzilla Traffic Net.

The Public Servant. You'll find him devotedly enrolled amongst the ranks of the ARRL, the ARPSC, Civil Defense, Coast Guard Auxiliary, the DAR, ASPCA, and UNCLE. One ear is attached to a 2-meter net, while the eyes scan the latest hurricane advisory. In a rush to carry his transceiver to an emergency, he once fell over his son's bicycle and ended up an emergency case himself.

The Developer/Experimenter. Our engineering elite. This amateur breathes oxygen so that he might advance the state of the art. One corner of his shack holds a drawing board, another a completely equipped workbench (frequency

2 A few toes may be bruised by this statement, but I believe it to be well-founded: When an individual must turn to amateur radio for social intercourse, something exists about his personality that renders conventional social contact difficult. There are two instances, one of which is the handicapped person (our hobby does itself most proudly in fulfilling his life). The other is the neurotic and/or obnoxious individual, who finds the airwaves an ideal medium for catching a pair of ears to hear him out. Please understand, however, that by "meeting people," I mean specifically the persons who rely on radio for the largest portion of their social lives. Although most of us make many friends over the ether, these friendships are usually lightly-taken and are often temporary.
counter, noise generator, cesium atomic standard). He may have a rig on the air.

Group II

The Ray-Chewer. Four basic types are known: 1. The old goat who owns one 75-meter crystal, has plenty of time, even more hot air, and nothing much worth saying but does so anyway (he usually runs an S13 or two on a.m. and cusses them sidewinders who he's dang sure QRM him on purpose but who don't know his old bucket of bolts blasts through anyhow). 2. The Authority, who attracts a roundtable following on the state net frequency, and then challenges anyone to disagree with his opinions. 3. The Regular Joe, who swaps stories, chats about mutual interests, and sends a QSL. 4. The Vapid Churl, who acknowledges you are 40 db. over S9 and then rapidly proceeds to bore you with the tuning idiosyncracies of his final amplifier.

The Certificate Hunter. Look closely, for you may not see his station for the paper. Where awards in 7½ black picture frames don't cover the wall, lists of unachieved obstacles do. At a dollar per award, his XYL suggests he might have made the last two car payments. You'll find him on 14,075 kc, trying to work All Yukon Trading Posts.

The Contest Operator. Notice the red-encircled dates on his calendar. Midnight oil lubricates his amateur activity. His domain features half-empty coffee cups, soft-drink bottles with cigarette butts in the bottom, and a multiplicity of check-and double-check sheets. Once he took first place in the Drill Press Operators QSO Party and treated the wife to dinner at a burger palace.

Group III

The Project Ape. The Ape lives only to add one more little gadget to the already teetering totem atop his receiver. Once he verifies over the air that his new Little Marvel works perfectly, he silences the rig and plugs in the soldering iron, to begin the next improvement. He owes its soul to the Minibox manufacturers.

The Hallowed DX Man. Awesome in his power, the DX Man stands for all to see. Neighbors blink incredulously at the 120-foot tower crowned with wide-spaced 5-element 20-meter Yagi. Some claim he started an uprising in a small Latin-American dependency so that he might have a new country to work.

The V.h.f. Operator. Six- and two-meter phone are his delight. If he has facilities for 1½ meters and above, he falls under the "Developer/Experimenter" shown above. One day he will Work All States, but in the meantime, contents himself with reminiscences of the 1958 sunspot peak. An unchallenged authority on detersants, deodorants and underthings, he watches a lot of daytime television waiting for sporadic-E skip.

The C.w. Man. Pride is his upon achieving the 35-w.p.m. endorsement. The C.w. Man's stock-in-trade is a clean fist, an electronic keyer with dot memory, full break-in, and an A-1 Operator's certificate. Only trouble is he can't spell.

Now we get to the heart of the matter, how to combat "hampathy." You probably will find yourself in one of the categories just listed, and unless you are dyed-in-the-wool, no-questions-asked, do-it-or-die on the subject, then you may be vulnerable to dwindling interest. So here is the crux: Interest and desire are strengthened when a given act or completed task brings a reward. A reply to a CQ is a reward of sorts. And the dyed-in-the-wool enthusiast is rewarded by the self-satisfaction of doing a job well. But generally speaking, the most important form of reward sought after in ham radio is recognition. Not a testimonial dinner, but a simple "thanks" or "you're doing a great job." When we do something we think is pretty darned good, and someone commends us for it, we're likely to do it again. Recognition, then, being a reward, motivates us to repeat the good job and perhaps even improve upon it in order to gain another reward.

With these thoughts in mind, let's re-examine the list of 10 ham types. Notice how they're grouped. Can you see the reason for grouping them that way? Group I amateurs are most likely to stay with the hobby for a long while. Group II is shaky, and Group III hams constitute a bad risk. And here's why: the first group consists of pursuits that (a) offer plenty of potential recognition and achievement, and (b) provide no physical limitations on quantity (there will always be a need for traffic relaying, experimentation, and emergency service). In the middle group, although there still is no physical limit on quantity, there is doubt in one's mind as to the real value of it all, and recognition is rather limited. But the most hampathy-prone of our fraternity fall in the last group, in which achievement in terms of accomplishment and contribution are miniscule. Recognition is practically nil, and physical barriers are suddenly apparent.

Obviously, then, the solution to hampathy is to first acknowledge that you are disenchanted, and then seek either a way to get some reward for your efforts or find another facet of ham radio that does provide rewards. The best possible solution is to culture a variety of interests, so that when one activity becomes tiresome, another fresh activity is available for leisurely entertainment. All this, incidentally, is very well tempered by an additional hobby apart from electronics altogether. You know, a good thing can be overdone.

So if you feel a tinge of creeping hampathy, plop down in your favorite easy chair one day when the wife and kids aren't around, and just meditate for a couple of hours. Thumb through some old ham magazines, if you should decide to spark another interest. But whatever you choose to do, make sure there's some way of obtaining a little recognition for your efforts. This activity, figured in with your old amateur endeavor, will make you a happier ham. And best of all, your one-man War on Hampathy won't cost one tax cent!

March 1968
I'm Not in The Contest But . . .

BY KATAKI NOSE, KH6IU

This is an appeal for help from a contester to non-contesters. By knowing something about the fine points of contesting perhaps you can tolerate, if not help us.

The contest frequently is slowed down by operators who check in saying "Sorry, I'm not in the contest, I didn't mean to interfere . . ."

Some will start giving their names (oops, handles), S-meter readings, equipment description, and weather information, even before call signs are clearly established.

A True Contest

A true contest keeps contesting year after year and probably appears on the band only during a contest. The rest of the time he probably is refurbishing his equipment or, more likely, just listening.

He recognizes other contesters and knows that he can get a short burst of information from them and be on his way.

Top scores in the ARRL DX Contest are over one million points. To earn this, a contester must make over 4000 contacts in practically all Canadian and U.S. districts from 80 through 10 meters, and even 160 and 6, if conditions permit.

He must be able to maintain an average pace of 60 contacts per hour throughout the contest, but must be able to slide up to as high as 130 contacts per hour during a hot stretch. To maintain this pace he must resort to all kinds of guiles and still maintain order. How to do this has been the subject of past parties by this author and others, and need not be repeated except to say that the contestor must and can maintain complete control of his frequency. He has only himself to blame if he lets the situation get out of hand.

Goals and Procedures

A contestor studies past performance of his competitors from which he sets up pace markers. For example, within the first thirty hours of the ARRL DX Contest he must be near 1800 contacts, because the next 42 hours will yield him approximately 2200 contacts for reasons mentioned later.

He also knows that it is difficult to compete across time zones. Moreover, unless he can get into the dense ham population areas (the second and third district for the U.S.) he cannot expect to compete successfully with those more favorably situated and must trim his sails accordingly.

A contestor knows that if he piles up contacts, the multipliers will automatically take care of themselves. It is not discourtesy which prevents him from indulging in the banalities of ham radio such as "I hope to see you further down the log" or even "signing off and clear." "73 and good luck" takes only two seconds to say, but multiply that by 4000 and that's two and a quarter hours! In two and a quarter hours he can make up to 225 contacts and that's enough to break a tie.

Have you ever picked up a pencil 4000 times? A contestor soon develops the habit of hanging on to his pencil (or pen) even while sending on the bug.

Get The Information Across

If police and airline dispatchers were to carry on their conversation in conventional ham style, they wouldn't get very far. A contest is a communications exercise. A contestor tries to convey maximum information within the least amount of air time. He must phrase his information in a manner so as not to confuse others. He does not change his pace, delivery, or format. He cannot afford to use the usual stalling techniques such as "er, ahh," but instead he must be able to take a deep breath and give out a line of information without a pause.

This is simple in some contests but in others this is a formidable task because the contestor must think as he goes along, assembling the information while talking, noting the time, logging, and getting set for the next burst of information.

During a particularly hot stretch, he may be logging one or two contacts behind and perhaps filling in the missing information for other contacts still farther behind. This is apt to occur.
when he starts a new page on a log and is making two or three contacts a minute.

He Quickly Fishes Out The Band

Two hours is about the maximum time that one hundred contacts per hour can be maintained. Beyond that time the rate deteriorates since he fishes out the band rapidly.

The operator then has two alternatives. He can either change bands or resort to some attention-getting technique to squeeze out the band. The decision is influenced by how long the contest has been in progress and the condition of the band.

In a fished-out band there are three kinds of stations left, those that are violently opposed to contests, those that are out for a ragchew, and those who are hesitant about calling in because they are not sure about the rules of the contest. The latter two groups are a potential source of new contacts, but the problem is how to entice them to answer and still be able to promote a quick exchange of information without hurting their feelings.

One way is to intersperse the CQ with “You don’t have to be in the contest, anybody, just give me a contact.” This usually entices type number three and possibly two. After you get them to answer you, the rest is up to the operator’s ingenuity to speed things up. One way to do this is not to give the station a chance to get wound-up by forcing a quick break-in type of operation with a series of leading questions such as, “What state are you in (usually a state of confusion)? Give me a quick break,” “What’s my report? Give me a quick break,” then acknowledging with an “OK” and beginning the CQ cycle over again before the other station has a chance to say “73 and good luck; see you further down the log.” The best time is approximately 40 contacts per hour with this method and therefore it is good only as a last resort in a fished-out band. In a good band, one CQ ought to last for two hours.

Appeal for Help to Non-contesters

A contest is not interested in handles, accurate reports, or description of your equipment. Neither does he need any good wishes and CU again. He wants the contest information and wants to get going. The faster you can provide this information, the more he will admire your operating skill.

The shorter you make your call, the better he likes it. If you don’t get him on the first few tries, lay off for a while because a good contest operator will fish out the band quickly. However, if the band conditions are such that it is open for only a short time, then I have no answer other than to suggest the following technique.

Unless the DX operator has certain prejudices he will go back to the fastest operator he can decipher. The one who can squeeze in the most information into a given time block is usually the winner in a pileup.

Consider the one who signs as “whiskey able the number six x-ray whiskey fox trot.” In a pileup this information is profoundly chopped up because there is too much useless information. Why not just “WA6 x ray whiskey fox trot.” The important thing is to get across at least two letters of your suffix, not the prefix. If the DX station has any savvy at all he will carry this bit of information to a successful conclusion. If you are a rare one, then you can play it up.

If you are a non-contester and get called by a contestor, ask for the required information by a series of short transmissions. Listen to see what the others are doing and see whether your country is eligible or what type of information is sought. The contestor needs your help but above all, speed is of essence.

How to Obtain a QSL

An avid contestor makes over 15,000 contacts per year and is deluged with requests for QSLs. Anything you can do to ease the burden will enable you to get a QSL. Send a self-addressed stamped envelope or IRC. Express all times in GMT. Local time involves too much figuring.

Old timers recall a well-known Mexican ham who inserted in the callbook after his address, “I don’t want QSLs from Wa.” There were repercussions to this in letters to the editor and even an article in QST. I do not condone this attitude because I was once a beginner, eager for any kind of QSL. However, it is both costly and time-consuming for a contestor to QSL and anything that lessens the chore is appreciated. “The final courtesy of a QSO is a QSL,” is no better than, “Give me your handle for the log.” Neither is a legal requirement.

Other Problems of the Hawaiian Contestor

A surprising number of hams do not realize that KH6 is the Hawaii section. In the ARRL DX contest when I send 500000 (for one kilowatt), some times the answer is, “no kidding, how can you be using zero watts?”

The official abbreviation for Hawaii is “HI.” When I send “HI” on c.w. in the ARRL Sweepstakes the non-savvy operator wonders what’s so hilarious about the information I sent. If I repeat with “HI, HI” that only compounds matters. If I say “Haw” he knows I’m only kidding. By this time when I send “HAW a II” he is in no mood to decipher it because he thinks I sent the “II” just for emphasis.
Which Mode?

Phone is much more effective for handling messages than c.w. Ask any phone-only operator. C.w. provides greater accuracy, just as much speed, uses far simpler equipment, covers a much greater distance per watt, occupies less than one-tenth the spectrum space. Ask the ham who sticks strictly to c.w. RTTY combines all the advantages of both c.w. and phone, gives you higher accuracy with greater speed and you don’t have to know the code. Ask the RTTY buff. F.m. eliminates interference. V.h.f. repeaters are gradually taking over from low-frequency relays.

It all depends on how you look at it, and how you look at it depends on your personal preference, and this often depends on how you were "raised" in amateur radio.

In public service communications, we are not so much concerned with the mode used as with the job done. In directing mobiles to strategic points in an emergency situation, or a potential one, it is ridiculous to use anything but voice.

What kind of voice, a.m., sidetone, or f.m.? Answer: whatever kind is available. For handling traffic in quantity between two far-distant points, RTTY is far superior to any other mode — if it is available. For distribution of recorded traffic among a number of points, it is hard to beat the practiced c.w. net for efficiency — if you have the practiced operators. V.h.f. is fine for local nets — unless most of your locals operate lower frequencies.

What all this boils down to is that if you are starting from scratch, without consideration for what you have but only what you need, then you will follow the above precepts — voice for "command" purposes, RTTY for long-haul point-to-point record stuff, c.w. for multi-distribution of record stuff in nets. Select the mode to suit the need. Select the frequency band for optimum path over the distance to be covered.

Select the time to coincide with the need and with propagation conditions. Select the operators with the skill necessary to perform the jobs to be done, or train them specifically for those jobs. Select the...

But wait a minute. This is amateur radio we are talking about, not a commercial or military circuit. All these people are volunteers, offering whatever skills, equipments and time they have to serve the public in an emergency. Therefore, there is a limit to how much selecting can be done: you have to use what is available, do the best job that can be done with it, and while you are doing it make whatever progress you can toward the ideal. For example, if you are forced to use sidetone for point-to-point record purposes between Los Angeles and New York, then use it. Improve it as possible as you go along, and eventually, if you can, replace it with a better mode for the purpose, such as c.w. or RTTY, or c.w. then RTTY. But if it has to remain s.s.b., then strive to make it the best damned s.s.b. circuit going.

These may sound like principles for leadership and not of interest to the average amateur, but axioms apply to everybody. Everyone has his place. If you operate phone only, your best function is in some kind of "command" net in which the operator serves as a person who controls the equipment while others speak; this is not the same thing as saying that record traffic should not be handled. But c.w. and RTTY, which cannot handle the "command" function, are more suited for record purposes. As a participant in public service communication, you have as much responsibility as anyone else, and as much interest, in seeing that your services are used in the most efficient way possible.

Garbles

Here at the headquarters we receive a great many messages asking for forms, supplies, info, you name it, if we have it we get asked for it. Usually the message requesting it contains a name and address.

Time was when this was very helpful; saved us the trouble of looking it up. Nowadays, however, we regret to say that we always check the call book (if a call is given) to make sure the address is correct. Why? Naturally, because of garbles in the message.

To the outsider, a garbled message is as bad PR as a good message is good PR. Traffic handlers say we don’t stress enough the importance of being accurate in traffic handling, but this must mean we don’t stress it often enough, because we have stressed many times how important and necessary it is to be accurate.

So here we are, stressing it again. In copying a message, whenever you have any doubt about some part of it, please ask for a confirmation or a repeat. If we amateurs are going to be valuable as communicators, we must be accurate. Edsel Murphy’s Law says that any guess from context will be wrong. If a flash of static wipes out the middle word of the phrase “Kilroy (blank) here,” the temptation is to fill in the blank with the obvious guess — but if you do that, the correct word will turn out to be “ate,” not “was.”

If you copy one message accurately at 15 w.p.m., you are a much better operator than one
who garbles three of ‘em in the same time. Check the check. Be suspicious of messages that don’t make sense. Never mind if the guy at the other end gets impatient, make sure you have it right!

You think we are exaggerating about garbles? Try this: Every once in a while, after you deliver a message, mail a copy of it to the originating station, ask him to compare it with the copy he sent. You’ll be amazed at some of the things that happened to the message en route to its destination.

So let’s tighten up, fellows and gals. Transmitting stations, make sure the message is sent correctly and properly. Don’t assume the receiving operator will know what you mean if you accidentally send a B for a 6, or if you send an initial F by phone without giving the phonetic equivalent. Put yourself mentally on the receiving end, transmit accordingly. Receiving operators, don’t guess. If you miss something, admit it, ask for a repeat. If the other guy sends something wrong, make him repeat or confirm it, even if you think you know what he meant.

In short, be accurate! Forget the speedy stuff until you have achieved accuracy. Only then are you qualified to up the speed. — W1NJM.

National Traffic System

A lot of net bulletins cross our desk in the course of a year’s time. There isn’t a region or area net of NTS, nor a TCC group, that hasn’t put out a bulletin of some kind or another at one time or another. Some of them are dry and statistical, some are interest-provoking, some are controversial.

Then there are the section net bulletins, also, from Maine to San Diego, from Seattle to Sarasota, a veritable flood of them. A visitor recently asking to see some traffic bulletins was amazed at the number and variety of them. Just leafing through the stack, we come upon the QSK Bulletin (W5DTR), the Virginia Ham (WA4EUD), the QIN Bulletin (W9FHR), the Michigan QMN Bulletin (W8RTN), NCN (WA4FFM), The Oregon Navigator (W7FCF), the Buckeye Net Bulletin (W8G0E), Nebraska (K50KK), the LAN Bulletin (W5GHP), the MDD Flyer (K3OAE), Zero Beat (WAG7ZT). Some other editors of outstanding section news bulletins are W7’s DWA EFW, K15 UV PNB, W72a IYO VSL, W3ELI, K5KMO, W5CF, W7’s ILE IYT, K4HMB, W5CEZ, K4HJZ, W7’s ORW QMO, W46ROF, K7NIL, W7C7LCE, W7’s OHT HZA, W9C7FJ, W9EYV, KUGSC, WA8MNV. This does not pretend to be a complete list, and undoubtedly some we have omitted will feel neglected. If so, we apologize in advance, but we hope the above covers most of the waterfront.

The business of producing a net bulletin has bothered some. There are two problems: getting an editor, and supplying the funds. Each or both of these problems are easily solved under some circumstances, next to insurmountable in others. One group may find it has a leader who is willing to produce and edit the bulletin all on his own; this isn’t common, but it happens. Another may find that certain “free” facilities are or can be made available for the purpose of reproduction, so that all that is needed is the editor. Others have capable editors but must pay to have the bulletin printed.

There is always a way, if the desire to have a net bulletin exists. The net manager may not always be capable of writing deathless or inspiring prose, but he usually has a message and somehow manages to convey it, so don’t laugh. One way of covering the cost of paper and printing is by donations from net members; usually a dollar donation by a net member will cover the nominal cost of printing an unpretentious bulletin. In small nets, even multi-carbons or other coupon methods will suffice—and facilities for making copies are becoming more and more widespread everywhere, these days.

By all or any means, have a net bulletin. If properly done, it can go a long way toward cementing fraternal feeling among net members. Most NTS nets have a bulletin. Does yours? Give it some thought.—W1NJM

December reports:

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1 Region net representation based on one session per day.
2 Section and local nets reporting (29): AMEB, D, H, O, P, R, S, AM (Ala.); OZK (Ark.); NCN, SCN (Cal.); HNN (Colo.); CPN (Conn.); FAST, FAIT, FMNTN, FPTN, GN, QMN, SATN, TPTN (Fla.); GSN (Ga.); QIN (Ind.); ILN (I11.); Iowa 75; KYN, KSN, OKS (Kan.); FCATN, KTN, KYN (Ky.); LAN (La.); PTVN (Me.); MDDN, MEPN, Termre (Md.-Del.); EMN, WIMN (Mass.); QMN, M5TN, QWN (Mich.); ANJN, MSN, MISP (Minn.); MNN (N.J.); NEB (Neb.); NJN,
Shown are K3MYS and K3WAIJ supervising the drafting of Christmas messages at the Philadelphia Message Center. In the pick group left to right: PR Officer Ward, K3WEOU, Council Pres. D. Ortona, Epa SCM W3ELI, Registrar Weiss, Operator W3QEQ, K3EOQ, unidentified, WA3BJQ.

W3EBAI and his ARCC members furnished communications for a boat race across Lake St. John Quebec. The 2-meter f.m. network utilizing a repeater worked out very well and contact with many agencies was available. — W3EBAI, SEC Quebec.

From Nov. 25 to Dec. 31, thirty-five amateurs utilized the facilities of the West Coast Amateur Radio Service to report a number of traffic accidents, vehicle fires and traffic hazards. On Nov. 28, W6WFL/mobile, en route to Ensenada, requested assistance via WCARR to find a party who was overdue from a vacation in Baja C. R. W6WFL and a number of other members of the net furnished information regarding routes and facilities. By the time W6WFL arrived at the border and entered Mexico, a number of XE amateurs were alerted and

Dedicated volunteers continue to share their time and talents to improve radio communication experiences and technology, as well as fosters strong community connections. Communication is essential, especially during challenging or emergency situations.
prepared to meet him and render assistance. An hour and a half later, W6WFV returned and reported that the group was found proceeding home- ward. On Dec. 15 to 18, a number of weather and road advisories were handled by WCARS during severe snow storms that clobbered Ariz. and N. Mex. K7VIS handled a message requesting emergency fuel for a snowbound Indian Reservation in N. Mex. WB0YFT and WA7AKI relayed the message to authorities. On Dec. 31, W6WHL used 725 kc. to request aid to supplement a Coast Guard search for an overdue pleasure boat in the Gulf of Calif. K6K2I and others relayed the pertinent information to XE amateurs in Sonora and Baja, Calif. WB6XKM sent messages, signed by Senator Murphy, requesting assistance in the search by some facilities in Mexico. XE2SS later requested some additional information which was provided by WA6SNF and WSZOM. Also on Dec. 31, an aircraft operating a mobile phone called 7255 kc. to report that he was unable to communicate with Long Beach airport because of equipment failure. W6FQY relayed the information to the airport and communications were restored via alternate frequencies. — W6GIZP.

On Dec. 1, an automobile went into the Ohio River in downtown Owensboro, Ky. A Fire Department boat and civil defense amphibious vehicle began dragging and later requested boat-to-shore communications. Within two minutes, K4UDZ was aboard with a 2-meter walkie-talkie and W4OYI mobile ashore at the scene. With darkness approaching, dragging was suspended. The following morning, the Owensboro AREC was available but the rising river prevented the vehicle from being found. — W4OYI SEC Ky.

On Dec. 10, twenty-nine Fort Walton Beach, Fla., amateurs provided emergency communications when a severe tornado struck the area. W4MMMW activated two local v.h.f. nets on 2 meters, one a.m. and the other f.m. Messages into and out of the area were handled on 80, 75 and 20 meters. Some of the agencies served were National Guard, civil defense and Red Cross, plus a large number of inquiry messages. Two-meter mobiles were used to make survey and damage reports to authorities at first, but later were used to assist in delivery of health and welfare messages. Telephone circuits were heavily overloaded or out and the v.h.f. networks enabled the deliveries to be made so that there was not a big backlog of undelivered traffic. The v.h.f. also performed as an intercom net for expeditions dispatch of messages between stations operating on the low bands. Nearly a thousand messages and inquiries were handled. — W4RKH, SCM, Western Florida.

On Dec. 14, the community of Haines, Alaska, lost all commercial communications when a vessel at anchor during strong winds dragged anchor across an under-water coax cable and then picked up a secondary under-water communications cable. Within 25 minutes, KL7TRZ and KL7IU established communications. A radio link between Haines and Juneau. Two hours later the South East Alaska Emergency net was functional under the direction of KL7DFW. Net members provided a 24-hour-per-day standby on 3880 kc. so that Haines could have an emergency communications link. A number of messages were handled including coordination for the location of the broken cable and its repair. At least twelve amateurs in Alaska were known to have supplied emergency communications during the cable outage. — VT7UI/KL7.

On Dec. 15 at 6:30 p.m., WSSQO broke into the West Virginia Phone Net to report the collapse of the Silver Bridge at Point Pleasant, W. Va., with telephone and power service seriously interrupted as a result. WASNDY and XYL WASSW were mobile near Spencer, W. Va., and proceeded toward Pt. Pleasant. WASLAL, W. Va. State Radio Officer, was ordered to establish emergency communications at the Emergency Operations Center in Charleston. The emergency network was activated at 7:30 p.m. with WAYSJB NCS and WSNR W. Va. SEC, and others assisting. W8ANQ, a member of the c.d. radio system, was halted at a block outside Pt. Pleasant, which had been totally sealed off by police. He received clearance by c.d. at Charleston through the state police headquarters and was the only amateur radio contact at the scene of the emergency on the W. Va. side that evening. Because of the river condition and general disaster situation, there was urgent need for "hard hat" divers. The W. Va. Emergency Net initiated contact with authorities at the Pentagon, Groton, Conn., Corps of Engineers at Huntington, W. Va., Portsmouth, Va., and other points where this equipment and personnel were available. Television and radio stations were notified by the amateurs to broadcast an appeal for this type divers to get in touch with civil defense or police departments. WASNDY positioned his mobile unit at the Mason County EOC and began supplying requested details and general information to the State EOC. At times WASNDY had to leave the car for message delivery or other assignments, but W8ACW took over the operation so that information was constantly available to both the W. Va. state EOC and authorities at the Kanawha, Ohio, end of the bridge via W8RRQ or W61CFC, the latter a mobile near the river bank. After five hours of continuous operations, additional telephone facilities were provided for Mason County civil defense and the amateurs closed the emergency radio net. — WASNDY, EC Upham County, W. Va.

On Dec. 15, nearly three hours after the Silver Bridge collapse, WSBSTU was notified by a civil defense radio officer that Franklin County AREC/ RACES was requested to provide personnel and vehicles to rescue and proceed to Kanawga, Ohio. Six mobile units were alerted, and proceeded to the disaster site. The group set up a 6-meter station at a bowling alley in Kanawga and supplied a limited amount of communications. At noon Dec. 16, the Columbus group secured when their services were no longer needed. — WSBSTU, EC/RO Franklin County, Ohio.

On Dec. 16, The Delaware Six-Meter Net handled Christmas greetings from a hospital. Communications originated from the hospital via 6-meter walkie-talkies manned by K3NTG and W3EEB. W3EEB received the messages and placed them into National Traffic System nets. Seventy-seven messages were handled during the three-hour exercise. — K3NTG, SCM/86C Delaware.

On Dec. 17, four members of the Delaware Six-Meter Net furnished communications for a community center foot race which was held in Wilmington, Del. W3CGV operated a portable station (Continued on page 152)
History Repeats Itself

The ARRL in 1922

BY WELLS CHAPIN, WSGVW

The other night while browsing through some old books I ran into a long forgotten book by Stuart Ballantine who was among the first to gather together information and present it in one volume so that it could be used as a handbook. This book was published by David McKay in 1922. This book was a masterpiece in its time and after you read the following article you will feel Mr. Ballantine had a very wonderful crystal ball. Read it just as if you were reading a 1968 QST.

RADIO CLUBS
THE AMERICAN RADIO RELAY LEAGUE

When one has a hobby it is very pleasant and natural to seek intercourse with others of similar propensities. It is largely to this impulse that clubs and associations of all kinds owe their existence. So in the delightful field of radio, particularly non-professional radio; from the early days amateurs have been wont to band themselves together into radio clubs and associations. Not only is this beneficial for the ordinary reasons, but is of especial value for the proper protection of the rights of the private citizen pursuing radio for amusement or instruction, and in defending it from the onslaughts of the military and of mercenary professionals.

I feel that many of my readers will be novices in this radio business and wish therefore to address to them the appeal that after getting their radio house in order, one of their first moves be to seek out and become affiliated with their local radio club. Here you will come in contact with many kindred spirits, with the radio heure esprit of your community, and the ideas to be there gathered, the free instruction, exchanges of experience and so forth, are of inestimable value. The prospect of a radio meeting at which 60-year-old presidents of large institutions and influential men will be found enthusiastically and deferentially discussing the merits of this or that "hook-up" with 14-year-old school-boys is a curious one to contemplate and to think about.

The domain of influence of a local organization is, however, very restricted, and from the point of view of protecting the amateur’s rights when radio legislation is contemplated by the Government, is quite inept. This indicates the need for an organization of national scope: one great organization embracing the grand hierarchy of radio amateurs, and not two or three. Fortunately such an organization, the American Radio Relay League with headquarters in Hartford, Connecticut, exists in this country and is probably the most powerful amateur radio club in the world, having a present membership of ten thousand. In view of the importance of this body in amateur radio affairs, and the plea which is here made that every amateur make it his immediate business to become a member of it, a few remarks on its history and aims will perhaps be appropriate. For this information I am indebted to Mr. K. B. Warner, Secretary of the League and editor of its admirable little journal, QST.

The American Radio Relay League is the only association of its kind in the country, being of national scope, entirely non-commercial in its nature, and truly of, by and for the amateur. It is a corporation without capital stock, with a charter under the laws of Connecticut. Its governing body is a board of seventeen directors, elected by popular vote every two years, and no man is eligible to membership of the Board who is in any way financially interested in the manufacture or sale of radio apparatus. The officers of the League are elected by the Board members and serve for two years.

The purpose of the League is the advancement of private radio, especially as exemplified by the American amateur. We are bonded together for the more effective relaying of friendly messages between our stations, for legislative protection, orderly operating and scientific growth. We have seventeen divisions in our Operating Department, embracing the United States, Canada and Alaska, and each division is in charge of a manager who is a well-known and qualified amateur. In turn he has district superintendents and city managers as assistants, forming a field organization of about 400 men, who keep closely in touch with the individual stations owners all over the country. ARRL
is a hobby with these men and all serve in their spare time without financial remuneration, as do all of our officers with the exception of the Traffic Manager and Secretary, who, devoting their entire time to the work at the headquarters' office, must necessarily make their living thereby.

The League owns QST as its official organ, chronicling the activities of the amateurs all over the country. QST is devoted solely to the interest of the amateur and that interest is principally the practical improvement of short-wave communication. The ARRL has represented amateur radio in legislative hearings ever since its formation, and it may be safely said that there have been several occasions when if no League had existed, there would be no amateur radio today. Our substantial prestige at Washington is due largely to our being bonded together in a non-professional organization into which the taint of commercialism cannot enter. We have made ourselves into that kind of an association which the United States itself can recognize and deal with.

Thus whenever any matter affecting the amateur is under consideration in Washington, the view of the ARRL is sought. When that expression is secured it represents the best opinion of seventeen men from all over the country who in turn represent the general amateur in their communities. To help in this business of being truly representative of the amateur, there are some 400 clubs scattered throughout the land which are affiliated with the League. Affiliation costs a club nothing and nothing tangible is given in return except a charter, but it bonds all together with hoops of steel in a common brotherhood— that of the American ham.

From time to time our Operating Department stages special stunts just to get some fun out of radio. We regularly handle some thousands of messages every night over relay routes, but occasionally knock off and try for a record. The resultant is that we have handled a message from the Atlantic Coast to the Pacific Coast and got the message back to the east coast again in a total elapsed time of six and a half minutes. Recently we handled messages from the governors of the various states to the President, and forty of the forty-eight messages were delivered, five not starting and three only being lost in the process of transmission. The ARRL recently conducted experiments in connection with the fading of radiotelegraphic signals for the Bureau of Standards, and thousands of curves and data sheets were obtained which are still being analyzed at the Bureau. It was the ARRL that sent Mr. Paul F. Godley to Scotland in the recent amateur trans-Atlantic tests, in the course of which about three dozen American amateur stations were heard across the Atlantic.

It costs nothing to belong to the League except the annual dues of two dollars. One does not even have to be an amateur station owner, the only requirement being that the applicant possess a bona fide interest in amateur radio. The dues include, of course, a year's subscription to QST.

Interesting reading, wasn't it? The mercenaries were at work stealing our bands in 1922. We can not go wrong by practising what he says. Join your Radio Clubs — constructively criticize the ARRL. Don't just do nothing — do something to help preserve our wonderful hobby.

\[\text{Strays}\]

Feedback
Our apologies are in order for misspelling the names of Harold Wirsching, WASHTA, and Benoit (Club) Bourg, W9COC, in "Silent Keys" for January 1968.

The Post Office Department promises faster mail service with the new Zip codes. Use yours when you write League Headquarters. Use ours 06111.

Except for a few visible kits, all of the equipment seen in this one-corner view of WDDEG's shack is homemade. At the top left is an antenna coupler with a built-in monitor scope and s.w.r. meter. Hanging on the corner of the panel is a transistor keying monitor. At the lower left is a 15-meter receiver; at the top middle is a WWV, 20 and 2-meter receiver with a built-in panamatic scope and trumpet speaker. An 813 transmitter is at lower middle and a 40-meter receiver is at the bottom right. All of the units use modular construction that make for easy troubleshooting, revisions, and updating.
Those Higher-Class License Examinations

In Six Parts — Part I

Basic Electrical and Electronics Principles

“Running scared” about passing the new Advanced or Extra Class examinations because the assortment of sample questions published by FCC looks formidable? Relax a bit. Yes, you’ll have to do some studying. But no, you don’t have to have a degree in electronic engineering in order to make the grade. What you’re expected to know isn’t any more than you should know if you want to make the most intelligent use of your ham privileges and equipment.

On first inspection the sample questions seem to cover a lot of territory. A closer look shows that this is partly because the subjects are thrown into the pot apparently at random—just as they would be thrown at you in an exam. When broken down, practically every question falls nicely into one of six broad groups—basic electrical and electronic principles; applications and familiar circuits; general aspects of transmitting, including telegraph methods; radiotelephony of various types; propagation, antennas and transmission lines; and receiving methods.

We have grouped the questions that way for the purposes of this series, and also rearranged their order within groups so that the same or closely-related subjects are adjacent.

We have made no distinction between Advanced and Extra questions because the breakdown showed quite plainly that both examinations ask questions in all categories. The Extra questions may dig a little more deeply into some aspects, but the fact is that anyone who is well prepared for the Advanced exam practically has the Extra in his hip pocket already. This is speaking of the technical part of the exam, of course; you don’t have to take a code test for the Advanced, if you now hold a General class ticket.

In this series we propose to take a look at each of the above groups with a view to bringing out the scope of the examinations, which is what FCC says the questions are intended to do. This word “scope” needs to be interpreted rather generously; it doesn’t mean that because an example question is on the time constant of an RC circuit an actual question wouldn’t be about an RL circuit; it might be, and in either case it would almost certainly be phrased differently—in a way designed to bring out what you really know of the subject rather than what you’ve tried to memorize for the trip to the FCC office.

This means being able to work formulas backward as well as forward. Once the scope is established, the necessary information for study can be found in ARRL publications which will be specifically referenced. Finally each installment in this series will conclude with our own concept of how actual questions might appear in a multiple-choice examination.

You’ve probably passed the General Class exam (and must hold a license of at least that grade before becoming eligible to take the Extra), so FCC takes it for granted that you could easily do it again. In other words, some of the actual questions you get may not be related, seemingly, to the Advanced and Extra sample questions, but may be on more elementary subjects—like Ohm’s Law—that you’re supposed to know. The very first sample question in the collection to follow is of that type, and is a tip-off as to what you might be asked in the elementary-electricity field in an actual examination. Review the General Class questions in the License Manual as you go along; any of them could appear in the more-comprehensive Advanced and Extra exams, too.

This series will deal only with the technical questions; those on laws and regulations demand familiarity that can only be obtained by study.

The new Advanced and Extra Class examinations stay strictly within the bounds of amateur competence — no “far-out” subjects or fine details which only experts could be expected to know about. This is the first of a series to help you plan your study for the examinations along logical lines.
of the actual texts. These are given in full, where pertinent, in every edition of the License Manual.

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Now to get down to cases. Inspection of the group of FCC sample questions that follows shows that first of all you need to have a fair grasp of the rock-bottom electrical fundamentals—what resistance, inductance and capacitance are, their properties, what happens when they are combined, how they behave in a.c. circuits, the meaning of reactance and impedance, impedance matching and the use of transformers to effect it. The decibel is included, too. All this information is to be found in a little over 20 pages in Chapter 2 in the Handbook—specifically, pages 18 through 41 in the 1967-68 editions, plus a short section about practical characteristics of capacitors and inductors on page 54. It is fair to assume, however, that some actual questions may go a little farther, delving into d.c. principles and tuned r.f. circuits the way the General Class examination does. It wouldn’t hurt to go through all of Chapter 2.

Filters obviously are included within the scope of the examination. With one exception, all you need to know is to be found in pages 51-52 in the Handbook, plus pages 110-111 in the 1967 edition (112-113 in the 1968 edition). The exception is that shape factor isn’t specifically named in the Handbook, although it is described. The definition is in the answer to the related sample question that follows.

Transistor principles, ratings, basic circuits and operating conditions are covered in Chapter 4 of the Handbook. The section you need to study is pages 81 to 86 in the 1967 edition, pages 80-87 in the 1968 edition. However, the earlier part of Chapter 4 shouldn’t be avoided just because it doesn’t deal directly with transistors; it is valuable background material that leads to the transistor itself, and thus should help make understanding easier.

Altogether, the scope of this group of questions is covered in 25 to 30 Handbook pages. There aren’t any direct questions about vacuum tubes, but you’re expected to know something about them already from the scope of the General Class exam.

It helps to memorize a few rules and formulas for arriving at numerical results. Here are the ones you might expect to have to know:

The “reciprocal of the sum of the reciprocals” rule for resistances and inductances in parallel, capacitances in series.

The formulas for calculating inductive and capacitive reactance.

The rule for finding the total reactance of reactances in series.

The formulas for the time constant of CR and LR circuits.

The rule for converting transformer turns ratios into impedance ratios (“the impedance ratio varies as the square of the turns ratio”).

Now look over the sample questions. Those marked (A) are from the Advanced Class; those marked (E) are Extra Class. You should find some things in the answers that send you back to the Handbook for more information. When you feel pretty certain that you’ve got a good grasp of these questions, try the multiple-choice ones at the end.

Next month’s subject will be practical applications and circuits.

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FCC Sample Questions

(A) How do inductors combine in series and in parallel? Capacitors in series and parallel?

If there is no coupling between the inductors, the total inductance when two or more are connected in series is equal to the sum of the individual inductances. When connected in parallel, the resultant inductance is equal to the reciprocal of the sum of the reciprocals: that is,

\[ L = \frac{1}{L_1 + \frac{1}{L_2} + \frac{1}{L_3} + \frac{1}{L_4} + \cdots} \]

With capacitors in parallel, the total capacitance is equal to the sum of the individual capacitances. In series, the resultant capacitance is found by the same rule as for inductances in parallel; that is,

\[ C = \frac{1}{\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \frac{1}{C_4} + \cdots} \]

(E) How does the positioning of a powdered-iron tuning slug affect the frequency of the oscillator it is tuning?

A powdered-iron slug, which has higher magnetic permeability than air, is inserted in a coil to increase the inductance for a given number of turns. Adjustable coils are wound on cylindrical forms inside which the slug can be moved back and forth so that more or less of the slug is surrounded by the winding. As more of the powdered-iron slug is inserted into the winding the inductance is increased, and the resonant frequency of the circuit therefore is lowered.

(E) How do mica and paper dielectric capacitors compare at different frequencies?

Because of the way they must be constructed to obtain useful values of capacitance, paper-dielectric capacitors have appreciable internal inductance as well as capacitance. The inductance can be ignored at low frequencies and usually can be tolerated in bypass applications at moderately
high frequencies, say 4 or 5 Mc., provided the capacitance is of the order 0.01 μf. or less. Paper capacitors, even in the low values, become predominantly inductive at 20–30 Mc. and are not useful above this range.

Mica capacitors have low internal inductance and can be used throughout the h.f. range as well as at low frequencies. Inductive effects become noticeable, especially in the larger capacitance values, at v.h.f., but with judicious selection of values and physical size mica capacitors can be used successfully at such frequencies.

At power-supply frequencies there is little choice between the two types as far as electrical performance is concerned, but mica capacitors in the required capacitance values would be prohibitively expensive.

(E) What is the meaning of the time constant in a resistance-capacitance circuit? How is it determined?

The time constant of an RC circuit is the time in seconds required for the voltage in a charged capacitor to decrease to 37% of its initial value when the capacitor is allowed to discharge through a resistor. Alternatively, it is the time in seconds required for the voltage across the capacitor to rise to 63% of its final value when being charged through the resistor from a fixed-voltage source having negligible internal resistance. The time constant is determined by the R and C values, and the time in seconds is equal to the product of the resistance in ohms by the capacitance in farads.

(E) What are inductive and capacitive reactance? How are they phase angles related?

Inductive and capacitive reactance are measures of the opposition to the flow of alternating current offered by inductance and capacitance, respectively. Inductive reactance is proportional to frequency; capacitive reactance is inversely proportional to frequency. In neither case is power dissipated in the reactance, although in the unit of reactance is the ohm, the same name as the unit of resistance. In both types of reactance, the phase angle between current and voltage is 90 degrees, but in inductive reactance the voltage leads the current by 90 degrees, and in capacitive reactance the current leads the voltage by 90 degrees. Thus, if inductive and capacitive reactance are connected in series so that the same current flows through both, the inductive and capacitive voltages are 180 degrees out of phase. If the reactances are in parallel so the same voltage is applied to both, the current through the capacitance is 180 degrees out of phase with the current through the inductance.

(A) A resistor, capacitor and inductor each have 100 ohms of resistance or reactance. What is the equivalent series impedance of these three elements?

The value of the resistor itself, 100 ohms. Since the reactances are equal and of opposite effect, they cancel each other in a series circuit.

(E) What does the term "power factor" mean in reference to electric power circuits?

The term "power factor" refers to the ratio of the actual power consumed to the apparent power (voltage multiplied by current) in an a.c. circuit. This difference in actual power and apparent power results from the presence of reactance in the circuit.

(A) A transformer with 115 volts applied across the primary terminals has a primary to secondary turns ratio of 10 to 1. If a 5-ohm load is connected to the transformer secondary, the reflected primary impedance is what? How much voltage appears across 1/2 of the turns of the primary?

The ratio of impedances in a transformer is in proportion to the square of the ratio of the number of turns in each winding. Thus the reflected primary impedance would be 100 times that of the 5-ohm secondary load, or 500 ohms. Voltage distribution in a winding is essentially uniform along the turns: therefore one-half of the applied voltage, or 57.5 volts, would appear across half the primary turns.

(E) How is the decibel used for voltage and power calculations?

The decibel is based on power ratios, and is expressed mathematically by the formula

\[ \text{Db.} = 10 \log \frac{P_2}{P_1} \]

Where \( P_1 \) and \( P_2 \) are the values of power being compared. For example, a power ratio of 10 equals 10 db., a power ratio of 100 equals 20 db., etc. For voltages measured across the same value of impedance, the formula is

\[ \text{Db.} = 20 \log \frac{V_2}{V_1} \]

Gains and losses expressed in decibels may be added or subtracted arithmetically.

(A) Define the shape factor of a crystal-lattice bandpass filter.

The shape factor of a filter of any type is the ratio of the filter bandwidth at some high value of attenuation, usually 60 db. below maximum response, to the nominal pass band of the filter. The pass band is ordinarily taken as the width of the band between the frequencies at which the attenuation is 6 db. below maximum response. For example, a 60/6 db. shape factor of 2.5 to 1 would indicate that the bandwidth at 60 db. down is 2.5 times the bandwidth at 6 db. down. Shape factor is a measure of the "skirt" selectivity of the filter.

(E) If a crystal lattice bandpass filter has bandwidths of 1.5 kc. at the 6 db. points and 3 kc. at the 60 db. points, calculate the shape factor.
The shape factor is the ratio of the bandwidth at 60 db. down to the bandwidth at 6 db. down (assumed in this case; other attenuation figures are sometimes used). Thus the shape factor of the filter in the question is 3/1.5, or 2.

(E) How are phasing capacitors used in crystal filters?

Phasing capacitors in crystal filters are used to vary the parallel-resonant frequency of the crystal and thus produce a tunable rejection notch which will aid in the elimination of an unwanted signal.

(A) Compare transistors and tubes. What are the advantages and disadvantages of each?

Transistors are quite small in size for a given power capacity, operate at low voltages, and do not depend on thermionic emission (as do vacuum tubes) for their functioning. Their size and voltage requirements make them particularly suitable for miniaturized equipment and portable operation with battery power supply. There is no “warm-up” delay in going into operation, since there is no cathode to heat. Their characteristics are such that they are particularly suitable for electronic switching. The overall efficiency of transistorized equipment is relatively high because a large proportion of the power-supply input is converted to useful output, since no cathode-heating power is required.

Disadvantages are sensitivity of operating conditions to temperature, the fact that the conventional (bipolar) transistor takes power from the signal input source, and susceptibility to cross modulation. (The last two disadvantages are overcome in the field-effect transistor.) All transistors have very small “working parts,” which limits the power-handling capacity and makes it necessary to use special means to remove heat when appreciable power is used. Transistors are impervious to mechanical shock and are nonmicrowave, but can easily be ruined by transient overvoltages exceeding the ratings or by excessive power dissipation. Single transistors for handling large amounts of r.f. power (over 100 watts) have not been developed at the present stage of transistor technology. The internal feedback from output to input circuits is relatively large in transistors, leading to the necessity for neutralization or “swamping,” or both, in tuned amplifiers.

Vacuum tubes require a heated cathode for thermionic emission, operate over a wide range of voltages (from a few volts to several thousands), and can readily be constructed to dissipate large amounts of power in heat. Amplification can be obtained without absorbing power from the signal source in certain types of operation (Class A1 and AB1 amplifiers). Tubes for r.f. service can be built to handle large amounts of power — 100 kilowatts or more. Small tubes for receiving purposes can be constructed with very low internal feedback so that neutralization is not needed to prevent self-oscillation. Linear amplification and amplitude modulation are relatively easy to achieve.

Disadvantages are the necessity for supplying cathode power, which contributes nothing to the output and adds to the heat which must be dissipated by the equipment, relatively fragile construction in types using glass bulbs so that mechanical shock and vibration may be a problem, and large overall size compared with transistors. The cathode of a tube also has a finite life, so that performance tends to be degraded after long usage. However, tubes are generally capable of standing considerable overvoltage without damage, and are less susceptible to destruction by moderate overloads.

(E) How do n.p.n. type transistors differ from p.n.p. type? How does their bias differ?

The two types of material are “n” type, in which the “carriers” of current are electrons, and the “p” type in which conduction is by means of “holes” or electron deficiencies. A semiconductor rectifier consists of the two types of material in electrical contact (a “junction”). Conduction occurs when a positive potential is applied to the p-type material while the potential at the n-type is negative (“forward” bias). With the opposite polarity applied (“reverse” bias) no current flows. A transistor is formed by a layer of one type of material on each side of a slice of the other type. Thus a p.n.p. transistor is formed by putting a layer of p-type material on each side of a slice of n-type. In the n.p.n. transistor the n-type material is on each side of a slice of p-type. The inner slice is called the base, one of the outer layers is the emitter, and the other outer layer is the collector.

In use, the emitter-base junction of the transistor is forward biased and the collector-base junction is reverse biased. With the p.n.p. type this means that the collector and base are both negatively biased with respect to the emitter, and in the n.p.n. type the collector and base are both positively biased with respect to the emitter. The base-emitter bias is less than a volt, usually, but the base-collector bias may be any value up to the ratings of the transistor.

(A) Power dissipation in what part of a transistor warrants careful observance of power ratings?

In transistors, the rating is based on the amount of power which can be safely dissipated as heat in the collector-base junction. This rating should be carefully observed. Some transistors require a “heat sink,” a mounting which helps dissipate excessive generated heat.

(E) Define the alpha cut-off frequency of a transistor. How is this parameter of use in circuit design?

The alpha cut-off frequency is that frequency at which the current gain (more precisely, the “small-signal common-base forward current
transferred ratio") in the grounded base circuit drops to 0.707 times its low-frequency (usually 1000 c.p.s.) value. Alpha is measured with the output short-circuited; actual gain must be calculated taking collector load resistance and other parameters into account. The alpha cutoff frequency is useful in establishing an upper frequency limit for a given transistor type in the grounded-base circuit.

(A) What is the vacuum tube counterpart of (1) a grounded-base circuit; (2) grounded emitter circuit; (3) grounded collector circuit?

The base element of a transistor corresponds to the grid in a vacuum tube; the emitter element corresponds to the cathode; and the collector corresponds to the plate. Thus a grounded-base transistor circuit would have a grounded-grid counterpart in a vacuum-tube circuit; a grounded-emitter transistor circuit would be similar to a grounded-cathode vacuum-tube circuit; and a grounded-collector circuit would be the counterpart of a grounded-plate vacuum-tube circuit (an amplifier of the latter type is usually called an "emitter follower" with transistors and a "cathode follower" with vacuum tubes).

(E) What is the phase relation between the input and output circuits in the common-emitter, common-base, and common-collector transistor circuits?

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**Examination-Form Questions**

Q1. An audio-frequency amplifier requires a load resistance of 2000 ohms for operation at optimum efficiency, but the resistance of the actual load is 50 ohms. The load is to be coupled to the amplifier through a transformer. What should the primary-to-secondary turns ratio be?

- A — 40 to 1
- B — 6.3 to 1
- C — 7.9 to 1
- D — 1 to 13.6
- E — 14.14 to 1

Q2. An automatic gain-control circuit requires a time constant of 3 seconds. The capacitance in the circuit is 0.1 microfarad. What is the value of resistance through which the capacitor must discharge?

- A — 25,000 ohms
- B — 3 megohms
- C — Infinite resistance
- D — 30 megohms
- E — 0.47 megohm

Q3. An inductor and capacitor each have 250 ohms of reactance at 1000 c.p.s. If they are connected in series in a circuit operating at a frequency of 500 c.p.s. what is their total reactance, and of what type?

- A — 375 ohms, inductive
- B — 500 ohms, inductive
- C — 375 ohms, capacitive

Q4. A 455-kc. mechanical filter has a shape factor of 2.3. If its bandwidth at the 60-db. attenuation points is 8 kc., what is its nominal (6 db.) passband in cycles per second?

- A — 2200
- B — 18,400
- C — 2000
- D — 320
- E — 3480

Q5. A p-n-p. transistor is connected as a Class A amplifier in the common-emitter circuit. What are the polarities of the voltages applied to the base and collector with respect to the emitter?

- A — Base positive, collector negative
- B — Base negative, collector positive
- C — Base positive, collector positive
- D — Base negative, collector negative
- E — Either, so long as base and collector have the same polarity


(Answers on page 148)
Ham Radio Expo

An unusual opportunity to expose amateur radio to the general public — several thousand square feet of exhibit area along with auditorium meeting room facilities at one of the world’s largest shopping centers — is currently being pursued by a group of ARRL affiliated clubs in the Hudson Division.

May 2-3 are the dates of the “Garden State Amateur Radio Exposition,” at Routes 4 and 17 in Paramus, N. J., which will feature displays of all facets of amateur radio; films, slides, talks and symposiums will cover a variety of subjects. An old-style free Hamfest with all the usual activities will top off the event. In addition, an International V.h.f. Conference is planned. A banquet on the evening of Saturday, May 4, will culminate activities. Write Ham Radio Expo, P.O. Box 3533, Paterson, N. J. 07509, for more information.

G3LTF (center) visited the East Coast V.H.F. Society, WA2WEB on the occasion of their annual Christmas Dinner. Here Peter is shown receiving an award for pioneering moonbounce in the United Kingdom from Society President K2OJD/FP8CA (left) while WB2OHV/WA1IIO looks on. The Society used the occasion to announce plans for another International V.h.f. Conference, similar to the one held in 1964, to be held in May at the ham radio Expo, see left.

This photograph was taken during the Field Day held in Liberia during 1967. At the left is one of the new Liberian Novices, while at the right is the Honorable Samuel Butler, EL2L, Minister of Communications of Liberia. Look for lots of Liberian activity beginning at 1200Z on March 30. There will be c.w. and s.s.b. activity on 40 through 10 meters plus RTTY work on 15 and 20 meters. The distinctive call sign SL22RL will be used for most operation, except that Novices on c.w. will sign SL2FD.

Virgin Islands Governor Ralph M. Paiewonsky presents a certificate of commendation to Dick Spaceley (L), KV4AA, on behalf of the Department of the Army in recognition of ten years of service in the Civil Defense Communications Programs in the U.S. Virgin Islands.

March 1968
FCC RETIREMENTS

One of our favorite people behind the scenes in Washington is Frank Gentile, the man in charge of amateur license issuances since 1947. Though never a ham, Frank understands us and our attachment to a particular set of call letters or type of call. When the computer goes awry, Frank puts in extra effort to straighten out the difficulty, always anonymously—he signs his memos only as "FCC Licensing Unit."

Frank has served the Department of Commerce, the Federal Radio Commission and the FCC since 1927, and has been in the licensing unit since 1939. He retired as Chief, Amateur Licensing Unit on January 12, 1968. A native of Providence, R.I., Frank is married, has one son and lives in Deer Park Heights, Maryland.

Ralph J. Renton, WJCU, Chief Engineer of FCC since 1966, retired on January 26 after 36 years with FCC and the Federal Radio Commission. Before World War II, Ralph was a radio inspector, serving at Grand Island, Nebraska, monitoring station and at the district office in Boston. Since 1941 however, his duties have been less closely connected with amateurs: radio intelligence, broadcast engineering, Conelrad, air defense, technical research, land mobile, etc.

He started as a listener in 1919 (copying the Boston Navy Yard NAD on a crystal detector) and was licensed as ICU in 1924. Other amateur calls have included W9VOG and W3JWD.

AMATEURS AND MEMBERS

FCC's year-end count shows 257,000 amateur operators, up a thousand from 1966, but down a thousand from June 30, 1967. The amateur station count, which adds club, military recreation and individual second-station licenses, was 267,000 on June 30.

League Full Membership increased .05% to 80,984 with nine divisions gaining and seven losing members. The Dakota, Canadian and Rocky Mountain Divisions led the list of gainers, followed by Roanoke, Southeastern, Southwestern, Pacific, Northwestern and New England. Atlantic, Central, Delta, Great Lakes, Hudson, Midwest and West Gulf posted small losses in voters.

CANADIAN RTTY RULING

Canadian Director Noel B. Eaton, VE3CJ inquired of DOT whether the practice of using a narrow (100-200 cycle) frequency shift for Morse code identification of RTTY signals would be acceptable in Canada.

The Department of Transport, quoting sections 51 and 60 of the General Radio Regulations, Part II, says that since the subject stations are using a telegraphic emission of type F1 (or F2 in the upper frequency bands), identification must be by telegraphy in the International Morse Code. At the same time, section 60 permits frequency shift keying of the carrier frequency up to a maximum of 900 cycles so that the proposal for a shift of from 100 to 200 cycles when keying the transmitter for identification

Here's the New Orleans Chapter of OOTC enjoying their annual banquet at Antoine's Restaurant, whose owner is W5RU. Others present: K5GGY, W5NO, W5AU, K5KAA, K5WMP, W4KF, W5BZ, W5WR, W5EDY, W5JO, W5EM, W5AY, W5DU, W5JNL, W5DHR, W5HUT, W5FM, W5AXQ, W5LE, W5CZ, W5ASE, W5HR, W5KO, W5BHK, W5LT, W5ABS, W5LA, W5PM and Delta Director W5LDH, totaling nearly 2000 years of hamming!
Behind The Diamond

Number 2 of a Series

In one corner of the ARRL Technical Department, the silence is broken only by the pecking of a typewriter. The words from that typewriter you see every month in QST, but the by-line “Donald H. Mix, WITS,” seldom. Don’s task is to edit the works of “outside” authors for QST style, completeness and accuracy.

But though the byline does not appear as often as it once did, Don is well-known both as a 35-year employee of the League, and as a ham. Even back in the twenties, hams talked about the “Sleepless Wonder of TTS.”

Don was operator of WNP aboard the schooner Bowedo, which it headed for Greenland in 1929 under Macmillan. When the ship was frozen in the ice at Etah Harbor, his contacts with amateurs kept the crew in touch with home.

Don spent the next ten years in research labs. He joined the ARRL staff in 1933 to operate the Technical Information Service. In 1939 he became assistant technical editor, the job he still holds. During the war, from 1933 to 1945 he served as acting technical editor. Over the years, he’s been a heavy contributor to the Handbook as well as QST.

As we hinted at the start, Don doesn’t say too much, but his flying fingers have resulted in DXCC credit of 310 countries. Three years ago Don passed the 1,000 mark of stations worked— in Asia alone! WITS is regularly heard in contests and CD parties, too. His current transmitter runs about 250 watts; antenna is a tri-band beam.

When Don does sign his name to an article—as for instance a number of transmitter “how-to’s” in the ’30s or “Ivory Tower Confessions” July 1959—it goes on the must-read list for us! QST—

“Lee DeForest Day” launched the Illinois Sesquicentennial for hams, who presented to Governor Otto Kerner the special QSL cards donated by Hollcrafters commemorating the state’s anniversary. Left to right, L. A. Wollon, Jr., of the Sesquicentennial Commission, W9QVA of Hollcrafters, the Governor, ARRL vice director W9PRN and W9FFP of the Sangamon Valley Radio Club.

purposes does not appear to conflict with the regulations.

“In the circumstances the intent of the regulations, which is that transmitting stations shall be satisfactorily identified, would appear to be met and we see no objection to your proposal. We are therefore notifying our Regional offices to that effect,” the DOT said.

CANADIAN TRAFFIC WARNING

The Department of Transport has recently brought to the attention of licensees of some university amateur radio stations that traffic which they were handling contravened the regulations. Specifically, the stations involved were passing traffic between one another which consisted of press material to be printed in the university publications, thus making it public rather than personal material.

Subsection II, Section 52, Radio Regulations Part II says amateur transmissions shall be limited to messages of a technical nature or of a personal character; the DOT considers material for newspapers as being public and thus not allowable.

Director Eaton, in a letter to Canadian amateur organizations and officers conveying the above information, closed with these remarks:

“Incidentally, this action on the part of the Department and a recent increase in citations to individual amateurs for incorrect station identification indicates that there is much more monitoring of amateur bands being done by the Department of Transport than we have been led to believe.”

(Amateurs in the U.S. follow a different test, domestically, on acceptability of traffic; there must be no pecuniary interest by any operator handling traffic, but public matters are not prohibited per se.)
RULES FOR LIFE MEMBERSHIP

1. The Board of Directors has established a provision for Life Membership in The American Radio Relay League, Inc., effective August 1, 1967.

2. Life Membership is granted only by the Executive Committee, upon proper application from a Full (U.S. or Canadian licensed) Member.

3. The Life Membership fee is twenty times the annual dues rate, or currently $130.

4. An applicant may choose an alternative time-payment plan of 8 quarterly installments, $16.25 each. In such instance he will be provided an interim two-year Full Membership certificate. Upon completion of the payments, Life Membership will be granted.

5. Life Memberships are non-transferable, and dues payments are non-refundable. In the event an applicant is unable to complete payments on the installment plan, he will be given a term of membership, at the annual dues rate, commensurate with payments received.

6. Other licensed amateurs in the same family, and at the same address, of a Life Member may retain or obtain Family Membership upon payment of the annual dues of $1, but without receipt of QST. The dues of the Family Member may be prepaid for any number of years in advance, but there is no special rate.

7. Application forms are available upon request from the Secretary, ARRL, Newington, Conn. 06111.

STATIONS ON FEDERAL LANDS

To avoid conflicts between stations desiring to use land under the supervision of the U.S. Forest Service and the Bureau of Land Management, new regulations have been added to each Part of the FCC rules outlining the steps for securing permission.

Section 97.11 of the amateur rules reads: "Applicants proposing to construct a radio station on a site located on land under the jurisdiction of the U.S. Forest Service . . . or the Bureau of Land Management . . . must supply the information and must follow the procedure prescribed by Section 1.70 of this chapter."

ARRL, QSL Bureau

The function of the ARRL QSL Bureau system is to facilitate delivery to amateurs in the United States, its possessions and Canada of those QSL cards which arrive from amateur stations in other parts of the world. You have to do is send your QSL manager (see list below) a stamped self-addressed envelope about 3½ by 5½ inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner. Changes are shown in heavy type.

Cards for stations in the United States and Canada should be sent to the proper call area bureau listed below.

W1, K1, WA1, WN4 — Hampden County Radio Association, Box 210 Forest Park Station, Springfield, Massachusetts 01080

W2, K2, WA2, WB2, W2N — New Jersey DX Assn., P.O. Box 605 Ridgewood, New Jersey 07451


W4, K4 — H. L. Parish, K4IFK, RFD 3, Box 804 Hickory, North Carolina

W4, W4B, WN4 — Richard Teater, W4WIP, 2066 Browning St., Sarasota, Florida 33577

W5, K5, WA5, WN5 — Hurley O. Saxon, K5QHV, P.O. Box 9015, El Paso, Texas 79989

W6, K6, WA6, WB6, WN6 — San Diego DX Club, Box 1029, San Diego, California 92216

W7, K7, WA7, WN7 — Willamette Valley DX Club, Inc., P.O. Box 555, Portland, Oregon 97207

W8, K8, WA8, WN8 — Paul R. Hubbard, W8BCX, 921 Market St., Zanesville, Ohio 43701

W9, K9, WA9, WN9 — Ray F. Bielen, W9MSG, Box 519, Elmhurst, Illinois 60126

W08, K80, WA8, WN8 — Alva A. Smith, W8DMA, 238 East Main St., Caloelina, Minnesota 55921

VE1 — L. J. Pader, VE1FPQ, P.O. Box 198, Halifax, N.S.

VE2 — John Ravenscroft, VE2NY, 155 Thorncrest Ave., Dorval, Quebec.

VE3 — R. H. Buckley, VE3UW, 20 Almont Road, Downview, Ontario.

VE4 — D. E. McVittie, VE1OX, 647 Academy Road, Winnipeg 9, Manitoba.

VE5 — Fred Ward, VE50P, 809 Connaught Ave., Moose Jaw, Saskatchewan.


VE7 — H. R. Hough, VE7HT, 1291 Simon Road, Victoria, British Columbia.

VE8 — George T. Kondo, VE8 ARRL, QSL Bureau, Department of Transport, Norman Wells, N.W.T.

VO1 — Ernest Ash, VO1AA, P.O. Box 6, St. John’s, Newf.

VO2 — Goose Bay Amateur Radio Club, P.O. Box 232, Goose Bay, Labrador.

KH0, W1H — John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, Hawaii 96701.


These bureaus prefer 5 x 8 inch Manila envelopes.

Andrew Pfieffer, K1KLO, receives the August Cover Plaque from New England Division Director Robert York Chapman, W1QV, while Carl F. Christian, K1RH, president of the Tolland Amateur Radio Club, looks on. The winning story was "The Connecticut Longhorn," which furnished the cover illustration of August QST as well.
Salud Amigo!

A hearty Texas-size welcome from the nation's 15th largest city, the unique city of contrasts, whose historic buildings blend a Spanish frontier heritage with the threshold of the space age.

Here is the setting, not only of the ARRL National Convention, June 7-9 (opening 3:00 P.M. Friday) at the Municipal Auditorium, but also of HemisFair '68, April 6-October 6, 1968, the first world's fair ever scheduled in the southwestern United States. Celebrating the 250th anniversary of San Antonio's founding, the fair has as its theme "The Confluence of Civilization in the Americas."

The San Antonio Radio Club is host for the 1968 National Convention, and they hope to make it the best ever. To search for ideas and spot pitfalls, committee members have been visiting other National and division conventions the past four years, to make your stay in the Alamo City an enlightening experience and entertaining fiesta.

Gene "Padre" La Fleur, W5WZR, will be master of ceremonies, a colorful contributor to any convention! There will be a host of speakers from ARRL Headquarters, FCC, the Military Affiliate Radio System (all three branches), NASA, Southwest Research Institute and from around the Southwest to cover a myriad of amateur topics.

Ladies not wishing to take in the technical sessions may enjoy a fashion show, Grey Line tour of the historic quarter, a morning coffee, luncheon and an initiation into SWOOP, a secret sorority for the wives of amateurs! Other events are still being hatched up by the Alamo Y.L.s.

To cap it off, HemisFair's featured performers this weekend are Jack Benny and the Baja Marimba band.

Nets in San Antonio operate normally on 7290 kc. daytime and on 3961 kc. in the evening. Also, 52.525 and 146.94 Mc. f.m. are monitored almost continuously. During the Convention there will be additional talk-in frequencies on 3900 and 7250 Mc. Flying in? Contact Gen-Aero on the Unicorn channel at San Antonio International, 123.0 Mc.

The pre-registration package price of $14 (with separate-event rates in parentheses) includes all this: Registration ($4) covering admission to the meetings, exhibits and goodies; preconvention party Friday night ($4), an informal soiree to renew old acquaintances and make new ones while enjoying a tasty buffet of ham, shrimp, and roast beef, with background music by a strolling Mariachi band; Saturday night dance ($5) with two bands to provide popular and country-and-western music along with other entertainment; and the Texas barbecue/banquet ($4) Sunday noon at the Convention Center next door to HemisFair. Pre-registration ends May 1, so sign up early with Gene Junk, W5EJT 100 N. Winston Lane San Antonio, Texas 78213.

Give him your "handle," call and QTH just as you want them to appear on your convention badge. Be sure to list the number of overall registrations or the number of tickets for each individual event.

And say! Housing will be tight, because of the fair, so make reservations early. Downtown accommodations run from $17.50 to $25 double at these hostelries (distance in blocks from the convention headquarters listed in parentheses): Gunter Hotel, Blue Bonnet, Travis Plaza (all 1 1/2); St. Anthony (3), El Tropicano (1 1/2), Menger Hotel (7), LaQuinta (10) and Palacio del Rio (8). These are in order of ascending costs; all require an advance deposit of one day's rent. There are other motels near downtown and farther out, too.

Make your plans now for a double treat — HemisFair '68® and the 1968 National Convention!
WELCOME TO LONDON PROGRAM

The “Welcome to London Program” of the Radio Society of Great Britain, 28 Little Russell St., London, W.C.1., is designed to assist visitors in meeting British radio amateurs, provide assistance with shopping, advice on restaurants, sightseeing, theaters, travel, emergency medical or legal aid, etc. The Society says it would be mutually helpful if visitors were to write beforehand introducing themselves and explaining their requirements. No charge is made for this service. Upon arrival, amateurs are invited to telephone 550.0882, 205.1443, LAB.5732, 204, 2520, SRS.5566, or 2050 (Southampton, Newport, Isle of Wight). RSGB regrets that no responsibility can be accepted for booking hotel accommodations, and prospective tourists are strongly advised to have confirmed hotel bookings before arriving in London.

AUSTRALIAN LICENSING NOTE

In response to a request by the Wireless Institute of Australia, VK Wireless Telegraphy Regulations have been amended to provide for a reduction of code speed requirement for a full license (AOCP) from 14 to 10 w.p.m.

NIGERIA LICENSING

Because of the continuing political difficulties in Nigeria, no new amateur licenses are being issued and all such applicants are being advised to re-apply at a later date. However, existing licenses are being renewed for 1968, and about ten SN2 stations will be active this year.

CHANGES AND CORRECTIONS

The Radio Sport Federation of the USSR reports that information contained in “QSL Via Box 88” pg. 77 of September, 1967 QST is inaccurate. RSF says that all QSLs to USSR amateurs should be sent to Box 88, Moscow, USSR.

The Club de Radio Experimentadores de Nicaragua advises that all U.S. cards for VN amateurs should be sent to: Mike Murciano, YN1MO/W4, P.O. Box 902, Coral Gables, Florida.

Effective January 1, the prefix for Barbados was changed from VP6 to SP6.

RSGB OFFICER CHANGES

John Graham, G3TR, became president of the Radio Society of Great Britain this year, succeeding A. D. Patterson, G3KYP. John has been a licensed radio amateur for more than 30 years. Replacing G3FMT, A. E. Dowdeswell, G4AR has become RSGB General Manager.

DX OPERATING NOTES

Reciprocal Operating

(Bold face indicates changes since last list.)

United States Reciprocal Operating Agreements currently exist only with: Argentina, Australia, Austria, Belgium, Bolivia, Canada, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Finland, 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.

Canada has reciprocity with: Bermuda, France, Germany, Israel, Luxembourg, the Netherlands, Senegal and U.S.

Third-Party Restrictions

Messages and other communications — and 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 GM CO CP CX EL HC HH HI HK HP HR LU OA PY TI VE VO XE XP YN YS YV ZP 1X and 4Z. Canadian hams 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

U. S. 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 such of 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 Jovian. Prefixes to be avoided are HS JY XV XV 3W8 3WS and 8F.
Here are two recipients of ARRL International DX Competition awards. Above is ZS6DW who received his award just prior to an operation, and right is JA1CWZ top Asian c.w. high-scorer.

On a recent U.S. visit G2MI was presented a plaque for his work at the RSGB QSL bureau by the North Jersey DX Association. Above Art is shown with his wife Lucy. G2MI, who also visited IARU/ARRL headquarters on his trip, is QSL Manager and a Past President of RSGB.

On a recent visit to South Africa, Barry Goldwater, K7UGA, had an opportunity to meet several ZS amateurs and discuss reciprocal operating. From left to right are ZS1TP, K7UGA, and ZS1ACD.

Recently the Philippine Amateur Radio Association celebrated its 35th anniversary with a well-attended banquet. PARA, founded in 1932, is the direct successor of Philippine Radio Club founded in 1924 and the Radio Club of the Philippines founded in 1922. DU1OR reports that one of the highlights of the anniversary celebration was the congratulatory letters received from IARU President Denniston and others.
ADVANCEMENT

I passed the Advanced Class today; the test took 45 minutes. The worst part is nervousness, fear of failure. However, I studied hard. The ARRL License Manual was a big help, but anyone without a solid technical background would find it difficult to pass.

The test was no snap. It really checked your knowledge. I have a feeling many will flunk it if they don't know the fundamentals of s.s.b. and transistor circuits.

I hope in a year to go for the Amateur Extra. — Willard R. Moody, K5YOW, Riverdale, Maryland.

Ever since the official notice that the FCC approved incentive licensing I've been studying for my Advanced ticket and I hope to be able to get it within three months. I have set a goal of 5 years to get my Extra, but I want to have the satisfaction that in 1973, when I send a QSO in the lower end of the 20-meter band, whoever listens to it can say: “Now, here is a fellow that knows what he is doing!” — Gilbert Velez-Borrero, W5YYO, Philadelphia, Pennsylvania.

Not being satisfied to proceed with only part of the whole picture, I found myself looking for a good school that could supply an equally good course in electronics. I have found the school, Purdue Extension, here in our locality, and I have found their electronics course to be very good. I might also add that getting back to school after so many years has been richly rewarding, and a real challenge.

If incentive licensing can indirectly cause a person to return to school after 26 years, it cannot be all bad! — William E. De Ger, W16MOE, Gary Indiana.

Thanks to your promptness in publishing the questions for the Advanced and Extra Class license in the November issue, I was able to pass both the first round. Technical — yes; unattainable — no.

To sum it up, the only things needed are a strong desire to better the state of the art and sound studying of basic amateur procedures. — William N. Kendall, K0COU, Minneapolis, Minnesota.

To start with I was a happy Technician for fifteen years and could not care about the rest of the bands, but something happened. Up comes this new incentive licensing, and I found I was being robbed to the tune of 250 kc. That was in June and up to now I am an Advanced Class operator. — H. M. Ashpole, KPIQJ, Glendale Heights, Illinois.

Actually, for the amount I'm on the air, I probably don't need the Extra Class privileges. But when they offer a higher grade examination, it seems like admitting defeat not to go down and pass it. — Charles W. VanWag, WA4YNE, Nashville, Tennessee.

I am 16 years old and got my General a year ago (it was a snap). And a year from now I am going down to L.A. and show everybody that I care what happens to amateur radio, and I dare the rest of you to come along. — Arden L. Accord, WB6SKQ, La Canada, California.

Recently I mailed to you a check to renew my membership in the ARRL for the eighth time. Originally I subscribed to our journal, QST; that is, the membership in the ARRL carried no meaning for me. Consequently, I never took occasion to write my director to let him know how I felt on any issue, nor did I write to the QST staff for any reason.

However, after following the pros and cons of incentive licensing and realizing the ever-present danger to our frequency allotments, I have come to regard receiving my monthly issue of QST as a pleasurable by-product to my necessary support of the ARRL. Had it not been for the efforts of the ARRL from its beginning to the present, there might well be no amateur radio today.

So after eight years of benefitting from fifty years of efforts and activities of the ARRL, permit me to offer a belated thank you and my continued support.

I must QRT now in order to study (from ARRL publications) for the Advanced Class license which I am only too happy to have the opportunity to strive for. — Robert W. Irish, Jr., K5ZOL, Dallas, Texas.

The letter that really got to me was the one in January QST from Hugh Vandergrift, Huntsville, Alabama, about all of you being “professionals.” From his letter I gather he was calling anyone who got Extra as a result of the incentive licensing a “professional.” Therefore, this must mean too. I would like to tell him and you how much of a professional in radio I am. I am a housewife and mother of three kids, who spends most of the time washing, ironing, cooking, mending and like that. You’d be surprised how much time is spent just looking for lost items!

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MANNERS

After reading the many letters complaining of various incidents of operating by lids, I must state that my recent experience indicates the number of courteous, proficient operators on the band far exceeds the number of lids.

The Korean government permitted third-party traffic for the period 23 December 1967 through 3 January 1968. I had a schedule with HL9TG to handle messages for our servicemen for every night of this period. Since the Korean stations are somewhat limited in power we anticipated some troubles from QRM. We found this to not be true. The cooperation from our fellow hams was amazing. I heard numerous instances of others trying to keep the frequency clear, stations moving so they would not cause QRM, etc. Although HL9TG would be a prize DX contact, there was not a single instance of any one trying to break-in. The result was a very rewarding period of message handling. The propagation on the bands did not always cooperate but the hams sure did. All I can say is, I am proud to be called a ham. — Roy A. Cartier, W4YJJ, Winchester, Virginia.

I guess there’s room for everyone in ham radio. Recently, in two separate QSOs I heard amateurs advocating the use of nuclear bombs on other countries. This was on twenty meters!

These people have a right to their opinions (I suppose). But, if they really feel that they must put this sort of stuff on the air, why don’t they use a not-so-international band, like 160 meters in the daytime?

How would these people feel if they heard amateurs from some other country advocating the bombing of this country? It kind of derogates the purpose of amateur radio — doesn’t it? — Richard Antman, Chicago, Illinois.

I wonder how many of the licensed amateurs in our country know the reason for being issued a license. If more of them stopped to think that we as amateurs are supposed to be a public service maybe there would be less interference on traffic nets. After listening to some of the goings-on on 75-meters I wonder what kind of idiots are being issued licenses. Not all 75-meter operators come under this accusation, but anyone who spends an hour listening will know what I mean. Mostly everyone who now has a license worked for it at one time or another. The only thing to do is go back to work, improve yourself and your license and then be able to operate in an area that may, for a while, be free of some of these objectionable characters. — Gregory P. Burton, K1TZD, No. Granby, Connecticut.

QST EXTRA

Congratulations on the initiation of “QST Extra.” I hope that this new addition will help intermittently active amateurs like myself to partially bridge gaps in our knowledge and understanding of, and acquaintance with principles.

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and progress that we miss during our inactive periods. — Keith Jones, W0PZL, Denver, Colorado.

QST COVERS

It's time someone commented on recent QST covers. As a reader since the early 20s I have seen them improve over the years. 1967 has been outstanding.

January, May, August and October tell a story, if without imagination, and do it well. The June issue kept up a tradition. February, March, April, July, September, and December rank as being good art, newsworthy, and story-tellers par excellence.

Thanks for a high standard in covers among all magazines. — Harry Mills, K9A.1/4, Annandale, Virginia.

LEGAL AID

Recently one of our club members, Mr. William Schmidt, applied for a building permit from the City of Wichita to erect an antenna tower and was turned down.

The City's position was that there was no restriction on the height of TV towers but amateur radio towers should be restricted to 20 feet because of r.f. radiation.

Mr. Schmidt, W0OZN, for many years and an Extra Class license holder, wisely did not argue the point but immediately wrote you and explained the situation.

You forwarded a "Legal Packet" that Mr. Schmidt presented to the "City Fathers" and after a short deliberation of the salient facts, Mr. Schmidt was told to re-apply for his building permit which was granted with no restrictions.

I wish to thank you for your prompt action in ironing out a situation that could have become rather "sticky" for the local amateurs. Few amateurs realize the importance of remaining calm, gathering evidence (or help) from ARRL and presenting it to the proper officials for just decision. Most times, if the facts are presented properly, justice will prevail. — Raymond L. Blain, President, Wichita Amateur Radio Club, Wichita, Kansas.

AMATEUR RADIO AND DISTRESS INFORMATION

I commend you on the excellent article written by R/MCM Charles R. Dean, WA2NDQ, USCG, Retired, entitled "Amateur Radio and Distress Information" which appeared in your January 1968 issue.

A discrepancy appeared in the article, however, which you may wish to rectify. On page 63, Table II, the telephone number for the Third Coast Guard District on Governors Island was erroneously listed as 264-5601. It should correctly read (212) 264-4500.

Thanks for an otherwise interesting and informative article. I am certain that the dissemination of this information to your readers shall prove an invaluable communications tool in the Coast Guard's continuing effort to improve marine safety. — W. S. Haight, Lieutenant U.S. Coast Guard, Aed. Chef, Search and Rescue Branch, Third Coast Guard District.

CONVENTION DATES

Frequently in the past months, various amateurs have made the remark that the Central Michigan Amateur Radio Club of Lansing, Michigan must be "out of their minds" for holding the Michigan State ARRL convention April 26 & 27, 1968, the same week-end as the Dayton Hamvention!

Let's set the record straight. When we of the C.M.A.R.C. decided to hold a convention, one of our first correspondences was to the Dayton group asking them for their projected date for the '68 Hamvention, realizing that many amateurs enjoy attending this affair. We never received a reply. On April 18, 1967 we received our sanction from the ARRL. On April 22, 1967 we publicly announced the date at the Grand Rapids convention. Our first knowledge of the Dayton event was from the December QST eight months later.

We regret that this may inconvenience some of our fellow amateurs, but we tried! I can only say, with the outstanding assistance we are receiving from the League, other Michigan clubs, the city of Lansing and our own club members, those who attend the ARRL sanctioned Michigan State Convention will not be disappointed. — Dick Kelley, KB8BV, Lansing, Michigan.

[Editor's Note: To avoid reoccurrences, Dayton Hamvention announces the following future dates: April 26-27, 1968; April 25-26, 1969; April 24-25, 1970; April 23-24, 1971; April 28-29, 1972; and April 27-28, 1973. DAR says it didn't receive the C.M.A.R.C. inquiry last year.]
ARRL AWARDS HONOR ROLL FOR 1967

In a membership association as large and as widespread as the League, much of the organization's work is accomplished by volunteers in the field. The League has some 35 unpaid directors, vice directors and 175 appointed SECs; hundreds of QST contributors, editors, and authors; thousands of Official Station Appointment holders; and some 35,000 members of the Amateur Radio Public Service Corps — all participating for the love of amateur radio and in support of League objectives. In addition to more general expressions of appreciation for such cooperative endeavors, the Board of Directors has occasionally singled out some individuals for special recognition on a particular contribution to the art. In the past year, the Board conferred the ARRL Technical Merit Award and twelve Cover Plaque Awards.

THE HIRAM PERCY MAXIM GOLD MEDAL

The Hiram Percy Maxim Gold Medal was created by the Board at its meeting in May, 1964, as an award for extraordinary contributions to the science of communications by a radio amateur. It is to be conferred only by the Board, and only in exceptional instances.

To date, the sole holder of the honor is the late John L. Reinartz, K6BJ, in recognition of his outstanding achievements of pioneering the early development of amateur radio communications equipments and techniques, which contributed so heavily to the opening of practical short-wave communications.

THE ARRL TECHNICAL MERIT AWARD

William Concel, W6DNG and T. Ray Naughton, VK3ATN won the 1966 ARRL Technical Merit Award for proving that communication via lunar reflection is within the realm of conventional amateur operation. Though “moonbounce” has now become a part of the amateur scene, many of the records set for earth-moon-earth QSOs have involved the use of professional apparatus (e.g., the big dish at Arecibo, Puerto Rico). W6DNG and VK3ATN, however, have each set records for particular paths with more-common gear: Bill’s antenna is an array of yagis while Ray uses a rhombic for two-meter work.

The Technical Merit Award was created by the Board at its 1953 meeting to be presented each year to an amateur chosen for his outstanding technical contributions to amateur radio.

Nominations for the 1967 award may be submitted by any amateur to Vice President Wayland M. Groves, W5NW, Chairman of the Merit and Awards Committee, or to a division director (addresses on page 8). Deadline is April 15, 1968.

COVER PLAQUE AWARDS

At its 1961 meeting the Board established an award for QST authors adjudged by the directors in mail balloting to have written the best article of each month. A unique plaque goes with the award — the actual printing plate used for the cover that month, chromium-plated and mounted on a polished board.

Cover Plaque Awards for 1967 were earned by these articles:


February: “Practical Consideration and Application in a Multi-element Quad,” by Roderick M. Fitz-Randolph, W5HVY/7

March: “Ninety Feet for One Hundred Dollars,” by Thomas J. Brooks, Jr., W5OSL

April: “Solid-State Receiver Design with the MOS Transistor,” by G. T. Daughters, WB6AIG; Wes Hayward, W7OI and Will Alexander, WA6RDZ

May: “The Vacation Special,” by R. F. Latter, W2YFM


July: “The W6EPV Squeeze Keyer,” by Jimmy Moss, W5GJR

August: “The Connecticut Longhorn,” by Andrew Pfeiffer, KIKLO

September: “The Swiss Quad at ZS6PP” by E. P. Towers, ZS6PP

October: “Save Those Transistors,” by Everett Emerson, W6PBC

November: “Break-In C.w. with S.s.b. Equipment,” by George W. Hippsley, Jr., K1WJD

December: “Transceive with Transistors (Almost),” by Varoujan Karentz, W1YLB

Our hearty congratulations and thanks on behalf of League members to these gentlemen, and to all the authors whose voluntary efforts make QST what it is.

March 1968
CONDUCTED BY BILL SMITH, * WB4HIP

E.M.E. for the Layman — Conclusion

This month we conclude a three-part discussion of e.m.e. (earth-moon-earth) principles by Mike Staal, K6MYC. The final section covers antenna mounts, drive systems and readout mechanisms.

First the prospective moonbounce must decide if he is going to use his antenna system for anything other than e.m.e. experiments. This decision governs the selection of an appropriate mount and drive system. A very simple mount can be constructed if the antenna is to be used only for e.m.e. and thus be aimed at a specific point in space. This may be a logical place to begin, but you will probably soon become frustrated at being limited to perhaps 5 or 6 hours each month when the moon passes through the antenna's pattern. I suggest at least a partially-steerable array.

If only e.m.e. is contemplated, a polar (or equatorial) mount would be a wise selection as it requires only one drive mechanism for tracking and some form of manually tilting the array slightly from day to day to set the *declination*.

To accomplish this, your antenna mast or tower must be mounted parallel to the axis of the earth. Thus, if your station location is at 35° north, the mast would be fixed at an angle of 35° from the earth’s surface at such location, oriented in a north-south direction (see fig. 1.). The declination (manually-tilted axis) changes from day to day. Information may be found in *The American Ephemeris and Nautical Almanac*, 1968, available through the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. for a nominal price. All that is necessary now is that your drive mechanism rotate the antenna at a rate of 15° per hour to track the moon.

This is all fine and dandy for e.m.e., but if you want to use your array for satellites, meteor scatter, aurora or something similar, a polar mount is not much good. A drive system permitting the array to be fully steerable in both azimuth and elevation (az-e) is the answer.

The array at K6MYC is mounted atop a homemade 12½-foot tower. The four legs of the tower are fastened to a platform which in turn is bolted to the roof of the garage directly above the operating position. A large unmodified prop pitch motor is mounted inside the top of the tower. A husky steel plate is welded to the rotating gear and another plate is attached to the first with ordinary door hinges, see the photographs. These hinges are employed in the elevating mechanism. To this plate a 3-inch aluminum channel is attached and the main boom of the array is clamped in this channel. A jack screw with right-hand left-hand square threads starting from the center out raises and lowers the array. At the lower end of the jack screw is a 20-to-1 gear reduction box giving a zero to 90° elevation time of three minutes. With the plates together the array is pointing straight up. The entire elevation drive rotates with the array.

*Selsyn hookups are used for direction readout and may be varied to suit the particular builder. I’ll let you work out your own azimuth system, but my elevation selsyn mount is quite simple. The selsyn is attached to the main array boom and aligned with it. A weight was tightly affixed to the selsyn shaft and, of course, the weight always hangs straight down regardless of the position of the array. The mates to both selsyns are mounted on a panel in the shack. Crude, perhaps, but it gives *one-degree* accuracy, and in e.m.e. you can’t afford less!*

A handy item for telling if your array is pointing at the moon is the RCA SQ2520 photo-cell costing about $2, or its equivalent. This device is sensitive enough to detect the light of even a small sliver of moon. When placed at the end of a 20-inch long one-inch diameter tube and the leads connected to an ohm meter, it is an

---

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

1 *Declination*. Angle in degrees north or south of the celestial Equator (the circle that would be formed at a right angle around the polar axis).
accurate indicator of proper aiming. Obviously it must be mounted so to be aimed along the exact plane of your array. It is useful only at night when the moon is visible.

As can be seen, the problems of mounting, steering and controlling an e.m.e. array are mostly mechanical and must be left to the ingenuity of the builder. Following the basic principles given here on locating the moon the builder may develop his own system.

It has been a pleasure to present these notes on e.m.e. problems, and it is my hope that many of you will become interested in building your own e.m.e. system. — K6MYC

Mike says he will answer individual questions addressed to Mike Staal, K6MYC, 13310 Carrick Street, Saratoga, California 95070. I'm sure he'd appreciate stamped addressed envelopes. Our thanks to Mike for sharing his ideas.

1296 Mc. E.M.E. Test Set

The Crawford Hill V.h.f. Club, W2NFA, has scheduled an e.m.e. test on 1296 Mc. for April 12-14. Dick Turrin, W2IMU, says the tests will be conducted between approximately 2500 GMT, April 12, and 1036 GMT, April 13, and from 0018 to 1057 GMT, April 14. Echo testing will be conducted the first one-half hour of each period. An alternate test period has been scheduled in case local weather or technical problems prevent operation April 12-14. The alternate test period is April 19, 0920 to 1520 GMT, and 0705 to 1632 GMT, April 20.

The equipment at W2NFA includes a minimum of 200 watts output on c.w. or f.s.k.; a 60-foot parabolic reflector with an estimated gain of 44 db. over isotropic, transmitting right-hand and receiving left-hand circular. The receiver noise figure is 3 db. The transmitting frequency will be 1296 Mc., plus or minus 5 kc.

WB2NDJ will be active on 14.335, 21.385 or 28.690 Mc. for liaison. Requests for schedules and reception reports should be mailed to Dick Turrin, W2IMU; Box 45 H12; Collis Neck, New Jersey 07722.

Plans for this test were formulated early in December when G3LTF visited the Crawford Hill Club. W2IMU, who is an advocate of using 1296 and up for e.m.e. work, says he would like to see an annual worldwide e.m.e. weekend initiated. Presumably the date would be coordinated so that large antenna installations would be available for schedules with individual stations. A report on the April test will be in an early edition of this column.

About the Boxes

DXing on v.h.f. and u.h.f. must be at an all-time high according to the number of additions being received for the states worked boxes. It is time consuming to keep the boxes a realistic indication of current activity and past achievements. Some listings are badly outdated due to deaths, loss of interest or relocation. It is therefore appropriate to make a thorough revision of the 144, 220 and 432 standings. After this issue all present listings will be invalidated and new reports are being solicited.

The policy on the listings, perhaps not adequately publicized, is to include only states and U.S. call areas. The distance is not affected by political boundaries. As an example consider W6DNG's 144-Mc. standing of 9 states, 5 call areas and 8850

**RECORDS**

**Two-Way Work**

<table>
<thead>
<tr>
<th>Mc.</th>
<th>Call</th>
<th>Distance</th>
</tr>
</thead>
</table>
| 50 | LU3EX | 9475 | A.E.
| 12.000 | W6EUS | 12.000 | B.F.
| 144 | W6BTC | 6560 |
| 2510 | W6DJS | 2510 | B.F.
| 220 | W6BNC | 220 |
| 2510 | W6DRW | 2510 | B.F.
| 420 | W5LUS | 420 |
| 1150 | W5LUS | 1150 |
| 1215 | W6BNC | 1215 |
| 3000 | W6DJS | 3000 |
| 4000 | W6BNC | 4000 |
| 7000 | W6BRC | 7000 |
| 8000 | W6BRC | 8000 |
| 10.000 | W6DJS | 10.000 |
| 179 Miles | W6BNC | 179 |
| 210,000 | W6BRC | 210,000 |
| 27 Miles | W6BNC | 27 |
| 500 Feet | W6BNC | 500 |

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miles. The mileage is derived from his QSO with OHINL, but the contact with Finland is not considered a "state" or a "call area." Canadian and other non-state-side stations should also report only the 50 states and the 12 U.S. call areas for the state and call area columns. The ARRL WAS rule that all contacts must be made from the same location will apply. One location is defined as an area in which no two operating sites are more than 25 miles apart.

2-METER STANDINGS

<table>
<thead>
<tr>
<th>Call Sign</th>
<th>2-Meter</th>
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The purpose of the complete revision is twofold. First, we get everyone on the same basis for states and call areas; and second, those who are no longer active will not be listed, with the exception of certain leaders, past or present, whose work remains truly outstanding. Listings will be reviewed each 12 months and those stations not reporting activity will be removed, taking into consideration their total standings. W0BPF is going to find it difficult to work his 46th 144-Mc. state, and obviously it is not proper to drop his listing on that account. The ones who will be most affected are those near the bottom of their respective listings, and we hope this attempt at more realistic listings may serve as encouragement to continue active DXing and reporting.

With the current state-of-the-art, a listing of approximately 25 states or less on 144 Mc. from the second call area is not particularly significant, except as it may serve to show a relatively new man's progress up the ladder. The "magic number" for listing depends upon your location; if states from California is a real accomplishment. The same philosophy holds for 220 or 422. We might also publish a 1215-Mc. listing, even if sufficiently, there is sufficient interest.

Please jot down your current standings for each band and mail it to me at 1238 Woodcroft Road; Richmond, Virginia 23235. Submission of a contact list is requested and the most distant station should be noted. Several of you have indicated a wish that the standings appear more frequently, and in the future we shall attempt to publish them every second month beginning with the May edition if sufficient revised listings are received by April 15.

Altering Crystal Frequencies

OVS Burton Lang, VE2BMQ, has been experimenting with the frequency alteration of type HIC/6-A, and other miniature sealed crystals. His method is based on the fact that altering the thickness of the plated electrodes will pull the frequency. Changes of 600 to 4000 k., at 2 meters are possible by this method.

First it is necessary to remove the crystal from the sealed case. This is most effectively and safely done by careful use of a propane torch with a low flame. Gripping both crystal pins in a wide pair of

Harley Hemdon, WA6HXW, of Inglewood, California is one of the regular 50-Mc. observers on the West Coast. He is considered by many to be one of the up-and-coming v.h.f. men.
220- and 420-Mc. STANDINGS

<table>
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<tr>
<th>Callsign</th>
<th>Frequency</th>
<th>W1BEQ</th>
<th>W6QDI</th>
<th>W1DQ</th>
<th>W2AO</th>
<th>W1J1</th>
<th>W1J7</th>
<th>W1K9</th>
<th>W1L0</th>
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<td>K1W1</td>
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The figures after each call rate to states, call area and mileage of best DX.

Both in the solution for a few seconds, an etching of the electrode will reduce its mass and raise the frequency. If a lower frequency is desired, reverse the power supply connections and copper will etch out onto the crystal electrode increasing the mass and lowering the frequency.

When plating or etching it is essential that the process be done in small steps to measure that the desired frequency is not passed, or that the crystal activity is not lost. A little experimentation will show the approximate frequency movement per second of etching, or plating time. It is essential that the electrode not be etched too much as it can become separated from the pin connection. After each step the crystal should be washed with water, rinsed with acetone and dried. The cover is then held in place with a rubber band and the crystal tested in its intended oscillator circuit. If the frequency is not sufficient repeat the etching or plating process. If the desired frequency is passed, reverse the connections and back-up. When the desired frequency is attained solder the cover back in place.

OVS and Operating News

50 Mc. came alive with P3 signals New Year's eve following a solar flare on December 30, and produced QRM the likes of which have never been heard before in Hawaiian on 50. But the band didn't only open from our western states into Hawaii, it also opened into the Caribbean. Some of it may have been EE, but no doubt about it, the bulk was almost forgotten. Numerous reports have been received, and I especially thank KIEEMM, K7CWC, W4O0XX and K6EDX for their early and highly detailed observations.

Apparently the first hint of things to come was K1M7X's logging P2CO on Aruba in Portland, Maine at 1500 GMT, December 31. At the same time aurora signals also were being copied by K1MTY. By 1635 GMT, W4FFQ, Kingman, Arizona was working KP4CR and KP4AST, Puerto Rico. Five minutes later K7CWC worked the Puerto Ricans from Las Vegas. Similar contacts were reported by K9GJX, South Dakota, and WA9FTI, Illinois. K6EDX heard one W4 briefly about the same time period, but that was all for the 31st.

The word had spread, however, that something was afoot and many DXers were on hand Jan. 1. Apparently K1MTY was again the first as he

Cliff Smythe, VE3BZC, of near Toronto, Ontario is a relative newcomer to meteor scatter, but has been quite successful during showers and random scatter schedules. He may be found most nights on 3.815 Mc. looking for 2-meter schedules.

March 1968
reports hearing PJ3CW at 1425 GMT. (Several PJ stations favor 60.25.) At 1645 GMT the band opened for K6EDX to the east coast, closed briefly, and then went wild 20 minutes later with 1s, 2s, 3s and 4s filling the band. K7ICW’s report is almost identical, give or take a few minutes. In Southern California, W6GIXW observed the opening from 1600 to 1825 GMT, except between 1710 and 1750 GMT when the band was quiet.

KI6NS first worked the west coast at 1904 GMT, and K166EEM says his first contact was at 1922 GMT. For the next two hours those two stations were swamped with eager Es until the band closed at 2100 GMT. Reportedly, the best DX of the session was worked at 1945 GMT, KI4KR in Florida to KI6NS.

January 2nd began at K6EDX not showing much promise, the m.u.f. hit only 37 Mc. to the east coast but at 1900 GMT, KI6NS came through working stations from Texas to Washington. KI6NS was surprised to find six open, because he was hearing only a 43-Mc. paging station in Mexico City. That opening lasted about 20 minutes.

These two men have made most 144-Mc. DXers their Oklahoma contacts. Jay, W5ORH, (l) won’t make known his 144 standings, but a guess would be 40 or more states, and Larry, W5UGO, has 42 confirmed.

January 3rd started slow also, but at 1825 GMT, W6GIXW heard 3s and 4s break through, seven minutes later K6EDX heard the east coast followed by V7NA in the Bahamas. The opening lasted until 1730 GMT and all was quiet until 1815 GMT when W6GIXW copied T2NA, Costa Rica. T2NA was working KI6NS, but it wasn’t until 1935 that the Hawaiian was heard in California.

January 4th was apparently quiet, but on the 5th, T2NA worked several stations in California and Oklahoma. On the 6th, W6GIXW worked KI6NS at 1000 GMT. Then on January 8th, KI66EEM worked KI6CH/KW6 on Wake Island at 0100 GMT. The Wake Island station was running 50 watts on 50.4. January 10th produced an interesting observation at W6ABN. He copied the BBC on 41.5 Mc. at 1700 GMT, the first time the BBC has been heard in the Los Angeles area since March 16, 1960. The m.u.f. to the east coast at the time was 40 Mc.

There continue to be second-hand reports of contacts being made between the eastern United States and Africa, but no first person reports have been made to this column although the stations reportedly involved have been queried. Much interesting and valuable information may be derived from F2 and we certainly would appreciate receiving reports from more stations. But no rumors, please!

Several Es openings enlivened the V.H.F. Sweepstakes weekend, Jan. 6-7, and VE1AFB, Nova Scotia, found himself very popular in the midwest and east. Ionospheric scatter was also good during the contest mainly because of more than the usual number of stations active. Thanks for reports by W1HDQ, W4LTS, W5ORH and W8PT/4.

144 Mc. is rather inert this time of year. The daily meteor count is at its annual low and tropospheric conditions are likewise generally poor. The Quadrantid shower, during the first week of January, was extremely poor and only one contact has (Continued on page 164)

Ted, W4FJ, Richmond, Virginia, has been on v.h.f. more years than he probably cares to remember. Recently he became quite active on 432 with 250 watts into stacked 11-element Yagis.
Mike Caveney, VE3GG, ex 2GG, spent most of his 83 years in gold camps in the north of Ontario and Quebec. Now he spends his time hamming and writing. Our reference in a QST "Stray" sometime back to a poem entitled "Silent Keys" written by Mike resulted in an overwhelming demand for the poem. So, by popular demand, we reproduce it here.

Silent Keys

Down through the years, close to 50,000 QSOs,
Like ships in the night, dipping mast head lights
From everywhere around this spinning globe.
Now my ship is harbored, in the sunset of my days.
The feeble faltering of electrocardiograph
Foretells the imminent end, maybe tonight. Who knows?
With dog sprawl my slippered feet come dreams,
Nostalgic memories of fond remembrance.

Where are they now? The legion of the lost,
Those gay companions of my buoyant youth,
Their open spark gaps grunting like unfed pigs,
Those trombone trumpeters tooting the code.
The whirling rotaries which always said "good night."
While pulling motor switch on the last GN
Made music, with a dying fall so like a last farewell,
Which often, to me, seemed to say "never more."
Then the advent of c.w.; what odious comparison,
When first I heard their piping plaints
Cheeping and twittering like timid mice,
Actually daring to QRM the roaring lions on spark
Who rolled like thunder across the night sky.

Well do I recall the chagrin; later, sour frustration.
Listening how effectually their flute like notes
Chewed tiny holes in distance, too small for lions,
Until I at last surrendered, and had to build anew.

I look around me now, note the fast dwindling few,
Washed up on the beach by the tide of time;
Slow moving, priority candidates who await our turn,
That black lined casket called "SK" in a future QST.

Well then, chin up! What about the glorious nights
Weaving invisible webs across the gliding moon,
The breathless ecstasy, the awesome wonder,
A flex of finger only, yet heard around the globe?
Where else could one find such miracles of magic?
Yes, like Cleopatra, I too "have immortal longings."
Yearning somehow to join the legion of the lost,
To sit beside them in their unknown Valhalla,
That bowers from which no traveller returns.

Exchange comments in our mild amazement as we hear
The glamorous multitudes of joyous hams,
Many grandchildren of the men we grew to love,
As they QSO the very stars with casual concern.
— Mike Caveney, VE3GG

25 years ago

March 1943

. . . Our cover shows a studious young man hard at work on radio theory. K. R. Warner editorially urges all hands to spend some time studying, since we can't operate. He also laments the fact that the red tape involved in getting a WERS permit has kept thousands of hams from participating in really worthwhile emergency communications, such as a recent Ohio River flood. We took no part even though many communities and even cities were isolated.

. . . Down in old Kentucky there is a large Signal Corps operation for the express purpose of training pre-service civilians and replacements. Clinton B. DeSoto, W1CIBD, in another of his profusely-illustrated articles tells how the place operates. At the time of publication, the future of this school is somewhat uncertain, even though its value is unquestioned.

. . . The Russian telegraphic alphabet is described by Louise B. Dresser, Editorial Assistant. This looks a little tough, but is no match for Arabie! Maybe some hams will want to use this dope when talking to fellow hams in the U.S.S.R.?

. . . W. J. Mertz, VE4UN, tells how to make a really useful and inexpensive bridge out of old parts from the junk box. With it, resistance, capacity and inductance can be measured with good enough precision for most ham applications. It is a bridge circuit and looks like a real good deal.

. . . This time it is vectors, in George Grammer's continuing series on elementary mathematics. He tells what they are, how we use them and make them behave. Just a little trigonometry is required. If you really want to understand a.c. circuits, you must have a go at these highly useful concepts.

. . . Better read Clint DeSoto's Chapter 2 of his "Who Killed the Signal." This is not only entertaining but intentionally instructive. The "actors" are radio parts.

. . . An exciting letter from Don Leahy, W8TRY, describes an action-packed trip to Russia. He was an RM1 on an armed merchant ship. They got through and he has returned to Brooklyn. A real rough deal in all respects. Don was subsequently cited and promoted for his part.

. . . McMurdo Silver, sort of anticipating s.a.b. techniques of today, has a fine article on "Unscrambling Secret Speech Transmission." This is a speech inverter, wherein low frequencies come out as high ones and vice versa. The circuit is only useful for simple inversions. — W1ANA

March 1968 85
Strays

Stolen Equipment
On the night of January 16, someone broke into the office at the Forrest Hill Church of the Nazarene in Peoria, Illinois and stole a new WRL Duo-Bander 84 along with associated equipment. The thief left the office in a shambles. In his haste to make his departure he overlooked the instruction manual for the equipment. Just in case the thief reads this notice, I would invite him to return to my office any morning and I will gladly give him the instruction manual... and a free sermon on the commandment, "Thou shalt not steal." Harry Gruel, W9AHQ/W9JYA, pastor.

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The Post Office Department promises faster mail service with the new Zip codes. Use yours when you write League Headquarters. Use ours, 06111.

Ray Naughton, VK3ATN (center) is shown receiving the ARRL Technical Merit Award for his moonbounce efforts. Making the presentation is E. J. Wilkinson, Assistant Director, General Radio PMG, while Max Hull, VK3ZS, Wireless Institute of Australia president, looks on.

Going, GOING, GONE! Just a pair of weekends left in the big bash, the ARRL International DX Competition. Phone is slated for March 2-3 and the c.w. windup March 16-17. Full rules appeared in December 1967 QST (p. 60). Plaque winners for the 1967 affair include (on the left) PY2BGL pointing to a nifty addition to his collection for leading South American c.w. entry and, (on the right) H18XAL (dark suit) shown receiving one of his two trophies for leading phone and c.w. single operator in North America. The OM making this presentation is none other than contest pro W3GRF, president of Potomac Valley Radio Club at the time Fred won both sessions. PVRC is "home club" for H18XAL. Figures!

From the Museum of Amateur Radio

Radio transmitter made and used by Robert Anderson, W9MWC, during the Ohio River flood of 1937 to obtain food and supplies for the 1500 inhabitants of marooned Shawnee town, Illinois and to accomplish their eventual flight to safety. The unit was transported at the height of a blizzard, in a small open boat over great areas of water running at flood force, and set up in a raging storm at 12° above zero to establish the first direct communication with relief agencies. For his meritorious performance, W9MWC was presented the 1938 Paley Amateur Radio Award.—W1ANA

86 QST for
**Conducted by Rod Newkirk, W9BRD**

How:

Rocky Marciano's recent victory over Jack Dempsey by computer has wide import. Gosh — no mayhem, no milling mobs. Just shove collected data on reflexas, punching power, endurance, recuperative index, agility, etc., and press the head-out. No fuss, no bloodshed.

It causes us to wonder, with the din of ARRL's 1968 DX Competition throbbing in our ears, if we're not doing this contest thing the old-fashioned hard way. Are we establishing our DX pecking order with too much turmoil now that more orderly scientific procedures are at hand?

Who wins DX contests? More often than not, the best operators with the best stations. If not, then we fail to prove anything anyway and might as well skip the whole thing. Okay: is there a neater way to find the best ops with the best outfits? Apparently there is, or the Rock couldn't have clobbered the Manassa Mauler.

First we obtain certified data from contest entrants. Equipmentwise much information is easily obtainable from manufacturers and the catalogs of distributors. Homebrews, always a nuisance, would have to submit notarized specs. (Perhaps we had best leave homebrewers out of it. What are they trying to prove?) Per-band antenna gain, front-to-back ratios, power, QSY rapidity, receiver selectivity/sensitivity and so forth would be facts easily digested by Mr. Computer.

Station location, another cinch. Just follow SWBC station criteria of terrain evaluation. You know, ground factors, horizon fall-off, etc. Local noise interference would be another factor subject to certification after tape studies. Propagation conditions? Records on file at CRPL, ITU and other sources should permit enough discrimination to match Massachusetts Ones against the Connecticut species for longitudinal and latitudinal variations over the selected period.

Operator capability and condition? Well, this is what the Marciano-Dempsey “fight” demonstrates. No longer do we have to go through the wringer to evaluate these things. No sweat, no strain. Reflex action, code speed, speech and list clarity, timing, endurance — all binary meat for the Big Box.

Yucks — how about XYLs or the lack thereof? Handicap or multiplier? (Don't you dare!) The little woman's role in a contest man's success can be so crucial that no computer could afford to disregard it. As HCITH testifies, "Rita kept the kids quiet, fed me, told people I wasn't home, let me yell throughout the night without a bad word, still treated me as a human being, and is the main reason I scored 2,670,000 points in the '67 ARRL Test." Gee, guys with gals like that should get dividers, not multipliers.

Guess we'd better hold off on this whole scheme for now, at least until they come up with computers courageous and capable enough to tackle such a decisive complex variable. See you in the Test pile-ups next year as usual — XYL permitting.

What:

Less tourism and international expenditures may slow our DX turnover, "he said, but there seems to be more than enough to go around. Since you've doubtless got your own ARRL DX Contest list clutched tightly in hand we'll rest up the "How's" Handbook this month in favor of a smattering of rare DX poput. — "C3BBC, PZIAR, TG8AA, and 6W8CW bring me close to 100 countries on 140. — "K0YXO..." — "Okay sure lively! Passed my Extra." — "AF2HY..." — "Hope to see more QST construction articles, etc., for 100 meters." — "N1BB..." — "Anyone interested in correspondence in French might try KDY2M..." — "N7DOZM..." — "A number of new ham arrivals in the Kwajalein region..." — "K6BDU..." — "Sure with 20 meters would stay with us longer..." — "6Y1YT..." — "Much fun working maritime mobile aboard 90-ft. larketing The Pride on route the Bahamas this winter..." — "K1KX..." — "ZP1ES makes it 38 for my AE-77 and PAR-6..." — "WASP1F..." — "Been working at WFNW/WAF/AM/AF when not hitting 40 at home..." — "WASPZV.

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But, Jeeves, it's supposed to tell us when and where to find our missing multipliers.

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Reprinted from March 1964 QST.

- "Lots of countries and WAC — all I need is some QSLs..." — "W9LYR..." — "W9LYR..." — "My 39's serial number is 0099..." — "W9LYR..." — "Passed my General..." — "W9HBO..." — "Me, too. Not for a new 3-element beam..." — "W9RUY..." — "11200, 90 cw... was my 50th state..." — "W5AMIN..." — "The 5V4 gang plans a lot of 26A6, a.s.a.p. activity..." — "W9SM..." — "Ten is beautiful..." — "W9GZON..." — "961RG, 20 cw... was my best in a long time..." — "W9LGC..." — "Need XYZYL for my call collection..." — "W9HGH..." — "DXperimenting with attic antennas..." — "W9HDO..." — "Haven'tained DX much for years but still interested..." — "W9BU..." — "1121's recent U.S.A. visit was a classic example of international good will and understanding made possible by ham radio..." — "W9XKT..." — "Need Del., Utah, KLF..."
PY1NO and YV1DP are avid c.w. DX diggers with potent signals from the south. In last year's ARRL DX Contest Luis ran a respectable fourth in fierce Argentine competition. Gregorio, signing YV1DP/5, needed just one week end to win for Venezuela with 1470 code contacts. (Photos via W1YYM)

KH6 for WAS... WYVHTL... "Wish DX stations would tune higher into the 21-Mc. novice range." DX HZ2GSS... "DX conditions substantially improved." HZ1YVS... "Score of JA's and UX's on 15." HZ1VPG... "Nightly openings to Europe on crowded 40." HZ1BFF... "Fria in blast in on 15 c.w. around 2000 GMT." HZ1RMM... "Oh, to be an FPM! The Atlantic wall is almost too much." HZ1BQ... "Been a reader of QST for thirty years." Y1NH... "Ham's interested in N6O phenomenon are invited to contact W46FDL." Y1RMR... "Finally worked K1HL after reading and hearing about him for twenty years." Y1HF... "A card from one of my two K1s will save my WAS." Y1RMM... "After 25 years of hammering the DX bug caught up with me." W9DRAK... "Went all the way through school with old friend N3LAAX." Y1RLX... "EL5/LK graduated from Dartmouth a year ahead of me." W9LFF... "This month's North Jersey DX Association DX Round-up at Wayne, N.J., follows the IRE convention by one day." W9PXR... "You're a hideout from under that eye shudder." W9BUHF... "Scorns a shame that so many yuppies are stuffed tight with store-bought black boxes these days." W9TH... "One-hundred-per cent c.w. out here." KE9AI... "ex-K4DRA... "Ready to start tuning off my new 60-Hz. crank-up." W9PAX... "Caught W5TDU/tam off the Ivory Coast on 15 c.w." W9AMI... "Putting the finishing touches on my STL-101 for 15 and 20." W9RIB... "Long a reader, finally a contributor." WA9KCU... "School is QRHing my head" ARI... "10 is a lark in the streets 10. I'll hit 200 by spring. W63GDP/tfl9... "Finally recovering from the holidays overload on my Post Office job." W9ZHY... "Send additional promotion to your bureau to bring on-floor s.a.s.e. in line with new rates." W9A6JQ... "Traveler sent me this in the mail from Montana." W9CGIS... "Busy on 10, 15 and 20 with my new TR-1." W9LQ... "Caught K4BCO and K4BZQ over one morning on G33000 on December 24th..." W9KEC... "Very busy lately but always try to steal some time for rare DX." KF4RT... "Note that our club station, DLAR1, now has its own mailing address." DL4FS... "Postage on one or two ham magazines, if sent an un-rated matter, costs no more than a couple of packs of cigarettes. Let's help our overseas friends." K9VHY... "No 75-meter work allowed in VSB-band." K9HAR... "Let's have more stuff in your 75- and 80-meter sections." O14UN... "Ten days on got me 110 DX stations with a low dipole." O14CFT... "Thank you K5LRAF. W6AANKO AM BE ESB L2H PWG Y10, W6RNNU, W7H1O, K7INA, WABA, W6A280 and WADJFY for generous fade assistance." O14VCI... "Been here in Uganda as a frustrated a.w.l. for more than a year." H53OP... "J39G has a handy filing system for QSL data including first names, QSO dates, etc... W2HE... "Our MARS QSL Bureau is extremely efficient..." 912BDO... "A borrowed Valiant and new 114-AQV bring me back to serious DXing." 92RM... "Power company still puts in an S9 TI signal at my place." W98CHR... "Awaiting M3L's QSL for QSOs on 28,605 kc. at 1500 QMT... W9GRY... "The XYL here works good DX as W411H." H54YOK... "...

Space permitting, next month we'll check band activity with the aid of (20 c.w.) WS Y1YK 3IHXY 41YK 7P0U 88IEX 9ICG 9LNLQ 9S2M 1FWJ 4OZL WAs ICTF 1DMJ FITIU 1HUJ 2P2D 3IRY 8MCQ 8PYN 9TIUH WB2BSS W1IER (20 phone) WS 2DI Y2VQZ 3IHXY 41YK 56EZ 5T2YR 8VG 4I1HOD FLWJ 5LHC WAs 1DMJ 4JDTA 5AUJ 25MCQ 8W5L 9T1W WRS 2JRJ 4JWU KP14DB (15 phone) WS 4IYK 7Q01U 9IQL WAs ICTF 1DMJ FITIU 1HUJ 2P2D 3IRY 8MCQ 8PYN 9TIUH W1IER (15 phone) WS 2DI Y4VNN 9IQL W1KIF, WAs 1DMJ K14P 7AUJ (10 c.w.) WS 4IYK 56EZ 4I1HOD FLWJ 5LHC WAs 1DMJ K14P 7AUJ (10 phone) WS 4IYK 56EZ 4I1HOD FLWJ 5LHC WAs 1DMJ 4JDTA 5AUJ 25MCQ 8W5L 9T1W WRS 2JRJ 4JWU KP14DB (15 phone) WS 4IYK 56EZ 4I1HOD FLWJ 5LHC WAs 1DMJ 4JDTA 5AUJ 25MCQ 8W5L 9T1W WRS 2JRJ 4JWU KP14DB (15 phone) WS 4IYK 56EZ 4I1HOD FLWJ 5LHC WAs 1DMJ 4JDTA 5AUJ 25MCQ 8W5L 9T1W WRS 2JRJ 4JWU KP14DB (15 phone) WS 4IYK 56EZ 4I1HOD FLWJ 5LHC WAs 1DMJ 4JDTA 5AUJ 25MCQ 8W5L 9T1W WRS 2JRJ 4JWU KP14DB (15 phone) WS 4IYK 56EZ 4I1HOD FLWJ 5LHC WAs 1DMJ 4JDTA 5AUJ 25MCQ 8W5L 9T1W WRS 2JRJ 4JWU KP14DB (15 phone) WS 4IYK 56EZ 4I1HOD FLWJ 5LHC WAs 1DMJ 4JDTA 5AUJ 25MCQ 8W5L 9T1W WRS 2JRJ 4JWU KP14DB (15 phone) WP1B and W411H, plus correspondents...

G4CP gives his beam a visual check before hitting the north Atlantic path. That towering QSL stack behind Ron, an outbound shipment, resulted from last year's ARRL Test. G2DC, right, is a multiband c.w. DX connoisseur of wide renown who also enjoys our annual event. (Photos via W1YYM)
Where:

AFRICA — 5G4DW cautions, "After January 1, 1968, there is no longer any assurance that QSLs sent to the East Africa bureau will reach me. Therefore cards intended for my station should be sent via HSGB or to my address in the catalog to follow." Jack suggests us to remind DXers that, while ARRL and many other societies accept and relay QSLs for members and nonmembers alike, some overseas bureaus operate on a members-only basis. So don't count on your QSL via the XU bureau reaching XY2AA unless XY2AA recommends the routing during QSL exchange. I regret that this will be some inconvenience to operators who have already dispensed cards via bureau since that date but I shall be pleased to route QSLs on receipt of QSLs via HSGB or my home address.

WJ7JP writes from Uganda to W2JIT, "We have received cards in the bureau for 5G7BR but I'm sorry to say he was not legal. He was not heard after March 15, 1967, never claimed QSLs and attended no meetings of the Kampala Radio Club."

WV9NQ's QSL manager for ZS1RR, commences January 15, 1968. V9NQ's DPXs indicate that VESIG may be of assistance in confirming contacts with operator Bill of 9E1AQA.

HSGB (International Reply Coupon) required.

SA - WZ1DA bombed KG0ZL in January with a batch of QSLs bound for W6AK. If yours is due, drop Ron an s.s.c.e. to 1029 Geary St., San Francisco, Calif., 94109. W7PHO advises inquiries he has no HV-type QSL cards in his possession since last July. Inmates W2BSSK, "so I will no longer be able to handle QSLs for 4X4C. Unusual cards received have been returned. To verify QSLs received, do as follows: 1) Write WZ1DA, WZ1DE, W2AEP, W6AK, W6BAO, or W6KDSO with request for your call and address. If the address is found, you will receive a note asking for proof of your QSLs. If the address is not found, you will receive a note asking for proof of your QSLs."

OCEANIA — All stations QSOs will receive cards. Please note that QSOs should be held for the next two months. To confirm QSOs, please send cards to K66AFP (K6CAA) at Island Club, 42nd St., New York, N.Y. 10016. John, however, must have QSLs not received before March 1, 1968. Invoices W2BSSK, "so I will no longer be able to handle QSLs for 4X4C. Unusual cards received have been returned. To verify QSLs received, do as follows: 1) Write WZ1DA, WZ1DE, W2AEP, W6AK, W6BAO, or W6KDSO with request for your call and address. If the address is found, you will receive a note asking for proof of your QSLs. If the address is not found, you will receive a note asking for proof of your QSLs."

EUROPE — The present DL1FS has held that call since September 1, 1967, but will receive QSL requests for earlier contacts. QSOs within the United States may be confirmed via the address in the catalog to follow. "If QSL, 100 percent." W5QXZ still awaits cards from many W7s he has worked QSL QSLs and QSLs from DL1LSF. DL1LSF expects overdue logs from QSL, and he is very interested in the QSLs from QSOs. No response. K5XOY, however, has received many QSLs from QSOs. No response. K5WDX has received many QSLs from QSOs. No response. K5WDX has received many QSLs from QSOs. No response.

COH: AMERICA — Reprinted from the DX and courtesy of 28-16, fn CX1DT: "Do not grudge a QSL to anyone who really needs it quick since I have no mailing list. On the contrary, I'm very pleased to know that Uruguay QSLs are sought after by U.S. hams and I feel honored when I am asked for one."

K2JTP talked up a 728-QSO storm in the '67 ARRL Test, finishing as second-high KA, fifth for Japan. (Photo via W1YYM)
VK6s MK and RU, Western Australia big DX guns of long standing, were most hospitable to VK2ADY during Don's stopover there the last year. (Photo via W9WNV)

W5QIG's move to Texas complicated his QSL-management effort. "I'll be out from under and caught up shortly," he vows. ... Bye-bye VP6, hello VP5! W3IBX, W2ORUP and DX News-Sheet correlate new Barbados calls with the old style as follows: VP7AY-VP5GC, VP3AZ-VP5AO, SP3BH-VP5KL, SP6BU-VP3BJ and SP4CG-VP4WR, respective QSL, routes unchanged. W58DR (ex-HI2XAL) advises, "As a cooperative measure with the Union Dominicana de Radioaficionados, K3EST is serving as QSL manager for HI3 MP SVRD and STGP; K0GZK likewise for HI38 BST CN0 and IBC, all after January 1, 1986. S.a.s.o. will get direct reply, otherwise answer via bureau." ... "I've been QSL manager for VP7NA for a number of years and expect the relationship to continue for some time to come," remarks K0GZK, no longer answerable for VP7NP postboard, WABXJ, after a pleasant Bahamian visit, states, "Anyone who worked VP7NA or WABXJ May from December 21 through December 31, 1987, should QSL to my home address with s.a.s.o. Harold preferred me to take charge of QSLing for QSOs made while I was at the helm." ... Time to restate that we normally have no space allocation to duplicate data already available in the Callbook, nor can we usually reply to a given listing more often than every six months or so, and then only when evidence is to hand that the information remains valid. Also note that for direct reply, unless specifically waived, self-addressed stamped envelopes (self-addressed envelopes with International Reply Coupons when appropriate) should be included in mailings to QSL managers listed in designated sections. Stickers, this is good practice when seeking postal response from anyone. Now perhaps one more of these will hit the spot, but keep in mind that each item is neither complete, accurate nor "official." .

C6FECZ, via K5BQX ex-GM2SW-CQ2SW (to KP4CRT)
C08MN, A. Soto, P.O. Box 102, Bayamo, Cuba
C0R6T, P.O. Box 322, Lavandia, Argentina
D14FS, Bernie Whale, CMR Box #188, APO, New York, N. Y., 091857 (see preceding text)
D1LHR, Club Station, CMB Box 2174, APO, New York, N. Y., 091857
EP2DF, SFC D. Willett, US Astronautics, Tehran, Box 1500, APO, New York, N. Y., 091857
FR7A ZO/4 ZO/4, P.O. Box 4, St. Clotilde, Reunion Is.
HI37MP SVRD STGP (via K3EST; see preceding text)
HI38 BST CN0 IBC (via K3EST; see preceding text)
HS1AF, 49 Sot Atavimal, Rajaprue Rd., Bangkok, Thailand

4S5CEY ropes out some c.w. from Caracas with the obvious approval of his dad, YV5BWP. (Photo via W3HMK)

Is 4RUF 6FRU (via I1IZZ)
K6HLL/K0G6, O. Johnson, P.O. Box 1048, APO, San Francisco, Calif., 94105
K6BEG/6, R. Dreyer, % Granger Associates, P.O. Box 11273, Palo Alto, Calif., 94306
K6BEDY, USCG Long Sn., USNS Box 36, FPO, San Francisco, Calif., 96414
MP4MBC, Amateur Radio Club, RAF Mafrastrah Is., BFPO 69, England
O4GNET, Nestor, Base Naval del Puerto, Callao, Peru
ON4UNJ, J. Devoldere, Box 47, Ghent 1, Belgium
PK1SH, Box 2147, Dickast, Indonesia
PK5YX, Harmano, 28, Bandung, Indonesia
PK5YF, Posen, Tjipantangan 148, Bandung, Indonesia
PK5YYZ, Lemong St., 25-A, Bandung, Indonesia
PY7ATH, C.P., 075, Portobelo, Costa, Brazil
PZ1BX, P.O. Box 2003, Paramaribo, Surinam
PZ1RF (via W3HMK; no incoming text)
SV0WH, P.O. Box 99, Rhodesia, via Crocex
TJ1AO, Box 49, Yaounde, Cameroon
UNQO, V. Ignatov, GPO Poste Restante, Novocheeba, 30, U.S.S.R.
UP2OV, Box 310, Kaunas, Lithuania 59-23, U.S.S.R.
VE4CDP/W9J, D. Clements, 400 Summit Dr., RJ 1, East, Ill., 60021
VE3DXY/W6, A. Montes, 530 Walker Dr., Mountain View, Calif., 94040
VK4HH, J. Hamilton, 37 Byfield St., Reservoir, Victoria, 3073, Australia
VP7EA NA NP (as preceding text)
WA2CQ/W5, Vonne Yone, P.O. Box 55, Ilo, Peru
WB6XHO/K1H (to KH6QGR)
XE1GR, P.O. Box 154, Puebla, Puebla, Mexico
YMMJ (via G. Baker, W8GHU/5, 113 Maple Ave., Dalhart, Texas, 79022)
YV3AID NO, J. Towar, P.O. Box 18, Maraca, Venezuela
YVL6C/1 (to K0BKN)
ZUBAN, P.O. Box 209, Nizamay, Niger
Z5DW, G. Perrott, P.O. Box 834, Nakenur, Kenya (see text)
ZQ7AM, Box 215, Kilgawen, Malawi
7X2VJ, V. Gogones, Box 105, Oran, Algeria
8P6A AZ BH BU CG (as preceding text)
8LZL, J. Wahn (W4PPM), Box 18, Chisuma, Zambia
9NB1UZ, Box 176, Kathmandu, Nepal
9O5G, Box 377, Mubimayi, R.C.
9O5P, P.O. Box 3172, Kinshasa, R.C.
9VNY, R. Helsop, 34 Poublen Ct., Jalal Kayu, Singapore
9X8AA, B.P. 28, Kigali, Rwanda

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QST for
4X4s YY UH and SO, left, center and right, are typical of Israel's thriving DX community. Scholar 4X4SO hopes to visit our country soon to study for his doctorate. (Photos via K3MNU, Ws 3HNK and 21WP)

90255; attm. K0CQP, Ontario DX Association Long Skip (VE3DLO), Southern Bulletin DX Club (W4AJP), W2MX, and W4AXM for her next. The line forms near 14,000 kc, around 0100 GMT. From W2DQ via W2AEP: "Why no W2MQD signals to the States these days? I left for my two heads and a box at Hailing estate which was sold in March, then spent four months at a temporary location before going to England on leave. Since December I've been at Redshad with only my TR-4 and trap dipole. Not sure I'll remain here,"

W3HJT visited J36BG's 290-ft. high shack at Omaha recently. "You should see his collection of TT cards. He finds VP2 the hardest area to work from there. Watch for him on 21,000 kc, almost daily at zero GMT."

U2MOH's friend JA2PO recounts his hard years in Lines to WIYYM translated by W1ARR of Hq. After apprenticeship on u.h.f., from 1956 to 1960 Vladimir hit the h.f. DX trail from club station UA2KCI. Since 1961 JA2PO has served as Novosibirsk Radio Club's QSL bureau manager. Vladimir delights in 14-M frequency contest work with his UA1FA-designed 100-watt transmitter and rotor drive, also trying 20-MC occasionally. Eastern oddments via the clubs press: AP2AQ wants to try East Pakistan again, meanwhile representing the West with AP2s ES and 9E on 20 voice. OD5BZ still points toward Qatar. H23TYQ of ArAmCo may be available for more rare DXexcursions out his way.

AFRICA — Uganda commentary courtesy Kampala-based W90IP via W2CWH: "At present the only active licensed stations are 5X5K and J2K, the former in Jinja, the latter in Kampala. I'm sharing a embassy and providing signed BV1USA, KR56U and DL4OP. Due to an emergency situation, recently extended another six months, I am unable to become licensed. However, I have members with G calls (one is S4ZL) who also obtain Uganda license. Kampala Radio Club, 5X5X, meets Tuesdays at 1700 GMT and uses three frequencies on 21,350 kc."

G3BID, back in the Gambian as Z6UF, hopes to visit Senegal as G3BID/6W8X. Africa addenda courtesy DX club netwoks: Red Cross press EA3S FP and TU (HB9Fp and TU) followed E4BCM (HB4CM) with January radiations from Fernando Poo. YQ5C90 of Changsha notes 11,020-1,010 kc. at 1200-1500 GMT. FR7A ZO/g and ZQ/g around 20-meter Glorices interest, F8TAN adds a fresh Niger note to 15 and 20 voice. 3Y8BZ's closeout detail from Tunisia. CN8S FP and FS switched Stateside with 1500-2000 VV to follow this month. Z65K is due for qRQ after turning out more than his share of Amosont wallaper. . . . CT3AV is devising a.u.b. gear but the Azores remain straight-a.m. territory. . . . Ex-TI88W-SV9CA (W2TQ) greets friends on 21-Mc, 0100 GMT via 21MC.

OCEANIA — "We recently installed a new trilateral beam," writes K6GIC's KBWXY from Iwo Jima. "(Continued on page 53)"

March 1968

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UV/8P, left, takes a breather between 14-Mc. openings while UAP0D keeps an ear on the band. Some of UA8/KFG's skywiring is in view. Yes, ham radio's booming in Siberia. (Photos via W1s ARR and YMY)
That Unanswerable Question

In early history there was the riddle of the Sphinx that no one could answer. Pilate asked "What is truth?" The smile of Mona Lisa is still a mystery that men try to solve. Every YL operator has, at some time, been asked "What ever made you get into this?" And, like the old riddles of the ancients, it isn’t easy to answer.

Why do we find ourselves learning a new language? Working over a machine that emits little beeps of sound, and sweating to be able to translate that sound easily and quickly? Why do we feel we are no longer satisfied with the on-off switch and the volume control of the radio, but must learn the inner workings and the underlying theory behind it? Ask any YL, ask yourself, and there is a pat answer: I heard amateurs talking and wanted to do it too; well, I was recuperating from surgery and had to do something to pass the time; it was in self defense so I would know what the OM and our son were talking about. These are some of the stock replies. It is no more easy to put our reason into words than it is for people to tell why they enjoy mountain climbing, collecting Spode “Blue Castle,” or rock hunting.

Certainly there is an interest that sparks it; if there weren’t none of us would have taken the time and trouble to find out how one went about acquiring a license. The interest grew to curiosity, or none of us would have wasted through all that dry theory that had once touched us briefly in science classes in school, and then was conveniently forgotten once we had passed the course. There was the challenge of the code that a beginner once described as sounding like a lot of crickets on a summer night, and the excitement of finding out that it was just as intelligible as any other language. So, that original interest sparked curiosity, which in turn developed into a desire for the thrill of talking to other people who were not those familiar friends in the bridge club, or the second-cup-of-coffee chat with the next door neighbor, but broadening it so that the familiar friends were spread over several states, and that over the back fence chat was with a YL half way around the world.

The interest and curiosity are only part of the reason, perhaps the real answer to the question.

---

WN9TVM. "Becky" has worked and confirmed all 50 states since receiving her Novice license. She recently passed General class and can be found on 80 and 15 meters. She shares the station with OM Marv, WN9TVJ, and their daughter Kathy, WN9TVE.

lies in a statement made by the wife of an amateur who said "My husband would like me to get a license, but I just can’t be bothered.”

There is one time when we ask ourselves that question. The night when, armed with our license and the gear all warmed up and the CQ called, we hear our own call coming back for the first time! As we start to answer with a hand that behaves like a jackhammer on the key, and in that moment of buck fever every bit of that painfully learned code leaves us, we ask ourselves “What ever made me want to get into this?”

---

28th YL Anniversary Party 1967

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PHONE SCORES
C.W. SCORES:

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C.L.A.R.A.

The Canadian Ladies Amateur Radio Association, the centennial project of the Ontario Trilliums, has been officially formed. The members of the executive committee who will guide this newest of YL organizations are:

- President, Chris Weeks, VE1AKO
- Vice President, Donis Booth, VE6ATH
- Secretary/Treasurer, Marion Inkman, VE7BQY
- Disbursing treasurer, Sally Ranti, VE2K0
- Publicity, Bubbles Timlick, VE4ST
- Editor, Thelma Woodhouse, VE3CLT
- Sunshine chairman, Vera Hines, VE8III
- Sponsored by the T.O.T., and Sparkettes, the development and expansion of C.L.A.R.A. depends on the support and interest of all Canadian YLs who are invited to join this all-Canada YL Club.

Claire Bardon, W4TVT, 1968 Vice president of YLRL.

March 1968
Madge Mason, WA6LWE/N0RAG

If she is presiding at the YLRC-LA, or the Ramona Radio Club of San Gabriel, or chasing DX, or chatting on the Tangle Net, she is WA6LWE. If she is in the Navy MARS circuits, v.h.f. or Mainline Nets, she is N0RAG, but always Madge, and always busy.

Madge was licensed in 1960, and joined Navy MARS when it first started. For a while she was working with the 602 stations picking up traffic from the Pacific area, and relaying it on v.h.f. at night for delivery five days per week. This past year, due to other responsibilities, her activity has tapered down to two days a week with liaison the night before on the v.h.f. nets to pick up traffic for relay on her Mainline schedules the next day.

Madge Mason, WA6LWE/N0RAG.

A member of YLRL, and formerly District Chairman for the Sixth YLRL District, Madge is the 1968 president of YLRC of LA, and as if that weren’t enough gavel pounding for one month, she is also president of the Ramona Radio Club. Her interest in Amateur Radio is v.h.f. nets and DX, when she isn’t busy with her MARS skeds.

The Masons are a ham family with OM, Bob, W6EZK, and their son Paul, W6EUZ. A daughter, Luise is unlicensed, but Paul’s wife, Judy is studying for her Novice license.

VE7TH, B.C. “Ham of the Year.”

When her son, Arthur, left Victoria to become a radio operator at Great Bear Lake, Freda Muskett decided to get a license so they could keep in touch. Arthur gave his mother a deadline of six months to get on the air, and she made it in three! As Freda puts it, “It wasn’t just the code, it was the great deal of trading and scrounging, and improvising to gather all the parts.” But she found them and managed to get her gear built and on the air.

During World War 2, she was off the air but that did not stop her interest, rather she worked with airmen to help them increase their code speed. This activity has been carried on since then, and she still gives weekly code classes in her home.

For her long time service to others, as well as her good operating ability, and her selfless lending of her home to the Victoria hams who need work shop space, VE7TH was awarded “Ham of the Year,” by the B.C. amateurs at a dinner on December 8, 1967.

While c.w. is her favorite form of emission, she is presently studying for her advanced license so she can have phone privileges as well.

VE7TH, Freda Muskett, B.C. “Ham of the Year.”

B.A.R.T.G. SPRING RTTY DX CONTEST

The British Amateur Radio Teletype Group is sponsoring a Spring RTTY contest that will run from 0200 GMT on the 2nd of March to 0200 GMT on the 4th of March. Stations may not be contacted more than once on any one band (80 through 10 meters), although additional contacts may be made with the same station if a different band is used. Use the ARRL Country list for country status. However, KI7, KH6, and VO will be considered as separate countries. The message exchange will consist of message number, report (RST), time in GMT, and country. All two-way RTTY contacts with stations in one’s own country will earn two points, with stations outside one’s own country earning ten points. All stations will receive a bonus of 200 points per country, including their own. The countries worked total is an accumulation of each band total. Scoring will be done as follows: (A) Two-way exchange points times total countries worked. (B) Total country points, times number of continents worked. Add A and B for total score. Logs and score sheets should be sent to B.A.R.T.G. Contest Manager, Alan Walmley, G2HIO, The Firs, 3 Trinity Close, Ashby-de-la-Zouch, Leicestershire, England, not later than May 1, 1968.

Visitors to the IEEE convention who are accustomed to including the Single Sideband Show in their activities will be glad to know that it is being continued this year under W2AYA’s sponsorship and will be held Tuesday, March 19, from 12:00 noon to 9:00 P.M. in the Penn Top Room, Statler-Hilton Hotel, Seventh Ave. at 33rd Street in N. Y.C.

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.
Sending Code Spaces. With so many of us bumping to get our code speed up to the required 20 for that coveted extra class license, this is a timely subject. Recently, we have exchanged some most interesting correspondence on the subject of code with W2JMZ and WA6NQQ. It all began when the latter questioned the former's "baud" count in his call letters. In the ensuing discussion of who was right and who wrong, a few basic principles about code were observed which might be of assistance if passed along to the fraternity.

It is common knowledge that the length of the code "dah" is three times the length of the "dit." What we fail to consider, sometimes, is that a dah would not be a dah nor would a dit be a dit unless it has spaces both before and after. Absolutely obvious! Absolutely! Then why mention it? Because the length of those spaces is just as important to proper code formation as is the "key-down" length of the dit or the dah itself. If you don't have space between dits and dahs, you'll have a continuous tone. If you don't have proper space between code-sent characters, you'll have continuous dits and dahs and will be unable to distinguish one character from another. If you don't have proper space between words, you'll have continuous characters and will have great difficulty in separating them into words.

Still pretty obvious, isn't it? And yet, judging from some code we have heard, proper spacing is fearfully neglected in the jumble of dits and dahs which are supposed to make intelligence.

A comprehensive treatise on this subject could occupy many pages (and we just might write one, some day!), but for the moment, let's consider just a couple of principles. First, that each dit or dah must have a minimum spacing after it in order to be a dit or dah. Second, that the length of the spacing required is just as important to proper code transmission as is the length of the dit or dah itself. Therefore, the spaces are an integral part of the code, and the concept of the 3-to-1 ratio between dabs and dits is meaningless.

The unit of time in code is called a "baud." The key-down part of a dit is one baud, but it must be followed with at least one key-up baud to make a dit be a dit. The key-down part of a dah is three bauds, but again it must be followed by a baud of space. Thus, a dit is two bauds, a dah four bauds, and instead of a dah

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**Operating News**

**GEORGE HART, WINJIM, Communications Manager**

**ELLEN WHITE, WYXW, Deputy Comms. Mgr.**

**Administration: LILLIAN M. SALTER, WIZIE**

**Contests: ROBERT HILL, WIAAR**

**DXCC: ROBERT L. WHITE, WIWPO**

**Training Aids: GERALD PINARD**

**Public Service: WILLIAM A. OWEN, WIEEN**

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**OPERATING EVENTS (Dates in GMT)**

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<th>March</th>
<th>April</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-30 IARC Propagation Research Competition (p. 75, Feb. QST).</td>
<td>2 Qualifying Run, W6OWP</td>
</tr>
<tr>
<td>2-3 DX Test, phone (p. 60, Dec. QST).</td>
<td>5 Qualifying Run, W6OWP</td>
<td>2 LO Time (League Officials only).</td>
</tr>
<tr>
<td>2-4 BARTG Spring RTTY Contest (p. 91, this issue).</td>
<td>6 LO Time (League Officials only).</td>
<td>4-5 Nebraska QSO Party</td>
</tr>
<tr>
<td>7 Qualifying Run, W6OWP</td>
<td>16 Qualifying Run, W1AW</td>
<td>11 PMT (ARRL Official Observers, only).</td>
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<td>9-10 QL OM Contest, c.w. (p. 60, Dec. QST).</td>
<td>20-22 CD Party (c.w.)*</td>
<td>11-12 DX-CCA Contest</td>
</tr>
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<td>16 Qualifying Run, W1AW</td>
<td>27-28 Ohio QSO Party (p. 104, this issue).</td>
<td>15 Qualifying Run, W1AW</td>
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<tr>
<td>10-17 DX Test, c.w. (p. 60, Dec. QST).</td>
<td>FACC (p. 91, this issue).</td>
<td>June 8-9 VHF QSO Party</td>
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<td>18 W1EA High Speed Code Test (p. 97, this issue).</td>
<td>27-29 CD Party, phone*</td>
<td>22-23 Field Day</td>
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March 1968 95
being three times the length of a dit, it is actually only twice as long. Since you can’t do without spaces, we can now talk in terms of ‘keying cycles’ instead of bauds, to simplify things. But it is simpler only if you consider that one keying cycle is equal to the key-down baud of a dit plus the minimum key-up baud. Thus, each dit is one cycle, each dah two cycles. Separation between code characters is one cycle, between words two additional cycles, and at the end of the sentence two more additional cycles—or a total of one between characters, three between words, five between sentences. In every case, the number of cycles required includes the minimum space before beginning the next character, word or sentence.

Sound pretty technical? It’s just one of those things that are basically absurdly simple but not universally understood. What we are really trying to say is that spacing is a vital part of code and is the thing most grievously neglected in so much sending we have heard. Watch your spacing! Better to exaggerate the spacing between words than to omit it. Better to enlarge the spacing between letters than to make AN sound like P,

ME like G, GET like GA. Don’t forget that when you are sending code you are also sending spaces.

**Copying Behind.** Stuck at fifteen w.p.m.? Many prospectives extra-classers throw up their hands, say they just “aren’t the type” who can master the code. Poppyeck! Anyone who learned to talk can learn the code. The latter is a hundred times easier. What happens is that you reach a “plateau” beyond which you cannot progress unless you change your method of copying. You have to stop copying letter-by-letter and start copying syllable-by-syllable.

To most, it comes naturally, just as it came to you through the years in copying the spoken word. You don’t copy each sound, you listen to a phrase, store it in your memory while you are writing it, and at the same time listen to the next phrase you expect to copy. After a certain point in progress, you do the same thing with code.

The typical progression goes something like this: first you memorize the code as dots and dashes, and an A is a dot followed by a dash. When you first hear it, it sounds like dit-dah.

### BRASS FOUNDER'S LEAGUE

**Winners of BFL Certificate for December Traffic:**

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QST for
Soon you start hearing it as di-dah, with the dit and dah sort of hanging together like a unit. After more practice, the di-dah becomes a single sound, like the letter I (ah-ee) does in speech, and it directly triggers your reflexes as the letter A.

Some learners stall at this point. They think this is as far as they need to go. For 13 w.p.m., even 15 w.p.m., maybe it is. If your mind is particularly alert, you can even go faster by this method. But sooner or later everyone reaches the point where he cannot progress in speed any faster unless the process of "storing" these sounds as single units can take place.

Try this: Instead of copying a word letter by letter, wait until the whole word is sent, then write it down. Start doing this at a slow speed which you can copy easily. Once you can copy solidly this way, increase the speed until you have difficulty, practice until you master it, then increase the speed again. (On long words, take a syllable at a time.) You will find there is almost no limit to your progress once you have mastered this method. Your mind can work faster than your hand; the ultimate limit is the physical one of putting it down. Twenty per is duck soup, if you can write that fast. Forty per comes with coordinating your typing to copying code. And brother, when you have mastered the code you are getting the full measure of benefit and pleasure out of amateur radio. — WINJMJ.

ARRL CERTIFIED AT 35-W.P.M. — JANUARY TO DECEMBER 1967

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<th>W8MCMQ</th>
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<td>W3JAYW</td>
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* Endorsement Sticker

C. D. ARTICLE CONTENT

This Communications Department article contest, a continuation of the very successful QST Article Contest during the 1964 anniversary year, needs your best ideas (in 800-1200 words) relating to League organization, clubs, training exercises, and operating techniques. Periodically, the best articles submitted for this "CD Contest" will be chosen to appear, with the winner electing to receive (a) a bound Handbook or (b) a QST binder. League emblem and the ARRL DX map. Our winner this month is Stanley R. Babcock, W6HIVP, and his article appears below.

DIVERSIFICATION IN AMATEUR RADIO

Stanley R. Babcock, W6HIVP

Some amateurs find themselves in a rut, doing the very thing pertaining to amateur radio every day. Soon they get tired of it or become concerned with very different modes, operating opportunities and endeavors in amateur radio for us to take advantage of, if we would only diversify our activities.

For instance, on Monday we could be chasing DX using International Morse. Tuesday might be DX chassing on phone. Wednesday could be our night for the traffic nets. This could branch out from Section to Regional then Trans-Continental Corps (TCC) which is the trunk line of the National Traffic System. Thursday could be spent working locals on v.h.f. and might benefit building a home project. Saturday you could operate radio teletype. Sunday you might get on the Novice bands and work the new people who need a little help in procedure and operating habits.

This is only the beginning of diversity. Other things that can be done are: code practice sessions nightly or weekly; handling messages for the boys overseas (or on the ships at sea) and for missionaries in remote areas. For that matter, for any remote place where commercial means are available. But there are so many different modes, operating opportunities and endeavors in amateur radio for us to take advantage of, if we would only diversify our activities.

Some amateurs find themselves in a rut, doing the very thing pertaining to amateur radio every day. Soon they get tired of it or become concerned with very different modes, operating opportunities and endeavors in amateur radio for us to take advantage of, if we would only diversify our activities.

HIGH SPEED CODE, ANYONE?

It's about that time again. On March 18 at 0130 GMT (remember, you guys who still, in spite of everything we have said, insist on using local times, this is Sunday evening, March 17 at various times by your clocks), W1ELA, club station of the Connecticut Wireless Assn., along with four volunteer stations, will transmit this Nineteenth Semi-Annual High Speed Code Test. Frequencies used by W1ELA will be 3837 and 7120 kc.; by W5QM, 3665 kc.; by K6DXY, 3990 kc.; by W6E0T, 3640 and 7115 kc.; and by W8FA, 5653 kc. The same text will be used in all transmissions, which will be synchronized radio. Call-up for the test will commence at 0115 GMT, with a plea for a clear channel while prospective copiers are finding the station with the best signal at their locations. At 0130 GMT, important instructions and rules will begin, transmitted at about 30 w.p.m. (if that's too fast, you won't be much interested in the rest of the test anyway!).

This time, we begin with high speed first. At 0150 GMT, five minutes of text will come at you, at 60 w.p.m. This will be followed by similar five-minute transmissions at speeds of 55 w.p.m. at 0200, 50 w.p.m. at 0210, 45 w.p.m. at 0220 and a merely 40 w.p.m. at 0330, by which time all but the novices will have stopped copying.

This test and program are intended to supplement the ARRL-WIAW program which leaves off at 35 w.p.m., but it is not put on or sponsored by ARRL; all work is done and arranged by stations mentioned above. If you don't think you can copy 40 w.p.m., try it anyway. What can you lose?

* 1714 West Fedor, Fresno, California 93705.
Meet Your SCM

Oklahoma SCM Cecil C. Cash, W3PML, was first bitten by the amateur radio bug in Japan in 1947 while with the army. After returning to Korea in early 1948 he was licensed to operate HL1AQ and received his current call in 1949. In 1956 he operated DL4SS in Germany and was active as president of the Heidelberg Amateur Radio Club. W3PML retired from the service in 1961 returning to Lawton, Oklahoma. He’s currently serving as a radio instructor for the U. S. Government.

This active SCM is principally interested in net operation and traffic handling and, additionally, holds the appointments of PAM, OPS and OYS. He is an active member (and past president) of the Lawton-Fort Sill Amateur Radio Club. His activity is principally on 80-40-20 with a transceiver. When time permits, Cecil enjoys camping, hunting and fishing.

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**DX CENTURY CLUB AWARDS**

From December 1 through December 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

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### Endorsements

Endorsements issued for confirmations submitted from December 1 through December 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.

### Radiotelephone

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98 QST for
WIAW SCHEDULE, MARCH 1968

The ARRL Maxim Memorial Station welcomes visitors. Operating visiting hours are Monday through Friday 3 P.M.-8 A.M. EST, Saturday 7 P.M.-2:30 A.M. EST and Sunday 3 P.M.-10:30 A.M. EST. The station address is 225 Main St., Noroton, 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.

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1 C.W. OBS (bulletins, 18 w.p.m.) and code practice on 1,005, 3,555, 7,080, 14,111, 21,075, 50,7 and 145,6 Mc.
2 Phone OBS (bulletins) on 1,005, 3,555, 7,080, 14,288, 21,405, 50,7 and 145,6 Mc.
3 RTTY OBS (bulletins) on 3,025, 7,045, 11,005 and 21,025 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: 21,025, 21,141, 28,082 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 170-850 cycle shift, repeated with 650-cycle shift. Maintenance Staff: W1A QIS WFR. * Times/days in GMT. General operating frequencies approximate.

CODE PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from WIAW will be made Mar. 16 at 0230 GMT. Identical tests will be sent simultaneously by transmitters on listed c.w. frequencies. The next qualifying run from W60WQ will only be transmitted Mar. 7 at 0530 Greenwich Mean Time on 3550 and 7129 kc. CAUTION! Note that since the dates are given per Greenwich Mean Time, Code Proficiency Qualifying Runs in the United States and Canada actually fall on the evening previous to the date given. Example: In converting 0230 GMT Mar. 16 becomes 2130 EST Mar. 15.

Any person can apply. Neither ARRL membership for an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted, 10 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m. you may try later for endorsement stickers.

Code practice is sent daily by W1AW at 0000 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, 14, 10, 13, 29 and 25 w.p.m. For practice purposes, the order of words in each line may be reversed during the 5 through 25 w.p.m. tests. At 0000 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 WIAW (but not on the air) and to allow checking strict accuracy of your copy on certain tests note the GMT dates and tests to be sent in the 0230-0320 GMT practice on those dates:

Date Subject of Practice Text from January QST Mar. 1: It Seems to Us, p. 9
Mar. 5: Teroidal-Wound Inductors, p. 11
Mar. 14: The 50MHz Communications Receiver, p. 22
Date Subject of Practice Text from Understanding Amateur Radio, First Edition
Mar. 22: Overmodulation, p. 83
Mar. 27: Voice Power, p. 84

*Speeds will be sent in reverse order, highest speed first.

Happy faces depict the occasion at the dedication of the Lake Success Radio Club station, W2ZQG, at the Sperry Radiocat Facility of Long Island, N.Y. The 10-year-old ARRL club is active in contest work and is a perennial highscorer in the annual Field-Day Contest. Shown (l. to r.) are W2AXL (V.P. and General Manager of Sperry Gyro Div.); K2JWT (V.P. of the radio club); K2IDB (SCM, NYCL); W2TZK (Hudson Div. Director); Mr. Adelson (Director Industrial Relations, Sperry-Rand); and seated is W2NBH (President of the radio club).
• 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. Proctor, K3NYG—RM: W1R7B, PAM: W2DXD, K3KGF closed out the year with 360-plus QO notices, W3GSM received a new Galaxys transceiver, W7WLO is planning his report for the year Christmas. W7WJO is doing on his recent trip to Australia. Because of my leaving to attend the wedding of my father in Kansas I had to cancel this column early and will complete the traffic report next month. Traffic: W3EBE 98, K3JMPZ 65, W3GSM 17, K3KRAJ 3.

EASTERN PENNSYLVANIA—SCM, George S. Van Dyke, Jr., W3ELI—SEC: W3NEL, K3M, K3AYO, K7QW, W3ZHM, PAM: K3MYS, V11F, PAM: W3GQG, EPA, QNI 448, QTC 851, PFSN, QNI 528, QTC 1155, PTTN, QTC 457, EPA, V11F, QNI 301, QTC 834. Reports were received from W3K6G, W3KXG, K3KGF, K3RDT, K3MYS, K3HNP and K3PSW. QVS reports from K9AXV, K9MSG, W83BYW, W7ZHR and W3CXZ: QO5R was reported by K3KFU and PMT active (p.p.m); 29, 29. 7, 5. 7. 7, 7, 7, 7. The following made the BPL: W3EJNO, W3JII, W3QPU, W3CUL, W3V3L, K3W1K, K3NYG, K3KU6A, K3N9U, K3ZPB, W3AQ3T, W3CEC, W3GQG and W3A8OJ. K3KPC is ex-K3KGF, W3QCO is doing a real bang-up job on the EPA, V11F. Net. W3Q1PX reports that PTN has broken all previous records for QNI and QTC. W3KJ is going completely solid state, WASEMO built a t-r, s-w. K3YV now gets his back. W3A7FI passed the Advanced Class exam, W3XJR is ex-W3VUB, W3AXL is now on the air. W3V3L has his annual report while home from school. K3NSN is working hard with the handicapped. W3YPF is getting a taste of DX. K3XWJ is really getting into it. K3FCA will be coming from Pennsylvania State university too, W4VR reports he is working hard now that he is retired, W3CUL is losing his patience and wants to try to upload traffic. W3EU6 has a new DX-100, W3AGAT is awaiting warmer weather for his installation on a tower and quid. W3FAP is closing in on 3000. pH on 1050 kHz is now the highest. K3QNY: back from RYN, W3AXSV wants dope on QRP rigs, K3KXO and W3G8ML are burn, W3NCR is a real busy one. Santa brought WAGUL on a new EPA, W38UEK is a big help on PTN, but most of his work is now handled by PTN and W3ON. K3KGF is now located at RCA Lancaster. K3KWEU wants to thank all of the people that have helped him on DX. K3SO9 is now the Philadelphia pick-up point. W3JFKF is taking part in a school science fair. K3KGY reports 1067 EPA, QNI 155, QTC 834. The Philadelphia Amateur Radio Club are W3MHR, pres.; W3OWK, vice-pres.; W3KJK, secy.; K3NL, treas.; W3ADV, dir. Check the note for the latest information on our spring activities and plans for a joint picnic. Traffic: (Dec.) W3CLU 9144, K3KGM 1069, W3YR 1294, W3ENL 1025, K3REB 1131, W3CLU 1156, W3CLU 5593, W3K8J 346, W3J1EC 246, W3J3TAQ 327, W3XF 306, W3AXS 305, K3BYA 399, K3KU6A 387, W3ELI 248, K3FYG 227, W3AXS 203, W3JRAH 218, W3AXS 174, W3V3L 169, W3AXS 160, W3AXS 157, W3JFC 134, W3AXS 129, W3AGL 112, W3N9L 198, W3AXS 184 with W3JRAH 70, K3TNL 67, W3KJ 90, W3ACD 53, W3OY 39, W3N7D 49, K3RAU 45, W3ALS 44, W3RV 44, K3MDO 42, W3AXS 38, K3N9L 36, K3AXA 25, W3AXS 22, W3HHT 22, W3MPR 22, K3J6K 20, K3PJO 24, K3V3F 20, K3KUO 20, W3AIO 17, W3AXS 15, W3AXS 11, W3J1HE 10, W3AVT 8, K3AML 7, K3FOB 6, K3SSG 6, W3WFF 2.

的空间
Great Lakes Division

KENTUCKY—SCM, Lawrence P. Jeffrey, WAKFEO—SEC: W4OYI. Appointments: W4FBOT as OBS, W4SAMS as OBS.

Mississippi—SCM, S. H. Hairston, W5EMM—SEC: W5JDF. The Mississippi Emergency Net "T" was originated Dec. 27, 1967, with W5AXY as net mgr., with an assist from WAFKE. This is a teenage net and the first of this type in our section. The net meets on 3880 kc. at 1720 CST. I was glad to attend the Jackson ARC yearly banquet and election of K50FE, pres., K550H, vice-pres., W5KUF, treas., W5VANY sent me a very good report of the Mississippi Sideband Net activity. They are really handling traffic, as WAFKE and we know K2AEW is hard at work. We hope he will come back to the States. He operated TF2WJO in Iceland. His YL is now W5QTC. The Mississippi C.W. Net has had added interest, with W2XX and W5KUF working W5WJY making this possible. Marty, with her new call WASSK, is doing a fine job from Columbus. I can't praise WWMQ and WASSK enough. We all hope they will remain kev in the operation of the Miss. Sideband Net. Check into our nets: Sideband Net, daily 1813 CST, 3880 kc.; Gulf Coast Sideband Net, daily 1905-2035 ke.; Miss. C.W. Net, daily 1845 CST, 3647 kc.; Miss. Teenage Net, daily 1920 CST, 3880 kc. Traffic: W5AXK 149, W5WY 94, K5FEM 25, W5AXX 12, W5EMM 3.


Newcomer: Pictured Rocks RC—WAS9PS, pres.; W4ZQI, vice-pres.; W4CQO, secy. Saginaw ValleyARA—W4AFNO, pres.; K89NN, vice-pres.; W8QYI, secy. K8LNR, treas., Central Mich ARC—K8BZV, pres.; W8CI, vice-pres.; K9ETU, secy.; K9KTM, treas.; K8N0P and K8UD, board. The CMARC has started an studying school as K8010A. WAS9VX, pres.; W4WV, vice-pres.; W49VR, secy., BPLERS W4WVF, W49YN, W8Y, W8W3G and WAFKQ, SCM (T. M. C.) finished model of "I-90"-are coming along with 758-1, 28S-3, H-10 antenna and several 100 feet high. The Fordson High School station is really new. W4CBD is hot on dec. W9KCD, Deluxe 3rd, is operating. Mr. W4SS skeds McMurdo, K8CUSB, for the U. M. The Eye Bank Net's 5th anniversary, shows total eye transplants at 2092 WBGX. AASV goes to 2092 WBGX. W9KRN joined the ranks of antique wireless collectors, W8FX is running a p.p. X150A final with a 300R ext. Traffic: W50888, 597Q0, 707C0, W50888, SQ20, WA9WQG, W9KRN, W8FX, W8FX, W8FX and W4WCW, SCM (T. M. C.) finished model of "I-90"-are coming along with 758-1, 28S-3, H-10 antenna and several 100 feet high. The Fordson High School station is really new. W4CBD is hot on dec. W9KCD, Deluxe 3rd, is operating. Mr. W4SS skeds McMurdo, K8CUSB, for the U. M. The Eye Bank Net's 5th anniversary, shows total eye transplants at 2092 WBGX. AASV goes to 2092 WBGX. W9KRN joined the ranks of antique wireless collectors, W8FX is running a p.p. X150A final with a 300R ext. Traffic: W50888, 597Q0, 707C0, W50888, SQ20, WA9WQG, W9KRN, W8FX, W8FX, W8FX and W4WCW.
WABAJZ reports that KBDG has a new Drake R-4B and a rhombic, KBBJF is in the hospital. W8UXQ has a new harmonic. Appointments made in Nov. and Dec.; W8- W8DU, W8MC1, W8LFQ, W8WAC, W8WHP at OES; W8UAI as OBS; W8U8JN as OBS; W8W8Z reports W8LSR was on duty at channel 22 TV Dayton when Hawaii reported the blackout. To the Amateur Radio Editors Association's 16th officers are W8NOK/W8ARC, pres.; V83HJ, 1st vice-pres.; W8WST, executive vice-pres., and secy.-treas. The Buckeye Net Bulletin is now edited by W8GIO, with W8CFC as net mgr. and W8M1M and K8MDJ printing and typing. Toledo's Ham Shack (Ekstra) tells us W8ZCP received his General Class license; W8ZCDD received his Technician Class license, K8DMU is home from the hospital and ready for the road; W8WCB is home on leave; the Toledo RC held its Annual Ham Award Dinner with the award going to K8LFD; George W8W5I was elected vice-pres.; W8KLF, secy.-treas.; W8G0C and W8B7C, trustees. From the Dayton RF Carrier in a recent issue we learn Ohio Radio Technicians, 712 Conditions, 6445 General, 1880 Advanced, 181 Extra, with 505 of them ladies. The Ohio 6-Meter Net meets at 0000Z daily on 58.6 Mc. From the Treaty City ARA's The Beam we learn that the club's 1968 officers are W8LRE, pres.; W8WJ5, vice-pres.; W8WQR, secy.-treas.; W8WIEY and W8WKZ new Novices. W8WEP, W8WWX and W8STF made the RPL in Dec. South East Arc's Ham-Box says the club has started classes for training its members in Advanced and Extra Class license examinations. Queen City Emergency Net's The Listening Post informs us the club's bins are in order; W8MBC, pres.; W8WSL, vice-pres.; W8ZDS, secy.; W8B7T, treasurer; W8DLD, assistant. W8WCJ, W8BXM and W8MFA spoke to the Boy Scout troop in Fountain Square, Traffic (Dec.) W8WDF 741, W8WTF 445, W8WVY 427, W8W82UZ 295 W8A9K1, W8MPE 217, W8WZK 205, W8P2L 198. W8WDD 167. W8WCQG 164, W8NAL 159, W8RTA 148, K8SDK 146, W8WBT 144, W8WBF 135, W8W9L 128, W8NLA 102, W8DAE 101, K8NO 98, W8F9G 90, W8- TV 90, W8H9M 87, W8RTT 85, W8WG 79, W8W6 78, W8N8 76, W8M6 74, W8W6 70, W8QV 68, W8U7 67, W8G9 65, W8W8 61, W8Q8 53, W863 52, W8U6 50, W8H80 49, W8HT 27, K8SYR 29, K8HDG 25, W8F5Y 23, K8G3C 22, W8UZ 20, W8Q8 18, W888 16, K8LF 13, W8W8 12, W8W8 11, W8W8 9, W8W6 8, W8W8 7, W8W8 6, W8W8 5, W8W8 4, W8W8 3, W8W8 2, W8W8 1, W8W8 0. (Nov.) W8AE5, K8HBD 4. (Sept.) K8HBD 1. (Aug.) K8HBD 3.

SIXTEENTH OHIO QSO PARTY
April 27-28, 1968

All Ohio amateurs are invited to take part in a QSO party to be sponsored by the Ohio Council of Amateur Radio Clubs.

Rules: 1) The party will begin at 2300 GMT (Saturday) and finish at 0000 GMT (Sunday). 2) All types of emission and all bands may be used, but a station may be worked only once, regardless of how many times the same station worked the same station may be worked in a single county. 3) The general call will be "CQ Ohio." 4) Scoring: Multiply the number of Ohio stations worked by the number of Ohio counties contacted. Contacts should include a call of stations worked, time, date and the county in which the station is located. 5) Scoring: The number of participating stations is 3545, 3740, 3861, 7095 and 7250. On the others, take your call for two points. 5a) Scoring: All active certificates will be awarded to the highest scoring stations. 6) All contest logs must be postmarked not later than March 15, and show the number of contacts made and the total points earned. 7) Each log must be accompanied by a $1.00 entry fee. 8) All logs will be scored in accordance with the rules and regulations of the Ohio Council of Amateur Radio Clubs.

Hudson Division

EASTERN NEW YORK—SCM, George W. Tracy, W2EFU—sec.; W2GIC, R.M. W2AIS, P.M.; W2JCG, Sec., W2AQG, R.M.; W2AK and W2AOX, HARCARS are W2AK and W2AOX, K9YB and K9YD, NYSTPEN on 392 kHz, nightly at 2300 GMT; ESSB on 300 kHz, nightly at 2200 GMT. Endorsements: W2AIS and W2AQG as OBS and W2AK as net mgr. and W2AOX and W2AKQ as OBS and W2AQG. W2AKQ extends to W2BUHZ, W2BVEAL and W2WLP on making the RPL in Dec. During the month, the ESSB handled 160 messages. The new officers of the Albany Club include W2A2WS, pres.; W2B2GN, vice-pres.; W2B2MO, secy.; W2A2WQ and W2A2WQ, treas. The Schenectady Club include W2A2Q, pres.; W2B2OD, vice-pres.; W2A2QT, secy., The Left Coast Club include W2A2Q, pres.; W2B2OD, vice-pres.; W2A2QT, secy. The New York State NET held its annual Ham-Box party at the Alcatraz Firehouse in New York City. The New York State NET held its annual Ham-Box party at the Alcatraz Firehouse in New York City.
Most new high-power 20 kW FM transmitters use the EIMAC 4CX15,000A tetrode for service as a Class-C amplifier. The tube features a new internal mechanical structure which minimizes rf losses, and is capable of operation at full power ratings to 110 MHz. EIMAC also recommends the 4CX15,000A for 220 MHz operation at lower power levels for VHF-TV transmitters. EIMAC's long experience in tube technology and ceramic-to-metal sealing leadership have combined to produce a tetrode of optimum design and structural integrity. That's why the 4CX15,000A is used in more new transmitters than any other ceramic tetrode with similar characteristics. For more information write Product Manager, Power Grid Tubes, or contact your nearest EIMAC distributor.

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EIMAC
Division of Varian
San Carlos, California 94070
One reason why your amplifier may be unstable...

by Jack Quinn, W6MIG

Some hams dropped in the other day and we got to talking about dynatron oscillation and what effect it has when you are trying to stabilize an amplifier. We agreed that it is a common form of self-oscillation; most of us have experienced its effect as noise, interference, or distortion on a carrier—even unwanted side bands. We agreed that it produces thermal strain on elements. But some hams didn’t know that the voltages can get quite high and can reduce the tube life. In a runaway condition, the tube can be destroyed.

We said that dynatron oscillation is caused when any electrode in a vacuum tube has negative resistance. But how this is caused wasn’t clear to everyone. And perhaps, more important, what can be done to eliminate it. If you were to look inside a tetrode, you would see some electrons flowing from the cathode to the plate hitting the screen grid. This collision would knock loose low energy electrons which are called secondary electrons. Most of them return to the screen grid because of the relatively low screen-to-plate potential. If they try to get very far from the screen, the plate will attract them. The result is an uncontrolled electron flow from the screen to plate. This is secondary emission. And during part of the operating cycle of the tube it is possible that more electrons will leave the screen grid than will arrive. Thus causing dynatron oscillation and possibly a runaway condition.

Now that we had a better understanding of how this oscillation occurs, we began to come up with suggestions of how to eliminate it. One ham suggested that we change the operating line so it doesn’t pass through the tube’s negative resistance region. In this way, the oscillation would never have a chance to get started. I suggested that we reduce the alternating current impedance in the screen grid circuit so that the voltage could not be developed across it. A very large capacitor across the screen grid power supply (say up to 1000 microfarads) should work well.

Why don’t you let me know if you have had this problem—and solved it in another way? I’m always glad to get into discussions like this. I think we all learn a little more.

Jack Quinn
Division Marketing Manager

Division of Varian
San Carlos, California 94070

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NEBRASKA—Acting SCM, Tony Coshon, KQOAAL—SEC: KQOAAL. Monthly net reports for Dec.: Nebraska. Emergency Phone Net, WAOHIZ, QNI 1352, QTC 147. Nebraska, Morning Phone Net, WADJ 1269, QTC 87. West Nebraska, Phone Net, WOKN, QNI 677, QTC 54. Nebraska, C.W. Net (NEB), KOAKK. 1st session QNI 131, 2nd session QNI 123, QTC 90, AREEC, Net, WAOEI, QNI 10, AREEC Phone Net, WOIRZ, QNI 225, Dead End Net, WAOBIX, QNI 259, QTC 84. Nebraska, Storm Net, WAOLOY, QNI 423, QTC 156. 0030Z session QNI 1460, 1500Z morning Net, WAOCLJ, QNI 321, QTC 2, PAMC, WAOJUP, Meeting Net, WAOLOY, Storm Net, WAOHOA, a.s.o., Noon Net WAOHZ, The Fenn Ridge ARC's most valuable member trophy went to KO7TPK, WAOBBS was elected pres. ECs are reminded to mail in SET reports. Traffic: KOAKK 342, WAOHIZ 247, WOLOD 215, KOJTW 126, WAOQZ 69, WAOBB 63, WOGP 59, WAOB 83, WAOJU 48, WAOFFJ 45, KOUK 21, WOFYK 28, KOJBF 29, WAOBK 23, WOFP 26, WAOXI 24, WOOGY 17, WOGY 15, KOED 14, KOFOF 14, KOFOF 13, KOOE 12, WOIJJE 11, WOIGP 11, WOIJJE 10, WOIIY 9, WOIIY 8, WOIIY 7, KOH 7, WOIIY 6, WOIIY 5, WOIIY 4, WOIIY 3, WOIIY 2, WOIIY 1, WOIIY 0. 

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For the CW operator the 500C includes a built-in sidetone monitor. Also, by installing the Swan Vox Accessory (model VX-2) you will have break-in CW operation. Thus, the model VX-2 now fulfills a dual function, both automatic voice control and break-in CW keying. Grid block keying of a pure CW carrier is employed with off set transmit frequency.

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VTCD 3555 1200Z M-6 287 - W1GVC
VTCS 3900/4 1500Z Sun. 38 10 W1AD
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The Vt. Trading Post Net is active again on 3555 after the Vt. Pone Net. We welcome new Novices W1W3V (Bells, Vt.) and W1YR4 (Bridgestone, Vt.). New generics W1UIC (Burlington) and WAI3S (Hanrock). Should you have a chance in the near future to drop in a QSO Party. Don't forget to send your logs to KIMPN. The W-Vt. certificates have been redesigned. W1FES, Ray Flood, is custodian and his address is 2 Marlboro Ave., Brattleboro, Vt. Traffic reports: (Dec.) R190B 449, W1FR 31, KIMPN 20, WAIGUV 6, WAIGKS 5, W1KJG 15, (Nov.) K1ZUGG 27, WAIGUV 4.

WESTERN MASSACHUSETTS - SCM, Norman P. Forest, WISTR-RI WIDDA reports 28 sessions and 138 pieces of traffic handled. Total for the year is 1,775 with a 5.7 average. The average QNI is 6 stations. PAM K1DQG reports 30 sessions, 230 check-ins with a QNI of 68. Excellent for the first month of operations on the WIMPN. The HCRAI Phone Net continues to have lively sessions Wed. (28.990) Mc. at 9 p.m., The Connecticut Valley V-R F. Net takes off again at stations calling on Mon., evening (145,350 Mc.) at 9 p.m., stations up and down the valley are invited to call in and pass traffic. The HCRAI, which recently took on the New England QSL Bureau, is making use of these nets to notify members who have unclaimed cards at the bureau. K1DQG recently sent out 68 messages to notify hams of cards in the file. Reports on the W6T Phone Net were received from W1OBD, 10.600, and K1KNQ, 97., etc. New appointments: W1AGB, W1BEB, W1GQG, W1HS, W1PS as OFS. Endorsements: W1LGE, W1WDA, W1AMT, W1CS, W1DAW as RM, W1ALL and W1UB are conducting classes for would-be hams in Southwick. Traffic 1105, K1DQG 129, W1DYY 129, W1DYY 109, W1OBD 27, W1FR 58, W1KHY 47, W1DAW 23, WAIGAB 27, W1ZPB 28, W1NHJA 12, W1MING 11, W1AAB 8, W1BRV 4, W1DNE 4.

NORTHWESTERN DIVISION

ALASKA - SCM, Albert G. Weber, K1LADG-SEC: K1LDGG, OBS: K1LCZ. During December the Haines undersea cable break kept the boys in S.E. Alaska mighty busy. K1FRZ, who is now Extra Class, informs us the communications outage lasted 8 days, 9 hours, and 10 minutes by official count. We regret to report that K1LDG was killed in a helicopter crash at Port oilfield. Vic. The North Pole is no longer a part of the system. K1TDZ, K1TEP, vice-sec., of the Juneau Club, K1LDZ devoted most of the summer to handling NTYU traffic

IDAHO - SCM, Donald A. Cripps, W7ZNN-SEC: K7THX. The FARM Net meets Tue., through Sat., at 0200 GMT on 3805 kHz. W7XH0 has installed a new 5-kw output 3-kw output and has ordered an HT-37, W7ETO is working a lot of DX with a new three-element 20-meter beam. W7KHX is sporting a new mobile transceiver. W7H1U is studying for the Extra Class Exam. New endorsements: W7ET0 as ORS and VO. Endorsements: W7KHX as OBS: K7LHR as OBS. New EC members:

---

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Receiver number one provides greater amateur band performance and features than any amateur receiver ever built. Receiver number two has the widest frequency range (from 5 Kc to 30 Mc) of any general coverage communications receiver ever built for lab or commercial application. Receiver number three is completely solid-state for high reliability, versatility and portability. It operates from 12/24 V.D.C. or 115/230 V.A.C. This receiver draws less current than a couple of dial lamps (when its dial lamps are switched off), and provides instant-on operation. Receiver number four incorporates specific features for high selectivity and has a six-pole filter to provide built-in steep-skirted 500 cps, 2.5 Kc, 5.0 Kc, and 8 Kc bandwidths with passband tuning for CW and SSB. Also AGC threshold control to knock out background QRM. Also a 50 db notch filter. Receiver number five has a phase-locked frequency synthesizer to replace conventional high frequency oscillator crystals for superior stability and over-all calibration. Receiver number six offers frequency meter performance with 1 Kc dial calibration and accuracy over its entire tuning range, 24 feet of bandwidth per megacycle, and 10 Kc per turn tuning rate.

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MONTANA—SCM, Joseph A. D'Arcy, W7TVY—Ass't. SCM/SEC: Harry Roylance, W7RZV, RM: W7DMA. P.AM: W7ROE.

MTN 31915 kc. 1800 MDT M-F

MST 32650 kc. 1700 GMT Sun.

Mont. RACES 31915 kc. 1800 GMT 1st and 3rd Sun.

Mont. P.O. 31915 kc. 1800 GMT Sun.

Endorsements: W7LBK, W7CIN, W7TVY, W7HJR. Appointment: K7OEX as OVS. New officers of the Butte Amateur Radio Club are W7FPF, pres.; W7FSL, vice-pres.; K7OEX, sec'y; K7DMD, treas.; W7LBB, asst. treas. New officers of the Missoula Amateur Radio Club are W7TPG, pres.; W7VNE, vice-pres.; K7YV, sec'y; W7DB, treas.; K7EQF, asst. mgr. K7DMA came within 35 points of the HPL. W7CIN has a new SB-101 in the works. W7AMD/L, with the Air Force in Lewiston, has been checking into RM. W7ROE has had a new 2-meter AWRDP on with his new s.s.b. rig. W7IAL has his HW-32A going in the Bozeman area. Adult education classes in the Bozeman school district include "Introduction to Amateur Radio." W7ATY is teaching this one for a Novice Class license. We still are in need of some c.w. stations for the net on 3039 kc traffic. W7DMA 445, W7TVY 139, K7DCH 129, K7EGJ 35, W7WYG 11, W7ADD 8.

OREGON—SCM, Dale T. Justice, K7WWR—RM: W7ZFH. P.AM: K7RQZ. Session nets:


AREC 3875 kc. 000Z Daily W7AHH

AREC 145.35 Mc. 400Z Tue-Sat.

ORS 3858 kc. 000Z Tue-Sat. W7ZFH

BSN 3875 kc. 0130-0200 Daily K7PG

W7IZW reports for the AREC Net for Dec., sessions 31, check-ins 744, contacts 80, traffic 30, QST'S 4 and maximum number of counties 16. W7ZFH reports for ORS. Check-ins 350, contacts 30, QST'S 1 and maximum number of counties 9. K7OFW was in the hospital for ten days in Dec., and also in Jan. New General Class stations are W7IUB and W7LIV. New Novice in the Grants Pass area are W7NLQ and W7NTW. Congratulations to K7RQZ on making the BPL. New appointment: W7WHY as ORS. Veuillez now exist in the JOO and ORS appointment. Applications can be obtained by sending a SASE to your SCM. Traffic: (Dec.) K7RQZ 317, W7WHY 222, W7KPO 174, W7ZBB 143, K7PG 154, W7ZBB 64, WWR 93, K7ETS 70, W7CIP 32, K7PFQ 23, W7BN 22, K7KPT 20, W7DAM 19, W7AHA 18, W7MLJ 13, W7GLP 12, W7KPO 6, W7KPO 5. (Nov.) W7B 9, K7ETS 47, K7KPT 22, W7EES 20.

WASHINGTON—SCM, William R. Watson, K7JHA

—SEC: W7UWT, RM: K7CTP, P.AM: W7BUN.

NTN 19392 3970 kc. Daily QNI 1062 QTC 491 Session 31

W7UWT 20125 3990 kc. Daily QNI 1024 QTC 491 Session 31

W7CIR 02592 3970 kc. Daily QNI 1350 QTC 227 Session 35

K7KHA 03106 3700 kc. Daily QNI 362 QTC 59 Session 31

The list below under "Traffic" represents the handling of over 12,000 traffic points and II BPLs, believed to be on-an-time record for the Washington session. W7AIA/T, operating from the Vet's Hospital in Vancouver, again took formal messages from the patients' bedside in a fine public service operation. W7AIA/T, a member of the Amateur Radio Club staff, manned the equipment in a delaying operation through the NTS. The Yakima Club is well underway in the planning of their Western State Hamfest to be held in July, NW Dir. W7PYG. SCM K7JHA and SEC W7UWT attended the BEARS Program Meeting Dec. 20, EK WZEB had his song activated on the new AIEC frequency, 3930 kc., when the Southomish area was flooded. New officers of the Tacoma Club are K7CIN, mm; W7CIN, vice-mm; K7RQZ, sec'y; W7AIAW, treas.; K7AZI and K7CDB, board members. New appointments: W7AXC and W7HJR as ASC'S. W7AXC and W7BQG as QPL. W7AXC needed the planning meeting in N.Y. Dec. 1 and 2. W7LO and W7CQX finally got the T16 beam up. W7UWT is backed up with a line-up at the new QTH. The Richland Club is starting Novice and Advanced classes. New officers of the club are K7KHA, pres.; W7CIR, sec'y; W7ZBB, mm; K7PG, treas.; W7CIR, trustee. K7MLJ reports from Japan and Vietnam and operates K2NY when in port.
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PACIFIC DIVISION

EAST BAY—SCM, Richard Wilson, K6LRN—Appointments as of Jan. 1 are: W6BPCQ, W6TSM, W6RYZ, W6BFHH, W6UZX as ORS; W6RRKH as OBS and VHF PAM; W6GQ and W6RHR as OBS; W6EY, W6QHF, W6QJW, K6LRYN and W6AGA as OOs. To keep your appointment current you must send in monthly reports. W6BPCQ made the NPL again. Bill Sr., W6BQKQ, and son Bill Jr., are recovering from an accident involving their crane. Bill Jr., suffered torn shoulder muscles and a badly bruised hand. He broke a finger, some severe cuts and badly bruised toes while climbing the ladder to remove a coaxial cable. The Northern Calif, Amateur Radio Association for 1969 are W6STNL, pres.; W6QCUL, vice-pres.; W6BY, sec.-treas.; and W6BQFO, operations officer. NORCAL’s repeater cell is active. W6OAO, 126 Galt, at 51.2 and output at 51. W6OWH is active with HH FSK and has managed 17 new phone countries in two months. W6UZX turns over the net, manages 212 for Charge of NCN/2 to W6LFA so he can spend more time with his son, who is returning from overseas. K6ZJR and XYL W6ADOO see the holidays in Arizona with affluence: W6BPCQ 866, W6TSM 270, K6LRN 198, W6UZX 197.

HAWAII—SCM, Les R. Wieland, K6HBFZ—SEC: KH6GHZ, PAM; KH6EEM, RM; KH6GGR. Races Nets (40, 10, 6 and 2) coordinate with K6GGR.

Net
Lease Appointment 7:200 Me. 07002
Friendly Net 7:400 Me. 20302
Pacific Interisland 14:300 Me. 08002

I’m sad to report that KH6ATS has joined the Silent Keys. Bill, formerly of Walkupu, was Hawaii’s Net Director for several years. K3JIG passed through town visiting the Honolulu ARC and heading for Indonesia for several years with the Peace Corps. K6HKG passed the Extra Class exam, Ditto for KH6EEM as well as the Advanced Class. A solar flare which occurred on Dec. 30 yielded an exceptional 6-meter opening. On Jan. 1, K6LRYN and KH6EEM worked California, Nevada, Arizona and Texas. On Jan. 2 and 3, 1969 KH6NS was able to work Oregon, Washington, Idaho, California, New Mexico, Texas, Florida and Costa Rica. Later K6HEEM, Hawaii’s OVS and VHF PAM, worked K6HCH, Wake Island, which is a first of 50 Me. W6LJW, who was out both on the Islands during the holidays, writes, “Thanks from W6LJW to KH6EEM, Larry, and all the other KH6 fellas who helped to make my stay in our 50th state so enjoyable.” Earl extends his Hawaiian hospitality to anyone visiting Buffalo, N. Y. I’d like to hear from all of you interested in a Lease appointment. Traffic: (Dec.) KH6GHZ 258, K6HBFZ 139, (Nov.) KH6GHZ 772.

NEVADA—SCM, Leonard M. Norman, W7PV—SEC: W7BEU. The Nevada Amateur Radio Association is conducting free courses on c.w. and theory leading to an amateur license. Amateur Radio Week in Nevada, K7OZ and K7RKH are building a new home for KB v.h.f./u.h.f. gear. W7DUP and WATDUG are active on the Novice band. W7BFL has a new home for 20 and 40 meters. W7KOE reports not much activity in the Elko area. The “SAROC” Convention dates are Jan. 5-12, 1969, at the Hotel Sahara’s new Convention Center, Las Vegas, Nev. Traffic: W7BEU 4, W7PBY 2, W7- PRM 1.

SACRAMENTO VALLEY—SCM, John F. Minke, III, W7GVT—RM: W7LWZ, ECS: W7BMX, K6HW, W6SMU, W6BSY, WATQY.

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SERVICE: SSB, CW, AM, and RTTY.

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W2EZG 148.30 0302 Wed. W2ESFW
Nevada Cox 115.30 0302 Wed. W2ESZU

New officers of the RARL are W2QGD, pres.; W6WHO, vice-pres.; W2LQH, secy.; W2KZG, treas. W2FYUZ installed a 700-ft. long-wire for 40 and 90 meters up at Low Mill Creek. W2QGD reports operation on 10 meters still reporting some of the new governor's moves among W2MDT's QTH. The skiing season has kept W2PMF busy operating the ski lift at Soda Springs and off the air. W2BDX, EC for Stanka, reports the addition of W2BDI to AREC; this makes 2 members to Jim's stuff. How about you Redding area amateurs giving W2BDI some support? W2MAQ is preparing for DXCC after this year's ARRL DX Test. Let's hear some SW activity in the March portion and send in your logs. Traffic: (Dec.) W6LNZ 147, W6MIAE 75, K6ZVU 25, K2OTQ 15, W6KE 9, W2FYUZ 2, W2MDT. (Nov.) W2BSRY 36.

SAN FRANCISCO—SCM, Hugh Cassidy, W6AUD—A 1580 s.w. in San Francisco FAB. A SCM in Marin is W6VOA, in Corte Madera. The Marin Radio Club is updating the roster of amateurs in the county. W6SHA, W6TXK and W6QQA were active in the San Jose Bell System Telephones' swap meet. W6QQA is home after another siege in the hospital. W6ABYZ and W6KQV made the BPL in Dec. W6AJA is moving one of his 10-meter operations to San Jose, W6GIX managed to run some traffic while his skip was in port. K6TJJ still is going strong on the Golden Bear Net. W6QQA made an average error of 0.5 p.m. in the FMT. The San Francisco Radio Club held its Christmas Dinner at the San Remo Restaurant in Dec. The Carolyne Club held a revival dinner at the hotel at the time of the FMT. December 1957. A neighbor trimming a hedge did some "pruning" of W6BNP's Zepp antenna. W6ERS is leading the way in more activity on 90 meters. A shortwave activity report for Oct, was received from K6NCQ via the W6 QSL Bureau. W6PNF has a new Seen for 4-meter activity. Another SCM in Marin is W6QQA, in Corte Madera. DX Club is W6ZC. W6PTS and W6BUOJ found their photos on the cover of the DXer magazine, West Coast DX Gams. Attending the same meeting were W6QQA, K6ZVU and W6WU. DX meeting at Fresno were W6FGB, W6DJO, W6PTS, W6ZC and W6AUD. The San Francisco Radio Club is holding some theory classes at its meetings. K6JO was at the Las Vegas SAROC in Jan. W6CYO has the confirmations for DXCC. The San Francisco Section Net continues to meet Mon. and Fri. at 1800 local time on 3000 ke. The San Francisco Section Courier is starting its fourth year of publication. W6KQV is EC for the West Coast Amateur Radio Net. The San Francisco Amateur Radio Club is W646. K6IHY 251, W6LW 121, K6TJW 49, W6WY 38, W6AUG 28, K6ZVU 15, W6CYO 14, W6ZQY 2. (Nov.) W6LW 227, (Dec.) K6NCQ 14.

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SANTA CLARA VALLEY—Acting SCM, Jan A. Olson, W6RZJ—Asst. SCM, Ed Turner, W6YNW; SEC: W6KBEZ, JAM; W6QNO, W6LNO, W6LNO, our SCM for several years, and a very active supporter of NCN, has been reported to have suffered a heart attack, and we hope he is recovering well at this time. SCM Jeri has worked very hard and long for amateur radio as well as other service type activities. Our best to her.

SEC W6PYZ was very busy preparing for the SSTP and

124
The 2K-2 was good ... in fact, it was the best linear amplifier for the amateur on the market. But now, thanks to a pair of new and improved Eimac 3-500Z tubes, providing 1000 watts of plate dissipation, the 2K-3 operates with even greater power output and less drive. (Its so much better we're going to call it the 2K-3 now.) Still endowed with the same rugged and reliable mechanical construction, inspired design and using only the very best components, the 2K-3 is unquestionably the finest. You have heard the strong clear signals of the 2K-2 by now. Why not go on the air with an even better signal? You can NOW with the new 2K-3. Console or desk model $745.00. Let us send you a descriptive brochure.

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organizing the section EC program. WB012ZF is busy on W09ARES and other activities and as EC for King Christian, WV011 renews as OPS. W46ACW is very active on Ncn2 and will take any traffic for Summerville. K4YKG is NCS of Ncn Sat. W4AUW reports that the San Carlos CD Club will be taking part in ARPSC activities. OVS W6PBC reports that a strained neck muscle has prevented activities in his station for the past few months, but that he will be busy experimenting with VHF soon. K6FW is busy with plans for the NET. WX6BY is back on NTS after a short period away. K8MAS, OltO W6MAFA assumed the management of Ncn2 as of the first of the year. W8IJE, with XYL K9BM, and also with K9FUM, attended the W4OHC convention in Las Vegas. W6DEF reports that the SCARS Annual Christmas Polka was a great success. W6PLS has applied for a two-letter call now that he has Extra. K6HGE is active on March VRS 2 meters. W4AUC is busy as AO and on several nets. Russ reports that W9MBH was the guest of the CQPR Luncheon Dec. 2 and talked about the old mark days. W4CBX is active as AO on 2 meters, making fine scores in the FMY. Traiff.; (Dec.) WORSY RS7BC, W9BY 432, W4FPL 164, W6REDEF 90, W4Z5E 46, W4PLS 44, K4KHG 31, W4Z5J 21, W4AUC 24, W4CIW 20, W4AUCW 5. (Nov.) W4VZN 30, W4BIZZ 5.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4BNU, Asst. SCM; James O. Pullman, W4APEN, Issy, W4AWME, W4VKZ, WM4. PAM: W4AJPY, W4FPL, W4BIZZ, W4WUG. More has a new Fime AU2 beam up, and also the RFL. W4CQ, W4CQG and others put up a station at the Mall in Rocky Mount to accept traffic from the publie with sons overseas, and originated against 200 messages. W4AMV, W4AWUQ holds the BPL certificate. W4B4BQ has a new 10-meter beam up. W4NN is sporting a new Swan 3000. Officers of the newly-formed Roanoke Amateur Radio Club are W4KGR, pres.; K4SNS, vice-pres.; and K4FYJ, secretary. W4B4CM received a new 2-meter rig for Christmas. W4FPL has moved to Charlotte, N.C., from Jacksonville, Fla. W4FPL will be operating portable J4 from Duke University until June, 1969.


SOUTH CAROLINA—SCM, Clark M. Hubbard, K4-LNJ; SEC: W4FQCM, Asst. SEC: W4WWQM, RM: K4- LNJ, PAM: W4FPEP.

SON 3795, Daily, 0000Z/0000Z Dec. 16, 176

SC57BN 3915, Daily 0000Z Dec. 17, 176

The SC Phone Net meets on 3000 kc, Mon. through Sat., at 1300Z and Sun. at 1800Z and 2300Z. The net has operated continuously since 1094. W4ADK and W4AGK are charter members. The nets first 1968 dinner was held in Orangeburg. W4AWUQ was the host and the next one is planned for Apr. The Spartanburg Club had its Annual Christmas Party. NJS is home-brewing, Phil Jones is working on his Novice Class ticket. Watch for plans for a section meeting in March. W4B4Z has been appointed Official VHF Station. Traffic: W4B4Z 201, W4AMAP 100, W4MVU 22, W4AMAP 47, W4H7C 40, W4FPEP 32, W4F9HC 22, W4AZS 11, W4A2OJ 6, W4AFS 7, W4G1V 16, W4MVU 13, W4F4K 12, W4IA 11, W4PEP 8, W4B4S 5.

VIRGINIA—SCM, H. J. Hopkins, W4SLJ—SEC: K4- IJMB, PAM: W4OKN, R4: W4AWUL, K4MC, W4- NJ, has been appointed EC for Louisa County and W4EXF EC for Orange County. W4EXI operated on a signal from 13 counties during the QSO Party. W4SLJ was assistant operator, W4WJ and K4SC. W4F4DFT has issued the BPL during Dec., all via origi- nations/deliveries. W4MFSF retired from the Marine Corps at the end of Jan. and plans to remain in the D.C. area. W4MTKB and W4F4DFT earned VBBN certi- ficates. W4BC6S/W4Z4FT has devised an effective break-in-feeding system for the SBH-101, W4DFC is look- ing over the publication chores of the B.J. R.A.M.; W4DAF continues as editor. Because of the large number of class appointments in the section the SCM has not been able to publish a list of annual endorsements or to notify the individual appointees upon endorsement. All
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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 these single 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!

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Elements: A full wavelength driven element and reflector for each band.


Dimensions: About 16' square.

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10' x 11/2" 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, 0.06" diameter.

X Framework: Two 12" x 1" OD aluminum 'hi-strength' alloy tubing, with telescoping 7/8" 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.

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The first morning I put up my 3 element Gotham beam (20 ft.) I worked VO4CT, QN5LW, SP9ADQ, and 4U1ITU, THAT ANTENNA WORKS! WNW4DYN

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 feeding line; easily handles 5 KW; 1/4" and 1" aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

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3 EI 20 ......... 22*
4 EI 20 .......... 32*
2 EI 15 .......... 12
3 EI 15 .......... 16
4 EI 15 .......... 25*
5 EI 15 .......... 28*

20' boom

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"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, W5KJY, W1WOZ, W2ODH, W3ADJ, WB2P6, W2YH, VE3FOB, W8SCE, K1SYB, K2RDJ, K1MVY, K8HGY, K3ULT, W8QJC, W2AVLVE, Y51MAM, W8APS, K2PGS, W2OJP, W4WJW, K2PSK, W8SCGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!

V40 vertical for 40, 20, 15, 10, 6 meters ................ $14.95
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1800

The new officers of the Utah ARC are W7QWLA, pres.;
K7JLF, vice-pres.; W7XGT, exec. vice-pres.; K7SOT,
secy. Officers of the Oregon ARC are W7IIA, pres.;
W7IVIE, vice-pres.; W7TGM, secy. Efficiency and
courage are the key words of the SW-500. The Utah
ARC is formulating plans for the State of Utah Counties
Award. The award is to be made to those who have
proof of QSO with 20 of Utah's 29 counties. Further
details may be obtained by writing any Utah
ARC officers. W7IAWA has new 1215-Mc. gear on the air.
Nominations soon will be open for SCM. All clubs and
groups are urged to send in valid nominating papers
for SCM. Traffic: W7OCX 318, W7BRME 169. K7RAJ 135,
K7CSL 82. K7SOT 23, K7ERR 11.

WYOMING—SCM, Wayne F. Moore, W7CMQ—SEC:
K7QX, RM; W7CQLF, P.M.; W7IHE, K7SDL, OBJS;
K7SM, K7QX, Nota: Pori Express, Sun, at 6000 on
3920; Yo, daily at 1100 on 3910; Jackson, Mon. through
Sat., at 1215 on 3920; Wb Net, 0030 Mon. through Sat.
on 3920. W7DNZJ is a new Operator Amateur W7DL.
New Tentative plans are being made for the Rocky
Mountain Division ARRL Convention June 29–30 at Cheyenne. Traffic:
K7QX, K7BDJ, W7CQLF. W7ZP2L, K7V6C. W7GJF,
W7D4U, K7DD and W7E6GK have their
Advanced Class licenses. W7F4FV got a new transmitter
for Christmas. 1966 County Club officers: W7CQLF, pres.;
K7SM, vice-pres.; W7N5N, secy.; W7NNX, treas.;
K7QNT, net. mgr.; W7F4FV, trustee. Some new calls:
W7GJ, W7GJF, W7GJH, W7GJL. W7GJF has been
appointed Asst. Mgr. of AEND. The outstanding work
during the recent tornados in Florida and Alabama was
very much appreciated and much credit is
deserved. W7DFP and K7TNS liaison AEND with the
West Fla. Net into Ft. Walton, W4ZF4A put in many hours
handling welfare traffic for the Huntsville area.

SOUTHEASTERN DIVISION

ALABAMA—SCM, Edward L. Stone, K4WJW—SEC:
W7F4FV, P.M.; W4ZKQ, RM; W4AEK. W4WQ reports
that the Huntsville Repeater Asso. is reorganizing
with the equipment being readied and looks like we will
soon have a repeater on 146 Mc. With the transmitter
high atop Monte Sano Mountain, it is hoped to
improve our AVM back as ORS. W4VEK made the BPL for
the fourth straight month. New OBJS: W4SVM, W4BADT,
W4F4FV, W4DOP, and W4MKU. W4F4FV has been
appointed Asst. Mgr. of AEND. The outstanding work
during the recent tornados in Florida and Alabama was
very much appreciated and much credit is
deserved. W4DFP and K4TNS liaison AEND with the
West Fla. Net into Ft. Walton, W4ZF4A put in many hours
handling welfare traffic for the Huntsville area.

TRAFFIC:

Traffic: (Dec.) W4AVM 297, K4AOG 165, W4W1XC 136,
W4F4FV 141, W4AEC 130, W4MFQ 124, W4DIN 119,
W4VEK 119, W4HWH 95, W4VJY 81, W4QG 79,
W4QG 77, K4BNE 62, W4BNW 44, W6H6G 38,
W4BADT 35, W4F4FV 34, W4YFIJZ 33, W4MKU 26,
W4U4J 24, W4AEK 22, W4NFJ 22, W4M 21, W4WUL 19,
W4WOP 13, W4WOP 11, W4WTP 8, W4ZC 10, K4WUC 9,
W4DGH 8, W4NLI 8, K4NJY 6, K4NKG 4, W4W4L 3, W4VFK 2,
W4GJ 1, W4BWA 9, W4KJ 8.

CANAL ZONE—SCM, Russell E. Oberholtzer, K25OD—
The Czarek held a practice drill on Sat., with 28
stations participating on 2, 6, 10 and 40 meters. The
1968 officers for the Czarek are K25OD, pres.; K25EJ,
mg. New officers of the Czarek are K25AD, pres.; K25W,
vice-pres.; K25OD, secy.; K25MA, act. mg. W4VEK, of
denied, Fl., visited with son-in-law, K25JW, and family for the holiday season. W4VEK is
out of the hospital and reenacting at home after being hospitalized. Lt (ex-K25MA) moved home after her automobile accident in Houston. I would
like to thank the membership for their confidence in me
and hope to fulfill my duties to the best of my ability. Mailing address: Canal Zone SCM during the next two years. Traffic:

EASTERN FLORIDA—SCM, Jose H. Morris, W4-
MVY—SEC: W4VIY, Asst. SEC: W4FF, RM C.W.

130
CPC ENGINEERS HAD A NEW ANGLE ON CORNER REFLECTOR ANTENNAS

Combining maximum strength with optimum electrical performance, this 10.0 db gain antenna meets the increasing demand for rugged durability at minimum weight. Cat. No. 465-508, has a reflector 55 in. by 29 in., yet weighs only 20 lbs. Its rated wind velocity is 150 mph. The radiating element material is brass, reflector screen components are of high strength aluminum alloys, and mounting accessories are fabricated of hot galvanized steel. This CPC Corner Reflector Antenna is ideally suited for use in multiple corner arrays.

THE CPC Corner Reflector Antenna

Cat. No. 465-509
Frequency Range 406-470 Mc

Electrical Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Input Impedance</td>
<td>50 ohms</td>
</tr>
<tr>
<td>Forward Gain</td>
<td>10.0 db at 450 Mc</td>
</tr>
<tr>
<td>Front-to-back Ratio</td>
<td>25.0 db</td>
</tr>
<tr>
<td>Maximum Power Input</td>
<td>250 watts</td>
</tr>
<tr>
<td>Termination</td>
<td>Type N Female with metal weather shield and Type N Male with Neoprene housing</td>
</tr>
<tr>
<td>VSWR</td>
<td>1.31</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>406-470 Mc</td>
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<tr>
<td>Lightning Protection</td>
<td>Direct Ground</td>
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Mechanical Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reflector</td>
<td>55&quot; wide by 29&quot; high</td>
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<tr>
<td>Reflector Material</td>
<td>6061-T6 aluminum</td>
</tr>
<tr>
<td>Radiating Element Material</td>
<td>Brass</td>
</tr>
<tr>
<td>Radiating Element Size</td>
<td>13-1/4&quot; long by 2&quot; wide</td>
</tr>
<tr>
<td>Rated Wind Velocity</td>
<td>in excess of 150 MPH with no ice</td>
</tr>
<tr>
<td></td>
<td>85 MPH with 1/2&quot; radial ice</td>
</tr>
<tr>
<td>Lateral Thrust at Rated Wind</td>
<td>164 lbs. no ice</td>
</tr>
<tr>
<td></td>
<td>180 lbs. with rated ice load</td>
</tr>
<tr>
<td>Weight</td>
<td>20 lbs.</td>
</tr>
</tbody>
</table>

Note: dbd gain indicated as per EIA RS-329

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WA4LK RTTY: WARWM, PAM 75 M; W4GQX, PAM 40 M; W4SDR, V.H.F.; PAM: W4BMC. The Florida RTTY Society has just completed its annual meeting in Daytona Beach. Redelегated was WA4JIZ, who was elected vice-prec, and WARWM was re-elected sec.-treas. President's awards went to WARWM and K4MEF for outstanding contributions to the society during the last year. Christmas brought a lot of new equipment. WA4FLW reports receiving a new Drake R-44-7-4X. WA4LE has a new Hunky Barnston. WA4UFQ has a new SR-2000. WA4JIV has a new SR-101. Thanks to the efforts to WA4NEB and W4CNA, many junior operators got to talk directly operators of the Class on 3940 kc. This annual event is always a favorite with the kids. One of our outstanding Florida QSOs, K4DZ, reports he is on s.a.h. now, W4JIDW and W4BANA operated W4APW7 and W4APW8 for a showing at the center during the holidays and made the BPL, WA4NEB is the new manager for the Fast Net. We are looking forward to a big year in Eastern Florida in 1968. On luck de WA4JVB, Traffic: (Dec.) W4AIC 1147, K4SN 798, W4JLY 565, W4JCS 145, W4BANA 440, W4BMP 268, K4EAC 248, W4DKY 216, W4FEP 104, W4LE 194, W4JPS 179, W4DEP 170, W4UW 154, W4SDR 129, W4HNY 102, W4TWS 96, W4AIH 96, W4HDD 86, W4FPP 80, K4CDO 74, W4LAD 78, W4HDO 72, K4DAX 70, W4JWY 67, W4VYX 65, K4SHJ 59, W4SME 57, W4IHY 49, W4NGR 47, W4AIB 46, W4VO 45, W4QCC 45, W4QX 43, W4CQ 32, K4FJ 30, W4ZAK 29, W4AJW 29, W4WLV 28, K4DAX 20, W4JWY 19, W4JU 18, W4ACF 17, W4QCC 16, W4QX 15, W4QY 14, W4ACF 13, W4ZAK 12, W4QCC 12, W4ACF 11, K4DAX 10, K4DAX 9, W4QX 8, W4ACF 7, W4QCC 7, W4QY 6, W4ZAK 6, W4JWY 5, W4ACF 5, W4QCC 5, W4QX 4, W4ZAK 4, W4QCC 4, W4QX 3, W4ZAK 3, W4ACF 3, W4QCC 3, W4QX 2, W4ZAK 2, W4ACF 2, W4QCC 2, W4QX 1, W4ZAK 1, W4ACF 1, W4QCC 1. No QSOs.

GEORGIA—SCM, Howard L. Schuhner, WARZ—Astd. SCM: James W. Parker, Sr., W4GSP; SRC: W4DDY, RM: W4CN, PAM: K4PEK, W4AQW, W4BGW reports high noise level on 6 during Dec. W4BFM indicates good ground wave conditions, especially in the evening openings to 1-3-5-5-8-0. The Dixie 6-Meter SSB Net meets Sun and Wed, at 2100 EST on 50.110. An southeastern 6-meter station is urged to participate. W4PGJ is on with a 2-w. The Augusta Radio Club bulletin received with interesting observations from new members. W4QOU, K4HOI reports a 2-meter opening on Dec. 4 to N.Y., Peoria, Chicago and others starting around 1500 EST to 2000 when the band started to fade. The 100th and 160th also produced good signals into La., Tex., Okla., Kan., Mo. and Neb.

Net Freq. Days Stat. QNI QTC
QBN 3395 0000/0000 Dy. 62 224 381
QSSB 3375 2000 Dy. Jr. 32 972 209
QTN 3718 Dy. 10 106 30

W4GQX is now Extra Class. K4RZB is on 2. W4BFAJ has a new foot tower. W4AIAR was married. K4TOU added a v.f.o. to the SR-42. W4HTY is attending U.S. Gen. school. W4ILR is studying for Extra Class. K4HQP added a 15-meter to the SSB Net. WA4KZK reports on 6-meter SSB with a &. K4CQ reports a 2-meter opening on Dec. 4 to N.Y., Peoria, Chicago and others starting around 1500 EST to 2000 when the band started to fade. The 100th and 160th also produced good signals into La., Tex., Okla., Kan., Mo. and Neb.

W4ACF—DV—K4FBC/A0ECD (Army MARS) retired from FT LM and is making bulletin and a full-time occupation. K4PMJ is president of the PRARC and advises club dues are now $13.90 yearly. K4PMJ and K4FBC regularly assist K4PC in teaching a radio class with 19 would-be hams as students. K4PEK/CL Felix and Alcin, devote most of their spare time to rare DXing. K4PBM is heard regularly on 20-15 meters with reports of 75, 100 in the U. of Mich., while K4PBJJ continues visits to Georgia Tech. K4PBJL and K4PBJD had an 'A' station in Oklahoma, WA4QCC and W4JWY. W4QCC and W4JWY have a 15-meter to the SSB Net. WA4KZK reports a 3-meter opening on Dec. 4 to N.Y., Peoria, Chicago and others starting around 1500 EST to 2000 when the band started to fade. The 100th and 160th also produced good signals into La., Tex., Okla., Kan., Mo. and Neb.

WEST INDIES—SCM, Albert R. Crumley, Jr., KP4DV—K4FBC/A0ECD (Army MARS) retired from FT LM and is making bulletin and a full-time occupation. K4PMJ is president of the PRARC and advises club dues are now $13.90 yearly. K4PMJ and K4FBC regularly assist K4PC in teaching a radio class with 19 would-be hams as students. K4PEK/CL Felix and Alcin, devote most of their spare time to rare DXing. K4PBM is heard regularly on 20-15 meters with reports of 75, 100 in the U. of Mich., while K4PBJJ continues visits to Georgia Tech. K4PBJL and K4PBJD had an 'A' station in Oklahoma, WA4QCC and W4JWY. W4QCC and W4JWY have a 15-meter to the SSB Net. WA4KZK reports a 3-meter opening on Dec. 4 to N.Y., Peoria, Chicago and others starting around 1500 EST to 2000 when the band started to fade. The 100th and 160th also produced good signals into La., Tex., Okla., Kan., Mo. and Neb.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4REH—SEC: W4KKB, PAM: W4BGW, RM: W4BVE, Section nets:

Net Freq. Time Days
WFPN 3997 kn. 2300/0000Z
QFM 3601 kn. 2000/0000Z

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ORANGE—SCM, Roy R. Musson, W6DXY, The Edison Amateur Radio Net furnished communications for the Ruito Dayceen Christmas Parade on Dec. 10. Members taking part were W6AUX, WADDT, W5JL, W6DQZ, W6EHE, W6ZLZ, W6AAXH, W5VCA, W5YAN, W6VLO, W6TWC, W6BVB, W6QFC, and W6LGR. The SAROC was a great success, saw many Orange section amateurs there and attended WCARS meeting. W6EQOQ now is on the W6FBR stations WIAW Official Bulletin on local RACES/AREC Nets. is also up to 275/220 DECX, W6FB visited W6ML and they met W6KIH at the Apr. Airport, W6PZ advises that Gerry Evans is W6NZYK and Joe is W6NYZ. They are going for General soon. K6QGA is writing a two-letter call and is active on 27 meters. W6PO is back on the air after nearly a year's absence.


SAN DIEGO—SCM, James E. Emerson Jr., W6PHM—New officers of the ARC of El Cajon are W6BSEZ, pres.; W6ILO, vice-pres.; W6BURL, sec'y.; W6BUN, treas.; The North Shores ARC's officers are W6AEG, pres.; W6BOK, vice-pres.; W6BUPW, sec'y.; W6SE, treas. Back from Vietnam and in at MCSD is K6KIM. Seen across the tables at the SORAC Convention in Las Vegas were W6ATAD and W6GNN. (Some ideas for the Southwestern Convention to be held in San Diego in 197?!) K6RCO reports several duplex crossband QSOs during the holidays. W6NVR recently passed the General Class exam and is writing to put his HG-10B V.T.O. to work. W6BUPW has a new quad up 20 feet. W6NMT has 4 elements up now. W6LCL is pointed toward I.A. on 6 meters. We regret to report the following Silent Keys: W6ELBL, beloved XYL of W6AAL, W6HCR and W6LRY. The Christmas Party and the much-anticipated P.R. Ball at the V.H.F. Club saw W6HJW take home a noise blanker. W6CDDC is the new editor of the ARC of El Cajon's monthly News Letter and he is doing a great job. W6AEG reports 22 Full and 7 Limited ARC members in the San Diego County 2-Meter Net, W6KZ0 can be heard daily checking into the 15-Meter Weather Net rather 1300Z. The quarterly meeting of the board of directors of the Mission Trail Traffic Net was held at the home of W6BGGM in Jan. Traffic: (Rec.) K6HEQ 290, W6BQ 1057, W6BGF 837, W6IRU 534, W6BOZ 231, W6FPP 113, W6GNGM 67, W6KKE 25, W6BXXIT 9, W6AEQ 4, (Nov.) W6ACU 57, W6ESC 50.

SANTA BARBARA—SCM, Cecil D. Hinson, W6AO—SKY—perschutting. The SCM left for Coron Island aboard the schooner Swift of Lastwitch PST Jan. 1, 1968, from Santa Barbara and is on the air using the call W6QUG/11M. W6TMLR, Santa Barbara EC, has appointed W6VPH as Asst. EC. W6BUPW, EC Santa Maria, has time for all activities including Air Force MARS and frequency measurements. W6OBW has been appointed OBS and continues duty in the Mission Trail; he also has a new tower and beam. W6OBW now has his Extra Class license. W6LVQ and K6GY were guests of K6AEK for lunch at the Santa Ynez Country Club. The Simi Valley Radio Club now has its ARRL Charter. W6HNS, W6BHM, W6ALML, W6KOZ, W6LQY and K6GYJ journeyed to Santa Barbara to visit W6AKONV en route. Traffic: W6ORW 17, W6EOD 16, W6AOGG 1.

WEST GULF DIVISION—NORTHERN TEXAS—SCM, L. L. Harbin, WARR—Asst. SCM: E. C. Pool, W5NFO. PAM: W5BBO, Sec: W5SYIY, FM: W5LIR. Now that the holidays are over I hope that everyone can devote more time to amateur radio activities. I heard many New Year's resolutions made by various amateurs on the air, but one in particular stuck in my craw, so to speak. "I resolve to get on the air more." I must admit that when applied to amateur radio, it is not a very good attitude for any ham to take. In other words get on some frequency before you listen to see if there is a net on the air. I would like for that to have been, "I will listen on a frequency before I transmit." In this respect the key is an eye hook network operating on 3970 kc, each morning from 7 A.M. to 7:30 A.M. and the net control has complained of interference from some local stations but has had the pleasure of attending the Christmas Party of the Arlington, ARC and enjoyed a very fine dinner and program. The club presented W6PXX with a Mayoral plaque expressing its appreciation for his cooperation with the amateurs of that area. Award of the year went to W6AEE for his outstanding contribution to the cause of amateur radio. New officers of the ARC for 1968 are K6LNM, pres.; W6BLU, vice-pres.; W6BCH, sec'y.; K6PZ, treas.; K6GGA, EC. The
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SOUTHERN TEXAS—SCM, G. D. Jerry Sena, W5AIR—SEC: K5QQR, PAM: W5KLV, BM: W5EZZ. Our thanks to the many amateurs in Southern Texas who have cooperated in reporting various activities and traffic and participated in the various emergency and traffic nets. Your efforts are greatly appreciated. We are looking forward to a better year in 1968. Congratulations to W5NKJ, who made the HPL with a traffic count of 418 in Dec. 67. The Houston ARC will host the Old Timers Night Feb. 16 with W5WE as program chairman.

SOUTHERN TEXAS—SCM, C. D. Court Sena, W5AIR—SEC: K5QQR, PAM: W5KLV, BM: W5EZZ. Our thanks to the many amateurs in Southern Texas who have cooperated in reporting various activities and traffic and participated in the various emergency and traffic nets. Your efforts are greatly appreciated. We are looking forward to a better year in 1968. Congratulations to W5NKJ, who made the HPL with a traffic count of 418 in Dec. 67. The Houston ARC will host the Old Timers Night Feb. 16 with W5WE as program chairman.

This annual meeting also brings about many old-timers who don't get around any more. Hope to see you there.

We noted from EC W5KR's bulletin that W5MBC, a very active and lovely lady hams, celebrated their 50th wedding anniversary in Brownsville, Members of the West Gulf Emergency Net elected EC of Brazoria County, K3HANF, as net control station for 1968. Attendance has been very good on the West Gulf Emergency Net as well as on the South Texas Emergency Nets S.A.B. The Tex C.W. Traffic Net, under the direction of RM W5EZY, is making excellent progress. W5ABQ reports he is still trying to get a block hunter on the air; also that W5SWZ has showed up with a better signal and must be right as W5SWZ is made the HPL. W5AMBC reports the new ground-plane antenna is doing fine with 15 new countries during Christmas week. From reports it seems the FCC will be busy giving Extra Class exams.

CANADIAN DIVISION
ALBERTA—SCM, Harry Harford, V57T—SEC: W5VCL, PAM (APSN): VE5YM, VE5AS, VE5ATG, OPS, VE5HM, VE5SS, VE5AQF, OQS: VE5HM, VE5T, OHRM: VE5U, VE5ALF. It is time to start making your plans for the International Glacier-Waterton Park Festival to be held in Waterton Lakes July 20 and 21 with an informal meeting on the evening of the 19th. Listen on the Vulcan County Radio Club Net Sun. at 2130 MST on 3740 kHz. VE5AJZ is making arrangements for his new house and is too busy to give out on the phone and is AVAILABLE at 2130 MST and 14200 kHz. VE5U, ex-VE5CA, is having receiver trouble and has to have a relay station. VE5AO is doing a lot of entertaining these days. VE5CA started out for Christmas and never got there. After a long absence VE5EF was heard back on 75 meters. VE5ADS reports that APSN is putting up more days with more check-ins and hope that the boys will keep it up. Traffic: VE5HM 85, VE5AN 13, VE5KX 13, VE5V 13, VE5TE 13, VE5BY 13, VE5AVI 13, VE5BY 2, VE5AF 2, VE5AVI 1, VE5BY 1, VE5AVI 1, VE5BY 1.
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SELECTIVITY: 2.3Kc (—6db), 3.7Kc (—55db)

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139
BRITISH COLUMBIA—SCM, B. K. Savage, VE2FB
—This is the time of the year to say thanks to each of you for all the help you have given. The Centennial Year has ended with all the projects and contests. But really, after this great year, may we continue with the help and projects. It’s been a most gratifying year for the B.C. section. VE7ASU has obtained its commercial license. VE7A on homed now is VE7BJT. VE7AM is busy putting together Santa’s Highb Pipe rig. VE7BQG was out of the hospital and doing OK. VE7BM will be a VE2. VE7BOA is the OM. VE7BQJ George and now VE7BXX Joe. VE7BXX is now a call. The VARC has sixteen code and thirty members. According to reports from other clubs it looks like a big year for new amateurs. Traffic: VE7BOA 10A, VE7AC 30, VE7BS 22, VE7FQ 15, VE7BO 15, VE7HUG 1B, VE7BWA 2.

MANITOBA—SCM, John Thomas Stacey, VE4JT
—Wiring bells ring for VE4GK, VE4LQ and VE4AX recently. New officers of the Dauphin ARC are VE4AN, VE4DP, VE4AP, VE4AN, VE4F, VE4DF and VE4UQ. VE4BV has an HV-12 and has started a swap and shop net on 3750 at 8 P.M. CEST. VE4CQ and VE4FQ are recipients of C.W. section net certificates. Let us briefly recap the section activities: The AARC participated in the Brandon Balloon Race, Paraplane Pan-Am Games, St. John’s College Snow Show Race, Red River Exhibition, Miles for Million Walk and the Halloween Goblin Patrol as well as providing 2-meter emergency communications units in the Winnipeg hospital. The traffic net has provided good service: both of them operating daily throughout 1957 and allowing excellent traffic results combined they handled in excess of 800 messages of traffic. The nets and the AARC need every willing member. How about joining us today? VE4AT is active from Thompson. Net reports from section: QNI 644, QTC 207, C.W. sessions 31, QNI 152, QTC 104. Traffic: VE4AT 108, VE4JT at VE4AX, VE4AN 17, VE4QF 14, VE4WA 14. VE4AX 14, VE4AC 14, VE4AIN 14, VE4W 14, VE4AX 4, VE4AX 4, VE4MK 4, VE4AX 3, VE4FX 2, VE4AX 1.

MARITIME—SCM, J. Harley Grimmer, VE1MX
—Asst. SCM: R. P. Thorne, VO1AZ; SEC: VE1HJ. I expect that this will be the last column this SCM will print. I would like to express my deep appreciation to all those who have contributed to this column and the help they have provided. ARRL in this section. The Acting SCM will be William J. Gillis, VE1NR, who will act in this capacity until an election can be arranged. I am sure that Bill will perform his duties as efficiently and I trust that all members will give him their support. VE1J has been a new amateur in Antigonish. You may remember that APN meets daily at 0000Z on 3658 kc. APN reports QNI 290, QTC 41, sessions 31. Traffic: VE1OM 41, VE1AM 32, VE1MX 18, VE1AXX 15.

ONTARIO—SCM, Roy A. White, VE3BUX—My sincere thanks to the Ontario hams who voted for me in the recent election and I’ll do my best to warrant your confidence. I am sure you all must be aware of the proposed new regulations. I would appreciate receiving copies of club bulletins each month. The Ontario Phone Net, on 3770 kc, is meeting back to life with a new program. VE3FAM, or the possible PAM, is looking for more controllers. Why not offer your services for half an hour or so once a week? The LEU has been sending out vital notices to a few Ontario hams who have been neglecting to put the prefix “VE” before card letters. As the DOT points out, the prefix is necessary to determine the source of the failure to include it is a violation of the regulations. The Windsor Amateur Radio Club lost a valued and well-liked member when VE3WV died suddenly in Dec. Let’s give a big hand to VE3DJK for so ably carrying on the duties of Acting SCM during the past few months. Our fun-loving SCC is doing a fine job of sending out both the old and new SCCs to a few very EC hams in the area. Please give VE3EU a call at any given time. VE3LAR says 2-meter activity is going on great guns and he hopes to have a repeater station in operation shortly. The Wentworth County ARSP has been busy lately what with assisting with County parades, car rallies, etc. Those taking part in the parade included CHX, FSH, FVJ, FYV, EUM, ELY and FVY, which helped out from the top of the parade. The assistance to the car rallies was considerable and thanks and to CO, EQI, AAE and EUM. This news be a little late but wish your new calls a long and all the hams happiness and prosperity in 1958. Traffic: VE3GQ 171, VE3DO 150, VE3DRG 123, VE3DKZ 116, VE3RQD 107, VE3QCP 99, VE3HAT 86, VE3QPH 86, VE3RAH 75, VE3NO 50, VE3AS 32, VE3CHL 32, VE3RQ 19, VE3DOB 17, VE3BHS 13, VE3BEC 12.
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RME 6900 HAM BAND WWV, CW, SSB, AM Receiver, excel. cond. $250.00.

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QUEBEC—SCM, J. W. Ivey, VE2OJ, SEC; VE2ALE, RM; VE2DR, PMA; VE2AQ, VE2BVW. We are pleased to hear from the formation of these new clubs. In Thetford Mines, VE2CTM—VE2AWS, pres.; VE2REA, vice-pres.; VE2EHL, treas.; VE2DGY, secy. The Club des Amateurs de Ganv—VE2WM, pres.; VE2GU, vice-pres.; VE2DDO, secy.; VE2DAL, treas.; VE2BYZ, responsible for V.H.F. VE2DAD responsible for H.F. and R. Desjardins, public relations. We list here nets which report: RTQ 3600 kc, RPK 3780 kc, Quebec ARC (Sum. 3570 kc, QCW 3550 kc, TQV 3540 kc, VE2RM (l.m.) 140,400 Hz, 170,400 Hz, VE2RMI (s.m.) 140,400 Hz, 140,740 Hz, VE2RTC 140,210 Hz, 140,300 Hz. Le Radio Club de Quebec is to be congratulated on their new net, VE2AVP, EC for the province of Quebec, proceeds actually to a reorganization of the communications d’urgence in the city of Quebec and the province. All amateurs active on the two mc in VE2DQ, are invited to offer their collaboration in joining the ranks of the AREC. Invitations to VE2BYZ and VE2BYG who have responded to an appeal for sending help from the Quebec and VE2BYQ, who can turn the emergency to work. VE2AJD is due to resign at a longer conveniences to the surprise of a number of amateurs from a distance. Traffic: VE2DR 197, VE2QJ 59, VE2BRD 3, VE2AJD 43, VE2EC 57, VE2WM 30, VE2CP 28, VE2BV 19, VE2BYQ 16.

SASKATCHEWAN—Acting SCM, Gordon Pearce, VE2HP. New officers of SARL are VE2HP pres.; VE2OF, vice-pres.; VE2PFI, secy. The new EC for the South East Section is VE2DLO. President of VE2DLO, pres., by his VE2HLO. Our new PAM is VE2PZ, of Swift Current. The Boy Scout Jamboree held at Buffalo Pound Lake, north of Moose Jaw, was sponsored by their local chapter. The Saskatchewan Club has been working hard on a "History of Ham Radio." Two-meter activity in Regina is picking up, as Moose Jaw and Saskatoon are well into this phase. A tip of the hat to the hams who took part in the communications relay and alert when a small plane was lost in southern Saskatchewan. Pinion was maintained in the search centre at Lethbridge. The directors of the SARL should be in touch with all their members. On the air and mail liaison would certainly help to build up our SARL. We are also hoping for a large increase in SARL membership. Get in touch with VE2BJF. And remember too, the 1968 Saskatchewan Hamfest is to be held this year in Saskatchewan—June 28 to 30. 1968. Two of our Regional Boys, VE2FO and VE2BAG, have opened the Queen City for Saskatoon. Early in Jan., VE2ABS, from Lethbridge, had his car break down in the U.S. Several Alberta hams immediately headed south with a truck and towed him back. Within minutes after the return trip started his XYL in Lethbridge and parents in Regina were breathing easier. Many of the boys made contact with the Queen Mary on her voyage to San Diego. VE2SM led them to have regular hourly skeds with her. Traffic: VE2SM 71, VE2EM 69, VE2VB 45, VE2NY 18, VE2HO 7, VE2NRX 5, VE2EQ 4, VE2LS 3, VE2BD 2.

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W1PJE, J. E. "Cap" Smith, West Newton, Mass.
K1VPF, Edward Allen Avery, Storrs, Conn.
W2AJI, Frank W. Hogan, Howard Beach, N. Y.
W2BSS, John F. Schroth, Elizabeth, N. J.
K2CVA, Sigurd Flom, Bronx, N. Y.
W2EEX, Joseph A. Armstrong, Delanco, N. J.
W2HTJ, Everett J. Brill, Malvern, N. Y.
K2JK, William Almas, Brooklyn, N. Y.
W2JV, Shirley L. (S) Burke, Dumont, N. J.
W2LG, William Bauer, Brooklyn, N. Y.
W2NQS, Angel Fernandez, Brooklyn, N. Y.
K2OFT, Samuel T. Marks, Albany, N. Y.
W2VNU, Joseph LoVaglio, Rome, N. Y.
W2YVK, Thomas H. Ambruster, Haddonfield, N. J.
W3GLL, George E. Reid, Berrwyn, Pa.
W3JFR, Wenzel (Bill) Weisefek, Hartly, Dela.
K3LHU, George S. "Pete" Truly, Frostburg, Md.
W3MIO, Don G. Harmer, Washington, D. C.
W3UWJ, J. Rollin Quillen, Coatesville, Pa.
W4AAS, W. K. Cowan, Chattanooga, Tenn.
W4AAK, Wayne J. Morris, Oldsmar, Fla.
W4BXG, Wm. J. Hufstetler, Alcoa, Tenn.
W4CNO, Richard E. Bolen, Atlanta, Ga.
K4DL, David W. Simmons, Shelbyville, Tenn.
W4GOX, William J. O'Phean, St. Petersburg, Fla.
W4JOT, Warner A. Simpson, Tullahoma, Tenn.
K4UUD, Henry C. Carlisle, Smyrna, Ga.
W4UVY, Charles D. Thompson, Jr., Johnson City, Tenn.
W5ABDI, Albert Goss, Loranger, La.
W5CJH, J. D. Pritchett, Dallas, Texas
W5CCT, James N. Barclay, Austin, Texas
W5PBU, M. H. "Moon" Mullins, McAllen, Texas
WASQME, Robert P. Jarrett, Canyon, Texas
W2QYE, Michael Stottlemeyer, Hennepassey, Okla.
W6SZZ, John Drummond, Jackson, Miss.
K6A, Alva J. Sprigg, Los Angeles, Calif.
W6BSM, Daniel O. Olekar, Dumont, Calif.
W6CERL, William O. O'Connell, San Jose, Calif.
K6HTJ, Frank Gaulert, Hayward, Calif.
W6EKL, Earle B. Duskin, Baldwin Park, Calif.
K6MIZT, William J. Peters, San Marino, Calif.
K5TQ, Edwin J. Mitchell, Garden Grove, Calif.
W7NZP, Stanley L. Reis, Spokane, Wash.
W81DC, Philip "Red" Byerly, Sr., Detroit, Mich.
W9OZW, Ronald A. Slutz, Dayton, Ohio
W8POH, Ray Hartman, Tiffin, Ohio
W8GEO, Kenneth E. Smith, Chiego, Ill.
W9HQB, George M. Lyons, Indianapolis, Ind.
W91NG, Milton L. Davis, Harvey, Ill.
W9LFP, James Wylie, Minook, Ill.
K9MUD, Edward R. Godman, New Carlisle, Ind.
W9HRKW, Thomas G. Robinson, Chicago, Ill.
W9TNP, Harold W. Beach, Fort Wayne, Ind.
W4HTW, Edward L. Mueller, Edmore, N. D.
K8HZ, Ralph Hammer, Rushford, Minn.
K4PGQ, Ray S. Eldridge, Denver, Colo.
W8VBI, Arthur B. Monroe, Sikeston, Mo.
W8YQR, Earl Shirley, Rapid City, S. D.
K16AM, Corwin D. Slayes, Honolulu, Hawaii
K16ATS, William W. Ruddock, Kailua, Hawaii
K16AXY, James G. Kagihara, Honolulu, Hawaii
K16DLA, Edward T. P. Lau, Honolulu, Hawaii
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(Continued from page 68)

Answers to license quiz: Q1 — B; Q2 — D; Q3 — C; Q4 — E; Q5 — D; Q6 — below.

\[\text{C1, C2 — A.f. coupling capacitors} \]
\[\text{C3 — A.f. bypass capacitor} \]
\[R1 — Grid return resistor} \]
\[R2, R3 — Load resistor and bias divider \]

\[\text{C1, C2 — A.f. coupling capacitors} \]
\[C3 — A.f. bypass capacitor} \]
\[R1, R2 — Bias voltage divider} \]
\[R3 — Load resistor} \]

VOX System for S.S.B.
(Continued from page 38)

which is still adequate to cut off plate current.

C.W. Operation

Those who have followed earlier articles on c.w. break-in for the Collins S Line\textsuperscript{2,4} may be interested in the following. Since working with the voice system, it has been found that the screen switch works well as a c.w. control. An advantage is that it is no longer necessary to adjust the final-amplifier bias\textsuperscript{3}.

The screen switch is the same as shown here in Fig. 1. The driving signal is taken from the collector of the 2N591.\textsuperscript{2,3} The 2N591 base resistor is changed to 300K.

All backwave is eliminated by applying an FET switch, identical to one of those shown in Fig. 1, to one grid (Pin 2) of V4 (the second mixer) in the 328S-3, in the same manner. The driving signal for this switch is also taken from the collector of the 2N591.

With this arrangement, keying is clean, and break-in operation very smooth.

In conclusion, it might be mentioned, for the benefit of Collins-equipment owners, that Collins can supply a four-foot coax section to be substituted for the 21-ft. cable normally used between the 328S-3 and the 30L-1. This change avoids the “suck out” problem when using a t.r. switch.

\textsuperscript{2} Hildreth, "Instantaneous Break-In With the Collins S Line," QST, December, 1963.

\textsuperscript{3} Hildreth, "Transistor Keyer/Muter for Collins S Line," QST, December, 1964.

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M.U.F. Tendencies in Sunspot Cycle

(Continued from page 15)

Elongated $F_2$ single hop (i.e., KH6 to eastern and midwestern USA, Europe to midwest and W5) usually occurs just as the skip is going out for the more regular $F_2$ distance contacts, such as KH6 to W6, or Europe to W1, 2, 3.

During the season change period (mid-March, mid-September) there are often $F_2$ type contacts between North and South America. The spring contacts often extend into late April or early May. Openings in March and early April are usually centered around 10 a.m. local time for the North American end. Later, our summer season $E$ skip may yield a single hop of $E$ skip into the Caribbean area, where it links up with the regular $F_2$ that builds up in the equatorial regions and south of the equator during our summer months. This may occur at any time of day, and contacts from 1600 PST to 1900 PST are not uncommon. Stations in the southern USA usually benefit the most from this.\(^3\)

Summary

The low band occupancy during scattered 50-Mc. openings is a shame. There is no good reason why more of us can't be aware that the band is open, or that it is likely to be open, when these unusual conditions occur. This is especially characteristic of regions of the Caribbean, Central America and northern South America. In this regard, we can all stand to do a little missionary work.

I am reminded of an instance on January 3 when WB6BJ here in Fresno heard VP1PV in Belize, British Honduras on 10 meters asking a VE3, ... "hey, what's going on with 6 meters?" WB6BJI broke in and told the VP1 in short order. That was a Wednesday, and the VP1 promised to be on 6 the next Saturday, the 6th. (He had a converter, but had to build a transmitter and beam!) On the 6th, he was on the air, and promptly worked into W/K.

50 Mc. is often open; at least much more often than we observe with reportable two-way contacts or verifiable heard reports. But you do have to be on hand at the right times, and so does somebody else, at the right distance, in the right direction!

\(^3\) Similar combinations of east-west $F_2$ and the north-south $E$ mode have provided extreme DX, even to more than half way around the world. — Editor

The Army Loop Antenna

(Continued from page 16)

The military version, Mr. Patterson stated that the military have access to a higher-quality mica capacitor than the average ham, and we have to agree! The loop has been used for over two years in Vietnam with excellent results reported, and because of the inherently high angle of radiation from such an antenna, it is particularly useful in maintaining contact from gullies or ravines where normal whip operation would be impractical.

(Continued on page 158)
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QST-27a
Conclusions

For a ham with limited real estate, the antenna has possibilities. However, cost is an important factor when all the considerations are taken into account. The version shown in the photographs cost about $70.00. The 1 3/4-inch-diameter tubing was about $35.00 and the air variables in the matching network about another $30.00. A considerable amount of capacitance is required: C1 is about 650 pf, for each section and C2 amounts to about 500 pf. If surplus variables with necessary capacitance could be found, the total cost could be reduced. However, a wire dipole will do as good a job or better, is much cheaper, and can be used on all bands. The loop, because of its small physical size and low resistance, is inherently a narrow-band antenna. It maintained a reasonable match about 10 kc, either side of the match point, but any frequency change greater than this would require retuning. This isn't true of a center-fed dipole with tuned feeders.

ARPSC

(Continued from page 61)

at the judges' booth. Mobile stations trailed the foot runners and reported the progress of the race. — K8NYG.

On Dec. 17, Ulysses, Kansas, was selected as the site for a simulated commercial power failure. This particular area would also be without its telephone system, which depends upon commercial power. WA8NFP moved his station to a hospital and operated on 75 meters using a temporary vertical antenna and a portable generator. Over 25 stations checked into the Zone 11 Kansas AREC Net and all were able to hear WA8NFP. During the test, a 2-meter link was available from Dodge City to Minneapolis, Copeland and Montezuma. The test was a success. — K9JDD, EC Zone 11, Kansas.

Fifty-five SEC reports were received for the month of Nov., representing 16,833 ARRC members. This is two more reports but 301 fewer members than for a year ago. The following sections reported: Ala, Alta, Ark, BC, Colo, Conn, Del, EFla, EMass, Ga, Ill, Ind, Kans, Ky, La, Me, Mar, MDC, Mich, Mo, Mont, Nebr, Nev, NH, NLI, NC, NJ, Okla, Ont, Org, Que, SF, SCV, Sask, SDAl, SNJ, STex, Tenn, Utah, Va, Wash, WVa, WFla, WNY, WPa.

How's DX?

(Continued from page 91)

usually get on around 28,500 kc. from 2200 GMT till the band clears, then start up on 30,000 kc. at 0300 or so, week ends only." Traffic work takes precedence over DX hunting at KG6IC, and Don notes that his QSOs with Sixa outnumber any other US. call area at least two to one. K9HBF reports action by 5W1AS on 28,562 kc. at 0230 GMT or so, also that WA8YVR/KH6 changed his spot to KH6KX. ZL2APZ calls WA1DMG of imminent Chathamian hammering, and WA6VJJ solicits your cooperation to assist with plans for a Brunel go. . . . . K9SAA toasts a KWM-5, HW-282A and 18-AVQ with him to KP6AP and other Pacific points. . . . . More Oceanian tidbits from literature of aforementioned clubs and groups: V9DAK reports VK9CR on Marquesas, 11,000-kc., rv; after 1500 GMT, the latter returning to VK3UG. . . . VK9DE's departure leaves Christmas in VK9FX's 20-side-charge, 30-AVQ. Ex-EZAR rocks on SW1A. . . . PkS 18H SYAK SYBC SYF5 and 8YZZ4 abound on 20 phone, 1000-1300 GMT. 

(Continued on page 164)
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SOUTH AMERICA — PY2BII and PZ1AII took turns panicking the 160-meter DX pack in December’s tests, with scores of W7/K/K6A, PZ1AII clinched a 1.8-Me. W7/K/K6A for DL2HRA, according to W1RBB ... transceiver and quad bend my 8-meter on 20 and 15 from Argentina island, reports W7AO5K. "Robin is G3FBN back home," ... with the assistance of WS5PWG. Neighbors YV5E Ciz and CKR, an OM-YXL team, lugged their NC-250, 2B-300, transmitter and receiver to Valeria where W1ATF reports a very objectives. "FV one, "DX News-News" has been heard and represent Chilos and Navarino isles on 14-Me. a.b., also, that PY7’s DX and SP managed two kilo-QSOs aboard St. Peter & Paul. Lonely anchorage—seven hours for a landing.

HEREABOUTS — KP4RK files "DXCC" No. 82, the first from Puerto Rico (see p. 88, November 1970 QST, and p. 97, October). The world of DX Arias, a 33-year-old spoken Puerto Rican DXer, a project KP4RK had to abandon because of increased vocalic pressures. ... ARRL Director W4ZPZ drops in on ex-CM2SW-CO2SW, pioneer Cuban DX chaser, who now thrives as K5KDP. W4JJW regularly visits the six highest points in Alabama as a microwave engineer. "What QTH?" ... Northern Illinois DX Association is a new and merging outfit founded by Lester Petersen. W6A BYZB DWQ GFF GXH UVJ LJK NZN QON WYB, K9G GSW KFP LUI and VLE. Secretary W6BZU warns, "Expect fierce competition from this group in all bands and DX contests. Excellent reports of the antenna are obtained via our 2-meter NIDX chanell.

"Redrafting the shack put me out of tourism for a while," says long-time "flavor"s helper W6NQ. Hope it’s not one of those parlor-looking jobs with no DX QSLs on the walls. W6H3R further adds, it’s a dipping order of a DX-301/3B-101 layout. ... Old-time ARRL official W6CIS convalesces from heart troubles with an SIF-161. Another "in the saddle," W6IIFU feels the two that one who monopolized VQV7 on 7050 kc. December 30th might well brush up on the Golden Rules. ... W9DAR tries to get a DX ball with QRP rules ranging from 0.7 to 20 watts. W91IFU feels that the two that one who monopolized WVJ7 on 7050 kc. December 30th might well brush up on the Golden Rules. ... W9DAR tries to get a DX ball with QRP rules ranging from 0.7 to 20 watts. W91IFU feels that the two that one who monopolized WVJ7 on 7050 kc. December 30th might well brush up on the Golden Rules.
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We have the following tentative schedule for upcoming v.h.f. conventions. The second annual Roanoke V.h.f. Convention is scheduled for July 20-21. W4KLT will have more on this one later, and the 144-Mc. DXers in the midwest are planning their second annual meeting, to be held in the St. Louis area, during the latter part of August. If you're interested in two, don't miss this one.

332 Mc. continues to enjoy a rapid increase in activity, and rightfully so because our lowest u.h.f. band has much to offer. In Florida, K4NTD at Oakland, says W4TOD, W4ZFO and W4BAKJ are all active on ATV in Orlando, and that W4PAO and W4A4KNX are telecasting occasionally. Another active station is K4IY at Merritt Island, transmitting a broadcast-quality picture, according to K4NTD. The Indiana Amateur Television and U.h.f. Club in the Indianapolis area is quite active with several stations telecasting regularly including K0GJ and WA9TMH. How about more information from you fellows? WB4BPS and WB4ACKM at Florence, Alabama, are nearing completion of their respective ATV transmitters.

Mid-winter tropo conditions in the East were surprisingly good. W4FJ at Richmond, Virginia, made numerous contacts with W3RUE and W4ZEMB in the 250 to 300-mile range. W4FJ soon will double his present 32-element Yagi stack and wants schedule. At Bristol, Tennessee, K4DQJ wants to keep schedules with his 4000-foot Holston Mountain station, looking especially for South Carolina, Georgia, Kentucky, West Virginia and Pennsylvania. He has three transmitters on 432 including a 4CX250B final. In Kingsport, Tennessee, W4WQZ is active with a varactor tripler and has worked W4NUS and W44BVW, both North Carolina, recently. W3KDF, Spencerville, Md., claims 5 states with his varactor. Smithy runs a 432 beacon when conditions appear favorable. K0QJX says he will put South Dakota on 432 soon. He will start with a varactor and a 32-element collinear array. In Quebec, VE2HW continues his activity with regular tests over a 90-mile path to VE3BDX, who runs 20 watts output. VE2A.KF has gone from 30 to 100 watts output and also schedules VE2BD. Those three stations operate near 432.03 nightly after 0100 GMT.

1296 Mc. activity is also reported by VE2HW. He has just finished a 32-element extended collinear made of brass rod elements with aluminum reflectors. The frame is 3/4-inch weatherproofed white pine, and the elements are mounted through 3/16-inch hardwood dowels glued into the frame crossmembers. His signal source is a 2N706A oscillator with a 108-Mc. crystal, tuned to 432, and a diode multiplexer into a 1296 trough line. Even with a multiplication factor of 12, the generator provides a stable 1296 signal for converter and antenna checks. He has leased a 2C30 tripler to VE2BMQ for tests over a 25-mile path. In the Washington, D. C. area W3AHQ, W4API and W4EXS are preparing for tests, as is K4QIF near Norfolk, Virginia. K4NTD and WA4CIIK, both Florida, report building projects also underway.

No 220 Mc. reports were received in the 30 days prior to this writing.
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HEATHKITS HR-10, $50.00; DX-60, with Novice xtal, $55.00; DL-100, as new, sell for $110.00. Apache, 110.00. Salvage Mitchell, 14 blade do., $80.00. WCN, 12118 W. 26th St., Chicago, Illinois 60623.

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CHEAP DX-115, $325.00; HT-92, $375.00; NCX-4, matching patch 100 watts, $100.00. Turner, 250 mikes, $100.00. DX-40, $100.00. Used Ken Lafferty, W5GPW, 3024 Broadway, Sacramento, Calif. 95820.

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