

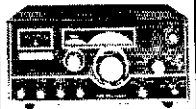




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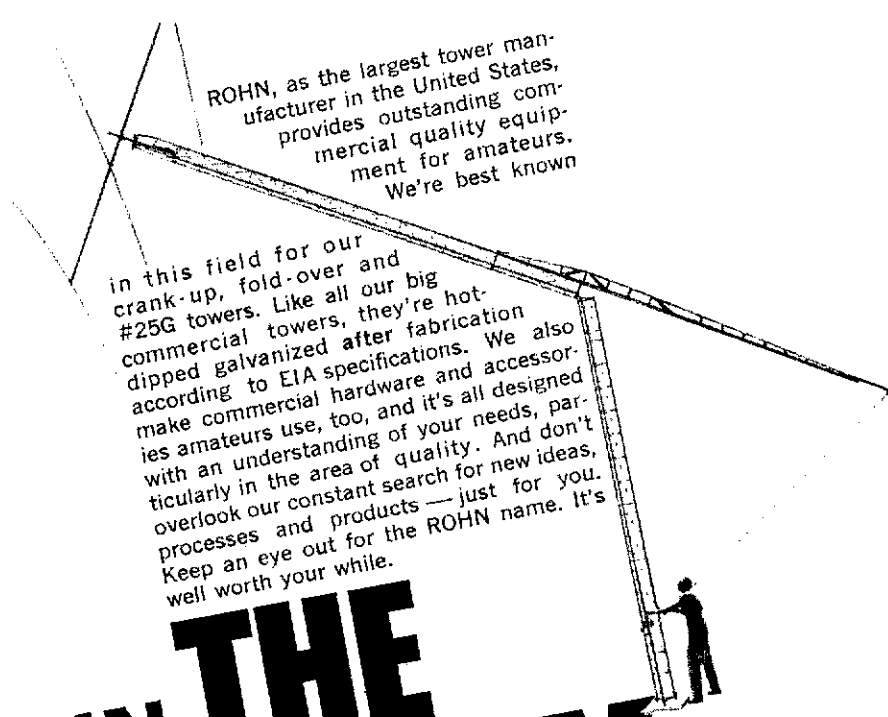
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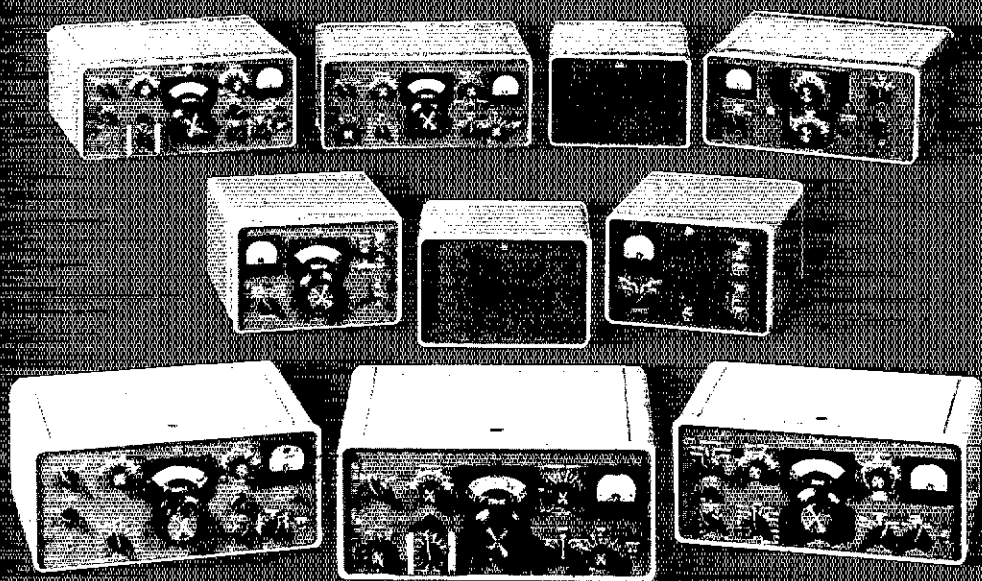
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OUR COVER
The Northwest Fla. FM Assn. does it the easy way! See page 76. (Photo by Judy Regan & Playground Daily News!)

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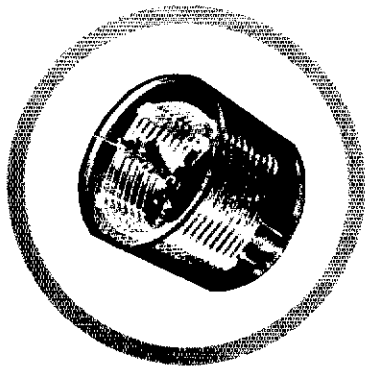
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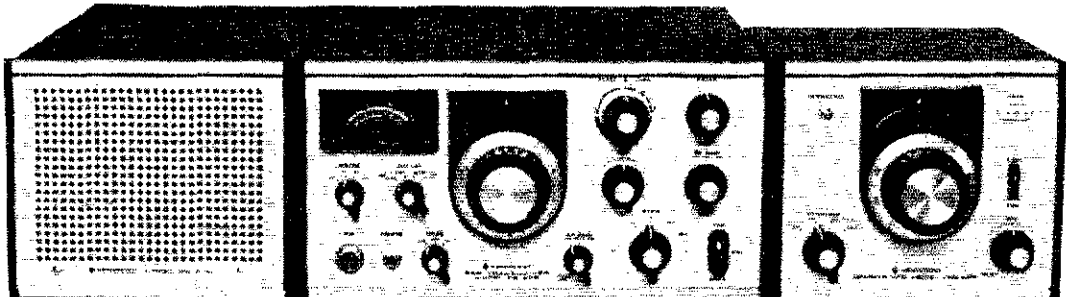


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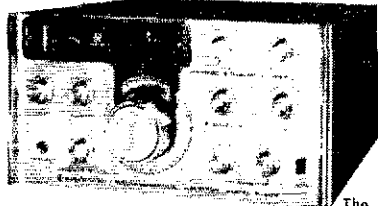
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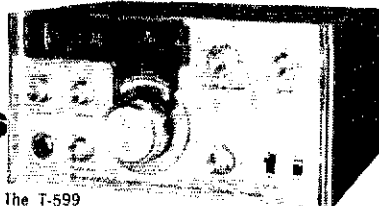
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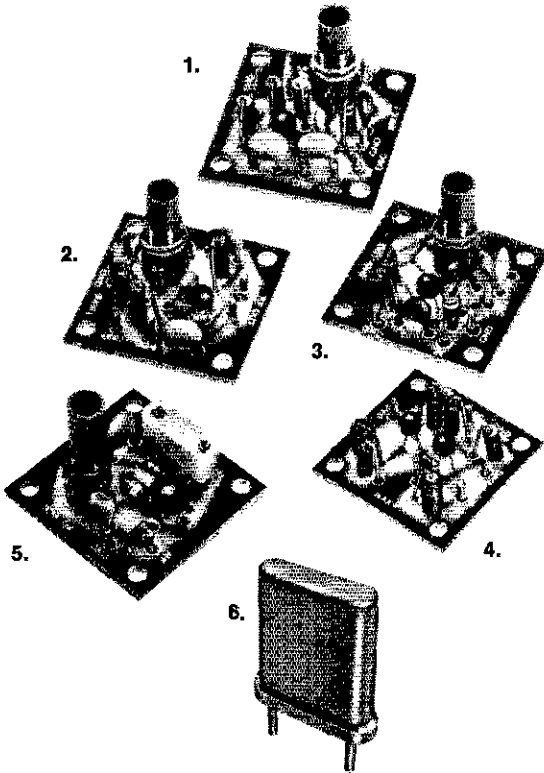
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"It Seems to Us..."



MORE HAM BANDS?

AT THE 1959 international radio conference held in Geneva, we had a number of informal conversations (mostly at the bar — naturally!) with a fellow delegate, an old-time frequency allocations engineer. During one, he said to us, "John, if you can hold off invasion of the ham bands for another ten years, you'll have it made. Cable, microwave, and now satellite systems all have far greater reliability for commercial and military communications purposes. Their growth will be such that no one will really need or even want hf bands except you amateurs and the broadcasters."

Like most sweeping predictions, this was certainly an overstatement, and obviously premature. Yet the trend of hf usage (or non-usage) has been precisely in that direction — and has been gaining momentum. And all these 12 years the point has not been forgotten, i.e., at the *next* hf radio conference we might pick up a few more kHz to alleviate congestion in our present bands. ARRL Executive (and other) Committee meetings the past ten years or so have regularly included discussions of this objective. They were usually "blue sky" sessions, kept intentionally informal rather than made subjects of motions to appear in the minutes. In this broad program, there has been much helpful advice and guidance from a number of professionals (who are also hams) in evaluating the practicality of amateur band expansion. They have voluntarily assisted our President, and other League officials, with their background of expertise. Most of them preferred anonymity, and we've respected their wishes.

"At the next conference" — but when? Twelve years have gone by since the 1959 full-dress affair. Specialized conferences in 1963 and again earlier this year dealt with space allocations, but made no substantial changes in hf. The emigration to vhf and uhf has relieved congestion enough to hold down what otherwise would be loud demands for another general allocations conference. But sooner or later there will be one. Indeed, there is currently another flurry of talk in Washington on the possibility of one before the end of this decade.

This will mean that League plans and projects must now be laid out in more detail, and with more effort behind them. ARRL

study and planning programs have been quietly in operation for about six years now, mostly on a passive basis of gathering information and statistics, and liaison with IARU officials. As an eventual conference becomes a certainty, however far in the future, the "go" button will be pushed in a League campaign to carve more kHz out of the hf spectrum when it is dissected. Through IARU, President WØDX has already started some of the "machinery" in this project.

It will by no means be a simple job. The lack of universal support by national administrations at the recent space conference indicates the depth of the problem, as pointed out in a September *QST* story and the October editorial. (Indeed, it is somewhat a follow-up to those items which prompts this month's comments.) But problems are routine fare for amateurs at international conferences. We simply have to work harder than most of the other services! And, make no mistake, we must indeed prepare thoroughly and long in advance; the alternative is still a possible *loss* of a band or bands.

Unless the talk about a possible future conference should totally disappear, you'll be seeing a lot more on this subject in *QST* from time to time. We'd like to end this instalment by quoting from a speech delivered two years ago to the International Amateur Radio Club in Geneva by A. Prose Walker, W4BW, then an independent telecommunications consulting engineer (now Chief, Amateur & Citizens Radio Division, FCC). After discussing the overall matter in some detail, he concluded:

"Probably the greatest obstacle will be the inertia of the existing allocations table. National interests must be taken into account in considering any move in this direction. In all likelihood, no country would be willing to propose convening an Administrative Radio Conference without considerably more justification than a re-examination of the amateur allocations. What I am suggesting is that we should be alert to the possibilities in this area, and that each national organization should maintain

(Continued on page 77)

League Lines . . .

Processing of alien ham visitor applications for operating privileges here, which in the past have often been delayed 60 days or more, has been speeded up considerably by some wholesale cutting of restrictive red tape procedures -- orchids to the new FCC staff for their aggressive action.

And a brickbat to us! Last month (page 86) we suggested that aliens intending to become citizens, and wanting to take the ham exam under the new Goldwater bill provisions, should provide a photocopy of their "declaration of intention to become a citizen." Oooops -- ZS6JC informs us this is an official court paper and photocopying is strictly forbidden. Fortunately, FCC procedures do not seem to require this document.

A goodly number of those attending the Pacific Division Convention in San Jose earlier this year were wearing "I'm on 220" lapel buttons. Shows there's a lot more activity on that band than is ordinarily evident; dedicated experimental vhf types are normally pretty quiet about their projects.

Ballots for director elections were mailed from Hq. in mid-October to all Full Members in Atlantic, Delta, Great Lakes, Midwest, Pacific and Southeastern Divisions. If your ballot hasn't arrived by early November fire us an airmail request to get a duplicate.

Although the proportion is infinitely less than in CB, ham radio has a few bad apples as well. Five Montanans with amateur licenses were recently indicted for bilking the phone company out of toll revenue through a homemade "black box" to confuse the billing system. We are happy to say that those involved are ex-members of the League and notorious in their area for strong anti-ARRL feelings.

And there's the station or two on slow-scan which takes delight in transmitting "art" pictures. Intercepts have been turned over to FCC, with call signs. Society may well be changing its mores to extreme liberalism, but that stuff belongs in "Playboy," not on the ham bands.

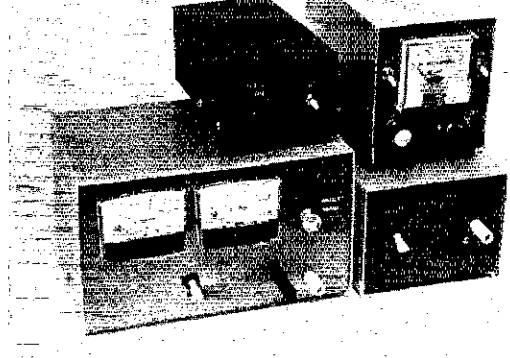
Our attendance at a recent conference of the Society of National Association Publications showed that, like ARRL, dozens if not hundreds of non-profit membership and trade associations around the country are adversely affected by proposed rules governing advertising income as separately taxable. Some outfits have found the rules so oppressive that they have voluntarily relinquished their tax-exempt status -- they feel they will pay less tax that way, or none at all! Even though the League has been in the red each of the past several years, the Internal Revenue Service initial audit claims ARRL owes some thousands of dollars back taxes on "profits." We are filing strong exception, of course.

Reminder to club program chairmen: Check the Training Aids list in your club portfolio for current film, slides and tapes on most every phase of amateur radio. Many affiliated clubs have yet to take advantage of this program resource.

The past fiscal year, FCC collected about \$16 million in fees. This was far less than the budget -- perhaps because there has not yet been a full year at the new rates. The Safety & Special Radio Services Bureau, which includes amateurs (and CB), provided the largest portion -- \$5 million -- more than the broadcasters or common carriers.

Quote-of-the-month: (Senator Barry Goldwater, K7UGA, addressing the Southwestern Division Convention in early September) -- "The ARRL does a fine job for you in Washington. I've heard rumors that we need better representation, but I can assure you that the League takes care of your political problems."

Power aplenty! Here are three fixed-voltage supplies to power transistorized rigs, plus a test-bench model for the workshop.



AC-Operated

Regulated DC Power Supplies

for Transistorized Rigs

BY DOUGLAS A. BLAKESLEE,* WIKLK

A SOLID-STATE transceiver for hf or vhf fm isn't always a low-cost project. Most home-made units end up costing more than commercially made equivalents. However, using the low-cost IC regulators and surplus power transformers now available, an amateur can build a 12.6-volt battery eliminator to run a "store-bought" transistor rig for a modest monetary investment, often far less than for comparable supplies now being sold.

Regulated Supplies

A regulated power supply is shown in block-diagram form in Fig. 1. The output from the rectifier/filter is passed through a control device called the *pass transistor*. The pass transistor may be built in as part of the IC, or an external discrete device driven by an IC regulator may be employed. For high-current requirements several pass transistors may be operated in parallel. Any variations in the output voltage caused by load changes or line-voltage fluctuations are sampled, amplified, and applied to the base of the pass transistor. The regulator section supplies a reference voltage against which any output changes can be compared. The pass transistor is adjusted by a change in base current to maintain a constant output voltage. As ac ripple on the output line is actually a shift in dc voltage, an IC regulator

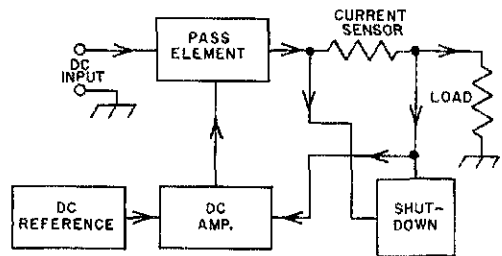


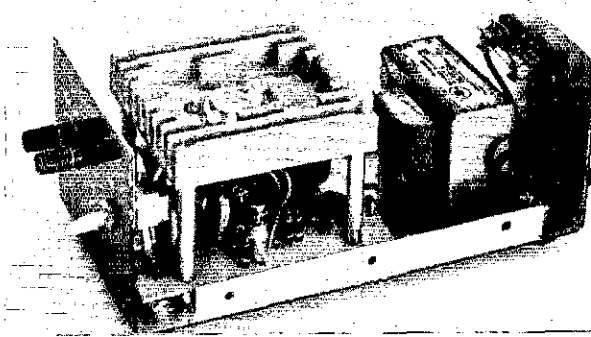
Fig. 1 — Block diagram of an IC regulator.

provides a large measure of additional filtering action. If the output current exceeds a preset level, a shut-down circuit turns the pass transistor off, preventing damage to the supply by a current overload or short circuit at the output.

Designing a regulated low-voltage, high-current supply is not a difficult task, but a considerable amount of computation and some cut-and-try bench work are usually needed. Several years ago Fairchild introduced the $\mu A723$ integrated-circuit regulator which contains the voltage reference,

* Assistant Technical Editor, *QST*.

Inside view of the 1-A supply. The rectifiers, filter capacitor and IC regulator are mounted on a small pc board. The heat sink for the pass transistor is mounted on standoff posts above the circuit board. A $3\frac{1}{2} \times 2\frac{7}{8} \times 7\frac{1}{4}$ -inch box made from a U-shaped piece of aluminum sheet and a cane-metal cover house the unit.



control, shut-down and pass-transistor driver elements on a single silicon chip. Other manufacturers quickly followed suit with a number of design variations. The power-supply construction task is simplified to a few interconnections when using an IC regulator.

The supplies described here were designed specifically to power the solid-state fm transceivers that are now so popular. Circuits for 1, 2, and 5 amperes are given in Fig. 2. In addition, a 1-A bench supply is shown in Fig. 4. All of the power supplies use the same basic rectifier and filter combination. The components used with the ICs are those recommended by the device manufacturers in their literature. The major difference between the designs is the choice of pass transistor

and associated heat sink. Auxiliary features added to individual supplies serve to illustrate accessories that can be included, if desired.

Circuits

The 1-A design uses the RCA CA3055 integrated circuit and a 2N3055 pass transistor. This supply employs a small heat radiator, as the 2N3055 is working well within its ratings. A *pc-mount control is used to set the output at 12.6 volts*. The 56-ohm resistor, R2, limits the current output to 1 A, using the current-limit feature of the CA3055. See Fig. 2, Z2A.

For current maximums of 2 to 3 amperes, the circuit at Z2B can be used. Here a Motorola functional circuit, the MFC6030 is employed with

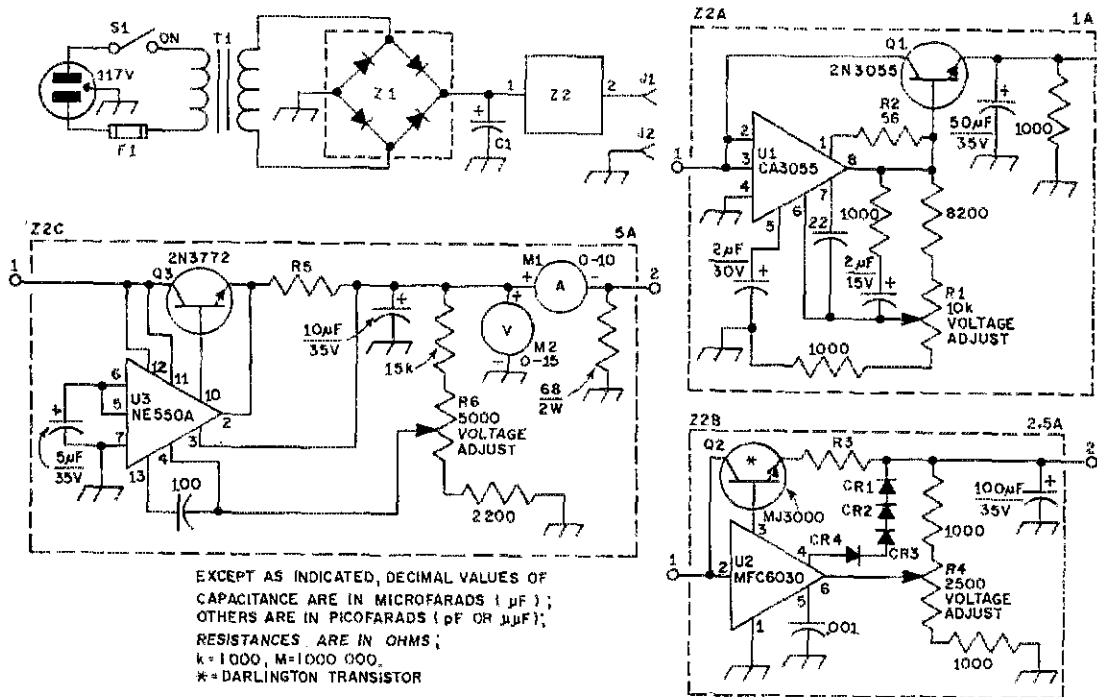


Fig. 2 — Schematic diagram of the three power supplies. Regulator sections of the 1-, 2-, and 5-A versions are shown at Z2A, Z2B, and Z2C, respectively. Heat sinks required are 4 1/2, 11, and 30 cubic inches (Cesco HS-2, Motorola MS-10, and Delco 7281366 radiators used here).

- C1 — For use with Z2A, 1000 μF ; Z2B, 3000 μF ; Z2C, 5000 μF ; all 35-V rating.
- CR1-CR4, incl. — Silicon diode, 50 PRV or more.
- F1 — For Z2A, 1A; Z2B, 2A; Z2C, 4A.
- J1, J2 — 5-way binding post.
- M1 — Ammeter (Calectro D1-920).
- M2 — Voltmeter (Calectro D1-917).
- Q1 — RCA power transistor.
- Q2 — Motorola Darlington power transistor; MJE1661 and MJ4034 also suitable for up to 5 A of output current.
- Q3 — Motorola power transistor.
- R1, R4, R6 — Linear-taper composition control, pc mount.
- R2 — Composition.
- R3, R5 — 0.1-ohm resistor, made from 8 feet of No. 22 enam. copper wire.
- S1 — Spt toggle.
- T1 — Power transformer, 117-V primary; secondary 18 to 21 volts; rated current should match or exceed desired output current. See text and Fig. 3. (Stancor TP-1 used with Z2A; Triad F-47U, Z2B; and Triad F-48U, Z2C.)
- U1 — RCA IC.
- U2 — Motorola IC.
- U3 — Signetics IC.
- Z1 — Rectifier assembly. May be 4 silicon diodes, 100 PRV or more rated at 1 A for Z2A, 2 A for Z2B, and 4 A for Z2C. Motorola MDA952-3 used in the 5A design.
- Z2 — See text and drawing above.

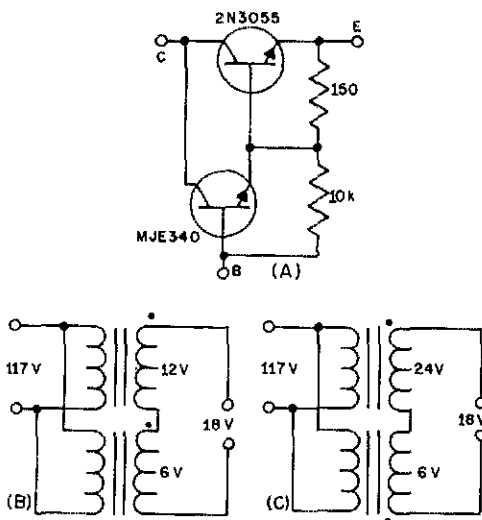


Fig. 3 — (A) Connections for a Darlington power transistor. (B and C) Connections for voltage aiding and voltage bucking with filament transformers.

a Motorola MJE3000 Darlington-connected pass transistor. The use of a high-gain pass device improves the output regulation. Of course it is easy to purchase a ready-made Darlington transistor, but the enterprising amateur can make his own as shown in Fig. 3. Of all of the circuits tried, the one using the Darlington pass element exhibited the best load regulation. However, some of the IC regulators have so much internal gain that it is difficult to avoid oscillation with a high-gain pass transistor.

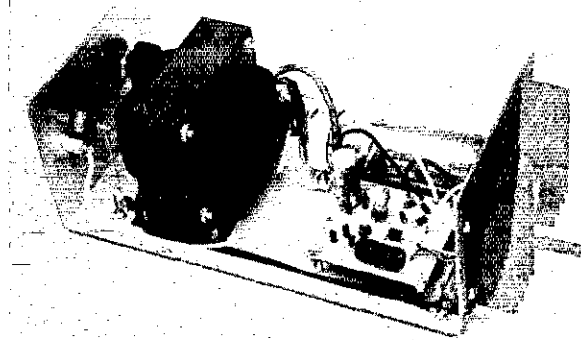
At C, the high-current supply uses a Signetics NE550 regulator. This integrated circuit is available in either a flat pack or TO-99 case. For experimental use, voltage and current metering were added to this supply. Also a VOLTAGE ADJUST control was mounted on the front panel, which, with the values given in Fig. 2C, allows one to vary the output from 5 to 15 volts. For more than 5 amperes of output current more than one pass transistor will be needed. If parallel-connected transistors are employed, care must be exercised to assure that the individual transistors handle equal amounts of the output current and that suitable precautions are taken to avoid oscillation (which often occurs in multitransistor circuits).¹

Fig. 4A illustrates the design of a bench supply which will deliver 3.5 to 21 volts at 1 ampere. Metering of the output voltage and current is provided. If desired, the current-limiting point can be made adjustable, as shown at B. The RCA CA3055 IC and 2N3055 pass transistor are used again, although any of the other combinations shown in Fig. 2 would be suitable.

Component Selection

The only expensive item in each supply is the power transformer. Shopping in surplus stores, or

¹ *Silicon Power Circuits Manual*, SP-51, RCA Electronic Components, 1969.

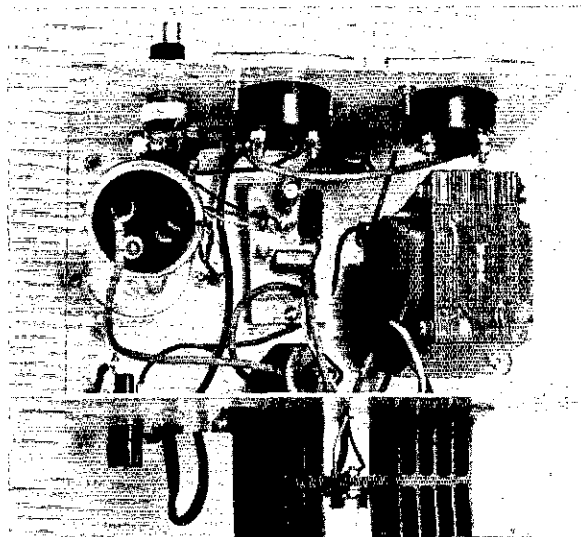


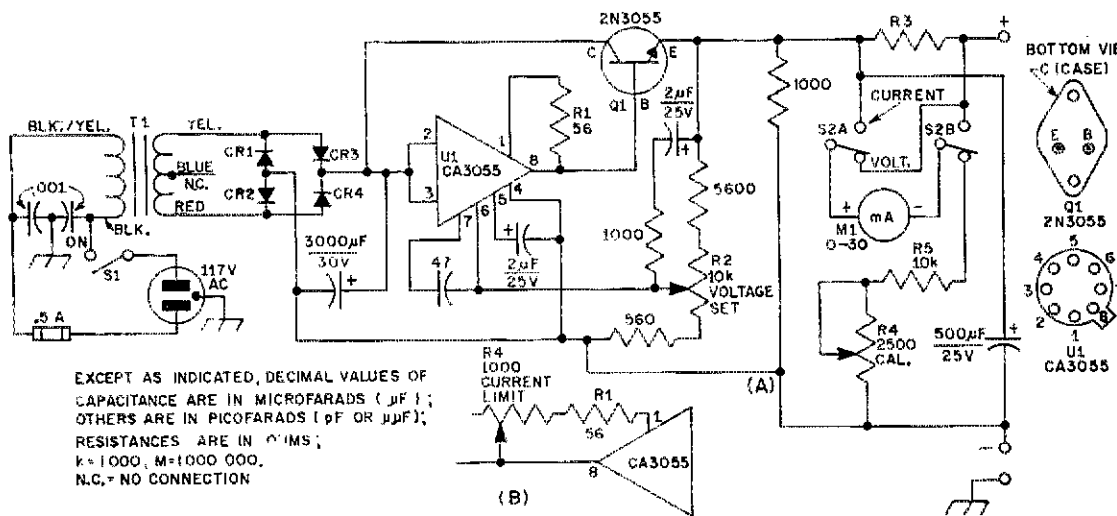
The 2-A supply is constructed in a 5 x 4 x 10 1/4-inch homemade enclosure. Rearrangement of the components would allow a smaller box to be used. The heat sink is mounted on the rear deck, with the fins oriented vertically for efficient cooling of the pass transistor. The coil of wire in the foreground (on the pc board) is the 0.1-ohm resistor used in the current-limiting circuit.

by means of catalogs, can be rewarding, as bargains are available for both the transformer and main filter capacitor. Unfortunately, few 17- to 20-volt types are advertised. It is often less expensive to obtain a 6- and a 12-volt surplus transformer, or 24- and 6-volt units, than to purchase a new 18-volt transformer. The 12- and 6.3-volt units may be series connected, as shown in Fig. 3B, to aid or to buck (Fig. 3C), if the 24-volt transformer is used. In either case the result is the same — about 18 volts. With some careful shopping the 5-A supply can be built for less than \$20, if the meters are omitted.²

² A transformer secondary winding may also be rewound to provide the desired voltage as described by McCoy in *QST* for February, 1970.

For 5 A of output current a massive heat sink is required, again mounted on the rear deck. The Motorola bridge-rectifier assembly is visible just above the heat sink. Although the flat-pack version of the Signetics NE550 is employed here, a TO-99 can type would be easier to use if point-to-point wiring is chosen.





EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICO FARADS (pF OR $\mu\mu\text{F}$); RESISTANCES ARE IN OHMS; K=1000, M=1000000. N.C.=NO CONNECTION

- CR1-CR4, incl. — 100 PRV, 3 A (Motorola 1N4720 or equiv.).
- M1 — 0-3 mA (Knight 701-0021 or equiv.).
- Q1 — Silicon npn power transistor, 2N3055 (Radio Shack Archer 276-592 suitable).
- R1, R5 — For text reference.

The layout and construction of the supplies are not critical. An etched circuit board may be used for the regulator section, if desired, although point-to-point wiring is probably faster for such a simple circuit. A metal enclosure should be employed, as one problem with solid-state power supplies is if getting into the "works." Should RFT difficulties develop, one or more ferrite beads installed on each long interconnecting lead should cure the problem.

Proper heat sinking of the pass transistor is essential. The techniques needed to assure good heat transfer to a radiator, and the construction of homemade heat sinks is covered in the Construction Practices chapter of *The Radio Amateur's Handbook*.

Once a power supply has been completed, the wiring should be checked for errors. IC regulators are hardy devices, but they will usually be ruined

- R2 — Linear taper, panel-mount control.
- R3 — Homemade from a 1 1/2-inch length of No. 30 Copper wire wound over a 1-M Ω 1/2-watt composition resistor.
- R4 — Linear, printed-circuit type.
- R5 — Linear, panel mount.
- S1 — Spst.
- S2 — Dpdt.
- T1 — Primary 117 V; 21-V, 1.5-A secondary (Stancor TP-4 or equiv.).
- U1 — Integrated-circuit voltage regulator, RCA CA3055.

by an improper connection. Once the supply is operating, it is only necessary to set the VOLTAGE ADJUST control for the desired output. If the shut-down circuit is not wired correctly a short circuit or current overload can result in damage to the pass device and the IC regulator, so it is wise to try an overload test. Connect a load which will draw approximately 30 percent more current than the rated output of the supply. This will prove that shut-down circuit is indeed working, as indicated by a large drop in output voltage. Then try a "crowbar" test, shorting the output terminals directly. Measure the current flowing through the short to see that the regulator is holding the current flow to a safe value.

Acknowledgements

The author thanks K1ZND for building and testing the 1-, 2-, and 5-A supplies, WINPG for work on the bench supply, and K1PLP for spotting the problem with RCA's recommended CA3055 circuit (a 5.6-ohm, rather than 56-ohm resistor was specified).

QST

Side view of the regulated transistor bench supply. The transistor mounted in the U-shaped homemade heat sink is Q1. The rectifiers, CR1 through CR4, are mounted beneath the meter on a tie-point strip, and are partially hidden in this view. The large capacitor sitting atop the etched circuit board is the 3000- μF filter capacitor connected at the rectifier output.

Interpreting SSB Linear Amplifier Peak and Average Power

BY GEORGE GRAMMER,* W1DF

IT IS QUITE OBVIOUS from letters to League Headquarters that few hams not engaged professionally in radio have a really clear idea of what is meant by such terms as "peak" and "average" when applied to current, voltage, power, or to a modulation envelope. It is really no fault of the ham if he gets confused, because these adjectives have different meanings in different situations. At times, even the experts have trouble in sorting them out.

We'll start out with the simplest possible case. Fig. 1 shows a circuit which should not confound anyone. We have a battery, a switch, a resistor, and an instrument for reading current. We aren't concerned here with actual values, so the number of volts and amperes doesn't matter. All of us know that when the switch is closed the current will be determined by Ohm's Law. The power lost in the resistor is, of course, equal to the voltage multiplied by the current. So far there is no problem.

But now suppose we open the switch regularly and close it with equal regularity. The voltage remains the same whether we close the switch or not, but the current flows only when the switch is closed. If this is done slowly, the meter will give the same reading each time and the power will be the same too. So we can say that when the switch is closed, both the current and power are constant. Quite obviously, both are zero when the switch is open.

Now suppose we have *two* such circuits, exactly alike. One is allowed to run continuously with the switch closed. The other is switched on and off at one-second intervals, as in Fig. 1C. We know that the resistor in the circuit that is kept on continuously will get hotter than the resistor in the intermittently operated circuit.

This brings us to a fundamental definition of power. Power is the rate of doing *work*; that is, the rate at which energy is expended. In the one case here, the total expenditure of energy in heating — that is, the work done — is only half as great as in the other. The regularly switched circuit is only working half the time, since it is on for one second and then off for one second. If we think of these two circuits in terms of time, the power is not the same in both even though they look alike. Over a period of time long enough to include several switching cycles, the power in the switched circuit is only 50 percent as large as in the unswitched one.

What do we do here about Ohm's Law, which says that the power will be equal to the voltage

multiplied by the current? The law doesn't say anything specifically about time. However, if we use the turned-around version of the power formula, it says that the current is equal to the power divided by the voltage. Since the voltage is constant, we conclude that the current must be cut in half in the switched case, since its power is one-half. Nevertheless, the meter reads the same when the switch is closed. How come?

The answer lies in the fact that we did the switching slowly enough so that the pointer could rise and come to rest each time we closed the switch. If the switching were done very rapidly, say 100 times a second, the pointer would hardly get started moving before the current would be off. The pointer could never reach the reading that it did with the switch closed. In fact, after a few cycles of switching the pointer would settle down at just half the reading that was given in the continuously closed circuit thereby confirming what we found from the formula.

At what rate of switching will the meter needle stop attempting to follow the changing current and settle down to a steady reading? This is determined by the meter's mechanical and electrical characteristics. A lightly-damped meter — that is, one with a highly responsive pointer — will try to follow the current variations. A highly damped one — one in which the pointer is "sluggish" — will try to smooth out the variations. But all meters give up trying to follow at audio-frequency and higher rates. This is important in operating an ssb linear amplifier, as we shall see later.

When confronted with current variations that are too fast for them to follow, all meters will settle down to the *average* value of current. The word "average" needs to be defined very carefully. In the simple case that we have just considered, the example shown in Fig. 1C, the current was on for exactly as much time as it was off. If we take a total time of 10 seconds with one-second switching, current would be flowing for 5 of those

This article is a reprint of a technical paper given by W1DF, the former ARRL Technical Director, now retired. The information given here should solve once and for all the age-old controversy about "peak" and "average" powers — terms which are used and abused by many radio amateurs.

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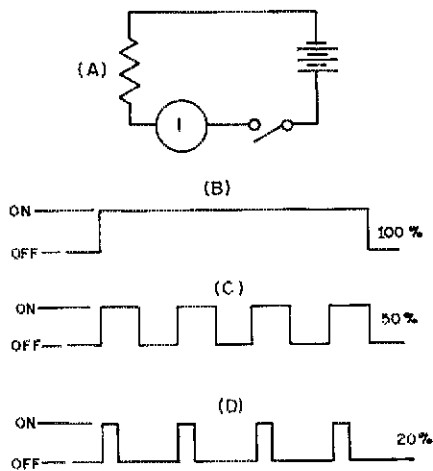


Fig. 1

seconds and not flowing during the other five. To find the average we multiply the switch-closed current, I , by the time, 5 seconds, that it was flowing, and divide by the *total* time, 10 seconds. The result is that the average current is $5I/10$, or $I/2$.

The same rule is followed whatever the relationship between on-time and off-time. Fig. 1D shows a case where the current is off four times as long as it is on. To use seconds again, if the current is on for one second it will be off for four seconds, and in a total time of 20 seconds it will have been on 4 seconds and off 16 seconds. The average current is $4I/20$, or $I/5$.

There is an important point to be observed here. In all three drawings the current, *when on*, has exactly the same value. In the present case it is also the largest value the current ever has, and so we call it the *maximum* value. Since the current is constant during the on-time, the maximum value is also the average value in the circuit in which the switch is left closed.

A second point is that the switching takes place with perfect regularity, and occurs over a length of time which is long compared with the time of one switching operation. These are very special conditions, and they simplify the calculations a great deal.

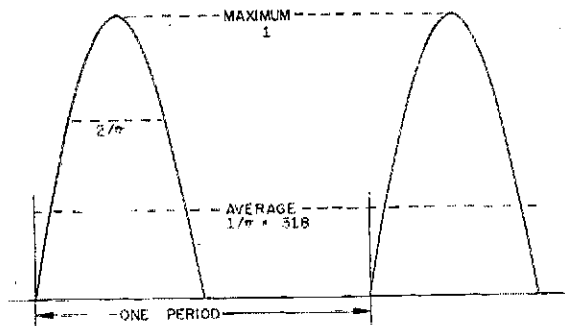


Fig. 2

What Are "Average" Values?

Now let us take another step and define a "period." A period is the time that the switch is closed *plus* the immediately following length of time that it is open. The complete sequence of operations in one period is a *cycle*. Then since the on-off ratio is the same for all periods (or cycles) no matter how long a time the switching may be continued, we need to consider only one period in determining the average value. The number of periods per second is called the *frequency*.

What has this somewhat lengthy discussion got to do with rf power amplifiers, particularly linear rf amplifiers? Simply this: pulse-like current flow is the rule in the plate or collector circuits of Class B linear amplifiers. Our dc meters read the *average* values of current - beginning, as we have seen, when the rate of current change reaches low audio frequencies. So we *must* take the time to understand what is meant by "average" before we can appreciate what the meter is trying to tell us. Our so-called rf voltmeters and power indicators also are actually reading current - the average direct-current output of a rectifier connected to the rf circuit.

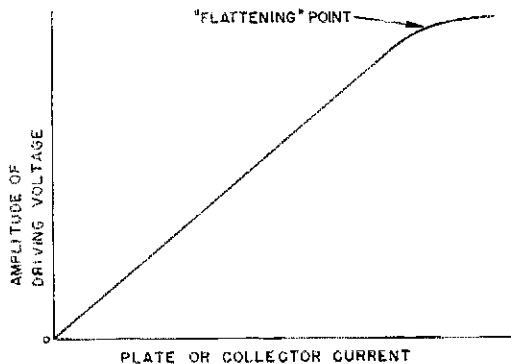


Fig. 3

When we move on to amplifiers we begin to encounter further complications. The plate or collector current of a Class B linear amplifier is one in which the *direction* of current flow is fixed, just as in our simple dc circuit in Fig. 1A. However, the *amplitude* or *value* of the current varies continually. It follows the amplitude variations in a control signal applied to another electrode. This control signal is usually a radio-frequency sine wave, or close to it. However, the nature of Class B operation is such that the plate or collector current flows *only* during *one-half* of the driving-signal cycle. As we have seen, this means that the average current cannot possibly be greater than one-half the maximum current. Actually, it is less, because the maximum current in a sine wave flows only at one tiny instant during the on time. The rest of the time the plate current is either zero or is varying from zero, through maximum, and back down to zero again. The rf plate-current pulses would look like those in Fig. 2. What is the real average value of such pulses?

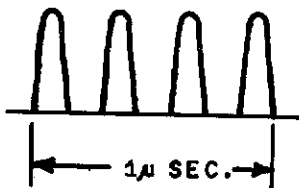


Fig. 4

When analyzed, it is found that the average current during the on time — that is, during the active one-half period — is equal to $2/\pi$, or 0.636 times the maximum value. Since there is no current flow at all for half the time, this figure has to be divided by 2. The average for a complete cycle therefore is $1/\pi$, or 0.318 times the maximum value. To put it another way, the maximum value is π times the value read by the meter. If you have a steady plate current of 200 mA in a Class B amplifier the instantaneous maximum current is 200 times π or 628 mA. You never see that value on the meter, but it occurs once during each radio-frequency cycle.

Peak Values

The maximum value is also called the *peak* value. The term “peak” has been avoided so far, as there are so many different types of peak values that they are responsible for most of the confusion in judging power. However, we’ll make use of the word shortly.

An important operating feature of a linear Class-B amplifier is shown in Fig. 3. The value of the plate or collector current is directly proportional to the amplitude of the rf driving voltage. This is true whether we consider just a simple dc voltage applied to the driving end or whether the driving voltage is changing at some audio or radio frequency. If the voltage is changing, each point on the curve represents corresponding values of instantaneous voltage and current.

The word “instantaneous” is another one that needs definition, and it has to be done mathematically if it is to be really precise. However, we shall be satisfied to say here that it means a *very* short time compared to the length of a period or cycle. If we’re talking radio-frequency periods, then a very short time is a small fraction of a microsecond. If we have audio-frequency periods in mind, “instantaneous” can mean a small fraction of a millisecond — a thousand or more times longer

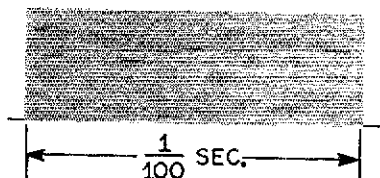


Fig. 5

than at rf. Essentially, an “instant” is a length of time so short that nothing changes noticeably *during the period we are using as a reference.*

The linear relationship shown in Fig. 3 is also true when we look at *average* values. If we double the amplitude of the driving voltage the average current also doubles; if we cut the driving voltage to 1/5, the current drops to 1/5, and so on. And to repeat an earlier statement, what we are saying here about current is also true of power input, for the reason that the plate-supply voltage is fixed. So the power, whether instantaneous or average, is exactly proportional to the current — instantaneous or average. To change from current to power input we merely multiply whatever current we’re considering by the plate-supply voltage. With this understanding, we’ll use the words current and power interchangeably.

The linear relationship holds only over the part of the curve that is a straight line. No amplifying device can continue to be linear if the driving voltage is increased without limit. Eventually, as the driving amplitude is increased, the current no longer will follow. Fig. 3 shows the way in which the relationship typically departs from a straight line at high driving voltages. In an ssb amplifier the “flattening point” — the point where the curve begins to depart from linearity — is the one where distortion and splatter begin to take on serious proportions.

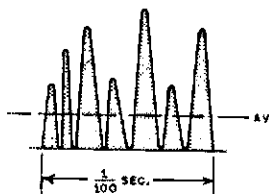


Fig. 6

Voice Modulation Problems

This ability of the Class-B amplifier to reproduce, in its output circuit, the amplitude variations in its driving voltage is what makes it useful for amplifying modulated signals. But modulation, particularly voice modulation, piles on another complication that we have to consider in our examination of dc input power.

With voice modulation, the overall amplitude of the rf driving voltage is varying irregularly at various *audio-frequency* rates. This superimposed amplitude variation runs from zero to the maximum tolerable value. The plate current therefore varies similarly although it should be understood that each individual rf plate-current pulse has the half-sine wave shape shown in Fig. 2. So we have another set of variations piled on the variations we have already talked about. And since these modulation variations are too rapid for the dc meter to follow, we find that the plate meter is trying to show us the average of *this* set of variations on top

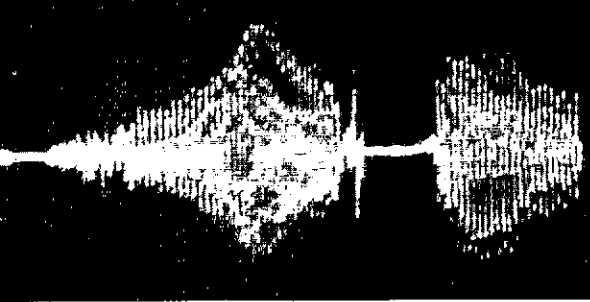


Fig. 7 — Oscilloscope trace of the words, "Hello test."

of the average of the rf variations. The point is rather tricky, and if you start feeling a bit lost at this stage, that's normal. However, we'll try to clear it up a bit.

Let's imagine that we are looking at the actual amplifier plate current as it might be displayed on a dc oscilloscope. If the horizontal sweep time is 1 microsecond and the operating frequency is 4 MHz, four pulses such as are shown in Fig. 4 would appear on the CRT face. They would all be alike and be spaced at perfectly regular time intervals. If the maximum current were 1 ampere, the average plate current as read by a dc meter would be 318 mA.

If we now slow down the sweep, more and more of the pulses would be shown side-by-side on the screen, crowding closer together as the sweep time is increased. Eventually, they would be so close together that neither the CRT nor your eye could separate them, and there would just be a rectangular glow on the screen, as in Fig. 5.

Now we introduce the modulation complication. Suppose the sweep has been slowed down to 1/100 of a second and that modulation is going on at voice frequencies. Over a 1/100-second interval the audio variations in the dc plate current might be as shown in Fig. 6, if just the audio-rate dc variations were displayed on the screen. The meter still could not follow these variations — they're too rapid — so it would read an average, as always in such cases. There is no simple rule that gives the average of such an irregular waveform, but we might guess that it would be as shown in the sketch.

However, in the actual amplifier the rf pulses are still there. The display, therefore, would not be a simple line but would be a lighted area. The shape of the *outline* of this pattern hasn't changed, but now we could call it a modulation envelope. The outline or envelope is not tracing a dc varying at an audio rate but is tracing the tips or maximum values of the radio-frequency pulses in the plate circuit. Does this call for a fundamental change in our approach? Not at all.

The ratio of maximum to average in the individual rf pulses is always the same no matter what goes on at a voice-modulation rate. So we can substitute average for maximum and still have the same result, except for a simple multiplying factor. We are merely superimposing a new average, that of the audio, on top of the rf average. We therefore have an average of averages. This is what our plate meter will indicate, at *audio* modulation frequen-

cies, and is what determines the dc input to the amplifier.

There is one more step. In voice modulation we also have amplitude variations at *less* than an audio rate, such as those that occur at a syllable or word rate. The meter cannot average these. It actually tries to follow them — approaching, during each of them, the audio-rate average of the rf rate. These are the fluctuations that your meter shows when you talk into the microphone.

Variations at less than audio rate are shown in Fig. 7, which is a reproduction of the audio waveform of the words "hello test." What would the plate meter of a linear ssb amplifier show when such a waveform comes out of the mike? It takes a little under one second to say the words, and this amount of time is great enough so that the meter would fluctuate. Throughout even such a short phrase it would be attempting to average several consecutive cycles of audio as they came along. Unfortunately, the problem of what the meter would read has no theoretical answer, because the overall variations are so irregular.

The practical answer is the one given by the plate meter. Here, the characteristics of the meter become the principal determining factors. The subject of meter response is a complicated one, involving pointer risetime, overshoot, and so on. Technical information of this nature is generally not available on meters either purchased individually or supplied in equipment, so at the present time standardization would be impracticable.

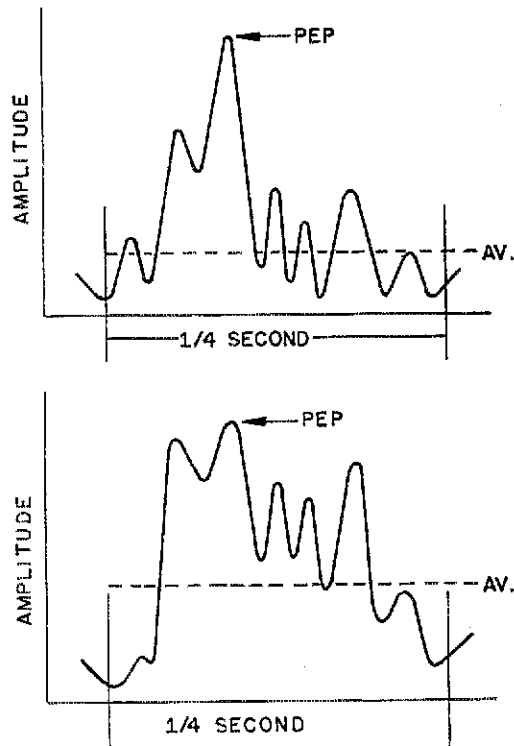


Fig. 8

Anyhow, we use whatever meters we happen to have. In most cases, the meter will try to average the current over some appreciable fraction of a second — about the same length of time it takes for our ears to appreciate that a sound has occurred, and for our eyes to catch the meter pointer at its maximum excursion. But because the pointer is sluggish at best, compared with the actual current variations, the reading is always below the real short-period average current on transient sounds. Given a sustained tone, the reading will be close to the truth, but in voice modulation sustained tones seldom occur, and the audio waveshape is unpredictable.

This brings us to our last point. What the waveform of a particular word or syllable will be depends on *your* voice, *your* microphone and its surroundings, and the audio amplifier and modulator in *your* transmitter. With one person, the waveform of a particular syllable might look like the top drawing in Fig. 7. The drawing shows both peak-envelope and estimated average levels. With another person the same syllable could look like the lower sketch. Relatively, the average current (and therefore the average power) in the lower waveform is considerably greater than in the upper one, although both have the same peak-envelope level.

Now, the permissible peak-envelope level is the real criterion for determining how much plate current and power input we should use. PEP involves no averaging at audio-frequency rates, but only the average of a comparatively small number of rf cycles around the highest audio peak. On the other hand, our power regulations are based on a dc input readable on ordinary meters. To repeat, the PEP level cannot be read on such meters. They aren't fast enough, and even if they were our eyes wouldn't be.

Unfortunately, there is no fixed ratio between PEP and what the meter reads on a voice peak. The actual PEP-to-average plate-current ratio depends not only on the several factors we have already discussed, but also on the amplifying device and its exact operating conditions. In an effort to keep things on a simple plane, we have neglected any consideration of operating conditions, such as resting plate current, and have assumed ideal Class B operation in which the amplifier is biased exactly to cutoff. Under more normal operating conditions, experience based on oscilloscope observations and plate-meter excursions has indicated that a ratio of peak to average power of about 2 to 1 is typical, but this is by no means exact.

Fortunately, a good alc circuit will prevent serious overdriving beyond the acceptable PEP limit. If allowed to perform as it should, it is the next best thing to continuous oscilloscope monitoring by a conscientious operator. A combination of the two is best of all. From the standpoint of living in peace with your fellow hams, it is far better to stay below PEP than to concentrate primarily on plate current read by a meter, although we are, of course, obliged to stay inside the dc power limit that the law allows.

In a short presentation such as this, many practical details have had to be omitted so we could concentrate on the highlights. A subject with as many intricacies as this one really could be treated thoroughly only in a whole series of articles. Let us hope you are now aware that the simple and seemingly easy-to-understand words power "input" are really just the part of the iceberg that sticks above the surface. If you're still confused on some points don't lose heart — you've got plenty of company. It takes careful study and re-study to get everything straightened out.

QST

Strays

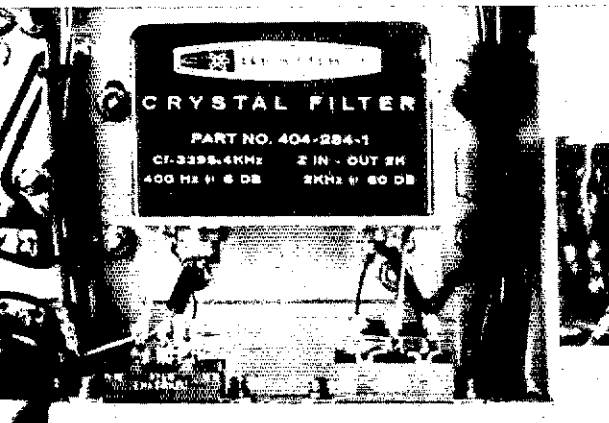
My four year old son occasionally plays with his toys in the ham shack when I am on the air. Otherwise he has no interest in radio — yet. One day recently while we were at the dinner table he was trying to tell us something and our baby was crying so loud that he couldn't make himself heard. Finally in frustration he yelled "QRX Kiran, would ya just QRX a minute?" — *Jinny Beyer, WU2IRA, ex-9N1RA*

Stolen Equipment

On June 2 a Heath HW-12 transceiver and HP-13A power supply were stolen from K6TFT's VW bus. The HW-12 may be identified by the modified antenna connector, a type UG-1084 quick disconnect BNC receptacle. A \$50 reward is offered for information leading to the arrest and conviction of the person or persons responsible for the theft. Anyone with information contact K6TFT (telephone 707-642-8724) or the San Francisco Police Department Auto Boost Detail.



A Boy Scout Eagle Court of Honor was held recently for WN9GYA by Troop 998 of Chicago. John, who is fourteen, earned the Eagle rank with a total of 28 merit badges, including electricity, electronics, computers, and radio.



The HW-100 and

1/2

*Modifying the Heath HW-100,
to Include Selectivity*

BY JACK GELFAND,* K2BMI

AFTER PURCHASING a Heath HW-100 sideband transceiver, it occurred to me that it would be nice to have a 400-Hz cw filter as used in the Heath SB301. Close examination shows that the HW-100 is simply an SB-101 with all of the fancy extras left out. The circuitry, mechanical layout, and even the instruction manuals are similar. Because of this, many features found in the SB-101 can be added to the HW-100 simply by putting extra parts in the appropriate places.

During construction of the HW-100, provision was made for a 400-Hz filter. It required \$3.55 worth of extra parts, spending \$2.00 for the SB-101 manual, and purchasing the \$20.95 400-Hz filter (which is an accessory for the SB-101 transceiver). No holes have to be drilled, as all of the parts are added or substituted in holes already provided on the HW-100 chassis. Even the most

weak-hearted constructors can easily accomplish this modification. Step-by-step instructions for converting the HW-100 while assembling it, and converting an assembled HW-100, will be outlined.

The details of the SB-101 filter circuit are shown in Fig. 1A. In the HW-100, the ssb filter is simply placed between points A and B. The intermediate-frequency circuits are identical in both rigs, and the input and output impedances of the filters are the same. Addition of the appropriate switches and the extra filter is all the modification that is necessary. Switching is accomplished with two slide switches which are mechanically ganged by an actuator, which is, in turn, moved back and forth by a lever arm mounted concentric to the rf gain control. This arrangement is shown in Fig. 1B. Fortunately, the bracket for the switches is already part of the HW-100 (the mounting holes are present, but empty). Also, the SB-101 rf gain control - plus concentric lever - fits in the same hole as the plain rf gain control used in the HW-100, and the SB-101 bracket that accommodates the two filters neatly matches the holes where the single filter (plus bracket) would be in an ordinary HW-100. (Murphy bit the dust on this one!)

The extra parts that must be purchased are listed in Table 1. In making the modifications, one needs the SB-101 manual because there are too many steps and illustrations to reproduce here. What is done below is to follow the HW-100 construction manual, as one normally would, but at certain points in the sequence shift to the SB-101 manual for a few added or substituted steps, and then continue using the HW-100 manual.

Modification Steps

- 1) - Start construction and continue normally until page 48.
- 2) P. 48 - Delete the step referring to Pictorial 8-2A, the mounting of the support bracket. See page 28 in the SB-101 manual. Complete mounting the 100,000-ohm control (No. 10-208) at point P (Detail 2-2A) and mount the switch bracket (Details 2-2B through 2-2D on Pg. 29 of the SB-101 manual). Continue on in the HW-100 manual.
- 3) P. 51 - Delete the mounting of the 100,000-ohm control (No. 10-44) at P. Detail 8-2G. This was already done in the steps above. Continue on in the HW-100 manual.
- 4) P. 71 - Mounting and wiring of the filters. Delete the step referring to Detail 8-6K, page 71. Go to page 31, SB-101 manual and do the steps referred to in Detail 2-2L, mounting both the cw and ssb filters. On the top of page 32, SB-101 manual, do the step (Detail 2-2M) mounting the bracket, as shown. (Note: The location of the filter bracket labeled BU in the SB-101 manual is labeled BV in the HW-100 manual.)
- 5) Page 44 (SB-101 manual) - see the section labeled Component Mounting - Chassis Bottom. Refer to Pictorial 3-4 and do the 9 steps on pages 44 and 45, wiring the filters to the switches and the circuit boards. This

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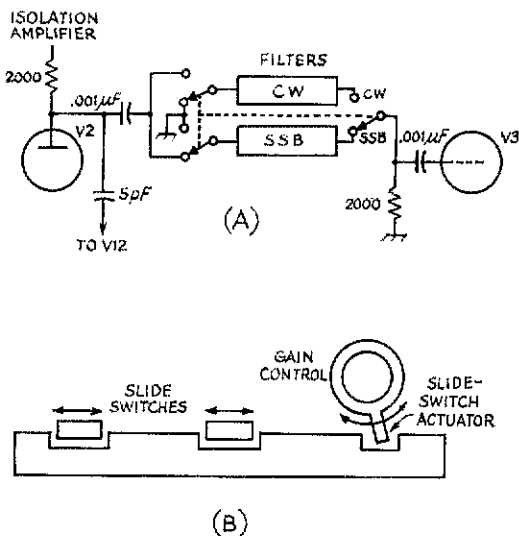


Fig. 1 -- (A) Diagram of the filter-circuit modification to the HW-100. Parts required are listed in Table 1. (B) Mechanical arrangement used to gang the switches.

includes the two steps in the box area concerning the 400-Hz filter. These steps will supersede all of the steps on page 71 of the HW-100 manual concerning the mounting and wiring of the crystal filter. Continue on in the HW-100 manual.

- 6) Page 97 -- Install the lever knob, a 1/8-inch-diameter knob combination at the rf gain position, in the same way as the final tune and load knobs are mounted in Detail 8-20A on the same page. The lever knob is the selectivity switch -- up is 2.5-kHz bandwidth, down is 400-Hz as in Pictorial 3-24 on page 79 of the SB-101 manual.

This modification does not change any of the other procedures in the HW-100 manual, nor does it influence the tune-up or test procedures. With the lever knob in the ssb position operation is the same as with any other HW-100.

Modifying an already-assembled HW-100 is not quite as easy as building it in as you go along. This is because the bracket that holds the two slide switches is put in quite early in the construction of the HW-100 or SB-101, and is later attached to the chassis divider and is hemmed in by the front panel. You may or may not have to remove the VFO subchassis to gain access, according to how nimble your fingers are or how lengthy your long-nosed pliers may be. It should be noted that any modification, even one such as this, voids the warranty on the unit. So if you are not sure of yourself and haven't built it yet, it might be best to complete the HW-100, test it first, and then put in the added circuitry according to the following instructions. Directions for removing the VFO are on page 150 of the HW-100 manual. It would be best to remove the VFO before starting. Note that you will need two .001-μF disk capacitors and a

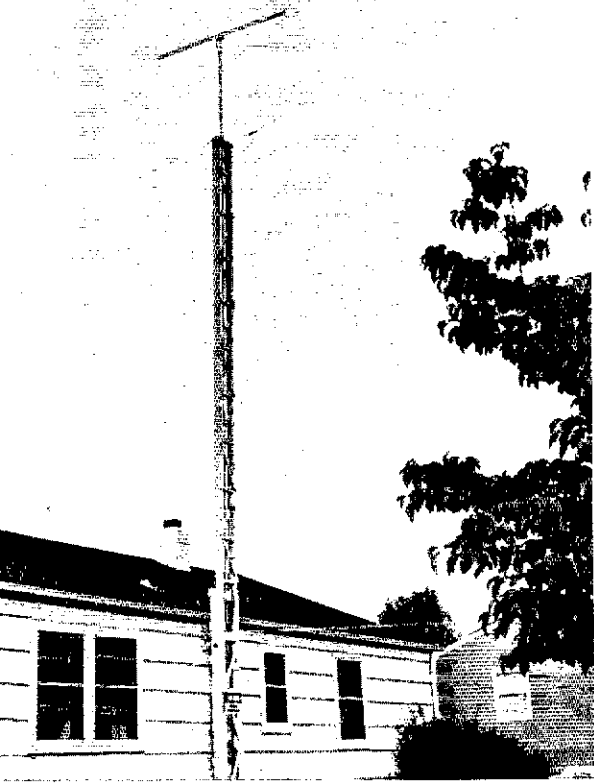
2000-ohm resistor, in addition to the other parts. The leads on the original parts will not be long enough to stretch to their new positions. Proceed as follows:

- 1) Refer to Pictorial 8-2 in the HW-100 manual. Unsolder the connections to the rf gain control at point P and remove it.
- 2) Unsolder the .001-μF disk capacitors going to the crystal filter and remove the filter and bracket. Try not to drop the two 6-32 bracket screws into the VFO case (because if you haven't already removed it, you will have to in order to retrieve them).
- 3) Remove the switch support bracket by removing the screws at points BT, BU, and BW in Pictorial 8-2 and slide it out to the left.
- 4) Mount the switches on the bracket according to the two steps on page 28 of the SB-101 manual, referring to Detail 2-2B.
- 5) Referring to Detail 2-2C, mount the felt pad and place the slide switch actuator in the proper position on the switch bracket.
- 6) Slide the entire assembly back into its original position on the chassis.
- 7) Put the screws back in at BT and BU. Use the shoulder spacer as shown in Detail 2-2E, page 29, SB-101 manual. Do not tighten the shoulder spacer.
- 8) Put the screw back in at point BW. It might be easier to put it in with the head and nut ends reversed from their original sense.
- 9) With the shoulder spacer still loose, put the new 100,000-ohm control with the actuator lever into the original hole and at the same time pop the lever into the notch in the slide-switch actuator. This takes a bit of twisting and shoving.

(Continued on page 37)

TABLE I

| Extra Parts Needed for the Conversion | | | |
|---------------------------------------|----------------|--|--|
| QTY | Heath Part No. | Item | |
| 1 | -- | SB-101 Assembly Manual. | |
| 1 | 263-7 | Felt pad. | |
| 1 | 255-79 | Threaded shoulder spacer. | |
| 4 | 250-56 | 6-32 X 1/4" screw. | |
| 1 | 60-4 | Spdt slide switch. | |
| 1 | 60-2 | Dpdt slide switch. | |
| 1 | 10-208 | 100,000-ohm control with switch lever. | |
| 2 | 259-6 | Small No. 6 solder lug. | |
| 1 | 266-97 | Slide-switch actuator. | |
| 1 | 204-737 | Crystal-filter bracket. | |
| 1 | 462-218 | Lever knob. | |
| 1 | 455-52 | Knob insert. | |
| 1 | 455-11 | Split bushing. | |
| 1 | SBA-301-2 | 400-Hz crystal filter. | |
| Parts Left Over | | | |
| 1 | 10-44 | 100,000-ohm control. | |
| 1 | 204-794 | Filter mounting bracket. | |



• *Beginner and Novice*

A Low-Cost Tilt-Over Tower

BY LEWIS G. McCOY,* W1ICP

Here is the completed tower, installed. While not clearly visible, two legs of an inverted-V antenna are used as two of the top guy wires.

30-foot vertical members, and are spaced 25 inches apart, center-to-center. Double bracers are used at the top and at the rotor mounting. The diagonal stringers are made from 1 × 2s. Approximately 40 feet of stock is required for the stringers.

The bottom, or fixed portion of the tower is made from 12-foot long 2 × 6s. These lengths may vary depending on the individual needs, but they should be long enough to go 3 feet into the ground, with the tops reaching just above the eaves. A TV roof bracket (the 90-degree type used on the peak of a roof) is mounted on the house wall near the eaves and is used to hold the base section to the wall. Lag screws, 4 inches long and 3/8-inch diameter, are installed through the bracket into the house studs.

One-inch diameter bolts, 5 inches long, are used for the hinge at the base and also at the eaves to hold the tower when it is upright. Of course, a large supply of nails is required to put the tower together.

Construction Details

In the installation shown, the rotator is mounted near the eaves. TV-antenna mast sections are used to support the beam. It is a good idea to drill the holes for the mast before installing the 2 × 4 support sections. Take care in aligning the holes so that the mast won't bind.

The base section should be mounted in concrete. In this installation, two holes, one foot on a side, and three feet deep were used. Also, a weather-proofing compound (Cuprinol) was applied to the portion of the wood that was imbedded in concrete.

Complete the base and tower portions but don't mount them in place. Even though you may follow the dimensions given in Fig. 1, it is easy to

PARTICULARLY IF a ham likes to experiment with beams, the best of numerous structures used to support antennas is a tilt-over tower. Unfortunately, the commercially made tilt-over towers are rather costly. Back in the early '50s, W1CUT (then W5TQD) built a wooden tilt-over mast that was quite inexpensive; it cost less than \$20 (at that time). The tower worked out so well that a newer version was built here in Connecticut. The unit shown in the photographs is a 30-foot high, tilt-over tower that can still be built for less than \$35.

The Materials

The main tower section is made from 30-foot long 2 × 4s. We checked with some lumber companies and found that while extra long lumber is not a standard item, it can be ordered. In fact, one lumber yard said that we could get 2 × 4s 60 feet long! The cross-bracing sections between the two long pieces are also 2 × 4s, 9 inches long. Twenty of these spacers are required. They are made from a 16-foot length of stock, cut into 9-inch lengths. These are installed between the two

* Novice Editor

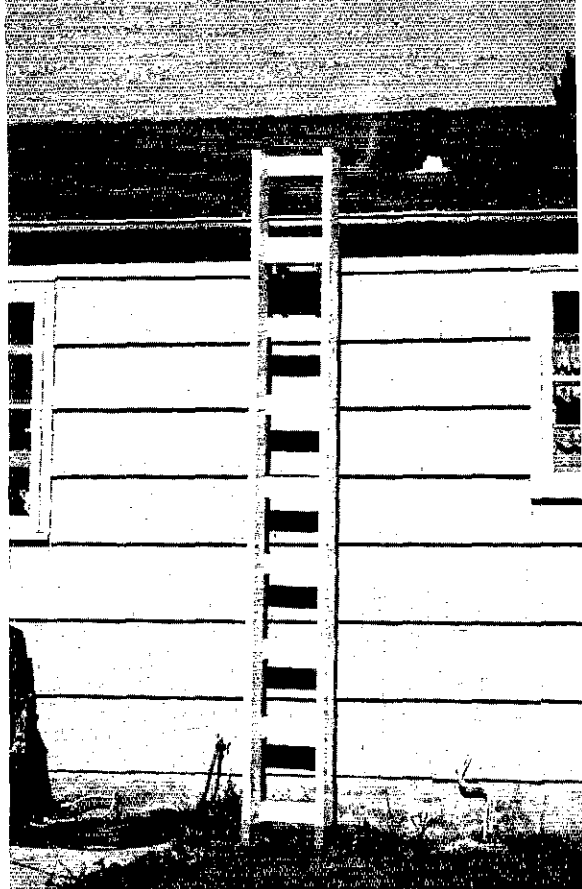
A Tilt-over tower for less than \$35? That's right! Here's an article for the Novice or General that describes a low-cost beam support. It is really hard to beat for simplicity and cost.

goof, particularly if this is your first carpenter work. If you have never worked with wood before, you may not know, for example, that 2 x 4s don't measure 2 x 4 inches, but actually about 1 1/2 x 3 1/2. All we are saying is that you'd feel pretty foolish if you mounted the base portion in place and then couldn't get the tower to fit inside (it happened here!).

Some Concluding Remarks

The completed tower should be given a couple of coats of paint. In this installation, the upper end of the tower is rested on a ladder, which puts the end high enough above ground for antenna work. Two men are needed to erect the completed structure - one man to "walk" the tower up, and another with rope or tackle to do the pulling from the roof top. While we don't recommend it, the tower is strong enough to be climbed, once it is locked in place. Just to be on the safe side, the tower was guyed, using two legs of an inverted-V antenna for two of the guys.

At different times, on this tower, WICUT mounted a triband beam, a triband quad, and various other systems. While it hasn't been tried here, there is no reason to believe the structure couldn't be installed at the end of a house and tilted from the top rather than the bottom of the fixed section. Appropriate counterweights could be used at the bottom to achieve a perfect balance. Then one man could raise and lower the tower by himself. All in all, this tilt-over tower is hard to beat for the price. QET



This is the stationary base-support section. The bottom of the support is buried approximately 3 feet in the ground.

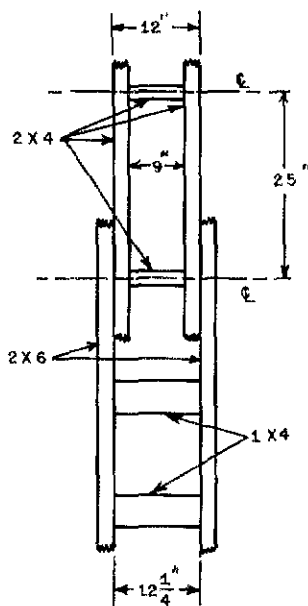
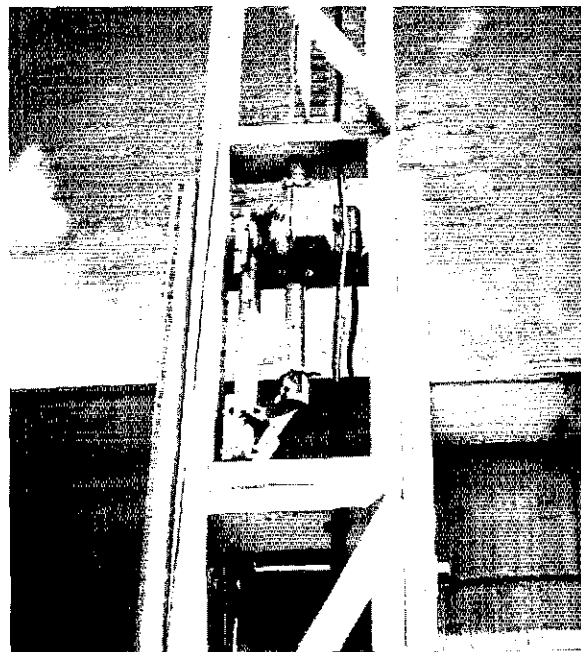


Fig. 1 - This detail drawing shows the dimensions for the tilt-over and support sections of the tower.

Note that a TV thrust bearing is installed in the tower to support the weight of the beam and mast. Also, those aren't cracks in the 2 x 4s; the lines are the halcyon ends for the inverted V antenna.





Digital ICs—A Family Portrait



BY JERRY HALL,* KIPL

DIGITAL LOGIC is the term used to describe an overall design procedure for electronic systems in which "on" and "off" are the important words, not "amplification," "detection," and other terms commonly applied to most amateur equipment. It is "digital" because it deals with discrete events that can be characterized by digits or integers, in contrast with linear systems in which an infinite number of levels may be encountered. It is "logic" because it follows mathematical laws, in which "effect" predictably follows "cause."

Just as the term implies, integrated circuits (ICs) contain numerous components which are manufactured in such a way as to be suitably interconnected for a particular application. The various circuits of the IC are comprised of bipolar transistors, resistances, and diodes, all on one piece of semiconductor base material. There may be dozens or even a hundred or more transistors on a single IC chip, usually of silicon. The resistors and diodes are formed on the same chip in the manufacturing process. After processing and testing, each chip is packaged in any one of a variety of forms, as shown in the photograph.

* Asst. Technical Editor, QST.

Digital logic and digital integrated circuits are certainly not new to QST — they have been used in every recent article on such things as electronic and keyboard keyers, cw message-memory devices, frequency-marker generators, and frequency counters. But just what do those odd-shaped symbols on logic diagrams really represent? And what do terms like MSI and TTL and CMOS mean? Here, in one source, are answers in layman's terms to these and many other questions.

Linear ICs, such as differential amplifiers or operational amplifiers, are constructed to respond to continuously variable or analog signals. Digital devices, on the other hand, generally have active components operating only in either of two conditions — cutoff or saturation. Digital ICs find much application in on-off switching circuits, as well as in counting, computation, memory-storage, and display circuits. Operation of these circuits is based on binary mathematics, so words such as "one" and "zero" have come into frequent use in digital-logic terminology. These terms refer to specific voltage levels, and vary between manufacturers and devices. Nearly always, a "0" means a voltage near ground, while "1" means whatever the manufacturer specifies. One must distinguish between "positive logic" and "negative logic." In positive logic, a 1 is more positive than a 0, though both may be negative voltages. In negative logic, the reverse is true. Often the terms "high" and "low" are used in reference to these voltage levels. The definitions of these terms are the same for both positive and negative logic. A "high" is the most positive or least negative potential, while a "low" is the least positive or most negative.

For practical use in some applications it is desirable to convert binary data into decimal equivalents, such as in electronic counting and display systems. In other applications, such as for the graphic recording or metering of summations or products of integers, it is convenient to convert the digital data into analog equivalents. Specialized integrated circuits designed to perform these functions are also considered to be included in the digital-IC category.

Logic Symbols

With modern microcircuit technology, hundreds of components can be packaged in a single case. Rather than showing a forest of transistors, resistors, and diodes, logic diagrams show symbols based on the four distinctive shapes given in Fig. 1 at A through D. These shapes may be "modified" or altered slightly, according to specific functions

performed. Examples are shown at E through H of Fig. 1.

The square, Fig. 1D and H, may appear on logic diagrams as a rectangle. This symbol is a somewhat universal one, and thus must be identified with supplemental information to indicate the exact function. Internal labels are usually used. Common identification labels are:

- FF — Flip-flop
- FL — Flip-flop latch
- SS — Single shot
- ST — Schmitt triggers.

Other logic functions may also be represented by the square or rectangle, and the label should adequately identify the function performed. Unique identifying shapes are used for gates and inverters, so these need no labels to identify the function. Hardware- or package-identification information may appear inside any of the symbols on logic diagrams.

Types of Digital ICs

Digital integrated circuits perform a variety of functions. These functions can generally be cataloged into just a few categories: gates, inverters, flip-flops, drivers and buffers, adders and subtractors, registers, and memories, plus the special-purpose ICs as mentioned earlier — decoders and converters. Some of these types, such as adders and subtractors, registers, and memories, find use primarily in computer systems. More universally used types of ICs are the inverters, gates, and flip-flops.

Inverters

A single chip in one IC package may be designed to perform several functions, and these functions can be independent of each other. One example of an IC of this type is Motorola's MC789P, which bears the name, "hex inverter." This IC contains six identical inverter sections. The schematic diagram of one section is shown in Fig. 2A. In operation, 3.0 to 3.6 volts are applied between +Vcc and ground. For this device in positive-logic applications, a 0 is defined as any potential less than approximately 0.6 volt, and a 1 is any voltage greater than about 0.8. With a logic 0 applied at the input, the transistor will be at or near cutoff. Its output will be a potential near +Vcc, or a logic 1. If the 0 at the input is replaced by a 1, the transistor goes into saturation and its output drops nearly to ground potential; a 0 appears at the output. The output of this device is always the opposite or *complement* of the input logic level. This is sometimes called a NOT gate, because the input and output logic levels are *not* the same, under any conditions of operation.

Shown at the right in Fig. 2A is the logic symbol for the inverter. In all logic symbols, the connections for +Vcc and the ground return are omitted, although they are understood to be made. The proper connections are given in the manufacturer's data sheets, and, of course, must be made before the device will operate properly. In the case of all multiple-function ICs, such as the hex in-

verter, a single ground connection and a single +Vcc connection suffice for all sections contained in the package.

Gates

Another example of an IC containing several independent functions in one package is Motorola's MC724P, a quad 2-input gate. Four gates are contained in one chip. The schematic diagram and logic symbols for a gate section are shown at B in Fig. 2. As with the MC789P, a supply of 3.0 to 3.6 volts is used; for positive logic a 0 is a potential less than 0.6 volt, and a 1 is a potential greater than 0.8 volt. It may be seen from the schematic diagram that the two transistors have an independent input to each base, but they share a common collector resistor. Either transistor will be saturated with a logic 1 applied at its input, and a 0 output will result. A 0 at the input of either transistor will cause that transistor to be cut off, but a 1 at the opposite input will hold the output at 0. Thus, a 1 at either Input 1 or Input 2 will cause a 0 (or a NOT 1) to appear at the output. The NOT functions are usually written with a bar over them, so $\bar{1}$ means the same thing as NOT 1, and is expressed as

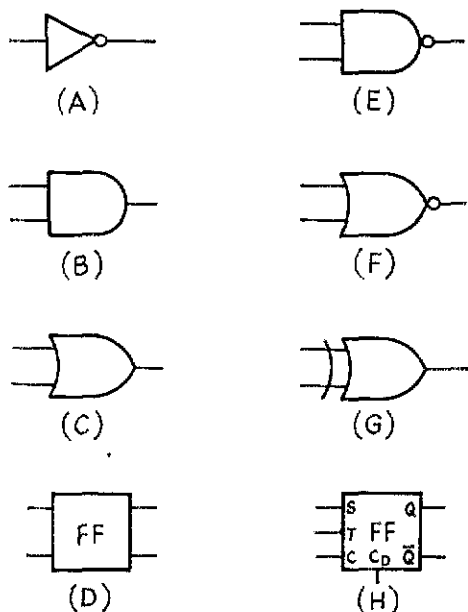


Fig. 1 — Distinctive symbols for digital logic diagrams. At A is shown a nonamplifying inverter, at B an AND gate, at C an OR gate, and at D a flip-flop. Additions to these basic symbols indicate specific functions performed. A small circle, for example, placed at the output point of the symbol, denotes that inversion occurs at the output of the device. Shown at E is an inverting AND or NAND gate, and at F is an inverting OR or NOR gate. At G is the symbol for an exclusive OR gate, noninverting. The symbol at H represents a J-K flip-flop.

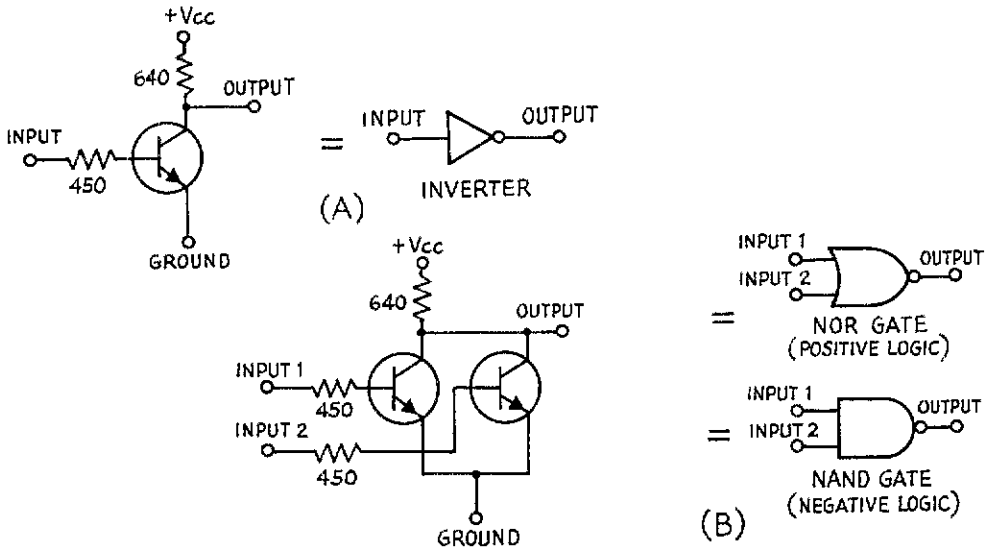


Fig. 2 — Digital circuits and their equivalent logic symbols. See text. Indicated resistor values are typical.

NOT 1 when reading the term. Logic-circuit operations can be expressed with equations. Boolean algebra, a form of binary mathematics, is used. These equations should not be confused with ordinary algebraic equations. The logic equation for the operation of the circuit in Fig. 1A is $1 \vee 1 = \bar{1}$. The little \vee means OR. Sometimes “+” is used instead of “ \vee .” In plain words, the equation says that a 1 at Input 1 or Input 2 will yield a NOT 1 at the output. This is equivalent to saying the circuit is an inverting OR gate, or a NOT OR gate. This latter name is usually contracted to NOR gate, the name by which the circuit is known.

If the circuit of Fig. 2B is used with negative logic, circuit operation remains the same; only the definitions of terms are changed. A logic 1, now, is a voltage level less than 0.6, and a 0 is a level greater than 0.8 volt. If a logic 1 is applied at both inputs 1 and 2, both transistors will be cut off. The output is near +Vcc, which is a logic 0 or NOT 1. The equation for this operation is $1 \cdot 1 = \bar{1}$, where the dot means AND. In this way, with negative logic, the circuit becomes an inverting AND gate, or a NOT AND gate or, more commonly, a NAND gate. Manufacturers’ literature frequently refers to this type of device as a NAND/NOR gate, because it performs either function.

Flip-Flops

It is not necessary for the various functions on a single chip to be identical. Motorola’s MC780P IC, a decade up-counter, contains four flip-flops, an inverter, and a 2-input gate. These functions are interconnected to provide divide-by-10 operation, with ten input pulses required for every output pulse which appears. Intermediate outputs are also provided (in binary-coded form) so that the number of pulses which have entered the input can be determined at all times. These binary-coded decimal (BCD) outputs, after decoding, may be used to operate decimal-readout indicators.

The term, medium-scale integration (MSI) is frequently applied to ICs such as this decade up-counter, which contains the equivalent of 15 or more gates on a single chip. Large-scale integration (LSI) describes ICs containing the equivalent of 100 or more gates on a single chip. These terms, when applied to a particular IC, convey an idea of the amount of circuitry.

A flip-flop is a device which has two outputs that can be placed in various 1 and 0 combinations by various input schemes. Basically, one output is a 1 when the other is a 0, although situations do occur (sometimes on purpose) where both outputs are alike. One output is called the Q output, or “set” output, while the other is the \bar{Q} (NOT Q) or “reset” output. If $Q = 1$ and $\bar{Q} = 0$, the flip-flop is said to be “set” or in the “1 state,” while for the reverse, the flip-flop is “reset,” or “cleared,” or in the “0 state.” A variety of inputs exists, from which the flip-flops derive their names.

The R - S flip-flop is the simplest type. Its outputs change directly as a result of changes at its inputs. The type T flip-flop “toggles,” “flips,” or changes its state during the occurrence of a T pulse, called a clock pulse. The T flip-flop can be considered as a special case of the J - K flip-flop described later. The type D flip-flop acts as a storage element. When a clock pulse occurs, the complementary status of the D input is transferred to the Q output. The flip-flop remains in this state even though the input may change, as it can change states only when a clock pulse occurs.

Although there is some disagreement in the nomenclature, a J - K flip-flop is generally considered to be a toggled or clocked R - S flip-flop. It may also be used as a storage element. The J input is frequently called the “set” or S input; the K is called the “clear” or C input (not to be confused with the clock input). The clock input is called T , as in the type T flip-flop. A clear-direct or CD input which overrides all other inputs to clear the

flip-flop to 0 is provided in most *J-K* flip-flop packages. The logic symbol for the *J-K* flip-flop is shown in Fig. 1H. A simple *J-K* flip-flop circuit contains 13 or 14 transistors and 16 or 18 resistors.

There are essentially two types of flip-flop inputs, the dc or level-sensitive type, and the "ac" or transition-sensitive type. It should not be concluded that an ac input is capacitively coupled. This was true for the discrete-component flip-flops, but capacitors just do not fit into microcircuit dimensions. The construction of an ac input uses the "master-slave" principle, where the actions of a master flip-flop driving a slave flip-flop are combined to produce a shift in the output level during a transit of the input.

Digital-Logic IC Families

There are seven categories or families of which nearly all semiconductor digital ICs are members. Each family has its own inherent advantages and disadvantages. Each is geared to its own particular market, meeting a specific set of needs.

Resistor-Transistor Logic – RTL

RTL is known primarily for its economy. It is well named, since it contains resistors and transistors exclusively. The circuits of Fig. 2 are RTL. Advantages of the RTL family are economy, ease of use in systems designs, ease of interface with discrete components, and high speed–power product. There are a wide number of functions available in this family. Disadvantages are low immunity to voltage noise (transients, rf pickup, and the like), and relatively low *fanout* (the number of loads that may be connected to an output before performance is degraded). The RTL family requires a supply of 3.0 to 3.6 volts.

Diode-Transistor Logic – DTL

DTL ICs contain diodes, as well as resistors and transistors. Early DTL ICs used design criteria carried over from the use of discrete components, where diodes were inexpensive compared to transistors. These ICs required negative and positive voltage sources. Later DTL ICs are of a modified design which lends itself more easily to IC processing. Performance characteristics are also enhanced, with less input current being required, and only a single voltage source needed. Members of the DTL family are limited generally to gates. Advantages of this family are low power dissipation, compatibility with TTL (see later section), low cost, ease of use in system design, ease of interface with discrete circuits, and relatively high *fanout*. DTL disadvantages are low noise immunity, especially in the high state where the input impedance is relatively high, rapid change in voltage thresholds with temperature, speed slowdown with capacitive loading, and lower speed capabilities than some other families. The DTL family requires a supply voltage of 5 volts.

High-Threshold Logic – HTL

HTL devices are designed for high noise immunity. The circuit form is the same as DTL

except that breakdown (Zener) diodes are used at the inputs. Higher supply voltages and higher power dissipations accompany the HTL family. These ICs find applications in industrial environments and locations likely to have high electrical noise levels. Advantages are high noise immunity, stable operation over very large temperature ranges, easy interface with discrete components, electromechanical components, and linear functions (operational amplifiers and multipliers), and a constant threshold-versus-temperature characteristic. Disadvantages are higher cost than other families, and relatively high power dissipation. The HTL family requires a supply voltage of 15 volts.

Transistor-Transistor Logic – TTL

TTL has characteristics that are similar to DTL, and is noted for many complex functions and the highest available speed of any saturated logic. TTL may be thought of as a DTL modification that results in higher speed and driving capability. It is noted for better noise immunity than that offered by DTL, and is more effective for driving high-capacitance loads because of its low output impedance in both logic states. TTL ICs fall into two major categories – medium speed and high speed. Various manufacturing techniques are used to increase the speed, including gold doping and incorporation of high-speed Schottky diodes on the chip. Another advantage of TTL is that it is compatible with various other families. Multiple sources and extensive competition have resulted in low prices for TTL devices. Disadvantages are that more care is required in the layout and mechanical design of systems because of the high speed, and additional capacitors are required for bypassing because of switching transients. The TTL family requires a supply of 5 volts.

Emitter-Coupled Logic – ECL

ECL has the highest speed of any of the logic forms. It is sometimes called current-mode logic. This family is different from standard saturating logic in that circuit operation is analogous to that of some linear devices. In this case, the transistors do not saturate and the logic swings are reduced in amplitude. Very high speeds can be attained because of the small voltage swings and the use of nonsaturating transistors. The input circuitry of ECL devices is of the nature of a differential amplifier, resulting in much higher input impedances than saturated-logic devices. Emitter-follower outputs are of low impedance with high *fanout* capabilities, and are often suited for driving 50-ohm transmission lines directly. Disadvantages are higher power dissipation, less noise immunity than some saturated logic, translators are required for interfacing with saturated logic, and slowdown operation with heavy capacitive loading. The ECL family requires a supply of -5.2 volts.

Metal-Oxide Semiconductor – MOS


Digital MOS devices are gaining significance in industrial applications, with p-channel or P-MOS ICs being the most popular. Large, complex re-

petitive functions, such as long shift registers and high-capacity memories, have proved very practical. Gates and basic logic circuits have not become as popular, because they exhibit lower drive capability than other IC families. Input impedances to these devices are essentially capacitive (an open circuit for dc). This feature allows very high fanout where speed is not a consideration. Bidirectional devices give more flexibility to the circuit designer. P-MOS technology results in the lowest cost per bit for memories and long shift registers, because many more functions can be contained on a given chip size than in bipolar devices. Disadvantages are that devices must be handled more carefully than bipolar ICs because excessive static electricity can destroy the narrow gate oxide, even with internal breakdown-diode input protection. Drive capability is limited because of the high output impedances characteristic of these devices. Two power supplies are usually required. The P-MOS family requires supplies of -13 and -27 volts.

Complementary Metal-Oxide Semiconductor - CMOS

CMOS technology employs both p-channel and n-channel devices on the same silicon substrate. Both types are enhancement-mode devices; that is, gate voltage must be increased in the direction that inverts the surface in order for the device to conduct. Only one of the two complementary devices of a circuit section is turned on at a time, resulting in extremely low power dissipation. Dissipation is primarily from the switching of devices through the active region and the charging and discharging of capacitances. Advantages are low power dissipation, good noise immunity, very wide power supply voltage variations allowed, high fanout to other CMOS devices, and full temperature-range capabilities. Disadvantages are restricted interfacing capabilities because of high output impedance, and medium to high cost. The CMOS family requires a supply of 1.5 to 16 volts, 10 volts being nominal.

Acknowledgements

A part of the information in this article has previously appeared in the pages of *QST*, notably in the works of Norman D. Pos, WA6KGP. His articles and other source material containing more extended discussions of topics covered here are listed in the bibliography which follows. 

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November, 1921

- ... What with the transatlantics coming up next month, there is a very timely article on how to receive MUU which operates on about 14,200 meters. Arrangements have been made with the British to have this station transmit daily the results of Paul Godley's receptions of American hams the night before. This writer was stationed at Riverhead, L.I. at this time and of course there was no problem in getting the hot dope every morning.
- ... McMurdo Silver tells us how to increase the range of regenerators. Just about everybody was using regenerative receivers at this time.
- ... W. C. White, of the General Electric Research Laboratories, gives us some extensive notes on the operation of large transmitting tubes. By this time the 204 series of tubes was available one way or another. The P tube was very popular, too. Incidentally our station for the transatlantics using 2BML and 2EH as calls used a 206, a 1-kw air-cooled monster which yielded 13.5 "thermocouple amperes" in the cage antenna. Boy, how the lights blinked!
- ... Ellery W. Stone describes his method of hf amplification. It is a sort of reflex receiver, having two stages of tuned rf, detector and two stages of af amplification, all with three tubes. - *WIANA*



November, 1946

- ... Our cover, by Phil Gildersleeve, is great. It shows a ham operator furiously sending out CQSS while his OW is sweeping out of range the local QRM - a junior operator with a large drum.
- ... K. B. Warner editorially discusses the business of reporting signals, both cw and phone. He also gripes about the rash of had signals on the air these days.
- ... George Grammer, W1DF, writes knowledgeably about "Keeping Your Harmonics at Home." Seems like a lot of the boys, eager to get going after the war, haven't been paying enough attention to keeping their signals up-to-snuff in many respects.
- ... J. H. DuBois, W3BXE, describes his "Three-Band Utility Transmitter." This is a modestly powered rig using an 807 in the final.
- ... More on lousy signals. This time John W. Smith, W0UCM, and N. H. Hales, W0J1H, discuss overmodulation, pointing out that it isn't necessary. They employ speech clipping and filtering effectively.
- ... George W. Stuart, W2AMN, of Hammarlund has an article on "Narrow-Band F.M. with Crystal Control." He predicts this mode will become an important factor in ham radio. He was right, but I wonder if he foresaw the present activity on 2-meter fm that we have now.
- ... The VT-127-A is available in the surplus market and Gomer Davies, ex-BAFW, tells how to use it on 144 Mc. Quite a lot of dope, with pictures, diagrams, and graphs. - *WIANA*

How to Tame a Solid-State Transmitter

BY DOUG DeMAW,* WICER

IT IS NOT unusual to find that a solid-state transmitter generates considerable spurious energy in addition to the desired output frequency. This condition can pass unnoticed by the inexperienced builder. But, the neighbors may be painfully aware of the low-frequency oscillations which beset their a-m radios. Or, the folks next door may become distraught when vhf parasitics and harmonics from your homemade transmitter bite into the fm and TV programs they are trying to enjoy. Transistorized transmitters and exciters are more prone to the foregoing problem than are tube rigs, mainly because of the high gain and nonlinear characteristics of most transistors used in rf amplifiers. Fortunately, some simple preventive measures can be taken to insure against unwanted radiations. The transistors in the transmitter will operate more efficiently when these superfluous energies are suppressed, stage by stage. And, lastly, the FCC is apt to be more favorably impressed with the purity of your transmitted signal if no "friggles" are present!

The Nature of the Malady

The higher the f_T of a transistor, the higher will be its gain at some lower frequency.¹ Many designers elect to use transistors whose f_T is only a few MHz above the proposed hf-band operating frequency. This practice assures sufficient gain at the operating frequency while providing only a modicum of additional gain at the lower frequencies. Furthermore, the limited f_T rating will tend to discourage vhf and uhf parasitic oscillations as a result of the inefficiency of the transistor at those higher frequencies. Such a criterion is fine for the industrial engineer who can select his transistors to fit the application. The amateur, on the other hand, may choose to use what he has in his plunder trove, or that which he can purchase at bargain prices from a surplus dealer. This means that he may find it prudent to use small-signal or power-type uhf or vhf transistors for operation in one of the bands between 160 and 10 meters. The result, of course, is phenomenal gain which can make the transmitter extremely unstable at the

* Technical Editor, *QST*.

¹The f_T of a bipolar transistor is its gain-bandwidth product (common-emitter connected), or the frequency at which its gain becomes unity, or 1.

operating frequency, below the operating frequency, and at vhf and uhf. It is necessary, therefore, to establish some design rules which will enable the builder to use these "hot" transistors and still realize good stability and purity of emissions.

A Design Example

In order to use some transistors which were in the author's supply cabinet, the circuit of Fig. 1 was developed. The low-level stages of the transmitter use 2N4124s, designed for operation well into the 200-MHz region, and with considerable gain. The PA stage is an RCA "mismatch-protected" transistor with an f_T of 900 MHz!² The mismatch-protection feature holds considerable appeal in that the device is relatively immune to damage during operation, even when the load is shorted, open, or anywhere between those normally catastrophic parameters.

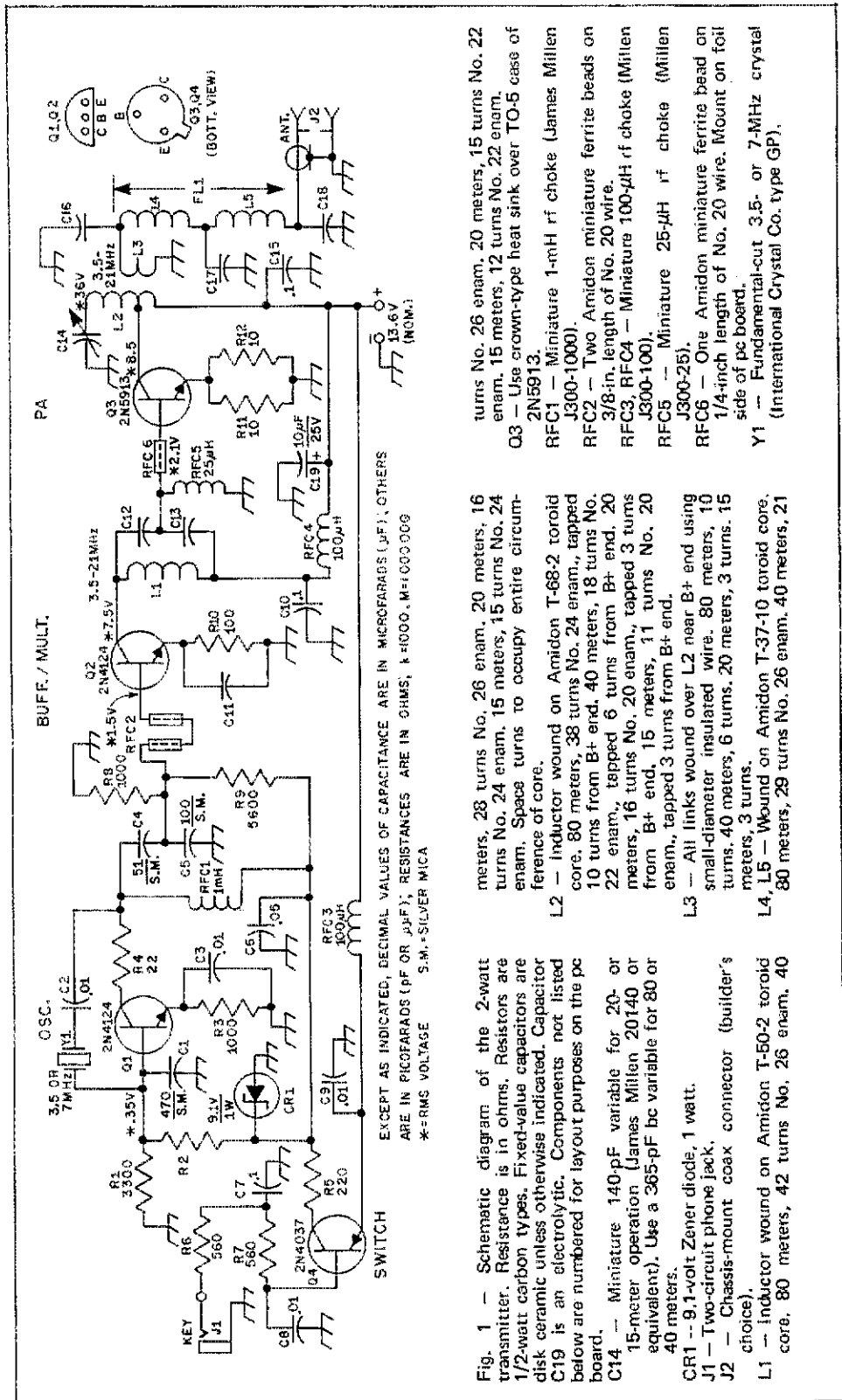
Considerable breadboard experimenting was required to tame the circuit, which initially had "whiskers" and a cw note that was akin to the wailings of a folklore banshee. Stage by stage the instabilities were located and cured until a pure sine-wave output was obtained at J2 of Fig. 1.

The Breadboard Model

After the breadboard model was completed, and the tuned circuits were resonated, power was applied and the cw signal was tuned in on a receiver. The note was clicky and somewhat chirpy. Also, "hash" was heard in the monitored signal. The hash was similar to the characteristic rushing sound in the output of a superregenerative detector. This suggested that a parasitic oscillation was present in the vhf region. An old cure was tried -- the addition of a 22-ohm resistor in the collector circuit of Q1, Fig. 1. The resistor was connected as close to the collector terminal as possible. This

² RCA used the term, "mismatch protected" to indicate that the transistor is specially selected and tested to withstand any load condition from open to short circuit with drive applied, and for short periods such as 30 seconds or less. The RCA "ballasted" transistors have like characteristics (2N5995, 2N5996 series), but have internal resistance in each emitter leg of the several parallel-connected bipolar transistors that are contained on the common chip. The resistance limits current during overload periods and protects the transistor from damage.

Building an hf-band solid-state transmitter is not a difficult task, but making it operate in a stable manner is a somewhat tougher assignment. Here are some debugging suggestions that should be helpful in obtaining good stability and freedom from spurious output energy. A practical design example is given, illustrating a 2-watt cw exciter/transmitter for use in the 80- through 15-meter bands.



turns No. 26 enam, 20 meters, 15 turns No. 22 enam, 15 meters, 12 turns No. 22 enam.
 Q3 — Use crown-type heat sink over TO-5 case of 2N5913.
 RFC1 — Miniature 1-mH rf choke (James Millen J300-1000).
 RFC2 — Two Amidon miniature ferrite beads on 3/8-in. length of No. 20 wire.
 RFC3, RFC4 — Miniature 100- μ H rf choke (Millen J300-100).
 RFC5 — Miniature 25- μ H rf choke (Millen J300-25).
 RFC6 — One Amidon miniature ferrite bead on 1/4-inch length of No. 20 wire. Mount on foil side of pc board.
 Y1 — Fundamental-cut 3.5- or 7-MHz crystal (International Crystal Co. type GP).

meters, 23 turns No. 26 enam, 20 meters, 16 turns No. 24 enam, 15 meters, 15 turns No. 24 enam. Space turns to occupy entire circumference of core.
 L2 — Inductor wound on Amidon T-68-2 toroid core, 80 meters, 38 turns No. 24 enam, tapped 10 turns from B+ end, 40 meters, 18 turns No. 22 enam, tapped 6 turns from B+ end, 20 meters, 16 turns No. 20 enam, tapped 3 turns from B+ end, 15 meters, 11 turns No. 20 enam, tapped 3 turns from B+ end.
 L3 — All links wound over L2 near B+ end using small-diameter insulated wire, 80 meters, 10 turns, 40 meters, 6 turns, 20 meters, 3 turns, 15 meters, 3 turns.
 L4, L5 — Wound on Amidon T-37-10 toroid core, 80 meters, 29 turns No. 26 enam, 40 meters, 21

Fig. 1 — Schematic diagram of the 2-watt transmitter. Resistance is in ohms. Resistors are 1/2-watt carbon types. Fixed-value capacitors are disk ceramic unless otherwise indicated. Capacitor C19 is an electrolytic. Components not listed below are numbered for layout purposes on the pc board.
 C14 — Miniature 140-pF variable for 20- or 15-meter operation (James Millen 20140 or equivalent). Use a 365-pF bc variable for 80 or 40 meters.
 CR1 — 9.1-volt Zener diode, 1 watt.
 J1 — Two-circuit phone jack.
 J2 — Chassis-mount coax connector (builder's choice).
 L1 — Inductor wound on Amidon T-50-2 toroid core, 80 meters, 42 turns No. 26 enam, 40

EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μ F), OTHERS ARE IN PICOFARADS (pF OR μ F); RESISTANCES ARE IN OHMS, k=1000, M=1000000
 *—RMS VOLTAGE S.M.—SILVER MICA

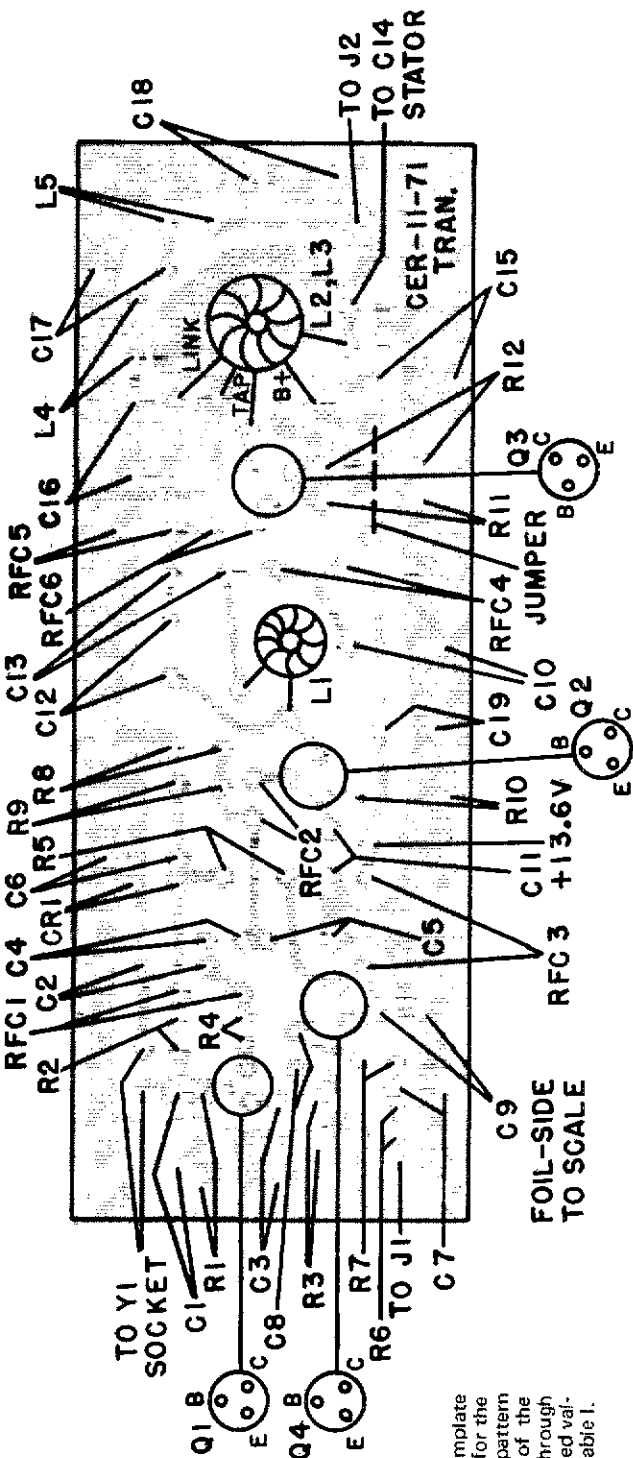
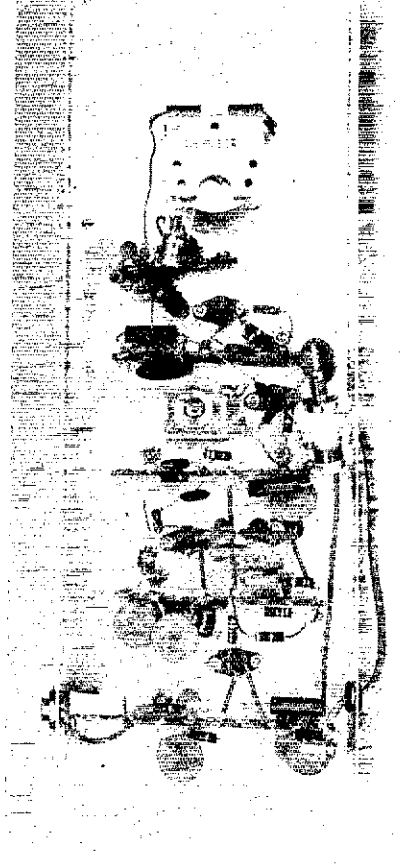


Fig. 2 - Scale template and parts layout for the transmitter. This pattern good for any of the bands from 80 through 15 meters. Selected values are given in Table I.

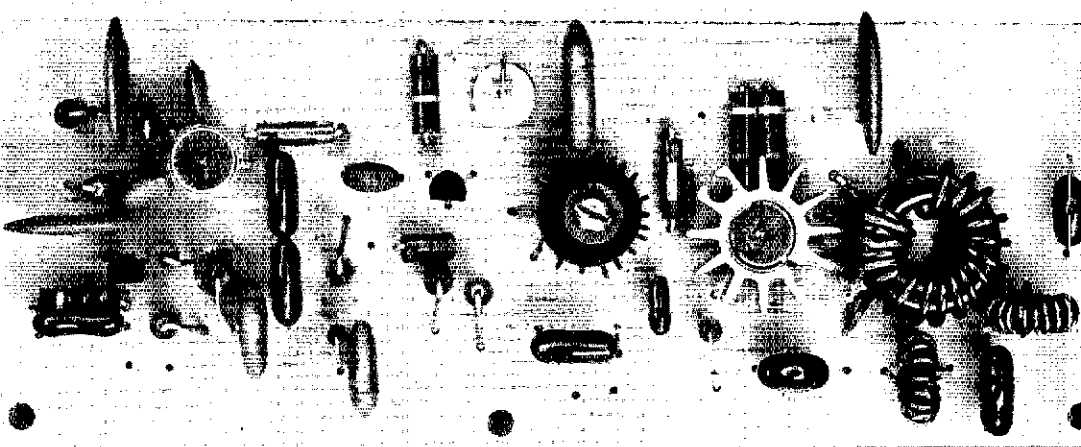
Table I

| Band | 40M | 20M | 15M |
|---------|--------------|-------------|-------------|
| R2 | 22K | 4700 | 4700 |
| R11-R12 | 10 | omit | omit |
| C11 | omit | .05 μ F | .05 μ F |
| C12 | 330 pF | 150 pF | 68 pF |
| C13 | 680 pF | 150 pF | 68 pF |
| C14 | 365 pF | 140 pF | 140 pF |
| C16 | 820 pF (SM) | 220 pF (SM) | 150 pF (SM) |
| C17 | 1500 pF (SM) | 470 pF (SM) | 330 pF (SM) |
| C18 | 820 pF (SM) | 220 pF (SM) | 150 pF (SM) |
| L1 | 9 μ H | 4.2 μ H | 1.6 μ H |
| L2 | 20 μ H | 2 μ H | 1.0 μ H |
| L3 | 6T | 4T | 3T |
| L4-L5 | 2.2 μ H | .55 μ H | .38 μ H |

Specific component values for using the circuit of Fig. 1 on the bands listed at the top of the chart. SM = silver mica. The pc-board is suitable for any of the bands listed here.



View of the breadboard version of the transmitter.



The final version of the transmitter. The crystal socket, B+ connector, jacks, and tuning capacitor are mounted separately on the chasses or box used.

measure greatly reduced the unwanted condition, but did not completely eliminate it. The next stage of the transmitter, Q2, was treated for parasitic oscillations by installing two ferrite beads (RFC2) on its base-feed lead, as near to the transistor body as possible. The cw note was again monitored, and no hash was heard. The foregoing tests were conducted with the transmitter operating on 20 meters. Ferrite beads were chosen for use at Q2 and Q3 after it was learned that 22-ohm resistors caused some attenuation of the driving signal at 7 and 14 MHz, but more so at the latter frequency. Ferrite choke RFC6 was added at Q3 as a preventive measure. A sensitive wavemeter was used next to "sniff" each stage for vhf and uhf energy. None was present.

The next step in debugging the circuit was to eliminate the chirp and key clicks from the signal. Capacitors C7 and C8 were added to the keying line between J1 and Q4. These capacitor values, in combination with the resistances of R6 and R7, provided a properly shaped keying waveform. The chirp was corrected by the addition of feedback capacitor C1 and the lower half of capacitive divider C4C5. Originally, C4 was used alone. The addition of C5 helped to mask the changes in junction capacitance of Q2 (brought about by changes in operating and signal voltages), thus reducing the pulling effect caused by the change in capacitance. The resultant reduction in drive to Q2 did not reduce the output of the transmitter significantly.

Phase III of the checkout called for an investigation of the hf and lf portions of the spectrum to learn whether stray oscillations were present. Again, a sensitive wavemeter was used to check each stage. A random oscillation was detected near the 160-meter band, originating in the second stage of the transmitter. Capacitor C11 was then a 0.22- μ F unit. It was changed to the .05- μ F value shown, which still provided adequate bypassing at the operating frequency while making the stage somewhat degenerative at the lower

frequencies. The attendant reduction in stage gain at lf stopped the oscillation. It was learned later that no bypassing was necessary for operation on 80 and 40 meters, so C11 was eliminated in those test models. Further tests showed two additional frequencies of oscillation in the bc band. C19, a 10- μ F electrolytic capacitor, was added and the condition was corrected. This shows the importance of good bypassing at low frequencies as well as at the operating frequency and higher.

Resistors R11 and R12 at Q3 proved necessary for 80- and 40-meter operation to provide sufficient degeneration to cool down the PA stage. No bypassing is used, and the two resistors are used in parallel to reduce stray inductance in that part of the circuit. Any stray inductance in the emitter circuit can lead to vhf and uhf parasitic oscillation. Resistors R11 and R12 can be eliminated from the circuit for 20- and 15-meter operation.

A final wavemeter check was made across the lf, hf, and vhf portions of the spectrum to make certain that the changes in component values did not simply shift the frequencies of the random oscillations. No spurious energy could be found (other than harmonics of the output frequency).

A Final Version of the Circuit

The breadboard circuit was transferred to the pc-board layout³ of Fig. 3, and not without some reservations about performance. One unhappy byproduct of miniaturization is the matter of unknown amounts of stray capacitance and inductance, to say nothing of the close proximity of the parts, which can lead to unwanted coupling effects. All of the foregoing can cause instabilities if the layout work has not been done carefully. Fortunately, the performance in this instance was as good as with the first version of the circuit. Toroidal inductors⁴ were used in the final model

³ Ready-made circuit boards for this transmitter are available from Stafford Electronics, 427 S. Benbow Rd., Greensboro, NC 27401.

⁴ Amidon cores are available from Amidon Assoc., 12033 Otsego St., N. Hollywood, CA 91607. James Millen parts are available factory direct by ordering from Mr. Wade Caywood, James Millen Mfg. Co., 150 Exchange St., Malden, MA 02148.

for L1 through L5, inclusive, to discourage unwanted coupling between the tuned circuits (toroidal-wound inductors are self-shielding). Tests were conducted on the bands 80 through 15 meters, using the appropriate tuned-circuit constants, bypassing techniques, and stabilization measures for each band. The pc-board pattern given here is suitable for building the transmitter for any of those bands. Table I gives the parts values for optimum performance on each of the bands under discussion. Stage Q2 operates as a buffer on 80 and 40 meters, as a doubler on 20 meters, and as a tripler on 15 meters. A measured output of 2 watts was obtained on each band. The collector tuned circuit of Q2 has sufficient bandwidth to cover all of each cw segment without being retuned. The only tuning control necessary is C14, which is used to resonate the PA tank. Maximum output with a 50-ohm load at I2 occurs at the collector-current dip.

Harmonic Suppression

Previous *QST* articles have stressed the importance of some form of harmonic filtering at the output of any solid-state transmitter. The rule holds in this case, too. Because of the nonlinear change in junction capacitance of an amplifying (or oscillating) transistor, the harmonic currents in the collector circuit are very great in magnitude. Ordinarily, the 2nd, 3rd, 4th, and 5th harmonics are down only 12 to 18 dB from the level of the desired output frequency. For this reason the half-wave filter of Fig. 1 was added (FL1).

Some Final Remarks

The bipolar switch used in the keying circuit is similar to that which is used in some of the W7ZOI

QRP rigs. It provides for shaping of the cw waveform, and lessens the chance of keying transients which might otherwise occur if a mechanical keying switch were used to break the 13.6-volt supply to Q1 and Q2. Zener diode CR1 helps to assure oscillator stability during keying periods.

A VFO can be used with the circuit of Fig. 1 by eliminating Y1 and C1, and supplying excitation across R1 (base to ground). A low-reactance blocking capacitor should be connected between the VFO output and the base of Q1. A .01- μ F disk or mica capacitor is suggested. The VFO should deliver approximately 1.5 volts rms to the input of Q1.

This transmitter can be used as an exciter for driving a power amplifier. The amplifier could be a Class C 6146, a grounded-grid sweep tube,⁵ or one of the power-class bipolar transistors such as the RCA 2N5995 or 2N5996.

During operation on 20 or 15 meters, a small amount of the driving power to Q3 may appear in the transmitter output (7 MHz). FL1 is a low-pass filter, hence will pass the 7-MHz energy. Those using a Transmatch or resonant antenna should find very little 7-MHz energy present in the radiated signal. A bandpass tuned circuit at L1 will correct the problem, but would require a change in the pc board layout.

The moral of this story is, of course, to make sure your solid-state transmitter has a clean bill of health before connecting it to that antenna. The simple checkout techniques described here should be helpful, and chances are that your neighbors — both on the air and next door — will think more highly of you as a result. QST

⁵ DeMaw, "Building a Skinner Linear," *QST*, April, 1970, p.32.

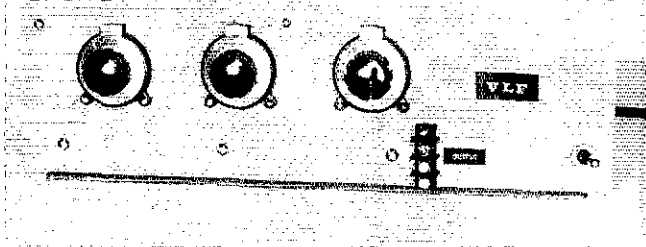
Strays

A resident of the Veteran's Administration Hospital, Milwaukee, Walt Reid, W9CUZ, operates daily from his motorized wheelchair. He can be heard on 146.94 MHz, while he cruises the tenth floor wards of the hospital. The Drake ML-2 operates from two six-volt storage batteries which run the wheelchair. The quarter wave ground plane is fastened to the chair's armrest with two wire radials on alligator clips stretched across the bottom of the chair. Best two-meter DX so far is WA9EUA at Wautoma, 110 miles away.

Walt, a polio patient since 1959, has slight movement in his left hand, with which he can actuate a micro-switch to run the wheelchair and rig. Tuning and bandswitching of his all-band station is done with the aluminum mouth stick, specially designed by a dentist friend. On cw he uses an electric mill, pecking out the letters with his mouth stick well enough to pass the Advanced Class. W9GA (Photo via K9FQG)



A WWVL Receiver



For Reception of VLF Signals in the 20-kHz Range

BY EUGENE PEARSON,* W3QY

EVER SINCE our article on the "NAA Receiver" appeared¹ there have been many schemes for vlf reception appearing not only in *QST*, but in other magazines as well. We like to feel that we had some real part in restoring this "lost art."

We have continued to be rather hooked on the subject and have built various preamplifiers for use with the original oscillator-detector. Anyone who built the set as presented in the earlier *QST* article must have realized that it lacked something in

* 448 W. Clapier St., Philadelphia, PA 19144.
¹ Pearson, "An NAA Receiver," *QST*, October, 1962.

selectivity! Using coils salvaged from an old Navy RAK-7 receiver, various amplifier circuits were experimented with, with minimal success. Finally sufficient separation was managed so that NAA and NSS, one or the other, could be heard. In the course of things, an obsession was developed to pick up the 20-kHz signals from WWVL at Ft. Collins, Colo. The problem was to build a narrow-band amplifier which would pull in the comparatively low-powered, miniscule signal from WWVL (2 kW), and beat down NAA's 1 megawatt at 18.7 kHz and NSS's 200 kW at 21.4 kHz. A couple of ideas on improved circuits were tried, and by mid-1968, the point had been reached where the elusive WWVL was being snatched right out from under the surrounding behemoths!

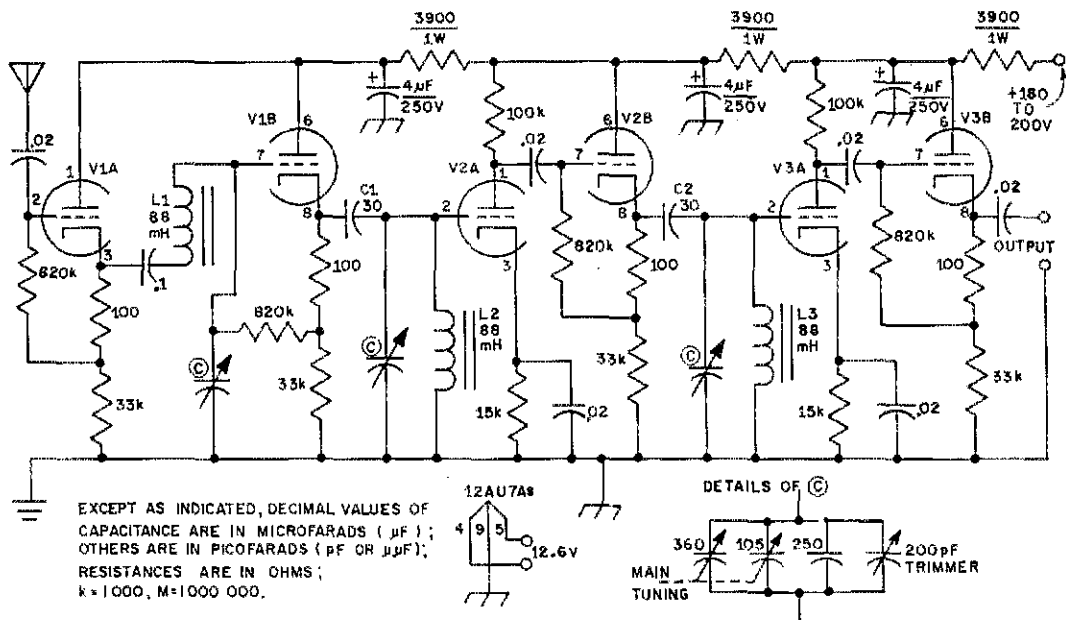


Fig. 1 - Schematic diagram of the WWVL amplifier. Resistances are 1/2 watt 10-percent tolerance unless otherwise noted. Capacitors with polarity marking are electrolytic. C1, C2 - For text reference.

L1, L2, L3 - Surplus 88-mH toroids (available from Typetronics, Box 8873, Ft. Lauderdale, FL 33310, or from L. S. Vant Slot, 302Z Passaic Ave., Stirling, NJ 07980).
 V1, V2, V3 - 12AU7A or 5963 dual triode.

The 18- to 27-kHz Amplifier

We recently built a later version of the amplifier section using the renowned 88-mH toroids (so dear to the RTTY brethren), and the size was reduced considerably. This amplifier and the circuit diagram are presented here. See the photographs and Fig. 1. No special instructions are offered since the whole job was a "junk-box operation." The front panel is 5 x 16 inches and the chassis is from an old Leeds and Northrup Speedomax amplifier. The three tuning condensers were obtained from Herbach and Rademan², and are midget bc super-het units with the two gangs connected in parallel. Some nice 2-inch-dia vernier dials were obtained from Lafayette Radio. (Vernier dials are almost a "must," since this amplifier tunes with razor sharpness.) The tuning range is roughly from 18 kHz to 27 kHz with the padder-capacitors shown.

Anyone who builds this amplifier will soon learn that it has exceptionally high gain and selectivity. As the stages are tuned, a certain amount of "ringing" will be detected. Although the thing will normally not "take off" on its own, extreme care must be exercised in seeing that there is minimal coupling between the antenna input circuit and the output circuit. In the situation where the 20-kHz signal from the local oscillator is brought into the proximity of the receiver, the signal-carrying lead should be well shielded. Use either a coaxial line or a shielded twisted line. (Electrostatic shielding is not as effective at 20 kHz as it is in the hf range.) An idea of the gain present in the amplifier can be realized when it is considered that a 5-mV 20-kHz signal at the input will cause an open-circuit voltage of 30 at the output. This amounts to a voltage gain of 6000.

WWVL Reception

In the two years that we have been using WWVL, the transmission modes have been changed from time to time. Three frequencies are involved, namely 20, 19.9, and 20.9 kHz. For the past many weeks the pattern has been as follows:

| | |
|------------|---------------|
| 20 kHz | On 10 seconds |
| 19.9 kHz | On 10 seconds |
| 20 kHz | On 10 seconds |
| *No signal | 10 seconds |
| 20 kHz | On 10 seconds |

* There may be a 20.9 kHz signal, but because of the selectivity of this amplifier, nothing comes through.³

Although there are supposed to be periods when the station is off the air for maintenance, we have generally found that the signal is present 24 hours a day, seven days a week. Literature on the NBS stations can be obtained by contacting the National Bureau of Standards, Boulder, Colorado.

2 401 E. Erie Ave., Philadelphia, PA 19134.

³ [EDITOR'S NOTE: The author's postulation is true. WWVL transmits experimental programs with multiple frequencies. Transmissions presently alternate between 20 kHz and 19.9 or 20.9 kHz, the change being made every 10 seconds. The transmission format and the frequencies used by WWVL are subject to change to meet the requirements of the particular experiment being conducted. WWVL uses no modulation; no identification is transmitted other than its unique format of alternating frequency every 10 seconds.]

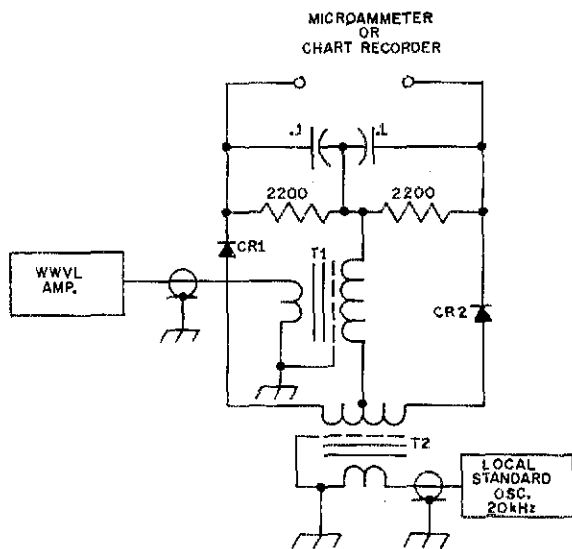


Fig. 2 - Phase deviation network. Resistances are in ohms; capacitances are in microfarads (μF). CR1, CR2 - Any small-signal diode. T1, T2 - Audio transformer, 5:1 or similar turns ratio (Leeds and Northrup 31178-39 or UTC A-20 or equiv.).

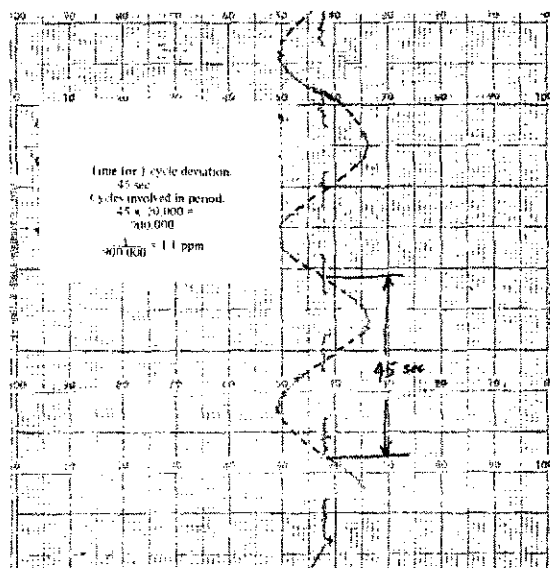
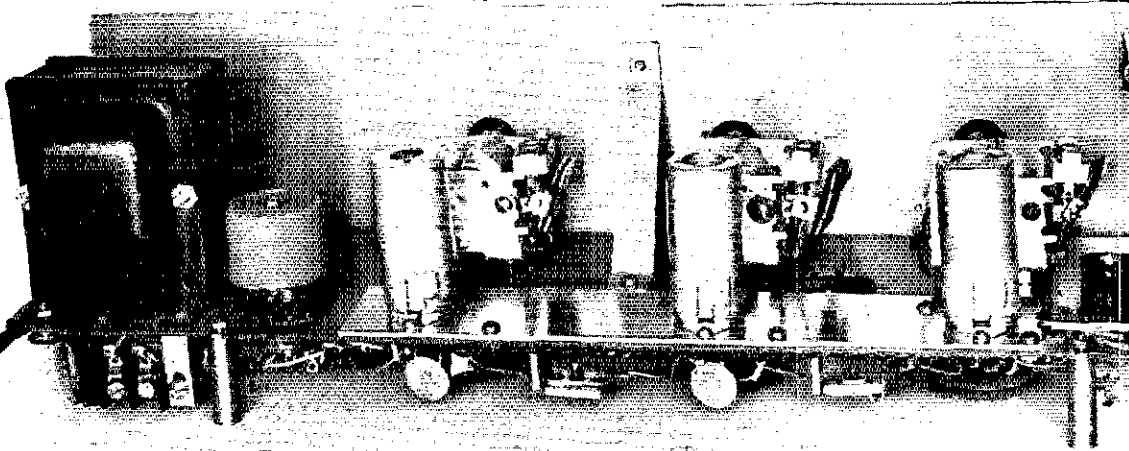


Fig. 3 - Typical record of a local "standard" oscillator plotted against WWVL by means of a chart recorder. The solid, somewhat "wavy" lines are the plot during presence and absence of the WWVL signal on 20.0 kHz. Dotted lines have been added to complete the cycles during signal absence.



This view of the back side of the WWVL amplifier shows the relatively open construction used by the author. The amplifier input and output circuits must be kept separated. Power-supply components are visible on the left. (*WQAJ photo*)

Antenna requirements will vary with the distance from Ft. Collins. Here at Philadelphia we use the "straight-through" lead of our 66-ft Zepp which is about 25 ft high. It does seem to be necessary to ground the unit to a good water-pipe ground. In general, it is probable that the longest, highest wire you can put up will give the best results. After all, this is pure ground-wave reception at almost audio frequency . . . it is a far cry from hf reception. Once you've got him, he'll stay rock steady for hours at a time . . . none of the violent QSB and phase distortion that you hear on WWV!

Using the Received Signal

Now that we have the signal, what to do with it? If you have an oscilloscope, the simplest procedure is to do a "Lissajous act" with WWVL on one axis and your 100 kHz crystal-oscillator signal on the other. You will get a 5:1 pattern. If the pattern glides, each cycle that slips by is 1 in

100,000. By timing the slip frequency you can determine your crystal frequency.

Another method is to connect two 20-kHz signals, one from WWVL, to a phase deviation network which produces a dc signal for a galvanometer or recorder. To get the second 20-kHz signal from the local standard oscillator, we use a multivibrator to divide by 5. The output signal from the phase-deviation network varies from a maximum positive to a maximum negative value as the phase angle between the two signals changes. When one transition from maximum positive, through negative, and back to maximum positive occurs, the phase has shifted by 360 degrees, or one cycle. In general, the phase angle is independent of magnitudes of the incoming voltages. The circuit of the phase deviation device is shown in Fig. 2. The transformers should be high quality ones with turns ratios of 1:1 to 5:1, having at least one winding center tapped and having good shielding between windings.

A peek at the under side of the amplifier. Many of the parts were obtained from the author's "junk box." C1 and C2, for example, are 5- to 30-pF trimmer capacitors. (*WQAJ photo*)

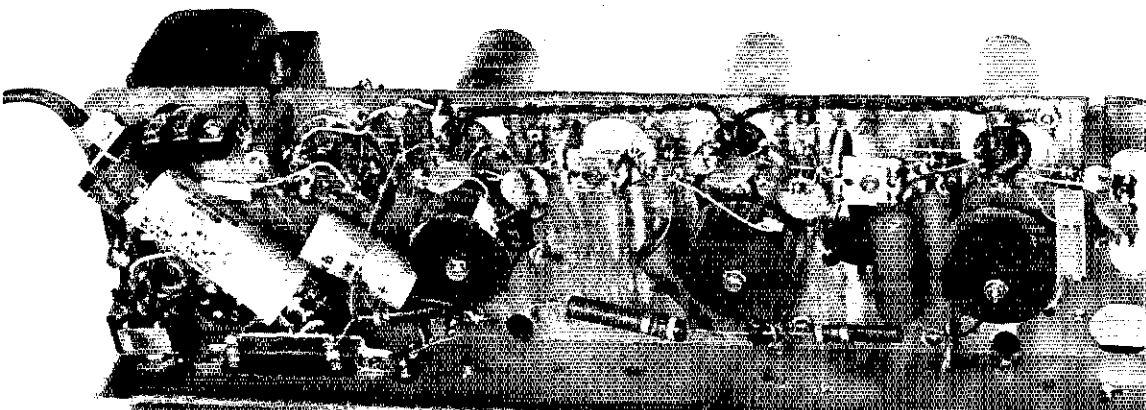


Fig. 4 BFO for the WWVL amplifier. Resistances are in ohms, M = 1,000,000. Decimal values of capacitance are in microfarads (μF), others are in picofarads (pF). V1 may be almost any small triode.

A dc meter suitable for use with the circuit may be difficult to come by. It should preferably be a suspension-type galvanometer having fairly low resistance (100 ohms or so) and good sensitivity. Typical microammeters available on the market usually have resistances upwards of 2000 ohms. In our case we were fortunate enough to inherit a Leeds & Northrup Speedomax chart recorder. A sample record is shown as Fig. 3. It shows quite clearly the ON and OFF periods of the 20-kHz signal and it is easy to trace the cyclic curve of the frequency deviation.

Another method of looking at the two voltages involves the use of a pair of transformers, connected in series, with the resultant output fed through a small amplifier to a rectifier-type meter. Assuming the two input voltages to be equal, the output meter will show twice voltage when they are in phase and zero when they are 180 degrees out of phase. The period from one maximum to the next represents a change of one cycle. A sensitive VTVM or solid-state VM can be used on ac instead of rigging up the rectifier voltmeter.

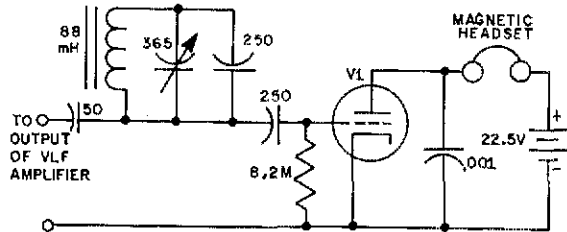
In comparing the techniques of using WWV against WWVL, it must be said that, for the same order of precision, it takes somewhat longer when using WWVL. For example, at 10 MHz with WWV, one cycle drift per second equals one part in 10 million. This just about represents the useful limit, though, because of instability of the received signal caused by continual changes in the ionosphere. In the case of WWVL (operating 1:1) one cycle per second is 1 part in 20,000. One cycle in 10 seconds is 1 part in 200,000. With a 100-second period the drift would be 1 part in 2 million. However, because of the extremely stable nature of the vlf signal, checks can be readily made for periods up to an hour or more (if your "standard" is that good!). The precision of the received signal is excellent.⁴ We have attained short-term stability (up to an hour or so) of about 2 parts in 100 million on our temperature-controlled, voltage-regulated FET crystal oscillators.⁵

This version of the vlf amplifier brings the thing into the realm where almost anyone can build it at minimal cost. The 88-mH toroids come in packs of five for \$1.50 . . . this is a big improvement over new toroids at \$14 each. The midget bc capacitors were 5 for \$2. The Lafayette dials cost 90 cents each. The rest of the unit can be scrounged from miscellaneous sources.

One item which was not mentioned is some sort of BFO which covers the frequency range. If you

⁴ EDITOR'S NOTE: Diurnal changes in the phase of the received WWVL signal will appear. For the most stable received signal in terms of phase information, periods when the sunrise or sunset line crosses the great-circle path between the transmitter and the receiver locations should be avoided.

⁵ See Pearson, "A Tale of Two Crystals," *QST*, August, 1971.



have built an NAA Receiver,⁶ you already have your BFO. Otherwise, one can be put together using another 88-mH toroid in an ultra-audion circuit which we extracted from our 1920 log! (See Fig. 4.)

Conclusions

This project, which has gone on for several years, has a certain fascination. Sometime, if we get crystal units which satisfy us, we may take on the job of making a counter to count to the nearest hertz. Then we will be ready to get into an ARRL Frequency Measuring Test. We have collected data on two FET-driven oscillators for many months, and the story on them has already appeared in *QST*.⁷ The only sad note is that the 100-kHz crystal has, in recent years, somewhat fallen from grace. Certain high-frequency crystals have exhibited superior stability characteristics and they may be the thing of the future. The old rocks can do a first-class job, however, with proper temperature and voltage control. When checked periodically with the receiver described here, they can provide a secondary standard of extreme accuracy. QST

⁶ See footnote 1.
⁷ See footnote 5.

The HW-100 and 1/2

(Continued from page 21)

- 10) Tighten the shoulder spacer and the control nut slightly and then check for smooth operation of the slide switches.
- 11) Wire the new control exactly as the old one.
- 12) Mount the crystal filters as shown at the bottom of page 31 and the top of page 32 in the SB-101 manual, doing the two steps in Details 2-2L and 2-2M.
- 13) Referring to Pictorial 3-4 in the SB-101 manual, do the nine steps on pages 44 and 45, the wiring of the filters to the switches and circuit boards, up to and including the two steps in the box area.
- 14) Put the knobs on as instructed in Detail 3-24A on page 79 of the SB-101 manual. This completes the operation - up is 2.5-kHz bandwidth, and down is 400 Hz, as in the pictorial.

If this conversion is attempted, purchasing the SB-101 manual is more than worth while because it shows you what a bargain you got when you purchased your HW-100. Many other nifty little extras can be added in the same manner as the filter. See you in the cw DX contest! QST

An Integrated-Circuit QRP Keyer

BY WES HAYWARD,* W7ZOI

FOR THE BETTER part of a decade, the author's major ham "hang-up" has been the construction and use of ultraportable battery-operated cw gear. Since this equipment is intended for use on mountaineering and hiking trips, power consumption is of more than academic interest. This article describes an electronic keyer which features variable speed and self-completing action while drawing a minimum of current. When operated from a 12-volt battery, the current required is only 10 mA. The keyer operates properly with a 9-volt battery, also.

The Circuit

The design, shown in Fig. 1, is based on a pair of inexpensive operational amplifiers, U1 and U2. In this application, however, the op amps are functioning without the usual negative feedback in a differential-comparator configuration. One input of each op amp is biased at a fixed voltage (about one-third of the supply voltage) while the other inputs are used to sense the voltage on the appropriate RC timing circuits. During key-up periods, the noninverting (+) input of U1 is held positive by R1 which keeps Q2 saturated. Similarly,

* 700 S. W. Danielle Ave., Beaverton, OR 97005.



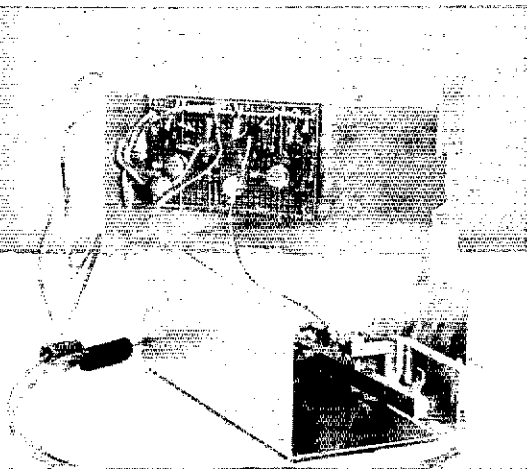
the inverting (-) input of U2 is held positive by R2 keeping the output transistors cut off. A dot is initiated by discharging C2 through the collector of Q2. The output of U2 saturates positively which keys the transmitter. Simultaneously, Q1 saturates, and this action discharges C1. This turns off the output of U1 which allows Q2 to cut off. The dot capacitor, C2, is now free to charge through R2. When the voltage on the inverting input of U2 reaches the reference level on the noninverting input, the amplifier changes state with its output going nearly to ground potential. This terminates the dot and allows Q1 to cut off, which in turn allows the space-determining capacitor, C1, to charge. When C1 has charged to the same potential as the inverting input voltage on U1, this op amp changes state and Q2 goes into saturation again. If the paddle is still depressed, another element will be initiated. A dash is formed by discharging C3 in parallel with C2.

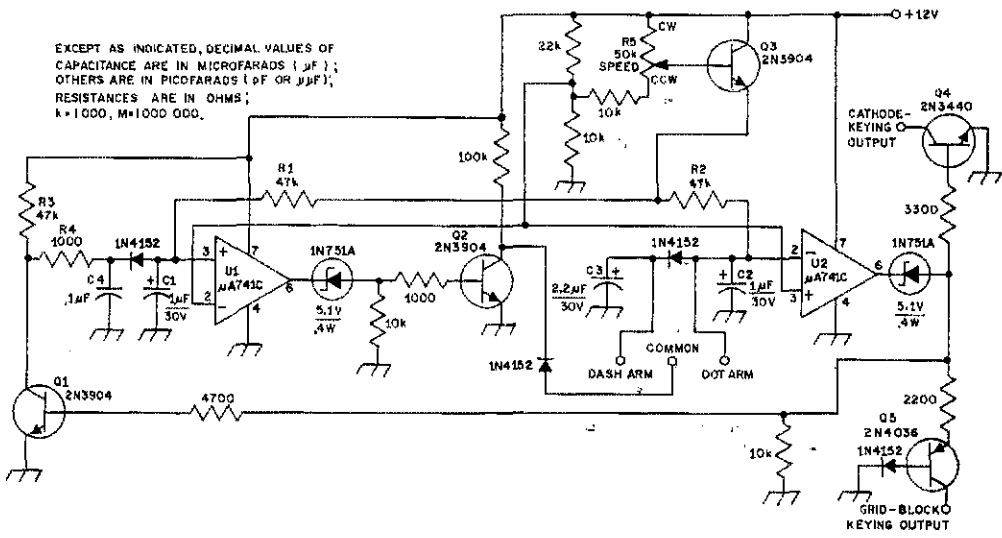
The network composed of R3, R4, and C4 introduces a subtle but essential delay into the cycle. This amounts to about 500 microseconds and occurs just after a dot or dash actuation. The timing capacitors, C2 and C3, are completely discharged for each element sent. The emitter follower, Q3, assures that the speed-control voltage remains stable during timing. Q3 could be eliminated if the voltage divider were much stiffer. However, this would increase the keyer current consumption. Two outputs are provided, Q4 being suitable for keying a positive voltage to ground (about 20 mA maximum) while Q5 is available for grid-block keying tube transmitters.

Construction and Operation

The construction of this unit is about as noncritical as any project can be. The author's unit was built on a small piece of Vectorbord. Building and testing can be completed in one evening. Ten-percent-tolerance tantalum capacitors were used at C1, C2, and C3. The Fairchild op amps are available from some QST advertisers. While intended for operation with a 12-volt supply, this keyer may be used with voltages up to 30. The speed is independent of the voltage used.

The entire keyer is contained in a small Minibox. The paddle was built for the author by WA6EED.





Although this device does not offer the precise timing of digital circuitry, the accuracy is more than adequate. The excellent performance, along with extreme simplicity and low power requirements, make the unit an ideal addition to the modern portable station.

QST

Fig. 1 — Circuit diagram of the keyer. Component designations are for text reference. Fixed-value resistors are 10 percent, composition; fixed-value capacitors are disk ceramic unless otherwise noted. R5 is a 50,000-ohm, linear-taper, composition control.

• New Apparatus

Much of today's experimental solid-state gear operates from a power supply whose output voltage is 9. If the equipment draws much more than 30 or 40 mA the battery life, if batteries are used, is fairly short. Therefore, it is convenient to have an ac-operated dc supply for use in testing and operating many of the transistor projects that amateurs build. The RCA KC-4004 seems to be made to order for the foregoing needs.

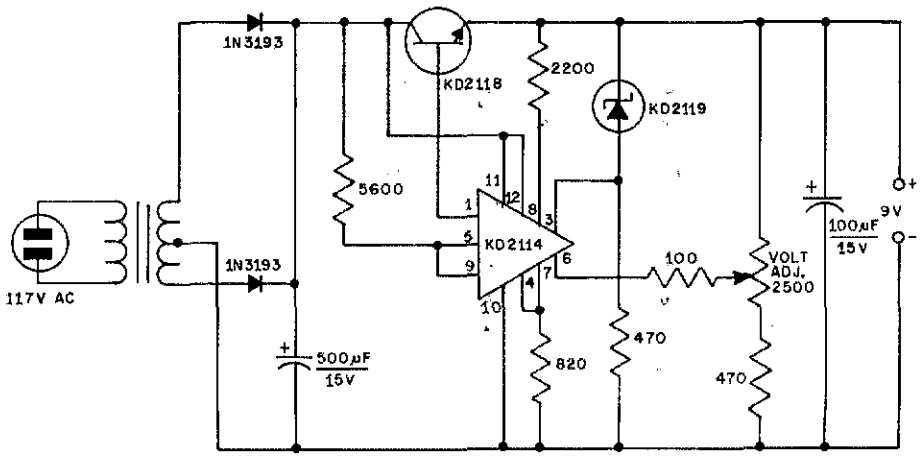
The kit contains all of the parts necessary to obtain 9 volts dc output (polarity reversible) at up to 250 mA regulated. Voltage regulation at the

maximum current rating is specified as 3 percent. Our tests confirm this figure.

Wiring instructions are included with the kit. Assembly time, plus checkout, was 2 hours. Adjustment of the voltage-control potentiometer revealed that a voltage range between 8 and 11 was possible, thus suggesting that the supply could be used for equipment requiring operating voltages other than 9.

A schematic diagram of the circuit is given in Fig. 1: An integrated circuit is employed as a regulator, and a bipolar transistor is used as a pass transistor. The finished unit is housed in a plastic case that measures 4 X 3 X 1 1/2 inches.

The kit is available from any supplier handling the RCA hobby packets. The price is \$11.30. — *WICER*



Two Possible Explanations for LDEs

Moonbounce and Gegenschein

BY C. R. CLARK,* WB4OBZ

SINCE THE 1920s reports have appeared of reception of echoes of radio signals with delays of several seconds after the transmission of the original signals. (See the references at the end of this article.) Several tentative explanations have been offered: clouds of electrons in space,¹ propagation delay in the ionosphere,^{2,3} several trips around the world,³ and storage and later stimulated emission.⁶ None of these explanations has won general acceptance, nor were any put forward as much more than mere possibilities.

It seems quite likely that more than one mechanism is responsible, and a study of the published reports of LDEs seems to suggest two possible explanations for some of them.

In Fig. 1, the delays cited in the reports listed at the end of this article are shown graphically. It may be seen that there are two significant peaks, one centered around 2 1/2 seconds and the other at 8 seconds. It is to be noted in passing that the times given may not always be accurate, depending on the method of measurement (not all hams have stop watches in their shack!), but the number of reports can to some extent offset errors of measurement in some of them. There seems to be enough data to permit the following analysis, although it is to be regretted that many reports do not give exact times, dates, periods of delay, and so on — all of which are important if a study of this kind is to be worthwhile.

The two groups, 2 1/2-second and 8-second delays, will be examined in turn to see whether any clues can be offered as to the mechanism at work.

2 1/2-Second LDEs

The moon, at 234,000 miles, is at just the right distance to account for echoes with delays of about 2 1/2 seconds. Of the eighteen reports giving times of 2 to 3 seconds, ten offer enough detail of time and place to permit their use to test the moonbounce hypothesis. They are tabulated in Table I. The zenith angle of the moon (the number of degrees that the moon is away from straight up) was computed with pencil and paper. For real accuracy a computer should be used. To keep the paper work involved at a reasonable level, the inclination of the earth's plane of rotation to the ecliptic and that of the moon's orbit were ignored, as well as the latitude of observation and the eccentricity of the earth's and moon's orbits and the influence of the sun on the latter. As a result, the zenith angles given may be in error by ten degrees or more, but it is believed that they are accurate enough for a preliminary study such as this.

The LDEs tabulated in Table I are plotted in Fig. 2. It will be noted that they are concentrated around 150 and 230 degrees, with two others reported when the moon was above the horizon.

Before jumping to the conclusion that this shows that reflection from the moon could not be responsible because the moon was below the horizon, remember that the ionosphere may have an important part to play in such reflection. The ionosphere may serve to focus the transmitted signal on the moon and to focus the reflected signal on the receiving antenna precisely because it would be rare that ionospheric conditions would be such as to do the focusing job effectively, LDEs caused by moonbounce are rare. Conversely, because there is such a strong correlation between the zenith distance and the reception of 2- to 3-second LDEs, it seems that the moon indeed may have something to do with it.

VHF and UHF men who read this may object that it takes high power, high-gain antennas, and the best receivers to work moonbounce, or EME. But that may be in part due to a low coefficient of reflection of the moon for those frequencies. It is possible that the lower frequency signals may be reflected more efficiently because of the deeper penetration of the longer waves into the moon's surface, and lower losses may result because of the lower frequency. In addition, there would be the gain contributed by the mechanism of ionospheric focusing just mentioned.

Eight-Second LDEs

The concentration of LDEs of eight-second delays suggests that there might be a reflector in space at a distance of about 800,000 miles. It so happens that this is the distance of Lagrangian points L₁ and L₂. There are five points in the earth's orbit, or for that matter in the orbit of any planet or satellite, where a body can revolve without being disturbed by the earth's gravitation, shown in Fig. 3. Lagrangian points L₃, L₄, and L₅ are too far away, 93 or 196 million miles, to be of interest, but L₁ and L₂ are at just the right distance. In the case of L₁, the distance is such that the earth's gravitation pulls against the sun's enough to reduce the required orbital velocity, and

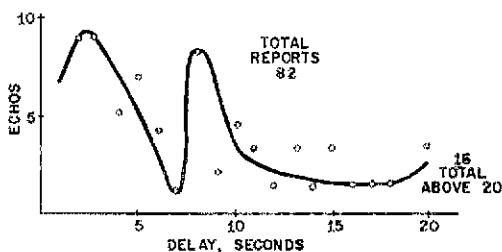


Fig. 1 — Number of LDEs reported for each delay time.

* Rt. 3, Box 357, Moncks Corner, SC 29461.

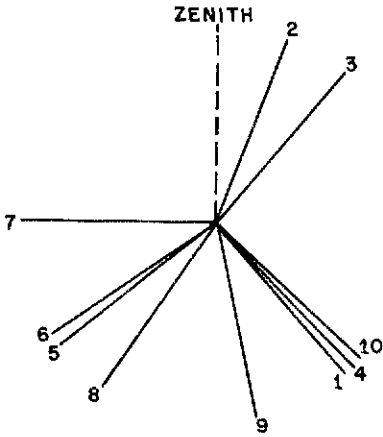


Fig. 2 — Zenith angle of moon for LDEs in Table 1.

the body completes its shorter orbit in exactly the same time as the earth, one year. And for L_2 , the distance is such that the earth's gravitation plus the sun's increases the required orbital velocity, so that the body completes its longer orbit in exactly a year. Actually the distance to these two points varies considerably in the course of a month, because of the additional influence of the moon's gravitational field, and this complicates the mathematical analysis no end. But for our purpose such an analysis, fortunately, is not required.

Points L_4 and L_5 are stable. If a foreign body is near them it tends to oscillate about them. But the others are not stable; any displacement, in the course of time, tends to increase. If the displacement is small, however, and if a foreign body is near the Lagrangian point and is moving with nearly the correct orbital velocity, it will tend to stay in the vicinity for a considerable time, and a concentration of matter will develop. In addition, collisions between particles and their mutual gravitational attraction will also tend to maintain any concentration that develops there.

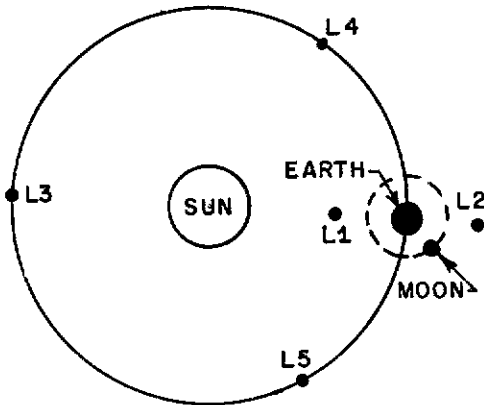


Fig. 3 — The Lagrangian points of the earth's orbit, not drawn to scale.

It would seem that Lagrangian point L_2 would be the most likely candidate, as it would be the place where interplanetary gases, gases driven off from the earth's atmosphere, and particles from the sun would tend to pause before resuming their journey through space. The density would be very low, of course, but so is the density of the ionosphere, and solar radiation might have the same ionizing effect that it does on the upper layers of the earth's atmosphere. It has been suggested that a concentration of dust particles near this point may be responsible for the gegenschein, a faint glow about ten degrees in diameter directly opposite the sun, a glow that can be seen on clear, dark nights.

And so perhaps echoes of eight-seconds delay may be explained by reflection from a concentration of ionized gases at Lagrangian point L_2 . Again, as in the case of the 2 1/2-second LDEs, the effect of focusing by the ionosphere would probably have to enter in because of the distances involved, and would explain why such echoes are rare.

Van der Pol seemingly ruled out any reflection from outside the atmosphere, because "wireless waves, even short ones, usually do not penetrate the Kennelly-Heaviside layer."² He bases this conclusion on the fact that the waves are reflected back to earth. But this is an over-simplification of the problem. The ionosphere is not a 100-percent-perfect reflector; it also absorbs and transmits waves. In fact, there is much study yet to be done on the question of transmission of radio waves through the ionosphere to and from outer space.

Summary and Conclusion

It seems possible, therefore, that LDEs of about 2 1/2 seconds delay could be the result of reflection from the moon, and those of eight seconds delay of reflection from a cloud of ionized gas at Lagrangian point L_2 . This still leaves many LDEs without explanation. Their explanation could well shed new light on modes of propagation of radio signals, and on conditions in space near the earth. One great need here is for more data. W6QYT, Radioscience Laboratory, Stanford University, Stanford, CA 94305, has been collecting reports,

(Continued on page 45)

| Call | Date | Ref. | Freq. | Moon's Zenith (Fig. 2) | Key No. |
|---------|----------|------|-------|------------------------|---------|
| PCJJ | 10-11-28 | 2 | 9.5 | 138° | 1 |
| K4OHK | 5-21-60 | 7 | 21 | 21° | 2 |
| W5YV | 12-2-67 | 6 | 28 | 40° | 3 |
| W1DNT | 10-8-68 | 7 | 14 | 136° | 4 |
| K8PKY/1 | 5-27-69 | 9 | 14 | 232° | 5 |
| W3AMF | 8-16-69 | 9 | 7 | 236° | 6 |
| W2UGZ | 11-3-69 | 9 | 21.3 | 270° | 7 |
| WB4JFK | 9-2-70 | 9 | 28 | 215° | 8 |
| K7TUU | 9-7-70 | 9 | 50 | 168° | 9 |
| W9NTE | 12-7-70 | 9 | 14 | 136° | 10 |

Radiated Power Patterns for Multiband Dipoles

BY DALE W. COVINGTON,* K4GSX

IF ONE IS given both the azimuthal compass direction from the installed antenna and the vertical angle of elevation above ground which are optimum for transmitting via the ionosphere to any desired station in the world, the question naturally arises, "How well does the antenna radiate power in the direction defined by these two angular components?"¹ The answer to this question is of particular interest in a stationary, multiband wire antenna such as the popular W3DZZ.^{2,3}

This article investigates the theoretical power-density pattern of a W3DZZ antenna installed at a feed height above ground of approximately ten meters, a height often encountered in practice. The same center height was used for a horizontal and an inverted-V form of the antenna in order that the effect of bending the legs could be directly compared.

Mathematical Approach

The actual W3DZZ antenna was represented mathematically by a collection of current elements located over a perfectly conducting ground plane. Current magnitudes for the elements were assigned for a simple sinusoidal current distribution which neglected the perturbing influences of the traps, the finite antenna diameter, and the feedline. The advantage of using incremental current elements was that the far-field patterns could be calculated by a computer for a rather general form of antenna with nonsymmetrical bends in the radiating elements. Table I summarizes the electrical details of the model while Fig. 1 gives the geometric details.

The computation proceeded as follows. First, the E and H fields radiated by each current element were found for every two-degree incre-

* 281 Vance Circle N.E., Marietta, GA 30060.

¹ It is relatively easy to obtain an estimate of these two angles. For any given circuit, the azimuth angle is found from the appropriate azimuthal world map or by mathematical calculations. Useful information and graphs relating ray paths and ionospheric layers to the angle of elevation are given in:

Chapter 12, "Propagation," *Radio Communication Handbook*, 4th Ed., Radio Society of Great Britain, 1968.

Davies, *Ionospheric Radio Propagation*, National Bureau of Standards Monograph 80, 1965.

Ionospheric Predictions, edited by M. Leftin, Institute for Telecommunication Sciences, Boulder, Colo., 1971.

² Buchanan, "The Multimatch Antenna System," *QST*, March, 1955.

³ McCoy, "A Coax-Fed Trap-Dipole for 80 Through 10-Meters," *QST*, November, 1969.

ment of azimuth and elevation in the first quadrant of the far-field hemisphere above the antenna. This yielded a matrix of the radiated power. Next the power matrix was searched for the maximum value of radiated power and all the remaining coordinates were referenced to it. The values in dB down from the maximum were printed out by the computer for each matrix coordinate. Contour lines for 3, 6, 9, 12, etc. dB down were then drawn from these data. With the symmetrical antennas being treated here, it was only necessary to find the power-density matrix for one quadrant of the hemisphere. Other quadrants are obtained by relabeling the azimuth axis as shown in Fig. 2A.

Computed Results

Unfortunately, lack of available computer time made it impossible to use enough increments to get

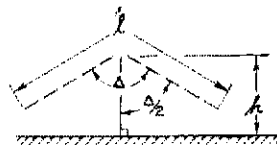
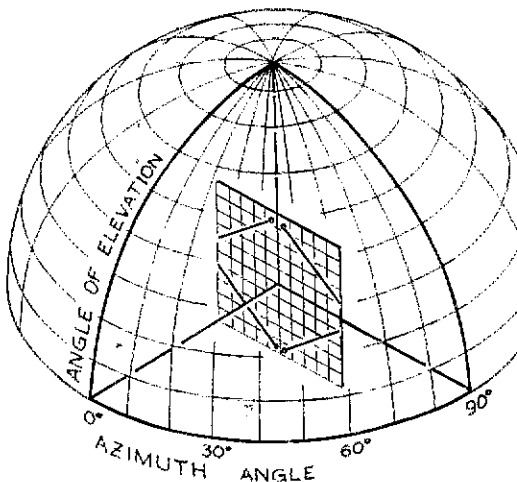


Fig. 1 — Isometric view of the multiband dipole and its image located at the center of the hemisphere which defines the angles of elevation and azimuth for the antenna. Patterns were computed for the outlined quadrant.

TABLE 1

Electrical Model of W3DZZ Antenna Located
10.7 Meters above Perfect Ground

| Freq. (MHz) | h (height in λ) | l (length in λ) | No. Elements per length l | Δ (angle $^\circ$) | Pattern |
|-------------|--------------------------|--------------------------|------------------------------|----------------------------|---------|
| 3.5 | $\lambda/8$ | $\approx \lambda/2$ | 18 | 180 $^\circ$ | Fig. 2A |
| | | | 18 | 120 $^\circ$ | Fig. 2E |
| | | | 18 | 180 $^\circ$ | Fig. 2B |
| 7.0 | $\lambda/4$ | $\lambda/2$ | 18 | 120 $^\circ$ | Fig. 2F |
| | | | 30 | 180 $^\circ$ | Fig. 2C |
| | | | 36 | 120 $^\circ$ | Fig. 2G |
| 14.0 | $\lambda/2$ | $3\lambda/2$ | 30 | 180 $^\circ$ | Fig. 2G |
| | | | 30 | 180 $^\circ$ | Fig. 2D |
| 21.0 | $3\lambda/4$ | $5\lambda/2$ | — | 120 $^\circ$ | — |
| | | | — | 120 $^\circ$ | — |

accurate results on the highest bands. The bands for which patterns were found are listed in Table 1. The patterns are plotted in Fig. 2. An angular-coordinate accuracy of two degrees appears to be consistent with the previously stated approximations regarding the quantized antenna and the hemisphere above it.

One should note that the horizontal antenna patterns could be computed manually by multiplying the free space pattern of the long wire, center fed antenna by the pattern for two isotropic point sources driven 180 degrees out of phase and separated by a distance of 2H. This procedure would not be valid, however, for the inverted V.

In the case of the horizontal antenna, Figs. 2A through 2D dramatically show the shift in the direction of maximum radiated power from the overhead direction at 3.5 and 7.0 MHz to end-fire, low-elevation-angle lobes at 14.0 and 21.0 MHz. The inverted-V form of multiband antenna (120 degrees), as the patterns of Figs. 2E through 2G indicate, is a more omnidirectional antenna. Performance off the ends at the lower frequencies

should be better for the V than for the horizontal antenna. However, the horizontal form makes the better 14.0-MHz antenna except along an azimuth of about 20 degrees.

Conclusions

Patterns have been displayed of the variation of radiated power from a multiband antenna over perfect ground as a function of azimuth angle and angle of elevation. In practice, real ground will cause more decrease in the radiated power at the lowest angles of elevation than indicated by the patterns. Furthermore, polarization effects for both real ground and the ionosphere introduce additional complicating factors not treated here. Nevertheless the theoretical patterns do locate the directions in space through which most of the radiated power flows. Relative signal strengths in other directions can be determined from the charts. This information can be used either to position the antenna in such a way as to achieve the best results or to gauge the effectiveness of the present antenna on the various bands of operation.

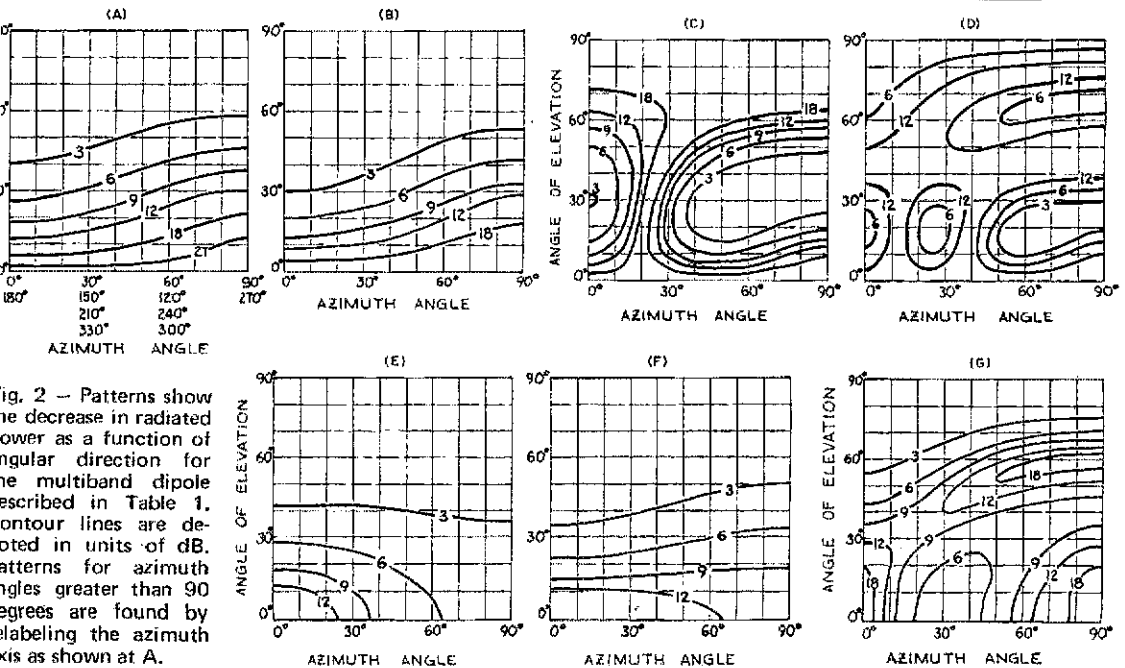


Fig. 2 — Patterns show the decrease in radiated power as a function of angular direction for the multiband dipole described in Table 1. Contour lines are denoted in units of dB. Patterns for azimuth angles greater than 90 degrees are found by labeling the azimuth axis as shown at A.

SWR—What Does It Mean?

BY JAMES N. THURSTON,* W4PPB

MUCH is heard these days about SWR, standing wave ratio, but unfortunately there appears to be a considerable amount of misunderstanding about what SWR really means, how important it is, and what can be done to improve it. It is often helpful to review a few definitions and facts about SWR.

SWR is defined as the ratio of the maximum voltage to the minimum voltage along a transmission line. Normally the ratio is meaningful only if the ratio is taken between adjacent maxima and minima because we are often dealing with lossy lines. Because of these inevitable losses on a transmission line, the SWR changes as the measurement point gets further from the load end of the line. The change is always such as to make the SWR better (nearer unity) as the measuring point is moved further from the load.

For a given transmission line and a fixed load *nothing* can be done at the *sending* end of the line to modify the SWR on the line. Only by changes at the load can any change be made in the SWR at the sending end. A high SWR is undesirable mainly because it does not permit the transmitter to be loaded properly. It may result in line losses if a long, lossy transmission line is used.

A perfectly matched line, with an SWR of 1:1, will occur only if the characteristic impedance of the line is identical with that of the load impedance. Most good transmission lines have characteristic impedances which are almost entirely resistive at the operating frequency. A line with a purely resistive characteristic impedance Z_0 which is terminated in a pure resistance R , will have an SWR of Z_0/R or R/Z_0 , whichever is greater than one.

Much of the confusion and frustration arising from the use of SWR, is a result of trying to do the impossible, or of misinterpreting the results of measurements. For example, an ideal half-wave horizontal antenna is supposed to have an impedance at the center of about 73 ohms. It seldom does because of factors too numerous to list here. Most amateurs use 50-ohm transmission line. Now if we connect our ideal antenna to a length of perfectly good 50-ohm line, we'll measure an SWR of 1.46:1, which is simply $73/50$. This might cause some amateurs to worry a great deal, and to attempt without success to trim the antenna for a better s.w.r. The same antenna connected to a 73-ohm line would show an SWR of 1:1. Also, a 50-ohm bridge used on a 73-ohm will give results that may be confusing. For example, a perfectly matched 73-ohm line, measured with a 50-ohm

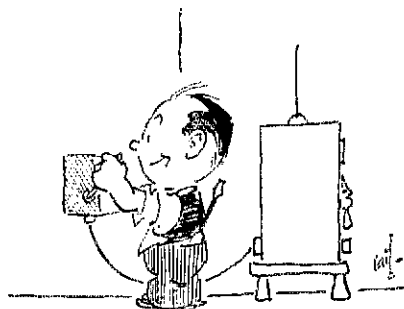
bridge, would show an SWR of 1.46:1, when the actual SWR is 1:1.

Many amateurs use tuning devices or "match-boxes" between the transmitter and the transmission line. This is an excellent procedure, and can generally result in an SWR of 1:1 as measured between the transmitter and the antenna tuner. This is a good condition because the transmitter is loading into a purely resistive load. It does not mean however, that the line SWR from the tuner to the antenna is 1:1. The SWR between the tuner and the antenna may be any value, and is not affected by any adjustments at the antenna tuner. Only by changes at the antenna such as trimming the length or adding loading coils will the SWR from the antenna to the tuner be modified.

An off-center-fed antenna, such as the Windom, is almost certain to have both a resistive and a reactive component of impedance at its feed point which results in an SWR of greater than one. Such an SWR may not be serious, since the line will radiate to some extent, and the line losses will probably be small if the transmission line length is less than 100 feet or so. Of course there may be a high-voltage point at the transmitter, resulting in lots of rf in the shack, and possible loading difficulties with the transmitter. Sometimes however, the convenience of such a multiband antenna more than compensates for some of its disadvantages.

To summarize then, a low SWR is not a guarantee of antenna radiation, and nothing magical happens when an SWR of 1:1 is achieved. When used properly, the quantity standing wave ratio can be a useful tool to the radio amateur. When interpreted improperly the term SWR can lead to hours of frustration and fruitless conversation.

QST

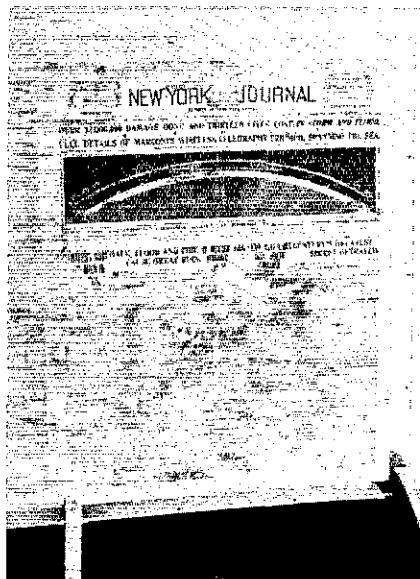


DO YOU KILL ALL TRANSMITTER CIRCUITS COMPLETELY BEFORE TOUCHING ANYTHING BEHIND THE PANEL?

* 212 Beucea Road, Clemson, South Carolina 29631.

From the Museum of Amateur Radio

Here is a reproduction of the front page of the *New York Journal* of December 16, 1901 — the story of Marconi's triumph in bridging the Atlantic by wireless for the first time. It makes great reading. I like the headlines, too. For example, it says "an operator played him false" by divulging "century's greatest secret" ahead of time. On the back of this page is a very choice news item. This has to do with an interview with Thomas A. Edison who is quoted as saying "I don't believe it." Edison goes on to say that the three dots of the Morse code could easily have been lost in static. The blank places on the page are due to the fact that some of the brittle paper had disappeared, particularly where the newspaper had been folded and lain in an attic trunk for over sixty years. The sheet was mounted in plastic professionally. — *WIANA*



Two Possible Explanations for LDEs

(Continued from page 41)

and will be grateful for any that are received. Give all possible details, especially dates and times (preferably GMT — and remember dates should be GMT too!), the exact delay between the signal and the echo, the length of time the echo was heard, the source of the transmitted signal (your own or another transmitter), the frequency used, the characteristics of the echo, any frequency shift noted if you have facilities to measure it. If you can send a tape recording, by all means do so. This is an area where the technical know-how, large numbers, and wide distribution of the amateur fraternity can make a contribution to the radio art, and continue to justify its occupancy of spectrum space eagerly sought by many other interests. QST

References

- 1) Stormer, "Short Wave Echoes and the Aurora Borealis," (Letter), *Nature* 122 (1928), p. 681.
- 2) Van der Pol, "Short Wave Echoes and the Aurora Borealis," (Letter), *ibid.*, p. 878.
- 3) Appleton, (Letter), *ibid.*, p. 879.
- 4) Dellinger, "Observations on Long-Delay Radio Echoes," *QST*, August, 1934.
- 5) Budden and Yates, "A Search for Radio Echoes of Long Delay," *Journal of Atmospheric and Terrestrial Physics*, 2 (1952), p. 272.
- 6) Villard, Graf, and Lomasney, "Long-Delayed Echoes . . . Radio's 'Flying Saucer' Effect," *QST*, May, 1969.
- 7) Villard, Graf, and Lomasney, "There Is No Such Thing As a Long-Delayed Echo," *QST* February 1970.
- 8) Crawford, Sears, and Bruce, "Possible Observations and Mechanism of Very Long Delayed Radio Echoes," *Journal of Geophysical Research*, 75 (1970), p. 7327.
- 9) Villard, Fraser-Smith, and Cassam, "LDEs, Hoaxes, and the Cosmic Repeater Hypothesis," *QST*, May, 1971.

FEEDBACK

Because of a sharp pair of eyes at W3CIX a missing ground connection was caught in Fig. 4 of the "Pip-Squawk MK-II," *QST* for August, 1971. The junction of CR4, C11, and R12 should be returned to ground. The template layout shows the correct connection, however. — *WICER*

A circuit board, and, if desired, a complete kit of parts is available for the IC Touchtone decoder described in *QST* for July 1971 from John Leeder, K8TIA, 430 Dumbarton Blvd., Richmond Heights, OH 44143.

Thanks go to K4JK, who pointed out that an error exists in the Hints and Kinks "Simple and Inexpensive Audio Oscillator" in the September, 1971, issue of *QST*. Ed correctly says that in the Wien-bridge circuit, the voltage polarities at pin 7 and pin 4 of U1 should be reversed. Pin 7 should be connected to +9 V, and pin 4 to -9 V.

In the DX Competition write-up in September, *QST*, the cw entry of VE1ASJ (+VE1s ACU DH) was inadvertently omitted from the results. Their score should have read: 1,112,496-301-1232-C-80, making them Canadian Division leader on cw.

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 176-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 WIAW visiting hours, see the schedule in "Operating News.")

drive a dc amplifier, and the amplifier operates a meter. This technique is fine provided the dipper is not coupled too tightly to the circuit under test, a condition which can cause the rf voltage to fall below the conduction point of the diode — approximately 0.4 volt for a germanium diode, and 0.6 volt for a silicon diode. When the diode no longer conducts, the meter indication falls to zero, thereby preventing one from obtaining a reading.

The circuit shown was tried, and the performance was good. There are no dead spots in the tuning range, and a pronounced dip in meter reading can be obtained without experiencing diode "dropout." Changes in drain current are observed on a 100- μ A meter. When S1 is placed in the DIODE position, the instrument can be used as an indicating wavemeter. In this mode the source-gate junction rectifies the sampled rf to provide an indication on the meter.

Keep all leads as short as possible to assure proper frequency coverage at the upper end of the operating range. James Millen GDO plug-in coils can be used if purchased as blanks and wound to the specifications given in the coil table. — WICER.

COIL DATA

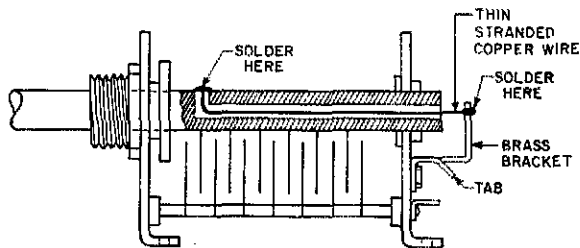
| Freq. Range (MHz) | L1 (μ H) | Turns | Enam. Wire Gauge |
|-------------------|---------------|---------------------|------------------|
| 1.5-3.4 | 220 | 214 | No. 34 |
| 2.7-6.0 | 70 | 125 | No. 34 |
| 4.8-10.2 | 22 | 58 | No. 30 |
| 8.7-19.0 | 7 | 34 | No. 22 |
| 18.0-40 | 1.6 | 16 | No. 18 |
| 35-80 | 0.4 | 8 | No. 18 |
| 70-160 | 0.1 | hairpin 5/8 x 2" | No. 10 |

Coils for the FET dipper (except 70-160-MHz inductor) are wound on 5/8-inch-diameter polystyrene tubing. James Millen 74012 forms (blanks for the coils used with the Millen dipper) are available from the company by ordering direct — 150 Exchange St., Malden, MA 02148. The plug-in forms are 5/8-in. diameter and are 2 1/2 inches long. The two low-band coils have windings which occupy 1 1/2 inches (close-wound). All others (except the high-band hairpin) occupy 1 inch on the form, turns spaced where applicable.

A STABLE CAPACITOR ROTOR CONNECTION

Electrical connection to the rotor of an air-variable capacitor is usually made through the use of small brushes which rub on the shaft or through contact between the shaft and the bearings. There are times when corrosion or dirt will cause the connection to become intermittent. This becomes an important factor when building any circuit requiring good frequency stability, such as a tunable oscillator.

A remedy is shown in the drawing. First drill a hole through the shaft, then drill a hole at right angles into the shaft near the front of the capacitor. Use a No. 34 to No. 40 drill size depending on the shaft diameter. Fish a length of small-diameter, stranded copper wire (usually 27 gauge) into the hole in the end of the shaft and out



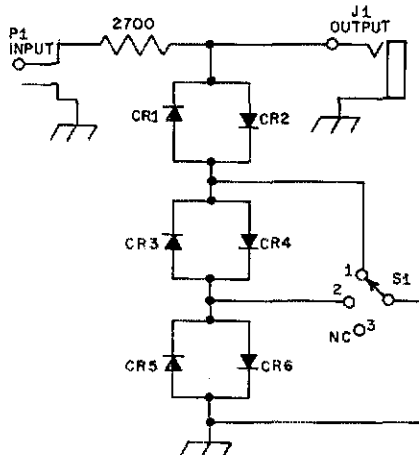
Modification of air-variable capacitor to make a stable rotor connection.

through the egress hole. Solder the wire onto the shaft at the egress hole. Next, make a small brass bracket as shown in the drawing with a mounting hole and a soldering tab for a connection. Attach the bracket to the capacitor frame by means of a nut and screw. Solder the wire coming out of the shaft onto the bracket. This completes the installation. — Gene Pearson, W3QY

[EDITOR'S NOTE: This type of connection should be used primarily with an air-variable capacitor having a stop.]

ADJUSTABLE AUDIO LIMITER

I found the "batteryless" audio limiter described by Lew McCoy, W1ICP, (July, QST, 1964) to be very effective. The one drawback was the one-volt peak-to-peak output which proved to be a bit too low to drive my pair of headphones. A modification to the circuit is shown in the drawing. By adding diode pairs and a rotary switch, the output can be adjusted in one-volt peak-to-peak steps. Silicon diodes are used because of the 0.6-volt drop across them when they are forward biased. Voltage and current ratings of the diodes are unimportant. I chose to use three diode pairs, but more can be added if desired. — Stephen Pawlowicz



Adjustable audio limiter. CR1-CR6, incl. — Silicon diodes, any voltage and current rating. J1 — Headphone jack. P1 — Headphone plug. S1 — 3-position, single-pole, single-section phenolic rotary switch.



Recent Equipment

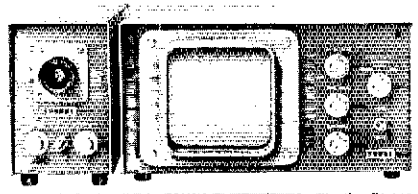


To acquaint you with the technical features of current amateur gear.

Robot Research Model 70 SSTV Monitor and Model 80 Camera

IN THE YEAR 1966, there were only five U.S. amateurs who were active below 30 MHz on slow-scan television (SSTV). Those five were WA0NLQ, W7FEN, W9NTP, W3LJV, and W0ITB, operating on 20 meters under special temporary authorization granted by the FCC. Because that small group of amateurs demonstrated successfully that good-quality pictures could be transmitted over thousands of miles in a voice-bandwidth channel without causing adjacent-channel interference, the FCC in 1968 acted in favor of an earlier ARRL proposal to permit SSTV operation in the hf amateur bands. Today, operation is permitted in all the hf bands, and the number of active slow scanners runs into the hundreds, with the number growing rapidly. This rapid growth may be attributed in part to the fact that Robot Research offers a complete SSTV system at a price which is economical when compared to that of most other commercially available television camera and monitor systems.

In the system which has been adapted as the amateur standard, the SSTV picture has a 1:1 aspect ratio (square picture), with a horizontal sweep rate (in areas using 60-Hz power) of 15 Hz. The vertical sweep rate is one frame in 8 seconds, with 120 lines per frame. The scan presentation is from left to right and top to bottom. During transmission, an audio subcarrier is frequency modulated with video and sync information. A tone of 1500 Hz represents black, and of 2300 Hz represents white. Intermediate shades of gray are transmitted with intermediate-frequency tones. See Fig. 1. Tones of 1200 Hz (ultrablack) are used to transmit vertical and horizontal sync pulses. A pulse of 5-ms duration is used for horizontal-oscillator synchronization, and of 30-ms duration for vertical sync.



The Model 70 Monitor

The monitor, completely solid state except for the CRT, demodulates and displays pictures from any video-modulated audio source — the station receiver, the model 80 camera, a flying-spot scanner, or an ordinary audio tape recorder. Accompanying photographs, taken off the air, show the quality of these pictures. The Robot monitor uses a rectangular CRT (with a 4 3/4-inch square mask) having a P7 or long-persistence phosphor. With slow-scan TV, 8 seconds are required to transmit one picture. As each new frame of picture information arrives, it is "painted over" the previous picture. The display has the appearance of a wiper being lowered slowly across the CRT face, "wiping on" a new picture while the old one is still visible ahead of the wiper.

All active components in the Robot model 70 monitor are located on a single etched circuit board, shown in Fig. 2. Op-amp ICs are used extensively in the monitor, such as in the limiter and discriminator stages. A double-differential tuned circuit using active filters is employed in the fm discriminator, producing an S-shaped frequency-versus-voltage response. With this type of response, interference from frequencies outside the video-subcarrier range results in a gray display, rather than saturation levels of black or white. A 3-pole post-detection Butterworth-response filter follows the discriminator, using op-amp ICs as filtering elements.

At the output of the post-detection filter a video amplifier boosts the signal before it is passed

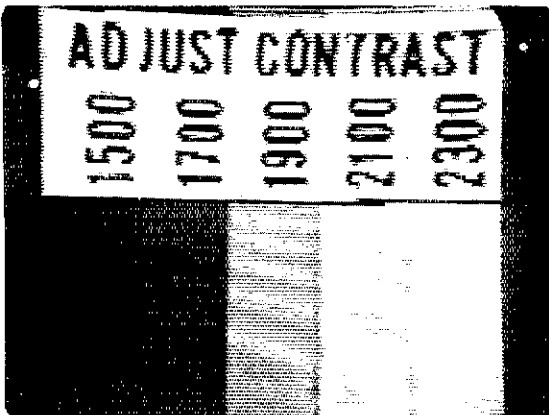


Fig. 1 — Gray-scale presentation of the model 70 monitor, resulting from tones of 1500, 1700, 1900, 2100, and 2300 Hz. The frequency associated with each scale bar is shown in the test pattern. The diagonal pattern of alternate light and dark areas across the scale bars results from 60-Hz ac pickup in the system. (Gray-scale test pattern courtesy of W4TB)

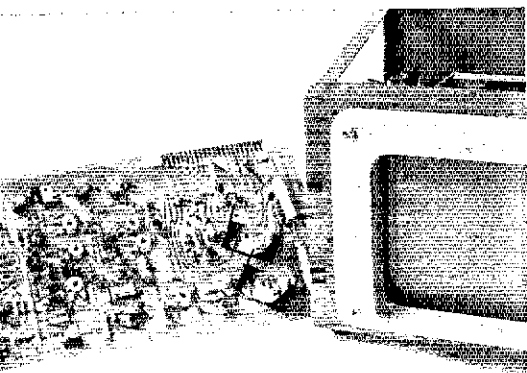


Fig. 2 — The active components of the model 70 monitor are contained on the etched board shown in this photo. The board, measuring 6 1/4 x 13 inches, is mounted just inside the top of the monitor during operation.

to the cathode of the CRT. Also at the filter output, a sync-separator circuit extracts the dc pulses produced by 1200-Hz tones accompanying the video signal, and feeds these pulses to the vertical and horizontal oscillator circuits. The vertical oscillator uses a phase-locked loop consisting of a phase detector, a voltage-controlled oscillator, and a horizontal deflection amplifier. The horizontal oscillator is locked to the exact line rate of the incoming sync pulses, and will maintain lock for input variations up to ± 20 percent from standard. A sweep-failure protection circuit is also included to bias off the CRT in the event of malfunction of the sweep-generating circuits. This feature prevents burning of the CRT phosphor in the event of sweep-circuit malfunction. The vertical oscillator, in the absence of 30-ms sync pulses, free runs to produce, nominally, 128 scanning lines. A sync pulse acts to reset the oscillator to a point corresponding to the top of the display screen.

Fig. 3 shows the inside of the monitor with the circuit board removed. Jacks on the rear panel permit interconnection of the station receiver, a

tape recorder, the station microphone, and the transmitter. Front-panel switches permit the selection of pictures for monitoring from the receiver, the camera, or a tape recorder. A second switch permits the selection of voice or video information for feeding to the transmitter. Except when monitoring pictures from the receiver, the video information available for transmission is the same as that being viewed on the monitor screen. In similar fashion, video information is available for feeding from the monitor to the tape recorder for recording.

Model 80 Camera

The model 80 camera is designed as a companion unit for the model 70 monitor, obtaining its operating voltages from the monitor through a 6-ft cable supplied with the camera. See Fig. 4. The camera, totally solid state except for the vidicon, converts live scenes and written or printed material into SSTV video-modulated audio

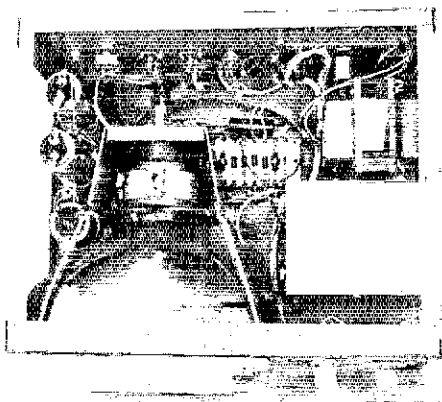


Fig. 3 — The inside of the monitor with the circuit board removed. The CRT is a rectangular type 9M25P7M, having a long-persistence phosphor and employing magnetic deflection. Low-voltage power supply components may be seen at various positions around the CRT; the 12-kV high voltage supply is contained inside the shielded enclosure.



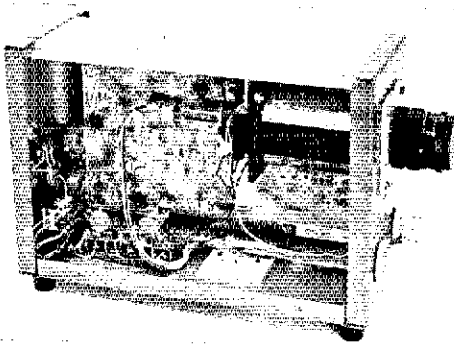


Fig. 4 — The Robot model 80 camera with the cover removed. In addition to the diaphragm opening and focusing adjustment of the mounted lens, front-panel controls include BRIGHTNESS, CONTRAST, and a NORM/REV switch. This switch reverses the transmitted picture from left to right, a feature which is convenient when a mirror is used to view printed material placed flat on the operating table. All active components are located on the opposite side of the 6 1/4 x 9 1/2-inch circuit board, and only their shadows are visible in this view.

tones, and inserts the appropriate sync pulses. Audio tones from the camera are fed to the monitor where they may be demodulated for viewing on the screen, and are also made available for either or both transmission and tape recording. The $f/1.9$ 25-mm lens, available as an accessory, permits the camera to be used at distances between 1.65 feet and infinity. Click stops on the lens provide for easy setting of lens openings between $f/1.9$ and $f/22$. A vidicon camera tube is employed with a sample-and-hold technique, with resulting sensitivity sufficient for proper subject illumination with an ordinary 75-W incandescent lamp at approximately four feet.

Difficulties arise when many types of vidicon tubes are used at slow-scan rates because of charge leakage of elements in the photoconductive layer during the long frame period. As a result, images may not be sharp when reproduced. Robot avoids these difficulties by scanning the vidicon at a fast-scan rate (4 kHz line and 15 Hz frame, with 250 kHz video bandwidth). The fast-scan video information is available at a separate receptacle at the back of the camera, as are sweep signals. A fast-scan monitor is useful for adjusting camera brightness and contrast, as well as for making focusing and framing adjustments. (An oscilloscope with an amplifier added for the Z-axis modulation can be pressed into service as a fast-scan monitor.)

Conversion of the fast-scan picture to the slow-scan rate is performed with a six-diode integrated-circuit switch, a holding capacitor, and a high-impedance follower. A timing chain provides the various deflection, blanking and sync signals, starting with a 60-Hz oscillator which can free run or be synchronized with the 60-Hz supply frequency. The 4-kHz fast-scan sweep frequency is synchronized to the 15-Hz sweep frequency, derived by dividing the 60-Hz frequency by 4.

Further division results in the 1/8-Hz sweep frequency used for the slow-scan vertical sweep. The sample-and-hold switch is operated by a narrow pulse generated when the amplitudes of the 1/8-Hz and 4-kHz sawtooth wave forms are equal. The 4-kHz sweep is used for vertical deflection of the vidicon scanning beam. In this manner, more than 250 video samples of fast-scan data are taken for each line of the slow-scan picture, with one line of slow-scan data being developed from each frame of the fast-scan picture.

Composite sync is added to the signal by removing the dc video information temporarily and substituting a bias of the proper level. A unijunction transistor is employed as a voltage-controlled audio oscillator operating at twice the output frequency. A binary divider produces the correct output frequency, and a two-pole Butterworth-response active band-pass filter limits the frequency spectrum at the output.

Installation and Operation

The Robot system can be integrated into any hf ssb station or uhf phone station in a matter of minutes for complete SSTV capability. Cables are provided to interconnect the camera, monitor, microphone, transmitter, and receiver, although proper mating plugs for the existing station equipment must be provided. Detailed information is included in the instruction manuals on set-up adjustments and technical operating procedures.

Under current FCC rules, narrow-band A5 and F5 emissions (SSTV) are permitted in the Advanced and Extra Class phone portions of 75, 40, 20, and 15 meters, in all but the cw-only portions of 10, 6, and 2 meters, and in the entire 220-MHz band, plus all uhf bands. The regulations permit the transmission of independent sidebands, with picture information contained in one sideband and voice in the other. Few amateurs are equipped for

Robot Research Model 70 Monitor and Model 80 Camera

Height: Monitor and camera, 7 3/4 inches; monitor with bail extended, 9 3/4 inches.

Width: Monitor, 13 3/4 inches; camera, 4 3/4 inches.

Depth: Monitor, 12 1/2 inches; camera, 13 inches including optional accessory 25-mm lens.

Weight: Monitor, 25 pounds; camera, 7 pounds.

Power Requirements: Monitor, 105 to 125 volts, 50 or 60 Hz, 50 watts; camera (supplied by cable from monitor), ± 5 V dc, +300 V dc, -100 V dc, 6.3 V ac, 30 watts total.

Price Class: Monitor, \$495; camera (less lens), \$465. Accessory 25-mm $f/1.9$ lens, \$30.

Manufacturer: Robot Research, Inc., 7591 Convoy Court, San Diego, CA 92111.

this type of operation, however. The usual practice is to intersperse picture transmissions with voice transmissions on single sideband. A stipulation in the U.S. regulations limits the bandwidth of A5 or F5 emissions below 50 MHz; they must not exceed that of an A3 single-sideband emission, approximately 3000 Hz. *This precludes the use of an hf a-m transmitter with the standard SSTV subcarrier tones.* With the Robot system, an ssb transmitter must be employed for transmissions at hf to comply with FCC regulations. The SSTV audio tones may be transmitted through fm repeaters,

and the frequency range meets the published Bell System tariffs for voice couplers, so it is conceivable that SSTV data could be phone patched. For that matter, pictures may be exchanged directly via the landline.

The current slogan among slow scanners is, "Hams should be seen *and* heard." If you run across some strange-sounding signals which might be compared to a flock of chirping birds or to the sound track of a science fiction thriller on 3845, 14230, 21340, or 28680 kHz, you can bet that some ham, somewhere, is being seen. - *K1PLP*

QST ————— QST ————— QST

The Douglas Randall Scrubber

THE DOUGLAS RANDALL division of the Walter Kidde Company has recently introduced the Scrubber. It is a solid-state device designed to function as an aid to noise-free cw reception, as well as a code-practice oscillator and station speaker. The heart of the unit is a frequency-responsive switch, called a Fritch by the manufacturer. It consists of a narrow-band audio filter centered on 1000 Hz and a detector which provides a voltage to operate a relay when an audio tone of the proper frequency is injected. This relay keys an audio oscillator. By listening to the audio oscillator instead of the receiver, the operator hears static-free, chirp-free code, without QSB.

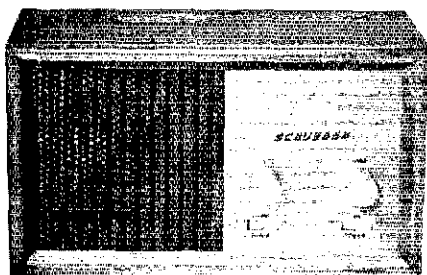
A single patch cord to the receiver is all that is required for hookup. The Scrubber has a built-in audio transformer which will accept input impedances of 3.2, 8, 600, or 1000 ohms. One front-panel control allows adjustment of the volume and a second sets the frequency of the audio oscillator. The two rocker switches control POWER ON-OFF and SCRUB IN-OUT.

Operation is simple. The first step is to tune in a cw signal on the receiver. A peak reading on the panel meter indicates when the station is tuned in correctly. Then, activate the SCRUB switch. The output of the Scrubber audio oscillator is fed to the speaker (and a headphone jack) in place of the receiver audio, providing the operator with a clear tone which follows the cw signal.

The Scrubber is almost immune to QRN. As for QRM, the manufacturer states that the Fritch will not distinguish between multiple signals in its bandpass. Tests indicate the unit will follow cw speeds in excess of 25 wpm, provided another station is not closer than approximately 300 Hz to the desired signal.

This writer is left with a rather unusual impression after using the Scrubber. While listening to a receiver, especially when tuning a crowded

The rear panel of the Scrubber contains the headphone jack, a receiver-input level control, and a terminal strip for receiver audio connections. A printed-circuit board contains the power supply, the two audio transformers, and the audio oscillator.

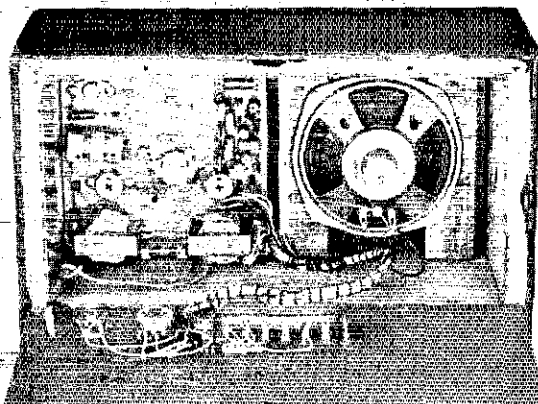


band, there is the feeling of an open room with several groups of people around. But when the SCRUB switch is activated, it suddenly becomes very quiet — like someone shut the door and the QRM was in the next room. This mode of operating is certainly unique.

A gold panel, gold knobs, and a walnut cabinet make the Scrubber a very attractive addition to the ham shack. - *W1FBY*

The Douglas Randall Scrubber

Height: 7 1/2 inches.
 Width: 13 inches.
 Depth: 6 inches.
 Weight: 6 pounds.
 Power Requirements: 117 volts ac, 60 Hz.
 Price Class: \$95.
 Manufacturer: Douglas Randall, 6
 Pawcatuck Ave., Pawcatuck, CT
 02891.



The Hallicrafters HC-100

2-Meter FM Transceiver

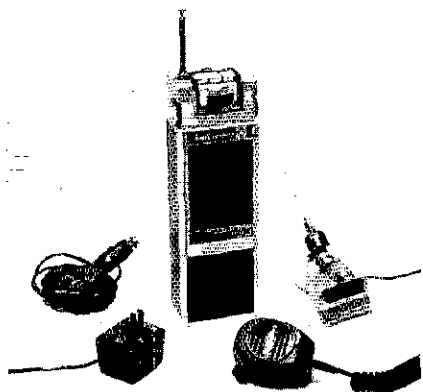
EVERY ONCE in a while a piece of equipment shows up in the ham market and catches the fancy of the fraternity. This writer thinks the Hallicrafters HC-100 Ham Command, a 2-meter fm transceiver, will be such an item. The HC-100, which was originally designed for the commercial market, is completely American made.

General Description

The HC-100 is capable of delivering 2-watts rf output, using an internal rechargeable battery supply, nominally 12 volts. Either 5- or 15-kHz deviation is available. Two channels are also provided, selected by a slide switch near the top of the unit. Solid-state devices, 35 in all, are used in the transceiver. The HC-100 is housed in an aluminum case which has a black vinyl covering. A telescoping whip antenna is built in. If desired, an external antenna can be connected via a water-proof jack which is located at the top of the unit. Two similar jacks, one for an external microphone and the other for a headset are located beside the antenna connector. A fourth jack, for an external dc supply, or for dc input to recharge the battery, is mounted on the bottom of the transceiver.

Receiver Details

The receiver sensitivity measured is 0.5- μ V signal input for 20 dB of quieting. Output from the rf stage, which uses a bipolar transistor, and energy from the local-oscillator chain are fed to the first mixer. The hf oscillator is crystal controlled at approximately 16.5 MHz. A portion of the oscillator output is multiplied 8 times and fed to the first mixer, with a resulting mixer output in the 17-MHz range, the first i-f. The 17-MHz energy is coupled to the second mixer along with the hf oscillator fundamental energy at 16.5 MHz. The output of the second mixer is at 455 kHz, which is then passed through a ceramic filter and amplified by four i-f stages. Following the limiter/discrimi-



The HC-100 with some of the accessories that are available. The recessed knob at the left is the volume control. The one at the opposite side of the transceiver is the squelch control. The channel selector is the slide switch mounted at the top center. Just above the switch are the three water-protected jacks for external microphone, antenna, and headphone.

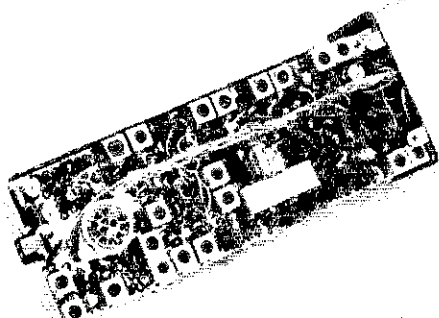
nator, the signal is fed to an audio amplifier providing 0.5-watt maximum output. Plenty of audio is available from the speaker for use under noisy conditions when operating mobile.

Transmitter

Crystals in the 8- to 9-MHz range are used in the transmitter oscillator. The unusual feature of the oscillator is the use of a thermistor and capacitor as a temperature-compensating network; see Fig. 1. The output from the oscillator is fed to a phase modulator which uses two varactor diodes, D101 and D102, as shown in Fig. 2. Output from the phase modulator is coupled to a buffer, then to a pair of tripler stages, and on to a doubler to provide the output frequency. A PT5653 transistor is used for a driver, followed by a PT5654, the final stage. The output of the final transistor is applied to a T-section tank circuit and thence through a double pi-section, low-pass filter for harmonic suppression.

General Comments

Regardless of all the lab tests that one can make on a piece of equipment, the real evaluation of a unit is made in actual field use. It was found that, when comparing the HC-100 to other fm transceivers, the receiver had appreciably more sensitivity than required for repeater operation. The receiver far exceeded the range of the



A look at the inside of the transceiver shows that with solid-state devices, a lot of radio can be constructed in a small area.

The sixth point of the Amateur's Code states that the amateur will use his knowledge and his station " . . . for the service of his country and his community." If there is a prime justification for the existence of amateur radio it must be the service that we can perform for our fellow man, and service is the key word to the members of the Handicapper's Information Net. That's what makes them so typically amateurs in the fullest sense of the word's meaning.

Amateur Radio

— SERVING AND BEING SERVED

BY MIKE LeFAN,* WASEQQ

MADE UP PRIMARILY of amateurs in Texas — but with check-ins from Oklahoma, Louisiana, and Colorado — the Handicapper's Net is pure public service in design and operation. The net's purpose is multi-faceted. First, it seeks to locate handicapped persons who might be interested in and could profit by being involved in amateur radio. Secondly, net members, about half non-handicapped, line up volunteer amateurs who are willing to assume responsibility for a disabled person in their vicinity. These volunteers see that their proteges get instruction and assistance in obtaining a license and getting a station on the air. It's not unusual, in fact, for a sponsor-ham to drive a hundred miles to check on his protege. All this time, the on-the-air net is scrounging the countryside for equipment that can be either given or loaned to handicapped people who cannot afford to purchase their own rigs.

Many net members are themselves disabled and know the value of having a knowledgeable helping hand to get started in amateur radio. As WA5VTA, net manager, puts it, "Radio means an awful lot to me. It gives me a chance to get out of my four walls to make new friends, and a way for me to help somebody else the same way I've been helped."

W5PCN (equipment manager), W5GBR (assistant equipment manager), WA5PRJ (records manager), WA5TIK (assistant net manager), and mana-

* 1802 South 13, Temple, TX 76501.

ger WA5VTA meet daily on 40 meters with other net members to coordinate the lists of new prospective amateurs with the catalog of available equipment and helpers. Net sessions include discussions of new prospects, the exchanging of ideas and helps concerning operating procedures for the handicapped plus the usual chit chat.

The handicapped individual is encouraged to purchase his own rig. However, if finances won't permit this, the net steps in with personal assistance and equipment. There are loans of code-practice tapes, code oscillators, Braille study material for the blind. After that, there are loans and gifts of entire rigs. Newly licensed and outfitted amateurs begin checking into the net as soon as they can, and the circle of helping starts revolving again.

The Handicapper's Information Net, believed to be the only one of its kind serving the disabled in the Southwest, can be heard Monday through Friday on 7270 kHz at 1400 in the Central time zone. The net has a continuing need for additional equipment — code practice equipment, transmitters, receivers, and operating aids for the blind and otherwise disabled. Outright donations are sought, but there's also a need for low-priced pieces that a disabled amateur with limited income can buy himself. W5PCN, equipment manager, indicates that serviceable receivers are really the hottest item needed, because these are that first step into the world of radio and prospective hams really crave a receiver to tune in on the action.

1051

WA5VTA, Buddy Boyd of Conroe, Texas, is the organizer and manager of the Handicappers Information Net. His special rig was designed and built for him by WA5QKE.



WN5BOA, Nathan Smith of Corpus Christi, Texas, is a sightless amateur who got his ticket as a result of assistance from the Handicappers Net.



DX-pedition to Curare Island

BY PETER H. LUKESH,* K1MVN

CURARE ISLAND, located approximately one thousand miles west of Midway, is the largest of a sparsely-inhabited and little-known cluster of five islands. It was originally settled by natives who set sail from Easter Island in rafts made of palm fronds, and was first seen by white men when mutineers from the *H.M.S. Cruelty* landed there seeking refuge. Their colony did not last long, however, as the natives proved to be cannibals for whom white meat was a rare delicacy. Today, though, things are much improved; human sacrifices are a rarity, and the only skinning is done by the local merchants.

It was from this picturesque spot in the Pacific that a group of us operated as PHØNY for an extended period beginning last April 31st. Curare is a rare catch for any DX-er, as local activity is non-existent. The only ham went inactive when he was unable to get parts for his Atwater-Kent receiver. Fortunately, he was a good friend of the Goomba (native chieftain) whose brother-in-law's cousin's friend knew the Minister of Cable and Wireless for Curare and the Outer Islands. With some difficulty we were able to get a permit to operate as PHØNY.

We arrived at Curare via the inter-island garbage scow *Refuse II* (*Refuse I* sank outside the harbor overloaded with coconut shells from an island celebration) early in the afternoon. Getting our equipment through customs posed no problems, as the native officials readily accepted American money, thus eliminating the bothersome exchange of dollars to conch shells. After obtaining our permit, we set up shop in a thatched hut on a hill just outside the village.

There being no telephone, telegraph, or radio on the island, all communication is by means of native runner-boys known as "Heyows" which, roughly translated, means bunion. It was fascinating to watch these fifteen-year-old, barefooted boys running over the coral delivering messages and carrying packages with such obvious enjoyment. Shin splints are a problem, and the average working life of an Heyow is sixteen months. Pango, our personal Heyow, did a splendid job with our equipment. He had a bit of trouble with the 5-kw gasoline-driven generator at first, but managed to pull through in fine style.

Equipment

Instead of trying to operate all bands, we decided to concentrate activity on one "low band" and one "high band." For the low band we chose 27.0 MHz and used an El Cheapo - 100 transceiver with the Canary - II LMO for cw. On the high band, a homebrew rig made with TV parts (a la WIICP) on 80.0 MHz gave us the capability for am,



cw, and ssb. Antennas were a long wire on the low band and a three-element beam on 80.

After a delicious dinner of rare island delicacies (marinated pig's brain and fried shark liver) at the Goomba's hut, the members of PHØNY prepared to "fire up" the rigs. Apparently the trip aboard *Refuse II* had been a bit too much and some minor rework was necessary. A few coils and capacitors needed repairs which were quickly made. Always an exciting moment for any expedition, our first QSO brought a suggestion from a tramp steamer enroute to Pago Pago that we QSY off the international distress frequency. Since more extensive repairs had to await morning, we switched to 80, but the band was dead. With nothing else to do, the members of the expedition trooped down to the Poona to absorb some of the local culture.

Most of the group arose at about two the next afternoon and, owing to a rash of headaches and upset stomachs, spent most of the day recuperating at the fine beach on the lagoon. Since noise from headphones and speakers aggravated our headaches, we did not operate until the next day.

We finally fired up (after making repairs) at 1628, with both rigs working to take advantage of openings on either band. At 1631, the group working the low band heard a rare DX station, weak but readable, calling CQ. After three or four calls, we worked him and found, to our amazement, that he too was on Curare! When we learned he was in the same building, we QRTed and spent the next two hours rearranging antennas to eliminate crosstalk.

We got back on at 1842 and called the first station we heard. Before we could determine if NSS returned our call, the generator quit. Apparently Pango had dropped it on his way up from the boat, because there was no oil and the engine had seized up.

Since it was impossible to repair the generator, we reluctantly pulled the big switch and retired to the Poona for an eyeball QSO with some of the waitresses. The remainder of our stay on Curare was a succession of the Poona in the evening, headaches in the morning, and the beach in the afternoon. Funds finally ran out and we shipped out tourist class aboard the *Refuse II*.

Speaking for the entire group, I would like to thank the natives, especially the proprietor of the Poona and his waitresses, for their gracious hospitality. We are all looking forward to another DX-pedition as PHØNY.

QST

*85 Wallace Hill Rd., Townsend, MA 01469.

Beat PVRC

... but not too badly

BY JOHN G. TROSTER,* W6ISQ



HEY, MR. PRESIDENT, I wanna make-a-motion."

"Ya can't make-a-motion 'cause I ain't called the meeting to order yet."

"Call it."

"The meeting will please come to order . . ."

"Mr. President, I make-a-motion that our club beat Potomac Valley Radio Club in the Sweepstakes this year."

"Huzzah . . . hear, hear . . . 'bout time . . . yeeaaaahhh . . ."

"Every year we get beat. We never even come close. It's humiliatin'."

"And how do you think you're gonna beat the champs? They got all these ionospheric sounders that tells 'em when to change bands and what antennas to use. And they got computers that keep their logs . . . and band scanner receivers that lock onto Sections they ain't worked yet. All comes over their automatic two-meter RTTY link. How ya gonna beat that kind a operation?"

"It's easy. All we gotta do is score more points than they do."

"Hmmm . . . and how you figure to score more points?"

"More members, that's all. All we gotta do is recruit us a thousand members and overpower 'em."

"Maybe we could fake a call for an emergency ARRL Board Meeting over Sweepstakes weekend. At least that would get W4KFC outa there."

"Mr. President, I got a better idea. How about us to recruit fellas from the Southern California Club to help out?"

"That's against the rules."

"Hooildd on . . . wait a minuuut . . . maybe ya got something there. If we add our two scores together . . . might help . . . hmmm. All we gotta do is figure how to make them Southern California fellas Bony 'idie members."

"We could charge 'em all a dollar . . . ahhh . . . naw."

"How about we make 'em free *Honorary Members* so we don't have to charge 'em."

"Hey, that's it. Hooorraayy, we make 'em Honorary Members."

"Don't sound legal."

"Sure it's legal. Show me where in the rules it says that specifically and absolutely a Honorary Member ain't allowed."

"Yeeaaaahh . . . watch out PVRCs . . . we're a comin' . . . ahhh . . . maybe."

"You bet. Maybe. You add our two club scores together from last year and you won't even have enough points to beat Murphy's Manglers . . . let alone the PVRCs."

"Who's Murphy's . . . ahhh . . . what?"

"Errr . . . Murphy's . . . ahhh . . . Manglers?? Naw, it's Murphy's Marauders . . . nooo it's Murphy's Maulers . . . Manhandlers . . ."

you're right the first time . . . it's Manglers! Who . . . what are they?"

They're back up in the Vermont hills somewhere . . . nooo, in Connecticut . . . naw, they're all over W1 and W2 . . . they got strong ties around Hartford, I think . . . oooooohhhh . . . real top secret group, I hear . . . somebody was sayin' it's some rich fella named Murphy . . . he buys 'em all their QRO gear if they sign their scores over to him . . . they gotta call him 'Mr. Murphy' too . . . they was nothin' a couple a years ago and now they're scarin old PVRC himself."

"Them Manglers could give us real trouble. Maybe we oughta go back to recruiting lots more Honorary W6s and . . . and . . . maybe Washington and Oregon . . . and Nevada . . . and VE6 and VE7 . . . like the whole West Coast. Ya think we could scare old PVRC with . . . ahhh . . . with . . . ?"

"Wouldn't even scare the Murphys."

"Wait a minute . . . QRX men. Maybe if we start joining up too many Honorary Membership fellas, old PVRC might get mad and join up with the Manglers . . . then we'd be finished for sure."

"Naw, they wouldn't do that. It's against the rules to . . . ahhh . . . besides old Murph's boys is comin' on fast and strong and they'd like to beat the PVRCs all alone."

"In that case maybe we oughta join the PVRCs and try to beat the Manglers . . . haw . . ."

"Aw, come on fellas, them two clubs would never join . . . never . . . ahhh . . . well, I don't think . . . but they might get together if they was to find out we was scanuviatin' around out here . . . hmmm. Just in case, maybe we'd better plan for the worst. We gotta get us a wedge in there somewhere to keep them two clubs apart so's they won't join up and whup us good. We need a wedge in there . . . between . . . the wedge . . ."

THAT'S IT . . . the wedge . . . like a *key-stone* . . . we recruit them fellas with the *keystone QSL* . . . Frankford Radio Club!"

"Hooooray . . . we'll automatically make all the Frankford Radio Club fellas our free Honorary Members for the Sweeps weekend . . . Hooorayyy."

"Whhoooppiiiee . . . That oughta do it this year. We finally shorted out old PVRC's coax."

"Ahhhh, Mr. President, I wanna make another motion."

"Make it."

"I make-a-motion that we don't beat the PVRCs too bad this year and get 'em mad at us . . . because next year maybe we'll want to make *them* free Honorary Members to join up with us to beat Mr. Murphy's Manglers."

"Yeah, let's be good sports about it . . . all in favor that we should take it easy on the PVRCs this year . . ."

* 82 Bellbrook Way, Atherton, CA 94025.

ARMED FORCES DAY 1970

COMMUNICATION TESTS RESULTS

THIS YEAR'S annual Armed Forces Day Communication Tests sponsored by the Department of the Army, Navy and Air Force once again proved to be a highly successful event.

Five military radio stations, WAR (Army), NSS (Navy), NØNNN (Navy), and AIR (Air Force) located in the Washington, D.C. area; NPG (Navy) in San Francisco; and NSSAM/NPGAM (Navy aircraft East and West coast) and an Air Force aircraft East Coast conducted the communication tests on 15 May 1971. The tests included military-to-amateur crossband operations and receiving contests for both continuous wave (cw) and radioteletypewriter (RTTY) modes of operation.

Crossband Results

WAR, NSS, NPG, NØNNN, and AIR had a combined total of 10,184 QSOs during the twelve hours and forty-five minutes devoted to the military-to-amateur crossband portion of the communication tests. Included in this total were 100 air/ground QSOs made by Navy and Air Force aircraft on the East and West coasts. Commemorative QSL cards have been mailed to all contacts that could be identified in the Spring 1971 issue of the *Radio Amateur Callbook Magazine*. Any amateur who has not received a QSL card confirming his contact should address a request for confirmation to the appropriate station, or Armed Forces Day Contest Attn: Chief, Air Force MARS, Headquarters, U.S. Air Force (PRCOM), Washington, DC 20310. This request must include the amateur's call sign, the station worked, time of contact, and the frequency utilized by the military station.

CW Receiving Contest Results

There were 242 perfect entries for the 25 wpm cw broadcast message originated by the Secretary

of Defense. A Certificate of Merit has been mailed to all those individuals who submitted a perfect contest entry. The complete text of the 25 wpm morse code message is printed below:

— R — 152100Z MAY 1971
— FM WASHINGTON DC
— TO ALL ARMED FORCES DAY PARTICIPANTS
GR 312 BT

FROM THE BEGINNING OF THIS CENTURY TO THE PRESENT TIME THE HISTORY OF RADIO COMMUNICATIONS IS REPLETE WITH THE CONTRIBUTIONS OF RADIO AMATEURS TO THE ADVANCEMENT OF RADIO TECHNOLOGY CMM DEVELOPMENT OF INTERNATIONAL GOODWILL AND THE PROVISION OF VITAL COMMUNICATION SERVICES PD IN 1966 THE STANFORD RESEARCH INSTITUTE PAREN SRI PAREN EXAMINED THIS CHRONOLOGY AND CONCLUDED THAT THE AMATEUR RADIO SERVICE IS A NATIONAL AND INTERNATIONAL RESOURCE WHOSE CURTAILMENT WOULD CONSTITUTE A SERIOUS LOSS TO THE TECHNOLOGICAL CMM ECONOMIC AND SOCIOLOGICAL WELFARE OF ALL NATIONS PD IN THIS PORTION OF THE ARMED FORCES DAY QUOTE REPORT TO THE NATION UNQUOTE I COMMEND THE ENTIRE AMATEUR RADIO FRATERNITY FOR THEIR MANY PAST CONTRIBUTIONS TO THE MILITARY COMMUNICATIONS SERVICES PD IN PARTICULAR CMM I COMMEND THOSE RADIO AMATEURS WHO CMM THROUGH THEIR AFFILIATION WITH THE DEPARTMENT OF DEFENSE PAREN DOD PAREN SPONSORED MILITARY AFFILIATE RADIO SYSTEM PAREN MARS PAREN CMM ASSISTED IN PROVIDING CMM DURING 1970 CMM MORE THAN NINE HUNDRED AND FIFTY THOUSAND RADIO TELEPHONE CALLS AND A COMPARABLE NUMBER OF WRITTEN MESSAGES BETWEEN OUR SERVICEMEN OVERSEAS AND THEIR FAMILIES AT HOME PD THIS SUPERB EXAMPLE OF AMATEUR RADIO PUBLIC SERVICE DYNAMICALLY CONFIRMS THE SRI CONCLUSION PD I ASSURE YOU THAT THE COMMUNICATIONS SERVICES OF THE MILITARY DEPARTMENTS WILL CONTINUE THEIR EFFORTS CLN TO SUPPORT AND ENCOURAGE MARS AND AMATEUR RADIO ACTIVITIES SMCLN TO ENCOURAGE AND COOPERATE IN THE DEVELOPMENT OF AMATEUR COMMUNICATIONS ACTIVITIES TO ENHANCE THEIR MILITARY AND CIVIL VALUE SMCLN AND TO MAINTAIN LIAISON WITH THE AMERICAN RADIO RELAY LEAGUE CMM OTHER RECOGNIZED U PD S PD AMATEUR RADIO ORGANIZATIONS AND THE FEDERAL COMMUNICATIONS COMMISSION PD I FIRMLY BELIEVE

(Continued on page 75)

Karl Medrow, W3FA (I.), and Capt. David Veazey, W4ABY, give a helping hand at the Naval Communication Station, Washington, D.C. (NSS) during the 1971 Armed Forces Day.





Results, 1971 Field Day

W1HEB/1

REPORTED BY AL NOONE,* WAIQOM/WB6SAZ

"We found there was no rain, few bugs, great conditions and fine food. . . . Please reassure us that June was really Field Day weekend." - W0AA/9.

FOR THE BENEFIT of W0AA/9 et al, please rest assured you had the right weekend. Field Day conditions, by and large, were great. If Murphy struck, he did so quietly! Comments indicating the usual FD difficulties were few and far between. (Could be that Field Day groups this year were better prepared to cope with "Mr. M")

Contacts were plentiful. A total of 1116 entries comprised of 11,908 participants manned 2780 transmitters for a contact total well over the 800K mark! Last years totals were 1313 entries, 11,762 participants, 3259 transmitters and slightly over 753K QSOs. The fact that fewer entries with less rigs involved more participants making more contacts seems to speak well for amateur emergency preparedness. And for those interested in statistics, 324 of the 822 Class A entries and 54 of the 136 Class B (indicated by an asterisk after the call) chose not to set-up prior to 1800 GMT Saturday, thereby taking advantage of the extra 3 hours of operating time.

Class 3A takes honors as most popular with WIARR/1 (+WN1LZQ), Murphy's Marauders (CT).

*Asst. Communications Mgr., ARRL.

leading the field of 228 entries. It is interesting to note that the only other FD group registering more than the MM 3000 QSO total was running 18 transmitters! Second class in popularity goes to 2A, 210 entries, led by K5RWK/5, the Richardson Wireless Klub (TX). (Easy to see why they are on top after getting a look at their meticulously prepared Field Day report.) Completing the Top Three categories is Class 1A, 166 entries, with VE2ND/2, the Montreal FD Association taking the †1 spot. Their 1502 QSO total is especially noteworthy when you stop to consider there were 13 entries tallying 1000+ QSOs in this class!

The only other category over 100 entries was 1B, with WB4MRI/4 (VA) winning by a comfortable margin.

CLUB AGGREGATE MOBILE SCORES

| 1C | |
|-----------------------------------|------|
| Radio Amateurs Mobile Society(CA) | 4438 |
| Mobile ARC of South Bend(IN) | 648 |
| Los Gallitos(W.I.) | 380 |
| F.D. Roosevelt HSARC(NY) | 356 |
| Radio Club of Tacoma(WA) | 320 |
| 3C | |
| Buckeye Shortwave Radio Assn.(OH) | 261 |

1972 Field Day June 24-25

Class-A Call-Area Leaders

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

| | | |
|----------|----------|----------|
| 1A | W2SEX/2 | ..... |
| W1Q1/1 | K3SSC/3 | K6QEZ/6 |
| K2AHB/2 | W4BFM/4 | ..... |
| W3CZ/3 | W5QU/5 | ..... |
| KG4CS/4 | WA6LXN/6 | WA9EDW/9 |
| W5YL/5 | W7JN/7 | ..... |
| K6YNB/6 | W8IC8/8 | ..... |
| W7LRA/7 | K9VHF/9 | ..... |
| W8EII/8 | W9EQU/9 | 8A |
| W9FB/9 | VE3JJ/1 | W1BFF/1 |
| K0MVC/0 | | W3RCN/3 |
| VE2ND/2 | 5A | W6SD/6 |
| | WA1NXU/1 | W7UMX/7 |
| | W2WQ/2 | W9SW/9 |
| | W3AI/3 | |
| 2A | K4WCC/4 | 9A |
| WA1HRC/1 | W5SWS/5 | W1LL/1 |
| K2CC/2 | K6DKX/6 | W2LI/2 |
| W3AA/3 | W7HNZ/7 | W9KOI/9 |
| K4HEX/4 | W8ACW/8 | |
| K5RWK/5 | K9RAS/9 | 10A |
| WB6ATW/6 | W0EMA/0 | W4HAW/4 |
| K7SKW/7 | VO1AQ/1 | W6CX/6 |
| W8DB/8 | | W7DK/7 |
| W9YT/9 | | |
| W0LK/0 | 6A | |
| VE1FO/1 | W1NEM/1 | 11A |
| | W2LT/2 | W2GSA/2 |
| 3A | WA3FJQ/3 | VE3VM/3 |
| WIARR/1 | KP4ID/4 | |
| K2JD/2 | W6VB/6 | 12A |
| K3TGM/3 | K7LED/7 | W7NCW/7 |
| W4IZ/4 | WA8MTX/8 | |
| W5GKF/5 | WA0NPZ/9 | 14A |
| W6HS/6 | WA0VQX/0 | VE3WE/3 |
| W7RM/7 | VO1MSA/1 | |
| W4FU/8 | | 18A |
| W9FK/9 | 7A | 18A |
| K0UVU/0 | WA1DGW/1 | W2RJ/2 |
| VE7EZ/7 | K2AA/2 | |
| | W3SK/3 | |
| 4A | K4BFT/4 | |
| W1EKT/1 | | |



W2RJ/2

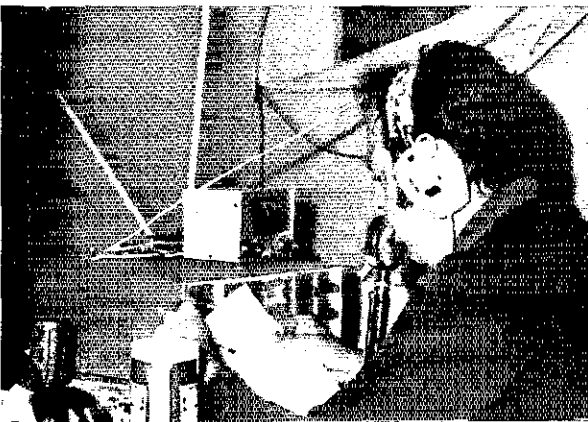
forgot to submit Summaries. Realizing that this was the first time around with the new system, a total of 178 post cards was mailed out requesting the necessary info be forwarded immediately. Every effort was made to match up this incoming information with that which was already on hand; the remainder appear elsewhere in this report under Check Logs.

If you have any comments, good or bad, concerning Field Day now is the time to drop a note to your nearest member of the ARRL Contest Advisory Committee. They are: W3GRF (chairman), W1AX, K2KIR, W3WJD, W4UQ, W6DQX, KH6LJ, W0HP and VE2NV.

And finally, don't forget next month's 2nd ARRL 160-Meter contest, December 10-12 (see p. 68 October, *QST*). If you haven't done so already, be sure to write today for the necessary forms. An addressed stamped #10 envelope will bring you all that is needed.

Scores

Class A stations are clubs and groups in the field with more than 2 operators. Scores are tabulated according to the number of transmitters operated simultaneously at each station. The figures and letters following each call indicate the number of valid contacts, the highest dc input power used, the number of participants at each station and the final score. The "power classification" used in computing the score is indicated by the letter A, B, C and D after the number of QSOs shown. A indicates power up to and including 10 watts (multiplier of 3); B indicates power over 10, up to and including 200 watts (multiplier of 2); C indicates power over 200 (multiplier of 1). An asterisk following the station callsign indicates set-up operations did not begin until 1800 GMT on Saturday.



W1ARR/1

1A - Battery

| | | | | |
|----------|----------------------|------|-------|------|
| W3NNL/3* | Schuykill River Rats | 412- | A- 5- | 140b |
| E8BXU/1* | Newington AR League | 305- | A- 3- | 915 |
| WAUCU/0* | VARS | 234- | A- 8- | 852 |

1A

| | | | | |
|-------------|----------------------------|-------|-------|------|
| VE2ND/2 | Montreal FD Association | 1502- | B- 4- | 3204 |
| G6YNN/6* | Alexander,Noe,Overbeck | 1404- | B- 3- | 2958 |
| W5YL/5* | Uniholnix ARC | 1398- | B-15- | 2946 |
| WBH/1/8* | Tri-State ARC, Group 2 | 1390- | B- 6- | 2880 |
| W5EX/1/5* | Lafayette ARC | 1354- | B-15- | 2818 |
| K14CS/KC4* | Ormeury Oriente Ovals | 1303- | B- 4- | 2756 |
| W9FB/9* | Independent Contest Optrs. | 1287- | B- 8- | 2724 |
| K9FRZ/9* | Howie,Mike,Jim & Tim | 1077- | B- 4- | 2304 |
| K4KE/4 | non-club group | 1065- | B- 6- | 2230 |
| W8F AW/8* | FAW-MFD-VQ* | 1057- | B- 3- | 2214 |
| K0MVC/0 | non-club group | 1036- | B- 8- | 2172 |
| E4PUZ/4* | non-club group | 1034- | B- 4- | 2168 |
| WB8CP/1/8* | Screaming Yellow Zonkers | 1001- | B- 5- | 2152 |
| W8E DU/8* | Cuse Amateur Radio Club | 951- | B- 9- | 2052 |
| W6VZ/1/6* | Four H Minus 1 Club | 866- | H- 4- | 1942 |
| K4IM/4 | Richmond Irregulars | 808- | B- 5- | 1816 |
| K8HKS/6 | Mauw ARC | 831- | H- 7- | 1812 |
| K0K YK/0* | Tri-State ARC, Inc. | 800- | B-15- | 1750 |
| Y0ZHA/2* | Goose Bay ARC | 774- | B- 8- | 1748 |
| W5RBY/5* | Ridge Runners Wireless | 803- | B- 6- | 1706 |
| W7LKA/7* | Utah ARC | 779- | B-23- | 1658 |
| W8NP/8* | Massillon ARC | 743- | B-15- | 1636 |
| W48ZAV/8* | Grand Traverse Co. | 804- | B- 3- | 1608 |
| E2AHB/2 | Will's Warriors | 737- | B- 7- | 1574 |
| W3CZ/3 | ITT/EPL ARC | 728- | B- 4- | 1556 |
| E3PH/3 | Martys Marauders | 702- | B- 6- | 1554 |
| W0DL/P/0* | non-club group | 693- | B- 5- | 1536 |
| W8VA/1* | Tri-State ARC | 663- | B- 9- | 1526 |
| W1QJ/1* | Candlewood ARA | 657- | B-16- | 1514 |
| W8TFZ/8* | Aviation RC-HF Group | 697- | B-12- | 1494 |
| E0BX/X/0 | Wrsburg&cont. Mo. ARCS | 664- | B-17- | 1428 |
| W43BW/3* | Brandywine ARC | 633- | B- 8- | 1416 |
| W0AK/0* | Des Moines RA Assoc. | 622- | B- 8- | 1394 |
| E0H OD/9* | Midwest ARC | 1185- | C- 5- | 1390 |
| W46IS/P/6* | Sot. at Wine,Taco&Iono.Soc | 635- | B- 4- | 1370 |
| WA10ZD/1 | Wallingford ARC | 571- | B- 4- | 1342 |
| W4ABK/4 | Johnson City RC, Inc. | 568- | B- 7- | 1286 |
| W1Y1Y/1 | Shearwater ARC | 542- | B- 8- | 1284 |
| W9BCB/9* | Point RA Ltd. | 565- | H-10- | 1280 |
| W8RT/8* | Condon ARC | 560- | B-30- | 1270 |
| K2TK/2 | Ward Milville HSARC | 582- | B-23- | 1264 |
| W5LM/5* | Temple ARC | 555- | B-25- | 1260 |
| W4LX/4* | Fort Myers ARC | 542- | B-12- | 1234 |
| W9E1/9 | Soc. of Radio Ops. | 564- | H-35- | 1228 |
| E0JRH/3 | First State ARC | 336- | B-22- | 1222 |
| W8MRM/8* | Motor City RC | 558- | B-15- | 1216 |
| W0FLN/9* | St. Louis Univ. ARC | 532- | B-15- | 1214 |
| W6UDU/6* | Imperial Valley ARA | 530- | B-15- | 1210 |
| W0MOW/0* | Goldfield RC | 529- | B- 6- | 1208 |
| W4HS/4 | Delta ARC | 525- | H-12- | 1200 |
| W7G/O/7 | Butte ARC | 522- | B-20- | 1194 |
| W9CHD/9* | Forson Ivy Rainmakers | 539- | B- 5- | 1183 |
| E0H6W/6 | Honolulu ARC | 538- | B-12- | 1181 |
| W3MK/3 | Maverick ARC | 514- | B-15- | 1178 |
| W0BAX/X/0* | Albert Lea ARC | 532- | B- 7- | 1164 |
| K6LDA/6* | Crescent Bay Emer. Net | 526- | B-11- | 1152 |
| W0PTSW/0* | non-club group | 570- | B- 6- | 1140 |
| W9BEZG/2 | Richmond Co. ARC (NY) | 476- | B- 3- | 1102 |
| WA20YR/2 | IBM Explorer Post 204 | 500- | B- 9- | 1100 |
| V14A/4 | Winnipeg DX Club | 563- | B-11- | 1126 |
| K2ISM/9 | Goshen ARC | 485- | B- 1- | 1120 |
| W0LSD/0 | Glenwood AR Soc. | 478- | B- 6- | 1106 |
| K1H6F AH/6* | Hickam AFB Mars | 475- | B- 8- | 1100 |
| W9I WW/9* | Washington Co., Amateurs | 467- | B-10- | 1084 |
| W4YU/1/4* | Orlando DX Assoc. | 466- | B- 7- | 1032 |
| W7NVT/7* | Innocencia ARC | 437- | B-12- | 1024 |
| W8E/0/8* | Lima Area ARC | 436- | H-16- | 1022 |
| K0QYM/0* | MidMo ARC | 407- | B-16- | 1014 |
| W40RCM/0* | Fl.Dodge ARC, Grp.1 | 432- | B- 6- | 1014 |
| W0NL/0 | Winnou ARC | 429- | B- 5- | 1008 |
| V14B/4* | Winnipeg ARC | 424- | H-15- | 998 |
| W5AC/5 | 6NC. Radio Committee | 497- | B- 6- | 994 |
| W7E O/7 | non-club group | 440- | B- 6- | 980 |
| W4PE/4 | N. Augusta-Belvedere RC | 384- | B-20- | 968 |
| W6YLD/6* | McDonnell Douglas RC | 434- | B- 8- | 968 |
| W8R1BM/8 | N. Rideeville HSARC | 405- | B- 7- | 960 |
| W2MI/2 | non-club group | 403- | B- 5- | 956 |
| W9PT/9 | Nienah-Menasha ARC | 398- | B- 8- | 946 |
| K0NI/0* | Hiawatha ARC | 367- | B-13- | 934 |
| R9HD/9* | HCA ARC of Indianapolis | 410- | B- 8- | 920 |
| V17ASC/7* | Chilliwack ARC | 358- | B-12- | 916 |
| W4ARF/4 | Huguenot HS ARC | 407- | B- 8- | 914 |
| W8VVC/7/4* | Choctaw ARC | 380- | B-18- | 910 |
| E0SOO/0* | Hastings ARC | 342- | B-14- | 884 |
| W0YF/0/0 | Electron Club of Denver | 391- | B-11- | 882 |
| W48BB/8 | Derby Wireless Assoc. | 339- | B- 6- | 878 |

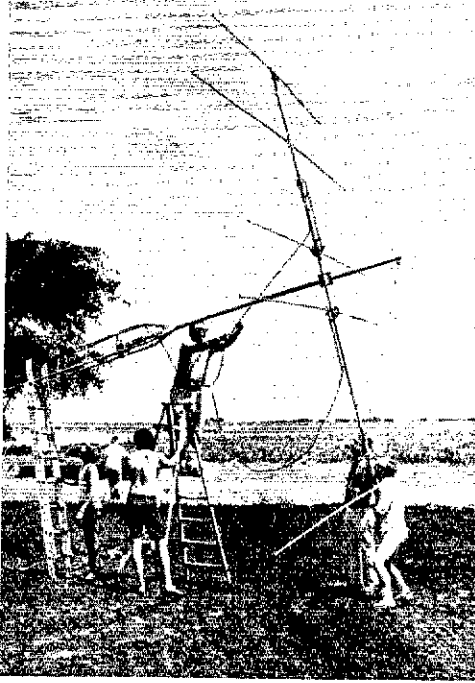
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|-------------|---------------------------|------|-------|-----|
| WA9UMN/9 | Univ. of Illinois | 988- | B- 7- | 876 |
| W0AZP/0* | Theodore Roosevelt ARC | 362- | B-10- | 874 |
| K0DIA/0* | U. of Minn. Radio-TV | 357- | B- 7- | 864 |
| WA0QP/0* | non-club group | 432- | B- 4- | 864 |
| W2UBW/2* | Nassau&Mid-Is. RC | 381- | B- 6- | 862 |
| W5HTK/5 | Enid ARC | 351- | B-25- | 852 |
| WA7BT/7/7* | Woodland ARC | 351- | B- 6- | 852 |
| W0B0JZ/0* | Arrowhead RA | 349- | B- 7- | 848 |
| W0ZVY/0* | Sioux Falls ARC | 359- | B-15- | 818 |
| W4BF/B/4* | Mecklenburg AR Soc. | 358- | B-13- | 816 |
| W0PDR/0 | non-club group | 353- | B- 4- | 806 |
| WA0PHZ/0* | Hamster VHF-UHF Club | 347- | B- 5- | 794 |
| K1H6GMP/KH6 | non-club group | 262- | B- 3- | 774 |
| W3CDI/3 | Balt. Polytechnic Inst. | 308- | B- 6- | 766 |
| W3EAN/3* | Reynolds-Rapp | 333- | B- 5- | 766 |
| WA3EJG/3* | non-club group | 128- | B- 3- | 756 |
| W4CN/4* | ARTS, Inc. | 303- | B- 6- | 756 |
| W46HMP/6 | Madera ARC | 373- | B- 9- | 746 |
| W80Y/8* | Mound ARA | 319- | B- 7- | 738 |
| W48ANCY/4* | non-club group | 293- | B- 5- | 736 |
| W21I/2* | Massapequa ARC | 317- | B-25- | 734 |
| W47RLP/7* | non-club group | 317- | B- 3- | 734 |
| K3TLE/3* | Adams Co. ARS | 285- | B- 1- | 720 |
| W0ZVY/0* | Sioux Falls ARC-Phone | 308- | B-10- | 716 |
| K0HTK/0* | Central Iowa RC | 283- | B-12- | 714 |
| VE1UV/1 | Pictou Co. ARC | 298- | B- 8- | 696 |
| K4CG/4 | Coast Guard ARC | 345- | B- 6- | 690 |
| W0QVLV/0 | Rau's Raiders | 294- | B- 3- | 688 |
| VE4DE/4 | Flin-Flon ARC | 293- | B- 2- | 686 |
| W4SONE/5* | U OF A FD Group | 292- | B- 5- | 684 |
| WB4IUS/4* | Rotten RC | 264- | B- 6- | 678 |
| WB4RSJ/4 | State Tech. Ins. Memphis | 268- | H- 9- | 636 |
| VE1AO/1 | Truro ARC | 240- | B-11- | 630 |
| W8SWS/8 | Piqua RC | 480- | C- 6- | 630 |
| K3ANA/3 | Bowie ARC | 231- | B-14- | 612 |
| K8DXF/8 | Mason Co. ARC | 229- | B- 5- | 608 |
| W40LE/0* | SW Minn. ARA | 252- | B-15- | 604 |
| W85ABR/5* | Scott Co. ARS | 250- | B- 3- | 600 |
| K4FBG/4* | non-club group | 242- | B- 3- | 584 |
| W5RE/5 | Albuquerque ARC | 291- | B- 3- | 582 |
| W7IDA/7 | Bonner Co. ARC | 236- | B- 9- | 572 |
| W7AFQ/7/7* | Teledyne-Wah Chang RA | 227- | B- 5- | 554 |
| W5NCK/5* | Ole Miss group | 176- | B- 6- | 552 |
| W2DUR/2 | Fayetteville Phantoms | 188- | B- 6- | 526 |
| K0BHX/0* | Page-Montgomery Co. Grp | 354- | C- 8- | 504 |
| K7C1Y/7* | Beaverton Electronics RC | 174- | B- 4- | 498 |
| VE3IS/3* | HW London | 170- | B- 3- | 490 |
| K8QIK/8 | Lincoln-Parifield Co. ARC | 194- | B-10- | 488 |
| WA5YTF/5 | Airstar AR Soc. | 191- | B- 4- | 482 |
| W8YPT/8* | Chippewa ARC | 327- | C-31- | 477 |
| K0JQQ/0* | Cree ARC | 371- | C- 5- | 471 |
| WB4ISD/4 | Tenn 3 + 2 | 181- | B- 5- | 466 |
| W40RBC/0* | Grand Is. AR Soc. | 356- | C-20- | 462 |
| W0AJA/0* | Coon Valley ARC | 223- | B-10- | 446 |
| WB6HYD/6* | non-club group | 332- | C- 6- | 432 |
| K5VHH/5* | Carbide ARC | 160- | B- 5- | 420 |
| W9CZH/9* | Winslow AR Soc. | 157- | B- 4- | 414 |
| WA9ZMP/9* | Naperville Central HS | 302- | C- 6- | 402 |
| WA5YDR/5* | Geneva Explorer Post 353 | 124- | H- 8- | 398 |
| W6NLG/7* | non-club group | 296- | C- 4- | 396 |
| W0NQV/0 | Neb. Beer&Prop. Soc. | 165- | B- 4- | 380 |
| K6SRM/6 | Valley of the Moon ARC | 136- | B- 5- | 372 |
| WA7DF/P/7 | Okanagan Valley RC | 126- | B- 2- | 352 |
| K9APH/9 | Ind. VHF Post Office Net | 118- | B-19- | 336 |
| WA9RPO/9* | Cooney RC | 111- | B- 7- | 322 |
| WN3QGE/3 | Bowie ARC-Novices | 47- | B- 6- | 294 |
| W40ZUP/0* | Allen Co. FD Assoc. | 192- | C- 3- | 292 |
| WB2VY/2* | Chemung Co. AREC Assoc. | 94- | B- 9- | 288 |
| WN0ZOE/0* | H.Dodge ARC, Grp. 2 | 61- | B- 5- | 272 |
| W4ZDFJ/2* | Ogdensburg ARC | 121- | C-10- | 271 |
| K0PHG/6 | non-club group | 131- | B- 3- | 262 |
| WA3PTV/3 | Cumberland Valley Gp. 1 | 79- | B- 3- | 258 |
| W1MY/1* | N. Conn. ARC | 70- | B- 3- | 240 |
| W8TEZ/8* | Aviation RC-VHF Group | 117- | B-10- | 234 |
| WN1NL/D/1 | Conn. Yankee ARC | 56- | B- 1- | 212 |
| K7AIA/7 | Santiam RC | 79- | B- 9- | 208 |
| WA3OER/3 | British Thermal Unit | 31 | B- 7- | 162 |

2A - Battery

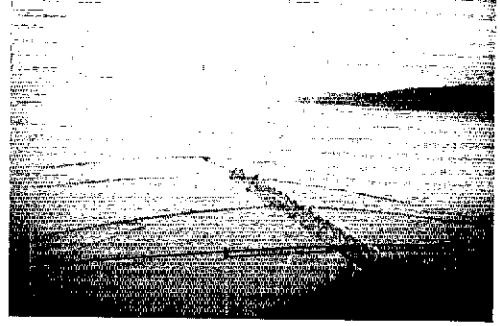
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|----------|----------------|-----|-------|-----|
| WA1MHN/1 | Somerville ARC | 17- | A- 3- | 301 |
|----------|----------------|-----|-------|-----|

2A

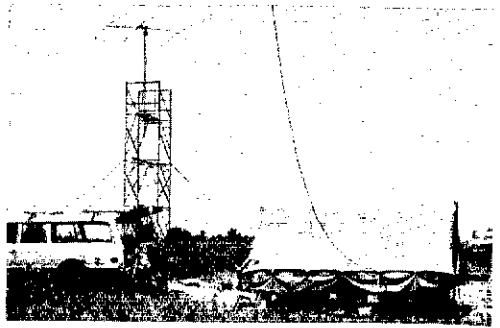
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|-----------|---|-------|-------|------|
| K5RWK/5 | Richardson Wireless Klub | 2316- | B-20- | 488* |
| W9YTF/9 | Badger AR Soc. | 2204- | B- 8- | 4708 |
| W9AXD/9 | Rockford ARC | 2024- | B-10- | 4348 |
| W86ATW/6* | So Cal Amateur Network | 1930- | B-19- | 4110 |
| W5BRX/5 | non-club group | 1822- | B- 6- | 3844 |
| K2CC/2* | Clarkson College Soc. | 1675- | B- 7- | 3600 |
| W0LJK/0* | Asaphoe RC, Inc. | 1602- | B-15- | 1454 |
| W8DB/8 | MVARCS | 1599- | B- 9- | 3448 |
| K8HLR/8 | Cooley HSARC & Farmington Repeater Team | 1560- | B-15- | 3420 |



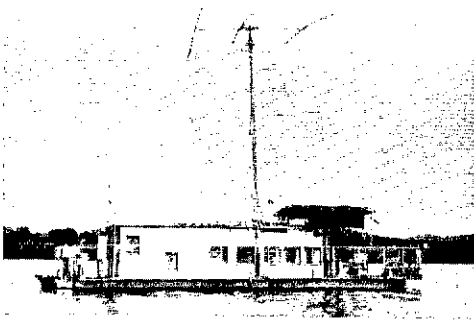
K5RWK/5



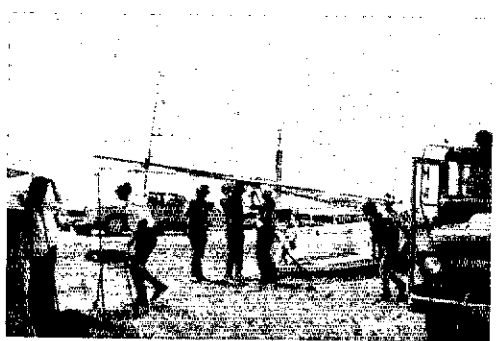
W7RM/7



K2CC/2



WB4GHZ/4



▲ W3SK/3

▼ WØEU/Ø



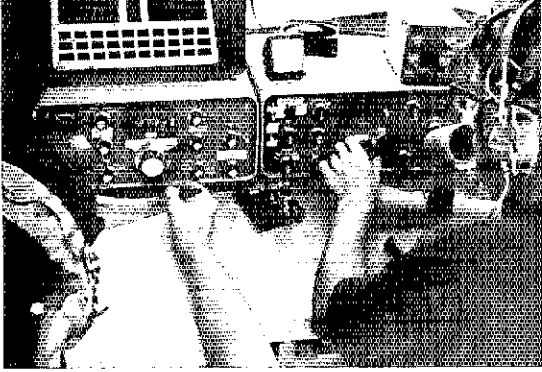
▲ WN4TIO

▼ VE3MW/3

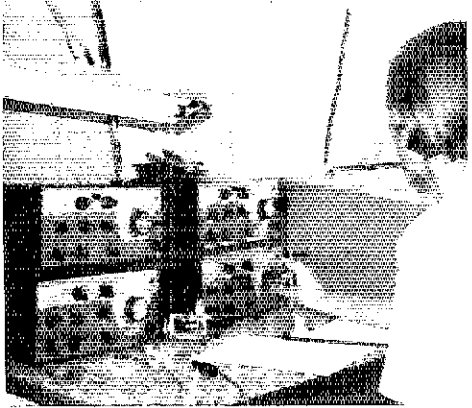


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|-----------|---|-------|-------|------|-----------|-------------------------------------|------|-------|------|
| W8QRC/8* | Oak Park ARC | 1537- | B-12- | 3274 | WA4ECY/4* | Naval Comm. Training Center ARC | 639- | B-10- | 1477 |
| W8COE/8* | Kanawha RC | 1444- | B-25- | 3188 | | | | | |
| W9YB/9* | Purdue Univ. ARC | 1463- | B- 9- | 3176 | W3KWH/3* | Steel City ARC | 613- | B-10- | 1478 |
| W8SH/8* | Mich. State Univ. ARC | 1279- | B- 8- | 2858 | W27XC/2* | Pope's Ex-pirates + 1 Utica ARC | 637- | B- 5- | 1479 |
| W9RCL/9 | Belleville AR Foundation | 1297- | B- 5- | 2844 | K2IQ/2 | | 604- | B-18- | 1451 |
| E8KRG/8 | N. Ohio AR Society | 1254- | B-22- | 2768 | W3T/3 | Baltimore ARC | 602- | B-15- | 1454 |
| W3AA/3* | Seawon Radio Amateurs | 1320- | B-12- | 2690 | VE4LS/4 | S.W. Manitoba ARC | 593- | B-15- | 1453 |
| WA9UMU/9* | Nicolet HSARC | 1219- | B-17- | 2688 | E700W/7 | non-club group | 615- | B- 4- | 1431 |
| K7SKW/7 | Mt. Baker ARC | 1187- | B-25- | 2674 | W0KB/0* | Ottumwa ARC | 589- | B-10- | 1422 |
| W0AA/9* | Minn. Wireless Assoc. | 1184- | B-13- | 2668 | W0WV/0 | Bellevue ARC | 583- | B-12- | 1414 |
| W0F-RH/0* | Johnson Co. ARC | 1184- | B-36- | 2618 | W0OJY/0 | Prairie Dog ARC | 607- | B-10- | 1416 |
| VE1FO/1 | Halifax ARC | 1154- | B-18- | 2558 | W9HHX/9 | Milwaukee School of Engineering ARC | 605- | B- 8- | 1410 |
| WA3KLS/3 | Hoys on the Band | 1135- | B- 6- | 2520 | | | | | |
| W0MXW/0* | Rochester ARC | 1110- | B-25- | 2470 | WA5KAS/5* | Trans-Texas Joint Effort | 590- | B- 4- | 1388 |
| W2HO/2* | Bouled Owls of N. Y. | 1085- | B- 9- | 2420 | W2QYV/2 | Ningara RC | 557- | B-10- | 1364 |
| WB2SE0/2* | American Red Cross Emergency RC | 1085- | B-22- | 2420 | W0AZR/0* | Austin Area ARC | 571- | B-13- | 1347 |
| K8NPH/8 | K & W Soc. | 1070- | B- 7- | 2390 | K4EQ/4 | Dade RC | 643- | B-17- | 1336 |
| W2NVB/2 | Radio Explorer Post 51 | 1039- | B-16- | 2328 | K0ALC/0 | The MARStians | 562- | B- 6- | 1324 |
| W2NTN/2* | Scotch Plains-Fairwood HS | 1030- | B- 8- | 2310 | V0IAI/1* | ARC of Newfoundland | 507- | B- 4- | 1314 |
| W8LT/8 | Ohio State Univ. ARC | 1048- | B-12- | 2296 | W8BBQ/0 | 3M ARC | 504- | B-15- | 1308 |
| W9U/9* | Fitchard ARC | 1017- | B-20- | 2284 | K3AW/3 | Friendship ARC | 651- | B-10- | 1307 |
| W6PMI/6* | United Radio AC | 1014- | B-22- | 2278 | W3I2W/3 | Kent Co. ARC | 515- | B- 8- | 1288 |
| YF1DH/1 | Saint John AR Assoc. | 1011- | B- 9- | 2272 | W4NYK/4 | Bridge Ridge Radio Soc. | 531- | B-15- | 1262 |
| WA1HRC/1* | WELL ARC | 1003- | B-10- | 2256 | K5FQ/5* | Kirtland ARC | 530- | B- 4- | 1266 |
| K4HX/4* | Lynchburg ARC | 988- | B-35- | 2226 | W3ONP/3 | Cheapeake ARC | 526- | B-15- | 1253 |
| W1HLB/1 | Middlesex ARC | 986- | B-20- | 2222 | W9RTP/9* | Tri-Co. ARC | 483- | B- 6- | 1246 |
| VF5AA/5* | Saskatoon ARC | 953- | B-31- | 2156 | W2DLT/2 | Key Clickers ARC | 521- | B- 8- | 1247 |
| WB4MZT/4 | S.E. Va. Wireless | 950- | B-12- | 2150 | K2YAH/2 | Hood's Hoodlums | 494- | B- 7- | 1243 |
| W3FPP/3 | non-club group | 907- | B- 5- | 2064 | W8LXE/8 | Detroit Metro. RC | 464- | B- 4- | 1236 |
| VF3RAM/3* | Ottawa Valley Mobile RC | 905- | B-17- | 2060 | WA5VE/5 | Cathide ARC | 478- | B-13- | 1230 |
| K4KDI/4* | Va. Tech. ARA | 904- | B- 9- | 2058 | W8LHJ/8* | Wooster AR Tech. Soc. | 461- | B- 5- | 1173 |
| WA2PNU/2* | Larkfield ARC | 903- | B-18- | 2056 | W2BMW/2 | Tu-Boro RC | 479- | B-10- | 1157 |
| W1DSC/2* | N.Y.U. ARC | 928- | B- 4- | 2056 | W4AB/4* | Broward ARC | 450- | B- 7- | 1156 |
| WA7JRL/7 | Desert Krauts | 922- | B- 7- | 2044 | W8MBX/8 | Hillsdale ARC | 447- | B-11- | 1144 |
| W0JUI/0* | North Iowa ARC | 896- | B-15- | 2042 | WA3UYE/3 | Whitehall ARC | 438- | B- 9- | 1124 |
| W5TSV/5 | Pampa ARC | 894- | B-12- | 2038 | W2LCA/2* | North Country RC | 432- | B- 5- | 1114 |
| WB8AKQ/8* | Madison Co. Madmen | 911- | B- 8- | 2022 | VF6NC/6 | Northern Alberta RC | 457- | B-12- | 1114 |
| W6NWC/6 | Radiomar RC | 886- | B-25- | 2022 | W5ES/5 | El Paso ARC | 429- | B-56- | 1109 |
| WB0BFL/0* | Palom Radio Dubuque | 886- | B- 3- | 2022 | K5SAM/5* | Edmond AR Soc. | 421- | B-10- | 1093 |
| W5ABD/5* | Westside ARC | 880- | B-12- | 2010 | WA3GAY/3* | Univ. of Delaware ARA | 390- | B- 7- | 1098 |
| W1DC/1* | Honeywell 1700 RC | 819- | B- 8- | 1938 | W5ACK/5 | Iring ARC | 443- | B-10- | 1088 |
| W0GH/0* | Quantrill's Raiders | 801- | B-28- | 1912 | W9CG/9 | Tri-State AR Soc. | 406- | B-16- | 1066 |
| W5PDO/5* | Los Alamos ARC | 849- | B-14- | 1908 | WA2CU/2* | non-club group | 527- | B- 3- | 1059 |
| VE7NA/7* | Nanaimo ARC | 825- | B- 9- | 1900 | WA7ROB/7 | S.E. Montana ARC | 426- | B- 5- | 1053 |
| K7ATF/7* | Shy-Wy RC | 819- | B- 8- | 1888 | W3PSH/3 | Keystone ARC | 425- | B- 5- | 1052 |
| WB0DAY/0* | S. Dakota State Univ. RC | 841- | B- 7- | 1882 | WA3LXK/2 | RF ARC FD Group | 424- | B- 3- | 1044 |
| W8DSO/8 | non-club group | 832- | B-20- | 1864 | WA0DAC/0* | Benton Co. ARC | 390- | B-13- | 1030 |
| W2LZ/2* | Watson Radio Assoc. | 792- | B-11- | 1834 | W8BEDZ/8 | Explorer Post 285 RC | 413- | B-14- | 1028 |
| W0ERF/0* | W. Va. Mo. ARC | 790- | B-35- | 1830 | W5ND/5* | Orange ARC | 387- | B-10- | 1028 |
| W0SOE/0 | Wichita ARC | 786- | B-46- | 1822 | WA0DGV/0* | Steele Co. ARC | 386- | B- 8- | 1023 |
| WA9IMY/9 | Explorer Post 373 | 810- | B-17- | 1820 | WA0ZPM/0 | Louis City ARC | 358- | B- 3- | 1016 |
| W1EDH/1 | Middlesex AR Soc. | 746- | B-13- | 1742 | WBAD0/0* | Armstrong ARC | 395- | B- 3- | 990 |
| WA3LHG/3 | Nights of the Round Table/GARA | 771- | B- 5- | 1742 | K8IH/8* | Henry Co. ARC | 367- | B-15- | 988 |
| KP4USN/4 | Sabana Seca ARC | 742- | B-10- | 1734 | K5WPH/5* | Sin City ARC | 361- | B-19- | 977 |
| K5BAG/6 | Pacifico RC | 1530- | C- 8- | 1730 | W3ZRO/3 | Tamaqua Area SSB ARA | 383- | B- 5- | 966 |
| K8LGN/8 | N.W. Va. FJ Assoc. | 864- | B- 6- | 1728 | W0RFU/0* | Bandioppers RC | 383- | B-15- | 966 |
| W5GPD/5 | Scotty & Friends | 762- | B- 7- | 1724 | WB2MZU/2 | Long Island DX Soc. | 380- | B- 6- | 966 |
| WA9LGO/9 | Indpls Chapter - American Red Cross ARC | 758- | B-14- | 1716 | WB8CMR/8* | Groves ARC | 353- | B- 8- | 956 |
| VF5MA/5 | Moose Jaw ARC | 730- | B-12- | 1710 | WB8AST/8 | Ray-Bec ARC | 352- | B- 7- | 954 |
| WA0RKQ/0 | Platte Valley BS | 729- | B- 5- | 1708 | W0LB/0 | Jayhawk AR Soc. | 369- | B-11- | 931 |
| WASVAQ/5 | Explorer Post 72 | 818- | B- 6- | 1686 | WBSXYX/5 | N. Arkansas AR Soc. | 715- | C-15- | 911 |
| W6KA/6* | Pasadena RC | 692- | B-16- | 1684 | W2RHM/2* | Black River Valley ARC | 356- | B- 5- | 911 |
| K6E-VQ/6 | Mission Trail Net | 684- | B- 4- | 1678 | W6TO/6* | Fresno ARC | 314- | B-16- | 871 |
| K1GAT/8* | Ford AR League | 713- | B-20- | 1676 | WA0HOU/0* | Blue Valley RC | 310- | B-15- | 871 |
| K1GAX/1 | Portland Amateur Wireless Assoc. | 701- | B- 9- | 1652 | K9RHH/9 | Menomonee Fall ARC | 330- | B-11- | 861 |
| WB8AAJ/8* | Shores ARC | 725- | B- 5- | 1650 | K8LUMY/8* | South East ARC | 658- | C-12- | 851 |
| W0FIT/0 | Albert Lee Spiderweb ARA | 702- | B-10- | 1650 | W5Y/5 | Rice Radio Club | 299- | B- 6- | 841 |
| WA2LQZ/2* | non-club group | 698- | B- 4- | 1646 | WB2ENT/3 | Willingboro-Trenton Wireless Assoc. | 315- | B- 5- | 831 |
| WA2LEW/2 | Coming Kilowatt Club | 821- | B- 4- | 1642 | WB88KA/8 | Spartan Village Wireless Assoc. | 309- | B- 3- | 811 |
| WA9TJV/9* | non-club group | 613- | B- 6- | 1616 | E7LYY/7* | Flathead Valley ARC | 278- | B-11- | 801 |
| WB4TON/4* | Hollywood ARC | 679- | B-13- | 1608 | VF1CD/1 | Annapolis Valley ARC | 302- | B-14- | 801 |
| W9N0W/9* | Wisconsin Valley RA | 675- | B-12- | 1600 | W41LEP/1* | E. Catholic HSARC | 299- | B-16- | 791 |
| W2JUG/2 | W. Jersey Radio Amateurs | 649- | B- 8- | 1598 | W4OLB/4 | Smoky Mt. ARC | 533- | C-10- | 781 |
| W3OV/3* | Philmont Mobile RC | 674- | B-35- | 1598 | VE7AWJ/7* | Powell River ARC | 288- | B-13- | 771 |
| W9YH/9* | Synton ARC | 696- | B- 6- | 1592 | WA3JWP/3 | Luzerne Co. RACES | 575- | C-20- | 771 |
| VE3ELI/3* | Saints & Sinners, S & S, Society of Samia | 668- | B-10- | 1586 | WA4BBI/4 | Winchester RC (KY) | 282- | B- 5- | 761 |
| W8MA/8 | Ma and her Xms | 717- | B- 9- | 1584 | W7TCK/7* | Capital City ARC | 254- | B-15- | 751 |
| K8VNO/8 | Mt. State Xmters, Inc. | 683- | B-11- | 1566 | VF7ARV/7 | Vancouver ARC | 274- | B- 8- | 741 |
| W0MRN/0 | McDonnell-Douglas Corp.-St. Louis ARC | 656- | B-15- | 1562 | WB8CAL/8 | Fenton FD Group | 247- | B- 4- | 741 |
| KZ5KZ/5 | Camal Zone ARA | 676- | B- 8- | 1552 | W8P/8 | M + M ARC | 245- | B- 5- | 741 |
| VF1ZH/1 | Greenwood ARC | 647- | B-12- | 1544 | W5DPA/5 | Houston ARC | 267- | B- 5- | 731 |
| WA9FFV/9 | Northland RC | 666- | B- 7- | 1532 | K0AJW/0* | Minot ARC | 236- | B-10- | 721 |
| VF5NN/5 | Regma ARA | 639- | B-20- | 1528 | WA0VMT/0 | Keith Co. ARC | 236- | B- 5- | 721 |
| W0GV/0* | Bell ARC | 634- | B-10- | 1518 | WA0TXB/0* | Black Hills State College ARC | 259- | B- 4- | 711 |
| VF6MR/6 | N. Alberta Inst. of Tech. | 632- | B-10- | 1514 | | | | | |
| WA9ROB/9 | S.S.G. RC | 646- | B- 7- | 1492 | K7YFJ/7 | Explorer Post 308 | 228- | B- 6- | 701 |
| W9F-BN/9* | Grant Co. ARC | 618- | B-18- | 1486 | VE3NDI/3 | York North ARC | 349- | B- 8- | 691 |
| | | | | | WA8SIU/8 | Shaker Hgts. HSARC | 232- | B- 5- | 661 |
| | | | | | VE3HB/3* | Oakville ARC | 230- | B- 6- | 661 |
| | | | | | VE2CMP/2* | Maniwaki HS | 227- | B- 5- | 651 |

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| VE3MW/3 | Kingston ARC | 199- | B- 5- | 648 | VE3NSR/3 | North Shore RC | 1039- | B-15- | 2428 |
| WA51PL/5* | Wheat Straw ARC | 196- | B- 6- | 642 | K4AF/4 | AIR Support Team | 1028- | B-18- | 2406 |
| WA6J1Q/6* | Harry's Hams | 221- | B- 6- | 642 | W6MPH/6* (+WN6GLKJ) | 'Telco ARC' | 1018- | B-21- | 2386 |
| K2LSA/2 | State Line RC | 435- | C- 9- | 635 | W8MAA/8 (+WN8IGU) | Central Mich. ARC | 995- | B-30- | 2340 |
| W8GON/8 | Straits Area RC | 185- | B- 8- | 620 | W0IE/0 (+WN0ZMG) | Wellcome ARC' | 1020- | B-17- | 2340 |
| W8LZ/8 | Sandusky Radio League | 182- | B-20- | 614 | W9BFO/9 | Southeastern Illinois Ham Society | 984- | B-20- | 2318 |
| WSBGJ/5* | non-club group | 196- | B- 3- | 592 | VE2ARC/2 | Montreal ARC | 983- | B-20- | 2316 |
| WA0MI/0* | Spencer AR Klub | 259- | B-15- | 568 | W7AIA/7* (+WN7QIQ) | Clark County ARC | 969- | B-10- | 2288 |
| VE7BEQ/7* | Prince Rupert ARC | 156- | R- 5- | 562 | W1GBJ/1 (+WN1OH) | Hamden ARA | 967- | B- 40- | 2284 |
| WA31BA/3 | HDI, RC | 174- | B- 5- | 548 | K4FFO/4 (+WN4RRD) | Middle Ga. AR/Mars Club | 957- | B-20- | 226 |
| K10XV/1* | Dennis-Yarmouth HSARC | 313- | C- 3- | 513 | K4HYB/4* | Charles E. Newton Jr ARC | 950- | B-11- | 2250 |
| WA0RNP/0 | non-club group | 126- | B- 5- | 502 | W3ZH/3* | ARINC ARC | 941- | B- 9- | 2232 |
| WA9AUW/9 | Valley VHF Club | 150- | B-10- | 500 | W4AVW/4 (+WN4TMD) | Foinsyth ARC' | 915- | B-12- | 2230 |
| VE3SOJ/3 | Algoma ARC | 212- | B- 7- | 474 | WA0UGU/0 (+WN0CJB) | PHD ARA | 920- | B-51- | 2190 |
| WB8AOA/8* | Lawton Comm. Schools | 130- | B- 4- | 460 | WA1JVL/1 (+WN1NRT) | Sharon ARA | 919- | B-15- | 2188 |
| W8HVO/8 | VHFers | 125- | B- 9- | 450 | W8ZPF/8 (+WN8HVV) | K6CLZ/6 | 942- | B-14- | 2184 |
| WA91FH/9 | Elmwood Park CD | 119- | B-15- | 438 | VU2JV/W9 | R.A. Megacycle Soc. | 897- | B-16- | 2144 |
| WB9DJX/9* | Hagerstown HSARC | 88- | B- 3- | 426 | W1KWX/1 (+WN1NWA) | Valley ARC | 894- | B-22- | 2138 |
| K3ZYK/3* | non-club group | 110- | B- 3- | 420 | VE3DRT/3 | Skywide ARC | 913- | B-25- | 2126 |
| W1FFR/1* | non-club group | 106- | B- 3- | 412 | WA2LQO/2 | Grumman ARC | 850- | B-20- | 2100 |
| W8QLY/8 | Mahoning Valley ARA | 98- | B- 5- | 396 | W3HGV/3 (+WN3RAP) | Signals Inc. | 869- | B-12- | 2088 |
| WN9FXQ/9 | All Novices | 61- | B- 4- | 372 | K9CWD/9 | Hoosier Lakes RC | 856- | B-15- | 2062 |
| W8LIL/8 | Firebird | 342- | C- 7- | 342 | K4EJD/4 | Limestone ARC | 852- | B- 9- | 2054 |
| WN5CTJ/5 | non-club group | 39- | B- 3- | 328 | W7DP/7 | W.W. Valley ARC | 799- | B-26- | 1998 |
| W3TOD/3* | Big K AC | 161- | B- 6- | 322 | W2YKQ/2 | Lake Success RC | 815- | B- 8- | 1980 |
| W0CBL/0* | N.E. Missouri ARC | 93- | B- 6- | 191 | W6OTX/6 | Palo Alto ARA | 785- | B-14- | 1980 |
| 3A | | | | | K9FEI/9 | Allison ARC | 811- | B-12- | 1972 |
| W1AKR/1 (+WN1LZQ) | Murphy's Marauders | 3000- | B-30- | 6400 | W9EI/9* (+WN9FPK) | Black Hawk Bandits | 811- | B- 9- | 1972 |
| W1TX/1* (+WN1NCC) | Conn. Wireless Assoc. | 2403- | B-22- | 5206 | K4IXG/4* | Platinum Coast AR Soc. | 827- | B-12- | 1954 |
| W7RM/7 (+WN7OTT) | non-club group | 2352- | B- 9- | 5004 | W5KA/5* (+WN5ZQU) | Austin ARC | 773- | B-35- | 1946 |
| W4IZ/4* (+WN4RCD) | N. Florida AR Soc. | 2254- | B-38- | 4858 | K2OLE/2 | Auburn ARC | 797- | B-15- | 1944 |
| W4IJ/4 | Panama City Contesters | 2162- | B- 4- | 4674 | VE7FG/7 | Fort George ARC | 802- | B-12- | 1904 |
| W4SKH/4* | Oak Ridge RAC | 2149- | B-30- | 4648 | K3VOZ/5 (+WN5BNO) | Lawford Fort Sill ARC | 801- | B-18- | 1902 |
| W5GKF/5 | Texas DX Soc. | 1937- | B-10- | 4224 | WA4TFZ/4 | Albemarle ARC | 787- | B-10- | 1874 |
| W4ABK/4 (+WN4SRX) | Kentuckiana RC | 1928- | B-15- | 4211 | W8QK/8 (+WN810) | Calhoun County Hams | 754- | B-30- | 1858 |
| W9FK/9 (+WN9FTL) | West Allis RAC | 1889- | B-19- | 4128 | K8HPS/8* | GMTE ARC | 777- | B- 7- | 1854 |
| W4FU/8 | Ohio Valley ARA | 1847- | B- 9- | 4094 | W8VVL/8 | Queen City Emer. Net | 727- | B-13- | 1854 |
| K4FU/4* | Louisville's Active Radio Operators | 1822- | B-10- | 4044 | K9HDH/8* | Elkhart Red Cross ARC | 740- | B- 7- | 1830 |
| W8TO/8* (+WN8GGQ) | Columbus ARA | 1806- | B-15- | 3962 | WA2DMM/2 | non-club group | 749- | B- 7- | 1798 |
| W9LML/9* (+WN9GNS) | Northwest ARC | 1775- | B-30- | 3950 | W9OQG/9* | Lake View ARA | 715- | B-10- | 1780 |
| W5LL/5 | Tombigbee ARC | 1743- | B-15- | 3836 | W2RVK/2 (+WN2CNB) | JBM Owego ARC | 711- | B-25- | 1772 |
| K5OCM/5 (+WN5AHL) | Old Natchez ARC | 1726- | B-15- | 3802 | W2GLQ/2* (+WN2PPO) | Nutley AR Soc. | 684- | B-16- | 1768 |
| W9OFR/9 | Joliet AR Soc. | 1712- | B-15- | 3774 | VE2CSJ/2* | Club CGEP-Saint-Jean | 559- | B-11- | 1768 |
| W4TRC/4 (+WN4QJR) | Kingsport ARC | 1623- | B-43- | 3596 | W3SL/3 | Delaware ARC | 689- | B- 8- | 1728 |
| W1USV/1 (+WN1NCK) | Trumbull ARC | 1611- | B-18- | 3572 | W71O/7 | Arizona ARC | 666- | B-25- | 1712 |
| W6HS/6* (+WN6QVC) | Crescenta Valley RC | 1595- | B-18- | 3545 | W5UK/5 (+WN5DTY) | Greater New Orleans ARC | 674- | B-35- | 1698 |
| VE7EZ/7 | Victoria Shortwave Club | 1526- | B-33- | 3452 | K3ZAC/3 | Warminster ARC | 673- | B-30- | 1696 |
| K6AFH/6 | Palisades ARC of Calver City | 1463- | B-50- | 3276 | WB4NTB/4 | Murray State Univ. ARC | 670- | B-12- | 1690 |
| W9COO/9* (+WN9GVH) | Ozaukee RC | 1427- | B-28- | 3204 | WB9FZN/9* | Elk Grove ARC | 694- | B- 7- | 1688 |
| K0UVU/0 | Independent FD ARC | 1452- | B-13- | 3204 | W7PKL/7* | Valley RC of Eugene | 665- | B-14- | 1680 |
| W0OU/0* (+WN0CFN) | Denver RC | 1302- | B-19- | 3009 | W6OS/6 | Fairport Elec. AR Team | 688- | B- 5- | 1676 |
| W9AA/9* (+WN9JMC) | Hamfesters RC | 1191- | B-17- | 2732 | WA2BPO/2* (+WN2OMS) | ALL ARC | 681- | B- 8- | 1662 |
| W8VM/8 | West Park Radiops | 1180- | B-19- | 2710 | WB9BPW/9 | Explorer Post 6 | 676- | B- 9- | 1652 |
| K2JD/2 | Band Dit-Dahs | 1175- | B-12- | 2700 | W9LJ/9* | Lake County ARC | 650- | B- 8- | 1650 |
| K2BK/2* | Overlook Mt. ARC | 1171- | B-20- | 2692 | VE3KCD/3 | Kitchener Waterloo ARC | 799- | B-10- | 1648 |
| K3TGM/3 | Wm. Penn. RC | 1179- | B- 8- | 2658 | W8COK/8 | Battelle RC | 646- | B-12- | 1642 |
| W1QPL/1 | Providence RA | 1107- | B-19- | 2614 | VE2JB/2 | Granly ARC | 1282- | C-14- | 1637 |
| VF3CR/3 | Cooksville ARC | 1131- | B-15- | 2612 | K9UQN/9 | Motorola ARC | 664- | B- 6- | 1628 |
| K2YNT/2 (+WN2MIP) | Metuchen YMCA RC | 1112- | B-22- | 2574 | W3QU/3* (+WN3NLU) | Harrisburg ARC | 634- | B-10- | 1618 |
| W4CVY/4 | Columbus AR Club | 1259- | B-25- | 2568 | W9BAR/9 | Eau Claire ARC | 648- | B- 8- | 1596 |
| WA2DJS/2 (+WN2NAM) | Wayne ARC | 1090- | B-25- | 2530 | WB4KIF/4* | Wenoco Twin City ARC | 771- | B-12- | 1592 |
| W3CI/3 | Springfield ARC | 1110- | B-12- | 2520 | K9WMV/9 | Chicago Radio Traffic Assoc. | 616- | B-18- | 1582 |
| WA2DNR/2 (+WN2SKD) | Colonia Central HSRC | 1075- | B- 9- | 2500 | VO2AI/2* | ARC of Western Labrador | 610- | B-11- | 1570 |
| W8GFG/3 | Shenango Valley AR Field Day Group | 1090- | B- 5- | 2480 | W0RR/0* (+WN0DQW) | non-club group | 631- | B-10- | 1562 |
| WA4IXA/4 | Knox ARC | 1060- | B-10- | 2470 | W1MHL/1 | Waltham ARC | 597- | B-14- | 1554 |
| K1JMQ/1 | Lexington HSRC | 1052- | B-15- | 2454 | K7CBB/7* (+WN7RFH) | Klanmath Basin ARA | 593- | B-18- | 1536 |
| K8ULU/8* (+WN8HPH) | Livonia ARC | 1050- | B-15- | 2450 | W3VV/3* (+WN3QNI) | McKean County ARC | 592- | B-12- | 1534 |
| K4UGF/4 | Seymour-Johnson AFB Mars Group | 1048- | B-10- | 2446 | | | | | |
| W4RYZ/4 | Panama City ARC | 1048- | B-10- | 2446 | | | | | |



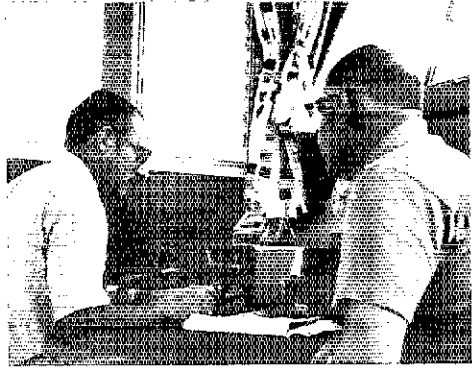
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W4TRC/4



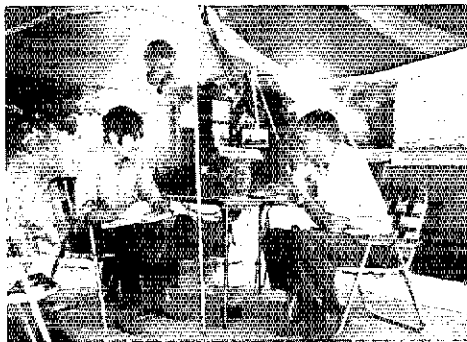
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WN9ECL/9



WB8BKA/8



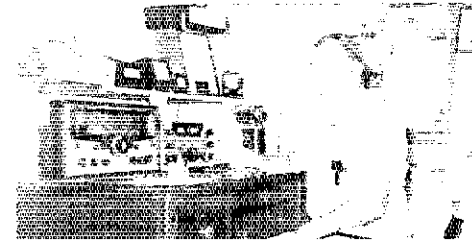
▲ W4OLB/4

▼ W1TX/1



▲ W3TQM/4

▼ W4LEP



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| W8CF/8 (+WN8FUE) | Fairborn ARC | 588- | B-10- | 1526 | K3IVO/3 (+WN3QMY) | Free-State ARC | 765- | C-10- | 1063 |
| YE3LON/3 | London ARC | 587- | B-32- | 1524 | W6PMK/6 (+WN6RJI) | No. Peninsula Elec. Club | 355- | B-19- | 1060 |
| K3UIB/3 (+WN3NUN) | Explorer Post 681 & Naval Compound ARC | 580- | B-20- | 1510 | WB4JFW/4 | Dothan ARC | 371- | B- 6- | 1042 |
| W0ZRT/0 | Bismarck Area RC | 474- | B-18- | 1498 | K2AVP/2 | Westchester RACES | 368- | B- 9- | 1036 |
| VF7UBC/7* | Univ. of B.C. AR Soc. | 596- | H- 4- | 1492 | K5JOA/5* (+WN5ZUO) | Miami ARC | 343- | B-11- | 1036 |
| W8VY* (+WN8JFA) | Kalamazoo ARC | 569- | B-15- | 1488 | W8OC/8 | Springfield ARC | 685- | C-17- | 1035 |
| K9IU/9* | Indiana Univ. ARC | 537- | B- 6- | 1474 | W9AML/9* | Cent. Illinois ARC | 335- | B-14- | 1020 |
| K8UZW/8 | Parma RC | 556- | B-12- | 1462 | W5DSC/5 | Victoria ARC | 346- | B-30- | 992 |
| WA8ZGE/8 | Euclid Sr. HSRC | 553- | B-11- | 1456 | K2MFF/2 | Newark College of Engineering ARC | 313- | B- 7- | 976 |
| W8WE/8 | Richland Co. ARC | 577- | B- 6- | 1454 | VE7ES/7* | Totem ARC | 301- | B-20- | 952 |
| K2BR/2* | So. Counties ARA | 550- | B-15- | 1450 | K6AGF/6* (+WN6JGG) | Tri-Co. ARA | 291- | B-15- | 942 |
| W8SP/8 | Mountaineer ARA | 575- | B- 8- | 1450 | WA0QHL/0* | Three Rivers ARC | 293- | B-13- | 936 |
| W0FK/0* | Explorer Post 11 | 515- | B- 6- | 1440 | WA3PHS/3 | Valley HSARC | 288- | B-23- | 926 |
| K5WOD/5* (+WN5ENQ) | Springhill ARC | 542- | B-10- | 1434 | WA7CRE/7 (+WN7QIG) | Fagle Rock RC | 280- | B- - | 910 |
| WB4VJO/4 (+WN4URE) | New River Community College RC | 513- | B-11- | 1426 | W8GVB/8 | Marion ARC | 279- | B-20- | 908 |
| WB6NVY/6 (+WN6KSR) | Redwood HSARC | 538- | B-15- | 1426 | WA7LNU/7 | non-club group | 303 | B- 4- | 906 |
| W7NBR/7 (+WN7QYO) | Spokane RA | 563- | B-15- | 1426 | WB4RCB/4 | Carferet-Craven ARC | 296- | H-10- | 892 |
| W9CCU/9 (+WN9FFA) | Wheaton Community RA | 537- | B-10- | 1424 | WA8JGE/8* (+WN8JFW) | Newark ARA | 295- | B-10- | 890 |
| K2GO/2 | Irrvington RAC | 1123- | C-35- | 1423 | WB9EQY/9* | Clinton Co. VHF RAC | 259- | B-25- | 868 |
| VE3SWA/3 | So. Waterloo ARC | 534- | B-12- | 1418 | VOIDL/1* | Humber AR Soc. | 259- | B- 8- | 868 |
| W0VZG/0 | Pilot Knob ARC | 527- | B- 8- | 1404 | K3KNR/3 | Mahanoj Brass Pounders | 567- | C- 6- | 867 |
| W9EUG/9 (+WN9FYW) | LAMARS | 524- | B-14- | 1398 | W1BD/1* | Central Vt. ARC | 279- | B- 8- | 858 |
| W3AVK/3* | West Branch ARA | 547- | B-15- | 1394 | WA6RLV/6 (+WN6MIC) | Explorer Post 201 | 403- | B-23- | 856 |
| W1DK/1 | Associated Radio Amateurs of S. New Eng. | 511- | B-12- | 1372 | WB2RLO/2 (+WN2TMA) | Fair Lawn ARC | 251- | B-17- | 852 |
| K8MJK/8 (+WN8JQS) | Delta Co. AR Soc. | 511- | B-11- | 1372 | W4TJM/4* (+WN4RXF) | Polk Co. CD A Comm. Soc. | 245- | B- 8- | 840 |
| W7DA/7 (+WN7RBR) | North Seattle ARC | 505- | B-12- | 1365 | VE3AFA/3* | Peterboro ARC | 270- | B- 4- | 840 |
| W3DOS/4 | Dept. of State ARC | 495- | B- 9- | 1340 | WA9TZW/9 | Hellville Twp. HS West | 268- | B-15- | 836 |
| WA0NOA/0 | Independence ARC | 494- | B-13- | 1338 | K6HA/6 | North Shore ARC | 519- | C-20- | 819 |
| W8BAE/8 (+WN8JTA) | non-club group | 517- | B-14- | 1334 | WB4ABT/4* | So. Peninsula ARC | 502- | C-17- | 802 |
| KH6AHQ/6 | Barbers Pt. Amateur/ Mars RC | 974- | C-10- | 1324 | VEJGS/3 | Westminster ARC | 226- | B-12- | 802 |
| K1NQG/1* (+WN1NSM) | Fidelity ARC | 506- | B-17- | 1312 | WB4IYO/4* (+WN4SZL) | Covington Co. ARC | 222- | B- 8- | 794 |
| W1MEP/1 (+WN1NWG) | Catamount RC | 499- | B- 6- | 1298 | K3USN/3 | 4th NAVMARCORMARS | 230- | B-10- | 760 |
| W1FW/1* | Merrimack Valley ARC | 993- | C-12- | 1293 | WB7R/8 (+WN8IOT) | Saginaw Valley ARA | 222- | B-13- | 744 |
| K1MVQ/1 (+WN1NLD) | Conn. Yankee ARC | 470- | B-10- | 1290 | WB8EBD/8 | Non-club group | 222- | B- 3- | 744 |
| W2FNVW/2 | Matawan Boro CD | 463- | B-10- | 1276 | K2KT/2* | Brooklyn Polytech RC | 221- | B-10- | 742 |
| WA3DFM/3 | Two Rivers ARC | 902- | C-27- | 1252 | KRSC/H/8 | OH-KV-IND VHF Radio Soc. | 220- | B-15- | 740 |
| WA7DUV/7* | Clearwater Valley ARC | 440- | B-10- | 1230 | W9GID/9* (+WN9GHE) | Prairie ARC | 379- | C-29- | 729 |
| WA0HOH/0 | Pawnee ARC | 437- | B-20- | 1224 | W7CJ/7 | Talutuna ARC | 188- | B- 7- | 726 |
| VE6AWV/6 | Alberta's Wireless Wonders | 410- | B- 8- | 1220 | VE3TC/3 | Elgin AR Soc. | 185- | B-10- | 720 |
| W4ZA/4* (+WN4QIP) | Richmond ARC | 452- | B-22- | 1204 | WB2SXG/2 | non-club group | 180- | B- 4- | 660 |
| W0RRZ/0* (+WN0DNY) | Western Slope RC | 426- | B- 8- | 1202 | WB4GTY/4 (+WN4RFU) | Tallahassee ARC | 358- | C-22- | 658 |
| W0KQU/0 (+WN0DOL) | Central Kansas ARC | 393- | B-22- | 1186 | WA6AEG/6 | Mt. View HSRC | 152- | B- 7- | 654 |
| W0NH/0 (+WN0DNB) | Missouri Valley | 415- | B-20- | 1180 | WA6UOW/6 (+WN6FLI) | Explorer Post 2202 | 172- | B- 8- | 644 |
| W9WW/9* (+WN9HPR) | Clark Co. ARC | 431- | B-10- | 1162 | WA7HAG/7* | Electric City RC | 147- | B-10- | 644 |
| K0EQH/0 (+WN0CTZ) | Sandhills ARC | 405- | B- 8- | 1160 | WA8CYE/8* (+WN3GNZ) | Industrial Nucleonics RC | 142- | B-10- | 634 |
| W9SA/9 (+WN9FOK) | North Shore ARC | 429- | B-10- | 1158 | K4GG/4 (+WN4ROY) | Manatee ARC | 236- | C-12- | 586 |
| W4NN/4 (+WN4SFD) | Oklahoma Co. ARC | 368- | B-31- | 1146 | W3AD/3 | Lancaster Radio Transmitting Soc. | 264- | B- 9- | 578 |
| WA9WHX/9* (+WN9GXO) | McHenry Co. ARC | 393- | B-10- | 1146 | K0KKV/0* | Lincoln ARC | 272- | C-12- | 572 |
| WA3IHV/3* | LMCD | 389- | B- 6- | 1128 | W4TE/4 | Sarasota ARA | 100- | B-12- | 550 |
| VE3COQ/3 | Sudbury & District ARC | 827- | C-15- | 1127 | K9QDE/9 (+WN9DQT) | Kokonito ARC | 193- | C- 9- | 543 |
| WB9BDL/9 | Columnet Area Teen-Age | 815- | C- 8- | 1115 | WA7MXZ/7* | Logan ARC | 96- | B- 6- | 542 |
| WA0BNZ/0* | Nevada ARC | 407- | B-15- | 1114 | WA8UXP/8* (+WN8JJE) | Goodyear ARC | 247- | B-10- | 494 |
| W9AZ/9 (+WN9GVR) | Kankakee Area R Soc. | 810- | C-20- | 1110 | W5SRW/5* (+WN5CSO) | Mesilla Valley RC | 94- | B- 5- | 488 |
| W8CON/8 (+WN8GKN) | Mich-A-Con ARC | 397- | B- 9- | 1094 | WA5WKP/5 | Twin City Ham Club | 400- | C-15- | 450 |
| W8BI/8 (+WN8GQH) | Dayton ARA | 542- | B-25- | 1084 | W7ITR/7* | Panaramaland ARC | 198- | B- 6- | 446 |
| WSQGG/5* | Midland ARC | 361- | B-15- | 1072 | WA9YXX/9* | Friend ARC | 70- | B- 9- | 440 |
| W6AK/6 (+WN6DFO) | Sacramento ARC | 386- | B-16- | 1072 | WB6ZAY/6* | Cal-Poly ARC | 67- | B- 4- | 434 |
| KL7FLO/7* | Moose Horn ARC | 386- | B- 9- | 1072 | W8RIBM/8 | Barberton Bushwachers | 13- | B- 5- | 376 |
| WA3NAV/3 | Balt. AR Federation | 768- | C- 6- | 1068 | K9HCD/0* | Bellowers | 121- | B- 3- | 242 |
| | | | | | | 4A | | | |
| | | | | | WA6LXN/6 (+WN6HEI) | West Valley ARC | 2732- | B-21- | 5964 |
| | | | | | W6HE/6 (+WN6EAK) | Conejo Valley ARC | 2446- | B-24- | 5342 |
| | | | | | W7JN/7 (+WN7NMMK) | Arizona Mt. Moguls | 2219- | B-18- | 4888 |
| | | | | | W2SEX/2 | ARA of the Tonawandas | 2125- | B-28- | 4700 |
| | | | | | W1EKT/1 | Quannapowitt RA | 2117- | B-20- | 4634 |
| | | | | | K3SSC/3 | Delmont RC | 2068- | B-30- | 4186 |
| | | | | | K1JMR/1* | Norwood ARC | 1774- | B-26- | 4048 |

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| WDEQU/0* (+WN0AJI) | | | | | Clinton Co. ARA | 439- | B-17- | 1328 |
| K30TY/3* (+WN30WP) | 1602- | B-58- | 3654 | | Fredricton ARC | 870- | C-20- | 1320 |
| W5QU/5 (+WN5DDR) | 1525- | B-22- | 3500 | | Triangle ARC | 425- | B-17- | 1300 |
| W2SE/2 (+WN2NPJ) | 1406- | B-74- | 3307 | | N. & W. Vancouver ARC | 422- | B- 6- | 1294 |
| W6IFZ/6* (+WN6DMK) | 1427- | B-30- | 3304 | | Malden ARA | 409- | B- 6- | 1268 |
| W2SB/2 | 1435- | B-15- | 3270 | | Mid-South VHF Assn. | 417- | B-10- | 1234 |
| W8ICS/8 | 1390- | B-15- | 3180 | | Tri-Co. RA | 363- | B-15- | 1176 |
| VE3I/1* | 1365- | B-33- | 3180 | | 80 thru 2 Contest Gp. | 337- | B- 7- | 1174 |
| K2CT/2* (+WN2TUJ) | 1320- | B-23- | 3090 | | Estero Bay ARC | 383- | B-10- | 1171 |
| W5LOW/5 (+WN5CRF) | 1317- | B-35- | 3084 | | Princeton YMCA RC | 360- | B-14- | 1120 |
| VE3PRC/3* | 1317- | B-35- | 3084 | | White Sands ARC | 320- | B- 6- | 1090 |
| K5SD/5 (+WN5EBE) | 1316- | B-22- | 3082 | | HF Amateur Mobile Soc. | 311- | B-15- | 1072 |
| W3GV/3 | 1258- | B-40- | 2966 | | Thunder Bay ARC | 287- | B- 9- | 1024 |
| VE3MRC/3 | 1210- | B-25- | 2870 | | Terry Co. ARC | 279- | B- 4- | 1008 |
| K8WWR/3 (+WN8FLO) | 1204- | B-17- | 2858 | | Tektronix Emp. ARC | 291- | B- 7- | 982 |
| WA3JZR/3 | 1181- | B-20- | 2812 | | MANCORAD AC | 264 | B- 6- | 928 |
| K9VHF/9* (+WN9LKA) | 1120- | B-25- | 2740 | | W1BCG/1 (+WN1DFL) | 222- | B-12 | 894 |
| W8FV/8* | 1114- | B-11- | 2728 | | W9OYQ/9 | 242- | B- 8- | 884 |
| WB2AUD/2* | 1161- | B-18- | 2682 | | K9UXZ/9* | 216- | B- 8- | 832 |
| W3BN/3 | 1129- | B-12- | 2658 | | K0OKI/0 | 216- | B- 8- | 832 |
| K6LI/6* | 1126- | B-20- | 2652 | | WA7NAG/7 (+WN&PPV) | 131- | B- 6- | 712 |
| W8UMD/8 (+WN8ILP) | 1066- | B-20- | 2532 | | | | | |
| K7NWS/7 | 1018- | B-50- | 2486 | | W3AJ/3 (+WN3PHO) | 2051- | B-50- | 4652 |
| K0LJR/0 St. Louis ARC | 927- | B-25- | 2304 | | W8ACW/8 (+WN8JHX) | 1652- | B-31 | 3854 |
| W8NJI/8 (+WN8ITU) | 931- | B-37- | 2262 | | W2WQJ/2 (+WN2SMS) | 1564- | B-38- | 3728 |
| W9ARA/9 | 892- | B-20- | 2234 | | K9RAS/9* (+WN9FIF) | 1493- | B-18- | 3486 |
| W6NI/6 (+WN6AIE) | 864- | B-15- | 2178 | | W2AOH/2 (+WN2MUD) | 1469- | B-15- | 3438 |
| W3CSL/3 | 843- | B-23- | 2146 | | K6DKX/6 (+WN6DVA) | 1419- | B-13- | 3338 |
| WB9FDZ/9* (+WN9ECL) | 813- | B-25- | 2126 | | K8BYI/8 | 1390- | B- 8- | 3280 |
| K8LUC/8 (+WN8HBS) | 828- | B-23- | 2106 | | W0LEMA/0* | 1300- | B-30- | 3150 |
| W8BAP/8* (+WN8GZL) | 824- | B-20- | 2098 | | K6FB/6 (+WN6HBS) | 1258- | B-19- | 3066 |
| W3YA/3* (+WN3QCC) | 807- | B-18- | 2044 | | W2MMD/2 | 1265- | B-30- | 3030 |
| W4BFM/4 (+WN4RBJ) | 816- | B-25- | 2037 | | W6MRO/6* | 1235- | B-12- | 2970 |
| W7GV/7 | 793- | B-18- | 2036 | | W6LUC/6 | 1197- | B-20- | 2944 |
| W6QFK/6 (+WN6CEM) | 772- | B-10- | 1994 | | K3BKG/3 (+WN3OGA) | 1189- | B-18- | 2928 |
| K4EG/4* (+WN4SGA) | 769- | B-19- | 1988 | | So. Chester Co. ARC | 1213- | B-19- | 2926 |
| W7BB/7 | 730- | B-15- | 1920 | | W6AJB/6 | 1069- | B-23- | 2688 |
| W9ARV/9 | 750- | B- 4- | 1900 | | W6ULI/6* (+WN6LMC) | 1041- | B-20- | 2682 |
| VOINT/1 | 712- | B- 6- | 1874 | | K8BYX/8 | 1036- | B-28- | 2572 |
| W2FWG/2* | 725- | B-18- | 1850 | | W9PCS/9 | 977- | B-22- | 2504 |
| W6ZB/6 (+WN6HUG) | 714- | B-15- | 1828 | | W6AG/6 | 964- | B-10- | 2488 |
| W9UVI/9 | 1401- | C-12- | 1801 | | W4BBB/4 (+WN4TCC) | 905- | B-25- | 2360 |
| W9MJL/9 (+WN9GHY) | 657- | B-18- | 1764 | | W6TJ/6 (+WN6CFF) | 867- | B-24- | 2294 |
| W6VTO/6 | 635- | B- 8- | 1720 | | W82NUW/2 | 895- | B-21 | 2290 |
| WA6TST/6 | 629- | B- 9- | 1708 | | W6JBT/6* | 862- | B-15- | 2274 |
| W2ZV/2 | 1295- | C-15- | 1695 | | K3CSG/3 (+WN3RCGN) | 861- | B-15- | 2272 |
| WA6TOW/6 (+WN6EAJ) | 613- | B-12- | 1676 | | K9UFO/9* | 842- | B-13- | 2234 |
| VE3AJ/3* | 592- | B-10- | 1634 | | W5SSWS/5* | 816- | B-11- | 2182 |
| WAINPG/1 | 572- | B-20- | 1604 | | W7HNZ/7 | 815- | B-20- | 2180 |
| K6QF/H/6 | 596- | B- 9- | 1592 | | W2ZE/2 (+WN2NTI) | 777- | B-20- | 2104 |
| VE3BSQ/3* | 1126- | C- 8- | 1576 | | W7FEL/7 | 771 | B-21- | 2092 |
| WA6GFY/6 (+WN6EXW) | 560- | B- 7- | 1570 | | WA3QDT/3 (+WN3QAT) | 1527- | C-30- | 2027 |
| WA2UWK/2 | 576- | B- 8- | 1552 | | WA9UHY/9 (+WN9HEF) | 712- | B-11- | 1974 |
| W0IN/0 (+WN0DAA) | 532- | B- 5- | 1514 | | VO1AQ/1* | 684 | B- 8- | 1968 |
| W1ZST/1 | 520- | B- 9- | 1490 | | W8AX/8* (+WN8LVL) | 717- | B-19- | 1934 |
| W3PGA/3 | 534- | B- 1- | 1468 | | W88EFU/8 (+WN8HWR) | 904- | B-23- | 1852 |
| VE3BA/3 | 508- | B-12- | 1466 | | W2VA/2 | 614- | B- 1- | 1721 |
| K8PBO/8 | 530- | B-15- | 1460 | | WB6KOY/6* (+WN6FYN) | 595- | B- 8- | 1691 |
| WA4YFK/4* | 493- | B-20- | 1436 | | WA6BCS/6 (+WN6G4P) | 538- | B-48- | 1681 |
| WB9AMF/9 | 715- | B-12- | 1430 | | W4PAY/4 (+WN4UKA) | 523- | B-20- | 1596 |
| W2DMM/2 | 464- | B-14- | 1378 | | WA9LIV/9 | 520- | B-12- | 1541 |
| W4VT/4* | 462- | B-14- | 1374 | | | | | |
| W4YAU/4 | 479- | B-18- | 1358 | | | | | |
| WA7APE/7* (+WN7OKL) | 446- | B-16- | 1342 | | | | | |

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| W4JNB/4 | Muscle Shoals ARC | 488- | B-10- | 1526 | K6EAG/6 | Hayward RC | 690- | B-20- | 2130 |
| W8VTD/8 | Warren ARA | 484- | B-25- | 1468 | K3JEC/3 | Cumberland ARC | 1360- | C-17- | 2110 |
| WA8GZE/8 | AREC CD ARC | 465- | B-11- | 1430 | WA1DGW/1 | Somerset ARC | 636- | B-20- | 2022 |
| W0CJX/0 (+WN0AA) | Empire RC | 438- | B-12- | 1426 | K4UTL/4 (+WN4UUF) | Lanierland ARC | 408- | B-17- | 1566 |
| WA2FML/2 | Rensselaer Co. CD | 428- | B-30- | 1406 | | 8A | | | |
| WB5BBJ/5 (+WN5AWB) | Wichita AR Soc. | 812- | C-12- | 1362 | W3RCN/3 (+WN3RCD) | Combined-Rock Creek ARA & APL RCs | 2783- | B-28- | 6476 |
| K9GXU/9 (+WN9DMP) | St. Clair ARC | 406- | B-32- | 1362 | W9SW/9* (+WN9FBB) | Chicago Suburban RA | 2791- | B-40- | 6432 |
| W8FO/8 | Toledo RC | 384- | B-21- | 1318 | W1BTF/1 | Framingham RC | 988- | B-21- | 2891 |
| W6OT/6* (+WN6PRU) | Oakland RC | 401- | B-14- | 1307 | W7UMX/7* | Whidbey Is. ARC | 673- | B-17- | 2196 |
| W2BX/2 | Cumberland RC | 748- | C-9- | 1248 | W1BIM/1 (+WN1OAS) | Central Mass. ARA | 637- | B-33- | 2124 |
| W9BZN/9 | L.M.O. ARC | 614- | C-14- | 1164 | W6SD/6* (+WN6DUK) | San Fernando Valley RC | 953- | C-26- | 1853 |
| WA1NXU/1 | Swamp Yankee ARC | 288- | B-20- | 1126 | | 9A | | | |
| W4GZX/4 (+WN4UZD) | Cleveland ARC | 237- | B-16- | 1024 | W9KOL/9 | Twin City ARC | 2901 | B-26- | 6752 |
| W9DUP/9 (+WN9HEG) | DuPage RC | 369- | C-20- | 919 | W2LH/2 | Tri-County | 2687- | B-52 | 6329 |
| WA5ZAA/5 | OCARE Club | 348- | C-17- | 898 | W9JZ/9* (+WN9FKS) | Four Lakes ARC | 1482- | B-40- | 3914 |
| W9YCR/9 | Quad City ARC | 277- | C-14- | 827 | W1LL/1 | Hampden Co. RA | 1152 | B-29- | 3254 |
| | 6A | | | | | 10A | | | |
| W6VB/6 (+WN6BLL) | TRW Systems ARC | 2268- | B-26- | 5236 | W7DK/7 (+WN7QYD) | RC of Tacoma | 2075- | B-40- | 5350 |
| W2LT/2 (+WN2TWW) | Ridgewood ARC | 2038- | B-28- | 4726 | W6CX/6* (+WN6KEX) | Mt. Diablo ARC | 1684 | B- | 4468 |
| W2ZZ/2* (+WN2KNW) | Bergenfield AR Klub | 2034- | B-14- | 4724 | W4HAW/4 (+WN4TTO) | W. Palm Beach ARC | 1625- | B-26- | 4300 |
| WA3PJO/3 | Maryland Mobileers | 1876- | B-16- | 4402 | W6TOI/6* (+WN6EMR) | Downey ARC | 928- | B-21- | 3356 |
| KP4LD/4 | RC of Puerto Rico | 1758- | B-17- | 4166 | K4WAB/4 (+WN4SIW) | Cape Fear AR Soc. | 1844- | C-22- | 3344 |
| K6SYU/6 | Anaheim ARA | 1604- | B-45- | 3808 | | 11A | | | |
| WA8MTX/8 | Monroe Co. Radio Comm. Assoc. | 1487- | B-15- | 3674 | W2GSA/2* (+WN2OQT) | Garden State ARA | 2462- | B-46- | 6124 |
| W2OYH/2 | Morris RC | 1343- | B-20- | 3336 | VE3VM/3 | Niagara Peninsula ARC | 1922- | B-25- | 5444 |
| W6CV/6 | San Bernardino Co. Emer. RC | 1293- | B-12- | 3236 | VE3NAR/3 | Norfown ARC | 2037- | B-60- | 5174 |
| W8CX8/8 (+WN8JTW) | Hills ARA | 1266- | B-27- | 3132 | | 12A | | | |
| W3PIQ/3 | South Hills Brass | 1170- | B-24- | 3010 | W7NCW/7 (+WN7ONA) | Lower Columbia ARA | 714- | B-20- | 2678 |
| W4CUE/4 (+WN4TFC) | Pounders & Modulators | 1178- | B-45- | 3006 | | 14A | | | |
| W81D/8* | Birmingham ARC | 1188- | B-16- | 2976 | VE3WE/3 | Scarboro ARC | 2283- | B-50- | 6466 |
| W3CWC/3 | Seneca RC | 1188- | B-16- | 2976 | | 18A | | | |
| W6RO/6* (+WN6HRH) | Antietam RA | 1154- | B-16- | 2918 | W2RJ/2* (+WN2ROA) | Englewood ARA | 4062- | B-60-10,024 | |
| W41YU/4 | Assoc. RA of Long Beach & Douglas Aircraft ARC | 1117- | B-28- | 2834 | | | | | |
| K7LED/7 | Middle Tenn. AR Soc. | 1045- | B-17- | 2740 | | | | | |
| W8OXS/8 | Mike & Key RC | 936- | B-20- | 2472 | | | | | |
| W3SGJ/3 (+WN3PXJ) | Lake Geauga ARC | 819- | B-15- | 2248 | | | | | |
| K6GIP/6 (+WN6INO) | Beaver Valley ARA | 776- | B-20- | 2202 | | | | | |
| WA0NPZ/9 (+WN0CCT) | Monterrey Park ARC | 619- | B-25- | 1888 | | | | | |
| VO1MSA/1 | Ramsey RC | 641 | B-20- | 1882 | | | | | |
| W1NEM/1 (+WN1NBR) | SONRA | 478- | B-15- | 1606 | | | | | |
| W6PW/6* | Hartford Co. ARA | 456- | B-30- | 1562 | | | | | |
| WA9ZES/9* (+WN9FPT) | San Francisco RC | 953 | C-8- | 1553 | | | | | |
| W6BXN/6* | Muncie Area ARC | 409- | B-16- | 1518 | | | | | |
| K1SSN/1 (+WN1OCF) | Turlock ARC | 863- | C-14- | 1513 | | | | | |
| W9DUK/9 | non-club group | 428- | B-10- | 1506 | | | | | |
| W4DOC/4 | Delaware ARA | 414- | B-18- | 1478 | | | | | |
| W6CO/6* | Atlanta RC | 352- | B-17- | 1354 | | | | | |
| K6BJ/6 | Silverado AR Soc. | 312- | B-13- | 1274 | | | | | |
| WA0VQX/0 | Santa Cruz Co. ARC | 592- | C-12- | 1192 | | | | | |
| WA8FSE/8 (+WN8IJW) | Faribou Area ARC | 511- | C-11- | 1111 | | | | | |
| K6IS/6 (+WN9FEN) | Opequon Radio Soc. | 297- | C- | 947 | | | | | |
| | North Hills RC | 368- | B-18- | 736 | | | | | |
| | 7A | | | | | | | | |
| K2AA/2 | South Jersey RA | 2841- | B-27- | 6432 | | | | | |
| W3SK/3* (+WN3OZJ) | Penn Wireless Assoc. | 2594- | B-50- | 5943 | | | | | |
| K4BFT/4 | Huntsville ARC | 2146- | B-28- | 5032 | | | | | |
| K4MC/4 (+WN4PMI) | Raleigh AR Soc. | 2089- | B-40- | 4928 | | | | | |
| K6QEZ/6* | Ampex Emp. ARC | 1683- | B-18- | 4116 | | | | | |
| WA9EDW/9* (+WN9COF) | Barrington ARS Communications Club of New Rochelle | 1826- | B-21- | 3702 | | | | | |
| K2YUJ/2 | Sterling Park ARC | 1034- | B-35- | 2853 | | | | | |
| W4RL/4 (+WN4SWE) | Howard Co. ARC | 1042- | B-10- | 2834 | | | | | |
| WA3PIC/3 | | 973- | B-19- | 2756 | | | | | |

| Class-B Call-Area Leaders | |
|---|-----------------|
| <i>(Bold Face=Over-all class leaders)</i> | |
| 1 Transmitter | 2 Transmitters |
| WA2KZV/1 | W1VSR/1 |
| W2AB/2 | WA2UOO/2 |
| WA3IRY/3 | K4JIS/4 |
| WB4MRI/4 | WB5AJS/5 |
| WA5VPB/5 | WB6UFT/6 |
| W6ANB/6 | K7LTV/7 |
| W7LTV/7 | WA7PEK/7 |
| WA2ASM/8 | WB8HIZ/8 |
| WA9ZGN/9 | WA9UZR/9 |
| K0KLB/0 | W0MEL/0 |
| VE2BDM/2 | ..... |

CLASS B

Grouped in this listing are the scores of portable stations manned by one or two operators. Where two persons participated, the call of the other operator (if known) is shown following that of the amateur whose call was used. Figures following the calls indicate number of contacts, power, and final score. An asterisk following the station callsign indicates set-up operations did not begin until 1800 GMT on Saturday.

| Class B | |
|---------------------|-------------|
| WB4MRJ/4 | 1145-B-2390 |
| W2ABJ/2* + W3CSZ | 850-B-1900 |
| KG4EY/4 + WA9SXQ | 906-B-1862 |
| WA3JRY/3 | 875-B-1850 |
| W6ANB/6* + WB6TBL | 824-B-1748 |
| WB4HEI/4 | 805-B-1710 |
| K4YSB/4 + WB4FWK | 666-B-1432 |
| K7LTV/7 | 695-B-1390 |
| K4LDR/4 + WB4RDV | 587-B-1324 |
| WA7ORM/7* + W7DNE | 577-B-1304 |
| WA7MJ/7 + WA7IZO | 541-B-1232 |
| WA5YPB/5* + WA5SIO | 551-B-1202 |
| K3ONW/3 | 550-B-1200 |
| VE2BDM/2* + VE3GSZ | 518-B-1136 |
| WA9ZGN/9* + WB9CXZ | 514-B-1128 |
| WA2KZV/1 + WA2PTS | 477-B-1124 |
| WA7KWY/7 + WA7OEX | 462-B-1124 |
| K5TSR/5 + WA5ZRB | 500-B-1100 |
| WB9BJO/9 + WB9AVN | 451-B-1052 |
| E7WWR/7* + WA7UES | 472-B-1044 |
| WA3ER/3* + WA3IOA | 443-B-1036 |
| K9MTI/9 + K9KOI | 467-B-1034 |
| K5AYH/5* | 464-B-1028 |
| WA2BLE/2 + WA2DBD | 462-B-1024 |
| W3YVQ/3* + WA4UGI | 440-B-980 |
| W5OJP/5* + W5SBAM | 412-B-974 |
| WA2ASM/8 + W2OPE | 429-B-958 |
| W9VOO/9 + W9VAK | 370-B-940 |
| W8RNI/9 | 387-B-924 |
| K0KLI/0 + WA0OOU | 382-B-914 |
| W2RKB/9 + K5IQU | 392-B-884 |
| W3IQM/4* | 258-A-874 |
| WA3NKG/3 + WA3NPS | 378-B-856 |
| K0AVI/0 + WA0ODW | 378-B-856 |
| WA8AZ/8 + WA8AZA | 325-B-850 |
| VE2AQV/6 | 322-B-844 |
| WA3NFI/3 + WA3QBE | 353-B-806 |
| VE3FIQ/3 | 352-B-804 |
| WB8EIK/8 + WB8LQK | 343-B-786 |
| K0ECC/4* (2 oprs.) | 317-B-784 |
| WA0NB/0* | 307-B-764 |
| W3JER/3* | 275-B-650 |
| WB9APY/9* + K9ORP | 264-B-628 |
| W3LJC/3* + WA3MNO | 253-B-606 |
| K7IWD/7* + WA7HXB | 252-B-604 |
| K1EUM/1 + WN1NOB | 221-B-592 |
| WA4JCD/0 + WA0MQW | 246-B-592 |
| WA6MBP/6 + WN6MBO | 212-B-524 |
| W2WPI/2 | 210-B-520 |
| WB0BGL/0* | 208-B-516 |
| WB9DJT/9 + WB9DJU | 182-B-514 |
| W9BIU/9 | 202-B-504 |
| W0MT/0 + WA0YPC | 200-B-500 |
| WA3LSX/3* + W2CCZ | 133-A-499 |
| K7IDX/7 | 173-B-496 |
| W6ACP/6 + W6MVV | 195-B-490 |
| WA0NVZ/0 (2 oprs.) | 192-B-484 |
| WA9PAD/3* + WA3EOJ | 191-B-482 |
| WA3MVR/3* + WA3MVO | 239-B-478 |
| W3GJB/3* + K3IWI | 157-B-464 |
| W8VWY/8* + K8NGQ | 179-B-458 |
| WA7NWP/7* | 147-B-454 |
| WA0PKE/9 | 225-B-450 |
| WA6GGC/6* | 174-B-448 |
| WA4LBO/4 | 172-B-444 |
| K1LEM/1* + WA1KAH | 169-B-438 |
| WN1MNX/1 | 168-B-436 |
| W2MOB/2* + W2MVX | 139-B-428 |
| VE3DV/3 | 148-B-426 |
| WA8LVT/8* + WA8LWH | 105-A-415 |
| W7DRA/7* | 70-A-410 |
| WA9OMN/9* (2 oprs.) | 148-B-396 |
| W7UGK/7 + K7REK | 146-B-392 |
| WA7MQO/7* + K7YSR | 146-B-392 |
| WA3JYV/1* | 144-B-388 |
| WA8VN/8 + WA8YTH | 143-B-386 |
| WA8REN/8 + WA8ROU | 141-B-382 |
| WA1KBZ/1 | 139-B-378 |
| VE7AED/7* + VE7GD | 114-B-378 |
| WA6FKO/6 + WN6FNL | 138-B-376 |
| WA7DGF/7* | 135-B-370 |
| VE7BAF/7 + VE7BZY | 110-B-370 |
| WA2EAJ/2 | 176-B-352 |
| WA5NHJ/5* + WA5MGC | 124-B-348 |
| WA9ZXZ/9 | 160-B-320 |
| WA5SCL/5 + WA5TYJ | 215-C-315 |
| WB2YLU/2* + WB2FVZ | 67-A-301 |
| K6ZJ/6 | 64-A-292 |
| WB9DDR/9 | 84-B-268 |
| KL7AKL/7 | 80-B-260 |
| WA7JVB/7 + WA7ILC | 53-B-256 |
| W7WTO/7 | 126-B-252 |

| | |
|--------------------|-----------|
| WB4ERZ/4 | 68-B-236 |
| W0KMH/7* | 44-A-232 |
| WA7LFG/7 | 62-B-224 |
| WN9HGN/9* + WN9EJT | 37-B-224 |
| WN4STA/4 + WN4SAL | 31-B-212 |
| WB6FVY/6 | 106-B-212 |
| W4LKB/4 + K4GSX | 17-A-201 |
| W2NG/2* | 29-A-187 |
| W6AMB/6 + WB6MNU | 43-B-186 |
| W2PXL/2 | 41-B-182 |
| WN9EMU/9* + WN9FUJ | 39-B-178 |
| WN6FND/6 + WN6FMO | 38-B-176 |
| WN1MJC/1* | 11-B-172 |
| WB8DHV/7* | 35-B-170 |
| W7JJY/7* | 31-B-162 |
| WA8JXM/8 + WA0JLY | 20-A-160 |
| WA5WFR/3* | 18-A-154 |
| WA3JTX/8 + WA3KJI | 13-B-126 |
| W3STV/3* | 8-A-124 |
| K5TAJ/7 | 27-A-81 |

| 2B | |
|--------------------|-------------|
| WA2UOO/2 + W2VJZ | 1039-B-2328 |
| WB5AIS/5* + WB5CEE | 756-B-1712 |
| WA2DFI/2 + WB2ISS | 519-B-1238 |
| WA7PLE/7 + WN7NNR | 468-B-1136 |
| WB2PEV/2 + WA2PCO | 458-B-1116 |
| W0MEL/0 (2 oprs.) | 417-B-1084 |
| W6OUFT/6 + WB6QQF | 433-B-1066 |
| W4SKOX/5 + WA5MLW | 308-B-916 |
| WA9UZR/9* + WB9EVH | 326-B-852 |
| WA0MKB/9* + WA0VYB | 280-B-810 |
| WA6ABP/6* + WB6PBD | 243-B-736 |
| WA0UVG/0* + WN0CXW | 267-B-734 |
| WB2SIH/2* + WA2FUI | 205-B-660 |
| WB8HIZ/8 + WB8DZJ | 202-B-654 |
| K8PTZ/8 + WA8VJE | 349-C-599 |
| WA2FLK/2 + WB2KDX | 288-B-576 |
| K2ROU/2 + WB2WYO | 160-B-520 |
| K6KVC/6* + WB6NUK | 255-B-510 |
| WA7JOV/7* + WA7JJK | 114-B-478 |
| WB6LSL/6 + WB6IPI | 127-B-454 |
| W1YSR/1* (2 oprs.) | 102-B-404 |
| K4UJS/4 + K4ILL | 72-B-344 |
| WA1NEL/1 + WN1OMM | 100-B-310 |

| 3B | |
|------------------|-----------|
| WA0YSO/0 + K0EKR | 161-B-672 |

| Class C Call-Area Leaders | |
|--------------------------------------|----------------|
| (Bold Face = Over-all class leaders) | |
| 1 Transmitter | ..... |
| K1FSI/1 | K9SFOQ/9 |
| K2RKS/2 | WA0ATY/0 |
| W3BRD/3 | VE3FHOJ/3 |
| W84GHZ/4 | 3 Transmitters |
| K5YCK/5 | W8ODJ/8 |
| WA6OK/6 | |
| W7AEA/7 | |

| Class C | |
|----------------------|-----------|
| WA6IQK/6 | 287-B-574 |
| K5TCK/5 (2 oprs.) | 181-B-512 |
| WB4GHZ/4 | 250-B-500 |
| K6HJJ/6 | 215-B-430 |
| W6LLP/6* | 190-B-380 |
| KP4CQC/4* + KP4CBI | 190-B-380 |
| W6OHR/6 | 180-A-360 |
| K2RKS/2* (4 oprs.) | 103-B-356 |
| K1FSI/1* | 176-B-352 |
| W6CXD/6 | 162-B-324 |
| W6NFH/6 | 162-B-324 |
| W7AEA/7* + W7BTU | 110-B-320 |
| WB6DFO/6 | 148-B-296 |
| WB6KZN/6 | 139-B-278 |
| K9SFO/9* (3 oprs.) | 42-B-234 |
| WB6ON/6 | 112-B-224 |
| W6OYS/6 | 108-B-216 |
| WA9SCHY/9* (3 oprs.) | 33-B-216 |
| WA6UNL/6 | 106-B-212 |
| WA6THI/6 | 102-B-204 |
| WA9BVL/9* (3 oprs.) | 24-B-198 |
| W2BHC/2 (2 oprs.) | 95-B-190 |
| W3BRD/3* | 84-B-168 |
| WA0ATY/0* | 31-B-162 |
| WB6SBR/6 | 69-B-138 |
| WA2JNF/2* (2 oprs.) | 6-B-112 |

| | |
|-----------|----------|
| W6ESZ/6 | 56-B-112 |
| WB6HOJ/6 | 56-B-111 |
| K4BJM/4 | 50-B-100 |
| W68IAW/6 | 44-B-88 |
| K6RIU/6 | 34-B-68 |
| WA7PEL/0* | 30-B-60 |
| WB6PHQ/6 | 29-B-58 |
| W6EXT/6* | 15-A-45 |
| W5OOY/5 | 20-B-40 |
| W6IXC/6 | 18-B-36 |
| W0SPF/0* | 18-B-36 |
| W6TEE/9 | 8-A-24 |
| VE3FHO/3 | 12-B-24 |
| WN6CXO/6 | 2-B-4 |

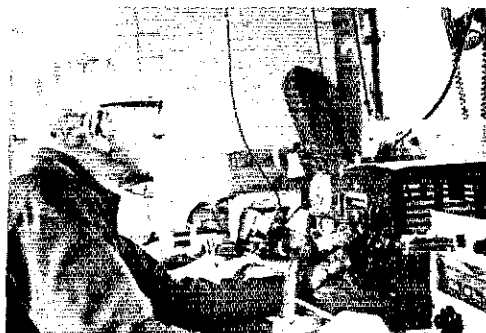
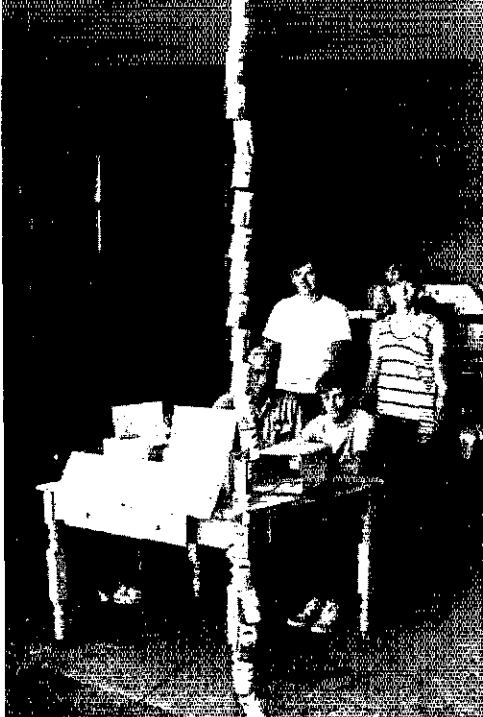
3C
W8ODJ/8 (15 oprs.) 261-C-261

| Class-D Call-Area Leaders | |
|--------------------------------------|----------------|
| (Bold Face = Over-all class leaders) | |
| 1 Transmitter | 2 Transmitters |
| WA1MICY | WINRE/1 |
| WB2IOF | K6FA |
| WA3KZN | WA7OFW |
| W4KLC | |
| WA5YCG | 3 Transmitters |
| WA6AAG | W1AEC |
| W7ROU | W2MU/2 |
| WB8BTH | WA3IQK |
| WA9LZA | WA9TFZ/9 |
| K0DSD | |
| ..... | 4 Transmitters |
| | K6SIR |

| Class D | |
|---------------------|-------------|
| WB2IOF* | 1010-B-2020 |
| WA9LZA* | 757-B-1514 |
| W2ADHF | 624-B-1248 |
| W7ROU | 618-B-1236 |
| WA5YCC* | 531-B-1112 |
| WA2EXZ + WA2GOI | 509-B-1018 |
| WA6AAW (2 oprs.) | 399-B-798 |
| W2FVS | 386-B-776 |
| WB6CIX* | 340-B-680 |
| WA6BNZ | 306-B-612 |
| WB9CJH (2 oprs.) | 280-B-560 |
| WA6DDQ | 541-C-541 |
| W7HVIH/7 | 239-B-528 |
| WA3KZN | 233-B-516 |
| WA3RBI* | 486-C-486 |
| WA1MICY | 240-B-480 |
| WB2IKL* | 232-B-464 |
| WA2LQO | 228-B-456 |
| W4KFC | 210-B-420 |
| WA9SVZ | 206-B-412 |
| WA6DWO* | 189-B-378 |
| WB8BTH* | 183-B-366 |
| WA1GXI* | 338-C-338 |
| K7UWT + W7JC | 163-B-376 |
| WB4QWM* | 161-B-322 |
| WA5ZKO | 162-B-322 |
| WA2QBC* (2 oprs.) | 317-C-317 |
| W5EJK (3 oprs.) | 158-B-316 |
| WN8GSV* | 155-B-310 |
| WA3KYC | 145-B-290 |
| K4CAX* | 145-B-290 |
| WB8RU* | 288-C-288 |
| K0DSD (WA5YK, opr.) | 140-B-280 |
| K1ATL | 133-B-266 |
| WB6EYC* | 133-B-266 |
| WB2NYC/1* | 124-B-248 |
| WA1KYV | 114-B-228 |
| K4CQA/8* | 114-B-228 |
| WA1NKE* | 226-C-226 |
| WB9JHI | 111-B-222 |
| WB6OJF* | 110-B-220 |
| WB8AYC | 208-C-208 |
| WB2YIG | 101-B-202 |
| W9TGB* | 195-C-195 |
| W6ROZ | 95-B-190 |
| WB2NMH* (3 oprs.) | 91-B-182 |
| WB6YZC | 88-B-176 |
| WA8ZNC* (4 oprs.) | 82-B-164 |
| K3NAF | 79-B-158 |
| W4LEP* | 79-B-158 |
| WB4RXP | 146-C-146 |



Shown here (clockwise) K6YNB/6, W0MOW/0, WN1NLD/1, and W3RCN/3.



| | | | | | |
|------------------|--------|-----|-----------------|-------|----|
| W3JFH* | 67-B- | 134 | W1BB/1* | 14-B- | 28 |
| WB2LVW | 64-B- | 128 | WB4SKJ | 14-B- | 28 |
| WB6BWZ* | 64-B- | 128 | WA0YGY | 28-C- | 28 |
| WA4ZUI | 63-B- | 126 | WA2LEZ* | 12-B- | 24 |
| WA0YSK* | 63-B- | 126 | WN2PWS* | 11-B- | 22 |
| W7EPB* | 62-B- | 124 | WB9FXL + WN9CWS | 11-B- | 22 |
| K5MHG/6 | 119-C- | 119 | WN2RIU | 10-B- | 20 |
| W2CKO | 36-B- | 112 | WN1OCH | 9-B- | 18 |
| W9KR R* | 55-B- | 110 | W7PSS* | 18-C- | 18 |
| WB6MIF* | 54-B- | 108 | WN0CYU | 5-B- | 10 |
| W4YOX | 104-C- | 104 | WB4JDM* | 2-B- | 4 |
| WA2LOI | 103-C- | 103 | W0DPI* | 1-B- | 2 |
| W3BHF* | 51-B- | 102 | | | |
| W7DFO | 49-B- | 98 | | | |
| WB4IUX* | 48-B- | 96 | | | |
| W0ERE* | 44-B- | 88 | | | |
| WB6RKN* | 36-B- | 72 | | | |
| WN7QCC* | 36-B- | 72 | | | |
| WA8BHR | 36-B- | 72 | | | |
| WB0ATR (2 oprs.) | 34-B- | 68 | | | |
| WB4RYZ, | 30-B- | 60 | | | |
| WB6GZS* | 30-B- | 60 | | | |
| WN8ISB | 30-B- | 60 | | | |
| W1AB | 27-B- | 54 | | | |
| W7QCV* | 25-B- | 50 | | | |
| W9ZPC* | 25-B- | 50 | | | |
| WB4RNT* | 23-B- | 46 | | | |
| WB8IOK* | 22-B- | 44 | | | |
| WN1OFI | 18-B- | 36 | | | |
| WN8HIB | 18-B- | 36 | | | |
| WN1OCU | 17-B- | 34 | | | |
| WN2AOC* | 16-B- | 32 | | | |
| W3NHX* | 16-B- | 32 | | | |

| | |
|-------|----|
| 14-B- | 28 |
| 14-B- | 28 |
| 28-C- | 28 |
| 12-B- | 24 |
| 11-B- | 22 |
| 11-B- | 22 |
| 10-B- | 20 |
| 9-B- | 18 |
| 18-C- | 18 |
| 5-B- | 10 |
| 2-B- | 4 |
| 1-B- | 2 |

| | |
|--------|------|
| 577-B- | 1154 |
| 457-B- | 964 |
| 134-B- | 268 |
| 46-B- | 92 |

| | |
|---------|------|
| 1288-B- | 2626 |
| 2353-C- | 2353 |
| 538-B- | 1116 |
| 373-B- | 796 |
| 364-B- | 728 |

| | |
|--------|------|
| 724-B- | 1448 |
|--------|------|

| | |
|--------|-----|
| 144-C- | 244 |
|--------|-----|

| Class-E Call-Area Leaders | |
|---|-----------------------|
| <i>(Bold Face=Over-all class leaders)</i> | |
| 1 Transmitter | K0MHH/0 |
| W4ZRJ | 3 Transmitters |
| W6MQF | VE7ARM |
| W8BTW | |
| 2 Transmitters | 6 Transmitters |
| K4GTS | WA3NAN |

| | | |
|---------|--------|-----|
| W4ZRJ* | 35-A- | 205 |
| W6MQF* | 100-B- | 200 |
| K2KGI/6 | 6-A- | 118 |
| WN6OMK* | 16-B- | 32 |

| | | |
|--------------------|--------|------|
| | 2E | |
| K0MHH/0 (10 oprs.) | 556-B- | 1362 |
| K4GTS (2 oprs.) | 467-B- | 934 |
| W0WSV (12 oprs.) | 368-C- | 618 |
| W4YKY* (10 oprs.) | 163-B- | 576 |

| | | |
|-------------------|--------|-----|
| | 3E | |
| VE7ARM* (7 oprs.) | 228-C- | 528 |

| | | |
|--------|--------|------|
| | 6E | |
| WA3NAN | 918-B- | 1836 |



AMATEUR RADIO PUBLIC SERVICE

NTS RACES AREC

In the Public Interest, Convenience, Necessity

CONDUCTED BY GEORGE HART,* WINJMJ

MONITORING SERVICES

ONCE AGAIN we wish to call attention to several monitoring services that are presently operating in the amateur bands, and to discuss the whole idea. It all started on the West Coast some years ago, with the West Coast Amateur Radio Service — an informal monitoring of 7255 kHz by a group of amateurs to assist anyone requiring assistance for almost any purpose, including but not restricted to emergencies. The group was later formalized, and so was the procedure, and hundreds (thousands?) of amateurs have since benefited from the services rendered.

We have stated above that the procedure was formalized, but yet it is still informal. A contradiction in terms? Perhaps, but we hope you get the idea. Informality is required for popularity, and "WestCARS" is decidedly popular, judging by the number of amateurs who utilize it and participate in it. On the other hand, organization is required for perpetuity, and some kind of set procedure is needed if we are to avoid chaos on the frequency. So WestCARS does have a control station and participants do observe the amenities in deferring to this control and direction, and there are certain procedures which have been developed to make the operation reasonably efficient.

Forty meters has always seemed a natural for this sort of thing. You old timers may remember the "Forty Traffic System" which existed in the 30's, a cw operation on somewhat the same order as WestCARS, which enjoyed amazing patronization despite loose organization prior to WWII.

*Communications Manager, ARRL.

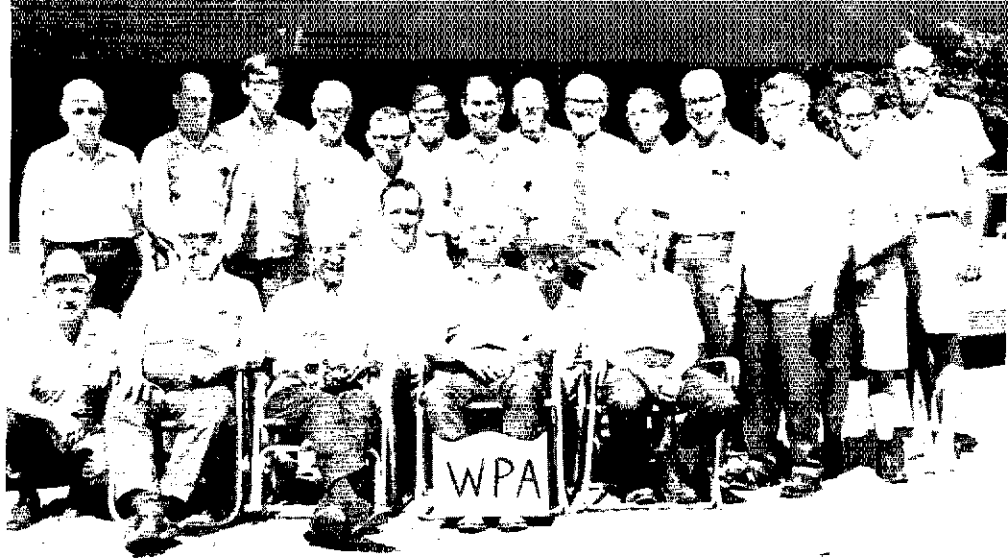
Following the successful establishment of WestCARS, similar groups were formed in the midwest (MidCARS) and in the east (EastCARS), operating quite near each other in frequency and often overlapping in coverage, so that WestCARS, MidCARS and EastCARS can, if necessary, form a chain of service from coast to coast — and, if we're not mistaken, have actually done so a time or two.

Just as the success enjoyed by WestCARS has inspired midwestern and eastern amateurs to start similar services, so has the success of these monitoring services on forty inspired amateurs on 75 meters to set up similar services on that band. Thus, we currently have a report on the Western Public Service System, which operates daily on 3952 kHz during the evening hours, starting with a roll call at "1930 hours" (Pacific Time, we suppose), and 58 of whose members attended the Fresno Hamfest last May. WB6KOL is the man to get in touch with about WPSS. We also have, courtesy of W7UU, a report on a newer monitoring service called NAMService (Northwest Amateur Monitoring Service), which operates on 3970 kHz from 9 A.M. to 5:45 P.M., suspending operation during directed sessions of the Noontime Net at 11:30 A.M. and the Northwest Technical Net at 3 P.M. There is no specific organization — no president, secretary, etc. — "And," says originator Curly Milner, W7MDM, "we hope to keep it that way." There is no roll call and the service flourishes through voluntary efforts. "NAMService is all indians and no chiefs," Curly declares.

One thing that might be considered significant about these monitoring services is that none of

About 25 members (mostly ECs) of the West Florida Phone Net met at DeFuniak Springs, Fla., July 25, for their annual picnic. K4VWE and K4KHV were hosts. (Photo by W4JKB)





The Western Pa. section picnic and Meeting took place Aug. 8 at Cook's Forest. Sitting, l. to r., K3VQV, W3KPKJ (SEC), W3SIJ, W3NEM (SCM), W3RUL (EC), W3LOD, W3LOS. Standing, W3IYI, W3ELZ, W3AMDY, W3MJ, W3KUN (EC and photographer), K3FUD, W2KAT/3, W3MFB (EC, W3SN, W3OEO, W3ATQ, W3MGU, K3MSB (EC), W3AKH.

them is ARRL sponsored, nor has any tie with the League or its headquarters other than the support traditionally rendered to *all* amateur radio public service efforts. This makes it possible to include in public service efforts even those amateurs who for one reason or another (usually personal) fancy themselves injured by the League's policies — a most desirable inclusion.

Even so, life on the monitoring services is no path of roses. They are not so easily permitted to go about their avowed purposes of rendering service to amateurs and the public as one might suppose from their lack of formal organizational affiliation. The sick minds among amateurs do not restrict their harassment to things ARRL; apparently they have this aberrational compulsion to direct harassment at *all* things normally considered beneficial or altruistic. Yes, the monitoring services have received their share, perhaps more than their share, of harassment from unidentified signals, consisting of catcalls, swishing, superfluous transmissions obviously designed to interfere, shouting of four-letter words, and the usual routines that, alas, we are gradually having to become used to.

Public service is one thing and an individual service is another. Or is it? Is an amateur who is given a domestic phone patch for purely personal, non-emergency reasons through a monitoring service being rendered a public service? Can the net be said to be rendering such a service under these circumstances? Many people think not, some even think that this is purely and simply a case of depriving the telephone company of revenue and therefore an inimical practice. Others compare it with record message handling, and ask "Where's the difference, actually?" Did Western Union or the telephone company ever complain about loss of revenue when BPLing was at its peak? Never. On the contrary, both these communications organiza-

tions frequently benefited from amateur know-how in this respect, during emergency conditions, and encouraged amateur preparedness through such normal-time activities. As a matter of actual fact, how many phone patches are actual substitutes for a telephone toll-call? A very low percentage. That is, most of them are calls that wouldn't ever be made if a cost were involved. The telephone industry has never complained about this aspect, and we doubt if it ever will. It is to their advantage for amateurs to be prepared to render this type of service, compared to which the loss of revenue, if any, is negligible.

Why does ARRL not give more recognition to the monitoring services? we are sometimes asked. This question begs the amount of recognition already given, which we feel has been considerable. It also fails to take into account that monitoring services are something comparatively new, regular recognition of which would take space now being used for other forms of recognition — or *more* space. There just "ain't no more" space, so what's to do? Just what we do for all forms of public service activities — publicize them in *QST* when they *do* something along public service lines, always provided, of course, that headquarters is informed of it, in the Public Service Diary which chronicles as many public services as we have room for each month. This is not so much a form of "recognition" or publicity as it is a record of amateur radio public service — the more or less routine, every day services amateurs render that would never be heard of or quickly forgotten if they were not recorded in the "Diary." The monitoring services are as eligible for this column as are any other amateur radio public service groups — to record their special achievements when there are some to record. Their *existence* is recorded in the net directory and in special writeups like this one. — WINJM.

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for August Traffic

| Call | Orig. | Recd. | Rel. | Del. | Total |
|--------|-------|-------|------|------|-------|
| W3CUL | 286 | 994 | 821 | 121 | 2232 |
| WA0VAS | 109 | 423 | 67 | 356 | 955 |
| W7BA | 15 | 441 | 401 | 35 | 892 |
| WB2RKK | 46 | 367 | 309 | 47 | 769 |
| WA1NMZ | 42 | 327 | 292 | 12 | 673 |
| W3VR | 161 | 239 | 216 | 9 | 625 |
| WB2LZN | 32 | 276 | 213 | 23 | 544 |
| W0LCX | 21 | 283 | 205 | 5 | 514 |
| W3JML | 32 | 282 | 179 | — | 503 |

More-Than-One Operator Station

WF7WBC 547

BPL for 100 or more originations-plus deliveries

| | | | | | |
|--------|-----|--------|-----|--------|-----|
| WB2CD1 | 180 | WA8WPO | 152 | W8QXU | 121 |
| W48VX | 168 | WB4SVH | 144 | K8ONA | 129 |
| W3FBI | 159 | WB4KSG | 137 | WA2FGS | 118 |
| WA6BYZ | 158 | W2CU | 136 | WA4MKH | 110 |
| | | W3TN | 134 | | |

More-Than-One Operator Station

WSAC 423, WA4PDM/2 129

BPL Medallions (see July, 1968 QST, p. 99) have been awarded to the following amateurs since last month's listings: WB4AIW, W6JOU.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

Traffic Talk

Our blurb about phone patches counting as traffic in Sept. QST brought a few inquiries regarding whether this means phone patches can be counted toward BPL. Gosh no, only record traffic can count toward BPL, and then only traffic handled in standard ARRL form. Phone patches are credited toward PSHR (Category 6). There is some dissatisfaction among the public service contingent about all this, but we trust it is still a minority. At least, the dissatisfaction varies widely as to reason. Some BPLers feel that BPL is not given a fair shake, spacewise, compared with PSHR, while some PSHRers feel BPLers are still accorded attention they don't receive. It is natural for an individual to be jealous of attention devoted to someone doing something that he does not or cannot do, and to think that his function is the more important and deserves the greater "credit" or "recognition." As long as the reasons for dissatisfaction are so varied, we'll keep on searching for that panacea which will satisfy everybody. Until then, it wouldn't appear that any overt or arbitrary changes are called for. — WINJM.



National Traffic System. Like old times, doing this part of the column again. Hope we haven't forgotten how!

Good CAN Bulletin by Manager W0INH, who says, among other things: "From the standpoint of traffic statistics, August was a disaster!" CAN certificates issued to W4s ZJY OGG, K4OCQ, WB4KPE, W5s SBM MI, WA5s VQE VJW, W9s CXY QLW NXG HRY, WA9s VZM ZKX, WB9AWY, W0s LCX HI BV, K0AEM and K0BAD/4. PAN certificates have been issued to W6s BVB IOU, WA6JGY, W6ZVC, WA7s HCL MAD, W0LQ, WA0ZWA, WB0CQJ. Manager W6BNX is working on getting QNB stations on opposite ends of this exceptionally large area. W2FR has issued 2RN certificates to W2CU, WB2s AEH CDI DDQ, and says that there are many openings for NCS and representation. W6s BGF RSY and YBV did August yeoman service for vacationing RN6ers. Traffic reaching an all time low, sez RN7 Manager W7BQ; Bill thinks the solution is more originations and "spreading the fever" to all nets. W8ALU is now the 8RN statistician. TEN certificates to W0s LCX PET TQD and WA0TAS. K7NHL is experimenting with phone at region level, says so far it cannot be considered successful. Second RN7 session is held on 3973, with 7273 alternate, at 0430Z.

August Reports

| Net | Sessions | Traffic | Rate | Avg. Rep. (%) |
|-------------|----------|---------|-------|---------------|
| EAN | 31 | 395 | 1,207 | 51.5 98.4 |
| CAN | 31 | 741 | 693 | 23.9 100.0 |
| PAN | 31 | 772 | 722 | 34.5 93.0 |
| 1RN | 62 | 530 | 376 | 8.6 94.1 |
| 2RN | 62 | 712 | 831 | 11.5 99.4 |
| 3RN | 62 | 480 | 400 | 7.7 96.4 |
| 4RN | 60 | 425 | 303 | 7.1 92.4 |
| RN6 | 62 | 614 | 454 | 9.9 100.0 |
| RN7 | 62 | 229 | 231 | 3.7 47.3 |
| 8RN | 57 | 535 | 462 | 8.6 86.0 |
| 9RN | 61 | 314 | 336 | 5.1 90.6 |
| TEN | 62 | 390 | 441 | 6.3 77.6 |
| ECN | 42 | 130 | 213 | 3.1 60.0 |
| TWN | 47 | 167 | 139 | 3.6 42.6 |
| TCY Eastern | 1241 | 524 | | |
| TCC Central | 931 | 368 | | |
| TCC Pacific | 1241 | 608 | | |
| Sections2 | 2414 | 11254 | | 4.6 |
| Summary | 3146 | 19388 | EAN | 5.7 |
| Record | 2987 | 31117 | 1,440 | 16.4 |

TCC functions performed, not counted as net sessions.

2Section nets reporting (68): Columbine & CCN (Colo.); N.J. Slow, NJEPTN, NJN & PVTEN (N.J.); Ohio SSB, STEF, AMN, BNR, SSEN, & BN (Ohio); GSN & GTN (Ga.); SGN (Me.); CNCE (N.C./S.C.); SGN & NGN (Calif.); KSSN, EPA, WPA, & FTTN (Pa.); N.M. Roadrunner; WSN (Wash.); MDCTN & MDD (Md.-D.C.); HUN (Utah); TLCN (Iowa); LTN & LAN (La.); BEN, BWN, WBSN, SW2RN (Wis.); CPN, CN, Nutmeg VHF (Conn.); MTFN (Miss.); KYN (Ky.); West Que. V/UHF; VBSN, VN, VSN (Va.); WVN (W.Va.); ILN (Ill.); FMTN, VEN, EAST, GN, WEPN, QFN (Fla.); MSN, M/N, MSPN Noon(Minn.); NYS (N.Y.); WMN (Mass.); OMN (Mich.); AENT, AENR, AEND, AENM, AENB (Ala.); OON, OPN (Ont.); QKS (Kans.); TEX (Texas); RISPN (R.I.).

Transcontinental Corps. W3EML reports this August better than a year ago, with vacation returns about balancing out those going to school as we go into Sept. TCC-E certificate awarded to WB2RKK. One no-report, six "failures." Three failures on TCC-C, with light traffic, sez Director W0LCX, apparently caused by less summer fair traffic. W6VNO reports from a hospital bed that TCC-P had 8 unsuccessful functions; he'll be out by the time you read this.

At the San Jose convention in July, this is Twelfth Region Net Manager K7NHL.

but won't be riding horseback for many moons. August reports:

| Area | Functions | % Successful | Traffic | Out-of-Net Traffic | |
|---------|-----------|--------------|---------|--------------------|------|
| Eastern | | 124 | 94.4 | 1539 | 524 |
| Central | | 93 | 97.6 | 702 | 368 |
| Pacific | | 124 | 93.5 | 1216 | 608 |
| Summary | | 341 | 94.7 | 3457 | 1500 |

The TCC roster: Eastern Area (W3EML, Dir.) - W1s BJG EJJ NJM QYY YNE, K1SSH, W4JTM, W2s FR GKZ, K2KTK, WA2ICU, WB2RKK, W3EML, K3MVO, W4s NLC SQQ UQ, K4s GTS KNP, WB4NNO, W8s PMJ RYP, K8KMQ, W4As PIM YVR. Central Area (W0LXC, Director) - W4s OGG ZJY, WB4KPE, W5s MI SBM, W9s CXY DND, WA9VZM, W0s HI INH LCX ZHN, W40s IAW WEZ, K0AEM. Pacific Area (W6VNO, Dir.) - W5RE, K5MAT, K6s KCB DYX, W6s BGF EOT IPW MLF MNY VNO VZT, W4As DEI LFA, W7s EM PI DZX EKB BQ, K0JSP.

Independent Net Reports (Aug.)

| Net | Sessions | Traffic | Check-Ins | |
|------------------------|----------|---------|-----------|------|
| 20 Meter ISSB | | 22 | 1166 | 481 |
| Clearing House | | 26 | 391 | 445 |
| North American Traffic | | 26 | 181 | 472 |
| H & B Morning Watch | | 31 | 586 | 321 |
| 7290 Traffic | | 44 | 453 | 1805 |
| Mike Farad | | 26 | 157 | 331 |
| All Service | | 5 | 38 | 90 |
| Northeast Traffic | | 31 | 281 | 471 |
| Eastern Area Slow | | 31 | 72 | 172 |
| ECTTN | | 13 | 13 | 82 |

Public Service Diary

A belated report indicates that back in January, '71, the radio officer for Oswego County (N.Y.) Civil Defense, K2DUR, received a request from the Fulton Police Dept. to furnish radio links in various areas to assist in the search for a missing elderly woman. The c.d. Emergency Operating Center was opened and manned and mobiles and portable units sent to Oswego County Airport. WA2SOO, WA2ZXT, WN2SOZ, WA2ZXU, WA2NUP and WA2LOW also participated, either actively or on a standby basis. No info on results of the search.

Another belated report comes to fore, this one from the Texas Panhandle which experienced a blizzard on Feb. 20-21 which bottled up all roads. Road reports were coordinated through the Panhandle Net on 3940 kHz, which operated from 2030Z Sunday to 0420Z Monday. Through W5RXC, info on road conditions were patched live over local TV and radio stations. At least five people considered lost in the storm were located through the efforts of the net. Net control stations were W5s RXC OTZ, WA5s FRJ RQS UMY and TBS - WA5UMY, Net Mgr., Panhandle Amateur Radio Net.

Still another belated report comes from W5NCB, Miss. SCM, concerning the part played by

The Miami Valley F.M. Assn., the Cincinnati F.M. Club and the Miamisburg Wireless Assn. supplied communications for the World Inboard Motor Boat Races on July 24, 25, 30, 31 and Aug. 1 at Eastwood Lake in Dayton, Ohio. Forty amateurs took part. Above is a typical action scene with the course safety officer at left, WA8ZUA with the hand-unit at right.

Public Service Honor Roll August 1971

This listing is available to amateurs whose public service performance during the month indicated qualifies for 30 or more total points in the nine categories below. A delineation of the points awarded for each function is given in the category key at the end of the Honor Roll listing. Please note maximum points for each category. Those making fewer than 45 points are listed with point totals only.

| Category | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | Totals |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| Max. Pts. | 10 | 10 | 12 | 12 | 12 | 20 | 3 | 3 | 5 | |
| WB6ZVC | 10 | 5 | 12 | 12 | 12 | 20 | | | 5 | 76 |
| K7UTP | 10 | 10 | 12 | 12 | 12 | 12 | | | | 68 |
| W3EZF | 10 | 10 | 12 | 9 | 12 | 7 | | | 5 | 65 |
| W3JCS | 10 | 10 | 12 | 12 | 12 | 3 | | | | 64 |
| K7NHI | 10 | 10 | 12 | 12 | 12 | | | | 5 | 61 |
| WB2ABH | 10 | 10 | 12 | 12 | 12 | | | | 5 | 61 |
| WB2RKK | 10 | 10 | 12 | 12 | 12 | | 3 | | | 59 |
| W1YNE | 10 | 10 | 12 | 12 | 12 | | | | | 56 |
| WA2ICU | 10 | 10 | 12 | 12 | 12 | | | | | 56 |
| W40GG | 10 | 10 | 12 | 12 | 12 | | | | 56 | 56 |
| W40GG | 10 | 10 | 12 | 12 | 12 | | | | | 56 |
| WB0BBG | 10 | 10 | 12 | 12 | 12 | | | | | 56 |
| WB0BBV | 10 | 10 | 12 | 12 | 12 | | | | | 56 |
| W70CX | 10 | 5 | 12 | 12 | 12 | | | | 5 | 52 |
| WA1JPI | 10 | 5 | 12 | 12 | 12 | | | | | 51 |
| W6MNY | 10 | 8 | 12 | 3 | 12 | | | | 5 | 50 |
| K0MRI | 10 | 10 | 12 | 12 | 12 | | | | | 54 |
| W3MPX | 10 | 10 | 12 | 12 | 12 | | | | 5 | 49 |
| WB4OKT | 10 | 10 | 12 | 12 | 12 | | | | 5 | 49 |
| W5EDT | 10 | 10 | 12 | 12 | 12 | | | | 5 | 49 |
| W9HRV | 10 | 10 | 12 | 12 | 12 | | | | 5 | 49 |
| WB4JMH | 10 | 10 | 12 | 12 | 12 | 4 | | | | 48 |
| WA0VAS | 10 | | 12 | 3 | 20 | 3 | | | | 48 |
| W2CU | 10 | 10 | 12 | 12 | 12 | | 3 | | | 47 |
| WB4DAJ | 10 | 10 | 12 | 12 | 12 | | | | 5 | 47 |
| W4NOG | 10 | | 12 | 12 | 12 | | | | 5 | 47 |
| W6RGP | 10 | 8 | 12 | 12 | 12 | | | | 5 | 47 |
| W0LCX | 10 | 5 | 12 | 12 | 12 | | 3 | | 5 | 47 |
| WA2EVH | 10 | 10 | 12 | 9 | 12 | | | | 5 | 46 |
| WB4JDT | 10 | 10 | 8 | 6 | 12 | | | | | 46 |

| | | | | | | | | |
|--------|-------|----|---------|-------|----|------------|-------|----|
| K3OIO | ..... | 44 | W3NEM | ..... | 39 | K2KTK | ..... | 34 |
| K5ROZ | ..... | 44 | W5RHH | ..... | 39 | K0BAD/4 | ..... | 34 |
| W2BU | ..... | 44 | W0INH | ..... | 39 | VE3DV | ..... | 34 |
| WB2NOM | ..... | 44 | W6IYY | ..... | 39 | VE3PXI | ..... | 34 |
| WB5DEK | ..... | 44 | W0HH | ..... | 39 | VE3GPN | ..... | 34 |
| W5SBM | ..... | 44 | W0HH | ..... | 39 | W3YA | ..... | 34 |
| W7AXI | ..... | 44 | WA2NLP | ..... | 38 | WB4KSL | ..... | 34 |
| W7IBK | ..... | 44 | W0SIN | ..... | 38 | W4UQ | ..... | 34 |
| W7MCW | ..... | 44 | VE3JAYZ | ..... | 37 | WASVJW | ..... | 34 |
| W7PI | ..... | 44 | WB2CDE | ..... | 37 | W6HUI | ..... | 34 |
| W0BV | ..... | 44 | W3TIN | ..... | 37 | W6YBV | ..... | 34 |
| W40DEI | ..... | 42 | WB4SVX | ..... | 37 | W2MTA | ..... | 33 |
| VE3AMS | ..... | 40 | E3EIR | ..... | 36 | W6JIT | ..... | 32 |
| W7HO | ..... | 40 | K3MFG | ..... | 35 | WABETX/VE3 | ..... | 32 |
| VE3FRU | ..... | 40 | WA2MFC | ..... | 35 | W4BIC | ..... | 32 |
| W2ER | ..... | 40 | WA3IV | ..... | 35 | WB2LQP | ..... | 31 |
| W2RUF | ..... | 39 | WB6ZTI | ..... | 33 | WB6AKR | ..... | 31 |
| W3LOS | ..... | 39 | WA0HRM | ..... | 35 | WA6AAW | ..... | 30 |
| | | | E1SKP | ..... | 34 | | | |

Category Key: (1) Checking into cw nets, 1 point each; (2) Checking into phone/RTTY nets, 1 point each; (3) NCS cw nets, 3 points each; (4) NCS phone/RTTY nets, 3 points each; (5) Performing assigned function, 3 points each; (6) Legal phone patches, 1 point each; (7) Making BPL, 3 points regardless of traffic total; (8) Handling emergency traffic directly with a disaster area, 1 point each message; (9) Serving as net manager for entire month, 5 points.





At the Greene County (Pa.) Fair in August, EC WA3NAZ (above) operated this demonstration ham station, with the assistance and cooperation of SEC W3KPKJ.

patient's life. Amateurs assisting included KZ5MB, LUI1DQ, WB4GMU and W9RUK. - KZ5MM.

On Aug. 8, on 15 meters ssb, WB9DNR received a call from an unidentified (to us, not to him) station in an isolated village in Peru asking for help in obtaining information for treatment of a cardiac patient. WB9DNR contacted a local doctor who relayed the necessary information to the calling person and two student nurses in the village. - K9EEH.

At 2130Z, Aug. 9, local c.d. called WB8BOT, acting EC for Genesee County, Mich. A severe storm had ruined the Linden, Mich., Fire Department antenna system, leaving them without communications. Through W8BFYF, help was requested on 2 meter fm. W8SSCI, W8CZLN, W8UXU, W8JUU and W8LXC responded and rushed to the scene. Not only was communication provided for the fire department, but a temporary antenna was erected, thereby restoring fire department communications. - WB8BOT, Acting EC, Genesee County, Mich.

On Aug. 9 at 0715 EDT, the Lakehead Search & Rescue Unit set up a base search camp in the Eaglehead Lake (Ont.) area and an organized search began for a lost 63-year-old berry picker. Supplemental amateur radio was set up at the base camp under call of VE3AYZ/mobile and communication maintained with VE3AJ and VE3ECR in Thunder Bay. Later VE3EEW relieved VE3AYZ and VE3ZCD/P3, station of the Lakehead Amateur Radio Club, was put in operation by VE3EEW from the search camp. The search terminated Aug. 10 at 1000 EDT when the lost person was found in good shape. - VE3AYZ, EC Thunder Bay Dist., Ont.

While demonstrating his station to some non-hams on Aug. 14, WN9HY1 heard VE3DAX calling for a Chicago station on 7160 kHz. Contacted, VE3DAX explained that a party in Toronto had been in a serious accident and notification of next of kin in Chicago was needed. WN9HY1 relayed the messages to the Chicago party and spent over two hours clarifying all details. - WN9HY1

On Aug. 27, the eve of Hurricane Doria, the nightly home-from-work chitchat through the Insurance City Repeater Club Station (now WA1HKK) on 146.28/.88 MHz was interrupted by W1EA who had just witnessed a traffic accident on Conn. Route 10, Avon. His request for police and tow trucks was landlined by W1ORW and officers arrived on the scene within ten minutes. - WIUED.

On Sept. 16 a sports car failed to negotiate a tight curve at an entrance ramp to Conn. Route 20 near Bradley International Airport in Windsor Locks, Conn., completely blocking the road. WIUED/mobile was one of the first to arrive after the incident and called police via the Insurance City Repeater Club's repeater, WA1HKK, and W1PYO. - WIUED.

amateurs in Mississippi during the February tornadoes. K5UBL and WA5VOR operated from Inverness 70 hours, handling over 200 health and welfare messages on RACES. They also received and retransmitted a tornado warning to Greenwood. WASSEG operated portable from Belzoni for 27 hours. K5TFV and K5JUD operated for 56 hours from Indianola, handling more than 100 health & welfare messages, plus many more on the RACES nets, also transmitted a number of tornado warnings. W5GGZ was assistant NCS on the RACES net for 56 hours. WA5JWD was on hand when the tornado touched down in Belzoni and his mobile was the only communication out of there until early Monday, when WASSEG took over. WA5GOH, along with K5SVC and WB5AHZ, operated a portable station from the sheriff's office in Rolling Fork for 47 hours, handling 127 messages. WA5OKI received a tornado warning for Oxford only 8 minutes before it touched down, injuring 45 people; he operated an emergency center for 16 hours thereafter. Other mobiles in the area were K5VQA, K5HCI, K5AEU, WA5UDQ.

WA5UYW, net manager for MSBN, kept his station on the air for 33 hours and with the help of 29 participating amateurs handled over 200 health & welfare messages to stations in the disaster areas. Just before closing down, this net obtained a census of all the injured in the various hospitals, which turned out to be very helpful in locating the injured and re-uniting them with their families, as well as reassuring others that their loved ones were not hurt. The CGCHN Net was also activated and operated for 1-1/2 hours with welfare traffic from Mississippi and Delhi, La.

An excellent job and congrats to all. The report was mailed by W5NCB in late March, but apparently never reached headquarters. Our regrets to all for the undue delay.

On July 4 KZ5BU received an urgent call from OA4IO in Lima, Peru. A brain surgery patient in Lima required a rare drug. KZ5BU began calling amateurs in the states to search for a supply of the drug. None of them could insure delivery of the medicine in time, but a hospital in the Canal Zone had a similar drug which was acceptable as a substitute. The medicine was flown to Peru by commercial airline, arriving in time to save the

The Norfolk (Va.) Amateur Radio Public Service Corps was alerted by the American Red Cross of impending flood conditions, on March 25, and asked to survey low-lying areas for flood reports and report back to the Red Cross. NARPSC members were alerted as per plan, on a 60% basis, nineteen members, but the control center and communications van were not activated. Assignments consisted of WA4BUF, K4PQD and WB4OSS at Ocean View; and WB4LNA, K4IIV, WB4OSQ and W4KBY at strategic midtown and downtown points. No emergency developed, but NARPSC was on the job. — WA4BUE.

In May, 1971, a disastrous tornado struck the city of Whitney, Texas. K5UOR, District 61 RACES Radio Officer, contacted Unit 61A, the District 61 Net Control Station and had him establish a net on 3987.5 kHz. Meanwhile, one of their weather watch stations equipped with both 2-meter and 75-meter gear went to Whitney to be ready to help. However, the RACES units were not needed. — Texas RACES Bulletin.

The AREC of Augusta County, Va., was activated by EC WB4KIT on May 30 at 5 A.M. when the Weather Bureau in Washington predicted possible floods in the area. Within a few minutes WA4PXX in Staunton, WA4FJC in Verona, W4WHH in Churchville, WB4OHL in Waynesboro and WA4BOQ in Staunton were on 75 meters and several 2-meter fm stations were ready to assist as mobiles. A watch was maintained until 1500Z, when the flood watch for Waynesboro was lifted and all emergency facilities were secured at 1610Z. What could have been a major disaster failed to materialize, but the alert showed that the Augusta County AREC is ready. — WB4KIT, EC Augusta County, Va.

Tornado watches were set up in Monroe County, Mich., on June 2, 6 and 7, in cooperation with the Monroe County Chapter, American Red Cross. Monroe County AREC nets on 6 and 2 meters were activated on all three days as well as the communications center in the Red Cross building. As per plan, an AREC member was assigned to monitor fire and police communications and report pertinent data into the AREC nets. Michigan ESSA also is monitored by local AREC members. Twenty local amateurs participated in this alert. — WA8EFK, EC Monroe County, Mich.

Congratulations are in order to the Hurricane Watch Net during Hurricane Doria on August 27. K4RHL at Fort Lauderdale, Fla., was assisted as NCS by WA1DXI, EC for Medford, Mass. and WA4VXR. All did a fine job, according to WIAOG, SEC Eastern Mass.

Another Hurricane Doria report comes from WA3GSM, EC for Sussex County, Del. A local monitoring group became a formal net as the storm moved close to the Delaware and Maryland coastal area. The organized net was stimulated by SEC W3DKX and SCM W3NYG, along with Delaware State CD. The net went into session formally at 2255 EDT, with stations reporting barometer readings and wind directions, power outages and other weather advisories. W3MK and K3NVV reported on minor flooding in the Dover area. W3PM went on the beach at Rehoboth during the

height of the storm to report on the tide and general condition of the beach. No emergency traffic or operation was necessary as the storm passed the area by 0312 EDT on Aug. 28.

The Tidewater Chapter of NARPSC (Norfolk Amateur Radio Public Service Corps) also was activated at 4 P.M. on Aug. 26 as Hurricane Doria posed a threat. WB4OSQ set up a station in the chapter house. At 1700, contact was made with W3KDI/4 and Doria was located by comparative barometer readings southeast of Kitty Hawk, N.C. Mobiles reported all low lying areas in Norfolk were flooded. The Virginia State Sideband net was alerted at 1800, and Virginia Phone Net (VFN) at 1930. WA4VHV gave rain and wind reports from Elizabeth City, N.C., via WA4VTX repeater. At 2040, WA4JZX/mobile reported clear skies south of Elizabeth City, a signal that the storm was over. WA4BUE says that all personnel performed exceedingly well, and if it had been needed a mobile communicator could easily have been dispatched to the Outer Banks of North Carolina.

A large stack of reports of non-emergency operations has accumulated in our files, with little prospect that their details will ever see QST print. However, we want to at least mention them, as far back as possible. Space will not permit even this, in this issue, but we hope the situation will be better next month.

Thirty-six SEC reports were filed for July, representing 11,544 members, a drop of seven reports and something like 3000 members since a year ago. This won't do, fellows. Sections reporting: Alta., Ariz., Colo., Conn., E.Fla., E.Mass., E.Pa., Hawaii, Ind., Iowa, Kans., Ky., Mar., Mich., Mont., Nebr., Nev., N.Tex., Ohio, Ont., Orange, Oreg., R.I., San D., Sask., S.Dak., S.N.J., Tenn., Utah, Va., Wash., W.Va., W.Fla., W.Mass., W.N.Y., W. Pa.

Armed Forces Day

(Continued from page 57)

THAT ONLY THROUGH SUSTAINED COOPERATION BETWEEN ALL SUPPORTING ORGANIZATIONS WILL THE FUTURE VALUE OF THE AMATEUR RADIO SERVICE AS A NATIONAL AND INTERNATIONAL RESOURCE BE ENHANCED AND THE CONTINUED SUCCESS OF MARS BE ASSURED SGD MELVIN R LAIRD CMM SECRETARY OF DEFENSE BT QRU AR

RTTY Receiving Contest Results

There were 467 perfect entries for the 60 wpm broadcast message originated by the Secretary of Defense. A Certificate of Merit has been mailed to all those individuals who submitted a perfect contest entry. It should be noted that there were more perfect radioteletypewriter contest entries than cw, demonstrating the increasing competence of the amateur radio operator in this mode of operation. The complete text of the RTTY message is almost identical to that for cw, with only minor changes in phraseology.

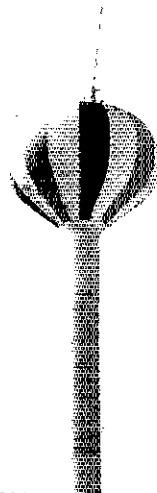
How to Put Down an Antenna!

The Northwest Florida FM Association, operators of the 2-meter fm repeater WB4KLT, had a high-gain antenna to mount at their repeater transmitting site in Fort Walton Beach atop a 150-foot high water tower tank. The antenna was too big to carry up the interior steps of the tower and they didn't want to scratch the new paint job on the tower by pulling it up.

The solution was a helicopter assist which required two trips, one to carry the stainless steel mounting bracket and one to carry the antenna shown on the cover. The two-place helicopter normally carries tourists on short sightseeing flights and charges \$1 a minute for use. However, it was worth the expense to insure a safe trip to the top for the \$200 antenna!

It took three helicopter passes to get the antenna in just the right position so it could be secured to its mounting bracket. Just in case you need a scale reference, the antenna mast is 25 feet long.

The antenna is mounted with the dipoles to the north so that the south null will fall over the Gulf of Mexico. The receiver site uses the same kind of antenna atop a conventional tower and it is located in Destin about 6 miles away.



Atop the tower were W3SMS, WB4TPR and W4RKH. Assisting the helicopter pilot was W4FDJ. The ground crew included WA7DVD/4, WB4EQU, and W4WBW. — Frank M. Butler, Jr., W4RKH.

ARRL QSL Bureau

The function of the ARRL QSL Bureau is to facilitate delivery to amateurs in the United States, its possessions and Canada, of those QSL cards which arrive from amateur stations in other parts of the world. All you have to do is send your QSL manager (see list below) a stamped, self-addressed envelope, about 4 1/4 by 9 1/2 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.

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

- W1, K1, WA1, WN1¹ — Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.
- W2, K2, WA2, WB2, WN2 — North Jersey DX Assn., P.O. Box 508, Ridgewood, NJ 07451.
- W3, K3, WA3, WN3 — Jesse Bieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355.
- W4, K4 — North Alabama DX Club, P.O. Box 2035, Huntsville, AL 35804.
- WA4, WB4, WN4¹ — J. R. Baker, W4LR, P.O. Box 1989, Melbourne, FL 32901.
- W5, K5, WA5, WB5, WN5 — Kenneth F. Isbell, W5QMJ, 306 Kesterfield Blvd., Enid, OK 73701.
- W6, K6, WA6, WB6, WN6¹ — No. California DX Club, Box 11, Los Altos, CA 94022.
- W7, K7, WA7, WN7 — Willamette Valley DX Club, Inc., P.O. Box 555, Portland, OR 97207.
- W8, K8, WA8, WB8, WN8¹ — Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.
- W9, K9, WA9, WB9, WN9 — Northern Illinois DX Assn., Box 519, Elmhurst, IL 60126.
- W0¹ — Reggie Hoare, W0OYP, P.O. Box 115, Mitchellville, IA 50169.
- WA0¹ — Lloyd Harvey, W0QGI, P.O. Box 7, Attica, IA 50024.
- K0, WB0, WN0¹ — Dr. Phillip D. Rowley, K0ZFL, Route 1, Box 455, Alamosa, CO 81101.
- KP4 — Alicia Rodriguez, KP4UL, P.O. Box 1061, San Juan, PR 00903.
- EZ5 — Canal Zone Amateur Radio Association, Box 407, Balboa, C.Z.
- KH6, WH6 — John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, HI 96701.
- K17, WL7 — Alaska QSL Bureau, Star Route C., Wasilla, AK 99687.

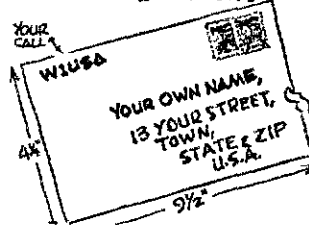
- VE1 — L. J. Fader, VE1FO, P.O. Box 663, Halifax, NS.
- VE2 — John Ravenscroft, VE2NV, 353 Thorncrest Ave., Montreal 780, PQ.
- VE3 — R. H. Buckley, VE3UW, 20 Almont Road, Downview, ON.
- VE4 — D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, MB.
- VE5 — A. Lloyd Jones, VE5J1, 2328 Grant Road, Regina, SK.
- VE6 — Karel Tettelaar, VE6AAV, Sub. P.O. 55, N. Edmonton, AB.
- VE7 — H. R. Hough, VE7HR, 1291 Simon Road., Victoria, BC.
- VE8 — George T. Kondo, C/o Ministry of Transport, Norman Wells, NT.
- VO1 — Ernest Ash, VO1AA, P.O. Box 6, St. John's, NF.
- VO2 — Goose Bay Amateur Radio Club, P.O. Box 232, Goose Bay, LB.
- SWL — Lerov Waite, 39 Hannum St., Ballston Spa, NY 12020.

¹ These bureaus prefer 5 x 8 inch or No. 50 manila envelopes.

QSL Bureaus for other U.S. Possessions and for other countries appear in the June and December issues of QST.

Note: First Class mail in the U.S. is now 8¢ an ounce. QSL Bureau users should send their manager enough two-cent stamps to cover the envelopes on file.

IS YOURS ON FILE WITH YOUR QSL MGR?



"It Seems to Us. . ."

(Continued from page 9)

close watch on the future of the spectrum and close liaison with their respective PTTs. Without attempting to prognosticate the outcome, it does appear that there are distinct possibilities for more amateur frequencies. I would urge all amateurs, especially their organizations, to do everything possible to further a serious consideration of this matter.

"a) Ascertain the status within your respective countries of frequency utilization, present and future.

"b) Discuss the potential with appropriate government officials.

"c) Initiate liaison discussions with IARU on the subject.

"Being an optimist, wouldn't it be nice to have amateur bands at 3.5, 7, 10, 14, 18, 21, 24 and 28 MHz? *It sure would!*"

W8BU SAYS:*

In the *Cleveland Press* this week there was published a picture of a young lady with the colorful imprint of the American flag upside down on the seat of her blue jeans. She had been arrested for this desecration of our Flag and fined one thousand dollars and given thirty days in jail to think about it, with the following stern lecture. It seemed the young lady was a mother of six children, her husband having gone elsewhere, and the whole family was on welfare. Now six children can draw down a lot of welfare — and it is all free.

The young lady was reminded that the government represented by the Flag she had sat upon was paying this welfare. The Judge finally asked the gal if she didn't think it was a pretty good government after all to keep her and her six children on the payroll. The girl answered meekly, "Yes, she thought it was a pretty good government after all," and she was given probation which, in this writer's opinion, was also the sign of a pretty good government, too. Many of us are like that. We do not understand when we are well off. We take it for granted, never giving a single thought to what things would be like without that good government.

Now, this is the attitude of many of our fellow hams when they complain, kick


*[EDITOR'S NOTE: It is not often we run a "guest" editorial in QST. But then it is not often we find a piece as direct to the point and well stated as this one.]

and beef about ARRL — while accepting its protection and its many benefits without a thought of what things might be like without that membership plaque pasted up in the ham shack.

Let me point out the League has given help and assistance to the amateur fraternity whether member or no — all, of course, paid for by those 90,000 of us who do believe and are willing to pay \$6.50 a year for the opportunity.

The League's greatest contribution to the survival of amateur radio as it is today, in this writer's opinion, is the fact that the League itself has been able to survive, grow and be greater each year over a period of more than 50 years, through three devastating wars and an equally devastating depression. No amateur group can match this fact . . .

To have a League of radio amateurs 90,000 strong to represent all the hams before the FCC and the ITU and wherever else the amateur service is or could be at stake or in trouble all over the world — it's no mean undertaking!

So come on, fellows and gals — complain if you wish, dissent if you will, but let's not figuratively stick the emblem up in our shack upside down. With all its faults, it is a pretty good old League. After all, it stands for Amateurs United, one for all and all for one. When someone comes up with something better, let's all join, but until that time let's be proud of what amateurs have created. Without the ARRL and its imperfections, there would be no amateur radio as we know it today. That, in the opinion of this writer, *is for sure!* —
W8BU. 

Strays

Help wanted: Last minute work on the Amsat-Oscar B satellite (QST, March, 1971, pg. 58) requires additional assistance. Amsat, the Radio Amateur Satellite Corporation is looking for amateurs with experience in aerospace soldering or wiring to help complete the A-O-B package. Volunteers (not necessarily in the Washington DC area) interested in assisting are asked to promptly contact Amsat, PO Box 27, Washington, DC 20044.

Armond Noble, WB6AUH, is putting out *Worldradio* a non-technical newsletter for hams interested in the international friendship and humanitarian aspects of amateur radio. For a free copy write to 2509 Donner Way, Sacramento, CA 95818.

Happenings of the Month

Elections — Results and Balloting

ARRL Files on "Eyebank" Docket

New 160-Meter Rules for Canada

Executive Committee Minutes

Commercial Tickets for the Blind

LEAGUE ELECTION RESULTS . . .

In current elections for director and vice director of eight ARRL divisions, four directors and two vice directors were the only nominees for their respective offices, and thus there is no membership balloting.

The VEs picked Noel B. Eaton, VE3CJ, as they have each election since 1960. The vice director, A. George Spencer, VE2MS, similarly garnered a second term. Larry J. Shima, W0PAN, and Edward C. Gray, WA0CPX, both first-termers, were reelected as director and vice director, respectively, in the Dakota Division. The Delta Division's director, Max Arnold, W4WHN, also will start a second term on January 1. Finally, J. A. Doc Gmelin, W6ZRJ, won a third term as director from the Pacific Division.

. . . AND MEMBER BALLOTING

The remaining ten posts are contested, some of them hotly so. Take, for instance, the Midwest Division: Ralph V. Anderson, K0NL; Raymond L. Keller, W0DU; Bruce A. Osmundson, WA0IRP; C. W. Wade, W0INH and Eugene V. Weiner, K0CKX, are all candidates for director. On the vice director side of the ballot are listed Paul Grauer, WA0LLC; L. C. Chuck Miller, WA0KUH; Richard W. Pitner, W0FZO; Russell R. Ritzman, WA0LGR; and Ronald M. Schweppe, K0EXN. The current director, Sumner H. Foster, W0GQ, has retired to Colorado, and thus is not a candidate for election. Atlantic Division voters will choose between challenger G. W. Bud Hipplesley, Jr., K2KIR and incumbent Harry A. McConaghy, W3EPC for director. For vice director the choice lies among Jesse Bieberman, W3KT, who now holds the office; Harold C. Smith, WA2KND; and George S. Van Dyke, W3HK. In the Delta contest for vice director, there's a rerun of 1969; incumbent Franklin Cassen, W4WBK versus John B. Sanders, WB4ANX. Members in the Great Lakes will ballot either for the incumbent, Alban A. Michel, W8WC, or for Leonard M. Nathanson, W8DQL as director. The vice director's office is sought by Richard A. Egbert, W8ETU; Mary Ryden, K8ONV; incumbent Currin L. Skutt, W8FSZ; and Henry F. Zimmerman, K4FIU. Vice director candidates in the Pacific Division are Albert F. Gaetano, W6VZT; Larry M. Reed, W6CTH; and Lee R. Wical, KH6BZF. In the Southeastern Division, Philip A. McMasters, W4BCZ is challenging Director H. Dale Strieter, W4DQS. John F. Porter, W4KGI and Larry E. Price, W4DQD are running for vice director.

Important: Ballots were mailed the week of October 8 and to be valid must reach headquarters before noon, EST, on November 20. Any Full Member of these divisions who has not received his ballot by November 1 should immediately write to League Hq.

CANADIAN 160 METER CHANGES

The Department of Communications has changed allocations of the amateur service within the 1.8-2.0 MHz band in line with recent changes in the Loran service, which has priority. For most VEs and VO's, there's at least an improvement in power levels; for Westerners, there is quite an increase in frequency space. See Figure 1 for details.

| CANADIAN | A | B | C | D | E | F | G | H |
|-----------------------------|----|---|---|---|---|---|---|---|
| B.C. | 3* | 3 | 3 | 5 | 0 | 0 | 0 | 0 |
| Alta. | 3* | 3 | 3 | 3 | 5 | 0 | 0 | 5 |
| Sask. | 3* | 3 | 3 | 3 | 3 | 5 | 5 | 3 |
| Man. | 3* | 6 | 6 | 6 | 6 | 6 | 6 | 3 |
| Ont., N. of 50 deg. N. Lat. | 3 | 5 | 5 | 5 | 5 | 0 | 0 | 6 |
| Ont., S. of 50 deg. N. Lat. | 3* | 6 | 5 | 0 | 0 | 0 | 0 | 5 |
| P.Q., N. of 52 deg. N. Lat. | 5 | 0 | 0 | 5 | 5 | 0 | 0 | 6 |
| P.Q., S. of 50 deg. N. Lat. | 3 | 6 | 5 | 0 | 0 | 0 | 0 | 0 |
| N.B., N.S., P.E.I. | 3 | 6 | 5 | 0 | 0 | 0 | 0 | 0 |
| Newfoundland. | 3 | 5 | 5 | 0 | 0 | 0 | 0 | 0 |
| Labrador. | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Yukon. | 3* | 3 | 3 | 5 | 0 | 0 | 0 | 0 |
| District of Mackenzie. | 3* | 3 | 3 | 3 | 5 | 0 | 0 | 5 |
| District of Keewatin. | 3 | 5 | 5 | 3 | 6 | 0 | 0 | 6 |
| District of Franklin. | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 5 |

*The power levels 500 day - 100 night may be increased to 1000 day - 200 night when authorized by a Radio Inspector of the Department of Communications.

| INPUT POWER (WATTS) | |
|---------------------|----------------------------|
| 0 | No operation, day or night |
| 1 | 100 day, 25 night |
| 2 | 200 day, 50 night |
| 3 | 500 day, 100 night |
| 4 | 1000 day, 200 night |
| 5 | 125 day, 25 night |
| 6 | 250 day, 50 night |

| SEGMENTS (KHz) | |
|----------------|-----------|
| A | 1800-1825 |
| B | 1825-1850 |
| C | 1850-1875 |
| D | 1875-1900 |
| E | 1900-1925 |
| F | 1925-1950 |
| G | 1950-1975 |
| H | 1975-2000 |

ARRL COMMENTS ON "EYEBANK" DOCKET

The League has filed strong comments in Docket 19245, the matter of handling traffic for non-amateur organizations. It asks for the continuation of an amateur's right to determine the traffic from his amateur station, subject only to the restrictions -- profanity, broadcasting, pecuniary interest -- already built into Subpart E of the amateur rules. It also traces the history of amateur traffic handling and of the now-controversial Section 97.39 "nor for its use" clause. The text follows:

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

In the Matter of
Inquiry into the extent to which
amateur stations should be used
on behalf of non-amateur organi-
zations

Docket
No. 19245
RM-1687

To: The Commission

RESPONSE TO NOTICE OF INQUIRY

The American Radio Relay League, Incorporated, submits the following response to the Notice of Inquiry released May 5, 1971 (FCC 71-453, 36 FR 8611).

Background

A recent series of letters from the Commission, each pertaining to some limited, specialized aspect of amateur radio communications, has threatened the very foundation upon which the Amateur Radio Service of the United States was established and has operated since its inception.

In each of the letters, the Commission has interpreted the phrase "nor for its use" in Section 97.39 of its Rules and Regulations as prohibiting the handling of messages for or on behalf of non-amateur organizations except in an actual emergency.

Section 97.39 is as follows:

"§97.39. *Eligibility of corporations or organizations to hold station license.* An amateur station license will not be issued to a school, company, corporation, association, or other organization, nor for its use, except that in the case of a bona fide amateur radio organization or society, a station license may be issued to a licensed amateur operator, other than the holder of a Novice Class license, as trustee for such society."

The Commission has recognized the impact upon the Amateur Radio Service which may arise from its interpretation of Section 97.39 -- as well as Section 97.107 of its Rules relating to operation in emergencies -- and has invited suggestions as to how the rules may be amended to insure continuation of meritorious communications in behalf of certain non-amateur organizations such as the Red Cross, Eye Bank Association, and the March of Dimes while, at the same time, to prevent the

"proliferation of non-amateur organizations with an interest in the use of amateur frequencies and amateur stations for purposes which may well lack the universal acceptability of Red Cross and Eye Bank objectives" and thereby possibly "pre-empt amateur frequencies to the exclusion of the individual amateur for whom the service was intended." (Notice para. 3.) The Notice then states:

"9. As previously noted, there is general recognition of the public benefit derived from limited use of amateur stations on behalf of such organizations as the Red Cross, Eye Bank Association, and the National Cystic Fibrosis Foundation. Such recognition may not, however, be nearly as universal when considering the possible use of amateur radio on behalf of other non-profit public service organizations such as political parties, student organizations, various church and missionary societies, and a large number of other and more controversial groups."

Comments and suggestions relevant to the following questions are invited by the Commission:

"I. Are any restrictions on the use of amateur stations in behalf of non-amateur organizations warranted?"

"II. If amateur radio stations should be permitted to furnish a communication service to non-amateur organizations;

"(A) To what types of organizations?"

"(B) What types of activity and communication should be permitted?"

"(C) If there is to be a distinction between emergency and non-emergency communications, should emergency communications be limited only to those situations where normal communications are disrupted?"

The League and a vast majority of licensed amateur operators share the Commission's concern over the possibility of misuse of amateur stations and frequencies. However, the record of amateur conduct and performance over a period of more than 55 years is so outstanding that substantial changes in the present rules and policies are not warranted.

Section 97.39 Has Been Misinterpreted

Section 97.39 has remained virtually unchanged for almost 33 years. The phrase "nor for its use" first appeared -- at the League's urging -- as "nor for their use" in Section 152.02 which became effective December 1, 1938.

"§152.02. *Eligibility of corporations or organizations to hold license.* An amateur station license will not be issued to a school, company, corporation, association, or other organization;



Pat Lane, W4OQG, right, takes home the "Ham of the Year" plaque from the Knoxville Picnic. Making the presentation is Jim Skeen, WA4NEC, outgoing president of the Tennessee Council of Amateur Radio Clubs. (Photo by W4WHN)

nor for their use; provided, however, that in the case of a bona fide amateur radio society a station license may be issued in accordance with Section 152.01 to a licensed amateur operator as trustee for such society."

The history of section 97.39, the organization of Part 97 of the Commission's Rules, and the practices and policies of the various regulatory agencies over the 57 years since the League was founded, conclusively prove that no rule of the Commission now in effect ever was intended to prohibit the handling of messages by amateur stations for or on behalf of non-amateur organizations.

At the outset, it is most significant to recognize that there was little or no formal mention of message handling activities by amateurs in the regulations until about 1928. Amateurs long had freely handled third party messages. The sole criterion, self-imposed, was lack of personal, pecuniary interest. Indeed, the American Radio Relay League was founded in 1914 by a group of amateurs primarily interested in organized, unrestricted message handling.

The first formal regulatory treatment of the status of the amateur as an individual user of radio communication came in the definition adopted by the International Radiotelegraph Conference held in Washington in 1927. A sub-section of "Private Experimental Stations" read:

"2. A station used by an 'amateur,' i.e., by a duly authorized person interested in radio technique solely with a personal aim and without pecuniary interest."

This language was adopted by the Federal Radio Commission in amateur regulations made effective on March 6, 1928, and subsequently was adopted by the Congress as Section 3(q) of the Communications Act of 1934, as amended, under the heading "Definitions." The definition has remained unchanged since 1927.

The 1928 order of the Federal Radio Commission contains the first specific mention of any rule or policy governing or restricting permissible activities:

"Amateur stations are not authorized to broadcast news, music, lectures, sermons, or any form of entertainment or to conduct any form of commercial correspondence."

As amateurs had always freely handled message traffic of any kind, this last part of the order naturally raised some questions. In response to an inquiry by the League, the General Counsel of the

Federal Radio Commission, in Opinion No. 35 dated May 10, 1929, ruled as follows:

"It is not to be doubted that the amateur performs a worthy service and as such is entitled to the greatest consideration by the regulating body. Moreover, by Section 4B of the Radio Act it is required that any order of the Commission prescribing the nature of service to be rendered by each class of station must be in the public interest, convenience, or necessity. To stifle amateur development by practically prohibiting all correspondence which amateurs have been handling could hardly be sustained as complying with this standard. Hence the only proper interpretation to adopt is that which will further the progress of amateur development. Thus both as a matter of statutory construction and sound public policy, it is apparent that the prohibition on amateur stations from conducting any form of "commercial correspondence" should be construed to mean that any amateur operator may transmit or deliver from any amateur radio station a message of any kind -- subject, of course, to any other provision of the Radio Act restricting communication over the air -- regardless of the source or text, provided that no pecuniary or other consideration is directly or indirectly paid or promised him." (Emphasis supplied)

That opinion, which never has been set aside or modified, is so relevant to the questions raised by the instant Notice of Inquiry that a copy is attached hereto as Appendix A.

This concept was incorporated into the first really comprehensive set of regulations for the amateur service. The following was adopted by the Radio Commission effective April 5, 1930:

"Amateur stations shall not transmit or receive messages for hire not engage in any communication for material compensation, direct or indirect, paid or promised."

The 1928 order has been carried forward into Section 97.111 of the present Rules:

"§97.111 No remuneration for use of station. An amateur station shall not be used to transmit or receive messages for hire, nor for communication for material compensation, direct or indirect, paid or promised."

That the phrase "nor for its use" in Section 97.39 is unrelated to the communications of amateur stations, but only to eligibility to be issued an amateur station license, is further supported by the history of that section.

Section 97.39 is a descendant of the amateur regulations adopted by the Radio Commission which became effective March 6, 1928. Then that Commission stated:

"An amateur station is a station operated by a person interested in radio technique solely



F. Van Turner, W2KE, left, founder and first president of the Gloucester County (NJ) Amateur Radio Club, was honored at a testimonial banquet recently, as he prepares to leave the area for a new retirement QTH in Delaware. GCARA Director Bill Bachman, WA2VEE, has just handed to Van a replica of the mobile communications center constructed by the club under his leadership -- one of many presentations made at the dinner.

with a personal aim and without pecuniary interest. Amateur licenses will not be issued to stations of other classes.

The new regulations were not entirely satisfactory. Use of amateur bands by stations set up at schools, newspapers, and manufacturing plants, masquerading as amateur stations, persisted. Accordingly, effective February 1, 1932, the Radio Commission amended the rule to read as follows:

"Amateur radio station licenses shall not be issued to corporations or associations; provided, however, that in the case of a bona fide amateur radio society, a license may be issued to an authorized official of such society as trustee therefor."

Despite this language, a few difficulties remained. A corporation which did not wish to relinquish an amateur station license merely applied in the name of an officer or employee of the corporation as trustee, even though not a licensed operator. Licenses were issued on the affirmation that the equipment would be operated only by licensed amateur operators of the proper grade.

At the urging of the League, another attempt was made to tighten the language. Effective October 1, 1933, the section again was amended to provide that an amateur station license would be issued only to the holder of an amateur operator license. At the same time, prohibition against "corporations or associations" was enlarged to include "other organizations."

Still a few organizations, mostly schools, continued the subterfuge of having one of their employees obtain an amateur operator license and then a station license, thus technically meeting the requirement and permitting the continued operation of the desired communication facilities.

Again at the urging of the League, another attempt to close the loophole was made in 1938. Effective December 1, 1938, the Federal Communications Commission amended then Section 152.02 to provide as follows:

"*Eligibility of corporations or organizations to hold license.* An amateur station license will not be issued to a school, company, corporation, association, or other organization; nor for their use; provided, however, that in the case of a bona fide amateur radio society a station license may be issued in accordance with Section 152.01 to a licensed amateur operator as trustee for such society."

The editorial remarks in the December 1938 issue of *QST* by then League Secretary K. B. Warner, who had spent considerable time with Commission personnel in discussing and drafting the new regulations, further show the intent and scope of the phrase "nor for its use":

"Retaining the old provision, except in the case of bona fide clubs, only individuals may hold station licenses, the language now becomes more specific and excludes schools by direct reference; moreover it says that a license will not be issued to a school *nor for its use*. This is a desirable tightening up, because school stations masquerading as amateurs, sometimes holding their license through dummy clubs, have long impressed us as improper occupants of the amateur bands." (Emphasis supplied.)

The League most certainly would not have suggested the addition of the phrases "nor for their use" and "nor for its use" if there had been even the slightest indication that the phrase might even remotely be interpreted to restrict the message-

handling activities upon which the League had been built since 1914.

In addition, the title of Section 97.39 certainly cannot be ignored. "Eligibility of corporations or associations to hold license" can have only one meaning.

In summary, with the exception of a minor grammatical change, the language of Section 97.39 today is identical with that adopted 32 years ago. The sole purpose of the phrase "nor for its use" was to remedy a specific abuse, largely by schools, of the regulations governing issuance of a license. *There never was any intent to restrict the message-handling activities of individual amateurs.*

The organization of Part 97 of the Rules further supports the often expressed opinion of the League that nothing in Section 97.39 is related to the communications, including messages, which may be handled by amateur stations. Part 97 has the following subparts and subheadings.¹

Subpart A - General (Sections 97.1 and 97.3)

Subpart B - Amateur Operator and Station Licenses

Operator Licenses (Sections 97.5 through 97.13)

Operator License Examinations (Sections 97.19 through 97.35)

Station Licenses (Section 97.37 through 97.49)

Call Signs (Sections 97.51 and 19.53)

Duplicate Licenses and License Term (Sections 97.57 and 97.59)

Subpart C - Technical Standards (Sections 97.61 through 97.75)

Subpart D - Operating Requirements and Procedures

General (Sections 97.77 through 97.93)

Station Operation Away From Authorized Location (Sections 97.95 through 97.101)

Logs (Sections 97.103 and 97.105)

Emergency Operation (Section 97.107)

Subpart E - Prohibited Practices and Administrative Sanctions

Prohibited Transmissions and Practices (Sections 97.111 through 97.129)

Administrative Sanctions (Sections 97.131 through 97.135)

Subpart F - Radio Amateur Civil Emergency Services (RACES)

General (Sections 97.161 through 97.165)
Organization (Sections 97.167 through 97.175)

Station Authorizations (Sections 97.177 through 97.191)

Technical Requirements (Sections 97.193 through 97.201)

Operating Requirements (Sections 97.203 through 97.213)

Use of Station (Section 97.215 through 97.227)

Subpart G - Operation of Amateur Radio Stations in the United States by Aliens (Sections 97.301 through 97.313)

Section 97.39 appears under the subheading "Station Licenses" of Subpart B.

There is not one sentence of any rule - not even those under the subheading "Prohibited Transmissions and Practices" of Subpart E - which even intimates that an amateur station may not

¹ Sections are not numbered consecutively. Every other number was left vacant when the rules were renumbered in 1963 to provide flexibility in adding new sections in future years.

handle messages for or on behalf of non-amateur organizations at any time.

Surely, if the Commission had ever intended to prohibit amateur stations from handling communications and messages for or on behalf of non-amateur stations except during emergencies, it would have included such a statement in one of its rules under the subheading "Prohibited Transmissions and Practices."

The care used by the Commission in titling each of its rules and in grouping the rules under the Subparts and subheadings also must be considered in interpreting the phrase "nor for its use" in Section 97.39.

Nor can the statement of the basis and purpose of the Amateur Radio Service in Section 97.1(a) be ignored:

"§97.1 *Basis and Purpose.* The rules and regulations in this part are designed to provide an Amateur Radio Service having a fundamental purpose as expressed in the following principles:

"(a) Recognition and enhancement of the value of the amateur service to the public as a voluntary non-commercial communication service, particularly with respect to providing emergency communications."

The "public" most certainly is not limited to amateurs and amateur organizations, but obviously includes non-amateurs and non-amateur organizations.

The following conclusion reached by the General Counsel of the Federal Radio Commission on May 10, 1929, in Order No. 35 remains just as sound and correct today as it was 42 years ago:

"It is not to be doubted that the amateur performs a worthy service and as such is entitled to the greatest consideration by the regulating body. Moreover, by Section 4B of the Radio Act [now Section 303(b) of the Communications Act of 1934] it is required that any order of the Commission prescribing the nature of service to be rendered by each class of station must be in the public interest, convenience, or necessity. *To stifle amateur development by practically prohibiting all correspondence which amateurs have been handling could hardly be sustained as complying with this standard. Hence the only proper interpretation to adopt is that which will further the progress of amateur development.* Thus, both as a matter of statutory construction and sound public policy, it is apparent that the prohibition on amateur stations from conducting any form of "commercial correspondence" should be construed to mean that *any amateur operator may transmit or deliver from any amateur radio station a message of any kind - subject, of course, to any other provi-*

sion of the Radio Act restricting communication over the air - *regardless of the source or text, provided that no pecuniary or other consideration is directly or indirectly paid or promised him.*" (Emphasis supplied)

It is respectfully submitted that Section 97.39 and particularly the phrase "nor for its use" have been misinterpreted and misapplied.

The Present Rules Are Adequate

The present rules and policies pertaining to the licensing and permissible communications of amateur stations have remained unchanged, except for minor grammatical changes, for more than 32 years. Rules and policies which have withstood the test of time should not be amended or modified except for the most compelling reasons. No such reasons are present here.

The Commission first asks:

"1. Are any restrictions on the use of amateur stations in behalf of non-amateur organizations warranted?"

The League's answer is a categorical "No"!

No organization, group or individual has the right to use any amateur station. Each amateur operator has the right to decide for himself if he will or will not handle communications and messages for or on behalf of any organizations, group or individual. To some amateurs, the need for communications which can only be provided by amateur radio are just as great, if not greater at times, for a missionary in a remote Eskimo village in Alaska or a priest in a village in the Amazon jungle than the needs of the Eye Bank Association or the National Cystic Fibrosis Foundation. If messages of controversial groups were to be barred from amateur radio stations, who would decide on whether or not a particular group actually is controversial?

Any fear of widespread misuse of amateur stations by political parties or candidates was dispelled in 1964 when one of the presidential candidates was a well-known and most active radio amateur. In fact, he specifically asked that amateur radio not be used to support his candidacy.

This is not to say that there never have been operations which have given the League and many amateurs considerable concern. During the widespread university and college campus unrest in the spring of 1970, some transmissions and communications of amateur stations attributed to student organizations related to demonstrations and unlawful acts including violation of civil rights and destruction of property. Additional rules to prohibit such communications are not required, however, as existing criminal laws are more than adequate to punish those advocating or engaging in unlawful activities.

The self-policing of amateur radio remains as the best and most effective control over improper and unlawful use of amateur stations. No amateur operator is required to participate in any communications or handle any messages. Every amateur has complete control over what is transmitted over his



Ted Mathewson, W4FJ, right, receives the 1971 ARRL Roanoke Division Service Award from Roanoke Division Director Victor C. Clark, W4KFC, at the ARRL North Carolina State Convention in Raleigh. (Photo by WB4JGZ)

station. Almost every transmission of an amateur station can be heard by tens, hundreds, and even thousands of other amateur operators. Many of these intercepting operators are and will continue to be sufficiently concerned about the preservation of amateur radio that they will initiate corrective action without delay.

The Commission then asks:

"II. If amateur radio stations should be permitted to furnish a communication service to non-amateur organizations:

"(A) To what types of organizations?"

It should be apparent from the answer to the first question that the League's answer is that there should be no restrictions or limitations upon the types or organizations, groups of individuals for whom an amateur station may provide communications.

The next question is:

"(B) What types of activity or communication should be permitted?"

Experience has shown over a period of more than 43 years of amateur regulation that the listing of permissible communications is so impractical as to be impossible. That is the reason why the rules under Subpart E of Section 97 are limited to prohibited communications. The adoption of rules setting forth "types of activity or communication [which] should be permitted," such as suggested in RM-1687 by the Electronic Industries Association, would cause nothing but confusion and administrative chaos.

The Commission's last question is as follows:

"(C) If there is to be a distinction between emergency and non-emergency communications, should emergency communications be limited only to those situations where normal communications are disrupted?":

Once again, the League's answer is a categorical "No"!

In times of emergency, "normal communications" usually are completely inadequate because of overloading even if not disrupted. If an amateur must first ascertain if "normal communications are disrupted," precious hours will be lost during which lives and property might otherwise be saved.

The unique ability of radio amateurs to provide essential communications in times of emergency is based, in large measure, upon experience gained in the handling of non-emergency communications. Any restrictions on non-emergency communications will seriously impede the handling of emergency communications. The public interest cannot possibly be served by the imposition of restrictions upon non-emergency communications.

Recommendations

The League is firmly convinced that changes in the rules and policies concerning use of amateur stations and third party traffic are both unnecessary and unwise.

The Commission is urged to terminate this inquiry and proceeding without delay. The unfortunate interpretation of Section 97.39 already has had a most severe impact upon the emergency planning and preparedness of the Amateur Radio Service. The work of the Amateur Radio Services Subcommittee of the National Industry Advisory Committee (NIAC) came to a halt more than a year ago when it became apparent that the Commission was persisting in its misinterpretation of Section 97.39. Numerous emergency organizations, including the American Red Cross, have been

most concerned as to whether the absolutely vital drills and practice sessions violate the Commission's rules and policies.

A simple order stating that the interpretation of the phrase "nor for its use" has been reconsidered and withdrawn is all that is required. A lengthy opinion is unnecessary and may cause more confusion than clarification. However, if the Commission persists in its interpretation of the phrase, the League recommends that the phrase be deleted from Section 97.39. Careful processing of applications submitted by a licensed operator as a trustee should prevent issuance of a license which would not have been issued under the present rule.

Any attempt to list permissible communications would be impractical and unwise. As is evident from the foregoing comments, the League believes that further limitations on the character and content of communications between amateur stations are unnecessary. However, should the Commission insist on imposing some limitation upon unpalatable organizations, groups and causes, adoption of the following as a new rule is suggested:

§97.120 *Other prohibited Transmissions.*

The transmission by an amateur station of communications or messages advocating or supporting unlawful acts is prohibited.

Once again, the Commission is urged to remove the uncertainties and to terminate this proceeding by a simple order merely stating that it has reconsidered and withdrawn its earlier interpretation of Section 97.39.

Respectfully submitted,

225 Main St. THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED
Newington, Connecticut 06111

By Robert M. Booth, Jr.
1150 Connecticut Ave., N.W. *Its General Counsel*
Washington, D.C. 20036

August 31, 1971

APPENDIX A

The Federal Radio Commission of the United States

In the matter of the construction of the term "Commercial Correspondence" as used in amateur regulations of September 1, 1928.

Opinion of the
General Counsel
No. 35.

FACTS

The Commission is in receipt of a memorandum of September 8, 1928, from the Radio Division, Department of Commerce, relating to communications carried on between amateur station W4TQ at Savannah, Georgia, and W4WD at Ossabaw Island. This report indicates that both of these stations are licensed to one individual and that there is no other form of communication between the two points.

OPINION

It is very plain that these stations were not established for amateur purposes. A study of the actual text of the messages submitted by the Supervisor of Radio at Atlanta shows that the full purpose of the establishment of these two stations was to build up a communication line between the

Who the Devil Is Who?

Number 23 in a Series of Call Conversion Charts

Now that twenty-five years have elapsed since licensing was resumed at the end of World War II, activity has picked up among Extra Class licenses swapping their old calls for two-letter calls. Here are some recent ones, plus a few we accidentally overlooked in earlier tabulations:

| <i>Now</i> | <i>Was</i> | <i>Now</i> | <i>Was</i> | <i>Now</i> | <i>Was</i> | <i>Now</i> | <i>Was</i> |
|------------|------------|------------|------------|------------|------------|------------|------------|
| W1EA | W1LOP | K3BA | W3GEL | W5WK | W5SJB | W8OA | K8VSL |
| W1YL | W1YYM | W3WM | W3LNE | K6QC | WA6YCO | W8OK | W8YCP |
| W2AB | W2FBA | W4AG | W4AQW | K6QT | KH6YL | W9IO | W9LVR |
| W2DW | W2JBQ | K4PJ | K4LPW | W6TB* | W6CTO | W9IY | W9HHA |
| K2EZ | W2FUH | K4RJ | W3GKP | K6TB* | W0AXQ | W0MX | W0LIL |
| K2FJ | W2TMI | K4RZ | W4SNU | K6TU | W6YFV | W0NL | W0RDF |
| W2GC | W2RDD | K4QZ | K4EMC | W6UA | W3FYS | W0NN | W0DFF |
| W2SR | W2LDQ | K4SF | W4VFP | K6UI | W8DEX | W0NQ | W0PJB |
| K3AQ | W3CPJ | W5WE | W5LQV | W8NR | W8CLX | | |

* Correction from an earlier listing

two points. In view of Article 1 of the General Regulations annexed to the International Treaty and of General Order No. 24 of the Federal Radio Commission, it is quite evident that the licenses of these stations should be revoked if it was the purpose in establishing them to develop a communications line. Such a purpose should find expression in the utilization of frequencies set aside for point to point communication.

With reference to the interpretation of the regulations of the Radio Commission of September 1, 1928, forbidding any amateur station from conducting any form of "commercial correspondence," the question is presented as to what is an "amateur" message and what consideration should be given to its source and contents in order to deprive it of such classification.

In construing any statute or any regulation promulgated under that statute it is always of primary importance to consider the various interests involved and then, whenever possible, to adopt a policy which will most nearly carry out the intent of the framers and at the same time further the interests of those in whose favor the scales seem to weigh most heavily. Both the Radio Act of 1927 and the International Radiotelegraph Convention, in their various provisions dealing with amateur stations and amateur operators, seemingly recognize a great public interest in their protection and preservation. But there is also recognition of the fact that such amateur status must not infringe upon the so-called professional and commercial classifications.

Looking at the Act, it is seen that Section 21 provides that "a permit for construction shall not be required for***amateur station." Section 27, relating to the divulging or publishing of radio communications, is made inapplicable to those transmitted by amateurs for the use of the general public. These sections, however, neither authorize nor define amateur communication but simply indicate amateur stations and operators to be an already existing class.

The first definition of an amateur appears in Article 1 of the General Regulations annexed to the International Radiotelegraph Convention where it is stated that "the term 'private experimental station' may mean - 2. A station used by a 'amateur' i.e., being a duly authorized person interested in radio technique solely with a personal aim and without a pecuniary interest." This definition was given effect in the United States by General Order 24 of the Federal Radio Commis-

sion issued March 6, 1928, wherein a provision with the selfsame language was inserted. It can readily be seen that the word "amateur" must thus be broadly construed as one who receives no pecuniary gain from his radio activities.

In the Revised Regulations Governing the Operation of Amateur Stations, it is provided among other things that "amateur stations are not authorized to broadcast news, music, lectures, sermons, or any form of entertainment, or to conduct any form of commercial correspondence." The phrase "commercial correspondence" must be construed entirely with reference to the status of an amateur station as contemplated by the Radio Act and treaty. The word "commercial" itself is derived from the noun root "commerce" meaning "trade or business intercourse." But when applied to the kind of correspondence in which an amateur may engage, it is used in the sense that the station or operator knowingly derives some financial benefit, either directly or indirectly, from the handling of the message. There are numerous other activities such as athletics and art which may be pursued either for profit or pleasure and in which the question of remuneration is the sole distinguishing feature between the amateur and professional or commercial. To give such a construction to the word "amateur" as used in the field of radio is in accord with similar language used in connection with the aforementioned activities.

Moreover, after applying this test of compensation there is the further corollary that an amateur is free to accept and transmit as he will, while a commercial message must be transmitted and failure to do so would make the station or operator liable to damages. In other words, any station handling commercial correspondence, with the exception of certain cases provided for by special license, is under the duty of a common carrier, while an amateur is under no such duty or contractual obligation.

Of course, all radio communications are intercourse and commerce in the constitutional sense and so subject to regulation. It could not have been meant that any communications which participate in the flow of commerce are to be prohibited since this would practically exclude all messages by amateurs and nullify the law creating amateur stations.

It is not to be doubted that the amateur performs a worthy service and as such is entitled to the greatest consideration by the regulating body. Moreover, by Section 4B of the Radio Act it is

required that any order of the Commission prescribing the nature of service to be rendered by each class of station must be in the public interest, convenience, or necessity. To stifle amateur development by practically prohibiting all correspondence which amateurs have been handling could hardly be sustained as complying with this standard. Hence the only proper interpretation to adopt is that which will further the progress of amateur development. Thus both as a matter of statutory construction and sound public policy, it is apparent that the prohibition on amateur stations from conducting any form of "commercial correspondence" should be construed to mean that any amateur operator may transmit or deliver from any amateur radio station a message of any kind - subject of course, to any other provision of the Radio Act restricting communication over the air - regardless of the source or text, provided that no pecuniary or other consideration is directly or indirectly paid or promised him.

(Approved) Bethuel M. Webster, Jr.
General Counsel

May 10, 1929

COMMERCIAL LICENSES FOR THE BLIND

FCC issuance of commercial radiotelephone licenses to the blind has been an off-again, on-again thing for a long while. Now, thanks to a decision in Docket 19182, FCC has answered the question with a yes. The rules which were changed in the process appear here:

Section 13.5(c)(2) is amended to read as follows:

(2) If an applicant afflicted with blindness is afforded a waiver of the written examination requirement and is found qualified for a radiotelephone first-class operator license, radiotelephone second-class operator license, radiotelephone third-class operator license, and radiotelephone third-class operator license with broadcast endorsement, he may be issued the license: PROVIDED, That the license so received shall bear an endorsement as follows:

This license is not valid for the operation of any station licensed by the Commission unless the station has been adapted for operation by a blind person and the equipment to be used in such station for that purpose is capable of providing for operation in compliance with the Commission's rules.

A new paragraph (e) is added to Section 13.11 to read as follows:

(e) Blind Applicant. A blind person seeking an examination for radiotelephone first-class operator license, radiotelephone second-class operator license, radiotelephone third-class operator license, and radiotelephone third-class operator license with broadcast endorsement shall make a request in writing to the Engineer in Charge of the appropriate district office for a time and date to appear for such examination. The examination shall be administered only at the district office. Requests for examinations shall be made at least two weeks prior to the date on which the examination is desired.

Section 13.23, headnote and text is revised to read as follows:

Examination Form.

The written examination shall be in English and shall be written by the applicant in longhand except in the case of a blind applicant, where the examination questions shall be read orally to the applicant and the dictated answers recorded by a Commission district office employee authorized to administer the examination orally.

One of the strongest pleas in the case came from Robert W. Gunderson, W2JIO, publisher of the *Braille Technical Press* and author of *QST* articles on radio equipment for blind amateurs.

NEW W4-K4 QSL BUREAU

The North Alabama DX Club of Huntsville, Alabama has agreed to take on the work of the W4-K4 QSL Bureau which has been handled by H. L. Pat Parrish, K4HXF. The new address: North Alabama DX Club, P. O. Box 2035, Huntsville, AL 35804.

MORE SPECIAL EVENTS CALLSIGNS

The following special amateur call signs have recently been authorized for the events and period noted. Amateurs and organizations should apply at least 120 days prior to the desired date of authorization for such special calls as may be granted in accordance with Section 97.51 (a)(4).

See chart below:

| Special Events Callsigns | | | |
|--------------------------|-------------------|--|-----------------------|
| Call | Trustee | Event | License Period |
| WS1OCF | Robert Green | Orleans County Fair, Barton, Vt. | Aug. 15-30, 1971 |
| WX2MAP | Arnold Oberson | Miss America Pageant, Atlantic City, N.J. | Sept. 1-15, 1971 |
| WD4ARF | Gregory R. Combs | National Conv. of Christian Churches Louisville, Ky. | Oct. 15-20, 1971 |
| KF2NYS | James Boehner | New York State Fair, Syracuse, N.Y. | Aug. 31-Sept. 6, 1971 |
| W08HIO | Richard Egbert | Ohio State Fair Columbus, Ohio | Aug. 26-Sept. 6, 1971 |
| WS9UCI | Howard Huntington | Union County, Ind. Sesquicentennial | Sept. 19-26, 1971 |
| WM3ARW | David Heller | Amateur Radio Week in Penn., McDade Mall, Glenolden, Pa. | Sept. 14-19, 1971 |



MINUTES OF EXECUTIVE COMMITTEE MEETING

No. 336

September 25, 1971

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., met at the Holiday Inn North, Raleigh, North Carolina, at 9:35 a.m. September 25, 1971. Present: President Robert W. Denniston, WØDX, in the chair; First Vice President Charles G. Compton, WØBUO; Directors Victor C. Clark, W4KFC, Harry J. Dannals, W2TUK, Noel B. Eaton, VE3CJ, and Robert B. Thurston, W7PGY; and General Manager John Huntoon, WIRW. Also present were Treasurer David H. Houghton, General Counsel Robert M. Booth, Jr., W3PS, and Dakota Division Director Larry J. Shima, WØPAN.

The Honorable Robert W. Scott, Governor of the State of North Carolina, at this point entered the meeting briefly to extend a welcome to members of the committee as well as to those amateurs attending the North Carolina State Convention the same weekend, and during informal discussion complimented the public service work of amateurs in general, as well as particularly in his State.

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

ATLANTIC DIVISION

For Director:

George W. Hippisley, Jr., K2KJR, and Harry A. McConaghy, W3EPC, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director:

Layfield L. Lamb, W3BWZ, was found lawfully nominated but ineligible because of lack of the required membership continuity. Jesse Bieberman, W3KT, Harold C. Smith, WA2KND, and George S. Van Dyke, Jr., W3HK, were found lawfully nominated and their names ordered listed on ballots to be sent to Full Members of the Division.

CANADIAN DIVISION

For Director:

Noel B. Eaton, VE3CJ, was found lawfully nominated and eligible. Being the only eligible nom-

E. Merle Glunt, W3OKN, for the past twelve years chief of the Treaty Branch, has been promoted to assistant chief, Frequency Allocation and Treaty Division, Federal Communications Commission. While in the Treaty Branch, Merle dealt with international interference complaints (including those submitted by the ARRL Intruder Watch). He has been a participant in many international conferences and bi-lateral negotiating teams. Earlier, he had been with the U. S. Navy, with the engineering responsibility for its transmission monitoring system. His first FCC job, in 1940, was in the Radio Intelligence Division (RID) monitoring, direction-finding, and cryptanalysis work against the Axis powers. As an active amateur, Merle has been a member of the ARRL National Traffic System, the U. S. Naval Communication Reserve, and the Army Amateur Radio Service; calls have included W8OEM, N8OEM, W9IAN, and W3KBL. He has frequently operated from 4U1TU as well.

inee, he was thereupon declared, pursuant to the By-Laws, to be duly re-elected as Director from the Canadian Division for the 1972-1973 term without membership balloting.

For Vice Director:

A. George Spencer, VE2MS, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly re-elected as Vice Director from the Canadian Division for the 1972-1973 term without membership balloting.

DAKOTA DIVISION

For Director:

Larry J. Shima, WØPAN, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly re-elected as Director from the Dakota Division for the 1972-1973 term without membership balloting.

For Vice Director:

Edward C. Gray, WAØCPX, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly re-elected as Vice Director from the Dakota Division for the 1972-1973 term without membership balloting.

DELTA DIVISION

For Director:

Max Arnold, W4WHN, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly re-elected as Director from the Delta Division for the 1972-1973 term without membership balloting.

For Vice Director:

Franklin Cassen, W4WBK, and John H. Sanders, WB4ANX, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

GREAT LAKES DIVISION

For Director:

Alfan A. Michel, W8WC/W8SMQ, and Leonard M. Nathanson, W8DQL, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division,

For Vice Director:

Richard A. Egbert, W8ETU, Sally Mary Ryden, K8ONV, Currin L. Skutt, W8FSZ, and Henry F. Zimmerman, K4FU/W8YJE, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

MIDWEST DIVISION

For Director:

Ralph V. Anderson, K0NL, Raymond L. Keller, W0DU, Bruce A. Osmundson, WA0IRP, C. W. Wade, W0INH, and Eugene V. Weiner, K0CKX, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director:

Paul Grauer, WA0LLC, Lyndell C. Miller, WA0KUH, Richard W. Pitner, W0FZO, Russell R. Ritzman, WA0LGR, and Ronald M. Schweppe, K0EXN, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

PACIFIC DIVISION

For Director:

J. A. Doc Gmelin, W6ZRJ, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly re-elected as Director from the Pacific Division for the 1972-1973 term without membership balloting.

For Vice Director:

Albert F. Gaetano, W6VZT, Larry M. Reed, W6CTH, and Lee R. Wical, KH6BZF/K8HQR, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

SOUTHEASTERN DIVISION

For Director:

Philip A. McMasters, W4VCZ, and H. Dale Strieter, W4DQS, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director:

John F. Porter, W4KGJ, and Larry E. Price, W4DQD, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

On motion of Mr. Compton, unanimously VOTED that Harry J. Dannals, David H. Houghton and Robert B. Thurston, with Francis E. Handy and Noel B. Eaton as alternates, are appointed a Committee of Tellers to count the ballots in the current elections.

On motion of Mr. Clark, unanimously VOTED to confer Life Membership upon the following:

Roy L. Albright, W5EYB; Edward M. Alderman, WA4PEN; Richard R. Anderson, WA6IYC; Orville P. Bailey, W7QPT; William G. Baird, Jr., K411; Perry D. Ballinger, W8VYU; Eugene R. Barnard, W0HLR; George F. Beaumont, VE3FWB; Daniel I. Biernacki, WN1MYX; David G. Brown, WN9GLU; Joe Buswell, WA5TRS; Archie Cameron, W3EVH; Russell J. Cassutt, K6VJE; Alan M. Chedester, WA4KQO; Robert C. Clothier, Jr., WA3NXA; Montie F. Cone, WA4PBG; Irving W. Cook, WA0CGS; Gerald E. Crawford, K7UPJ; Paul M. Crawn, Jr., WB2GXD; Donald R. Delozier, K8YJL; Bill Dennis, K0UKN; Jimmy George DePoy, K0GT1/6; Joseph J. Dremer, KL7EWY; Homer P. Driesslein, K5MEN; Luther G. Fulton, W1WPG; Herbert E. Garren, WB4AUO; George H. Goldstone, W8AP;

Martin B. Goodwin, K5AYH; George D. Hahn, K9AUF; Frederick B. Haines, K4BZX; Donald K. Hammond, WB2FNV; Richard G. Harman, WA4USB; R. Ward Harwood, W9QCD; Robert J. Heavener, K2YPX; O. R. Heinz, III, K7KHA; Robert E. Hendershot, WB4UWU; Michael E. Hiehle, W6RZ; Jesse H. B. Jackson, K4FAC; Ed Jug, W5TOO; Floyd R. Jury, W3OLV; Edward B. Kalin, WA1JZC; Wayne A. King, W9HBO; Arnold J. Linzner, WA2ZHA; Joseph C. Makeever, W5EBJ; Donald McClenon, W31N; John P. Meixensperger, WA9EYM; Kenneth M. Miller, K61R/W9NQT; Jack Nelson, K5FSE; Arnold Oberson, W2BZL; Dale K. Park, K0LMU; Richard J. R. Parkinson, WB4NTI; William H. Parry, K5TSR; Donald W. Peter, WA7NFE; C. F. Pfeiffer; Theodore K. Phelps, W2EMS; John Pinkham, K3PER; Gary J. Plano, WA2CEA; John P. Quitter, W8ODV; W. Stephen Rice, K8LOU; Joe G. Roberts, W7DRR; John L. Robertson, W5OB; Theodore M. Rolle, K6AGW; Marcille L. Rolle, WB6FXR; Ralph Saroyan, W61PU; Francis C. Sheehan, W1FYU; Stacey L. Smith, WA2OIO; Donald L. Spurlock, WB6BMW; Bannie L. Stewart, W4CE; Gary L. Taylor, WB8BEM; Richard L. Taylor, K3UQK; Wilbur F. Tipton, W2UBS; Cary A. Trlica, K5LQJ; Charles T. Urban, K31VI; Kenneth F. Wessel, W0QAU; Gregory S. Wetzel, WA3HKZ; Elizabeth M. Zandonini, W3CDQ; Elmer E. Zborofsky, WB4IGW.

On motion of Mr. Dannals, unanimously VOTED to cast the League's vote in favor of IARU proposals 130 and 131, relating to admission into membership of the Singapore Amateur Radio Transmitting Society and the Society of Thai Amateur Radio.

On motion of Mr. Compton, unanimously VOTED that Kathleen Root is authorized to sign disbursement checks on League funds in behalf of the Treasurer, and to sign documents in connection with the League's several savings accounts, vice Charlotte Clark, retiring.

At this point General Counsel Booth reported on progress in formation of a Legal Counsel Committee, on a rational basis, to assist the League in providing advice and guidance to members who might be involved in zoning ordinance difficulties, tower height problems, etc.

The Committee was in recess for luncheon from 12:40 p.m. to 1:30 p.m.

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

Cummins Amateur Radio Club, Columbus, Indiana; Eastern Shore Amateur Radio Club, Parksley, Virginia; Elk Grove Amateur Radio Club, Elk Grove Village, Illinois; Goddard Amateur Radio Club, Greenbelt, Maryland; Insurance City Repeater Club, Farmington, Connecticut; McHenry County Amateur Radio Club, Crystal Lake, Illinois; North Carolina FM Repeater Assn. Inc., Salisbury, N.C. Roger Bacon Amateur Radio Club (H.S.), Cincinnati, Ohio; Tampa Bay Repeater Association, Tampa, Florida.

There being no further business, the Committee adjourned, at 2:50 p.m.

(During the course of its meeting, the Committee discussed, without formal action, procedures for director and committee reports prior to the 1972 Board meeting, progress of FCC dockets, status of the 220-225 MHz amateur band, and forthcoming international radio conferences.)

Respectfully submitted
JOHN HUNTOON, W1RW
Secretary



Correspondence From Members -

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

UNITED STAND

● My hearty congratulations on your superb work and for the splendid results you accomplished at the World Administrative Radio Conference on Space Telecommunications in Geneva. What would we amateurs do without the ARRL? I cannot understand why some hams do not realize that "united we stand and divided we fall" and I urge all amateurs to join up now even if they are not builders or DXers or contesters. It is the united front that counts, and I was proud when I read in the preview of the preliminary report "All the delegations attempts made to invade amateur bands were defeated," mostly by the good work and the efforts of our united amateur representation and the huge volume of work that was done in preparation before the convention.

Congratulations again. It was a great job and we wouldn't have gotten along without you. — *Jim Russell, W8HU, Cleveland, OH*

220 MHz CB

● My hat's off to you for your first class editorial in September *QST*, referring to big business and CBers on 220 MHz. Now that's more like it, I believe you hit the nail square on the head. Only hope it drives home in the right place. Keep up the good work. — *Thomas Katchuck, WB9EAW, Elmhurst, IL*

● You are to be congratulated for your strong stand on 220 MHz CB, as expressed in the September editorial. Now let's all get down to the serious business of promoting activity on this "forgotten band." — *Lewis D. Collins, K4GGI/1, Arlington, MA*

● Your September editorial is right on. More, more! — *George S. Wilson III, W4OYI, Owensboro, KY*

● Let me congratulate you on the September editorial. I am glad that you let them have it with both barrels. The whole CB band is a mess and many of them are disgusted and selling their equipment. — *Frank Baker, W1ALP, Braintree, MA*

● If my continuous membership in ARRL for the past 15 years does nothing but defeat this proposed action, then my dues have been well utilized. — *R. Jan Carman, W5SBX, Houston, TX*

● I am opposed to expansion of the Citizens Band Service to a portion of the 220 MHz band, as petitioned by the Electronic Industries Association.

Instead of expansion, I favor stiffer regulation of the Citizens Band Service. Two items which might be of value are: 1) Restriction of fixed station antennas to a quarter-wavelength vertical type. 2) A comprehensive examination on regulatory and technical matters. — *James A. Gundry, W4JM, Atlanta, GA*

● I rarely disagree with the ARRL which by and large has served the amateur fraternity well. Your

position on proposed 220 MHz allocations for the Citizens Band, as set forth in the editorial in September *QST*, however, seems to miss a good many points.

Believe me, I have no brief for CB as presently abused. I hold a CB license which I find virtually useless and I could not agree more on the sad state of affairs on 27 MHz, particularly here in central Ohio, although elsewhere, especially in remote areas, it seems to serve a useful purpose still.

First, I would maintain that what hurts CB also hurts ham radio. The public image of the two services has been badly blurred and any proposal that might help clean up the CB band should be welcomed and not opposed by the amateur fraternity. I would not necessarily agree as to the precise frequency changes, but the concept of moving CB to the uhf area seems long overdue.

Your editorial advocates stricter policing of CB as an answer. Even if such were administratively feasible, it still overlooks the fundamental error of the initial CB allocation to a band subject to skip conditions. As long as radio exists, the temptation towards DX is virtually irresistible, and I am convinced that it was this possibility which started the present chaos on CB.

Obviously, some of the EIA proposals are extreme and subject to challenge. But what would the hams really lose if we regained 11 meters and lost a part of 220? Even that may be debatable and I will not press the point. Regardless, some sort of compromise plan is certainly possible and if CB were to virtually start all over again with the knowledge we now have about potential abuse, a combination of public and private policing might become workable.

Let us then work constructively with the FCC to discover means of getting CB up out of the sun-spot area as rapidly as possible and let us also not overlook the tremendous benefits that have come to all of us through technical advances made by these same manufacturers because of increased markets. — *George C. Whitney, W8JJE, Columbus, OH*

EDITOR'S NOTE: The 220 MHz Class E proposal is in addition to, not instead of the present 27 MHz CB allocation.]

EDUCATIONAL

● Something happened to me on 20 meter ssb recently that I would like to share with you and your readers. It just goes to show that you can learn something new every day.

As I was tuning around the band, I ran across a phone patch. The station doing the patching was a very strong local, spluttering up and down the band. I could find traces of his signal peaks ± 15 kHz from his frequency. At first I went on my way, but as I tuned further up the band (and kept hearing his peaks) I finally thought I would call and mention it to him, since he probably would not want to be broadcasting such trash.

So I broke in and told him what I noted. In the discussion that followed, here is what I learned from the station and his partner-in-contact: 1) No

signal could splatter as wide as 30 kHz. Period. 2) He was running only an SB-200 and was well below the maximum legal input, therefore he could not be splattering. 3) There is distortion inherent in a phone patch, and that must be what I was taking to be splatter. 4) I certainly had nerve interrupting a phone patch.

At this point, since I did not want to provoke an argument, I decided not to mention that I hold an Amateur Extra, first phone, and degree in EE, plus broadcast experience which includes a one-megawatt standard BC station (in Costa Rica), but rather to bow to superior knowledge and apologize.

However, I have made careful note of these reasons, so I can quote them in the event I inadvertently radiate a rotten signal. — *Al Brogdon, K3KMO, Silver Spring, MD*

GETTING THROUGH

● It impressed me on our Hq. tour, so it might be a good idea to advertise the fact that the "brass" take turns opening the ARRL mail — it's such a good thing to make sure that no one gets out of contact. I wonder how it would work out if President Nixon opened some of his mail, along with other officials . . . similarly, the presidents of the big corporations . . . and so on . . .

Many hams complain that the League is "out of touch." Mention of the mail-sorting job might convince people that they do "get thru" the clerical help. I noticed that your air conditioning is the "positive" type, and wonder if that means there is a slight pressure in the building to keep dust out? You could sell the fact that dust is kept from entering, but ideas aren't . . . *Tom Carten, WA1DJC, North Dartmouth, MA*
[EDITOR'S NOTE: All mail — several bags a day — to ARRL Hq. is delivered under padlock, and opened, examined and distributed to appropriate departments under the watchful eye of (usually) WIUED, WA2INB, or W4WFL.]

TWO-WAY STREET

● I enjoy reading each issue of *QST* — particularly the section dealing with correspondence from the amateurs. The reason I use the term amateurs, rather than ARRL members, is because it appears that the better portion of destructive criticism comes from amateurs who have either discontinued their ARRL membership or are content to cite reasons why they should not belong. I certainly believe everyone has the right to criticize, but I also believe that it is high time that we realize that any group organized for the promotion of its goals is certainly a two-way street.

Although rather new in the amateur radio field, I have been around long enough to see many an organization fold simply because a faction of its members who were willing to do nothing for their organization became discontented because the organization could not achieve its goals without the sorely needed assistance from this faction of members who could offer plenty of nothing but criticism — but little, if any, being constructive.

I was motivated into becoming a Novice by enthusiastic hams who are ARRL members. Because my time for building up my code speed and learning my theory was limited, I depended entirely upon W1AW for acquiring my present code speed. Since I was out of town a good bit of the time my wife would tape code transmissions and I would pick up the tapes between trips. Also, I might add that for the exception of one reference book, all of my theory, proper operating practice,

and basic code sending techniques were obtained from ARRL publications.

I joined the League shortly after getting my Novice license in October, 1970 at age 39 and passed my Advanced exam on May 28, 1971. So far it has been pretty much a one-way street for me; i.e., I feel that for the exception of the very small contributions I have made to the ARRL, such as my membership fee and the meager cost of the above-named publications, I have done little. I strongly feel that I am an Advanced amateur because of information published by ARRL and the help of a few of its local members. However, I don't expect to stop at this point. I am presently training three teenagers for their Novice exams. I expect to conduct a class this winter for the General Class examination and participate in other League activities.

If, after becoming completely cognizant of the many areas in which the ARRL functions, I feel that in one or more of these areas there might be a better way to proceed, then I believe I may have a right to offer a suggestion. — *John T. Molnar, WB8IAM, Youngstown, OH*

STUNNED

● The ARRL Board of Directors has initiated a study into the possibility of a 10 wpm code speed requirement for the General Class license (League Lines, June *QST*). Is this the second phase of incentive licensing? If so, it seems to defeat much of what was gained by the first phase. To those ARRL members who shared in the abuse directed at them because of incentive licensing, this action of the Board is an outright betrayal of their efforts. Or perhaps the advance in the technical aspects of the amateur exams needs to be offset by regression in code proficiency? This results in a net gain in amateur skills of zero. This sort of mediocrity is not what amateurs join the League for. Why does the League find it necessary to ridicule the efforts of all previous amateurs by removing the qualifications they had to meet? Or does the League feel that code is a superficial requirement that should be eliminated altogether at some future date? Unfortunately, we cannot criticize your motives in this matter because we cannot imagine what they are. This is contrary to all the League fought for in incentive licensing. We are stunned. — *David George Johnson, WB4JTT, Secretary, Tidewater Amateur Radio Club, Norfolk, VA*

[EDITOR'S NOTE: Hold off on the panic button — the key word is "study." Let's hear from everybody who has an interest in the matter, from either side. Address your comments to the Planning Committee chairman, J.A. "Doc" Gmelin, W6ZRJ, 10835 Willowbrook Way, Cupertino, CA 95014.]

LIFE MEMBERSHIP

● Having been a Technician Class license holder for the past 11 years, and currently working toward an Advanced license, it is with a great deal of admiration toward the many deeds of the ARRL that I apply for Life Membership in this worthy organization. — *Frank R. Chapel, Jr., K9PSN, Elmhurst, IL*

● I would be greatly honoured to be accepted as a Life Member as I believe ARRL is doing a magnificent job in representing Amateur Radio throughout the world. — *George F. Beaumont, VE3FWB, Burlington, ON*

I.A.R.U. News



INTERNATIONAL AMATEUR RADIO UNION, THE GLOBAL FEDERATION OF NATIONAL NON-COMMERCIAL AMATEUR RADIO SOCIETIES FOR THE PROMOTION AND CO-ORDINATION OF TWO-WAY AMATEUR RADIO COMMUNICATION

RCA 50th YEAR

During October, the *Radio Club of Argentina* marked its 50th year of operation. A gala commemoration of the anniversary was held on October 22, in Buenos Aires. RCA now has a membership of 1600 - 1400 of which are licensed amateurs. The club has its own station, LU4AA. The current RCA president is Pablo Garcia Sigüero, LU4CG.

RECIPROCAL AGREEMENTS

Canada has recently concluded agreements for reciprocal operating with the Dominican Republic and Portugal. The agreements which are now in effect, provide for amateurs of one country to obtain permission to operate in the other. A complete list of such agreements held by Canada and the U.S. appears elsewhere in this department.

NOTES

The *Nigerian Amateur Radio Society* reports that during October, 5N2 amateurs received special governmental permission to use the 5N5 prefix. The special call signs were in celebration of the country's 11th year of independence. Commemorative QSLs are to be available.

The *Jamaica Amateur Radio Association* has indicated that the first license for slow-scan TV has been issued in Jamaica. The holder is 6Y5PB. The association recently held its monthly meeting aboard the *SS Hope* as guest of W4ABY.

DX OPERATING NOTES

Reciprocal Operating

(Bold face type indicates changes since last list.)

United States reciprocal operating agreements exist only with: Argentina, Australia, Austria, Barbados, Belgium, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Finland, France*, Germany, Guatemala, Guyana, Honduras, India, Indonesia, Ireland, Israel, Jamaica, Kuwait, Luxembourg,

Monaco, Netherlands*, New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, Portugal, Sierra Leone, Sweden, Switzerland, Trinidad and Tobago, United Kingdom*, Uruguay, and Venezuela. Several other foreign countries grant FCC licensee amateur radio operating privileges on a courtesy basis; write League headquarters for details.

Canada has reciprocity with: Belgium, Bermuda, Dominican Republic, France, Germany, India, Israel, Luxembourg, Mexico, Netherlands, Nicaragua, Norway, Peru, Portugal, Senegal, Sweden, Switzerland, United Kingdom, U.S., Uruguay, and Venezuela.

Third-Party Restrictions

Messages and other communications - and then only if not important enough to justify use of the regular international communications facilities - may be handled by U.S. radio amateurs on behalf of third parties *only* with amateurs in the following countries.** Argentina, Barbados (only U.S. stations /8P), Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Greenland (XP calls only), Haiti, Honduras, Israel, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela. Permissible prefixes: CE CM CO CP CX EL HC HH HI HK HP HR LU OA PY TI VE VO W or K/8P XE XP YN YS YV ZP 4X and 4Z. Canadian hams may handle these same type third-party messages with amateurs in Bolivia, Chile, Costa Rica, Dominican Republic, El Salvador, Honduras, Israel, Mexico, Peru, U.S., and Venezuela. Permissible prefixes are: CE CP HI 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 and Vietnam forbid radio communications between their amateur stations and such of other countries. U.S. amateurs should not work XU XV or 3W8. Canadian amateurs may not communicate with Cambodia, Vietnam and Jordan. Prefixes to be avoided by Canadians are JY XU XV and 3W8. QST

* Agreement includes overseas entities.

** By special agreements, third-party traffic is also permissible with Australian amateurs for traffic regarding amateur satellites, and with 4U1TU.



Recently the International Congress of Amateur Television was held in Geneva. This photo shows a home-made camera and sweep unit built by F1BDJ. Shown from left are Albert Maurer; HB9ANZ; J. Hurter; and HB9TJ.



How's DX?



CONDUCTED BY ROD NEWKIRK,* W9BRD

Why? (more)

In our recent dialog on aspects of QSL hunting we logged several viewpoints from the unrare end of the problem. Now 9G1WW of Tema tells us how he sees things from the DX side of the fence. . . .

Just finished a foot-high stack of QSL replies and thought I'd give you some feed-back on the subject. One particular problem I've run into is replying to club stations. Sometimes the op does not put his own call on the card and does not otherwise make it clear to whom he wants the reply sent. Also it's dismaying how many hams can't figure Greenwich Mean Time and dates. My policy is to QSL 100 percent, but I cannot do so if the QSO is not found in my log. If I cannot identify the contact I return the sent card to the sender's bureau asking him to double-check. Incidentally I find it surprising how many non-W/K/VEs are extremely fond of alphabet soup. We all know about DXCC, WAS, WAC, etc., but I'm mystified by occasional references to BERTA, WAP, WBE, WPX, DVQ, RAQL, CRSJ, ISSB, WAE, *ad inf*. Here are a few QSLing tips I would stress, starting with some do's:

Include sufficient International Reply Coupons. In my case three are required for sealed envelope by air, two for air postcard. . . . Always supply self-addressed stamped envelopes when QSLing via Stateside managers. Theirs is a very tough job without pay. . . . Be very careful of your dates and times. Wrong info, especially when pile-ups and contests are involved, may fail to turn up your QSO on log check. . . . Try to put all pertinent QSO info on one side of your card including your callsign. . . . Spell out the month of QSO. Most non-Americans interpret "2/3/71" as March 2nd, not February 3rd. Use, for example, "3 Feb 71." . . . Obtain original or at least somewhat different QSLs to represent your station. Photos, cartoons, etc., are a pleasure to receive. . . . Allow sufficient time for reply via bureaus. I receive six-month-old QSLs via GARS. Bureau routes are slow but sure.

QSLing can be a tedious business, but I feel that anyone who spends time listening and waiting in my pile-ups deserves a card. You will increase your over-all chances of getting answers to your QSLs if you *do not*:

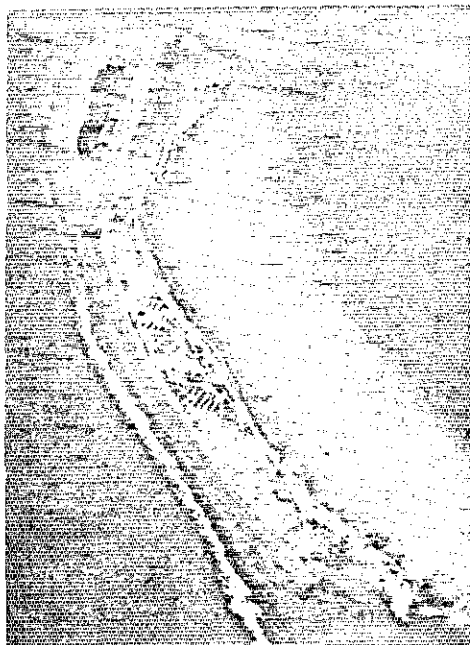
* 7862-B West Lawrence Ave., Chicago, IL 60656.

Include political or religious literature with your cards. . . . Send out odd-sized QSLs. . . . Use thin envelopes through which tempting IRCs can be seen. . . . Send one card intending to confirm more than one QSO. . . . Ship self-addressed envelopes without protective tissue under gummed flaps. . . . Use hand-scrawled index cards, wrapping paper, etc., in place of decent QSLs.

Emile's opinions are only one operator's thoughts on the situation at the DX end, but he speaks with fresh experience. This discussion on the troublous art of QSLing continues open.

Where:

HEREABOUTS - I could not agree more with VE1AL's September comment on humdrum QSL conformity. There is much to be said for something like a monthly best-QSL contest. - *W1FLX*. . . . My answer to the drab-QSL problem is colorful, carefully homebrewed cards. A toy Spirograph helps, and no two are alike. OK1BNR called me during a CT3AS pile-up to ask for one! - *W8CL*. . . . We should all keep in mind that QSL managers often are not supplied with logs by their clients for months and months. There is nothing they can do but hold onto your s.a.e. - *HPIAC*. . . . CO2FA came through with a QSL from that P.O. Box 6996, Havana, address. - *WAØVZC*. . . . QSL files and records get bulky when you near the 300 mark so I photograph each new-country group of ten for compact pin-up reference. - *K1DRN*. . . . QSLs to Iowa State Fair's KFØMEX from Ws go via WAØSWJ, Ks via



KX6IY works code or phone on 10 through 80 meters from your QTH of the Month, bird-like Eniwetok atoll, renowned nuclear test site of bygone days. This Marshall islet is three miles long and 700 yards wide at maximum.



JY1 is the hub of much DXcitement in the Middle East of late. Royal aide Zaza operates JY1 as JY1/B at left. In the next picture Arabian Net members (standing, L. to r.) 9K2s AL AM, 7Z3AB, JY4IA, and host King Hussein watch guest ST2SA parry a 20-meter pile-up. (Photos via WA3HUP, Ks 2QHT 6GLC)

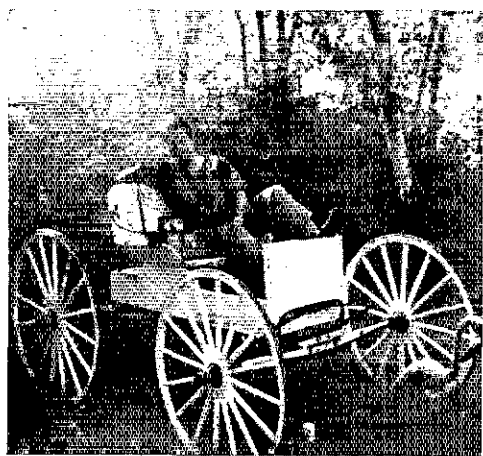
KØUKN, and others via WAØETC. — DXNS. . . . Active DXpedition of the Month stations as of August included CN8HD, CRs SSP 7FR, CX2CO, DJØVB, FM7s WF WQ, HKØAI, HP1IE, JW1EE, KF4SJ, KV4FZ, LA1H, OY7ML, PJ7VL, PY2s PA PE, VA2UN, VE8RCS, VKs 2BM 3CH 9DR 9XI 9XK 9XX, VPs 7NY 8JV 9GR, VS6DO, XE111J, and 9Y4VT. — W2GHK.

ASIA — Somehow people have the idea I manage all AC3PT QSLs. I did send out cards for my own operation at that station from December, 1969, to February, '70, but other QSOs, so far as I know, must be confirmed directly through AC3PT. — F. Lieberman. . . . Had a lot of fun printing my own HS1ADX QSLs on a small hand press. — W4VFP. . . . XYL Karen handles all QSLing for me from my Wisconsin home QTH. We're a poor military family so please include self-addressed stamped envelopes. — HL9WU. . . . I'm QSL manager for HS2AFV for contacts after August 3, 1971, s.a.s.e. required. — WA9ELV. . . . I still seek QSLs from Wis CPT DPJ FJJ, K1TEV, WA1JAS, W7s GKN and GVA for 1968-'70 contacts. — UAØKQU. . . . 9K2BQ operation by JA1BIN may be QSLd via JA1ZZ. —

WCDXB. . . . My card to BY3NK was returned for want of a better address. Any fresh ideas? — W6QPF.

AFRICA — 5Z4 and 5Z5 are amateur prefixes for Kenya but the latter will be used only on special occasions such as my August operation from Lamu island, 200 miles north of Mombasa. — 5Z4KL. . . . When I chased DX in the States my QSL returns averaged about 50 percent, the lowest being from South America (nil from six YV1s). 9G1WW. . . . I'll handle QSLing for the daughter of SU1IM, call unknown at this writing. — W3HNK. . . . Due to log difficulties I no longer serve as QSL manager for A2CAW. — WB8BTU. . . . Effective September 12, 1971, I handle QSLs for T11AW. — KAMPE. . . . It may be useful to know that 9J2JC's XYL is a stamp collector. — VERON.

OCEANIA — For the late October operation of W7UXP/KH6/KM6 QSL manager KH6HCM requests no QSLs via bureau, only s.a.s.e. or, when appropriate, s.a.e. plus IRCs. — KH6BZF. . . . I shall continue to supply QSLs for DU7SV's past QSOs but I expect the demand to dwindle because Volt is not WB6EFY. — WA6KGP. . . . As of July 29, 1971, I am QSL manager for YB3AAY. Customary s.a.s.e. from W/Ks, s.a.e. plus International Reply Coupons from others, please. — W3BRB. . . . We are having special QSLs printed and will confirm contacts 100 percent for November 6th-7th operation by VK4SZ at the Sunshine Coast International Rodeo. — Sunshine Coast ARC. . . . Self-addressed stamped envelopes from W/Ks, please, or QSL replies must go via bureau routes. — KX6JY.



EUROPE — Somebody apparently misused the SVØWT Crete MARS call during the summer of 1970. It's a pity but QSOs with operators "John" and "Dan" cannot be confirmed. However,

5H3LV mans a nostalgiamobile at a recent Winnipeg DX Club field day. Garth still keeps an eye on the possibility of Zanzibar or other rare doings out Tanzania way. (Photo via VE4s AA SK)

if you worked Randy of SVØWT after August of '70 you will receive a QSL in the near future. — WVØWLL. . . . The two dozen members of BRA, Bolinas Radio Amateurs (SK3BR) are 100-percent QSLers. — SM3ALR. . . . Just catching up on TF2WKF QSLing. The last s.a.s.e. hit the mails in early September, others to follow via bureaus. I handle cw QSLing only; phone TF2WKF cards should go via TF2WKP. — WAØGQI. . . . The "A" suffix on German callings, contrary to your July info, means a second fixed QTH, applied for by licensee, granted and registered by licensing authorities. — DLs 1FL 2QB 3NOA. . . . Anyone still needing a GC5ANX/Guernsey QSL should reapply to my Nevada QTH. Many open spaces in the log may indicate some cards tied up in bureau routes. I should be in Las Vegas for another six months or so. — WA2MEQ/7.

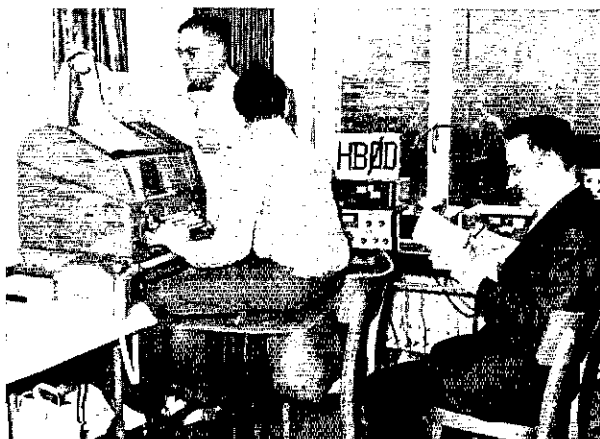
SOUTH AMERICA — QSLs from W/Ks with s.a.s.e. to my New Jersey address will be appreciated. 1 QSL 100 percent on receipt. — WA2WYR/CE2. . . . Those desiring QSLs for my CP1GN activity should apply to my present Arizona QTH. — WA3ECE/7. . . . QSLs for September's Bajo Nuevo HKØAA operation go via K3RLY. — WCDXB. . . . "QSLers of the Month" DL1PB, FL2CB, FO8BQ, HBØXUD, HKØBKX, JD1ABO, K4BZH/V7P, KG6ALY, KX6DC, P21AV, VPs 2AAA 9NP, VQ9R, VR2FO, ZA2RPS, ZD8CW, ZL4OL/a, 3F1IE, and 9M2DQ, plus associated QSL aids, are specifically saluted in "How's" correspondence from Ws 6QPF 8YGR, WA3RDU, WBS 9CJS ØBBR and VE7BAF. Any praiseworthy pasteboard performances we missed? . . . Halp! W4LXA solicits QSL shoves toward wallpaper from CR4AJ, F6AGM, M1AP, WVØWN, 5N2ABH; W6QPF hunts hints on nabbing tardy confirmations from JA3XPO, 3A2AJ; WØEWF likewise re overdue FPØCA, VO1CO/F3, YA1AFQ; HP1AC is foiled by holdouts FK8BN '70 and 9X5LM '68. Any 'alp? . . . QSL managerial assistance to ops at DX points is offered by WB1WN, K4PRE, WAs 2MDX 6DHH, WBS 2IKN 4RMQ 6WXO and 9AOH. Would-be QSL agents be advised, however, that such arrangements normally come about in QSOs with DX stations or during QSL exchange. . . . Now the mailbag's assorted individual suggestions, but remember that each item is necessarily neither "official," complete, nor accurate. . . .

AC5TY, T. Yonten, Dir., Wireless, D/Tshe, Thimpu, Bhutan
ex-CP1GN, H. Mills, WA3ECE/7, P.O. Box 4242, Huachaca City, AZ 85616
EL7s A, D (via DK3IA)
FGØGD/FS7 (to W9IGW)
FM7AI, B.P. 619, Fort de France, Martinique
G3PPE/W6, M. Eccles, 30 Roosevelt Cir., Palo Alto, CA 94306
GC5ANX, L. Wilson, WA2MEQ/7, 2522 State St., Apt. 1, N. Las Vegas, NV 89030
GD3s RZI WJN (to G3WJN)
HBs 9VXS ØVXS (to WA4WME)
HL9WU, R. Tlachac, P.O. Box 302, Marshfield, WI 54449
IA5s RB RBJ (via W2GHK)
IE9SZ, DXOTC, P.O. Box 143, Palermo, Sicily, Italy
IG9MEC, P.O. Box 511, Florence, Italy

IP1RBJ/4/6 (via W2GHK)
KB6RCT, Box 153, APO, San Francisco, CA 96401
KX61Y, D. Griffin (WB5EEN), USCG LorSta, APO, San Francisco, CA 96333
OA8S, Casilla 2492, Lima, Peru
TY3ABF, P.O. Box 504, Cotonou, Dahomey
VK9JV, Box 3155, Port Moresby, P.T., Australia
VP2LB, P.O. Box 264, Vieux Fort, St. Lucia, W.I.
VP2LY, Box 79, Castries, St. Lucia, W.I.
VQ9RM, R. Marchant, Box 191, Mahe, Seychelles
VQ9XX, Box 193, Mahe, Seychelles
VR2FY, Box 1168, Suva, Fiji Islands
VR4CD, Box 310, Honiara, Solomon Islands
W7UXP/KH6/KM6 (via KH6HCM)
WA2WYR/CE2, J. Gargen, c/o BIC Project, Casilla 445, La Serena, Chile (see text)
WB6IAO/KB6, Box 1187, APO, San Francisco, CA 96401
YB2AY, Box 35, Magelang, Java, Indonesia
YB4AAY, APO, San Francisco, CA 96356
4JØs BF BJ DI, Central Radio Club, Box 88, Moscow, U.S.S.R.
9Y4NN, J. Pafford, Rte. 3, Box 22, Pocomoke City, MD 21851

AC5PN (to AC5TY) OB4QN (via RCP)
DC8NR/VQ9 (to DC8NR) OHØAL (to OH2AL)
ex-DU7SV (to WB6EFY) SVØWT (see text)
ET3USD (via K9HJS) SVØWXX (via W3HNK)
ET3USE (via K8IRC) SZØGA (to SV1GA)
FM7WF (via WB8BTU) TA5ZH (via WB8DWA)
FP8RO (to WB8BTU) TE2A (via TI2HP)
GM5AIW (via WA3RHQ) TJ1AW (via K4MPE)
HBØXTL (to WA6GDS) VK9LF (via WA3HUP)
HS2AFV (via WA9ELV) VP2LAJ (via W7VRO)
IA5VNC (to HGHO) VR1AA (via K3RLY)
IS1DFO (via WASØYR) WB6DJN/KC4 (via K2BPP)
JD1ACF (via JA1OAF) WS9UCI (via W9LVH)
JW4LN (to LA4LN) YB3AAY (via W3BRB)
JY9BI (to DK2BI) 3AØEP (to WA6GDS)
JY9DX (via VE6AKV) 3AØEW (to DJ9KH)
JY9DX (via W3HNK) 3F1IE (via W2GHK)
KFØMEX (see text) 3F1XYZ (to HP1XYZ)
KL7HHA (to WA6CVU) 5X5NF (via VE6AKV)
KQØNEB (via WØYOY) 5Z5KL (to SZ4KL)
Ky4CD (to W4DDQ) 9A1W (via IP1MWB)
KZ5PN (to KZ5PNN) 9K2BQ (see text)

QTH contributors this time: Ws 1CW 2BBK 3HNK 4YOK 6GSV 6QPF 8YGR 9LNQ, Ks 3YVN 4SD, WAs 2KWB 3RDU, WBS 2AQC 2RLK 4PXW 5DOJ 6KBI 9CJS, DL4WJ, Columbus Amateur



HBØD surmounted logistical odds with a radioteletype DXpedition to Liechtenstein for DARC's April WAE RTTY Contest. HB9s P, AIK, and WP, (left to right) enjoyed impressive DX results.



OH0MA (left) and OH2BHU/OH0 cool their tootsies in chill Market Reef waters during the latter's June DXcursion. Bo used the same portable call from the Alands in May and June. Reef resident OH0MA runs a radiotelegraph on the lower bands.

Radio Association CARAscope (W8ZCO), DX News Sheet (G. Watts, 62 Bellmore Rd., Norwich, N.72 T., England), Far East Auxiliary Radio League (M) News (KA2LL), Florida DX Club DX Report (W4FRO), Long Island DX Association DX Bulletin (W2GKZ), Newark News Radio Club Bulletin (J. Heien, 3822 Marshall Ct., Bellwood, IL 60104), North Texas DX Association Bulletin (W5SZ), Northern California DX Club DXer (Box 608, Menlo Park, CA 94025), Southern California DX Club Bulletin (K6HIH), VERON's DXpress (PA0s FX LOU TO VID WWP), and West Coast DX Bulletin (WA6AUD). Any tips to pass along?
 † † †

W h e n c e :

AFRICA — Operational stops in XT TU 5V TY 5U 5T and CT3 in that order are anticipated starting the first week of this month, a five-band tour with 550, SB-220 and 18-AVQ. — DJ6QT. . . . Working skeds with FL8HM Saturdays at 0300 GMT on 14,277 or 14,297 kHz. — K4SKI. . . . 3V8AL is a 5B-DXCC target on 3750 kHz around 0600 GMT Saturdays, tuning higher for W/Ks. — W4YOK. . . . Enjoyed the '71 ARRL DX Contest very much and we'll be in there next year! — 9G1s WW YA. . . . ZD8CW has been active most evenings near 14,025 or 21,025 kHz, also working the low ends of 40 and 80 for the 5B-DXCC lads. — W2MUM. . . . EL2BI and CN8BG knocked off for the States this summer. — W3HNK. . . . 5Z4JP is less active lately due to increased missionary duties. — W5ZXS. . . . DXers are welcome to join my Sunday schedules with 9Q5LW on 21,360 kHz around 1930 GMT. — WA2GZC. . . . ZE1CY heads a Rhodesian Air Force electronics development team at Salisbury and has a brother living in Malawi. He works 10 through 20 with a Yaesu and homebrew 7094 linear. — W4JUK. . . . My 14,090-kHz radioteletype is beamed Statesward beginning at 1700 GMT with 170- or 850-Hz shift, 45.45 or 50 bauds. I also have a two-element beam on 80 meters, three-element array on 40, and split frequency is available. — 9J2ED. . . . EL7s A B C and myself are mostly on 21,150-21,200 kHz around 1830 GMT, a little earlier on Sundays. I'm ex-DL8EZ. — EL7D. . . . My uncle, 9Q5AF (WSAHC), returned Stateside after a four-year missionary stint in the Congo. — WBSDOJ. . . . SU11M's daughter will start out on cw, and I hope to get Ibrahim to try ssb with a rig I'm shipping to him. — W3HNK. . . . ZD9BE operator Alan was

due back home last month, and 5Z4KL reports little progress in efforts to obtain Somalia DXpeditionary authorization. — NTDXA. . . . OH2s BH and MM rattled off eight kiloQSOs as 3C1EG on Fernando Poo, seven more from Annobon as 3C0AN. — DXNS.

ASIA — MP4TDM expects to be active from Ras Al Khaimah for the next year or more. That sheikdom is quite likely to become an independent country in the near future. — K1DRN. . . . I'll be looking for on-the-air friends from Virginia now after some 2000 QSOs with 170 countries from HSIADX. — W4VFP. . . . Amateurs planning extended visits to Thailand are invited to contact STAR concerning the possibility of amateur operation here. Permission is not granted prior to arrival. — HSIABU. . . . Amateur Radio Society of Iran offers an award commemorating the 25th centenary of the founding of the Persian Empire, details available via s.a.s.e. to ARSI, Box 1000, APO, New York, NY 09205. — EP2DX. . . . Got my Korean QSO credentials in late August. My dipole and HW-16 do very well atop a 4600-ft. mountain. I'll soon try ssb with an HW-101 and 30-L. The States come through best around 0100 GMT on 15 and 20 but JAs overrun 40 and 80 like W/Ks do back home. I schedule my dad, WN9DFZ, daily at 2330 GMT on 21 MHz. — HL9WU (WA9QVT). . . . HL9KH at Osan Air Base is an extremely well equipped club station. It's really something to hear so many JAs boiling through on 40 and 80 in the daytime. I hold an HL9 operator's permit but haven't managed to hit the air yet. — K3ILC. . . . Now back on at the U.S. Consulate in Hong Kong signing VS6CZ. — ex-XW8CS (K3KZB). . . . I originally started out as W2CJB in 1930 and now enjoy ssb and cw on 15 and 20 with an SR-400, SB-101, HA-20, and HQ-180AX. — EP2JA (W2JA). . . . VU2JEZ thanks all who gave him help and advice in the completion of his station. Gopal works mostly 20 cw at present. — WA7MUY. . . . I operated "4X" in July from Tel-Aviv, Haifa, and Jerusalem on 15 and 20 but, as I never stayed on after 1700 GMT, no Stateside QSOs resulted among contacts with 25 countries. — WA2FBI. . . . In JARL's All-Asia Test I noticed most ages given were from 20 to 35, the oldest only 54. Are DX tests a young man's game? — W3TV. . . . HS2AFV can be found daily at 1200-1700 GMT on 14,075-kHz cw or 14,200-kHz sideband. Nick won't return to WA9MQP till next June. — WA9ELV. . . . The Structure of English is so different from Japanese that most JAs, including myself, find it almost impossible to overcome the language barrier for radiotelephony. English radiotelegraphy is difficult enough! — JA1RRU via WA7LMZ. . . . DXpeditions to the Spratly islands appear most unlikely in the near future. — 9V1QJ. . . . Martial law has taken many hams off the air in Turkey and I'm probably the only active TA5. I run about ten watts on the low ends of 14 and 21 MHz. — TA5ZH. . . . Watch for my cw on the low ends of 15 and 20 meters, 1300-1600GMT. — XW8CY (WA0QFA). . . . VS6DO's skyhook was a typhoon victim. — DXNS. . . . JA8IOC will represent the 1972 Winter Olympics from Sapporo. Renewed amateur activity by Burma nationals appears more likely. — WCDXB. . . . 9M2IR (VE7IR) labors toward

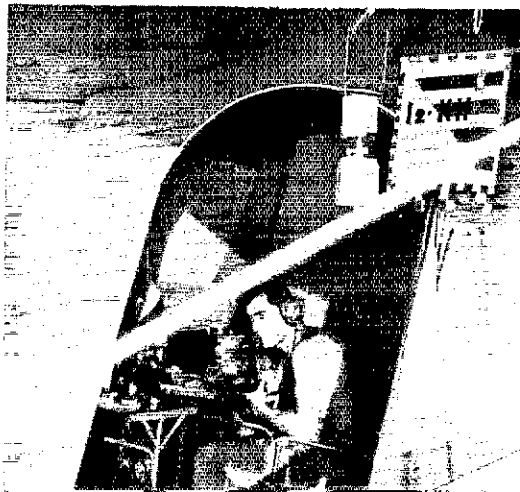
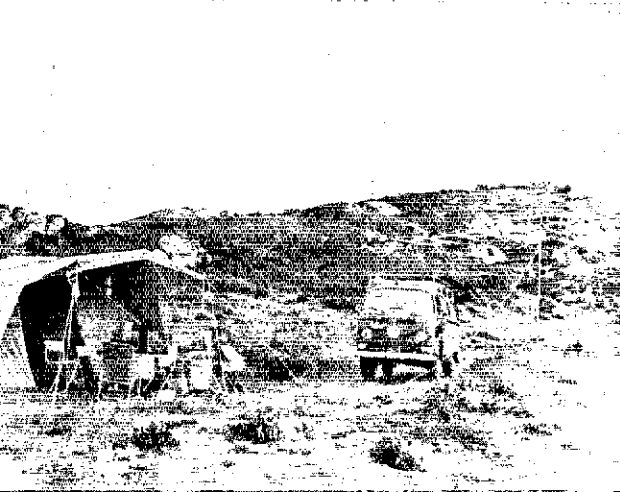
Cambodia action, possibly as VE7IR/XU. JT1s AI and KAA make the M.P.R. available on 20 sideband. — *VERON*. . . . KA2SF replaces departing KA2UR as manager of the FEARL QSL Bureau. New or renewed memberships are claimed by KAs 2AA (WA4HIG), 2AD (WA6CPN), 2AS (K0SVW), 2BP (WB8KAW), 2CR (WB4UVJ), 2HE (W1TME), 2IL (WA6EIG), 2MR (K1TTO), 2UR (K3FUR), 2WB (WB6JUJ), 2WW (WA1OKL), 7DM (WA6OOW), and 9DH (W6IBC). — *FEARL*.

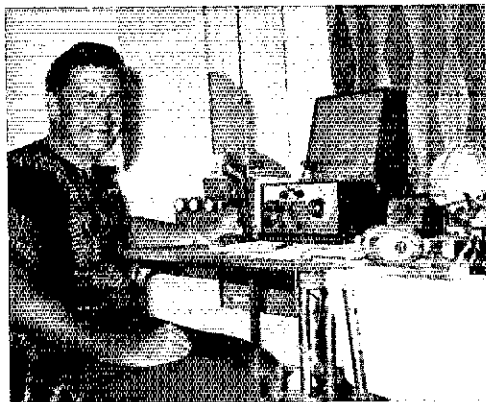
OCEANIA — Five-Band DXCC chasers be advised that week days I intend to use 3844 kHz at 1000-1030 GMT, 7087 or 7230 at 0930-1000 and 1030-1130, 14,230 at 1130-1230, and 21,400 at 0000-0030. On weekends it's 21,300 at 2300-0100, and 28,600 kHz at 0100-0200 GMT. Radio-telegraph skeds are also available on request. I have a gallon and rhombic for all bands plus a log-periodic for 40 through 10. — *KX6LY (WB5EEN)*. . . . KS6CY has been active from Pago Pago weed days at 0100 GMT on 21,332 kHz, also Mondays, Wednesdays, and Fridays at 0430 on 14,225. K6UPT often is net control for ZK1MA's Sunday net at 0405 GMT, 14,202 kHz. Tuitae runs on battery power from Manihiki. — *WA2LWA*. . . . I'll be at Samoa for two to four years with my TR-3, SB-200, TA-33, and 14-AVQ. *KS6DY (W6HUQ)*. . . . Worked KS6DX on 10 phone the other night when the band was apparently dead. — *K4ELV*. . . . Just replaced K6PWX/KG6 with my new call and I'm interested in 40-meter DX potentialities. — *KG6JBD*. . . . Too much tail-ending, ill-timed breaking, and overaggressiveness by the W/K gang rankled WB6JXQ while guest-operating VR2EK. — *WA6CPP*. . . . The rudeness of some DX chasers is beyond tolerance. I got disgusted one day, pulled the big plug and knocked down the antenna. — *KB6CT-5WIAT*. . . . Papua's VK9BS hits 14,286 kHz every Wednesday at 1130 GMT. — *W3HINK*. . . . Had about 900 QSOs on 20 meters and a few on 40 while signing FOØTG this summer. — *WA6IVM*. . . . Recently ran into VK2ADØ on 20 ssb and found I had worked Frank in 1926 when he was A2BK with a 250-watt Colpitts. Also scored a 43rd anniversary QSO with VK2NS in April. Hope we can make the 50th! — *W5ACL*. . . . Never could work the Solomons until I found myself in a roundtable with VR4s BS CG and EE one recent evening. — *W4ZLMZ*. . . . KH6s GMP HCM and HGP were on W7UXP/KH6YKM6's staff at Kure and Midway last month. — *KH6BZF*. . . . QSOD W 1AW and 6ISQ of ARRL and I've been trying SSTV with interesting results. Friend VK6ES is on holiday in Europe. — *VK5MF*. . . . ZLs 2BT and 3LE helped us Caribbean chaps keep the 75-meter DX pot boiling this summer. —

8P6CX. . . . QSOs with two FO8s during the first three weeks of September may have qualified you for a special certification. Check with FO8AA. — *DXNS*. . . . More JA DXpeditors are zeroing in on Parece Vela. — *1IDX4*. . . . We'll surely miss 9M8s OEA and SPD, due for Sarawak QRT, but ZL3PO/c may inhabit Chatham Isle for several more months. — *NTDXA*. . . . VRIAA, ex-GFHCL-9M2LO, expects a long Gilbert & Ellice tour. Danny is RAF-retired and likes the key. *VERON*.

EUROPE — Crete SVØs WBB (WASHWO), WCC (WA3OEJ), WLL (WB4KZI), WMM (WB2JGZ) and WS (WB5DRI) are not allowed 80 meters but are active on higher bands using phone and code. *SVØWLL*. . . . UA3FF returns to the air after a six-month layoff constructing a new transceiver and linear. *W3HINK*. . . . Wish we could get more of those ham tourists to concentrate on 40 and 80 from San Marino and Andorra. I lack only about thirty QSLs for 5B-DXCC. — *G2MI*. . . . Thinking about a 1972-'73 transworld DX safari using a camper. — *G3ATI (K2MH)*. . . . HBØXTO (DK3ST) expects to terminate cw and ssb work in Liechtenstein this month. — *DK2PN*. . . . FØWJ/FC (W5QNY) is a contester who enters U.S. QSO parties whenever conditions permit. — *K5MAT*. . . . YO2AFB, assisted by DK3s DX and CU, apparently is the first RTTYer in Roumania. He's also planning SSTV operation. — *W1BBJ*. . . . Club station ZB2A runs a Vespa MkII, R-88D and Racal ensemble. — *WA9VNE*. . . . Bollnas Radio Amateurs club offers its WABRA certification for contacts with club members since 1965, details available from me for s.a.e. plus IRCs. — *SM3ALR*. . . . Radio Club Beograd issues a WRCB award for sufficient QSOs with YU1 members since 1950. Send s.a.e. with IRCs to RCB, P.O. Box 235, Belgrade, for full info. — *J. Dell Olie*. . . . RAAG's SV1SV boys have their DXpeditionary eye on Mt. Athos, a monastic "holy mountain" in northern Greece. — *K3AFO*. . . . Finland's SRAL celebrated its 50th anniversary in September. — *W9BRD*. . . . Our Continental reporters logged no southeast Asia or Australian 28-MHz signals in June, only one North American station. — *GDME, QUAX*. . . . Moved to Palo Alto where I've been working quite a lot of Novices. — *G3PPE/W6*. . . . Found I qualified for the first two-way ssb WAE-I diploma awarded by Germany's DARC to a U.S. amateur. — *WA3KEG*. . . . Old UA1KED is said to be signing UK1PAA from Franz Josef Land. KFØUJ, DL7s AV FT and NS scored 2513 Albanian QSOs in their latest ZA2RPS go, 65 percent cw and 50 percent with W/Ks, Germany's most-wanted list

IMØKH, a May maneuver by I2s FGT and KH (operating) is a typical example of island-hopping Italian style. The lads knocked off 2100 QSOs with 90 countries from Caprera island under auspices of ARI's Milano DX Gang.





goes Clipperton, Minerva, Bouvet, British Phoenix, Maria Teresa, China, Willis, Tonga, Tokelaus, Revilla Gigedos, Canton, Spratly, Manihiki, Juan Fernandez, and Fanning in that order. — *NTDXA*. . . . GW3AHN's modest rotary dipole has collected 328 countries on 21 MHz. — *DXNS*.

SOUTH AMERICA — Gunning for W/Ks around 14,330 kHz from this 7100-ft.-high La Serena location during the next month or more when not tracking satellites. — *WA2WYR/CE2*. . . . Glad to receive ARRL's WAS to go with QSLs from about 200 countries. My TR-3, SB-200, HQ-180AC and homebuilt quad are located on a farm some 600 miles south of Santiago. DX conditions are quite good here in spring and summer but, being so far south, bands are dead much of the winter. — *CF6EQ*. . . . HC8GG is to be commended for fine operating this summer, steady, concise, and accurate. — *WA7MMK*. . . . While visiting 9Y4VU and friends, I was fortunate to be named an honorary member of Trinidad and Tobago Amateur Radio Society. Incidentally, XYL Eva's call is WA2BAV, not WB2BAV as given in your September photo captions. Yes, she drew an "older" prefix than I did! — *WB2AQC*. . . . I'll be operating from Arizona after making DXCC as CP1GN at La Paz. — *WA3ECE/7*. . . . Worked LU5BB after QSOing KZ5BB. LU5BB had just signed with CO2BB! — *W1BBJ*.

SV0WOO (right) and guest K3AFX inspect 14 MHz in the former's ham shack at Kefissia. John also hits 10 and 15 when not too busy with Athens university studies.



9J2PM is regularly heard from Lusaka on higher DX frequencies. Rev. Mueller is one of the more active of Zambia's several dozen amateurs.

HEREABOUTS — TG4SR, after a quarter century with Central American Mission, expects another five years down there. Ed is 65. — *W1BBJ*. . . . Hope the west coast boys will cooperate in keeping 1825-1830 kHz clear of local QSOs so we'll have a chance to work Europe this season. — *W6NUT*. . . . MP4BJI, GW4AEC, ZD8AY, VK6HK, PY1DVG, and WA4PXP gave KV4FZ a fantastic 22-hour midsummer 160-meter "WAC." — *NTDXA*. . . . Clipperton, Bouvet, Maria Teresa, Cambodia, South Sandwich, China, Spratly, Iraq, Tibet, San Felix, Minerva, Sikkim, Bhutan, and Guinea hold most-desired status in a recent poll. — *FDXC*. . . . W4VSV's sixth VO2 on 10 phone earned an award from West Labrador ARC. — *WA4ZZU*. . . . Cw-only here but I hope to try sideband next year. On 160 I listen 1820-1835 kHz while transmitting on 1803. My transmitters are homebrew, 10 through 160 meters, and the receiver is a Geloso G209. I previously signed VP2AGA. — *8P6DR (G+RWL)*. . . . Renewed my YN4IM ticket just in case. Say, skeds excepted, why must some birds work rare DX over and over again, week after week on the same band and mode? — *W5QPX*. . . . Thirty QSLs confirming QSOs with different maritime-mobile stations may qualify you for the certification offered by Maritime Mobile ARC, 5527 Tiffany Dr., Houston, TX 77045. — *W5FGO/mm, SS Delta Mexico*. . . . Most WNs work their DX near the bottom of the 21-MHz Novice band but I've managed 15 countries higher up. — *WN9FBG*. . . . Fifteen is still fine to the south. WN8IWQ and I recently scared up a PY3 and PY5. — *WN3JEF*. . . . Latest 21-MHz goodies here are WH6HLW and YV1ALD but I still need Alaska for WAS. — *WN5CMX/Ø*. . . . FM7AA is quite active with his new Drake combo and three-element Yagi. Frantz also is available for 40- and 75-meter action with inverted Vs. — *W8TJDY*. . . . Interested in a list of beam headings and distances for 90 U.S. cities and about 300 countries computerized for your particular longitude and latitude? They're available here as a by-product of a data project, s.a.s.e. for details. — *W6FFC*. . . . My May DXcursion as ZF1WF rolled up 850 contacts with 85 countries and 47 states on 10 through 20. — *W4GIW*. . . . KV4s BV EY FR and other V.I. DXers represent our Virgin Islands Transmitting & Listening Society in Caribbean DXpeditionary efforts. **VITALS**. . . . I've passed the 3000-QSO mark but Asia is tough from the Bahamas. Ten is quiet, fifteen spotty, twenty best, forty noisy with SWBC splatter, and eight loaded with QRN. Glad to help 5B-DXCC aspirants. — *K4BZH/VP7*. . . . Navassa Island is home for some 700,000 birds and 700 of the world's smelliest goats. — *K4CSY/KC4*. . . . FP8AP's boat *Attaboy*, pictured on page 92, November '70 QST, is now landlocked 200 feet above sea level. Gus has her fitted out as a hamshack overlooking St. Pierre and my FP0EG operation took place there. — *VE1AIH*. . . . KV4FZ's August work as VP2SAM on St. Vincent gave 160-meter country No. 76 to W2EQS, No. 109 to me. — *W1BB*. . . . WA3KEG filed a photo of QSLs from DXCC members in 100 countries, the 64th "DXCC-squared" recorded, and the fourth from Threeland. — *W9BRD*. . . . The passing of W6WX in July saddened club colleagues. Dave was one of the great ones, a fine DX competitor. *NCDXC*. . . . W9IGW, PJ7VL, and I will operate FG0GD/FS7, VP2s EF and ES in that sequence beginning November 3rd on 10 through 80, voice and code, usually 30 kHz inside each band or subband. Before heading home I also hope to reactivate PJ8AA. — *W2BBK*. QST



CONDUCTED BY BILL SMITH,* KØCER

Record-Breaking Tropo

WHAT MAY have been the strongest and most widespread tropo opening since the 1950s spread from the midwest to New England August 15, and through the early morning of the 17th. At least one amateur record was broken, when WØDRL in Topeka, Kansas, worked K1PXE, Milford, Ct., over a 1205-mile path on 432. A uhf TV DX record fell when Bob Cooper, W5KHT, Oklahoma City, logged Boston's channel 34 at nearly 1500 miles.

The opening was associated with a slowly-developed stationary front extending from Hudson's Bay along the Canadian border to north of Winnipeg, down through western North Dakota and into a low pressure area in north central Wyoming. At the same time an intense low was moving north along the Atlantic Coast. Such conditions in the Atlantic hurricane season merit attention, so vhf DXers were ready.

The reported beginning was when WØLER, Minneapolis, logged exceptionally strong 144-MHz 300-mile path signals from KØMQS and WØEMS at 0800 CDT, August 15. By 1800, John was receiving strong TV signals from eastern Wisconsin to Sioux Falls, S.D. A WØLER CQ flushed WA9QZE, Chicago, and the session was on. WØLER and other midwest stations worked as far east as K2ZAI/8 in eastern Ohio until shortly after 2300 CDT, when K2TXB/2 answered a WØMJS CQ. WØLER followed by working Russ, K2CEH, K2YRZ, and VE3DSS. On 432, WØDRL was working 650-mile paths to the northeast with S2 and S3 signals.

Signals the morning of the 16th were similar to the previous evening, but it wasn't until that evening signal levels began to build. Several operators sent reports, some of which were confused on times and dates, probably caused by lack of sleep, not to mention the excitement! At 2130 EDT, K1HTV, Ct., worked K3IUV, Pa., on 432 and then switched to 144 to contact stations west to Wisconsin and south through Iowa, Missouri, Kansas, and W5UGO, near Tulsa. Rich said this was an unusual situation, in that

Connecticut stations only 20 miles apart could not hear the same midwestern signals, indicating a sharply defined duct.

W1JSM, New Hampshire, worked west to KØMQS, Iowa, and VE3ASO contacted WA5NOB, Arkansas. WA1FFO, 20 miles north of K1HTV, had comments similar to Rich's. He worked W5UGO and K5BXG, both Oklahoma, WØNEN in Kansas City, as well as Ohio stations.

W3LNA, Pa., active on 2 meters for 25 years, says, "this opening was the best I ever heard in regard to extent of coverage." Larry had numerous midwest contacts from Minnesota to W5UGO, good for 3 new states. WA2UDT, N.J., exchanged reports with KØMQS. W5WAX, Muskogee, found himself outside the best of it, and had to settle for Ohio, Michigan, VE3, and closer stations. Sam sat frustrated listening to stations 50 miles away working W1s and 2s. W8BYW, near Detroit, was also frustrated having to operate above 145 MHz, while the DX was being worked near 144.1. From Ohio K8CTM worked stations from Connecticut to Oklahoma and heard both ends of a K1HTV/WØNEN contact. WA8MVV had August 16 evening contacts with the Minneapolis group, Iowa, Missouri, and Nebraska, and heard Oklahoma. K8UQA added Kansas on 432 working WØDRL (who else?) at 800 miles.

From Toronto, VE3DSS says, "stations were piling on top of DX like 20 meters." Dana reports that he and VE3s ASO, DSE, DSQ, and EMS worked W5ORH and K5BXG, and a helping of 9s and Øs. One of the better Canadian contacts was between VE3ASO and WØZJY, Kansas, who was running 10 watts and a 16-element collinear. VE3DSQ added 5 new states, working west to Minnesota and south to Oklahoma.

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

Maximo Bachi, XE1XA, Mexico City is looking for stateside meteor scatter schedules on 144 MHz. Max runs a 4CX250B and 20-element collinear. He worked W5UKQ during the August Perseids.





At the recent Central States VHF Conference in Sioux Falls, S.D., these three 144-MHz moon-bouncers met personally. Left to right: Sam Harris, KP4DJN (W1FZJ), Mike Stall, K6MYC, and Don Falle, VE2DFO.

Perseids, 1971

Perhaps the most significant event was WØDRL's 1205-mile 432 contact with K1PXE. At 0600 CDT August 17, Al crawled from the sack and found 432 full of strong radar signals. More than one radar being heard told Al that 432 was open farther into the northeastern U.S. than the 650-mile range he had heard for 2 previous days. Shortly after 0630, Al heard the CQ tape of K1PXE in Milford, Ct. peaking S6. Al didn't have K1PXE's telephone number but instead phoned W2AZL, N.J. They worked at 0638 for the first Kansas-to-N.J. QSO. W2AZL then informed K1PXE that he was being heard in Topeka. At 6:45 K1PXE and WØDRL swapped reports, and the record was on the books! Quite likely the record could have been extended further into New England had someone in Massachusetts been active. At nearly the same time, WSKHT in Oklahoma City was watching Boston's channel 34 television!

Between the K1PXE contact and 1000 CDT, when Al took his son fishing, WØDRL worked WA2FGK, W2UK, K2UYH, and W3RUE with signals peaking S9 over 1100-mile paths! Al says the fact that stations he worked were within a small geographical area indicates ducting, but he is interested in knowing whether there was activity to the north and south of N.J., Pa., and Ct. between 0600 and 1000 CDT. Need we say those three states were new on 432 for WØDRL who now has 23 worked? Al says 432 operators should become more aware of potential long-haul tropo conditions. He is certain 1300- to 1500-mile paths were workable, and WSKHT's TV logging supports that theory.

The favorite of the 144-MHz DXers, the July - August Aquarids/Perseids meteor shower, produced what appears to be a record number of contacts. Although meteor numbers and burst duration were not as high as some past years, they were sufficient for dozens of contacts. John, WØLER, Minneapolis, had more than 50 contacts, including a number of repeats. John collected his 44th state on a 30-second burst August 13 from W7UBI, Idaho. Rich, K1HTV, Ct., said, "although not the best Perseids ever experienced, certainly one of the most productive." Rich tallied 22 contacts with 11 stations.

If the shower was not good in terms of meteor counts, why then was it so productive? The consensus is that there was an extraordinary amount of interest, with many new operators chasing meteors. Probably the biggest disappointment was the shower didn't produce the first 432-MHz meteor scatter contact. W4FJ scheduling WØDRL and WØLER resulted in pings and letters being exchanged, and several long bursts. Ted scheduled WØDRL from July 28 through August 15 and heard complete calls on five days, including a 30-second burst on July 31. On only two days was nothing heard from WØDRL. Ted says the path was not apparently reciprocal, WØDRL heard far less from W4FJ. WØLER heard pings only from W4FJ - so the first 432 m.s. contact is still waiting.

WØLER estimated that the peak Perseid hours were 0600-1100 GMT for the east-west path on both August 12 and 13, 1000-1500 GMT August 13 for the north-south path, and 1100-1400 GMT August 12 over the southwest-north-east path. The longest 144-MHz burst heard at WØLER was 2 minutes, from WA1FFO, Connecticut.

Operation appears to have been nearly equally distributed between ssb and cw. Ssb is becoming more popular because of its faster information exchange rate. For example, 19 of K1HTV's 22 contacts were ssb, 18 contacts were made *without* schedules, 16 of those from calling CQ. During one 18-second burst, K1HTV completed ssb contacts with both WA9QZE and KØMQS. Based upon the ssb exchange rate, K1HTV predicts the first 432 m.s. contact will be made on ssb due to short burst duration at 432. On August 6, K1HTV became first to work the island of St. Pierre on 144 MHz during a meteor exchange with FPØCA operated by K2OJD.



Much 6-meter experience is shared by these four. Left to right: W6KJD (K6QE), W4GDS, W6ABN, and WSKHT.



Nearly 100 Japanese 2-meter fm fans met recently at Lake Hamana, Japan. JA1s and 3s use mostly 145.73. Repeaters are not allowed in Japan. (JH3DPB photo)

K1HTV suggests eastern stations call CQ during the second and fourth 15-second periods of each minute and listen for western station replies during the first and third 15-second periods. Obviously western stations could likewise CQ during the first and third 15 seconds during peak shower activity.

W1JSM, N.H., had contacts with FP0CA, K41XC for state number 26, and WA9QZE, all on schedule. Don also had random contacts with W9SUV, W9YYF, W9JGV, and W0LER. WA1FFO, Ct., worked W0LER three times and K0MQS, all on ssb. W3BDP, Delaware, worked K5AGI and W5WAX. In a lengthy report from W4EJ, Ted lists the success of the following eastern stations. K3CFY worked K5BXG, W0EMS, W0ENC, W0LER, W5RCI, and K5AGI. WA1JXN, Vt., contacted K0MQS, W0LER, W9JGV, WA9QZE, K9HMB, W0RLI, WA0CHK, K2ZAT/8, and K9UIF, while K1PXE was working FP0CA and W0NEN. WA1LNJ worked W9YYF and W0LER, and WA2GSX contacted W0LER, K2ZAT/8, and WA0CHK. After a layoff, Florida's popular K41XC returned to 144 MHz in time for meteor contacts with W1AAL, W1JSM, K1HTV, WA1JLD, K2RTH, K2TXB, K5BXG, K8HWW, VE3DSS, and VE3EMS. K4QIF, Va., worked K5BXG on a 35-second burst while W4WDH, Ga., worked W5WAX and W5ORH. W5ORH, Okla., lists W4WDH, K6QEH, K7ICW, K8HWW, and VE3DSS, the last on a 1:47 burst.

W5ORH got calls from WB6NMT on 220 MHz. WA5MFZ, N.M., worked WB6NMT August 13 on 220 while Lee's husband, Fred, W5LO, completed with W0RLI on 144. W5WAX worked WB6CXF for his 10th call area on 144 plus K7ICW, VE3EMS, W4WDH, and W3BDP. W7JRG, Mont., worked K6QEH, W0RLI, and VE7BQH on 144, heard WB6NMT on 220 and one ping from K9HMB on 432. K7BBO, Wash., contacted W0ENC, S.D. K9HMB exchanged with K1HTV, W1YTW, WA1JTK, WA1FEO, WA1JXN, and W5GVE on 144, and K9AQP/1 on 220 MHz. W9JGV, Ill., completed schedules with WA1JXN and W1AAL, bringing Jerry to 31 states worked. He also worked W1JSM and K2TXB without schedules. VE7BQH worked K6MYC and W7JRG. XE1XA, Mexico City, worked W5UKO, La., on his first attempt at m.s. Elsewhere in this column is a

photograph of XE1XA, who seeks further schedules. Write Sr. Maximo Bachi, S. Francisco 10, Mexico 12, D.F., Mexico.

Our thanks to the operators who sent reports. They made this Perseid summary the most complete in recent years. This report clearly shows what good equipment, operating techniques, and awareness can produce on 144 MHz.

Late-September Tropo

There'll probably be more on this one next month, but K1RJH, Groton, Ct., phoned Headquarters to let us know about a strange bit of 2-meter DX the night of Sept. 28. Carl heard 2s and 3s working into Mississippi around 2230 EDT, and was amazed to find two stations in Pascagoula, Miss., coming through S9. He raised them both readily, and they reported him stronger than the nearer stations. Carl heard no other DX of any importance, and the Mississippi stations were apparently hearing only a relatively small area of the Northeast. Just another example of the need for *transmitting* regardless of what listening checks may appear to show in the way of propagation conditions. *WIHDQ*

OVS and Operating News

50 MHz finally cooled in late August after a fine July and early August *E* show. Here is a look from around the country and the Far East on the summer's finale. WA1FFO, Ct., worked W7UBI, Idaho, for number 40, but spent most of the summer on 144. WB4KGW, Pensacola, sent a lengthy report on the August activities of stations in that area including *E* openings on the 2nd, 3rd, and 4th. He says the Greater Pensacola VHF Net meets at 0100 GMT and that most of the stations are a-m.

WA6HXM says little doing from the Los Angeles area in August, except for a number of contacts with the Bay area some 400 miles to the north. According to Peter, this is just a case of the fellows finally pointing their antennas at one another. W6DOR missed most of the summer *E* fun while working at various radar sites for the USAF in Canada and the states. W6YKS became a League Life Member while catching several



Among the 6-meter DXers attending the Sioux Falls meeting were (l.to r.) WA7FPO, W7FN, and WB4BND.

single-hop openings. W6DPD worked W1s on July 7. K7BBO, holder of the most recent 50-MHz WAS, says little doing in Washington during August, but Dave did work 5s, 6s, 7s, and 8s. W7JRG says the September contest was slow from Montana, but Ken did work W5WAX on scatter, for an Oklahoma multiplier. K7QFW, Washington, comments that the July 12 opening to W1 and 2 was the best multihop opening he ever heard. KSREG, Ohio, who signs KV4HG when operating from the Virgin Islands, heard or worked all states this summer except KL7 and KH6. WB9HRV, Ill., got his first taste of scatter when he worked WA2HYA on August 13 during the Perseids meteor shower. W0P1P, Iowa, reports his only August opening was on the 12th, to the east coast. WA51YX/0 says August E was much better than he expected, judging from many years of intensive record keeping. The 15th was exceptionally active. Pat says anyone who contacted him from his temporary Colorado location may QSL to his San Antonio address. WA0JVF, Kansas, sent a report covering June and July when he worked into the Caribbean, Canada, and all over the states.

From Canada, Doug, VESUS, says he has mailed over 1200 QSLs covering contacts between May 1, 1968, and July 13, 1971. Doug says, "my apologies to the 6-meter fraternity for an unfortunate QSL situation, I'll do my best to see it doesn't happen again." The cards were mailed via the ARRL QSL bureaus.

In the Pacific, KR6R1 found August E to his liking, working many JAs and HL9WI, Korea. Ray says that on July 10, JR1MSR, Japan, heard OA1AA, Peru, at 2245 GMT but could not get his attention! Also on July 10, HL9WI, Korea, reports he worked VS6AI, Hong Kong. In addition to that contact, Bill worked a log full of JAs during July and early August, plus KR6R1, and was heard in Alaska by KL7HAM! Yes sir! The Far East is the "in" place on 50 MHz.

144-MHz news increased this month, thanks to the Perseid shower and the August tropo, both reported elsewhere in this column. W4SDH, Georgia, caught a small tropo August 29 when he worked Texas, Oklahoma, La., Arkansas, and Alabama, for an interesting evening. WSLO, N.M., works WSORH, Oklahoma City, nightly over a 500-mile path. W0DRL has been encouraging Fred, WSLO, to try 432 and so, with the loan of an

amplifier from WSORH, Fred will soon be active on 432. Fred and his wife, Lee, WA5MFZ, are also active on 220. W0MJS, Minneapolis, worked the September contest for seven states with 90 watts of ssb, Ron has a 36-element Yagi array, and his 90 watter will soon give way to a kilowatt. He has had much coaching from W0LER. Not many better teachers around, Ron! And from W0LER we learn there was good tropo on August 29, Sept. 1, 12, 13, and 14, plus a "fairly good" aurora on August 30 when K2TXB was worked by W0RL1, Minneapolis. VE3DSS reports also the August 30 aurora which lasted for some three hours. His best DX worked was WA0CHK, Mo., and K0MQS, Iowa, plus many W1s. Tropo was good the next two nights and one VE3DSS contact was with WA2BIT (3 watts, ssb) over a 400-mile path. From Vancouver, VE7BQH says his moonbounce schedules are continuing, producing two recent contacts with SM7BAE, Sweden. Ho hum, eh Lionel? You sure have a circuit working to Sweden! And in Korea, prodding from K6MYC has HL9WI well underway on an EME project which includes a 4CX1000 amplifier and an array of eight 9-element Yagis.

220 MHz continues to receive enthusiastic promotion from at least two newsletters. The *North California 220 News* (WA6GYD) reports new stations now active in that area include WB6COB, WA6HBB, and WA6LXK. WA6JYG seeks 220 RTTY schedules and WA6UAM beats condominium antenna restrictions by using a wire rhombic at roof-top level. The editor of the *Mid Michigan 220 News*, WB8IDD, offers a list of all articles on 220 equipment, propagation, and so forth published in ham magazines in the past 20 years, for a stamped, self-addressed envelope. Write WB8IDD at Box 74, Haslett, MI 48840. K7HSJ compiled the directory.

W8UDP has completed a new converter and is finishing a multiple-Yagi array. K8JNZ is preparing for an assault on 220. W01FR, Minn., has a 220 rig ready for winter meteor scatter schedules. John runs 500 watts and stacked Yagis. W9DJ is running 100 watts from Wisconsin, and says that W9OVL at Hammond, Indiana, remains active on 220 after 20 years on the band. K4GGL/1 says several low-power stations are active nightly after 9 P.M. in northern New Jersey, around 220.05. W2CRS has 14 states worked with 150 watts and 36 elements. New additions during the September contest were W3CGV, Del., and W8P LZ/8, W. Va.

WB6NMT silenced his 220 sporadic E watch beacon August 4th, with no reception being reported. The beacon is ready to be activated on 222.01 in the event of solar or auroral activity. WB6NMT has it that K9HMB has completed a 160-element collinear for EME. K6YNB did some mountain topping during the summer months from locations in Nevada and Utah, giving new states to several of the Los Angeles and San Francisco area 220 gang. WB6NMT reports he and several other Bay Area stations are breaking down the difficult 350-mile plus path to Los Angeles. Louis covers the path regularly and says low power is the only

Bull sessions are popular at vhf gatherings. WA5IYX60 and WA5UNL exchanged propagation notes at the Sioux Falls meeting.



factor preventing more stations, such as W6FFB, K6JKQ, W6OIA, and W6FZJ, from working the mountain path. Three hours either side of sunrise and sunset produce the best signal levels. Louis also did some late-summer traveling in Nevada and explored several proposed portable operating sites. Using his Bay Area beacon, Louis found several suitable locations including Reno and Lake Tahoe. Vhf contest operations in the making, Louis?

I would be interested in material regarding propagation, scatter, equipment requirements, preamp circuitry, and the like for column presentation from you 220 buffs who are "in the know."

432 MHz is becoming increasingly popular. Here's what is happening around the country. WA1FFO, Conn., thanks K2RIW for operating portable in Vermont August 15. Stephen worked him with 3 watts of ssb. K2RIW/1 was worked by many others including K2ARO, now with 17 states on 432, and running 500 watts and 44-element Yagi array. W4FJ and K4QIF, both Virginia, also worked the Vermont portable bringing them to 21 states. K2RIW/1 was apparently running a kilowatt and a 12-foot dish. In Florida, K4IXC works W4VHH, S.C., nearly every night over a 385-mile path. K3UGM, Dallas, is building a sideband rig and four 15-element Yagis.

W6FZJ, San Jose, recently worked K6YNH/7, Nevada, for state number 2 on 432. Joe would like to schedule someone in Oregon and Arizona. Any 432 in those states? There is in Washington. K7BBO has completed a 500-watt final. K8DEO, back to 432 DXing after trouble with ATV interference, ran August 12-13 meteor schedules with W0WYZ in Colorado with little success. Don says the Perseid velocity is too fast to ionize sufficiently at 432 and that the slower Geminids and Quadrantids are better for meteor scatter.

W0LER, Minneapolis, reports an excellent September 14 tropo, which extended into Michigan and Ohio. John found one new state, W9BTI, Wisconsin, and Neighbor W0LCN worked two new ones, Wisconsin and Michigan, W8CVQ. John says the 432 group should pay more attention to TV tropo and weather maps; too many openings are being missed. And from Calgary, Alberta, VE6MX says a winter project is underway to promote ATV in that area.

1296 MHz What were probably the first New Hampshire-to-New Jersey contacts on 1296 were made during the September contest. W1DC/1, using W1OOP's all solid-state 7-watt rig and a 6-foot dish, worked WA2LTM and K2JNG, according to a report from K4GGI/1. Lew also sent a list of 27 W1s, 2s, 3s, and 4s active on 1296, running 7 to 250 watts and 3- to 5-foot dishes.

K4QIF writes from Hobson, Virginia that he has 250 watts output and a dish on the air. Rusty works WA2LTM at 250 miles under "normal" conditions regularly. Rusty asks we pass along his telephone number, 703-238-2543, for those who have been having trouble contacting him.

I'd be interested in you 1296 buffs sending along some information for beginners, such as

suggestions on systems, propagation, and the like. Pictures are always welcome.

2300-MHz, according to K4GGI/1, is "where it's at" nowadays for the serious vhf'er in the northeast. A recent look at W1QXX's log revealed contacts with W1s GAN, JOT, and OOP, W2s DWJ, DYG, and OMS, K2s JNG and DZM. WA2LTM, K3IUV, and K1SFF/3.

While it is not exactly amateur radio in nature, there is increasing interest in monitoring U.S. manned moonshot transmissions around 2287 MHz. Dick Knadle, K2RIW, with the support of WB2MLH, WN2MUE, and Byron David (no call) began a crash program shortly before the July Apollo 15 mission. They built a copy of the 12-foot dish pictured in the December, 1970, column and scaled down the 1296 feed horn shown. Signals were received several times from the command module going to, circling, and returning from the moon. During the reception period, three hours of Q5 voice was recorded, up to 14 dB over the noise, at a distance of 230,000 miles. The antenna built by the K2RIW group may be duplicated for approximately \$40. Dick is preparing a QST article on the system used, and publication is hoped for before the Apollo 16 launch next year. K2RIW is making some system improvements in the hope of receiving Apollo 16 and 17 lunar-rover signals from the moon's surface.

One added note, for the record. Paul Wilson, W4HHK, received Apollo 15's voice channel July 30, with astronaut Al Worden at the mike as he circled the moon alone, while his colleagues were on the lunar surface. This is the first amateur reception of the service module's voice channel from lunar orbit.

A further indication of amateur interest in parabolic antennas is evidenced by the number of requests received at Headquarters for full construction details of WA9HUV's 12-foot dish described in the June column. W1HDQ filled some 30 requests for the information. See page 100, June, QST.

QST

**SWITCH
TO SAFETY!**





YL News and Views

CONDUCTED BY LOUISE RAMSEY MORFAU,* WB6BBO

YLRL Certificates

FO YLRL, the past thirty-two years have meant growth from a small nucleus of women amateur radio operators in this country who were interested in the formation of a YL club, to a world-wide membership of almost a thousand. The years have seen the introduction of on-the-air activity, beginning with a QSO party that included both YLs and OMs at first, but developed into the YLRL Anniversary Party limited to only YL participation, to celebrate the club's "birthday" each year. The informal "Howdy Days" followed, an activity designed chiefly for the purpose of getting to know each other with a little "contest flavor" to add interest. And there was the ever popular YL-OM Contest each winter that makes the hunt for the club-sponsored certificates a little easier for the men who are seeking the necessary contacts.

As with most clubs the YLRL offers certificates, but here the usual regulations of contacts with so many members of the sponsoring organization do not apply. Rather, it is the contacts with YLs that count in these awards whether they are members or not, because the search for the YL operators among the thousands of voices and fists is not easy.

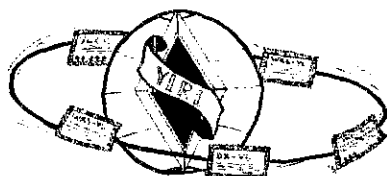
Contact with 100 women amateur radio operators is the main requirement for YLCC. They may be on a world-wide level or just one state, or across the country. Once the QSLs have been acquired, send them, as proof of contact with sufficient return postage, to the custodian, Onie Woodward, W1ZEN, 14 Emmett Street, Marlborough, MA 01752. This award is available to all amateur radio operators and, after the certificate has been earned, there is the added incentive of endorsement stickers for each fifty YLs worked following the initial number.

On the DX side, both YLs and OMs can work for WAC-YL. Here only six QSL cards are needed to earn it, with their proof of contact with North America, South America, Europe, Asia, Africa, and Oceania. These should be sent to Miriam Black-

* YL Editor, QST. Please send all news notes to WB6BBO's home address: 1036 East Boston St., Altadena, CA 91001.

burn, W3UUG, Box 2, Ingomar, PA 15127, and be sure to include the return postage.

The toughest award that YLRL offers is WAS-YL, in spite of the large feminine amateur population in this country. Some states have lots of women operators, but others have only a few, so the hunt to acquire the cards from fifty gals in fifty states is difficult. Once that goal is reached and the proofs of contact have been received, that is all there is to it. Just mail the cards with the return postage to Irene Akers, W3RXJ, 5943 St. Clair Drive, Washington, DC 20031 for that pale blue certificate with the flag.



Only one of the YLRL operating awards is limited to women amateur radio operators, the DX-YL Certificate. The rules are simple enough, for all a gal has to do is work 25 DX YLs and that's it. They need not be from 25 different countries, although that is quite possible; only 25 different gals with DX calls. The reason for the "for YLs only" regulation is to encourage contacts between YLs all over the world. Mail QSLs to prove these contacts to Emma Berg, W0JUV, RFD 2, Lawrence, KS 66044.

It should be remembered that all the certificates have the requirement that the contacts must be worked from the home station or from within a 25 mile radius of the fixed station address.

This month marks YLRL's 32nd birthday. As the gals celebrate it in the YL Anniversary Party on the air, "YL News and Views" adds "33 Many Happy Returns" as the club begins the 33rd year of organization.

YLRL Membership

"YL News and Views" receives many inquiries regarding the procedure for membership in YLRL. This world-wide YL group is open to any woman



WN6EVU, Judy Mason, found herself surrounded by OM, WA6EUZ, and his parents, WA6LWE/NØRAG and WA6KZK/NØFMF/NØGAF, as Coordinator 11th Naval District Navy MARS, so she studied for her Novice license to close the communications gap in the family. (WA6LWE photo)

QST for

amateur radio operator with a current license interested in affiliation. All classes of license are qualified.

Requests for membership applications should be sent to the membership chairman where the gal is located. In the Eastern United States: Marge Campbell, K4RNS, 65 North Arbor Drive, Ormond Beach, FL 32074. The Western Membership Chairman is Beth Taylor, W7NJS, 14637 S. E. Fair Oaks Avenue, Milwaukie, OR 97222.

1972 YLRL Officers

The results of the election of officers for the coming year are: President - Mae Hipp, K7QGO; Vice President - Betty March, KL7FJW; Secretary - Carrie Lynch, WA4BVD; Receiving Treasurer - Jackie van de Kamp, W6YKU; Disbursing Treasurer - Jan O'Brien, K6HHJ; District Chairman: 1st District - Carol Ann Gawle, WA1LGU; 2nd District, Chris Haycock, WB2YBA; 3rd District - Jane Jones, K3ZDN; 4th District - Frances Propst, W4AAB; 5th District - Ann Deadel, WA5GLM; 6th District - Marcia Rast, K6DLL; 7th District - Katherine Rutherford, WA7ELC; 8th District - Lillian Abbott, K8CKJ; 9th District - Carol Bourne, WA9NET; 10th District - Mary Powers, WA0SLX; KH6 District - Ardella Johnson, KH6TU; KL7 District - Lyla Inman, KL7CSR; VE District - Thelma Woodhouse, VE3CLT.

"YL News and Views" congratulates these women and wishes them every success in the 33rd year of the club.

TYLRUN Birthday Party

The 16th Annual Birthday of the Texas YL Round-Up Net will be held on November 5 and 6, 1971, at Frost Lodge, in Forbing, Louisiana (Shreveport).

Net members who are planning to attend and desire accommodations for themselves and their OMs will be accommodated at the Alamo Plaza Hotel West in Shreveport. For the gals who wish to stay at the Lodge, the committee advises that it will be necessary to bring a bedroll.

Members of Air Force MARS in Shreveport plan entertainment for the OMs who accompany their ladies during the Net meeting.

Annual Trillium Memorial Weekend November 6, 7, 1971

The Ontario Trilliums' Annual Weekend Contest will be held on the weekend of November 6-7, 1971, beginning 0030, Nov. 6, GMT, and ending 0030, Nov. 7, GMT.

The Trilliums, being the host club, will call "CQ TW." All other participants call "CQ TOT."

Exchange signal report, name, QTH and Trilliums will give their club numbers. Cw and phone contacts will each count as five (5) points. Low power multiplier of 1.25 for all transmitters running 150 watts cw, 150 watts a-m, 300 watts PEP, and under.

Each Trillium may be contacted twice, for example: One phone contact and one cw contact (same band) or, two phone contacts (different bands), or, two cw contacts (different bands), or, one phone contact and one cw contact (different bands).

No cross band or cross mode operation permitted. All cw contacts must be made below 3.725, 7.150, and 14.100 MHz.

Logs must show: Date, Time in GMT, RS or RST, band, type of emission, TOT Number, as well

as name and address and claimed score. All logs must be signed by the operator.

All participants sending in logs are eligible for the three prizes in the "lucky draw."

The non-member with the highest score will receive a Trillium Plaque. A "bonus" of 100 points will be added for working 10 club (TOT) members.

All Ontario Trilliums with the highest score will be recognized.

The TOTs will operate on the following suggested frequencies on November 6:

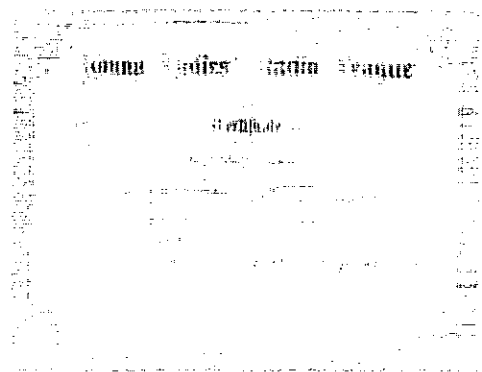
| Freq. (MHz) | GMT |
|-------------|------|
| 3.855 | 0030 |
| 3.685 | 0200 |
| 7.240 | 1830 |
| 7.103 | 2000 |
| 14.280 | 1300 |
| 14.140 | 1430 |
| 14.035 | 1600 |

Send logs to Irene Williams, VE3BEI, 18 Montgomery Avenue, Agincourt, Ontario, Canada. All logs must be postmarked not later than December 31, 1971, and received not later than January 15, 1972.

YLRL Continuous Membership Certificates

The Continuous Membership Certificate is issued only for continuous membership in YLRL, and is issued every five years. The certificate was originally issued each five years, but the newer style is designed with provision for stickers to indicate the additional five year period of affiliation. It is issued automatically to the membership as they qualify by the custodian, Ruth Siegelman, W2OWL, who will be a 30 year member in 1972.

Since the first one was sent to W7NJS, 1430 of these have been issued. Those gals who have obtained their affiliation for 30 years are: W8SJE, W1FTJ, W2JZX, W2MJS, W2RUE, W8UTM, W0LQL, W0ZWL, W6BSU, W7HHH, W3CDQ, G2YL, W7GLK, W6QGK, W3UUG, W7KCU, and W9RTH. These certificates have also been issued to the YLs who founded the club 32 years ago: W1GQT, K4LMB, W6NAZ, W6UXE, W8TAY, W0UA, VE2HI, K4UBT, W6WSV, W7GX1, and W9NLW.



YLRL Continuous Membership Certificate

Emma Berg, W0JUV

Versatility has been another name for Emma. When she wasn't on the air she might be found on the water at the controls of a boat, outboard, motor launch, or cruiser, or, says Emma, a row-



Emma Berg, WØJUV, YLRL DX-YL certificate custodian.

boat. She has been active in Lodge work, religious organizations, retired teachers' clubs, United Fund, Metal Health Association and Clinic.

In CAP she has held about every office except pilot. She left piloting the plane to the OM. She has been an elementary school teacher, a County Supervisor of Public Instruction and, if you think that isn't enough, she and the OM also raised registered Hereford cattle for some 12 years before they retired.

In 1942 came amateur radio with Advanced license in 1943. A member of YLISB, CHC, SWL/CHC, TYLRUN, QCWA, OTC, ARRL, YLRL, RCC, ROWH, LARC, DCAR, KVARC, and Army MARS, WØJUV has earned over 200 certificates and is very active in YL contest work, with first place honors several times. She made high USA YL score in the 1969 CHC QSO Party, and the following year topped herself with YL world high score.

A-1 Operator, ARRL Public Service Awards, Armed Forces Day Certificates and QSLs are also evidence of her activity where her interest is as versatile as the rest of her life.

YLRL's custodian of the DX-YL certificate operates all bands on a-m, ssb, cw, fm, RTTY, and ATV. [57-]

HC3CD, Elsa Gonzales, recently returned to her home in Bogota, Colombia, after attending Tallahassee Jr. College, in Florida. She can be found on 21,255 MHz, on Sunday mornings in sked with W4MVO, and breakers are welcome. (Photo courtesy W4MVO)

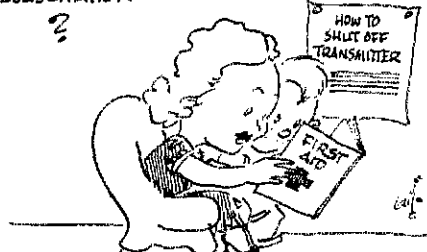


Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

- W1KNX, Robert J. Schreiber, Burlington, MA
 K1MPN, E. Reg. Murray, Montpelier, VT
 W1OBR, Edmund S. Strelczyk, Waterford, CT
 W1RGB, Joseph M. Meyers, Plainville, CT
 K1VNF, Richard S. Leonard, Bellows Falls, VT
 W2AT1, Ladislav Knakat, Syracuse, NY
 K2BHI, Herbert B. Wescott, Fairport, NY
 WA2BRY, Anthony L. Cardarelli, Farmingdale, NY
 K2EW, Conrad E. Roberts, Merchantville, NJ
 WA2FWS, Walter C. Fox, Millville, NY
 W21FG, Myron E. Doucette, Setauket, NY
 W2JFS, Frank C. Hills, Bergenfield, NJ
 WA2LRS, Guy H. Herrick, Mayfield, NY
 W3FBV, Theodore S. French, Plymouth, PA
 W3YAJ, Carl E. Ivanson, Drexel Hill, PA
 WA4COP, Dan W. Reynolds, Tampa, FL
 WA4GBP, Wilson D. Cornett, Sr., Appalachia, VA
 WA4GUC, Hal C. Anderson, Boca Raton, FL
 WA4GZU, Joe C. Swaringen, Chimney Rock, NC
 W4QLW, Russell B. Gillespie, Miami, FL
 W5DTJ, Thomas F. G. Abbott, San Antonio, TX
 K5FQV, Joe D. Woolsey, Ingram, TX
 W5LI, Henry D. Schleeter, Jr., Houston, TX
 WA5QPN, Walter Schmidt, San Antonio, TX
 K6DHH, Eugene S. Davis, Marina Del Rey, CA
 WA6HQ, Lester F. (Barney) Harris, San Bernardino, CA
 W6HCY, Ralph (Sarge) Kimball, Imperial Beach, CA
 W6IYM, Noble D. (Red) Foster, Cambria, CA
 W6KEI, Hans Rudy Jepsen, Lake Isabella, CA
 W6LPY, Don L. Dotson, Huntington Beach, CA
 W6VDS, Earl S. Knowlton, Arcadia, CA
 K17GDI, Richard R. Nordmark, Fairbanks, AK
 K17GCU, G. Curtiss Mattson, Anchorage, AK
 W7PCX, Nilo Joso, Seattle, WA
 W7ZO, Norman R. Hood, Aloha, OR
 K7ABA, Alfred W. Younger, Anderson, IN
 W9ACX, William R. Todd, Tipton, IN
 W9FVA, Robert P. Austin, Schiller Park, IL
 WA9JTF, Frederick O. Thomas, Winnebago, WI
 W9HDW, Leslie G. Thelaner, West Allis, WI
 W9HSJ, Wade S. Tinsman, Morris, IL
 W9JG, George F. Dammann, Lombard, IL
 W9SCV, Walter F. Severin, Evanston, IL
 W9GN, Elmer Quentin Johnson, Ladue, MO
 W9IFG, Serge S. Ostapoff, Sioux City, IA
 W9J1, James W. Carter, Boulder, CO
 W9TQG, Arnold H. Widdekind, Burlington, IA
 W9ZGB, Arthur W. Musgrave, Emporia, KS
 KP4BRC, Bernard Shepard, Hato Rey, PR
 EI6U, L. Morris, Dublin, Ireland
 EI9H, W. Power, Dublin, Ireland

DO MEMBERS
 OF YOUR HOUSEHOLD
 KNOW HOW TO TURN
 OFF THE POWER -
 AND HOW TO APPLY
 RESUSCITATION



QST for

NOVEMBER

- 3-4 **YL Anniversary Party** phone, p. 102 Sept.
- 4 **W6OWP Qualifying Run** (W6ZRI, alternate) at 0500 GMT on 3590/7129 kHz, 10-35 wpm. This is 2100 PST the night of Nov. 3. Underline correct minute of highest speed copied, certify copy made without aid and send to ARRL for grading.
- 6-7 **Illinois, N.C., Mass. QSO Parties**, p. 108 Oct. **Trillium Weekend**, open to YLs and OMs, full rules YL News this issue.
- 12 **WIAW Qualifying Run** 10-35 wpm, at 0230 GMT on 1,805 3,52 7,02 14,02 21,02 28,02 50,02 and 145,588 MHz. This is 2130 EST the night of Nov. 11. Underline one minute of top speed copied, state no aids used (typewriters OK), sign and mail to ARRL with your full name, call (if any) and full mailing address.
- 12-14 **QRP Contest** cw, p. 108 Oct.
- 13 **Frequency Measuring Test**, p. 108 Oct.
- 13-14 **Sweepstakes** phone, p. 74 Oct.
- 13-20 **QRP** cw contest, p. 108 Oct.
- 20-21 **Sweepstakes** cw, p. 74 Oct.

DECEMBER

- 4-5 **Telephone Pioneers QSO Party**, sponsored by the Stanley S. Holmes Chapter No. 55, open to all telephone pioneer hams in WVE. It starts at 1900 GMT Sat. and ends at 0500 GMT Mon. All hands may be used and the same station may be worked on more than one band. Suggested freqs., plus or minus 10 kHz: phone, 3965 7260 14295 21365 50100-50250 144275-145500; cw, 3565 7065 14065 21065. Score 1 point for signal reports exchanged with a pioneer in any chapter, 1 point for exchanges with each different chapter. Exchange report, contact no., chapter name and no. Send log extract showing date, time, station, chapter name and no., contact no. by Jan. 6, 1972 to: Frank J. Wojcik W2SNJ, 100 Central Ave., Kearny, N.J. 07032.
- 6-12 **VR1ASA operation** commemorating the 70th anniversary of Marconi's transatlantic experiments, manned by the Society of Newfoundland Radio Amateurs. The station will be operated on 80, 40, 20 cw as well as SSB during the year. Particularly during the noted week, SONRA hopes to have around-the-clock operation from Cabot Tower on Signal Hill, the approximate site where Marconi carried out his experiments. OSL via Box 1226, St. John's, Newfoundland, Canada.
- 8 **W6OWP Qualifying Run**.
- 11-12 **Spanish Contest** cw, sponsored by the Union de Radioaficionados Espanoles, runs from 2000 GMT Sat., to 2000 GMT Sun. Non-EA stations try to work as many EA stations on as many bands as possible in all EA districts, 80-10 meters. Send a 6-digit serial number, representing RST plus QSO number, starting with 001. Two points per EA QSO, repeat QSOs with EAs on different bands permitted. Total points times the sum of EA districts on each band represents final score. Full log info. should be sent to URE, along with the call of the station, the operator and full mailing address. Usual contest declaration necessary. Reports must be sent within one month following the end of the contest to URE

International CW Contest, Box 220, Madrid, Spain. **R.I. QSO Party**, sponsored by the Providence Radio Assn. WIOP, in celebration of 50 years of affiliation with ARRL; open to all. The party will be held coincidentally with the ARRL 160 Meter Contest to enhance low-band activity and to recall our beginnings "200 Meters and Down." Stations may be worked once on phone and once on cw per band. Mobiles may be worked twice if they change counties. No time segments within the operating period (starts/ends 2300 GMT) and no power restrictions. Use of FM simplex, such as 94-direct, is encouraged. Suggested freqs.: cw, 1812 3550 7050 14050 21050 28050; phone, 3990 7290 14290 21390 28590; vhf, 50.3 145.2 146.94 (FM-direct). R.I. stations send signal report and county, others send report and ARRL section or country. Contacts on 160 and 2 meters (and above) count 2 points, 80-6 meters 1 point. R.I. stations multiply no. of points times no. of sections (DX countries count as sections). Non-R.I. stations use the no. of R.I. counties for multi., a max. of 5 (Providence, Washington, Bristol, Newport, Kent). Each complete 2-way exchange constitutes a QSO. Appropriate awards and special certificates for 160 and vhf plus a grand award to the station with the highest no. of QSOs. Send a summary sheet with score computations plus a checklist of stations worked (ARRL op. Aid 6, or equivalent) but do NOT send logs to: R.I. QSO Party, Providence Radio Assn., Box 2903, North Station, Providence, R.I. 02908. Reports must be postmarked before Jan. 31, 1971. For results, enclose an s.a.s.e. **160 Meter Contest** rules p. 68 Nov.

- 14 **WIAW Qualifying Run**.
- 18-20 **National Awards Hunters Club Contest** from 1500 GMT Sat. to 0300 GMT Mon. Exchange name, QTH and if member of the NAHC, Score 1 point per QSO for non-members and 2 points per QSO for members. A number of plaques will be awarded. Mailing deadline is Feb. 1, 1972. Logs should contain 25 entries per page. Send to the contest chairman Larry S. Friedman, WB2KHO, 50-07 203rd St., Bayside, N.Y. 11264.
- 30 **WIAW Morning Qualifying Run**.
- 31 **Straight-Key Nite** (SKN) starts at 8 pm your local time on New Year's Eve, ends 3 am local time New Year's day. Rules require use of a straight key. Aim at 7030 and 3530 kHz but spread out as necessary! Call SKN and rag-chew. Following SKN, we'd like a list of the calls of the stations you worked plus your "vote" for the best straight-key fist heard that night. Reports must be at Hq. by Jan. 17, please. CU SKN!

JANUARY

- 8-9 **VHF SS**.
- 15-16 **CD Party** cw.
- 22-23 **CD Party** phone.
- 29-30 **Simulated Emergency Test**.
- FEBRUARY
- 5-6 **DX Competition** phone.
- 13 **FMT**
- 19-20 **DX Competition** cw.
- 26-27 **YL/OM Contest**, phone.

MARCH

- 4-5 **DX Competition** phone.
- 11-12 **YL/OM Contest**, cw.
- 18-19 **DX Competition** cw.

OST

Hamfest Calendar

NOVEMBER

1971

| | M | T | W | T | F | S |
|----|----|----|----|----|----|----|
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | | | | |

New York - The Communications Club of New Rochelle will hold its 11th Annual Holiday Beef Dinner on Saturday, November 20. The program will feature a prominent guest speaker whose topic will appeal to both amateurs and XYL guests. Reservation forms can be secured by sending a s.a.s.e. to K2SJM, CCNR President, 50 Parcot Ave., New Rochelle, NY 10801.

Pennsylvania - The Anthracite Chapter of the QCWA will hold its annual Banquet at the Hometown Fire Company, 2 miles north of Tamaqua on Penn. Route 54, Saturday, November

13, at 6:30 P.M. A Pennsylvania Dutch style ham and turkey dinner will be served. Reservations, \$4.50 per person. All radio amateurs, YLs, and XYLs are invited to attend this affair. Send reservations to Karl W. Pfeil, W3VA, 211 Schuykill Ave., Tamaqua, PA 18252. Reservation deadline is November 9.

COMING A.R.R.L. CONVENTIONS

- January 22-23 - Southeastern Division, Miami, Florida
- March 17-18 - Great Lakes Division, Muskegon, Michigan

NOTE: Sponsors of large ham gatherings should check with League headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance.

Operating News

GEORGE HART, WINJM
Communications Manager
ELLEN WHITE, W1YL
Deputy Communications Mgr.
ROBERT L. WHITE, W1CW; DXCC
GERALD PINARD, *Training Aids*
ALBERT M. NOONE, WA1KQM; *Contests*

How's Your Signal? Because most of us, these days, purchase ready-built rigs or put them together from standard kits, there is a decided tendency to take signal quality for granted, to try to relegate the responsibility for this to the manufacturer and to blame him or the person criticizing instead of placing the blame and responsibility on the real culprit — yourself. It is you who gets the ticket from FCC for poor signal quality (oh yes, it still happens), you who has to answer it, and you who gets put off the air if the answer or the remedy is not satisfactory.

The above topic is inspired by a blurb in a bulletin of the Miami Valley (Ohio) F.M. Association which reads as follows: "Have you been listening to the repeater lately? Have you ever *objectively* listened to the quality of the signals? If you answer *yes* to these two questions, you, like I, have come to the conclusion that we have plenty of room for improvement! I am not talking about the quality of the *repeater* — I am talking about the quality of the signals going *into* the repeater. Thousands of dollars worth of engineering and development have gone into our rigs, to give them good communications quality. However, it's up to us as the operators to see that they are kept in proper condition and sounding right. Anything less than the "designed in" quality should not be acceptable. It's up to each of us to seek and obtain authoritative reports on the quality of our signals. Don't be satisfied with one report through the repeater, get on simplex with a friend."

The subject has a broader application than repeaters, of course, although anyone should know that the repeater that improves the quality of a signal being repeated hasn't been invented yet. Blind acceptance of quality of a manufactured rig, whether it be on fm, ssb, am or cw, is dangerous. Trying to blame poor quality on the manufacturer is foolish — that is, the fact that you paid empty-ump dollars in good faith that the equipment was high quality is not an excuse and will never be accepted as such. Even the fanciest equipment can be mistuned, ineptly operated, or even, let's face it, poorly constructed or engineered. You *and you alone* are responsible for the signal you put out on the air, so you'd better be aware of it and believe it if your signal has defects, regardless of the reason.

Exclamation Point. We miss it. In the old days, the cw exclamation point used to be dahdahdidi-dahdah (now a comma), the comma was didahdidahdidah (now the period) and the period was didit-didit-didit (now nothing). In order to eliminate the spaced punctuation, the old comma became the period, the old exclamation point the

comma, and the exclamation point was dropped overboard. Before this occurred, it was often the practice in amateur communication to use the exclamation point to express surprise, chagrin, alarm, anger and several other emotions, dragging out the "dahs" to indicate the depth of the emotion. For years after the change, too, older amateurs continued to do this, no doubt to the puzzlement of younger amateurs wondering at this use of the comma. Commercially, the exclamation point was perhaps seldom if ever used. We amateurs used it quite a lot. When it was sacked, we missed it. Many of us kept on using the old symbol.

Now comes a proposal, from the Pennarc Amateur Radio Club of Glenside, Pa., that the exclamation point be resurrected using a different combination not now used: *didididahdahdah*. How about it? Oh, we know, some old fogey is going to dig up some literature that indicates this combination *is* used for something, as is *every* combination. But we sure miss that exclamation point and would like to have it back.

Weak Sections. Glory be! We have finally elected a SCM for the Canal Zone Section. There was no halloing; in a section of only 40 members, this is too much to hope for. But KZ5ZZ was duly nominated by 1/8th of the section membership, and for the first time in several years we have an elected SCM in C.Z. *(Continued on page 108)*

DX ADVISORY COMMITTEE

The DX Advisory Committee (see page 87, September) is now preparing recommendations to the Awards Committee on a number of subjects. The advice of all DXers is requested to assist the Advisory Committee in arriving at decisions. All comments should be directed to DXAC Hq, Liaison W1CW who will forward them to individual members of the DX Advisory Committee. The Advisory Committee is now discussing the following possible steps:

1. Modifying current criteria under which countries have been defined for the ARRL Countries List. This could result in either deletion or annulment of non-administered islands, rocks and reefs from the Countries List and prohibition of further additions of this type to the list.
2. Consolidation of the DXCC program along the lines of the 5BDXCC Award, with no distinction being made as to mode of emission.

DX CENTURY CLUB AWARDS

Radiotelephone listings follow the general-type "New Member" and "Endorsement" listings.

AUGUST 1-31, 1971

New Members

| | | | | | | | | | | | |
|--------|-----|----------|-----|--------|-----|---------|-----|--------|-----|---------|-----|
| DL9RC | 255 | W0LDV | 126 | K3YVN | 112 | W3TQM/4 | 106 | SM7EVM | 104 | K9EHP | 100 |
| SM2CJX | 241 | K6UJS | 125 | LZ2RZ | 110 | W9GXR | 106 | SP9AQY | 104 | K9VBW | 100 |
| W0VUU | 202 | W6KDI | 125 | WA4YBV | 110 | ZE1DI | 106 | W3QDV | 104 | K9VFA | 100 |
| K3TSR | 201 | K6JAN | 123 | WA8ZTU | 109 | K42KI | 105 | K71TV | 103 | K17HDP | 100 |
| IP1CCL | 161 | DL2EF | 120 | DK2OY | 107 | SP2AHD | 105 | VE7BBD | 103 | W4AZU | 100 |
| YU2ACD | 160 | WB4SPG | 120 | VE3CVZ | 107 | WB6UNS | 105 | WA3NQJ | 102 | WSUNF/6 | 100 |
| HR9AQU | 155 | OZ8WH | 119 | W9IXV | 107 | W9NLF | 105 | W8RKH | 102 | WA5DXI | 100 |
| DL2GV | 141 | VE2MW/W2 | 119 | W0BWI | 107 | DJ7BR | 104 | YU2REO | 102 | W90FQ | 100 |
| ZC4CB | 141 | JA7CYC | 117 | DL6ZG | 106 | JA3GF/O | 104 | K6UHO | 101 | WA9RGK | 100 |
| WA2MID | 128 | K1JVN | 112 | OH2BJY | 106 | PY8JL | 104 | K6HO | 100 | | |

| | | | | | | | | | | | |
|--------|-----|---------|-----|--------|-----|--------|-----|--------|-----|--------|-----|
| I1UW | 250 | W8SET | 136 | WB9FJX | 119 | WA8ZTU | 108 | LU8BF | 101 | K9EHP | 100 |
| OZ2FU | 180 | W5DRW | 128 | W2EWI | 114 | K2GXP | 107 | WB4PXW | 101 | EA2PC | 100 |
| JA2LA | 174 | WA2MID | 127 | WA6LLY | 112 | W0BWI | 106 | WA9YZN | 101 | W2MSV | 100 |
| WA5RTG | 170 | W9ECV/9 | 126 | K6JAN | 111 | WB6UNS | 103 | WA0NBZ | 101 | WA3LRJ | 100 |
| WA5TYU | 166 | VS6BF | 122 | OZ1PD | 108 | CT1ZW | 102 | CN8CG | 100 | WSGRL | 100 |
| HK4TA | 156 | K0JPW | 121 | WA4YBV | 108 | OZ6GH | 102 | K8CSG | 100 | WSNCV | 100 |
| OZ8MG | 139 | | | | | | | | | W8AFF | 100 |

Endorsements

In the endorsement listings shown, totals from 120 through the 249 level are given in increments of 20, from 250 through 319 in increments of 10, and above 300 in increments of 5. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

| | | | | | | | | | | | |
|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|---------|-----|
| W3NKM | 340 | WA4TSP | 300 | DJ5IO | 260 | WA3KSO | 240 | K4PY | 180 | YU2LA | 160 |
| W8BT | 340 | XE1KS | 300 | K5LIW | 260 | JA1HHM | 220 | KP4DKZ | 180 | F3VN/W2 | 140 |
| DL9OH | 335 | DJ7AH | 290 | OE8RT | 260 | JA8MS | 220 | W1HRJ | 180 | F37WN | 140 |
| W4NYU | 325 | K2JGG | 290 | OK3EA | 260 | K4CYU | 220 | W2CHP | 180 | G3COL | 140 |
| G2FYT | 320 | K2LGI | 290 | SM7ZY | 260 | K0RTH | 220 | W2DF | 180 | K2HWF | 140 |
| K4SCT | 320 | VF3DRT | 290 | W7TV | 260 | W1AJO | 220 | W5RUB | 180 | K9ZPJ | 140 |
| W1WQC | 320 | WB2RLK | 290 | W5LZG | 260 | W4JD | 220 | WA5VAQ | 180 | KP4DCR | 140 |
| DL1HH | 320 | W3BVL | 290 | WSMN | 260 | W5DRW | 220 | WB6ZUC | 180 | KP4DIW | 140 |
| JA1BN | 315 | WA4FWW | 290 | W5NGW | 260 | W5HCJ | 220 | W7ETZ | 180 | KR6KQ | 140 |
| K6AR | 315 | W8DCH | 290 | W6AFM | 260 | WB8ABW | 220 | W7VSE | 180 | LA8CE | 140 |
| W4LEO | 315 | W8DX | 290 | W7VRO | 260 | K4CKA | 200 | W8IFDY | 180 | WB2JYM | 140 |
| DJ5DA | 310 | W9ABA | 290 | W8BQV | 260 | K4HMZ | 200 | W9VBV | 180 | WASWQF | 140 |
| HB9DX | 310 | W9CAV | 290 | W8SH | 260 | K8HKM | 200 | WA9UCF | 180 | WASZIB | 140 |
| W1MLI | 310 | YV5AE | 290 | DL1KS | 250 | OE5CA | 200 | DL7HT | 160 | W661LY | 140 |
| W9WKU | 310 | DL3OH | 280 | VF3ADV | 250 | OZ4IA | 200 | JA0GRF | 160 | W86WOA | 140 |
| DJ7CX | 305 | F8SK | 280 | VF4FU | 250 | VO2GD | 200 | K3QMI | 160 | W8KCI | 140 |
| K5QHS | 305 | K1DRN | 280 | SM0MC | 250 | W2MBU | 200 | K3YUA | 160 | W9LVT | 140 |
| W1YRC | 305 | K6LAE | 280 | WB2AMO | 250 | W3QI W | 200 | K4LDR | 160 | JA8BF1 | 120 |
| W2MZV | 305 | OE7UD | 280 | W6MEL | 250 | WA5RTG | 200 | K0QYD | 160 | K1FNU | 120 |
| W5HTY | 305 | OH2QQ | 280 | DJ5GG | 240 | WASUCT | 200 | K0ZXX | 160 | K1LEM | 120 |
| W7DY | 305 | PY2RW | 280 | DL3AR | 240 | WB6WIV | 200 | SP8SR | 160 | K4CBE | 120 |
| SM5AZU | 300 | V56DR | 280 | JA2LA | 240 | WA7MGK | 200 | WA1FBX | 160 | K4TXI | 120 |
| SM6CKX | 300 | K3AFO | 270 | K2KGB | 240 | WB8CCE | 200 | W2SE | 160 | WA3OSO | 120 |
| VE3CTX | 300 | W3CRE | 270 | SM6AJH | 240 | WB8EUN | 200 | W6AYU | 160 | WA8EQJ | 120 |
| W3DKT | 300 | W5KYD | 270 | WA1ABW | 240 | WA8TFJ | 200 | WB9FJX | 160 | WB9BCJ | 120 |
| W4IKL | 300 | | | WB2KTO | 240 | | | WA0PRS | 160 | | |

| | | | | | | | | | | | |
|--------|-----|--------|-----|--------|-----|--------|-----|----------|-----|---------|-----|
| W8BT | 340 | YV4IQ | 300 | K1OMV | 260 | W2EV | 220 | IP1CCL | 160 | WA2FLA | 140 |
| ZL1HY | 340 | VF4OX | 290 | K8AXG | 260 | W5KYD | 220 | K9HDZ | 160 | WA2BHU | 140 |
| DL9OH | 335 | W4EFO | 290 | OE1MEW | 260 | CR4AJ | 200 | KP4DKZ | 160 | WA2MBF | 140 |
| ON4DH | 335 | W8GKM | 290 | W9WKU | 260 | K4BMS | 200 | OA6BW | 160 | WA4YJJ | 140 |
| W1CLA | 330 | YV4UA | 290 | DJ7CX | 250 | K4HMZ | 200 | OK3EA | 160 | WASWQF | 140 |
| W1WQC | 320 | CR6DU | 280 | EA11Y | 250 | K0RTH | 200 | WA1FBX | 160 | WA0YZN | 140 |
| W2FGD | 320 | F8SK | 280 | OA8V | 250 | WB6WIV | 200 | W5ILR/TF | 160 | CX7BF | 120 |
| W21OT | 315 | G6LK | 280 | SM0MC | 250 | DK3LP | 180 | WASUCT | 160 | DL4DR | 120 |
| W9JT | 315 | K1DRN | 280 | VE4FU | 250 | HS1ABU | 180 | WASVAO | 160 | F3VN/W2 | 120 |
| I1ZV | 310 | K3GKU | 280 | W2ENC | 250 | JA6BSM | 180 | WA7MGK | 160 | HK3LT | 120 |
| WSMB | 310 | K4RQZ | 280 | WB2PWU | 250 | K2UNY | 180 | W8DX | 160 | H1CAT | 120 |
| W5HTY | 305 | VE3GMT | 280 | W3CRE | 250 | K4CKA | 180 | WB8EUN | 160 | K4LBJ | 120 |
| HK3AFB | 300 | W3BVL | 280 | WB6GKK | 250 | WB2KTO | 180 | DL7KX/W2 | 140 | WA2AWJ | 120 |
| K5QHS | 300 | DJ5DA | 270 | WA6RTA | 240 | W5QBM | 180 | F37WN | 140 | WB2MQJ | 120 |
| SM5AZU | 300 | K2JGG | 270 | DL3OH | 220 | W71LR | 180 | VE2BZD | 140 | W3QND | 120 |
| VF3CTX | 300 | OF7UD | 270 | DL3VX | 220 | DJ3PY | 160 | W1HPK | 140 | WA3GZT | 120 |
| WA4TSP | 300 | JA1BN | 260 | VF3RO | 220 | HK4BNC | 160 | WA1JPP | 140 | WA9ROU | 120 |

WIAW FALL-WINTER SCHEDULE

(Oct. 31, 1971-April 30, 1972)

The Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M.-1 A.M. EST, Saturday 7 P.M.-1:00 A.M. EST and Sunday 3 P.M.-11:00 P.M. EST. The station address is 225 Main Street, Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent upon request. If you wish to operate, you must have your original operator's license with you. The station will be closed on Nov. 25, Dec. 24-25, Dec. 31, 1971; Jan. 1, Feb. 21, Mar. 31, 1972. Please note that all times-days are in GMT. Specific operating frequencies are approximate and indicate general operating periods.

| GMT | Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|------------------------|---|----------------------------|-------------------------|-----------------------------|-----------------------------|--------------------------|----------|
| 0000 | | | | | RTTY Bulletin ³ | | |
| 0030 | CODE PRACTICE DAILY ¹ 10-13-15 wpm | | | | | | |
| 0100 | | | | CW BULLETIN ¹ | | | |
| 0120-0130 ⁴ | | | 3.7 Novice ⁵ | 14.020 | 7.020 | 7.15 Novice ⁶ | 3.520 |
| 0130-0200 | | | 3.7 Novice ⁵ | 14.100 | 7.080 | 7.15 Novice ⁶ | 3.555 |
| 0200 | | | | PHONE BULLETIN ² | | | |
| 0205-0230 ⁴ | | | 3.820 | 50.120 | 145.588 | 1.820 | 21.270 |
| 0230 | CODE PRACTICE DAILY ¹ (35-15 wpm TThSat, 5-25 wpm MWFSa) | | | | | | |
| 0330-0400 ⁴ | | | 3.555 | | 1.805 | | 3.555 |
| 0400 | RTTY Bulletin ³ | | | | RTTY BULLETIN ³ | | |
| 0430 | Phone Bulletin ² | | | | PHONE BULLETIN ² | | |
| 0435-0500 ⁴ | | | 7.220 | 3.820 | 7.220 | 3.820 | 7.220 |
| 0500 | CW BULLETIN ¹ | | | | | | |
| 0520-0530 ⁴ | | | 3.7 Novice ⁵ | 7.020 | 3.945 | 7.15 Novice ⁶ | 3.520 |
| 0530-0600 | | | 3.7 Novice ⁵ | 7.080 | 3.945 | 7.15 Novice ⁶ | 3.555 |
| 1400 | CODE PRACTICE ¹ (5-25 wpm MWF, 35-15 TTh) | | | | | | |
| 1800-1900 | 21.28 CW ⁷ | 21.28 SSB ⁸ | 21.28 CW ⁷ | 21.28 SSB ⁸ | 21.28 CW ⁷ | 21.28 CW ⁷ | |
| 1900-2000 | 14.280 | 14.050 | 14.280 | 14.050 | 14.280 | 14.280 | |
| 2000-2100 | 7.080 | 7.255 | 14.095 RTTY | 7.255 | 7.080 | 7.080 | |
| 2100-2130 | 21.28 SSB ⁸ | 21.28 CW ⁷ | 21.28 SSB ⁸ | 21.28 CW ⁷ | 21.28 SSB ⁸ | 21.28 SSB ⁸ | |
| 2130 | CW BULLETIN ¹ | | | | | | |
| 2200-2230 | 7.150 Novice ⁵ | 21.125 Novice ⁴ | 7.150 Novice | 21.125 Novice ⁴ | 7.150 Novice | 7.150 Novice | |
| 2230 | | RTTY Bulletin ³ | | RTTY Bulletin ³ | | | |
| 2300 | CPN ⁶ | 7.095 RTTY ⁴ | 3.625 RTTY | 14.095 RTTY ⁴ | | CPN ⁶ | |
| 2345 | | CN ⁹ | | CN ⁹ | | | |

¹ CW Bulletins (18 wpm) and code practice on 1.805 3.52 7.02 14.02 21.02 28.02 50.02 and 145.588 MHz.

² Phone Bulletins on 1.82 3.82 7.22 14.22 21.27 28.52 50.12 and 145.588MHz.

³ RTTY Bulletins sent at 850-Hertz shift, repeated with 170-Hertz shift; frequencies 3.625 7.095 14.095 21.095 and 28.095 MHz.

⁴ Starting time approximate. Operating period follows conclusion of bulletin or code practice.

⁵ WIAW will tune the indicated bands for novice calls, returning the call on the frequency on which called.

⁶ Participation in section traffic nets.

⁷ Operation will be on one of the following frequencies: 21.02, 21.08, 28.02 MHz.

⁸ Operation will be on one of the following frequencies: 21.270, 21.410, 28.520 MHz.

⁹ Maintenance Staff: WIS QIS WPR YNC.

Take a look in the October *QST* election notices (p. 107). Four of the sections from which nominations are being solicited are carry-overs. That is, their SCM's terms of office have already ended but they continue to serve because no one has been nominated to replace them. Four additional SCMs will inevitably be put in this position unless petitions are received before Oct. 11, long after this issue appears in print but before the present writing (late Sept.). Of all those listed, all but the last four are second solicitations; that is, no nominating petitions were received as a result of the first solicitation in August *QST*, (p. 106).

While we're looking at August *QST*, note that two of the solicitations go back a year or more. In list after list, the majority of sections being solicited are for the second time, some more than that.

A section without any interest in who its SCM is, is a weak section. There is no alternative to this, because the SCM is the section's operating-administrative leader. Without one, the section has nowhere to go. Usually, sections without elected SCMs are those with low ARRL member population, but not always. They can just as easily be sections with low organized operating interests.

The new breed of SCM we are getting today is one who is interested in doing a good job, who is dedicated, enthusiastic, serious. Most of them are elected without balloting, as the only eligible

candidate — an indication that the section members know whom they want, or else that there is only one member in the section willing to run. Take your pick. We can't complain about quality, but we could wish for more in the way of interest and involvement by the section members. Too often such involvement is manifested by discovering, after an SCM is elected, that they don't like him. For all practical purposes, by then it is too late.

How about it? Take an interest in your section operating administration. Make it a point of pride to see that your section is not one of those that have to "beat the bushes" for candidates, that nominates only one candidate because no one else wants the job, that continues an incumbent SCM (who usually is not active) because no one takes enough interest to get up a petition signed by only five full members. Honestly, the lack of interest in the democratic process on which this nation was founded is sometimes appalling. Make it a point to check the election notices every other month when they appear, to keep tabs on the status of your section and take action when it appears on the list.

Staff Note. Another recent addition to the CD staff is Frank Connelly, WA7GWL, who will take over the Public Service Branch as a communications assistant. Frank is a traffic man with emergency preparedness experience, comes highly recommended by Washington Section officials and

5-Band Awards

(Updating the September 1971 listing.)

5BDXCC: (Starting with number 110),
WB2YQH OZ3Y DL8PC EP2BQ PA0XPQ
W9GIL DJ7CX W3ZUH G3NLY 6W8DY
K2KTK.

5BWAS: (Starting with number 64), PJ2PJ
WASKPL/HRI K4PUZ K0ZXE WA2FLA
W1BVP/7 LA0AD KH6HGP.

is well known in public service circles in the Northwest. He was selected from a considerable field of applicants. ARRL headquarters thanks all who expressed interest in the opening. At the present time, this fills all staff openings in this department. — WINJM.

It isn't easy — or is it?

Bennet R. Adams Jr., enjoys an enviable (?) distinction. He has made the DXCC CW/F Honor Roll three times and somehow during that period of time we managed to goof up his listing on two occasions. Now's the time to set the record straight, however, and make sure you append that September 317/327 total to K4EZ.

WIAW CODE PRACTICE

WIAW transmits code practice according to the following schedule. Approximate frequencies are 1.805 3.52 7.02 14.01 21.02 28.02 50.02 and 145.488 MHz. For practice purposes the order of words in each line may be reversed during the 5-13 wpm transmissions. Each tape carries checking references.

| Speeds | Local Times/Days | GMT |
|----------------------|------------------------------------|------------|
| 10-13-15 | 7:30 PM EST dy 4:30 PM PST | 0030 dy |
| 5-7½-10- 13-20-25 | 9:30 PM EST SntTThs 6:30 PM PST | 0230 MWFSn |
| 5-7½-10- 13-20-25 | 9:00 AM EST MWF 6:00 AM PST | 1400 MWF |
| 35-30-25- 20-15 | 9:30 PM EST MWF 6:30 PM PST | 0230 TThs |
| 35-30-25- 20-15 | 9:00 AM EST TTh 6:00 AM PST | 1400 TTh |

The 0230 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are sent in this period. To permit improving your fist by sending in step with WIAW (but not over the air!), and to allow checking the accuracy of your copy on certain tapes, note the GMT dates and QST practice text (from the issue 2 months previous) to be sent in the 0230 GMT practice on the following dates.

- Nov. 10: It Seems to Us
- Nov. 16: Correspondence
- Nov. 19: League Lines
- Nov. 30: ARPS

The subject of practice text for the following sessions is *Understanding Amateur Radio*, First Edition.

- Dec. 3: Filter Components, p. 229
- Dec. 6: Practical Circuits, p. 232



Here's K4EZ receiving 5BDXCC no. 82 from SE Division Director W4DQS at the Georgia State Convention this past summer. (Photo by K4BAI)

SEPTEMBER 12 FMT RESULTS

The September 12 ARRL Frequency Measuring Test brought in a total of 134 entries representing 1800 individual measurements. Only 2 reports were too late to be counted this time (received after the closing deadline of September 23, sorry). WIAW carried the results starting Sept. 24 for the early birds. The unipole measured the frequencies for the early run at 3528.177 7084.741 and 14069.797 kHz. The late run checked out at 3546.082 7070.373 and 14099.697 kHz. Interested in an Observer appointment? Check with your SCM (see page 63). Plan now to participate in the November 13 FMT, rules in full on page 108 of the October issue.

HONOR ROLL

This top listing is the standing of the frequency measuring leaders. In consideration of the minimum possible error due to doppler and other unavoidable factors, we accord it as of equal merit all those reports computing 4/10ths parts per million (or higher) accuracy. A participant must submit a minimum of 2 measurements to qualify for this listing.

W1BGW K1BWB K1LUM W1PLJ W1RF W2AIQ W2CNO W2FWK
W2GQT W2HRW W2KSB W3BF W3REG W3PT W3PYW
K3WK W4AQD/2 K4BF W4FMW W4KB W4JUF K4KLC
W4KQO W4NTO W44YVO K5MAT W5QIO W5LUNA/4
W6GAL W6BXR W6CBX K6DM W6ME W6RQ W8AQB W8GRG
K8JHA W8MVN W8NWU W8URR W9BCY W9CLY W9MV
W9QPM W9SUD K9TUV Ireland

In the following tabulation, error percentage can be determined by moving the parts-per-million decimal point (the figure shown in parentheses) 4 places to the left. Class 1 OOs must demonstrate an average accuracy of better than 71.4 parts per million. Class II OOs must show at least 357.2 ppm.

- (.6) W5FMO W9MNY, (.7) K6MZN, (.8) W6FR, (1.0) WSUHF, (1.2) WA3NNA, (1.3) W5KYD, (1.5) WA3LLK, (1.6) K6TW W8DPW, (2.1) WBSCAV, (2.2) K6TR, (2.5) WA4USB W9FLQ, (3.3) W1FCH, (3.8) W89AHJ, (5.3) W5NDW, (5.4) K4CYU, (5.7) W3CSZ, (6.3) WA8ROU W6MTJ, (6.4) W1DDO, (8.4) W1LKB W9H, (8.7) W6AUC, (9.8) K6OPH K8EHU VE5DP, (10.2) WA3KLR W9WYB, (10.7) K3KMO K6FC, (11.8) W1AYG, (12.5) W4WVQ, (13.8) W8SN, (14.5) W8ZMH, (14.9) W3ADE, (15.3) WA5RIO, (16.6) W6JH, (16.8) W9HPG, (17.4) Gantner, (18.0) K4JK, (18.7) WA5LES, (18.8) K6CL, (19.7) K9DQI, (19.9) W4HU, (20.5) W8FMG, (21.4) W1CSM, (21.5) K4EOD, (21.7) W1LQF VF6MJ, (22.7) W4WRK, (23.5) K0COA, (24.4) K4CRY, (24.6) W8BU, (25.0) W8OMY, (25.8) W4PKD, (26.9) WA1FBE, (28.8) W7JJD K8MRL, (28.9) WA6LKY, (29.1) WA5RRH, (29.5) WA9RNX, (29.7) W6GOLD, (30.0) W6MXC, (30.4) K4EMA, (31.8) WA3JHB, (33.5) W8JZD, (34.1) W3KFK, (34.7) W9UC, (35.7) WA1UR, (36.0) W7HS, (36.1) W4YOK, (40.3) W8MDL, (40.5) W3YO, (43.0) WA4NWM, (45.5) K4GFW, (48.0) K6GJ, (48.8) K5BZ/3, (51.9) K9FEL, (58.8) K4DWO, (127.6) K9TGO, (131.8) WA7XD, (137.1) K7RSB, (144.4) Martinek, (181.4) W7CH, (205.6) W5VW, (28.4) W8RCTN, (1954.9) W0PHY, (9.0) VE6HM. QST

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 Perrod, K3NYG - SEC/PAM: W3DKX. RM: W3EEB. It has been a pleasure being SCM for Del. for the past five years and I wish to thank all the amateurs who have helped make Del. such a fine section. Roger Cole, W3DKX, 345 E. Roosevelt Ave., New Castle, Del., 19720 is the newly-elected SCM. Give him your 100% support. New appointee: WA3QUU as ORS. Renewals: WA3LTA and WA3DUM as ORS; W3DKX as SEC; W3EEB as RM; WA3GSM as OPS and EC (Sussex); W3RDZ, WA3HWC as OVS. W3EEB has joined us with sub. WA3DUM upped his station with the new Drake line, WA3GSM is now Extra Class. W3BDP was busy during the perisds shower with skeeds out in 5-Land. Winners of the Delaware Field Day trophies were the Brandywine ARC and the U. of D. ARC. Traffic: (Aug.) W3PEB 113, WA3LTA 99, W3DKX 37, WA3DUM 33, WA3GSM 32, K3NYG 5, WA3FRV 3. (July) WA3DUM 1.

EASTERN PENNSYLVANIA - SCM, George S. Van Dyke, Jr., W3HK - SEC: W3ICC. RMs: W3EML, W3MPX, K3MVO, WA3AFI, K3PIE, W3CDB, PAM: WA3PLP. OO reports were received from K3WRY, W3KEK, W3CPR, K3RDT. OVS reports from K3WRY, K3VAX, W3CL, W3ZRR. OBS reports from K3WRY, WA3AFI. BPLs: W3EML, W3CUL, W3VR. PSHR: W3MPX, K3MVO, K3OIO.

| Ver | Freq. | Operates | QNT | QTC | RM/PAM |
|---------|-------|------------|-----|-----|--------|
| EPA | 3610 | 6:45 P Dy | 183 | 205 | W3MPX |
| PTTN | 3610 | 6:00 P Dy | 102 | 61 | WA3AFI |
| EPA&PTN | 3917 | 6:00 P Dy | 346 | 84 | WA3PLP |
| FASN | 3776 | 7:30 P Dy | 172 | 72 | WA3OGM |
| PFN | 3960 | 5:30 P M-J | 483 | 287 | K3PSO |

Because of working conditions our PAM for PFN has asked to be relieved. As soon as we can get a replacement it will be announced, in the mean time give your reports to K3BHU, W3CUL reports a slow month but thinks things will pick up soon. W3VR reports that storm Doris took only one antenna down, W3EML still would like more 3RN and TCC representatives from the EPA gang. W3MPX now sports a phone patch. WA3OVZ has inverted V on 80. Farm work still has priority at the OTH of WA3OGM. WA3PLP picking up PAM for EPA&PTN very nicely. WA3ATQ reports she may move to the Poconos. WA3LYC reports he is 80% homebrew! W3BNR will be bursting the S meters soon with a linear. W3BUR reports their club is taking on the project of helping an injured boy become a ham. FB, W3EU postponed antenna repairs until the Wrens move south! New member from NJ is WA3RJO. WA3QOZ is assembling his HW-101 after it had been lost in shipment for two weeks. WA3RCA, call of the Penn ARC, was up on Blue Mt. trying for WAS. W3HK has returned from a tour of the continental 48 and ham radio sure was a big help. Traffic: (Aug.) W3CUL 2222, W3VR 625, W3EML 503, W3MPX 302, K3MVO 156, K3OIO 147, WA3OVZ 133, WA3QOZ 124, WA3OGM 105, K3PIE 98, W3CDB 84, WA3PLP 81, WA3ATQ 75, WA3PQA 46, WA3PGT 44, WA3AFI 42, WA3IC 31, W3BNR 25, WA3LVC 22, WA3JRY 17, W3HK 9, W3ADE 7, W3CL 6, K3EDY 4, WA3RJC 2, WA3BJJ 1, W3BUR 1, W3CPR 1, W3ED 1, K3FOB 1, W3GMK 1, WA3IAZ 1, W3KFK 1, K3VAX 1. (July) K3PIE 49.

MARYLAND-DISTRICT OF COLUMBIA - SCM, Karl R. Medrow, W3FA - The Aug. BPL man is W3TN. PSHR winners are W3EZF, W3FCS, W3TN and WA3HV. MDD handled 137 messages in 31 sessions with 10.8 average QNT followed by MDDS with 62 in 28 sessions and a QNT of 5. MDCIN does O.K. with 48 messages in the regular 18 sessions and a good turnout of 14.3 per session. Vacationers - W3RUQ says he has now visited the 50 states and most of the provinces doing 12000 miles on the last trek into the northwest, W3FA went to the mountains of Calif. W3OKN survived the hurricane Beth in VE 1. Eleven inches of rain in 24 hours and all

antennas intact. K3RUQ is back from his summer camp job in the Poconos. WA3IYS and WA3LWT separately made a WIAW visit. W3ECP left the gear home on his trip to Myrtle Beach. Retiree W3TN vacationed early in Sept. to N. Carolina. Its back to the school grind for WA3FLU with plans to beat the system and get little operating this year. WN3OYP is down to one sked with WN3RCJ. WA3MSW wonders if school will curtail his activities. WA3OHF has no school worries with his new long wire and bar hopping on 10 and 15. New gear department: W3FCS and hrtbrander to 50-ft. W3EZF at the 80-ft. mark. W3EZF sporting new Yaesu, K3BA a new Swan and various 2-meter gear and strong phone fascination. W3QU has uhf gear to help his contesting friend WA3IYS build some and wins some at Winchester. K3LFD is still thinking about that vertical with one eye on winter. WA3EOP renewing old acquaintances after settling down to the newly-married routine. WB6HSL/3 is looking for 2-meter men in Towson and Baltimore area. WA3APO finds some good 6-meter opening. K3NCM made the hamfest tour this year now its back to work. W3EZF keeps K4EZF, ex-W3OCW in touch with his friends by phone patch, W3FZV had a big time in the Md. QSO party. W3ECP at loose ends after 20 years as Md. State MARS director. Congrats to new affiliates the Md. Mobilizers, the Md. Chapter Telephone Pioneers Radio Club and to the Dept. of State Amateur Radio Club. Traffic: (Aug.) W3TN 238, WA3IYS 129, W3FCS 105, K3RUQ/87, W3OKN 84, W3EZF 83, WA3MSW 64, W3FZV 59, WA3IV 5, K3BA 50, K3LFD 45, W3QU 42, W3FA 40, WA3LWT 30, K3GZ 26, WA3LFU 22, W3ECP 10, WA3OHF 8, WA3EOP 6. (July) W3OKN 85, WA3LFU 56, WA3LWT 48.

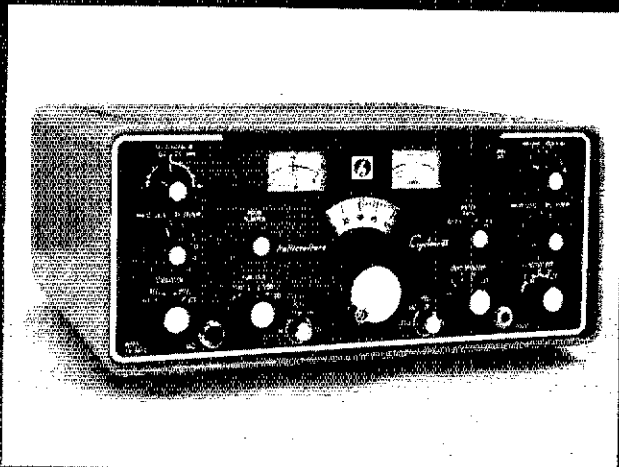
SOUTHERN NEW JERSEY - SCM, Charles E. Travers, W2YF - SEC: W2LVW. PAMs: WB2FJE, W2YPZ. RM: W2JJ.

| Net | Freq. | Time(PM) | Seas. | QNT | T/c. | Mgr |
|---------|-------|----------|-------|-----|------|-------|
| NJPN | 3930 | 6:30 | 5 | 96 | 22 | WB2TJ |
| MC's | | | | | | |
| VHF EFN | 145.9 | 8:00 P | 2 | 8 | 0 | W2YP |
| NISN | 3860 | 7:00 | 22 | 65 | 21 | WA2FV |
| NJN | 3695 | 10:00 | 62 | 823 | 75 | WA2BA |

With the vacation period a memory, stations are preparing in various ways for the forthcoming schedules ahead. WA2KWB received two certificates for participation in amateur radio week and also had great time in the N.J. QSO Party. Frank resumed studies and operations at the Rutgers School of Engineering and the AR station WA2NPP. W2BLM has completed his goal of 3077 countries in the USA and expects to be on the nets more regularly. The Gloucester County ARC Picnic was a huge success with a large attendance at Lake Garrison, Clayton, N.J. Two new members of the GCARC are WA2VAT and HC2EP. Dave a 35-wpm up bolstered up 40 meters on Field Day and Earl is our first club member with a DX call. Welcome back to W/K-Land, Earl. WA2FG is working hard studying for her Extra Class exam. Are you affiliated with some emergency group? If not this is an excellent time to make an effort to join CD, RACES, AREC and others to be ready for any emergency. Contact your club officers, town or county coordinators, SCM or SEC. Be sure your equipment is in operating condition, especially portable or mobile equipment. Hel is always needed. WA2FG is a regular on NJN since her OM struck an inverted V. Rose Ellen, her OM and W2QWC attended the RACES National Meeting in Las Vegas. Traffic: WA2FGS 131, WB2VEJ 128, W2ZQ 34, W2II 20, WB2FJE 19, WA2KAP 11, WA2KWB 10, WA2KIP 8, W2BLM 7, WB2SFX 6, W2IU 3, W2OR 3, W2YPZ 3.

WESTERN NEW YORK - SCM, Richard M. Pitzeruse, K2KT - Asst. SCM: Rudy M. Ehrhardt, W2PVI. SEC: W2RUF. Section nets appear in Apr. QST. Glad to see club activity on the upswing again as evidenced by the club papers received here. Is your SCM or the mailing list of your club? WA4PDM/2 operated by WA4PD and WA9WIF at Camp Idylwood in South Schroon again made BPI Sorry to report the passing of K2BBI. WA2JCE reports the Governor Rockefeller has proclaimed the week of Nov. 1 through as Y1RL week. Congratulations girls. For Aug., NYS handled 52 messages with 789 check-ins. RAGS activated fancy KF2NYS at the New York State Fair in Syracuse. K2CEC has a better signal since acquiring the HT-32A. WB2QGD is happy with his new SB-10. W2FSB contemplates a new HXL-1, while W2JR will try a T4-X1

HALLICRAFTERS' NEW SR-400A HAS INCREASED POWER TO 550 WATTS P.E.P. WITH IMPROVED RELIABILITY FOR CONTINUOUS DUTY OPERATION.



The incomparable new CYCLONE III features:

A. Increased SSB input and output power with Hallicrafters' engineered exclusive Power Amplifier tube balancing adjustment. It provides matching and peaking of tube gain for continuous, maximum power output.

B. Improved reliability through optional HA-60 heavy duty, high efficiency cooling fan (6.4 CFM rated) for Power Amplifier. Permits continuous duty operation in either SSB or CW modes at high power levels with greater reliability.

C. Easily accessible internal adjustment panels include AGC attack, Carrier balance, (3) VOX controls, S-Meter adjust and CW side tone volume for interface with various types of microphones, tube aging and general performance adjustments.

D. Rear panel input/output terminals and connectors for phone patch, accessories, power supply, antenna plus provision for common or separate receiving and transmit antennas, or linear amplifier operation.

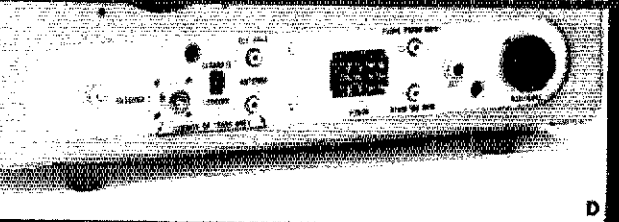
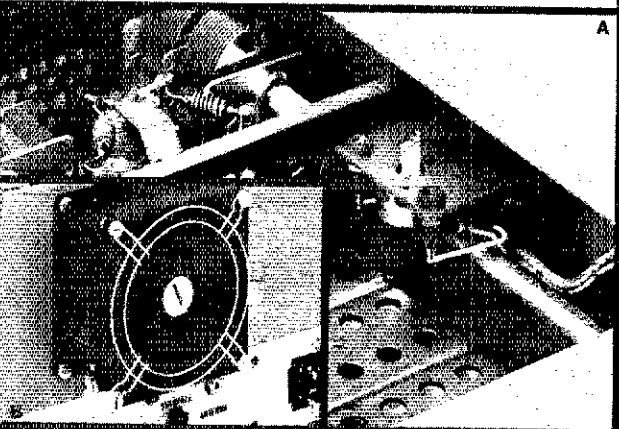
Of course, the new Hallicrafters SR-400A also has semi break-in CW, RIT, AALC, VOX, USB/LSB, < 1 KHz readout, noise blanker plus many more exclusive features.

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A Subsidiary of Northrop Corporation.



W2MTA hosted the NYS picnic this year as in the past six. The NJN crew clouted the NYS gang 19 to 5 in the much heralded soft ball game at that picnic. Meanwhile, W2RUF held another of her patented water-ball games which K2KIR won as usual. WA2LUF sports a new Marauder. W2FXA and WA2YQH made the first father and son 5BDXCC when the latter received award number 110. His dad holds No. 88. WB2NNA has a new HW-22. A recent ad in the RAWNY QSO tells of a 700 KW 80-meter amateur radio station for sale! W21MI now is K2FJ and recently made DXCC and is but a few states away from 5BWAS -- all with 60 watts. WA2MRZ is active in Marilla. A welcome to WJMRW from Vt. to WNY. His new call is WA2CJY. K2KIR was nominated as Director for the Atlantic Division at the NYS picnic. WNY ranked 9th in traffic and number of reports for 1970 as it did in 1969 -- this despite a significant drop in total traffic reported. Keep up the good work! Traffic with the + indicating PSHR: (Aug.) WA2ICU* 379, W2OE 242, WA4PDM/2 156, W2FR* 146, W2MTA* 123, W2FK 101, W2HYM 94, W2BU* 93, W2RUF* 87, WB2LOP* 86, K2UIR 61, WB2HLV 54, K2KTK+ 52, WB2IKL 40, W2FEB 36, WA2MP* 34, K2RTQ 32, W2MSM 30, K2NYS 28, WB2VND 27, K2DNN 26, K2OFV 16, W2CGD 15, K2KIR 13, WA2ITJ 11, W2PVI 8, W2NAOG 6, WA2LUF 5, WB2NNA 5, W2RAI 4, WA2LCC 3. (July) K2KIR 6, WA2LUF 3, W2CGD 1. (June) K2KIR 9.

WESTERN PENNSYLVANIA - SCM, Robert E. Gawryla, W3NEM - SEC: W3KPI, PAM: K3ZNP. RMs: W3LOS, W3KUN, WA31PU, WPA CW Net meets daily 3585 kHz at 7:00 P.M. KSSN meets Mon. through Fri. 3585 kHz at 6:30 P.M. All times local. It is with deepest regret that we report the Silent Key of W3HUL. The Nittany ARC reports they will conduct code and theory classes again this winter. They also announce W3ZUH has completed his confirmation of 5-Band DXCC with the last card coming the hard way. Congrats Dick. The Presque Isle ARC announces they also are sponsoring code and theory classes this winter. The PARC also reports W3BRB and XYL have returned from Europe and their DX operations from HV3SJ and 4U1TU; K3AFO was made an honorary member of SV1SV during his trip to Europe this summer; WA3POK is a new Advanced Class licensee and a big end of the summer picnic was held the end of Aug. Two-Rivers ARC also held an end of summer corn roast/meeting the end of Aug. with a two part film from ARRL to wind up the session. They also report that WA3LNF has moved to Minn. and is now WB9FJG. Indiana County ARC report WA3PMI is a new ham in the area and passed his exam with his broken writing arm in a cast. W3CFC retired Aug. 31 and will be heading for Ariz. before the snow flies. WA3JBN will spend the next few years at Penn State II. Congratulations to WA3RIG, the Tuscarora ARC of Mercersburg, Penna., on becoming an ARRL affiliated club. Check your license expiration date. Upgrade when you renew. WPA traffic report for Aug.: 30 sessions, 186 messages, 354 QNL. Traffic: WA31PU 252, W3NEM 202, WA3NAZ 169, W3YA 133, W3KIN 112, W3LOS 77, WA3MDY 55, W3MJ 38, W3ATQ 33, K3FXE 30, K3ASI 16, W3SN 13, W3IDO 7, WA3EJO 4, WA3JBN 4, K3SIN 3, K3SMB 19.

CENTRAL DIVISION

ILLINOIS - SCM, Edmond A. Metzger, W9PRN SEC: W9RYH. PAMs: WA9UCP and WA9PFI (vnt). RM: WA9ZUE, Cook County EC: W9HIG.

| Net | Freq. | Time/Days | Tfc. |
|--------|-------|---------------|------|
| IEN | 3940 | 1400 Su | |
| ILN | 3690 | 2330/0300 Tty | 132 |
| NCPN | 3915 | 1300/1800 M-S | 72 |
| IL PON | 3915 | 1430/2245 M-F | 399 |
| IL PON | 145.5 | 0200 MWF | 23 |
| IL PON | 50.28 | 0200 M | 0 |

K9VFA and WA9NF5 are active new operators to the ILN. The Peoria Area Hamfest was held Sun, Sept. 19. Bob and Ellen White of the headquarters staff were present and held eyeball QSOs with the gang. They also were guests of the DXCC meeting held the day before at Chicago. W9PRN was guest speaker at the McHenry County Amateur Radio Club on Sept. 9. Net manager of 9RN, W9HRY reports their traffic count was 433 for Aug. WB9HZB and WB9HZV are new calls in the DeWitt County area. WA9RTB has been appointed manager of the 75-meter PON. W9BXB received his Technician license. W9QKI, pres. of the York Radio advises that their net operates on 2,061,855,7010 meters. Elmer (Bud) Frohardt, W9DY, was presented with the 1971 Illinois Ham of the Year Award at the Hamfesters annual hamfest at Santa Fe Park. W9JXV received his DXCC certificate and installed a speech compressor in his mobile so that he can work DX en route. W9HKN is a new Novice in the Decatur area. The Decatur repeater WA9LJC is in operation and tone operated on 34.94 and open on 28.88, WB9CPT, WB9LIV and W9NGXO were elected officers of

the McHenry County Amateur Radio Club. WB9CYI is their activity manager. K9VFA received his DXCC and WAC awards. Traffic: WB9AWY 115, WA9ZUE 110, W9NXC 97, WA9RTB 77, WA9NZF 63, W9LNO 46, WA9SFB 36, W9JXV 28, W9PHJ 26, K9VFA 26, WA9LDC 24, W9HTF 18, W9YELP 8, W9PRN 8, W9LDU 6, W9LXL 4, WA9LEU 2.

INDIANA - SCM, William C. Johnson, W9BUQ - SEC: W9FC. RMs: WB9ANT, W9FC, W9HRY. PAMs: K9CRS, WA9OHX, (vnt) W9PMT.

| Net | Freq. | Time/Days | Tfc. | Mgr. |
|------------------------|-------|---------------------------------|-----------|----------------|
| ITC | 3910 | 1330 Dy 2130 M-S 2300 Tty | 294 | WA9OHX |
| QIN | 3656 | 0000 Dy | 167 | WB9ANT |
| IPON | 3910 | 1245 Su 1830 S-S | 34 | WA9UMH |
| IPONVHF Hoosier VHF | 50.2 | 0200-0400 Dy | 172 30 | K9APH W9PMT |

With deep regret I report W9ACX and W9ABA as Silent Keys. WB9ANT is the net manager for QIN. W9JAI is EC for Vanderburg, Warrick and Posey Counties; WB9CYT EC for Morgan County and K9LQG EC for Tippecanoe County. WA9TNH has been running phone patch for KP4DHQ this summer, thus making it possible for him to keep in contact with his folks back here. W9EGQ received his Incentive license in 1919, Extra 1922, phone 1927, restricted 20-meter phone 1928. The Central Ind. Radio Assn. new officers are WB9CHH, pres.; WB9AZT, vice-pres.; W9NGOW, secy.; WB9CYT, treas.; W9NERV, editor. By the time you receive this issue of QST, there may be a new SCM for Indiana. I want to thank everyone who has helped me for the past 4 years. I will be active as always for amateur radio is part of my life. You will see me more on the DX band to get my QSL card back that I lost in a fire. Traffic is down at present, but we still need the training so we can be efficient when an emergency does happen. Aug. QIN Honor Roll: W9HS 25, W9HDP 21, W9E1 21/20, W9L15 16, WB9ANT 15/20, W9MGC 15/16. (July) W9HS 24, W9BDP 20, W9QLW 17, W9MGC 15, W9MZV 15. Traffic: (Aug.) WA9WA 228, W9HRY 162, WA9OHX 111, K9RPZ 38, W9BUQ 37, K9YBM 32, K9JQZ 24, W9KWB 20, W9FVH 19. K9CBB 17, W9L 11, W9DZC 10, W9ENU 10, W9UEM 9, K9DID 8, K9LLK 8, K9VHY 8, WB9RAP 6, W9HWR 5, WA9YXA 5. (July) WA9VZM 128, WA9AUM 10, W9E1 3.

WISCONSIN - SCM, S.M. Pokorny, W9NRP - Asst. SCM: Joseph A. Taylor, W9OMT, SEC: W9NCT. PAMs: WB9CKE, K9FHL, WA9OAY, WA9PKM, WA9QKP. RMs: WB9BJR, K9KSA.

| Net | Freq. | Time/Days | QNI | QTC | Mgr. |
|-------|--------|-----------|------|---------|--------|
| WSBN | 3985 | 2300 Dy | 1251 | 174/141 | K9FHL |
| WIN | 3662 | 0115 Dy | - | - | WB9BJR |
| BFN | 3985 | 1800 Dy | 854 | 129/103 | WA9QKP |
| WSSN | 3662 | 0200 TFS | - | - | K9KSA |
| IFWN | 3985 | 1245 M-S | 418 | 237 | WA9OAY |
| SW2RN | 145.35 | 0230 Dy | 140 | 5 | WB9PKM |
| SW6RN | 50.4 | 0300 M-S | 139 | 8 | WB9CKE |
| W-PON | 3925 | 1801 M-F | 534 | 33 | W9EMC |

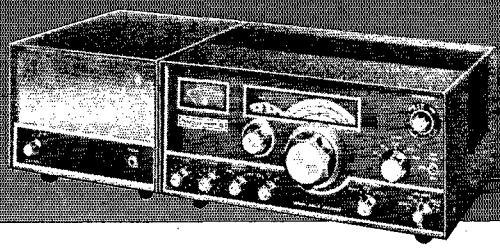
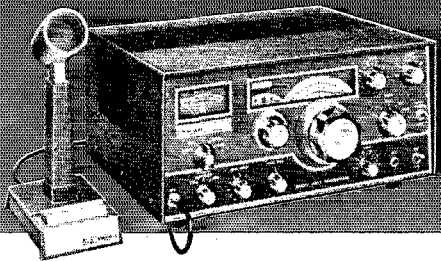
One of the reasons most of us enjoy amateur radio so much is because of the many different types of activities in which we can participate. How about checking into one of the cw nets? If you would like to gain some experience in operating and procedures, try the Slow Speed Net (WSSN), K P.M. M-W-F (local time) on 3662 kHz. For the more experienced operators try WIN at 7:15 daily (local time) same frequency. We need the participation and outlets so drop in and join the fellows often, we'll be glad to hear from you. Noticed a few new calls operating NCS on WSBN. Like WB9EJ who did a real good job. If anyone would like to give it a try, contact your net manager listed above. WSBN net certificates were issued to WB9AMT, WB9CMD, WB9DLP, WB9FRL, WB9LJ, W9LZC, WB9PHY and WA9ZCM. New EC appointees are W9CFS, WA9IZK, W9SZL, K9REZ, WA9LHU and W9ONI. Renewed OO and OPS to K9ITQ who just put up a new TH6-DXX and twenty-two-element beam on 2 meters, 70 ft. up. Congrats to new Novice in Whitewater W9JAL, W9FUY, now WB9FUY, with new Advanced Class license, K9JW - now an ARRL life member, and WB9DWG and XYL. W9DWF who made it an all ham wedding with honeymoon trip to VF7 and VF6-Land. Now that summer is over let's look for an increase in activity on all our nets and don't forget to add your operating news items with your reports this month. Traffic: W9CXY 234, K9CPM 220, WA9YSD 156, W9DND 107, W9L 65, K9FHL 58, WB9EEF 53, W9NFBG 50, WB9AB1 29, WA9OAY 30, W9KRO 30, WB9BRT 28, K9KSA 24, WB9DXX 20, W9OMT 20, K9LJO 20, W9NRP 18, WB9DWG 17, WB9CMD 13, WA9NBU 5, K9LJO 4, W9ONI 2.

(Continued on page 118)



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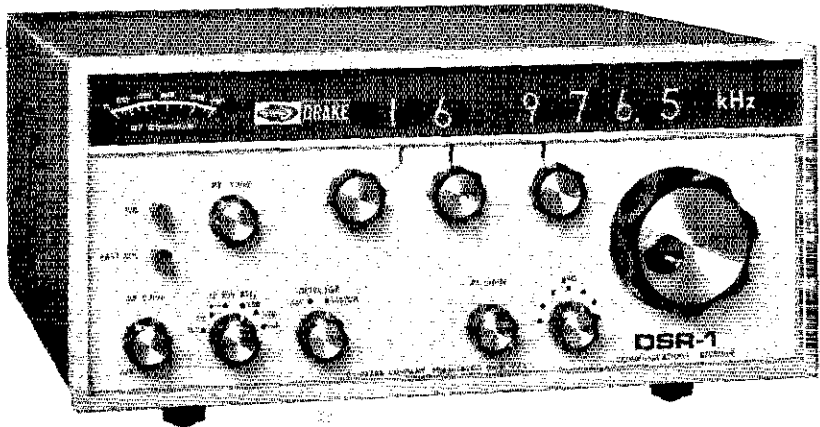
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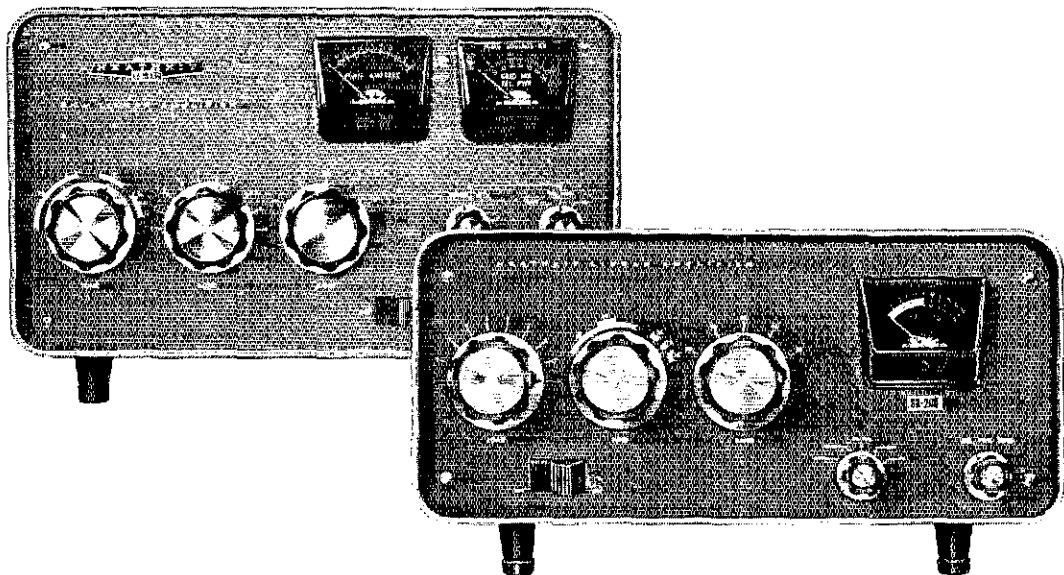
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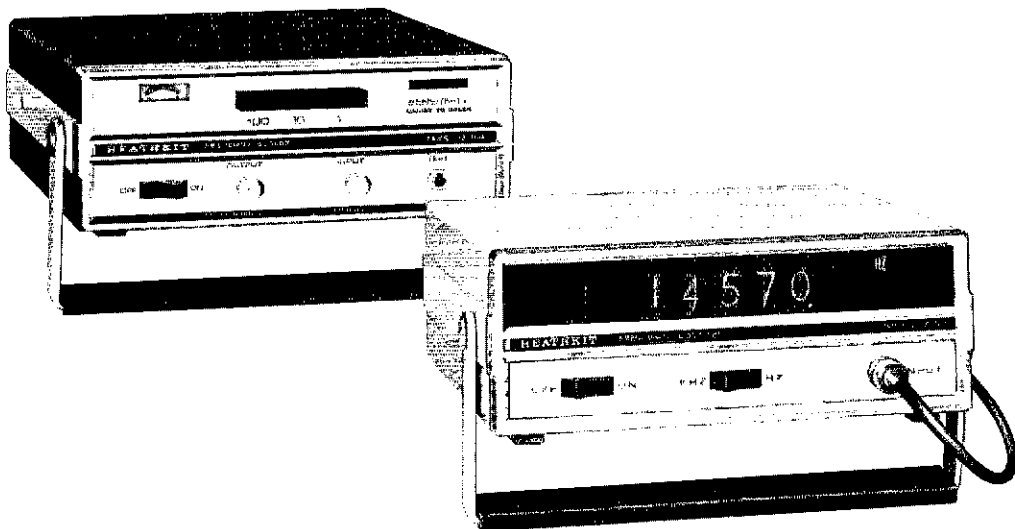
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Fast, easy tune-up! Just set the band switch, push CW-Tune/SSB rocker switch to CW-Tune position, adjust Tune & Load controls for maximum relative power. Push the rocker switch to SSB position and you're ready with a full 2 kW P.E.P. input — in the CW-Tune position you've got a full gallon for code or RTTY transmission. Bring your rig up to the performance limit, now. Order your Heathkit SB-220 today!
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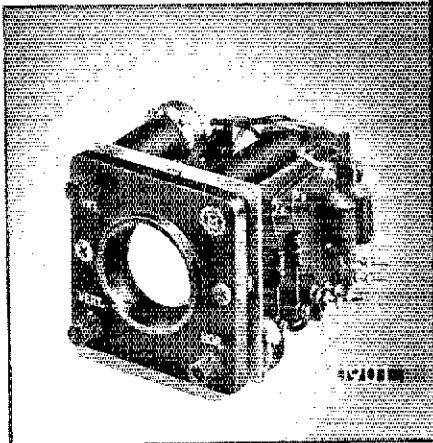
will divide input frequencies from 2 MHz to 175 MHz with the scaled output fed to any compatible counter with a 1 megohm input. Front panel switch-selection of 10:1 or 100:1 scaling ratios... resolution down to 10 Hz with a counter having 1 second time base. For use with frequencies within the range of the counter being used, a 1:1 switch position provides straight-through counting without scaling. The exclusive Heath input circuit triggers at extremely low signal levels, increasing versatility greatly. At 100 MHz, for example, only 50 mV maximum is needed to trigger. The front panel Test switch gives a quick, easy method of checking input level. Other features include all solid-state IC/transistor design...handy tilt stand/carrying handle and easy 5 hour design. Get into VHF measurement the easy, inexpensive Heath way... with the new IB-102. Shipping weight: 7 lbs.

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DAKOTA DIVISION

MINNESOTA - SCM, John H. Halstead, KOMVF - Asst. SCM: Edna M. Thorson, WAORRA. RMs: W0ZHN and W0AAU. PAMs: WA0HRM and K0FLT. WA0PSI and W0DDOU have passed their Advanced Class exams. W0ZHN has accepted appointment as RM for MSN, Dick was selected as Minnesota CW Operator of the Year and is also Asst. Manager for TFN. WA0IAW has resigned as RM of MSN after several years of exceptional service. Thanks, Tom, for a fine job. WA0YAH has accepted appointment as RM for MIN. W0AIH suffered serious damage to his antenna farm during a storm on Aug. 9. Paul reported that his 40-meter beam, 20-meter and quad were a total loss. The tower was fully extended and ended up as an inverted "U." Multi-op contesting is off for this year from W0AIH. WA0SUA was the radio contact between 28 Boy Scouts and their parents while on a 500-mile trip down the Mississippi. Schedules were kept in the evening with several Twin Cities stations for phone patch traffic. WA0VAS reports 12 phone patches in one session on Aug. 7. Traffic: (Aug.) WA0VAS 955, W0BUC 211, W0ZHN 111, WAORRA 103, W0BRG 91, WA0YVT 77, KOMVF 69, W0DDYZ 68, WA0EBZ 60, K0CSE 53, WA0TTC 51, WA0WEZ 46, WA0YWA 43, WA0VYB 37, WA0HRM 36, K0ORK 34, WA0YER 30, W0PPT 27, K0ZXE 27, WA0VHX 26, WA0PR 25, K0FLT 24, W0CCGT 19, K0ICG 16, WA0EWC 13, W0UMX 10, K0ZBI 10, K0SXQ 9, WA0YAH 8, W0KLG 7, WA0YGE 5, W0BATR 4, WA0MMV 4, WA0OLF 4, W0ISI 2. (July) W0PPT 37.

NORTH DAKOTA - SCM, Harold L. Sheets, W0DM - SEC: WA0AYL. OBS: W0BATB. PAM: W0CAO. RM: WA0RSR. OO: W0BF. K0PVG has changed his QTH to Devils Lake. W0YCL came out of obscurity to inhabit 75 meters again. Welcome back Arnie. W0B0HF is a new YL in Grand Forks operating 40 and 20 meters for the present with an NCX5. WA0BUG is another conditional soon to put an NCX3 on the air. We were all saddened by the accident which took the life of an old timer in ham radio, W0DDOW of Minot. WA0JPT took off for a vacation out West. WA0UKD has been transferred to the Carolinas where he shortly will be retired from the Air Force. W0FNU, a new call, is the XYL of WA0WTZ, another husband and wife team. WA0BIN has a teletype setup with a model 15. He also has a motor generator auxiliary power hooked up in his apartment! They have a local emergency net operating on 3912 kHz once a week with K0GGL helping out. W0B0HJ is working on a new power supply for the TR3. WA0RSR has activated the N. Dak. cw net which meets on 3640 kHz. He needs more operators to work on TEN and especially operators no matter how slow to gain experience in net procedure and get the traffic out to the various towns as they are taken off of TEN. WA0OVW has gone to Ariz. for the winter at least. K0PYZ is still turning out Novices - W0F0MK, W0F0ML and W0F0MM. I receive many inquiries a month concerning counties, locations of various hams. To help me keep up with new calls especially the new W00 or reissued calls, I would like to receive a card from you new fellows with your name, call, QTH and county. A message over the net would suffice also.

| Net | kHz | CDT/Days | Sess. | QNI | QTC |
|-------------|--------|----------|-------|-----|-----|
| Goose River | 1990 | 0900 Su | 5 | 27 | - |
| PON | 1996.5 | 0900 Su | 14 | 328 | 13 |
| | | 1830 S-S | | | |
| NDRACES | 1996.5 | 1830 M-F | 22 | 619 | 34 |

Traffic: WA0SUF 60, WA0BIN 14, W0DM 12, WA0RSR 5, W0CCD 3, WA0JPT 3.

SOUTH DAKOTA - SCM, Ed Gray, WA0CPX - The Black Hills ARC held a hamfest on Sept. 6. Some hams that came from a distance were WA0LLG, WA0UOS, WA0FGV and WA7RIK. The South Dakota nets meet as follows:

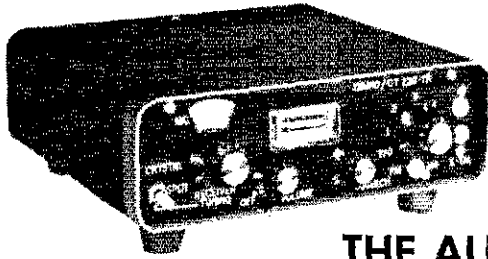
| Net | Freq. | Time/Days | QNI | QTC | Mgr. |
|-----------|-------|-----------|-----|-----|-------------|
| Morning | 3.955 | 1400 M-S | 454 | 53 | W0HOJ/W0ZWT |
| NJO | 3.955 | 1815 M-S | 507 | 12 | WA0RNE |
| E-Evening | 3.955 | 2330 Dy | 325 | 12 | WA0YFR |
| Evening | 3.955 | 0030 Dy | 920 | 29 | W0NEO |
| S0N* | 3.645 | 0100 Dy | | | |

*Started meeting Sept. 1. Thanks go to WA0YFR who has served as net manager of the early session net but now will not be able to because of his attending college at Springfield, S.D. If you would like your traffic count recorded please report it to your SCM. Traffic: W0HOJ 72, W0B0DG/07.

DELTA DIVISION

ARKANSAS - SCM, Jimmie N. Lowrey, WASVWH - SEC: WSRXU. RM: WASTLS. PAM: WASKJT. WASKJT is in the process of building a 2-meter repeater in Forrest City. The Fayetteville-Springdale 2-meter repeater is in the experimental stage on

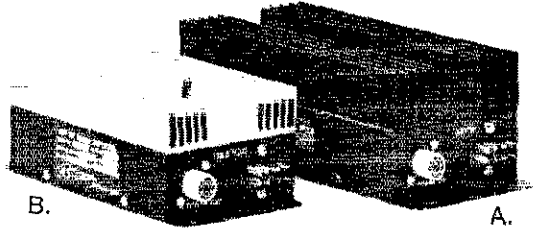
More good news from Tempo



THE ALL NEW, TOTALLY UNIQUE, TEMPO CT 220 TR FM/AM TRANSCEIVER

Don't let its small size fool you (it's only 7" wide). This little giant outperforms its big brothers. Look at these specifications... then look at the low price. Completely solid state. 220 to 225 MHz operation. Transmitter: Positions for 5 internal crystals (not supplied). 1 external crystal position and VFO input. Power Output: 4 watts FM, 1½ watts AM. FM internally adjustable to 15 kc. Power Requirements: 13.8 VDC XMT 1.2 amps FM, .5 amp AM, 25 ma Stby. Receiver: Tuning Meter for AM and FM. .6 micro-volt for 20 db quieting. Tunable or pre-set to five internally adjustable frequencies. FM is detected by limiter discriminator, 6 db at 15 kcs. 1 watt audio output — 5% distortion. Double conversion, 10.7 MHz and 455 KHz. ACCESSORIES AVAILABLE: AC Power Supply & Speaker. Internal amplifier to increase output to 20 W FM and 8 W AM. External VFO. External high power amplifiers for FM operation. (CT 220-40 or CT 220-80 suggested.)

Introductory price: \$179.00



TEMPO CT HIGH POWER VHF 2 METER AMPLIFIERS ... COMPACT AND HANDSOME

A. The CT 1002-2: Operates directly from a 12 VDC power source. Antenna switching is automatic when as little as 1.5 watts of RF drive is applied. The amplifier incorporates Balanced Emitter transistors and state of the art design practices, making it virtually immune to destruction due to high VSWR or misloading conditions. It may be used anywhere in the 2 meter band without the necessity of retuning. Only 9¾" x 4" x 3", the CT 1002-2 can be installed almost anywhere. Since there are no switches or meters, it may be mounted under a seat, in the trunk or in a desk drawer. SPECIFICATION: Power output: 100W. Input voltage: 13.8VDC. Current required: 12-14 amps. Drive required: 10W. Price: \$220.00

B. The CT 602-2: A superior quality 60 watt VHF FM 2 meter power amplifier measuring only 6½" x 3½" x 3". \$145.00

TEMPO CT OFFERS THE MOST COMPLETE LINE OF AMPLIFIERS AVAILABLE TODAY

| MODEL NUMBER | POWER INPUT | POWER OUTPUT min. | BAND | MODEL NUMBER | POWER INPUT | POWER OUTPUT min. | BAND |
|--------------|-------------|-------------------|------|--------------|------------------|-------------------|---------|
| CT6-30 | 1 to 10 W | 30 W | 6 M | CT252-A2 | 1 W | 25 W | 2 M |
| CT6-60 | 1 to 10 W | 60 W | 6 M | CT352-2 | 8 W | 30 W | 2 M |
| CT6-100 | 1 to 10 W | 100 W | 6 M | CT220-40 | 4 W | 40 W | 220 MHz |
| CT1202-2 | 25 W | 125 W | 2 M | CT220-80 | 4 W | 80 W | 220 MHz |
| CT1002-2 | 5-10 W | 95-100 W | 2 M | CT445-1 | 100 mw to 300 mw | 1 W | 440 MHz |
| CT602-2 | 5-10 W | 60 W | 2 M | CT445-5 | 200 mw to 1 W | 5 W | 440 MHz |
| CT606-B2 | 1 W | 60 W | 2 M | CT445-15 | 1 to 5 W | 15 W | 440 MHz |
| CT452-2 | 5-10 W | 45 W | 2 M | CT445-30 | 1 to 10 W | 30 W | 440 MHz |
| CT452-B2 | 1 W | 45 W | 2 M | CT445-50 | 1 to 10 W | 60 W | 440 MHz |

Tempo CT equipment may be obtained from select dealers throughout the U.S. or from:

Henry Radio

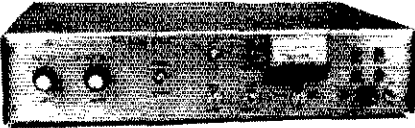
11240 W. Olympic Blvd., Los Angeles, Calif. 90064 213/477-6701
 931 N. Euclid, Anaheim, Calif. 92801 714/772-9200
 Butler, Missouri 64730 816/679-3127

HAL DEVICES



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All the features of previous HAL keyers and more. TTL circuitry. Optional identifier for sending all letters DX and RTTY ops. Take notice. Transistor switching for grid block AND cathode keying. Rugged crackle cabinet with brushed aluminum panel. Designed for ease of operation. Model 1550 only \$64.95. With ID \$89.95



HAL MAINLINE ST-6 RTTY TU

Complete parts kit for the W6FCC ST-6 now includes all parts except cabinet. Only 7 HAL circuit boards (drilled G10 glass) for all features. Plug-in IC sockets. Custom transformer by Thordarson for both supplies, 115/230V. 50-60Hz. \$135.00 kit. Screened table or rack cabinet \$26.00. Boards and manual \$16.50. Shipping extra. Wired units available.

HAL TOUCHCODER II KIT \$55.00

Complete parts kit, excluding keyboard, for the W4UX CW code type. All circuitry on one 3 x 6" G10 glass PC board. Plug-in IC sockets. Optional contest ID available. \$35.00. Watch for announcement of the new HAL code-typers, both Morse and RTTY.

HAL ARRL FM TRANSMITTER KIT

Drilled, plated, glass epoxy HAL PC boards. 2N5913 final transistor. RF detector with 0-1 ma. meter added. All parts, and the RF detector and meter only \$55.00 + shipping. Cabinet and crystals excluded. Board only \$7.50.

OTHER HAL PRODUCTS

ID-1 REPEATER IDENTIFIER ... \$75.00 wired
W3EFG SSTV CONVERTER ... \$55.00 kit
DOUBLE BALANCED MODULATOR ... 6 50 kit
DIP IC BREADBOARD CARD ... 5 50
MAINLINE ST-6 TU KIT ... \$50.00
MAINLINE AK-1 AFSK KIT ... 27 50
HAL RT-1 TU/AFSK KIT ... 51 50

HAL FARRIER MODES: 1000, 2000, 3000, 4000, 5000, 6000, 7000, 8000, 9000, 10000, 11000, 12000, 13000, 14000, 15000, 16000, 17000, 18000, 19000, 20000, 21000, 22000, 23000, 24000, 25000, 26000, 27000, 28000, 29000, 30000, 31000, 32000, 33000, 34000, 35000, 36000, 37000, 38000, 39000, 40000, 41000, 42000, 43000, 44000, 45000, 46000, 47000, 48000, 49000, 50000, 51000, 52000, 53000, 54000, 55000, 56000, 57000, 58000, 59000, 60000, 61000, 62000, 63000, 64000, 65000, 66000, 67000, 68000, 69000, 70000, 71000, 72000, 73000, 74000, 75000, 76000, 77000, 78000, 79000, 80000, 81000, 82000, 83000, 84000, 85000, 86000, 87000, 88000, 89000, 90000, 91000, 92000, 93000, 94000, 95000, 96000, 97000, 98000, 99000, 100000.

HAL DEVICES, INC. 1414 N. 56th St., Urbana, IL 61801
Phone 217-359-7373

ORDERING INFORMATION

Catalog, including photos, of all items 24¢ postage. Please add 75¢ on parts orders. \$2.00 on larger kits. Shipping via UPS when possible. Give a street address.

HAL DEVICES, Box 365A Urbana, IL 61801
Phone 217-359-7373

146,94-34. WASEEL is moving into his new house in Little Rock and should be back on the air soon. WB5HTY is on the air with a Hustler 4-BTV and his SB-102. WA5COZ has a new SB-610 and is working on a homebrew digital-readout frequency meter. W5PRZ has received his long waited for DX cards and now has 100 countries confirmed for DXCC. WASVWH now has a five-element 20-meter beam and a Hygain DB-1015 on an 80-ft. tower thanks to quite a bit of help from WB5BID and many other Fort Smith hams.

| Net | Freq. | Time(Z)/Day | Mgr. |
|-------------|-----------|-------------|--------|
| OZK | 3790 | 0100 Dy | WASLTS |
| Razorback | 3995 | 0200 M-S | WASKJT |
| Hillbilly | 3995 | 0030 Dy | WASZKH |
| Post Office | 3925 | 2130 M-F | W5MJO |
| Ark Phone | 3937 | 1200 M-S | W5VFW |
| DX Info | 3995 | 0045 Su | WASEEL |
| Caren | 146,34-94 | 0200 Th | W5ODT |

Repeaters: W5DI-Little Rock 146,34/94; W5YUT-Fort Smith 146,34/94. Traffic: W5KL 4.

MISSISSIPPI - SCM, Walker J. Coffey, W5NCB - SEC: W5A1WD. RMs: W5SBM, W5ATMC, PAMs: W5JHS, W5KEYE, K5MDX. Endorsements: W5SIX as OPS (vht), W5AO, W5PWW and W5SUF made the DX Honor Roll, W5VFP says ham radio is great. While in Ecuador he was patched home by W5UDQ and W5GGZ. W5ASUY kept in touch with the gang via mobile while on vacation. The Tombigger Club put on a great MSBN picnic at West Point. W5ATMC was given the W5EPT Memorial Award for his work with Novices on the Novice Net. W5ACKL and W5KEYE moved into new ham shacks. W5KLY says air conditioning never felt so good. K8YUW/5 got homesick while on his 30-day leave in Ohio. W5AKRN is organizing a group of Novices to prepare for General Class. The Jackson ARC has organized a group to prepare for the Novice Class.

| Net | Freq. | CMT/Days | QNI | QTC | Mgr. |
|-------|-------|----------|------|-----|--------|
| MNN | 3733 | 2300 MWF | 65 | 3 | W5ATMC |
| GCSBN | 3925 | 2330 Dy | - | - | W5JHS |
| MTTN | 3665 | 2345 Dy | 178 | 93 | W5SBM |
| MSBN | 3990 | 0015 Dy | 992 | 91 | W5ATWI |
| GCSBN | 3935 | 0100 Dy | 1593 | 64 | K5MOJ |

Traffic: W5SBM 213, W5VY7W 204, W5EDT 149, W5NCB 53, W5WZ 39, K8YUW/5 34, W5DZC 31, W5KEYE 31, W5A1UH 24, W5YJA 6, W5A1LN 4, W5KYB 4, W5BW 2.

TENNESSEE - SCM, O.D. Keaton, W4AGLS - SEC: W4ANX. PAMs: W4FP, K4MOI, W4EWW. RM: W4DAJ. The Cedars of Lebanon Hamfest was a success. The Certificate of Merit Award was conferred upon W4PRP, W4RMJ, W4TER, W4HZZ and K4TKR for their fine job during the Carroll County tornado, also the assistance in traffic handling by K4MOI, W4WVX, W4MOZ, W4ICW and K4EGC during this disaster was acknowledged. W4ANX, W4FVM, W4AJNW/4, W4BXZ and W4TYV were very instrumental in locating a young housewife who had been lost for three days, appears to have had a happy ending. Congratulations to W4LHV and W4KAT for their success in getting clubs organized at Jackson and Savannah respectively. K4YPK gave a very informative demonstration of slow-scan TV at the Aug. 21 RAIS club meeting in Nashville. Congratulations to W4HHK for his work on high frequencies, especially his reception of Apollo XV. Traffic: W4DAJ 123, W4OGG 105, W4RUW 67, W4UAZ 57, W4AGLS 43, W4ZY 39, W4WBK 35, W4SOF 34, W4ZCB 31, W4DJU 30, W4PH 19, W4YAU 19, K4CNY 16, W4ANX 15, W4MYZ 10, W4CYL 9, W4FVM 9, W4LBD 8, W4LHL 8, W4LHV 8, W4SYE 7, W4WVW 7, W4AMPJ 6, W4BHS 5, W4SGI 3, W4ATWL 3, W4TYV 3, W4DYJ 1.

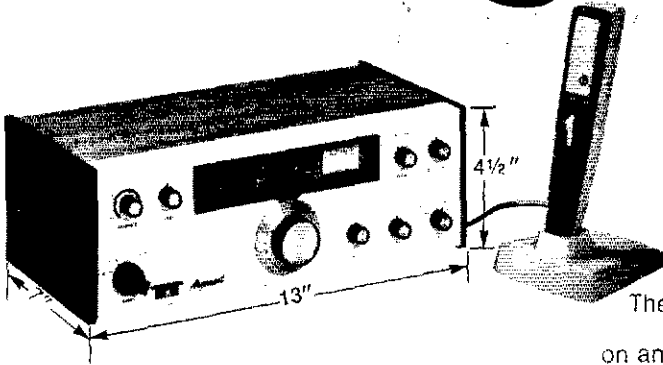
GREAT LAKES DIVISION

KENTUCKY - SCM, Ted H. Huddle, W4CID - SEC: K4YZU. Appointments: W4OXM as OPS; K4LOL as EC District 5. Endorsed: W4CSN, W4ARZS and W4KER as FCs; W4BAZ as ORS; W4NBZ, K4UMN and W4KER as OPSs; W4BAZ as OBS. BPL: W4AMKH.

| Net | QNI | QTC | Net | QNI | QTC |
|------|------|-----|-------|-----|-----|
| YER | 406 | 26 | FCATN | 78 | 4 |
| MKPN | 680 | 91 | KPON | 31 | 16 |
| KTN | 1115 | 174 | KRTN | 47 | 20 |
| KYN | 313 | 224 | | | |

The Kentucky RTTY Net (KRTN) finished its first month of operation with pretty fair QNI. All are invited to check in on 3628.5 at 2345Z nightly. There is a new 60-ft. tower at the Louisville RC headquarters. The RC station, K4CSH will be back or soon. W4AXQ is resigning as PAM of FCATN. Many thanks for a good job Rob, K4CRB and W4PSP have new beams. The Louisville Hamfest was a time success with over 200 hams attending. K4DMU

introducing the Argonaut.



The Argonaut is for every ham.
A transceiver that operates
on an AC pack or lantern battery.
Covers Amateur bands 80-10, SSB and CW.

A little bored with high power? Substitute skill for brute force and thrill to the challenge of conquering distance with a few but potent watts.

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Sailing? Tie down the mainsheet and enjoy a QSO. Flying? Keep in contact with the world. Motoring in a car, camper or trailer? Go mobile without tedious installation.

The Argonaut is more than just fun. It is always ready for the serious business of providing emergency communication when commercial power fails. It augments one of the great public services of Amateur Radio.

The Argonaut is for every ham.

The Argonaut is for *you*.

| | |
|---------------------------|-----------------|
| Argonaut Price | \$288.00 |
| AC Power Supply | \$ 24.95 |
| Microphone, EV PTT | \$ 17.00 |

SPECIFICATIONS

GENERAL: Frequency range in MHz: 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5, 28.0-30.0. 9 MHz crystal filter. 2.5 kHz bandwidth 1.7 shape factor at 6/50 dB. Automatic sideband selection, reversible. Completely solid state. All circuits permeability tuned. Tuning rate approximately 25 kHz per revolution. Size: HWD 4½" x 13" x 7". Weight approximately 5 lbs.

RECEIVER: Sensitivity less than ½ uv for 10 dB S + N/N. Backlash less than 50 Hz. S-meter. AGC fast attack, slow delay. CW side tone. Incremental tuning. Separate af and rf gain controls. Frequency response 300-3000 Hz. Distortion less than 2%. Built-in speaker. Drift less than 100 Hz. Dial accuracy ±5 kHz (slightly more in 28 MHz).

TRANSMITTER: Power input: 5 watts PEP SSB, 5 watts CW. Output circuit: broad band 50-75 ohm impedance. Actuation: Press-to-talk. Full break-in for CW. Built-in SWR bridge. Integral TVI filter. Drift less than 100 Hz.

TEN-TEC dealers will have Argonauts in stock soon. If there is no dealer in your area, order direct and include \$2.00 for shipping. Tennessee residents, add 3½% sales tax).

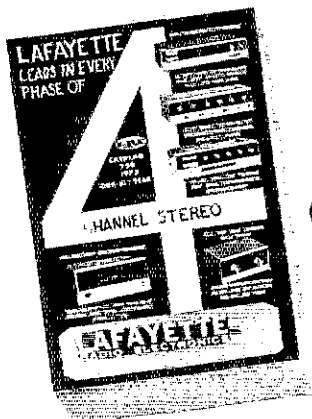
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lost his entire antenna farm when the cable of his crank-up snapped. Traffic: WA4MKH 280, W4BAZ 131, WB4PVC 123, WB4EOR 78, W4CID 76, K4MAN 64, K4YZU 53, W4OYI 50, K4TXJ 47, W4VZZ 47, K4TRT 43, WA4MEX 42, WB4KER 35, WN4PSP 33, WA4JOS 29, WA4GHQ 27, K4LOL 21, W4OXM 21, WA4ENH 20, WA4AVV 12, WA4WQZ 12, WA4AGH 11, WA4FAF 11, W4BTA 8, WA4MXD 8, K4HY 4, W4EWM 2, WA4WVA 1. Reports: 27. Total traffic: 1289.

MICHIGAN - SCM, Ivory J. Olinghouse, W8ZBT - Asst. SCM; B. Peter Trem, W8KRZ. SFC: W8MPD. RMs: W8PIM, W8RTN, W8WVL, K8RMO, W8DVT. PAMs: W8TAN, K8MIK, K8PVC. VHF PAMs: W8CVQ, K8ALM.

| Net | Freq. | Time/Days | QNI | QTC | Sess. | Mgr. |
|--------|-------|-----------|-----|-----|-------|--------|
| QMN | 3663 | 2300 Dy | 528 | 286 | 62 | W8PIM |
| WSSB | 3935 | 0000 Dy | 703 | 81 | 30 | K8PVC |
| BRIMEN | 3930 | 2230 S-F | 846 | 37 | 27 | W8TAN |
| OPEN | 3920 | 2230 Dy | 540 | 49 | 35 | K8MIK |
| GLEFN | 3932 | 0130 Dy | 744 | 74 | 31 | W8KHK |
| POB | 3955 | 1600 Dy | 839 | 288 | 31 | E8LNE |
| POB/CW | 3645 | 2400 M-S | 129 | 18 | 24 | VE3DPO |
| Mi6M | 50.7 | 0000 M-S | 158 | 51 | 18 | W8LRU |

The Oakland County AREC Net reports 4 sessions in Aug. with QNI 51, QTC 5, Silent Keys: W8EQC and W8DUH. WN4RXT contacted W8DF for a renewal of their first QSO 50 years ago. In 1921 WN4RXT was 8BGI and W8DF was 8BYF and they were using Ford spark coils. W8ULU, W8VXE and W8MFL, CAP members, assisted in the search for a plane crash of four Ann Arbor people. The plane was located Aug. 29. The Genesee County Radio Club and amateur radio were represented by W8BOT on radio station WTAC through a series of 6 consecutive public affairs interviews. The radio station covers 32 counties with a listening audience of 300,000 and carries the program twice daily. CMARC operators in cooperation with RACES handled communications for the water ski tournament. Comments overheard were that communications were the most efficient of any. W8JXA club station at the Soo is in operation with a new HW-100. Admiral Great Lakes Award custodian is W8SHD. K8VOB delivered a tri-band beam to the Soo club station 100 miles. W8BPO now has 301-401 combo. K8TNZ took his Swan 350 to Barga Co. to give county hunters a rare one and accidentally poured a cup of black coffee into the finals. Result, no contacts for several days. W8SIQ has a new SB-200. W8OHS and W8CMG joined the 2-meter fm family. K8IRC now is ET3USE at Asmara, Ethiopia. You can find him around 21,027 and 14,027 for the next 11 months. W8KVL is a new Tech. at Galien. W8YIH now has Conditional and is all set for cw bands. The P.O. Net Amateur of the Month is W8MXR. Traffic: (Aug.) K8ZJU 296, W8WZF 226, K8RMO 204, W8YVR 202, W8PIM 162, K8LNE 145, W8LXY 137, W8BJJ 74, W8DUL 68, W8ZDF 65, W8IAJ 64, W8KBZ 64, W8ZBT 55, K8PVC 43, W8ONZ 42, W8LBC 37, W8EU 34, W8FZ 33, W8RFZ 24, W8MO 21, W8SQC 19, W8FX 17, W8OJI 17, K8CPW 16, K8PEO 16, K8TAK 16, K8DYI 15, W8BYB 14, W8YU8 14, W8RFFZ 13, W8LUC 13, K8ACO 12, W8BDQ 12, W8VXM 11, K8JED 10, W8LUC 9, K8JHA 9, W8OBE 9, K8AEM 8, W8ANR 8, W8DCN 8, W8FXR 8, W8PND 8, W8AGQ 8, W8BNW 6, K8DX 4, W8LEU 4, W8SGHT 4, W8WVY 1. (July) W8DCN 17, W8SWE 10, K8PEO 4.

OHIO - SCM, Richard A. Fgbert, W8FTU - SUC: W8OUU. RM: W8IMI. PAM: K8UBK. VHF PAM: W8ADU.

| Net | QNI | QTC | Sess. | Freq. | Time/Z | Mgr. |
|---------|------|------|-------|--------|-----------|-------|
| OSSBN | 2226 | 1003 | 67 | 3972.5 | 1530/2345 | K8UBK |
| BN | 716 | 350 | 62 | 3580 | 0000/0300 | W8IMI |
| O6MtrN | 428 | 72 | 62 | 50.61 | 0000 | W8ADU |
| | | | | 50.16 | 0200 | |
| OSN | 201 | 66 | 30 | 3580 | 2325 | W8WAK |
| BN RTTY | 171 | 69 | 31 | 3605 | 2300 | W8YUB |

BPLs: W8WPO, W8QUL and K8ONA. Appointments: K8JFX as OO; K8UQA as OVS; K8MLO as OKS. Net certificates for participation in Buckeye Net went to W8CLF, W8CXY, W8FTU, W8IBE, W8LAM, W8IZE, W8RSP, W8SZU and W8WEG. OSSBN regulars receiving net certificates are W8HLL, W8SDQV, W8SENS, W8FTO, W8FXD, W8GVT, W8LZE, K8NV5, W8PBS, W8OPH, W8TOY, W8WVS and W8ZYV. W8TGX, chmn. of this year's Ohio QSO Party reports the following results: Ohio 1st place W8LT/8, Delaware Co., 14,508 points; 2nd place W8BU, Butler Co., 13,312 points; 3rd place W8CX5/8, Putnam Co., 12,393 points. Out-of-state winners were K8GJD, Mo., W3ABC, Md.-DC., and W8CLF/VE3, Ont. Congratulations to all. Honorable mention for operating from 22 Ohio counties went to W8SDHY/M. My thanks to the Treaty City ARA and W8TGX for conducting the party. The Fourth Annual Traffic Nets Picnic was attended by

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about 75 people including Director W8WC, W8OUU, W8IMI, K8UBK, WA8ADU, W8CJT and myself. K8UBK announced the appointment of W8MOK as vice-mgr. of OSSBN. Welcome to newly-affiliated Mad River Radio Club. Inter-City RC reports a New-Timers meeting in Nov. W8NAL says that K8DGT had two lightning hits within three weeks. OBS W8DYF says the Steubenville RC hopes to get its repeater on the air soon. EC W8LPA reports the ARC/CD tower has been completed and stands on the roof of the court house in Gallipolis. Dayton ARAs new officers are WA8UUX, pres.; W8LPT, vice-pres.; W8RCQH, secy.; W8BPHW, treas. Newly-licensed W8RKYX reports he's active with a Challenger and SX-111. Stark Co. CD RC has new officers: WA8ORO, pres.; K8DIL, vice-pres.; W8VKF, secy.-treas. Massillon ARCs recent election produced new officers: K8ISQ, pres.; K8FKG, vice-pres.; W8YHU, secy.-treas. We regret to report K8RDG and W8WJK as Silent Keys. The Worked Toledo Award can be had by sending logs as evidence of having worked 15 Lucas Co. hams to W8UUPH. Congratulations to new Advanced Class K8KZH and K8TFR. I attended the Southwest Ohio ARCs Family Picnic along with about 50 attendees from the Cincinnati area. SEC W8OUU reports that our current AREC membership is 1343. Traffic: (Aug.) WA8WFO 339, W8MOK 299, W8RFD 274, W8IMI 263, W8OCU 263, K8ONA 203, W8CUT 202, W8WDW 188, W8PMJ 177, W8BETX 142, W8BWK 141, W8BALU 138, W8UPI 134, W8ZUK 133, W8YUB 131, W8QFK 118, W8JMD 113, W8CJT 105, W8RCWD 105, W8RYP 92, W8UDG 88, W8BCY 83, W8BOK 83, K8LGA 76, K8MLO 69, W8SFD 67, K8UBK 66, W8GVX 63, K8BXP 61, W8VWH 59, W8HIGH 58, W8ATYF 57, W8QZK 56, W8RNOQ 55, W8BCLF 53, W8FEZ 53, W8BHL 46, W8BZTV 43, W8JD 42, W8SZU 42, W8SGVI 40, W8BAIC 39, W8VKF 35, W8BAYC 33, K8YUW 30, W8ETU 29, W8SSU 29, W8ADU 26, W8MHI 25, W8SSI 25, W8GNL 22, K8NOW 21, K8QYR 21, W8GTS 18, W8LZE 18, W8BNC 17, W8BDNZ 16, W8NAL 16, W8ARW 15, K8DHI 15, W8DEA 12, W8FGD 12, W8KC 12, W8BCLF/VE3 11, W8YIB 10, W8GOE 9, W8STX 8, W8COA 7, W8OUU 7, W8ZNC 6, W8SDQV 5, W8JEH 5, W8LAM 4, W8TV 4, W8DYF 3, W8GRT 3, W8VNU 3, W8FSX 2, W8YRU 2. (July) W8COA 58.

HUDSON DIVISION

EASTERN NEW YORK - SCM, Graham G. Berry, K2S2N - Assl. SCM/PAM: Kenneth M. Kroth, W82VJB. SEC: W2URP, RM: WA2VYS. VHF PAM: W82YQU. Nets: ESS 2300Z daily 3,590 (10 wpm) NYS 0001Z and 0300Z daily 3,675. NY County Net 1400Z Sun., 0045Z Tue.-Fri. 3,667. NYSPT&EN 2300Z daily on 3,925. Newcomer: Adirondack Novice Net 2200Z daily, 3,714. Appointments and renewals: K2BK as OO and W2HO as EC Town of Monroe both renewed. All appointees please send certificates for renewal by year-end. On the club circuit: Welcome to new affiliate, Spring Valley HS ARC. Yonkers ARC starting second year after reorganization. The Communications Club of New Rochelle supplied 2-meter communications for City Swim Meet, 12th year in a row. Theory classes under W2IB and K2S2N now finished, with new calls or upgrades expected for 12 students. Most clubs under summer hiatus - big plans for Sept. and later. Harmonic Hills, WARA, Yonkers, New Rochelle all holding dinner meetings this fall. Individual station activities: Section members off to college include WA2FBI, WA2VOZ, WA2HHO, WA2JLV, WA2FIQ and WA2CRW. Most hope to be active via college stations or portable. W82FUV reports dearth of QNLs from section for NYS - Regular QNLs from Westchester, Albany and Columbia only at the moment. Fall project, anyone? K2AVP 2-meter repeater roster now includes 37 stations - plan is for regular AREC check-in Wed. from 2000 to 2030 local 145.68 MHz NRFM in, 147.06 out. Details via WA2ROJ. W2IB supervising construction of fm adapters for New Rochelle Club members. Write him for details on low cost unit. W2URP invites all ECs to sign into net Sun., 1500 local on 3,950, and particularly on first Sun. of each month - good chance to exchange ideas and mutual assistance. W82FXB now has worked into 60 repeaters NYC to Denver on his trucking runs. New call WA2EXM - congrats on first step up from "N." Traffic: WA2FBI 115, W82IXW 61, WA2FIQ 59, WA2HHO 50, WA2CRW 46, W82LXF 45, W82FUV 27, W2URP 24, K2S2N 23, WA2JLV 22, WA2WGS 15, WA2HGB 6.

NEW YORK CITY AND LONG ISLAND - SCM, Fred J. Brunjes, K2DGI - SEC: K2OVN, RM: K2UAT. HD PAM: WA2UWA. VHF PAM: W82RQF. The following are major AREC nets, join one!

| | | | |
|----------|-----------|-----------|------------|
| Bronx | 28.64 MHz | 50.35 MHz | 146.17 MHz |
| Brooklyn | 28.64 MHz | 50.35 MHz | 146.26 MHz |
| Richmond | | | 146.88 fm |
| New York | 29.50 MHz | 50.48 MHz | |

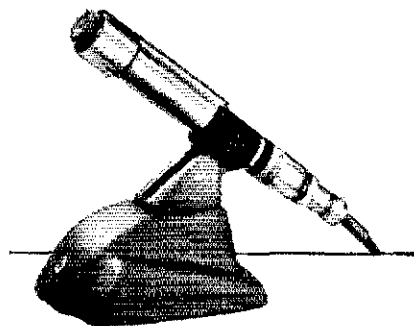
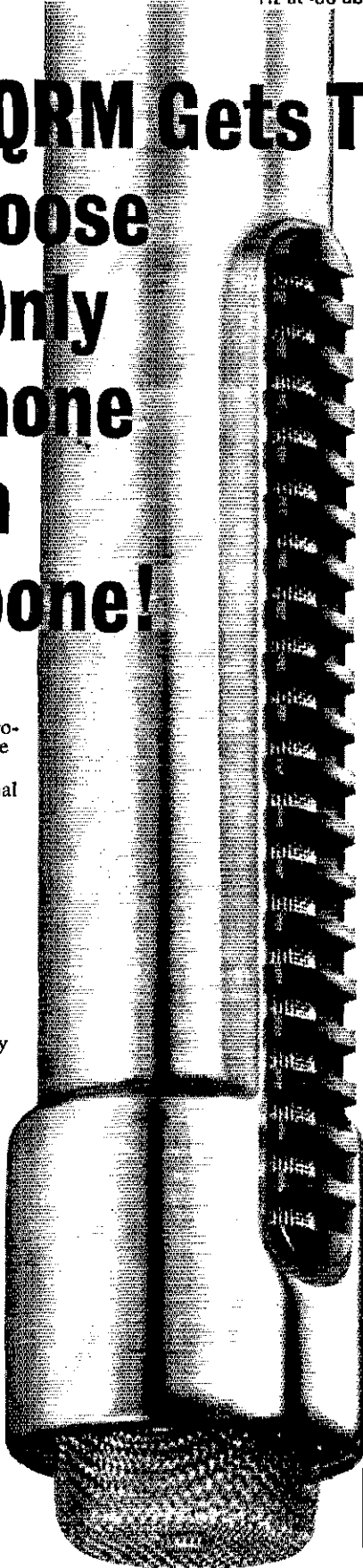
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|------------|-----------|-----------|------------|
| Queens | 29.50 MHz | 50.30 MHz | 145.62 MHz |
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| Suffolk | | 53.51 MHz | 146.82 fm |
| Brookhaven | | 50.46 MHz | 146.82 fm |
| Huntington | 29.30 MHz | 50.46 MHz | 145.59 MHz |

Note: Nets usually open 2000 local, Mon. My thanks to the "OM" for reporting this column last month while I was suffering the hardships of a European holiday! W2GKZ was a "rare one" operating as FP0C while vacationing in the Canadian Maritimes. WB2UFG heading back to Louisiana Tech, with a new Extra Class license. Aug. traffic was overflowing at QTH of WB2LZN. Bob had to take a two day vacation to get over it! WB2OYV will be ready for the heavy fall traffic with a new Heath keyer. I very often receive an inquiry from the general public as to whether or not an amateur station nearby could handle phone patch traffic for them, particularly to Latin America. I would appreciate information of stations who could help out in this Public Service. WA2MDX reports a large amount of activity and traffic on ESCARS as a result of Hurricane Doria. W2DBQ is ready to be heard on 2-meter fm with an array of new antennas. The American Red Cross Radio Club of Jamaica, N.Y., dedicated their new radio station in a very FB ceremony as an integral part of Queens County Red Cross emergency operations. W2PF reports using a borrowed Yaesu DX-400 from W2LH, who hand-carried it from Tokyo! Well, that gigantic four-element 15-20-meter quad antenna is back up at the QTH of W2AWK! Found some interesting things while operating in Europe; most countries require you to belong to their National Amateur organization before they will issue you a license (even with the reciprocal agreement) regardless of the amount of time you may be in that country operating. The other thing was the amount of U.S. stations active in the range below 14.275 MHz, and the lack of activity above "27.5." Much has been said of the crowding of the General Class portion of 20 meters, but I did not find this to be the case on a Sun. between 2100 and 0100 GMT (prime time for state side stations). Must be coast to coast QRM Hi! Congratulations and a welcome aboard to the Lincoln Amateur Radio Club on their affiliation with ARRL. W2TUK reports a new vhf antenna system. XYL Kay had to be restrained from lowering the boom on the second tower! BPL: WB2LZN. Traffic: WB2LZN 544, W2GHK 265, WB2OYV 137, WB2LGA 135, W2EC 102, WB2YIG 96, WB2UFG 80, K2JFE 23, WA2OMX 18, W2DBQ 14, WA2LJS 12, W2PF 8, WN2MTP 2.

NORTHERN NEW JERSEY — SCM, Louis J. Amoroso, W2ZZ — SEC: K2KDQ. RMs: WA2BAN and WA2TAF. PAMs: K2KDQ and WA2TAF.

| Net | kHz/Time(PM)/Days | Sess. | QNT | T/c | Mgr |
|--------|-------------------|-------|-----|-----|--------|
| NJN | 3695 7:00 Dy | 31 | 518 | 396 | WA2BAN |
| NJN | 3695 10:00 Dy | 31 | 308 | 174 | WA2BAN |
| NJSN | 3740 8:00 Dy | 21 | 65 | 19 | WA2FVH |
| NIEPTN | 3950 6:00 Dy | 32 | 518 | 150 | WA2TAF |
| NJPON | 3930 6:00 Su | 5 | 96 | 21 | WB2FJE |
| PVTEN | 145710 7:30 Dy | 32 | 223 | 36 | WA2JIM |
| ECTN | 145800 8:30 Dy | 18 | 57 | 9 | WB2LTV |

New appointments: W2NKK as EC for Union County. WA2BLE as OVS and WA2CAK as OPS. Renewals: WA2UOO as ORS and WA2FVH as OPS. WA2JIZ reports that the Carteret ARC sponsors code classes every Thur. at the Carteret Free Public Library. W2NKD reports that W2KOG, W2NVA, WB2ZCU and WA2BME manned the Scotch Plains CD center during Hurricane Doria. We thank all who assisted in this emergency. K2KDQ is still looking for more ECs. Hope more join the ranks as a result of the storm. WA2UDT worked Iowa for his 20th state on 2 meters. W2CVW is looking for rare DX on 15. WA2FPI has both a new SW-220 and TH3 Beam for chasing DX. WB2FEH is now WA6MIU and is off to W6-Land for college. WA21U1 received his Navy MARS call and is N05IS. WB2KNS received his WAC and is looking for a KL7 to complete his WAS. WB2RKK and WA2EUX back to college. The Net Mgrs. join me in thanking all the college men for their help while on vacation during the summer months. WA2BAN is looking for NCS as is WB2LTV. WA2JNQ puts out an FB bulletin for the PVTEN. Hope to hear you in the SS contest gang. Traffic: WB2RKK 769, WB2DDQ 290, WB2CDI 252, W2CU 220, WB2JA 143, WB2NOM 120, WB2AFH 114, WA2NLP 63, WA8FKQ/2 53, W2CVW 50, W2ZEP 40, WB2LTV 33, WA21VH 31, WA2UOO 28, WA2FUH 17, WA2CCF 15, WA2EP 14, WB2KNS 13, W2ZZ 12, WA2CAK 9, W2EWZ 5, WA2EUX 3, WA2ICU/2 2, WB2WNZ 2, K2ZFI 2, W2ABL 1.

MIDWEST DIVISION

IOWA — SCM, Al Culbert, K0YVU — SEC: K0LVB. The Iowa 75-meter picnic at Marshalltown on Aug. 15 was an unqualified success, and a hearty hand to those who worked so hard to make it



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| 100 | .06 | .08 | .16 | .20 |
| 200 | .08 | .10 | .20 | .25 |
| 400 | .12 | .14 | .28 | .50 |
| 600 | .14 | .16 | .32 | .58 |
| 800 | | .20 | .40 | .65 |
| 1000 | | .24 | .48 | .75 |

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| 27 | 1300 | 820K | 100K | 1.5 Meg |
| 39 | 1800 | 11K | 120K | 2.2 Meg |
| 82 | 2200 | 12K | 180K | 2.7 Meg |
| 100 | 2400 | 18K | 220K | 5.6 Meg |
| 270 | 2700 | 22K | 330K | 9.1 Meg |
| 330 | 3300 | 24K | 390K | 10 Meg |
| 390 | 3900 | 33K | 470K | 22 Meg |
| 620 | 4700 | 51K | 680K | |

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such. Weather and attendance were tops. WA0NEH received the new HW-12A. On the political front, K0CKX of Iowa City has announced his candidacy for the Midwest Directorship and W0FZO of Sioux City for Vice-Director. It is pleasing to note that the section has and still does produce fellows who have the desire and interest in our amateur service and society to seek these positions. I have been informed that Iowa was first place in TEN traffic for Aug., with such stalwarts as W0LCK K0DDA, K0AZJ, W0M0O, WA0VKI, W0LI, K0LUZ and WA0SSU making this possible. K2CN, ex-W0THH was visiting in the Fort Dodge area. It is about time to give that antenna one final look before winter and the rig a tune-up before Sweepstakes.

| Net | Freq. | Time(Z) | QNT | QTC | Mgr. |
|--------------|-------|---------|------|-----|-------|
| Iowa 75 fone | 3970 | 1830 | 1488 | 90 | K0LVB |
| Iowa 75 fone | 3970 | 0000 | 1207 | 43 | W0YLS |
| TLCN (cwt) | 3560 | 0030 | 136 | 45 | K0AZJ |

Traffic: W0LCK 514, K0DDA 118, K0AZJ 91, WA0AUX 81, WA0VZH 39, K0IGI 25, WK0LUZ 24, W0BW 12, W0MOQ 11, W0AAM 4, WA0YJW 2.

KANSAS — SCM, Robert M. Summers, K0BXF — SEC: K0LPE. PAMS: K0JMF, K0ENU, RMS: K0MRI, WA0TZK, VHF PAMS: WA0CCW, WA0TRO, K0GZP is in the hospital and WA0QEH is home from the hospital. Hiawatha now boasts of 3 husband/wife teams on their membership roster; WA0KDE/RVT, WA0YPA/YPB, WA0VSI/EKR. The Mid-State Mobile Monitor Service had another good month with 872 fixed stations, 74 mobiles, 53 QTC, 41 phone patches. Got a few minutes? — why not monitor MMM on 3920 any evening after 7 P.M. W0B0UX has earned his cw Section Net certificate. W0LXA has resigned as h' Zone 14 and W0BCL has been appointed to take over Zone 14 AREC activities. W0HI, TEN RN Mgr., reports that Kans. was 2nd in representation in TEN for Aug. WA0CIC and WA0LLR have moved back to Hays. I understand a County Hunter QSL Bureau has been established. For more information send an SASE to ICH Mobile QSL Agency, P.O. Box 146, Lakeside, CA. Pittsburg now has a repeater organization formed, and a repeater forthcoming 30 watts 34/94 operation. AREC Zone Nets total QNT over 600 for Aug. with Zones 1, 3, 4, 5, 7, 10A, 10B, 12, 13 and 15A reporting.

| Net | QNT | QTC | Sex |
|------|------|-----|-----|
| K5BN | 1069 | 127 | 26 |
| KPN | 243 | 21 | 17 |
| QKS | 594 | 186 | 62 |
| K5WX | 607 | 20 | 31 |
| KEC | 42 | 3 | |

Traffic: (Aug.) KW0HI 159, K0MRI 119, W0INI 113, K0JMF 81, K0BXF 78, WA0LBB 78, W0CHJ 67, W0FCL 48, W0GCJ 44, K0GJI 30, W0PP 28, W0LLC 26, K0LPE 19, WA0SRO 16, WA0JFC 15, W0CZP 14, W0NI E 9, WA0SIV 9, WA0YXK 9, W0B0L 8, WA0SXR 7, K0GZP 6, W0BGX 5, W0FDJ 5, K0PSD 5, WA0OWI 4, WA0OZP 4, K0JID 3, K0ZHO 2. (July) WA0SEV 4.

MISSOURI — SCM, Robert J. Peavler, W0BV — SEC: W0ENW. Appointment renewed: WA0KUH as OBS, PAM.

| Net | Freq. | Time(Z) | Days | Sex | QNT | QTC | Mgr. |
|-------|-------|---------|------|-----|-----|-----|---------|
| HHN | 7290 | 1805 | M-F | 22 | 468 | 38 | WA0LUPA |
| MoPON | 3963 | 2300 | M-S | 26 | 525 | 49 | WA0TAA |
| MoSSB | 3963 | 2400 | M-S | 20 | 997 | 68 | K0RPH |
| MON | 3585 | 0100 | Oy | 31 | 177 | 70 | W0OOD |
| MON 2 | 3585 | 0344 | Oy | 31 | 158 | 49 | W0HH |
| PHD | 5045 | 0130 | T | 5 | 104 | 9 | WA0KUH |

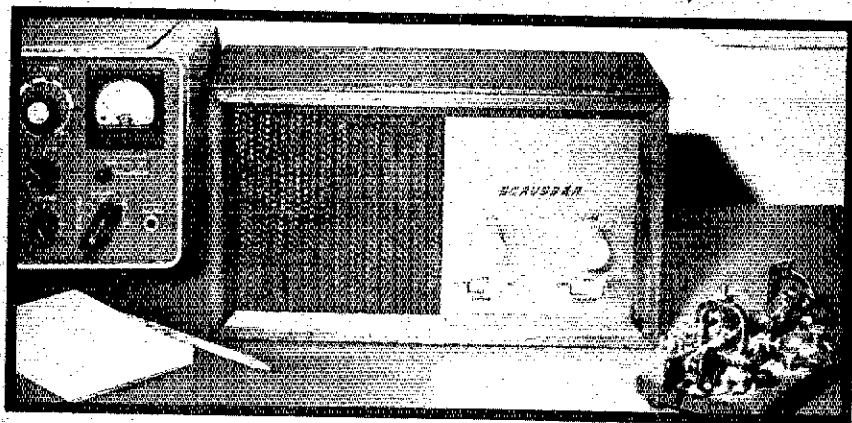
The above times become effective with the shift to standard time. K0AEM has resigned as mgr. of MON. My thanks to Charles for his three years of dedicated service and to W0OOD, who completed the month of Aug. as interim mgr. W0HH took over on Sept. 1. WB4KSL/O, who was a regular on MON and MON 2 this summer, has returned to Ala. K0GJD has been reassigned and left for Calif. Sept. 1. Congratulations to: WA0LUPA, who passed the Extra Class exam; to WN0CSF, who passed both General and Advanced; to WN0ZCC, who passed General Class and now is WB0FLT (Pat didn't make the expiration deadline); and to new Novices WN0FGC WN0FIE, WN0FND (father of WN0FEX), and WN0FOY. Traffic: K0ONK 458, W0HH 186, W0OOD 43, WA0HTN 29, W0BV 26 WA0KUH 20, K0BLX 14, W0GBJ 10, WA40WY/0 8.

NEBRASKA — SCM, V.A. Cashon, K0OAL — Asst. SCM: Velma Sayer, WA0GHZ, SEC: K0ODF. Appointment: WA0RET as OPS. Renewed appointments: K0HNT and W0YFR as OBS; WA0IXD WA0PSN, W0INR and WA0PIF as OPS; K0YRI, W0INR and WA0HWR as OBS; W0YFR, W0LOD, W0FHU, WA0JKN and WA0HO as ECs.

| Net | Freq. | GMT/Day | QNT | QTC | Mgr. |
|-------|-------|---------|-----|-----|--------|
| NSN 1 | 3982 | 0030 Dy | 989 | 13 | WA0LOY |
| NEB | 3590 | 0300 Dy | 138 | 29 | W0TQE |

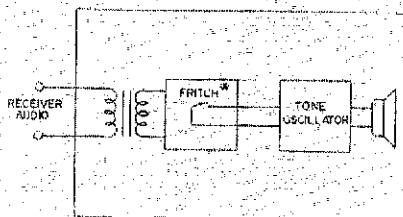
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| <input type="checkbox"/> | SN7491N 8-bit shift register | 1.50 |
| <input type="checkbox"/> | SN7492N Divide by 12 counter | 1.50 |
| <input type="checkbox"/> | SN7493N 4-bit binary counter | 1.50 |
| <input type="checkbox"/> | SN7494N 4-bit shift register | 1.50 |
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6-AMP FULL WAVE RECTIFIERS

| PRV | SALE | 400 | 1.50 |
|-----|--------|------|------|
| 50 | \$.88 | 600 | 1.75 |
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| PIV | 1Amp* | 2Amp | 3Amp | EPOXY SILICON RECTIFIERS |
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| 50 | \$.05 | \$.06 | \$.08 | |
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| 600 | .12 | .12 | .28 | |
| 800 | .18 | .16 | .39 | |
| 1000 | .18 | .22 | .59 | |

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| Type | Function | Price |
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State case desired: DIP, TO-5, FLAT PAK

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- EPOXY
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| <input type="checkbox"/> | 909 Buffer |
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| | | | | | |
|--------|------|----------|------|----|--------|
| NMN | 3982 | 1230 Dy | 1309 | 32 | WA0JUF |
| WNN | 3950 | 1300 M-S | 556 | 9 | W0NFK |
| AREC | 3982 | 1330 Su | 221 | 1 | W0IRZ |
| CHN | 3980 | 1730 Dy | 1056 | 48 | WA0GHZ |
| DFN | 3980 | 2000 M-F | 142 | 1 | WA0AUX |
| NSN II | 3982 | 2300 Dy | 1091 | 11 | WA0LOY |

Congrats to new Novice W0FFHN of Crete, KO0NEB, at the Nebraska State Fair has completed another successful operation and the Nehr, QSO Party for 1971 is over. Many thanks to all who handled traffic for KO0NEB, and the participants in the QSO party contributing to their success. WA0PMC who recently moved to Chandron hopes to get an antenna up so that he can operate in the Nehr. nets. WA0LGR of Lincoln is running as ARRL Midwest Division Vice-Dtr. 2-meter repeater activity is on the incline in Nehr. Box Butte Co. 2-meter AREC Net reported QNI 19 and QTC 1. Traffic: W0LO 151, WA0SCP 96, WA0CBI 29, W0TQD 26, W0HOP 25, W0AIE 24, W0ODF 16, W0FQB 14, W0KPA 12, K0DGW 11, W0DMY 11, WA0P1F 10, W0N1K 9, WA0QEX 9, WA0GHZ 8, WA0LOY 8, W0AGK 7, WA0HFH 5, K0CAL 3, W0N1R 4, W0VEA 4, W0YFR 4, WA0PCC 3, WA0YGZ 3, W0DJU 2, WA0EEI 2, WA0OQX 2, K0SFA 2, W0SWG 2, K0UDJ 2, WA0HQQ 1, WA0NYM 1, WA0RZF 1, WA0ZPM 1.

NEW ENGLAND DIVISION

CONNECTICUT — SCM, John J. McNassor, WIGVT — SEC: WIIHR, RM: K1FIR, PAM: KIYGS, VHF PAM: K1XKF.

| Net | Freq. | Time/Days | Sess. | QNT | QTC |
|-------|--------|-----------|-------|-----|-----|
| CN | 3640 | 1845 Dy | 62 | 415 | 346 |
| | | 2200 | | | |
| CPN | 3965 | 1810 M-F | 33 | 513 | 210 |
| | | 1000 Su | | | |
| VHF 2 | 145.98 | 2200 M-S | 22 | 113 | 22 |
| VHF 6 | 50.6 | 2100 M-S | 22 | 140 | 17 |

High QNI: CN — WIKUO, K1FIR and WA1GFH, CPN — K1E1C, WIGVT, WA1NMZ, WA1OPB, K1XKF and KIYGS, SEC WIIHR alerted Conn. Nets during Doria storm warnings — excellent cooperation by Net Mgrs. and members gave full coverage and extra sessions — thanks much. Director WIQV called an LO meeting, held at ARRL Sept. 25, W1FUF requests help of Navy MARS members during coming Joint Service Communications Tests. Lots of information is in the ARPSOC LO Bulletin — hope all appointees read and take note! Danbury CARA members were active during Doria alert. Tri-City ARC presented the Ham Radio film at meeting. Hamden ARA held OT night. New officers of the Avon Repeater Assn.: W1WHO, pres.; K1GZU and W1CH, vice-pres.; WA1HF, secy.; KIYGS, trans.; WA2TLW, W1K1K and W1CER, exec. comm. HCARA have code class at Manchester Town Hall de W1SBK. With deep regret we report W1OBR, W1RGB and K1NAX as Silent Keys. WA1FEO sends complete vhf report each month. W1YYM now W1YLI, W1MPW, W1BYW and W1EJ1 on the sick list. W1WEE is busy with code class and MARC 2-meter net. W1ADW received 207 cards from OSQ Bureau at one time! Congratulations to: WA1NMZ for Aug. BPL, the hard way; Taft ARC for ARRL affiliation; W1NOIH for Conditional Class and W1NOIH new Novice! Happy Thanksgiving to all! Traffic: (Aug.) WA1NMZ 673, K1E1R 268, W1EJ1 227, WA1JZC 180, K1E1C 168, WA1NES 120, KIYGS 102, WA1GFH 89, K1XKF 80, WA1NR 78, W1CTI 68, WA1MOW 67, W1GVT 52, WIQV 42, W1IHR 30, WIKUO 28, W1YBH 17, W1KVI 13, WA1OPF 12, WB2CHO/1 10, WA1CEA 9, W1CUB 8, WA1OPB 7, W1DQJ 4, W1BDI 2, W1AW 1. (July) WA1JZC 133, WA1GFH 89, WA1JVV 58.

EASTERN MASSACHUSETTS — SCM, Frank L. Baker, W1ALP — SEC W1AOG received reports from: W1s LE, HKG, K1s DZG, NFW, ZUP, WA1DXI, W1JRN, WB6BZB, ex-W1QOI are Silent Keys. W1NF is active in the OOTC and SOWP nets. WA1NLX has his Advanced. 6MCRN reports 10 sessions, 43 QNTs in June. W1ALK retires and is going on a long tour. W1VIN is CD dir. for Carlisle. K1UAQ now in Wilmington. W1ALP has an NCX-3, W1IXO back in Marblehead. W1IBF has been on a long tour and is now home. W1IHZR has a new QTH in Milton. W1ACEH and W1CAR are back home after a visit. K7OTR is back for a visit. Appointees: W1CE as ORS; W1SR, W1MTO as OOs; WA1MWN, WA1MFG as OPS/OVSS. Endorsements: W1PEX as ORS; W1s LE, Y1 as ECs. WA1FNM as OPS; K1RZJ as OBS. WA1KZE went on a trip to the Sierras. WA1NRV is now General Class. WA1FNM worked DA1G of New Bedford. 6MCRN had 18 sessions, 71 QNTs, traffic 1 W1OJG is active again. W1GGS is ex-W2WHG. WA1JVL is a W1MX. WA1RY is at Brandeis. WA1LXE has DXCC. WA1MWN worked a KR6 on 20 with dipole in attic. Chelmsford ARC held it annual outing in NH. WA1OBF has Advanced Class ticket and Drake Line receiver and transmitter. (I want to thank many for the letter and remarks about my letter in the Sept. issue, which proves that

AHA! YOU THOUGHT GOTHAM

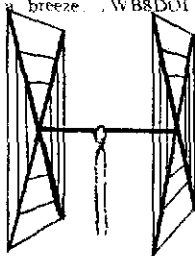
made ordinary, everyday, run-of-the-mill antennas. No, no, no. We make winners through superior materials and design. WA1JFG won the New England Round-Up championship with our 3-element 15-meter beam by a margin of 5,982 points! In QST since '53.

QUADS

Totally satisfied with quad. Worked DR4VJP, SM7DLH, XE1AB, DM4SEE, FL8SR, F6AUM, HK7YB in few hours. Instructions a breeze. WB8DDI

CUBICAL QUAD ANTENNAS

— these two element beams have a full wavelength driven element and a reflector (the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a fool-proof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!



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Elements: A full wavelength driven element and reflector for each band.

Frequencies: 14-14.4 Mc.; 21-21.45 Mc., 28-29.7 Mc.

Dimensions: About 16' square

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10' x 1 1/4" 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: Aluminum wire, tempered and plated, .064" diameter.

X Frameworks: 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.

Now check these startling prices — note that they are much lower than even the bamboo-type:

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| 10-15-20 CUBICAL QUAD. | \$37.00 |
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BEAMS

"Just a note to let you know that as a Novice, your 3-EI, 15 Beam got me RI Section Winner and New England Division Leader in Novice Round-up. See June QST, p. 57 for picture of ant. (below). Tax for a fine working piece of gear. 73s, Jay, WA1JFG"

Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new! full size (36' of tubing for each 20 meter element for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; 7/8" and 1" aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

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|------------------|------|------------------|------|
| 2 EI 20. | \$21 | 4 EI 10. | \$20 |
| 3 EI 20. | 27* | 7 EI 10. | 34* |
| 4 EI 20. | 34* | 4 EI 6. | 20 |
| 2 EI 15. | 17. | 8 EI 6. | 30* |
| 3 EI 15. | 21 | 12 EI 2. | 27* |
| 4 EI 15. | 27* | | |
| 5 EI 15. | 30* | | |

*20-ft. boom

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, TI2FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8OJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W21WJ, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4-AQL, SM5BGG, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!

| | |
|-----------------------------------|---------|
| V40 vertical for 40, 20, 15, | |
| 10, 6 meters. | \$14.95 |
| V80 vertical for 80, 75, 40, | |
| 20, 15, 10, 6 meters. | \$16.95 |
| V160 vertical for 160, 80, 75, | |
| 40, 20, 15, 10, 6 meters. | \$18.95 |

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all systems

TRI-EX W-51

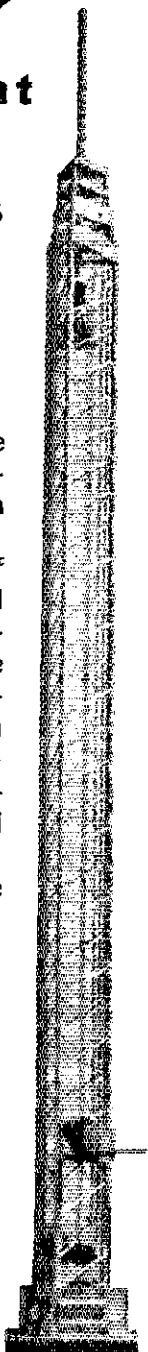
W-51 by TRI-EX . . . free standing . . . self supporting. Gets the MOST from your antennae. Rigid, torque resistant, built of high strength tubular steel with solid rod "W" bracing. No guys or house brackets required. Extended height 51', nests down to 21'. Telescopic cable extends sections uniformly. Hot Dipped Galvanized After Fabrication. Available for immediate delivery.

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these reports are read, WNINZU now in Andover, WA11FF worked DX on 2 and 6, EM2MN had 22 sessions, 113 QNTs, 49 traffic. K1BJZ active in MARS. W1RQL is back on the air after a long illness. Ex-W1MPP now is K4GBZ and ex-W1PS is K4RO. The Mitre-Bedford ARC is now affiliated with ARKL with WA1LKL as pres. W1BIO has an HW-101. W1SR says both of his boys WA2FRZ and WB2DEG are going to college up this way. WA8QNC's brother in Stoneham is going after a ticket. Somerville ARC, WA1MHN, starting up. WA1DXI helped out in the Hurricane Watch Net on storm Doria. SEC W1AOG took part in a civil defense test for radio emergency communications from various hospitals. WHDH has a certificate; work 5 employees or former employees, send log data to W1DKD. K1s IDU, DJW and WA1GGR have a 6-meter repeater going, sponsored by the Massasoit ARA. W1AY is on 6, W1AOEZ has a new Johnson rig. Framingham RC held its first meeting. WA3QOZ sends out the first bulletin for the Early Eighty Free Net, WA1MSB is our man in this section. Capeway RC met at K1LOE's. WA1KSF has WAC. Middlesex ARC held a meeting. WA1MGC working the states and now has 40 plus KP4, VEs, VU2PI/W1 and KH6YU1 are at Northeastern Univ. and on 10. W1ALP talked with K1NQA by phone patch through W1TT and KX6BU who is out on Kwajalein. New hams: WN1s PCF, PCG, PCH, PCK, PBW, PCC, PCY, PCZ, PDB, PDS, PDD, PDA, PDT, PDL, PEE, PEE, PED; WA1s PCO, PBV, PBU, PDI, PDZ, PDY. K1LWJ got his 100th for DXCC. WA11PF moved to Calif. K1EPI reports that NEEPN had 4 sessions, 88QNTs, 4 traffic. Traffic: (Aug.) W1OJM/1 239, WA1EYY 21R, W1PEX 139, WA1FE 94, WA1DJC 24, W1MNK 23, W1UX 22, W1AOG 20, WA1KZE 18, WA1FNM 5, WA1MWN 5, K1UAF 5, WA1LXE 4, K1OKE 2. (Apr.) WA1OJU 12.

MAINE - SCM, Peter E. Sterling, K1TEV - SEC: K1CLF. PAM: WA1PCM. RM: W1BJG. W1MSF (Mass.) now resides in Maine. K1LPS is moving to VT. W1TDK had a fair turnout at his picnic, all hams were treated to a ride on his homemade steamboat, a good time was had by all. WA1JTJ is working all sorts of DX with his new linear. WA1PCM and XYL WA1JCN have moved to their mobile home in Sabattus. WN1OVP is a new ham at Old Orchard Beach. New hams in Maine are WN1PCT, WA1PCN, WA1PDX. K1GUP operates portable from Lubec. K1RQE worked his 313th country. The Yankee Repeater operates from the QTH of W1EJ. W1OXR hopes to have a repeater going in the Bangor area soon. Met quite a few new hams at WA1GRA's picnic and a good time was had by all. Interested in an appointment? Get in touch with your SCM for information. Traffic: WA1PCM 180, K1TEV 4.

NEW HAMPSHIRE - SCM, Robert C. Mitchell, W1SWX - RM: WA1GCE. Acting RM: W1UBG. The summer is over and band conditions are improving according to W1DXB and WA1JTM. More new hams: WN1OZN, WN1PBH and WA1PFA. K1ACL is going on teletype. W1UBG received his 30 wpm endorsement sticker. W1CTW won the Vt. QSO Party for NH. K1AEG has a new swimming pool to increase his ground conductivity. K1MYV has moved to Franklin. W1UBG's excellent report on the NHVT Net shows 127 check-ins with 149 traffic in 31 sessions. W1BYS is having power supply problems. WA1IH is on his way back to U.N.H. W1QD/W1CTW says Utah stations will not OSL even with an SASE. W1JY is back in Merrimack after Calif. work trip. W1FZ fine signal was heard on 80 working DX. Traffic: W1UBG 149, WA1MXT 128, WA1JTM 106, K1YMH 83, W1SWX 8, W1BYS 1.

RHODE ISLAND - SCM, John E. Johnson, K1AAV - SEC: W1YNE. RM: W1BTV. PAM: W1TXL. VHF PAM: K1TPK. R1SPN report: 31 sessions, 497 QNT, 49 traffic. The Newport County Radio Club is off to a good start this season. W1YRC gave a talk on DXing. He is well qualified and has over three hundred countries confirmed. Code and theory classes have started with W1NEC and Jim Bartraut doing the instructing. The Providence Radio Assn. will sponsor the R.I. QSO Party on Dec. 11 and 12, rules in this issue (Operating Events). The W1AQ Club of Rumford has a world traveler in their organization. W1DK will travel to VR2-Land and hopes to operate from VR2DK with whom he has been in contact on several QSOs. W1DK has 342 countries on his list with a recent QSO, ET3ZU/A. W1YNE now has his TA-33 in service and started TCC sked with W7KV in Olympia, Wash. If any cw hams are interested in forming a R.I. cw net contact the SEC for information. Traffic: W1YNE 198, K1YVC 6, K1CEP 5, WA1HBW 4.

WESTERN MASSACHUSETTS - SCM, Percy C. Noble, W1BVR - SEC: WA1DNB. CW RM: W1DVW. PAM: WA1MFB. VHF PAM: W1KZ5 (Berkshire County). Sun. Morning ARCC Net, 9:00 A.M. on 3935. If you are interested in the Emergency Corps, drop a line to SEC WA1DNB for name and address of your county EC. The WM CW Net had 108 QNTs and handled 117 messages. Top five in attendance were: W1DVW, W1BVR, WA1LNF, W1KK, WA1LPJ. The WM Fone Net is now active 5 days a week on 3915 at 6:30 P.M.

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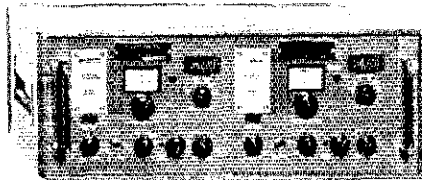


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Single channel high stability
XTAL controlled receiver

- 2 thru 30 MHz
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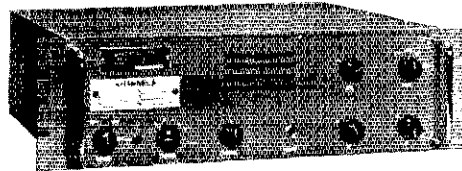


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Up to six channel high stability
XTAL controlled receiver

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- 6 XTAL controlled channels
- All solid state
- Stability—2.5 PPM -30 to +50 C
- Sensitivity—0.5 microvolts for 10 db S+N/N

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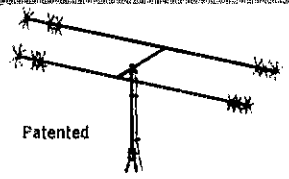
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The time proven B-24 4-Band antenna combines maximum efficiency and compact design to provide an excellent antenna where space is a factor. New end loading for maximum radiation efficiency. No center loading.

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| Bands | 6-10-15-20 Meters |
| Power Rating | 2000 Watts P.E.P. |
| El. Length | 11' |
| Turn. Radius | 7' |
| Total Weight | 11 lbs. |
| Single Feed Line | 52 ohm |
| SWR at Resonance | 1.5 to 1.0 max. |

Model B-24
Net \$59.95

MULTIBAND COAXIAL ANTENNA
for 6-10-15-20 METERS

Needs no ground plane radials. Full electrical 1/2 wave on each band. Excellent quality construction. Mount with inexpensive TV hardware. Patented.

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|------------------|-------------------|
| Power Rating | 2000 Watts P.E.P. |
| Total Weight | 5 lbs. |
| Height | 11' |
| Single Feed Line | 52 ohm |
| SWR at Resonance | 1.5 to 1.0 max. |

Model C4 Net \$34.95



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| TC2 | \$6.00 |
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| Spinner (-S) | \$1.90 |

Case: 2x4"; shaft 1/4"x3"
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Please give it a hand! Two new OBSs are WICSF and K1TMA. W3FBF/1 did fine job as radio operator at Camp Emerson in Hinsdale, including giving the boys a tour of ARRL Headquarters. In addition to his cw and ssb activities, WALLPJ is also using RTTY. The Mt. Tom Repeater Assn., an ARRL affiliate, gets out a fine bulletin and is very active. Officers are K1LRB, pres.; K1HOZ, secy.; K1HAX, treas. From CMARA: The club's repeater is on the air in N. Grafton (rec. 146.37 trans. 146.97). From HCRA: New officers are: K1PKZ, pres.; W1GVV, vice-pres.; W1IUB, treas.; K1NJC, secy. 2-meter net, Mon. 9:00 P.M., 145.35, 10-meter net, Wed. 8:30 P.M., 28.7. From MARC: WIACP has a Drake TR-4. W1JWB has TR- and 18-AVQ, W1MDS used vertical at summer camp with FB results on 15 and 20. W1GUL kept daily skeds with W1JY/6. K1JHC was in charge of a group of cd mobiles searching for a downed plane. From VARC: Club officers are: W1KFE, pres.; W1AETF, vice-pres.; K1YQQ, treas.; W1NLN, secy. Informal Net, Sun. 8:00 P.M., 29.0. Traffic: W3FBF/1 234, W1BVR 111, W1DVG 103, W1ALPT 101, W1ALNF 59, W1AIFB 9, W1ZPB 4, W1AIFB 1.

NORTHWESTERN DIVISION

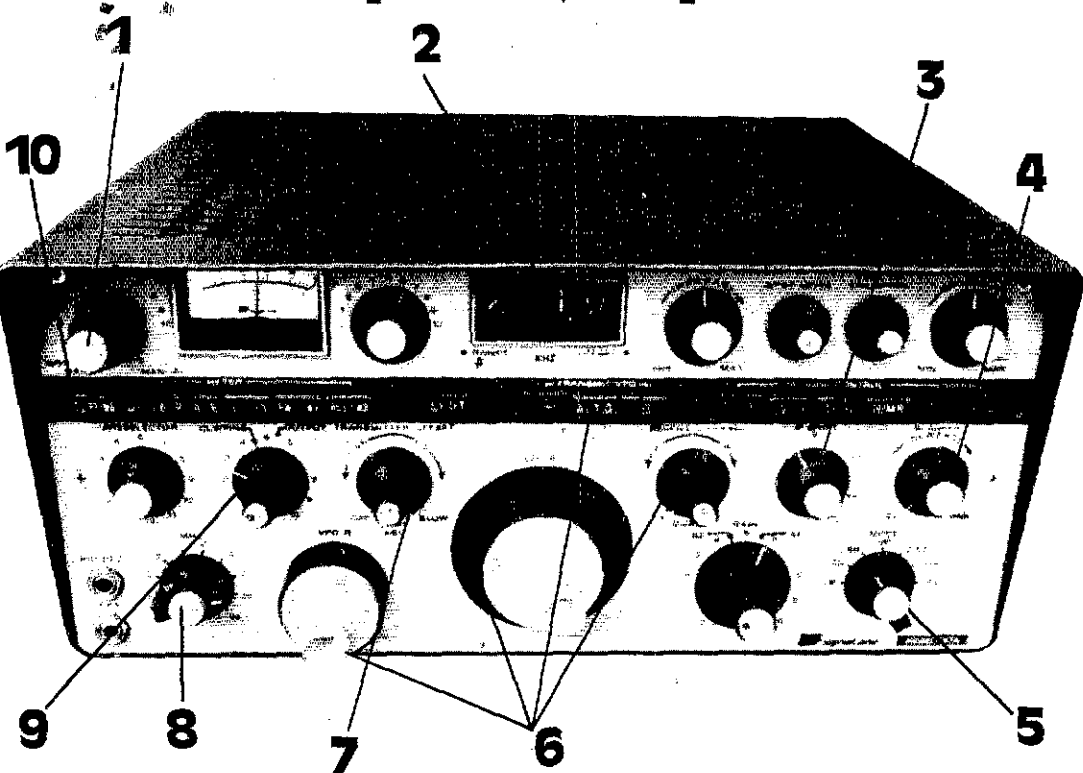
ALASKA - SCM, Kenneth R. Klopff, K1EVO - Ex-KL7AN and KL7ZR were guests of KL7BZO and KL7CZU in Anchorage; over two dozen friends got together with them again at a lawn party. Ham Electronics has closed and amateurs throughout the state will miss it. KL7BTP and XYL left for 7-Land in Aug. after a get together with Anchorage area hams. Say, DXers, how about some information on how to work Zone 39: KL7CZ has been trying for 25 years. The 2-meter am gang are still meeting on 145.3 Tue. at 1830 ADST in Anchorage. Incidentally, Fairbanks 2-meter activity is on 145.35. KL7CZ, ex-W7AFG, has been a ham for 41 years. The Arctic ARC had a booth at the Tanana Valley Fair and did a fine PR job. W17HFL was the ring leader. Helping out were KL7GMY, KL7GOY, K17GJC, YL6ADP/KL7, KL7GBG, KL7FVO, KL7TBI, KL7AZJ, KL7GFD, KL7TCH, KL7AEO and KL7EUW. KL7GBG and KL7EVO have been working cw mobile on 3735. KL7EWH is again headed for Tasmania. She has donated a batch of model-15 parts to the Arctic ARC so if you need something-- Traffic: KL7CAH 48.

IDAHO - SCM, Donald A. Crisp, W7ZNN - SEC: WA7EUV. The Idaho FARM Net meets at 0200 GMT on 3935 kHz each day. The Idaho RACES Net meets wck days at 1515 GMT on 3991.5 kHz. The Lewiston-Carlson Club installed a ham station at the county fair. The Eagle Rock Club has organized a women's auxiliary. N.W. Division Dir. W7PCY was the speaker at the Boise Club meeting recently. Idaho SCM, W7ZNN, attended a N.W. Division ARRL officials meeting in Seattle. The League is looking for volunteers for the Intruder Watch program, a program to report unauthorized non-amateur stations that are operating within the amateur bands. If you are interested in the intruder program, contact League Hq. FARM Net report: 31 sessions, 915 check-ins, 29 traffic handled. Idaho Post Office Net report: 13 sessions, 116 check-ins, 14 traffic handled. Traffic: W7GHT 73, WA7BDD 66, W7LY 55, W7ZNN 36.

MONTANA - SCM, Harry A. Roylance, W7RZY - Ast. SCM Bertha A. Roylance, K7CHA, SEC: W7TYN. PAM: WA7ZR. W7PMN and WA7OOO have 2-meter gear on in Miles City. WA7OOO has his equipment with him at college. W7OIQ has a new 2-meter rig, K7SVR has returned to the air after an absence of a year. K7IOA and XYL have a new son. WA7ZR thanks everyone who helped make the W1MU hamfest a success. WA7EAP has moved to Alaska. WA7OBH has been bitten by the DX bug. Several have asked why their news and traffic isn't in this column. If your news and etc. is in by the 5th of the month it will appear. Sorry to report the passing of W7HJM of Hamilton. Nets: Montana Traffic Net 2400Z 3910 kHz; Montana PON 0145Z 3950 kHz; RN7 0230 and 0430Z 3560 kHz. Repeaters: Butte, Great Falls, Bozeman, Helena Billings, all on 146.34 in, 146.94 out. KadiSpell 146.34 in 146.7 out. We have about 26 new hams in Montana. The Butte Amateur Radio Club is studying the possibility of an ARRL Division Hamfest for 1973. No one in Mont. has volunteered their service for the Glacier-Waterton Hamfest next year. Idaho will sponsor the W1MU Hamfest in 1972. Traffic: (Aug.) W7LBK 37, WA7OBH 15, WA7NWP 19, WA7ZR 15. (July) W7EKB 195, WA7JQS 173, WA7ZR 26.

OREGON - SCM, Dale T. Justice, K7WWR - Net report: WA7GTX reports for the AREC Net (July) sessions 31, check-ins 480, contacts 38, traffic 14; (Aug.) sessions 29, check-ins 510, contacts 32, traffic 27. WA7FTN received a perfect copy certificate for Armed Forces day RTTY test, and made 200 patches to S. Asia. W7MLJ has a new-threband quad. WA7ECY is in Taiwan with the Air Force, and keeps up through his QSTs. Two-meter fi

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activity is increasing by leaps and bounds, with many new calls heard through the repeaters. Visitors from WA, CA, NY and ID have used local repeaters this summer. WA7KIU reports for OSN for August sessions 22, traffic 28, check-ins 60, Traffic: (Aug.) K7NTS 179, WA7HS 123, K7QFG 95, K7ODF 75, WA7MOK 30, W7HLF 19, W7LT 11, WA7KRH 7, K7WWR 2, W7HJ 1. (July) W7WBC 547, WA7MOK 32, WA8TXJ 17, W7LT 17, WA7KRH 14, W7MLJ 5, W7HLF 3.

WASHINGTON - SCM, Arthur Henning, W7PI - SEC: W7UWT, RM: W7GYF, PAMS: W7GVC, W7MCW, VHF PAMS: K7BBO, K7LRD. New appointments: WA7GWL as OPS; W7WMY as OO. Sorry to report W7BHA as a Silent Key. New officers of NWSSE Net are K7KPC, mgr.; W7FIM, secy.-treas.

| Net | Freq. | Time(Z) | QNI | QTC | Sess. | Mgr. |
|-------|-------|---------|------|-----|-------|--------|
| WSN | 3890 | 0145 | 301 | 105 | 31 | W7GYF |
| NSN | 3700 | 0200 | 270 | 80 | 31 | WA7HCL |
| NTN | 3970 | 1830 | 1196 | 139 | 31 | WA7HKK |
| NWSSR | 3945 | 0130 | 1051 | 59 | 31 | K7KPC |

VHF PAM K7BBO worked So. Dakota first time on 2-meter cw and reports an active group of 12 operators on 448.3 fm. With the increased power permitted on 160 meters, W7AIB has worked KL7 and Oregon with FB results. W7IEU now has worked over 1000 counties on cw - QRP power. WA7LUJ reports passing the Extra Class exam. Leading DXer W7PHO gave an FB talk on working DX to North Seattle ARC. The Radio Club of Tacoma has documents on public record proving they organized Oct. 20, 1916. W7GYF covered 7200 miles on a camping trip to New Jersey and worked 22 countries from NJ portable 7. Our best wishes to WA7GWL in his new job as communications assistant on staff at ARRL Hq. The Skagit ARC Annual Salmon Bake at Oak Harbor had a big turnout with W7REC barbecue specialist presiding. W7SAB is redesigning the SSTV station for fall and winter operations and opened SSTV activity with Central American HR26K. Boeing Bears Club and Radio Club of Tacoma are arming to the teeth to do battle for Sweepstakes Contest "Big Bone" trophy, now tenaciously held by Tacoma. K7DBR has new TR-6. Traffic: (Aug.) W7RA 892, W7P 348, WA7HKR 241, W7KZ 119, WA7HCL 102, K7CTP 86, W7BUN 81, W7GVC 65, WA7OCV 60, W7MCW 54, K7QXL 54, W7BUN 53, W7AXT 38, WA7GWL 35, W7APS 32, W7ZHZ 31, WA7AVI 30, W7IEU 22, W7IEY 22, W7IWI 22, WA7EDQ 13, W7GYF 12, WA7LOV 10, W7AIB 9, K7OKC 6, WA7GVB 4, K7BBO 3, (July) W7KZ 186.

PACIFIC DIVISION

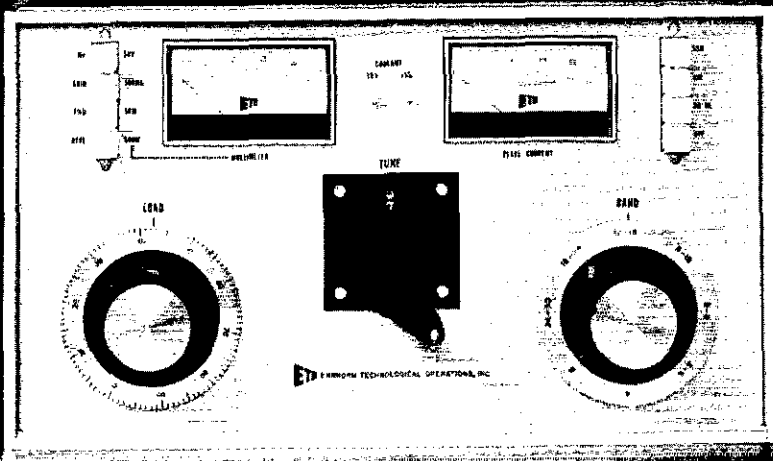
EAST BAY - SCM, Paul J. Parker, WB6DHH - KMs: WA6LJL, W6IPW. East Bay Radio Club had an unusual meeting recently with Mr. Caludia Mariotta of the Standard Tele-Communications Dept. The East Bay Radio Club picnic was held in Walnut Creek. WB6EME is moving to a new QTH. WN6FAS is back from recent K17 vacation. WB6GHS put up a new quad. W36EQH and WA6HHG are now General Class licensees. WB6WMR and WB6IQ recently helped the EBRC to make about 1500 points on Field Day. EBRC Net meets every Thurs. at 7:00 P.M. local time on 3980 kHz plus or minus 5 kHz. Make a resolution this New Year to help future hams and new-starting Novices. Remember the Northern Calif. New cw traffic net meeting daily on 3630 kHz at 7:00 P.M. and 8:30 P.M. local time. This is an excellent way to improve your speed, and to learn how to handle traffic on cw. Traffic: WB6VE 29.

HAWAII - SCM, Lee R. Wical, KH6BZF - A.S.T. SEC: KH6BZL, RM: KH6AD, PAM: KH6GJN, VHF PAM: KH6GRU, QSL Mgr: KH6DQ, 8Cs: KH6s GPQ, BAS and GLU, RACES: Net coordinated by Dick Hamada, RO. How are you serving your League? How about an appointment?

| Net | MHz | Time(Z)/Days |
|----------------------|--------|----------------|
| Friendly | 7.290 | 2030 M-F |
| World-Wide Boy Scout | 21.360 | 1800 S-F |
| Confusion (Patches) | 21.400 | 0000 All |
| Pacific Interisland | 14.335 | 0830 M-W-F |
| Micronesia | 14.335 | 0800 T-Th-S-Su |
| S.E. Asia | 14.320 | 1200 All |
| Islander (cw) | 21.111 | 0600 M-W-S |
| PACDXNET | 14.265 | 0600 T&F |
| Pacific Typhoon* | 14.265 | * |

*During typhoon alerts, I regret to report the death of form Honolulu amateur and friend KH6FRE. Kudos to KH6JJ who pass the 36th year writing his Hamateur column. KH6ELW is now / KH6GKD's XYL is KH6HNB. W8CJD/KH6 replaced KH6HCO Hawaii District Director NAVMARCORPS MARS. W6MHA reports that the State of Penna. House of Representatives recently cited T Confusion Net for an outstanding job handling phone patches of military and civilian personnel overseas. QSL Mgr. KH6DQ reports

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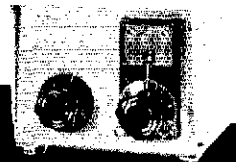
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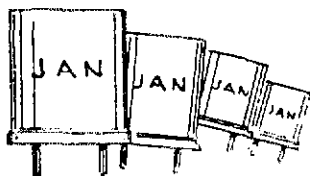
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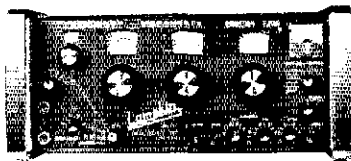


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that he's back on the job after a mainland trip which included L.A., Vegas. Former SCM, ex-KB6ALD now reported signing HL9TN. Returned from HL9KR, WA7LFD now signing KH6HDA again. In the travel dept.: KH6BZF and family went to Europe via Baltimore, NYC. They visited G, PAØ ON, LX, DJ, HB9, HBØ I, IRØHV, /3, and F-lands enjoying visiting with hams and mutual friends. They back to NYC, Cleveland and I.A. He missed the So. Cal. DX bus by not getting in touch with W6NJU and Co. sooner. Keep those cards and letters coming. Traffic: (Aug.) KH6BZF 18, KH6HIG 8, KH6BB 1, KH6DQ 1, KH6CQW 1, KH6HDA 1, KH6RGL 1, WH6HIE 1, W6MHA 1. (July) WØDAD/KH6 20, KH6HIF 1.

NEVADA — SCM, Leonard M. Norman, W7PBV — SEC: L.L. Mike Blain, WA7BEU, 560 Cherry St., Boulder City, Nev. 89005. Hats off to the Carson City and Reno gang for an FB Sierra Hamfest, they have started planning the next one in Aug. 1972. W7JLX, ex-K2AAS, is looking for cw traffic for Southern Nevada WA2MEQ/7 is finding Nev. almost as rare in DX as G5ANX when he was stationed before coming to our silver state. W7UI and WA7NIN are in a duel with their signals when it comes to working some DX. WA7NIN also has a very good construction article on how not to install a 2-meter fm antenna. K7ICW reports some good ut activity. WA7IDV has created some new interest in the RACES program with the 3996 net at 1830 P.M. on Mon. but still needs more Nev. stations to check-in from all over the state. Mobilizing almost anywhere in the west, then check into WCARS-725 daylight hours and WPSS-3952 after dark. In Nev. try 34/94 or 9 simplex, with spotted coverage into Ariz., Calif. and Utah. New RACES repeater on Angles Peak, west of Las Vegas, 145.680 received and 146.835 transmit.

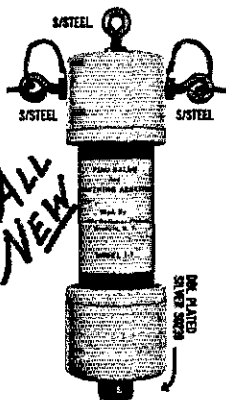
SACRAMENTO VALLEY — SCM, John F. Minke, III, W6KY. A new appointee in Sacramento Valley is WB6QZZ as RM, Larry is manager of NCN/2, the slow speed (2nd) session of NCN. Now that the fall months have arrived activity has picked up. Ten meters seems to be showing promise. W6BIL of Redding reports that he got 2500 volts at 1 amp, through his right hand and doesn't recommend it. W6BIL also states his DXCC total is now 293 with the addition of 3B9DK (our Darlene) and F7AM/E. Speaking of DX, did you see the photo of K6LZQ/VP7 in the DX Test results? Sept. QST? Clarence is a former SV member, who lived in North Highlands. W6VUZ now has his svv monitor debugged and in operation. K6TFR of Carmichael is a Silent Key. Don't forget the Sweepstakes. You don't have to send the time or your birthday this year. They will be looking for Sacramento Valley, so get in there and join the fun. Let's hear from the rest of you out there. Traffic: W6NKR 10, W6VUZ 4.

SAN FRANCISCO — SCM, Kenneth S. McTaggart, K6SRM. The Geo. S. Ladd Pioneer Radio Club is starting licensing classes. Contact W6KXG for more information. W6GGR has built transistor curve tracer. The Valley of the Moon Club participated in the annual Sonoma Valley Vintage Festival and handled a good deal of traffic. NCN members assisted in getting the traffic on its way. K6UGS has a new quad up and is planning to assault FCC in hopes of acquiring an Extra ticket. The S.F. Club has coordinated the distribution of fm equipment to S.F. volunteers associated with the S.F. Disaster Corps office. W6EJ reports working KL7CL on 160 m in Aug. with good signals both ways. WB6KSS is active on NCN/2. NCN meets on 3630 kHz at 7 P.M. and NCN/2 meets on the same frequency at 8:30 P.M. daily. The Redwood Empire Net meets Sun. on 3930 kHz at 230Z. ECs are needed in Marin, San Francisco, Humboldt and the Santa Rosa area. Anyone interested in more information about the duties of the EC are requested to contact the SCM. Traffic: (Aug.) WA6BYZ 246, WB6JQP 7, W6KVO 54, W6BWV 14, W6RNL 7, WB6KSS 4. (July) W6WLW 2, WB6KSS 6, K6UGS 4.

SAN JOAQUIN VALLEY — SCM, Ralph Saoyan, W6JPU. The Mt. Oso 2-meter repeater, W6AJU is in operation. Input 146.430, output 147.660. W6AJU is interconnected with W6JPU repeater with excellent coverage from Bakersfield to Sacramento. WA6QKE is active in WESCARS. JA2RLO with students were guests of K6QPE during Aug. K6QPE is active on meters fm with a 1R10-220U. WB4DHA is located at Lemoore NA and is active on 2 meters fm. WA6ISR new OTH is in Clovis. WB6JFI is editing the JPU repeater newsletter. W6MOG is active on 75 ssb. W6LZE is a new Novice in Fresno. WA6LBL of the Del Norte Amateur Radio Club, is looking for unused novice crystals to loan out to novices. New Novices in the Stockton area are WN6IC, WN6JSQ, WN6JMS, WN6JSS, WN6JTB, WN6KHIN, WN6KIH, WN6KHW, WN6LBY and WN6LUX. K6YNB operated from Rose on 6 meters. WB6RSS has returned to school. WB6YU is active on the Astro net. WA6CPP was NCS for WESCARS during the summer. K6QZV is back on fm. WA6MHD has a Regency 1

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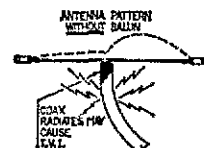
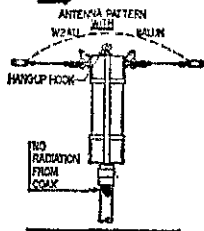
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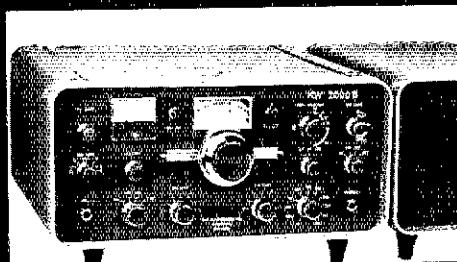
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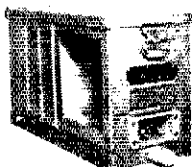


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transceiver, and on his vacation, maintained contact with others across the country on 2-meter repeaters. During Sept. W6JMP/N0LWT was NCS for the Navy MARS net 12A17B. Traffic: WB6RSS 67, WA6CPP 15.

SANTA CLARA VALLEY — SCM, Albert F. Gaetano, W6VZT — RM: WA6LFA. W6AUC reports that if you want to be completely legal on phone patching you can call the telephone company and they will come out and install a QKT speech processor. WB6IZF has been in south east Asia and operating as 4Y1QF, YB8AAP and VK8FG. Boy that must be fun. WA6LFA spent the month of Sept. in Europe and W6BVB took his place as manager of NCN. W6NLG reports that incoming DX cards to the QSL bureau are really slow because of the dock strike. Traffic has been very slow lately probably due to people being on vacation and also to the bad conditions on the hands. Don't give up fellows it can only get better. W6ZRI has finished his new ham shack in the garage and is again back on the air. W61QU had a serious accident and is now recuperating. We all hope for a speedy recovery. Frank. Traffic: W6RSY 492, W6YBV 283, W6BVB 213, W6NW 189, WA6LFA 161, W6DEF 120, K6DYX 95, W6AUC 68, W6VZT 43, W6NLG 15, W6GCFJ 12, WA6DKF 11, W6RFF 8.

ROANOKE DIVISION

NORTH CAROLINA — SCM, Calvin M. Dempsey, WA4UQC — SEC: W4EVN, PAM: W4AJT, VHF PAM: W4HJ7. WB4BGL passed the Extra Class exam. FB. The Durham FM Association is now affiliated with ARRL. WA4WZQ reports real good 6- and 2-meter activity. The Shelby Hamfest was really great and we are looking forward to next year. WA4TRQ is back at Wallops Island, Va. and has a new HW-12 and is talking with his father WA4UQC daily. WA4ZPC and WB4FBW are now on 2-meter fm and are working mobile and fixed. WB4KPD works 2-meter fm and will soon be on 6-meter fm. W4SDF is running a lot of patches on 20 meters. W4PCN was active during Hurricane Doria.

| Net | Freq. | Time(Z)Days | QTC | Mgr. |
|--------|-------|-------------|-----|-------|
| NC SSB | 39.48 | 2330 Dy | 17 | WA4OP |
| CN (E) | 3573 | 2345 Dy | 108 | K4LND |

Traffic: (Aug.) W4EVN 253, WB4PNY 106, W4PCN 69, WB4OZLJ 49, K4VBG 19, W4WXZ 19, WB4PWZ 9, WB4HGS 8, WA4UQC 8, K4EZH 7, WR4HGT 6, WB4BGL 3, WA4KWC 3. (July) WB4BGI 15.

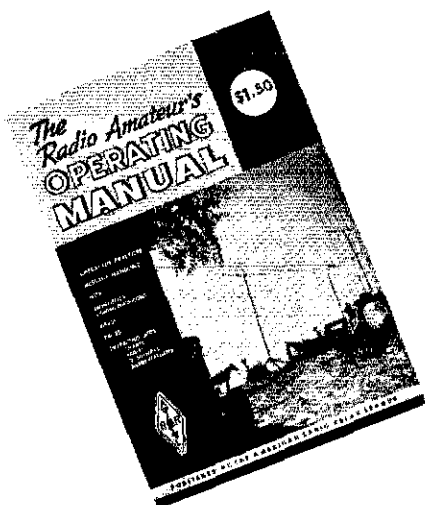
SOUTH CAROLINA — SCM, Mrs. Elizabeth Y. Miller, WA4EFT — SEC: WA4ECJ. Asst. SEC: W4WOM. PAM: W4JSD. RM: K4LND. W4ZEQ has a new Quid going on 10. WB4KPN has a new shack out back. WN4UUU is in new QTH in Spartanburg. K4HDX planning new set up with transmitter removed. New ORS appointees: WB4RMZ and WB4RKU.

| Net | kHz | Time(Z)Days | Mgr. |
|------------|------|--------------|--------|
| SC SSSHN | 3915 | 2300 Dy | W4JSH |
| SCPVN | 3930 | 1600 M-S | |
| | | 1230/1930 Su | |
| CN (early) | 3573 | 2245 Dy | K4LND |
| CN (late) | 3573 | 0200 Dy | WB4EFT |

SSBN 1104. Traffic: WB4RRU 65, W4MTK 42, W4NTO 35, WA4RMZ 35, WB4BSW 4.

VIRGINIA — SCM, Robert J. Slagle, K4GR — Asst. SCM: A.J. Martin, Jr. W4THV. SEC: WA4PBG. Asst. SEC: WB4CVY. PAM: WA4FGC, WA4YXK. RMs: WA4EUL, WB4NNO, W4SHU, WA4BU. A beautiful job in getting Norfolk area amateurs to get quarters for Hurricane Doria threat. WB4SJK is a new ORS, K4LH a new ORS appointee. WB4KSG made BPL with over 100 originations. Fine get together at W4OUK's for VSBN picnic; ne PAM, WA4FGC coming on strong with VSBN. K4KNP is active nets and ICC. WB4RNT still gleeful over new rig. W4T speak-plugging Eye Emergency Net pending FCC ruling. Virgin Mod Squad mostly back to school. WB4FDT getting lots of attention with Virginia Ham. WB4KBJ has lots of projects planned and no time. WA4JIF got me talking louder from mobile with no antenna he built. WB4DRB really plugging 2-meter fm; reports Va. FM Assn. has license and should have WB4QEP repeater soon. W4YZC was elected secy. of PVRC. Director W4KFC was the Winchester Hamfest. Canton Ohio Chapter (CWA, and Warr Ohio Hamfest. The Raleigh Convention and Gaithersburg Hamfest were a success. W4ZM attended a joint meeting of NYS, 2RN a NUN at W2MTA. WA4WOG has 2755 counties, W4JUJ 270. WB4RDV has rig fixed and is active. K4FM enjoying the min contests. K4CTY now holds CP-20 certificate. W4KX vacation through W34,5,8,9 and 0. K4JYM had best fun ORPing vacation. W4KAO working on SB-101. Virginia nets: VSBN on 39 at 6:00 and 10:00 P.M.; VSN and VN on 3680 at 6:30 and 7: P.M. and VFN on 3947 at 7:30 P.M. Traffic: (Aug.) WB4NNO 40

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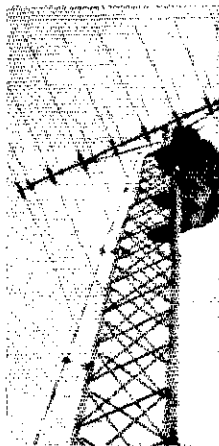
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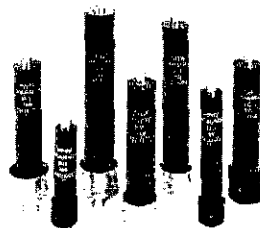
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WEST VIRGINIA - SCM, Donald B. Morris, W8JM - SEC: WA8NDY. RM: WB8BHC. PAMS: W8DUW, W81YD, K8CHW. Phone Net Mgr: W8BPOS. CW Net Mgr: W8RCYB, W8BKG has new tri-band beam. I regret to report the passing of K8NNE of Princeton and WB8FQH of Logan. W8BMMV is now EC for Marion County and NCS on the phone and cw net. WB8DQX has accepted EC for Harrison County. The CW Net with 122 stations handled 43 messages and the Phone Net with 415 stations passed 84 messages. W8NYH was elected pres. of the "Thumpin Keggers" at the Bluefield Hamfest. W8JM was approved for membership in the "Keggers" and they meet each Wed. at 8 P.M. on 3927 kHz. Newest YL operator in West Va. is W8NLAL at Fairmont. The State Radio Convention and Council meeting is set for Charleston on Nov. 6. W8BBG and W8BMMV made PSIR. W8NIFU is building a new transmitter and handling some traffic. WA8NDY is active on 2-meter fm. Active in the Martinsburg area are W8KMS, W8AGY, W8BIW and W8RIV along with K8SDL, W8DOY, K8QYG, W8AEC and W8BKG. Traffic: W8BOS 125, W8BBG 124, W8BMMV 109, W8NDY 96, W8JM 19, W8CYB 16, WB8DQX 12, W8BKG 12, W8BLEW 8, W8AJC 7, W8NIFU 7, W8BKN 4, K8QFW 6, W8BAKR 3, W8KWL 3, W8AFRO 2, K8BCF 1, W8BCPU 1, W8SDXE 1, W8EKG 1, W8KRM 1, W8KNG 1, W8LWZ 1, W8SOKG 1, W8BUNP 1, W8BYW 1, K8ZDY 1, W8WCK 4.

ROCKY MOUNTAIN DIVISION

COLORADO - SCM, Clyde Penney, WA0HLQ - SEC: WA0QOY. RM: W0LRN. PAMS: W0BAWG, W0CXW, K0IGA, W0LRW. Congratulations to all amateurs who participated in the simulated 747 air crash exercise on Aug. 21, 1971, for a job very well done. Approximately 500 persons participated in the exercise, which involved close coordination and cooperation between all of the Search and Rescue groups in Colo., and various radio amateur communications organizations. Members of the PPRAA provided communications for the annual Pikes Peak Marathon, Aug. 15, and turned in a most commendable performance. W0SIN is the proud owner of the new Heath Frequency Measuring gear and is available to assist local amateurs in getting their rigs on frequency. K0CNV is enjoying his new Drake TR-22, and is putting an excellent signal on the air through the W0WYX/RMRL repeater. Congratulations to WA0ZWA and W0CQJ, both of whom recently passed the examination for Advanced Class licenses. It is with deep regret that we report W10BR/0 as a Silent Key. Net traffic for Aug: H5-Noon QNT 479, QTC 20, 3 phone patches, time of 587 minutes for 22 sessions, Colorado (code QNI 220, QTC 102, 29 sessions, Colimbine QNI 990, QTC 72, informals 194, time of 1308 minutes for 27 sessions. Traffic: (Aug.) W0WYX 366, W0LQ 168, W0CQJ 119, WA0ZWA 113, W0SIN 72, W0CXW 45, K0JSP 45, K0ECC 41, WA0NTO 22, WA0YNE 9, W0LCE 7, W0KFF 4, WA0HLQ 3, (July) W0CQJ 15, (June) W0CQJ 43.

NEW MEXICO - SCM, James R. Prince, W5NUI - The major event of fall was the Hamfest in Albuquerque Sept. 17 - 19, with an excellent program. Section participation in the phone segment of TNW has been most disappointing despite much effort by W5MYM, W5PNY, W5AUNO and W5NUI. W5SRPC has completed a tone dialing unit utilizing design by W5OJM. The previous winter provided some amateur TV experiments. Are additional projects scheduled for completion this winter? Any stations interested in reactivating a section cw net please contact K5MAT. Traffic: K5MAT 110, K5DAB 62, W5NUI 43, W5RE 30, W5NON 24, W5PPY 16, W5MYM 10, W5OHU 8, W5DAD 7, W5BLL 4, W5JNC 4, W5AXC 3.

UTAH - SCM, Carroll E. Soper, K7SOT - SEC: W7WKE. RM: W7OCX. W7HVH has 2300 counties confirmed and five new novice operators in Vernal. W7GUT is back in Cedar City after spending fifteen months at the Arizona State Univ. in Tempe, Ariz., working on his Doctorate. Welcome back, Don. K7ZJS has resigned as OG because of business obligations that will take him out of the state. W7EM has purchased an K-4B and 1-4XB. Charles Cotterell, W0SIN, Director of the Rocky Mountain Division was the guest speaker at the meeting of the Utah Amateur Radio Club, Sept. 2, explained the operation of the league and


the accomplishments that have been made in the past year. There was a question and answer session following in which a great many questions were brought up and it appeared that most every one was satisfied with the answers. W7HX has been transferred to Denver by the FAA. He has been one of the most active amateurs on 2 meters in the Salt Lake area and will make his presence known in the Denver area. The Beehive Net operates daily on 7272 MHz, QNI 672, QTC 65, average time 10.35 minutes. Traffic: W7OCX 57, W7EM 50, K7CLO 15, K7SOT 8.

WYOMING - SCM, Wayne M. Moore, W7CQL SEC; K7NOX. RM: W7GMT. PAMs: W7TZK, K7SLM, OBSs: K7SLM, K7NQX, W7SDA, WA7FHA. Nets: Pony Express, Sun, at 0800 on 3920; YO daily at 1830 on 3608; Jackalope Mon. through Sat. at 1215 on 7260 (alt. 3,920); Wx Net Mon. through Sat. at 0630 on 3920; PO Net 1900 Mon. through Fri. on 3950. W7NNX has moved to Caldwell, Idaho. W7HNI vacated in Seattle during Aug. and Sept. The boys have installed a new repeater and antenna at the K7KMT repeater site. W7VJI has returned to Wyoming. He has moved to Casper and hopes to get his old VU call back again. K7TAQ vacated in Oregon during Aug. W7HEB and K7WRS have a new travel trailer to vacation in - very nice. The Sky-Wy Club has won the SCM Field Day trophy for this year. This makes the third time for them. Traffic: K7KSA 107, K7VWA 33, W7SDA 17, K7SLM 7, WA7EUX 5, W7HNI 4, WA7NHP 4, W7RPV 4.

SOUTHEASTERN DIVISION

ALABAMA - SCM, James A. Brashear, Jr., WB4EKJ - SEC; W4DGH. RM: W4HFU. PAM: W4WLG. The Decatur ARC put on another real good hamfest on Aug. 15. The Alabama Emergency Net System was the proud recipient of a certificate from the American National Red Cross. On behalf of the AEN System, our most sincere thanks. WA4VUG is on a tour of duty in the Navy. K0ELJ/4 received his "4" call and is now WB4WAD. K4JK reports WX nice, DX poor, very little activity. WB4LNM is working on interspace communication using ATS-3 satellite. W4DGH and WA4SNU are continuing their efforts on 2 meters. WB4SVH reports a new AREC net was formed in Tuscaloosa - 0100Z Mon., 29 MHz. They also plan on operating from a booth at the West Ala. Fair. WB4OKT, NM of AEND says his time now is pretty well taken up in school but he is planning on at least one SET session. K4PRE is building a rhombic antenna for 80, 10 meters as described in the ARRL Antenna Book, he needs to locate an 800-ohm non-inductive resistor of suitable wattage. Says he also has a 50-ft. tower and 3CX2500F3 EIMAC that he would like to trade for an 80, 10 ssb exciter. I hope you read "It Seems to Us...", Sept. '71 QST. Did you write the FCC and express your feelings on RM-1747? The Huntsville ARC, the North Ala. Repeater Assn. and the North Ala. DX Assn. told the ham radio story at a booth set up at the Northeast Ala. State Fair. The movie "This is Ham Radio" was available for showing. W4YFN has resigned as IC Madison County. K4HJM reports his ssb station was hit by lightning. Congratulations to WB4SVX and WB4SVH for making BPL. Appointments: WB4OKT as ORS and OPS. WB4SVX as ORS. Traffic: WB4SVX 337, WB4SVH 301, WB4OKT 211, WN4VSW 86, WB4FKJ 84, WN4TFC 76, WB4JMH 57, WB4TFB 54, WB4KSL 41, WB4NLK 23, WB4ADT 9, WB4OVR 8, W4DGH 7, WB4LNM 6, WA4VUG 2, WB4WAD 2.

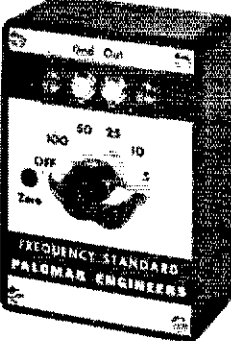
EASTERN FLORIDA - SCM, John F. Porter, W4KGI - Asst. SCM; Regis Kramer, W4ILE. SEC: W4IYT. Asst. SEC: W4SMK. RMs: K4EHY and W4ILE. PAMs: W4OGX 75 and W4SDR 40. We had another low month for traffic. Hope things will pick up in the winter. New appointments. WB4HML as EC for Broward County. WB4TDB as EC for Monroe County, W4DQS as ORS and W4GUJ as OPS. W4DFP, WB4GHD, WB4HML and WB4TPI earned QFN Net certificates. Sorry to lose K4DAX as OBS. He has been a main standby. New Novice in the section is WN4VYU. WA4JBI and W4IYT installed a 75- and 40-meter new antenna atop the National Hurricane Center for emergency use. We may need them this year. K4LMI and W4APV assisted Pinellas Park CD during recent flooding in that city. The Tampa Bay Repeater Assn. now has 43 members. We extend our deepest sympathy to K4COO on the loss of his wife on Aug. 23 after 43 years of marriage. In less than a week, this sad news was followed by shocking word that K4KO had passed away at Halifax Hospital on Aug. 26. WB4SZS of Ft. Lauderdale graduated from the Novice ranks on Aug. 11 with an Advanced Class ticket and QNI'd GN on the 12th. That's the kind of spirit we like. Another newcomer to GN is WB4PNG. Mr. Walter Hudson of the Tampa Electric Co. gave a very interesting talk on electrical interference to the Brandon ARS, Sept. 13. W4EXO has on display at the Science Museum at W. Palm Beach a nostalgic collection of



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ham radio gear ranging from 1918 head phones to 1933 Hartley medium-power transmitter built from OST schematics. Palm Beach Junior College ARC is being revived. WB4OUH is applying for trusteeship. Traffic: (Aug.) WB4AIW 323, WA4SCK 277, W4FTC 188, WB4OMG 162, WB4GHD 128, WA4JH 96, W4SDR 93, W4DVO 79, W4ILE 71, WB4QVO 70, WB4HJV 68, WB4HML 49, WB4MIQ 45, W4NGR 44, WB4JY 43, WA4FJA 42, W4JA 35, K4FAC 33, WB4TPJ 27, WA4HDH 24, W4IYT 24, WN4VOS 23, K4SJH 19, W4DQS 17, W4GJU 16, W4ZAK 16, W4OGX 13, K4BLM 12, WB4SKJ 12, WA4OHO 11, W4BCZ 9, W4KJ 9, W4SMK 7, W4KOH 6, W4LK 4, W4DFP 3, WB4SMA 3, W4TJM 1, (July) K4FAC 36.

GEORGIA — SCM, A.J. Garrison, WA4WQU — Asst. SCM: John T. Laney, III, K4BAI, SEC: WA4VWV, RM: K4BAI, Acting RM: WB4SPB, PAMS: K4HQI, W4LRR.

| Net | Freq. | Time(Z)/Days | QNI | QTC | Mgr. |
|-------------|-------|--------------|-----|-----|--------|
| GSN | 3595 | 0000/0300 Dy | 811 | 287 | K4BAI |
| GTN | 3718 | 2300 Dy | 138 | 18 | WB4SPB |
| GRN | 3975 | 0100 Dy | - | - | WA4VWV |
| Ga. Cracker | 3995 | 1300 Su | - | - | WA4IQU |

W4LRR and W4WDH recently caught a 2-meter opening and worked into the Oklahoma and Texas area. W4KRE reports that the auto patch is going FB on the Atlanta Radio Club 2-meter repeater. Recent appointments include WB4TAQ as ORS: W4JM, W4BFQ, WB4NTW as OPSS; W4REL, EC Atlanta metro area. Anyone missing the Augusta Hamfest sure missed a good one. Good food and fellowship was the order of the day. Traffic: K4BAI 127, WB4KVE 106, WB4RUA 104, W0GXQ/4 97, W4EFP 83, W4RNL 57, W4AMB 54, W4PIM 54, WB4SPB 37, WB4TAQ 36, WA4WQU 36, W4CZN 14, W4JM 11, W4RFI 8, K4NMM 5, W4FDN 2.

WESTERN FLORIDA — SCM, Frank M. Butler, Jr., W4RKH — SEC: W4IKB, RM: K4LAN, RTTY: W4WEB, PAM: W4NOG.

| Net | Freq. | Time(Z)/Days | Sess. | QNI | QTC |
|-------|--------|--------------|-------|-----|-----|
| WFPN | 3957 | 2300 Dy | 31 | 427 | 6 |
| QFN | 3651 | 0000/0300 Dy | 62 | - | - |
| 2m FM | 146.94 | 0030 Th | 4 | - | - |

Pensacola: New hams in Aug. include WB4VZI, WN4WEO, WN4WER and WN4WHU. K4CFS is back on 75 and 80 meters with a new antenna. WB4KGW has his 2nd Class Commercial ticket and is working at WSRE-TV. He has a new Olsen 6-meter rig, and is working on 220 MHz gear. WB4PKW reports the 6-meter net going strong. Escambia County CD has been reorganized. Fort Walton Beach: New hams include WB4VUP, WB4VZH, WB4WJ and W3ZBW/4. WB4UEK joined Navy MARS, WN4VWZ, a new YL, and her OM, WN4UFI, live in Choctaw Beach. WB4TPR is the only N.W. Fla. member of QFTN. Dehuniak Springs: WA4PXR was recognized on a nation-wide radio program for his work with the HALO missionary net on 15 meters. Panama City: WASAXO/4 has his quad working, and he also has a new ham shack. WB4LEL is active on QFN. Tallahassee: WB4QLL joined the WFPN 75-meter SSB Net. WB4WGO is a new ham here. Traffic: (Aug.) K4VPY 235, K0BAD/4 134, W4IKB 21, WB4LEL 13, W4RKH 11, WBSAXO/4 10, K4CFS 2, (July) K0BAD/4 159, W4IKB 12.

SOUTHWESTERN DIVISION

ARIZONA — SCM, Gary M. Hamman, W7CAF — SEC: K7GPZ, RM: K7NHL, PAM: W7UXZ. The SW Division convention at Disneyland was an experience enjoyed by many. Arizonians attending included WA7CNP, W7GX, WA7MAE, W7DOZ, WA7DRG, K7UGA, K7YAM and W7CAF. WA7MAE and W7CAF brought home trophies for their entries in the QSL Contest and mobile antenna efficiency contest. Coming hamfests in Ariz. are the annual Winter Hamfest in the Phoenix area in early Feb. and the Southwest Ham Roundup and Fiasco in Tucson on Apr. 29 and 30. The Ariz. ARC is a sponsor of a new Boy Scout Explorer Post 710 in the Phoenix area with WA7NXI as Post Advisor. K7NHL, manager of IWN, has been trying the second session of TWN on tsh on 3970 (or 7270) kHz at 0530Z. Assisting the Red Cross in Tempe after some high winds did some damage were K7GHS, K7JWB and K7KEQ using 2 meters. W7CAR has returned home after a mobile

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QS 11-71

vacation to New England. Best wishes to W7UXZ as wedding bells toll for him and Sheila in Nov. K7UGA and his operators completed 1489 patches in Aug. Those earning Section Net certificates for Aug. were: K7EMM, WA7HIT, K7NTG, W7OUE, K7RLT and K7UOK. PSHR: K7NHL. Traffic: (Aug.) K7NHL 181, K7NTG 117, K7EMM 41, W7OUE 15, K7RLT 8, WA7IXC 7, W7CAF 4, W7LLO 3, K7WUG 3. (July) K7NHL 131, W7CAF 18, WA7IXC 8.

LOS ANGELES - SCM, Eugene H. Violmo, W6INH - By the time you will read this column the Southwestern Division Convention will be over. W6CL has been printing the local QCWA and UOTC bulletins for sometime now and deserves a big hand for his untiring work. W6RIG sends OBS regularly now that his transmitter is going good and also sends them Sun. on the QCWA cw net. I was invited to give short talk to the L.A. County Sheriff's group and we discussed the possibility of joint cooperation between the RACES and AREC groups. WB6ZVC has a new linear on the air. K6QPH was heard on 20 meters. WB6JIN is building a new linear and is about ready to put it on the air. W6IVC modified the final to get more grid drive. WA6DHM spent vacation in N.J. and checked into EASTCARS. He also was appointed secy. of Bellflower Radio Club. W6UTE heard on 20 meters. W6OAW took in the Reno Hamfest. W6JIT is vacationing in northern Calif. K6UYK is an ORS appointee. W6OQZ has been acting as substitute NCS on the Golden Bear Net. W6IYC modified the rig to improve grid drive. Your SCM was invited to visit the county emergency facilities and it was a very interesting visit and meeting. There have been considerable pros and cons about the earthquake report as published in QST. Please understand that I was not the SCM at that time and was too busy with distress traffic to make any comments. I know that if we learned something from it fine, if not let's just forget about it and go forward. WB6WFI and WA6BLK spent a week at the desert trying out 2 meters, but no luck. WB6KKG is very active on the uhf bands. Asst. SCM W6LPI and WA6KUR have been handling phone patches with Okinawa 3 to 4 nights a week. Please contact Archie or the San Fernando Radio Club regarding AREC. The San Fernando Radio Club now has a 450 MHz repeater in the Mill, input frequency 444.5 output 445.5 MHz located near VA hospital in Sepulveda. WB6YIZ received his Public Service award. WA6AAW putting up a new tower. W6QD, W6AEE and W6URS received the 50-year QCWA award at the hamfest. In closing I would like to remind the area

members to read Section 324 of the Comm. Act. Traffic: (Aug.) W6INH 299, W6LYY 198, WB6ZVC 194, WA6DHM 58, W6USY 56, W6QAF 48, WA6AAW 45, K6UYK 45, W6OEO 33, W6OQZ 32, WA6ZKI 27, W6FIT 26, WB6ZTI 24, W6HUI 18, K6KA 18, W6IVC 14, WB6KKG 11, K6QPH 5, WB6WFI 4, W6BHG 1, (July) W6IVC 55.

ORANGE - SCM, Jerry L. Verdult, W6MNY - Asst. SCM: Richard W. Bitherk, K6CID. SEC: WB6COR, RMs: WB6AKR, W6BNX, WA6AAG and WB6COP are new members of the Orange County 40-meter ARFC Net. OO W6VOZ finally got his four-element tribander in the air. WN6DBX is studying for his Advanced Class in addition to some 15-meter DXing. WB6A entered a home brew 20-meter ground plane. W6QHD was again 100% QNT on SCN and SCNT in Aug. OVS WB6AM is still copying bulletins direct from W1AW and transmitting them on Mon., Wed., Fri., 7080 kHz at 2030, 3580 kHz at 2100. The SCM and Asst. SCM spoke at a special meeting of the Inyo County AREC meeting in Bishop called by EC WA6YWS. They are organizing an Inyo Co. ARFC Net and a new Eastern Sierra Area Radio Club to be an ARRL affiliate. W6TDW was appointed Asst. IC for the Bishop area. OVS WB6ASR and WB6RAL won the July So. Cal. VHF Club transmitter hunt. The So. Cal. VHF Club Information Net meets Mon. at 2000 on 50.220 MHz am. The Orange County 2-meter am T-Hunters group meet at the top of Panorama Heights every other Sat. at 1945. Riverside County ARC sponsors a repeater. WB6YEK/6, atop Box Springs Mountain, input am 145.480 MHz, fm 146.160 MHz, output 146.880. San Bernardino County RACES, W6CV, has two new Mon. night nets: 28.575 kHz at 1915, and 1812.5 kHz at 2000. The So. Cal. ATV Club has 23 active members using the following club frequencies: 2-meter primary, 146.90 MHz NBFM within 5 kHz, secondary 146.05 MHz am; 450 video 435.00 MHz, audio 439,500 MHz 1m within 15 kHz. Congrats to chmn. W6MUR, vice-chmn. W6QIU, WA6VJV, and the entire convention committee for an outstanding SW Division Convention at Disneyland Hotel. PSHR: W6MNY 50, WB6AKR 31, WA6IVA 27, WB6ASR (July) 3, W6CPB 1. Traffic: (Aug.) W6MNY 109, WB6AKR 89, W6QHD 73, WA6YWS 14, W6WRJ 5, K6GGS 4, WB6EAU 3, WN6DBX 2. (July) WB6ZOK 7.

SAN DIEGO - SCM, Paul C. Thompson, W6SRS - Asst. SCM: Art Smith, W6INI. There are many opportunities available to all to

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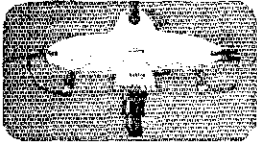
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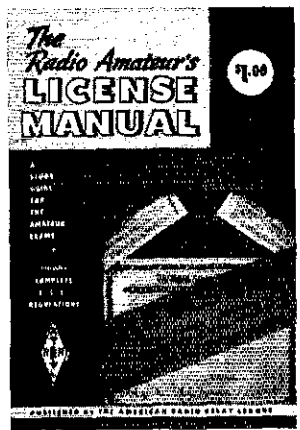
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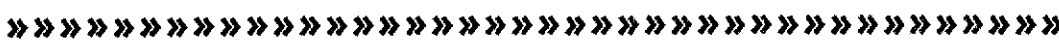
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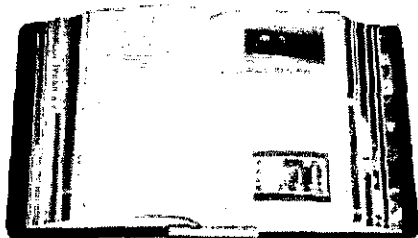
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participate in our section level traffic nets and become acquainted with message handling. Try the SD service net, 0800 Sun. 3725 kHz or the SCN training net at 1630 Sat. and Sun. 3600 kHz. Phone nets open for section traffic are the Golden Bear Net 1900 Daily 3975 kHz, Mission Trail Net 1900 Daily 3928 kHz and the Post Office Net 2000 Mon. through Fri. 3916 kHz. These nets will give you an opportunity to try traffic for fun, and more important, as a public service. Clubs: El Cajon held a QSO Party Mini Field Day at the QTH of WB6VKV, El Cajon, No. Shores and SDFM had programs of SSTV. IVARA now has a new certificate. Contact WB6KMG. Palomar had their annual picnic at Live Oak Park, SOBARS had a program on ssb operation. SD DX Club held their meeting at the QTH of W6BZF. Station activity: WA6COE is now transmitting bulletins on 3838 kHz. W6DFY is homebrewing a 2-meter fm rig. K6BTO is operating 220 and 1296. K6CXR has passed the Advanced Class exam. WB6AFT now is W6NST. New Novice is W6LZC. WA6MIW is still county hunting. WA6AMK is putting up 20-meter antennas. WB6ODR has started a new RTTY class. WB6GAV has received a Section Net certificate. PSHR: W6BGF. Traffic: W6VNO 448, W6BGF 274, K6HAV 207, WB6HMY 102, WA6AMK 79, W6DEY 28, WB6JQI 8, W6SKS 6.

SANTA BARBARA - SCM, D. Paul Gagnon, WA6DFI - SEC: W6JTA. RM: W6UJ. Congrats to new OPS WB6MKM. The MTN Net meets daily at 1900 on 3928 kHz. Many thanks to the Estero Radio Club of Morro Bay and especially to WB6PGK and W6JTA for nominating me for SCM. I hope I can effectively serve you, the members, in this capacity. A complete review of the appointments is underway. If you desire one let me know. SCN certificates go to W6JTA and WA6DEI. The SEC and myself want to schedule a meeting with each club in the section. Please advise me of your open dates so arrangements can be made. ECs are needed in several areas of the section, contact SEC W6JTA. EC WB6PGK is hunting generators to spread out in the Morro Bay area. A section-wide net is starting on 3935 kHz at 8 P.M. Wed. It is hoped this will turn into an AREC net. Lets all check in and get it rolling. We need several OBS stations for 80 and 2 meters. The Mike and Key Radio Club of Camarillo meets the 2nd Thurs. of the month. Your SCM would like to be put on the list for club bulletins. My address is 1914 Gauchio Way, Oxnard, Cal 93030. SCNT, the cw training net, meets on 3600 at 1630 on Sat. and Sun. A new cw check-in on SCN is WA6EUA. Traffic: (Aug.) WA6DEI 180. (July) WA6DFI 249. W6MQF 2.

WEST GULF DIVISION

NORTHERN TEXAS - SCM, L.L. Gene Harrison, W5LR - Asst. SCM; Gene Pool, W5NFO. PAM: W5BOO. RM: W5QZG. The Dallas ARC has established a contest committee with W5QZG as chmn. with WA5RAL, W5YKO, W5VOT and W5ZSL members. Endorsements: W5KHE as OO; K5ZVZ, W5IZU, W5NFO as OPSs; W5AQY and W5LGY as ECs; W5NFO as asst. SCM. New members of NTEX are K5GMY, W5CTM, K5DOM, W5SBMZ, W5KZA and W5BCB/S. W5EBC passed his General Class exam. Incidentally, many NTEX hams active in OBS work report non-receipt of OBS card bulletins. Send in your certificates for endorsement, also fill out green card you received from HQ, and return to Newington. W5NFO made the Levelland swanfest for SCM, attendance 200 plus and NoWesTex EN W5OVU NC, W5CGY alt. NC. More FD results: Irving ARC, 1136 points, voted to join DARC in school work. K5MMS's mother passed away. W5ASM's QTH is now Box 2665 Abilene. W5SBAM's EC endorsement approved. K5GM1 operates the Tylron Net 3940 kHz Thurs.; stations heard include W5LGY, K5BNO, K5NGG, K5IHF, W5LUZ, W5TYH, K5TZU, K5UKK, W5QYP, K5TXQ and K5MPI. The Arlington ARC held "Fly-in" with 100 plus present including Mayor Vandergriff and SCM. The Inaugural Ball is scheduled for Dec. 4, Hwy 183/157 Western Hills, Euless, Tex. The Kilocycle ARC Ft. Worth held an ice-cream social with excellent attendance. FD results now 3,062 plus 15 new members. SCM sent a letter to 34 ARRL affiliated clubs suggesting club appoint representative to work with SCM on special operational problems. NTEX, DX Assn. working at full speed. W5SZ says his QSL cards are late. Panhandle ARC reports a dinner meeting Sept. 1. The hamfest in Amarillo is planned for spring. Code and theory classes are now in session. Navy MARS has repeater in Amarillo 150.090 in and 148.410 out, and in case you didn't know it, Amarillo has city ordinances applicable to ham radio. Traffic: W5VJW 131, W5QU 129, W5IAR 18, W5NFO 14, W5LR 9, W5KHE 8, W5N5BK 4, W5SBPG 2, W5EVS 2, W5IZU 2, W5EBC 1.

OKLAHOMA - SCM, Cecil C. Cash, W5PML - Asst. SCM: W.L. Smoky Stover, K5OOV. SEC: W5FSN. RM: W5AYRO. PAM: W5MFX, W5AWHV, K5DLE and W5ZRU. QSL Bureau: W5OMJ. This report was written by K5OOV. SCM W5PML suffered a heart

attack Sept. 9 while on a vacation trip through the Ozarks. He is in Baxter County General Hospital, room 205, Mountain Home, Ark. 72653. At last report he is improving. Your Asst. SCM and XYL adopted two girls and one boy this summer. This may explain my absence on the nets. Hi. K5LAD and XYL added a male type harmonic to the family this summer also. Nets:

| Net | kHz | Time(Z)/Days | Sess. | QNT | QTC |
|------|------|--------------|-------|-----|-----|
| OPEN | 3915 | 1400 ZU | | | |
| STN | 3850 | 2230 M-S | 26 | 332 | 12 |
| OWXN | 3913 | 2245 M-S | 24 | 347 | 11 |

Wx reports 230. Traffic: K5TEY 353, WB5CFZ 100, W5FKL 14, WB5CW 13, WA5QQP 9, W5MFX 8, WA5OUV 5.

SOUTHERN TEXAS - SCM, E. Lee Utrey, K5HZR - SFC: K5HXR, PAMS: W5FUA, W5KLV; RM: W5EZY. Congratulations to new OO K5HHA, OPSs W5IRO, W5UKN and ORNs W5BWBV and WB2HEY/5. El Paso ARC members helped with communications in a simulated medical alert. W5BVN and son K17HAW back after tour in Alaska. Both are now Advanced Class licensees. Congrats. EC W5KR reports new Valley Novice Slow Speed Net on 3730 kHz at 0130Z Thurs. Visitors are welcome and WNSCUR is NCS. Orange ARC new club officers: K5UAH, pres.; WA5VDW, vice-pres.; W5AJG, secy.-treas. The Golden Triangle Repeater Assn., W5AYUS reports it now has thirty members. Congratulations to W5AC on BPL with 418 originations. ORS WB2HEY/5 chief op. reports W5AC first licensed in 1913. OBS W5QMH now transmits bulletins 5 times weekly on the Tex. P.O. Net. 68 attended the TTN picnic at Lake Whitney on Aug. 14 and 15. Thanks to WA5MKV and XYL for their efforts. Section Net certificates were issued to K5AHG, W5AMN, W5EOG, K5HUA, W5IRO, W5TPY, W5UKN, K5UZU and W5VUX. Regretfully we report the passing of our good friends and neighbors K5MDS and K5SPQ. W5LI, Houston, also became a Silent Key. 85 members and visitors enjoyed W1ICP's presentation at SARCA Aug. 30. Congratulations to W5RBB and K5ROZ on the PSHR. Reports were received from W5BTO, W5LPO and W5OVH.

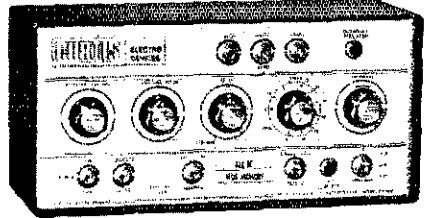
| Net | kHz | Sess. | QNT | QTC |
|----------|------|-------|------|-----|
| TEX* | 3770 | 62 | 420 | 223 |
| TIN* | 3961 | 31 | 1559 | 153 |
| 7290 Tfc | 7290 | 44 | 1805 | 453 |

*NTS, Traffic: (Aug.) W5AC 439, W5MXY 185, W5EZY 91, W5ABQ 70, K5HZR 66, WA5FZ 52, W5VW 46, W5RBB 35, W5QMH 27, K5RVF 21, W5BGE 20, W5TFW 20, W5SSE 13, WA5AUZ 10, W5QO 8, K5HUA 6, W5UKN 4, W5IRO 2, K5HGB 1. (July) WA5AUZ 67.

CANADIAN DIVISION

ALBERTA - SCM, Don Sutherland, VE6FK - Asst. SCM: Mrs. Domez Booth, VE6YL, SEC: VE6XC, PAM: VE6ADS, ECs: VE6SS, VE6AZU, ORSS: VE6LZ, VE6WG, OPSs: VE6YL, VE6ASL, VE6HN, OOs: VE6HM, VE6MJ, VE6TY, OVS: VE6MX. The Labor Day week end once again saw the "Bring 'em Back Alive" provincial campaign in operation. VE6AW handled provincial control very effectively on 75 meters. OVS VE6MX reports a possible upswing in ATV in Alberta. VE6LZ, VE6AWW and VE6ANE are active on RTTY at 0200Z daily on 3625 kHz. Sorry to report that VE6AMO is leaving Alberta for Vancouver Island. VE6AWW has modified an HW-12 for the cw bands. VE6AKV is OSL Mgr. for 3B9DX, S2ANE and 5XSNE. The new ARRL Net Directory is available on request. Send a No. 10 SASE to Hq. with your request. Remember .16 cents U.S. postage on the SASE. VE6AWL new editor of VE6 is looking for copy. Please submit material early in the month. VE6MJ has received WA-VK-CA award and WAZ phone. His country total is now 190. We could certainly use more VE6 participation in the CD Parties, both phone and cw. VE6YL has graciously accepted the Asst. SCM position. Traffic: VE6FK 34, VE6MJ 4, VE6SS 2, VE6YW 2.

BRITISH COLUMBIA - SCM, H.F. Savage, VF7FB - The British Columbia FM Communication Assn., held a very successful clinic day. Twenty-four 2-meter mobiles were completely checked for frequency, power, receiver input and antenna output. During the summer a number went for their class "A." VE7AZO, VE7BOP were two. The Fort St. John area is forming a radio club. British Columbia CD has a new communication officer. Mike Considine. He holds no amateur call but is very interested in the amateur. VE7QT will be our liaison between CD and ARPSC. VE3FV now is VE7ARB. If the VE7s read this, you wanted representation; I volunteered. Nothing has been heard since! Traffic: (Aug.) VE7H 70, VF7BLO 31, VE7TT 6, (July) VE7AC 41, VE7BLO 33, VE7SF 5, VE7TT 3.



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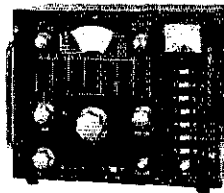
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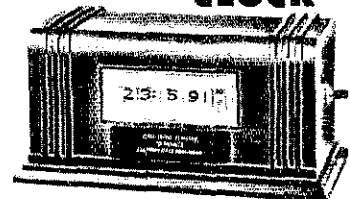
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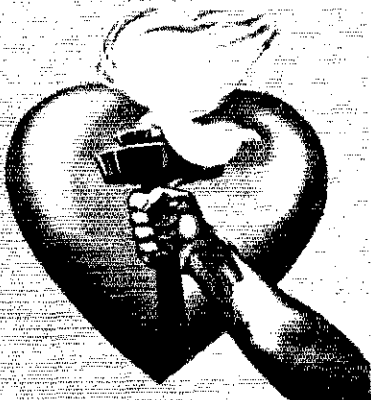
now is VE2DU, VE2DFE mobile VE2RM on 444,449. MHz repeater. PSHR: VE2APT 29. Traffic: VE2DR 37, VE2EC 31, VE2DLG 30, VE2ALE 24, VE2APT 18, VE2AJD 3.

SASKATCHEWAN - SCM, Barry Ogden, VESBO - SEC: VESCU. The disastrous Bertha Army Worm invasion of VES-Land provided a realistic situation for all AREC and VESs to put their SET training into practice. The Sask. Emergency Measures Organization called for auxiliary communications and VESs responded instantly. AREC was alerted in all areas by messages transmitted on all Radio and TV stations in the major centers. Volunteers forego their holidays to participate. The major service was locating many spraying equipped aircraft. Link to Regina government LMO Hq. from Houston, Tex. re "Lanate" operations was provided. The Lake Net 3780 at 1830Z is closed until next June 15. Thanks to VESXG for an FB control. Traffic: VESDN 67, VESCI 46, VESXG 30, VESSE 23, VESBO 22, VESCB 4, VESHO 4, VESLN 2. 

*To Get Your Bearings....
See Page 159*

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QCWA Quarter Century Wireless Association is an international non-profit organization founded 1947. Any Amateur Radio Operator licensed 25 or more years is eligible for membership. Members receive a membership call book and quarterly news. Write for information. Q.C.W.A. Inc., Box 394, Mamaroneck, NY 10543.

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FREE sample copy Long Island DX Assn bulletin. Latest DX news. Business size sase to K2AFY Box 74 Massapequa LI NY 11762.

AN INVITATION NYC area hams and SWLs are invited to attend NY Radio Club meetings - 2nd Monday of every month, Williams Club, 24 E. 39th St., near Madison Ave., at 8 PM - New members wanted.

SAROC January 6-9, 1972. Advance registration \$9 per person includes tickets for admission to meetings, Ham Radio Magazine, Swan Electronics, Fly-Gain/Galaxy Electronics and SAROC parties, buffet lunch, breakfast. Advance registration with mid-night show two drinks, \$14.50. Advance registration with Flamingo dinner show, \$17.50. Ladies who register receive transportation for shopping tour, luncheon, crazy hat contest program. Frontier Airlines SAROC group flight package planned from Chicago, St. Louis, Omaha, Denver, send for details. Advance registration to SAROC Southern Nevada ARC, Inc., Box 73, Boulder City, NV 89005 before 31st December. Accommodations request to Flamingo Hotel, Las Vegas, NV, 89114, before 15th December.

RECEIVING & Industrial Tubes, Transistors, all brands - Biggest discounts. Technicians, Hobbyists, Experimenters. Request Free Giant Catalog and save! Zelytron 469 Jericho Turnpike, Mineola, NY 11501

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QSLs 300 for \$4.50, samples 10c. WSKRR, George Vesely, Rte. #1, 100 Wilson Rd., Ingleside, Ill. 60041.

RUBBER stamps \$1.50 includes tax and postage. Clint's Radio, W2UD0, 32 Cumberland Ave., Verona, NJ 07044.

QSLs "Brownie" W3CJ1, 3111 Lehigh, Allentown PA 18103. Samples 10c. Catalog 25c.

DELUXE QSLs, Petty, W2HAZ, PO Box 5237, Trenton NJ 08638. Samples 10c.

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QSLs - Thin dome brings samples. Alkanprint, Box 3494, Papago Station, Scottsdale, AZ 85257

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Excellent QSLs, reasonable, Samples 15c, W9CL Press, R.R. 1 Box 811, Carmel, IN 46032

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AMATEUR museum* buying old radios, books, magazines, catalogs, parts. Selling QSTs and CQs. Erv Rasmussen 164 Lowell, Redwood City CA 94062.

WANTED: An opportunity to quote your ham needs. 32 years a ham gear dealer. Collins, Signal/One, Drake, Galaxy, Tempo, Kenwood, Henry Z-F, and all others. Add \$25,000 inventory used gear. Request list. Chuck, W8ICG, Electronic Distributors, Inc. 1960 Peck St. Muskegon MI 49441. Tel: 616-726-3198

HAM ticket - Amateur radio license course for Novice, General, Advanced, Extra Class. Write for information. Clayton Radio Co. 220 Mira Mar Av. Long Beach CA 90803.

WANTED - For personal collection, The Radio Amateur's License Manual, Edition 12, W1CUT, 18 Mohawk Dr., Unionville CT 06088

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CLUBS: Send membership list for QSLs. World QSL Bureau, 5200 Panama Ave., Richmond, CA 94804

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DUMMY loads, 1 kw, \$9.95; phone patch, \$8.95. Wired, \$4.00. Ham-Kits, Box 175, Cranford, NJ 07016

PRIVATE collector wants old wireless gear, buy, trade, Dick Sepic, 1945 E. Orangegrove Blvd., Pasadena, CA 91104

WEST Coast hams buy their gear from Amrad Supply, Inc. Send for flyer. 1025 Harrison St., Oakland CA 94607

GREENE - center insulator, with or without Balun - a tough number to beat - free list. Greene Insulator, 3 Pilgrim Dr., Bedford, NH 03102

WANT wireless (early) magazines and equipment for W4AA historical library, Wayne Nelson, Concord, NC 28025

SIX meter Virginia kilowatt final, pushpull 4CX1000s; \$495. Send \$2 for photos. W4UCH

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EDITING a club paper? Need public relations help? You should belong to Amateur Radio News Service. For information contact Rose Ellen Bliss, W4ZFGS, Secretary, 17 Craig Pl., Pennsville, NJ 08070

SRK Delta Tri-bander, proven DX antenna, 2 element, 10-15-20 delta loop, 30 lbs. brochure \$95. Order Island Electronics, 4103 Ave. S. Galveston, TX 77550

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TELETYPE pictures for sale. Vol. 1, \$1, Vol. 2, \$2, Vol. 3, \$1.50. All for \$4. Perforated tapes available. 200 different pictures. J. Greve, W9DGV-B, 2210-30th St., Rock Island, IL 61201

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COLLINS. Complete station, 75S-1, 32S-1, 30L-1, 312B, antenna, odds and ends, from the estate of K4IS, \$1000. See K4DAY.

SB-301 with am and cw filters; SB-401 with crystal pack for sale together or separately. Will consider selling SB-101 with SB-640 and HP-23 and cw filter. Any mature offer considered. Frank Williams, Box 19252, Washington, DC 20036

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TELEVISION equipment for sale; G. E. transistorized camera 14T514B11, 40mm f1.8 Wollensak lens, 17" monitor 14T126A2. All excellent condition, with manuals. Write for info or quote. K. Linkhart, K7YJM, 719 12th St., Clarkston, WA 99403

WANTED: Collins 30S1 linear. Also good used bug. Hal Cushing, W6LXZ, 5224 Bobbie Ave., San Jose, CA 95130

GROUNDED grid filament chokes, 30 amps, \$5. Plate chokes 800 mA. \$3; 5-30 Mes, PFUSA48. William Deane, 8431 Sovereign Rd., San Diego, CA 92123

MUST sell, no reasonable offer refused; Hammarlund HQ-170C; Hallicrafters HA-5 heterodyne VFO; Hallicrafters HA-8 modulation monitor; Ameco TX-88 90 watt cw and am 80-8 meter transmitter; Ameco PCL nuvistor preamp; Lafayette bug; Mosley T4-32 Jr. beam. Lee Brown, 902 Niagara St., Elmont, NY 11003

DRAKE TR-4, RV-4, AC-4, perfect condition, \$450. 212-631-3711, WB2PFY, 215-33 23rd, Bayside, NY 11360

FOR SALE: amateur and engineering texts. S.a.s.o. for list. K1APA, 3 Sunny Acres, Brattleboro, VT 05301

COLLINS KWM-2, 30L-1, 312B-4, 180S-1 antenna tuner, MP-1, 302C wattmeter, MM-1, 816F-2 Hy-Gain reel PD-1 and 64B-4, Mosley portable T-31A. Damaged 88 Ft. Triax tower HS-553 4. Heavy coax switches. Best offer \$1999-9214, W1USP, Kamborian, Wheeler Rd., Lincoln, MA 01773

HALLICRAFTERS SK-111, excellent condition. Tom Winter, 76 Terrace Rd., Franklin, NH 03235

RTTY Westrex Diversity converter unused commercially, \$400. W2ATQ, Box 453, Shelter Island, NY 11965

WANTED: SB-10 single sideband adaptor for Apache transmitter with manuals. Write W2GKB, QTRS 511 E Tillman, West Point, NY 10996

WANTED: HQ 110 receiver; sale SB-300 - 4 2 meter converter, \$12, C577 preamplifier microphone \$12, electrovoxe microphone \$19 \$16, Signal generator \$10. Heath AX-18 \$65, HW 32 \$70, Hustler 20 meter resonator new \$5, GR-64 receiver \$25, W2WFR, 210 Utica St., Tonawanda, NY 14150. Tel: 716-692-5451

COLLEGE expenses: Sell SX-101A NC-300, both mint DX-100 no chip, evening wire to roof mount MP-33 tri-bander beam, coax cable, 40' coax, 10' tripod, balun, the works \$145. W4VYR, Room 311, Rumsey Hall, West Quad, Ann Arbor, MI 48104

WANTED: T4XB or TR-4 with accessories. Tell me your price. Selling: Swan 250 and maybe a 2-C. Please make offer. All trades invited. W8CZS, 9200 Cregier Ave., Chicago, IL 60617

WANTED: socket and air chimney for PL5D22, K6HMM

RTTY: wanted model 19 ask in good working order. Send particulars to W4LZLV, Paul Goldman, 394 Rutland Rd., Brooklyn, NY 11223

NOVICES: Need help for General ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information. Amateur License, Box 6016, Norfolk, VA 23508

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FREE Electronics Magazines, list #1. Electronic Publications DEW25, Wainwright, AK 99752

WANTED: +195154 gearshift for model 2R ASB. Also M28 LPR-9 Reperf. Larry Kleiber, K9KLA/W9CPD, Belvidere, IL 61008

TRADE: Drake L-2B and TR-4 for Harley Davidson Electric Glider. K2ABQ (516) 781-3995, 3469 Major Dr., Wantach, NY 11793

HW-16 for sale. Ex conds. Will throw in 2 baluns, 19 xtals, spr, and HD-10 kever needing repair. All for \$110. Also AR-22R rotor, never used \$25. Norman Chikskales, 300 Dickinson St., Bamberg, SC 29003

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NEED help with infrared communication system. Amateur or commercial help. Fred Tucker, 6122 E. Pierson Rd., Flint MI 48306

TRADE, sell digital volt ohm meter Fairchild 7050 solid state, compact. DuPont 403 triggered by scope, 700 for SSB equipment. Want Pentax type SLR lens. Triband beam. Pohorence, WB4RSK, PO Box 5 (Olympia Station) Miami, FL 33165

6M STATION - Tecraft TR20 transmitter, ARR-7 receiver, manuals, converter, power supply, \$100 or trade. 2M fm Motorola P33AM, 4 channel trans accessories Littleton, 2916 Radcliffe Ave., Iowa City, IA 52240

HW-16, Heath aligned, \$89, ppd U.S. WB4RYZ, 6205 Tally Ho Ln., Alexandria, VA 22307 (703) 768-6945

SB-220 \$325; SB-500 \$125; HW-17A with FM \$90; GR-75 \$100; IM-48 \$60; FOB. All factory aligned, mint condition. J. Knepler, Route 1, Auburn, IL 62616

LAFAYETTE HA-800 receiver with speaker, mint condition, \$85 plus shipping. Henry Gac, 1715 Halden, Detroit, MI 48208

HQ-315 mint, best offer. Jim, WB9DMC, 621 Raymond St., Plainfield, IN 46168

COLLINS 78S3B with 200/600/2100/6000 Hz filters, 32S3, 516F2, 30L-1, 302C-3, SM-2, CC-2, SB-620 Panadapter, \$1638 and you pay shipping. New condition, owned by Collins engineer, factory maintained, all current modifications. If you pick up will throw in TA-33JR and AVQ20 antennas free. W5OG, W. Fells, 7929 Willow Green Court, Dallas, TX 75230

HEATH Co. One SB-303 receiver, with 400 Hz cw crystal filter and you pay shipping. New condition, owned by Collins. SM-102 wattmeter-bridge, one SB-600 80hm speaker. Just built, factory tested and aligned. Best reasonable offer. Dan Hayes, 3412 W. 104th St., Crown Point, IN 46307

6 and 2 meter HC-6/U xtals \$1, s.a.s.o. for list. Mac Robbins, W4KRD, West Newton, PA 15089

CRYPTOGRAPHIC items wanted for amateur museum. All types of cipher equipment and literature needed. Louis Krub, 17 Alfred Rd., Merrick, NY 11566

FOR SALE: Central Electronics 10R sbb exciter \$45. Gus Wilson, WINPG, ARL, 225 Main St., Newington, CT 06111

HEATHKIT DX-20, Ameco monitor, key, x-tals. Best offers. K1MAN

HEATH TX-1, good condition; Hammarlund HQ-170AC, excellent condition. Both for \$220. Pick-up only. Hal Dunlap, WA3GH, 1315 Quarry Ln., Lancaster, PA 17603

TEN-TEC PM-1 transceiver with 80/40/15 meters and antenna tuner. Nearly new - works F.B. \$55. Swan, 4839 Beaune Rd., Ludington, MI 49431

BARGAINS: QST from 1935, Clegg 99er, cmtr transmitting and receiving converters, rf wattmeter, Omega noise bridge, grid dipper, bug, W2CT

COMPLETE station: NC270, DX60, HG10B, PCL-P, TR switch, swr, phone, clock, bug, transmatch. All for \$180 cash. Mike Moran, WB2FUV, 514-255-5497, Gardiner, NY 12525

HEATH RX-1 Mohawk receiver, excellent condition, \$100. Sy Balsebaum, 637 E. 80th St., Brooklyn, NY 11236

HEATH HW-32A transceiver. Wired by electronics engineer. Absolutely perfect, \$85. 20 meter, gamma-matched, 2-element beam \$12. WB6DVL, 745 Corrida, Covina, CA 91724. (213) 339-0131

JOHNSON Invader 200/2000 for sale, \$225. Hammarlund HQ 170C for sale, \$125. Includes manuals and original cartons. WBQVI, 1013 Gargas Circle, Fort San Houston, TX 78234

CONTACT us for new or reconditioned Collins, Kenwood, Tempo-One, Drake, Galaxy, Hy-Gain, Mosley, Henry linear, towers, antennas, rotators, other equipment. We try to meet any deal and to give you the best service, best price, best terms, top trade-in. Write for price lists. Try us. Henry Radio, Butler, MO 64730

TRI-EX 1M-470 70' crank-up tilt over complete, New \$1600. First offer over \$1000. You pay freight. K2DJD, 12087 Buckwheat Rd., Alden, NY 14004

MOTOROLA P-338AC, 2-channel model, Dave for 2R/8R and 46/46; good NiCad pack and Motorola charger, \$110. Progress Line 450 MHz with two spare 6907 and crystals for 446.5T 449.5R, cables, head and Antenna Specialist 3dB antenna \$85. Progress Line MTS rig converted for 2 meters per June 70 QST (including preamp) crystals for 34/92, 28/88, and 28/75, with cables and head, \$135. Unconverted Progress Line 1500-Hz WTS 2-channel rig, with cables and head, \$109. GE Prog slimline T supply, \$25. Motorola 80D with simplex crystals for 29.6 MHz converted to base station with built-in ac power supply and controls, \$40. D. Blakeslee, W1KWK, c/o ARRL, 225 Main St., Newington, CT 06111

WANTED: Hammarlund SP600 vcr also Panadator for 456KCLF. W. Pilon, J. Hermans CL, Worcester, MA 01605

NATIONAL HRO 500 for sale new condition less than fifty hours, \$1195. Dennis Dressler, Rt 7, Topeka, KS, phone 913-478-4751

COLLINS 32S-1 \$380, 516F2 ac supply \$60, 30L-1 \$385, Drake 2A with 2 AQ-Q multipliers/speaker \$175, Dave Arnold, K4JQU, 501 Harton Circle, Virginia Beach, VA 23452. Tel: (703) 340-5791

LAMPKIN 105-B frequency meter with 111 crystal calibrator. 205A fm modulation meter, Model 78B signal generator. Best offers. Glenn Baxter, Belgrade Lakes, ME

HEATH HW-16, factory aligned, plus crystals, \$85. Heath IM-18 VTM, \$25. WNGKYJ, 4827 Astoria St., Torrance, CA 90503

MECHANICAL filters: 455 kHz, 2.1 kHz \$18.95, 300 Hz \$22.95, J. A. Fredricks, 314 South 13th Ave., Yakima, WA 98902

CENTRAL Electronics 200-V rarely used, manual. Cash and carry \$375. W4ZBM, Del Badigo, 20 Centre Ave., Secaucus, NJ 07094. 201-867-8784

APACHE good condition - Needs 6146 - \$60, Knight R-100 receiver - \$25, Jim Donnelly, 2155 Maple Dr., Jackson, MI 49203

HY-GAIN afterburner + linear with receiving amplifier \$100. WN2CEL, 516-ORR-1385, New York 11572

SALE: New SB401 and SB301 both \$600 or will split. College expenses. WB4NMY, 4803 Russell St., Richmond, VA 23222

WANTED: to buy or borrow, copy of Technical Materiel Corporation "Single Sideband Handbook." Thomas Ford, 55 Union St., Boston, MA 02108

SELL: National NCX-3 and NCX-A, \$195. Hammarlund HQ128X and matching speaker \$100. All excellent, includes manuals. F.O.B. W2LBR, 7 Brookside Dr., Fort Washington, NY 11050

BEST Offer: HRO-500, Collins 32S-3, Collins 30S-1, Johnson Matchbox related equipment. C. J. Mozzuchi, Box 1315, Hartford, CT 06101. Call 1-203-633-7121

HUSTLER 4BTV 4-band vert. Pickup only, \$25. WB2IWH

WANTED: NC-300, NCX-3, and SB-10. Sell DX-100B, \$76. K8GNZ, 5049 Northlawn Dr., Murrysville, PA 15668

HRO-60, "B" slicer, A, B, C, D, ac coils, manuals, excellent condition, \$200. Jon Ahlquist, 508 Bender, UNI, Cedar Falls, IA 50613

SBE-34 with mike, manual, carton, excellent; unused mobile mount, Hustler, 40/80 coils, \$275. W2KOY, 850 Richmond Rd., East Meadow, NY 11554

HP-13 w/power transistor spares, \$50. GE EP14B solid-state dc supply for Progress line; all plugs; manual, \$35. Sound-power phones, \$10. B. Meyer, 6505 Yellowstone, Flushing, LI, NY 11375

75S-3 excellent, speaker, manual, set spare tubes, \$400, cash, carry. Fataki, 34-24 76th St., Jackson Heights, NY 11372. 212-439-3195

HOOSIER Electronics your ham headquarters in the heart of the Midwest where only the finest amateur equipment is sold. Authorized dealers for Drake, Hy-Gain, Regency, Ten-Tec, Galaxy, and Shure. All equipment new and fully guaranteed. Write today for our low quote and try our personal friendly Hoosier service. Hoosier Electronics, Dept. C. R. R. 25, Box 403, Terre Haute, IN 47802

FOR SALE: Johnson Viking 6N2 and VFO with fm modulator. Also has 2-807 a-m modulator and power supplies, Viking II with VFO. Both transmitters have Dow antenna relays and new spare tubes. All for \$135. Shipping prepaid to \$15. Chas. W. Carter, WLLLD, Kenwood Ln., Charlottesville, VA 22901

FOR SALE: SB-34 vcr used only 15 hrs. \$289, +250 6M vcr used only 4 hrs. \$249. WA4PEL, 61 Court Sq., Harrisonburg, VA 22801. 434-6767

SELL: Two Lafayette HA-750 6 meter transceivers; one 1 year old, \$75; one 2 months old, \$95. J. A. Edwards, 7517 Sunview Dr., Columbia, SC 29209

SELL: Eico key model 717, Brown Bros. paddle, Eico oscilloscope model 460, All excellent. Best offers. WIBB3, 57 Byram Rd., Byram, CT 10673

HAMMARLUND HQ-110, \$115. In good condition. No shipping. VJ Panzer, WA2JW, 1077 Barbara Ct., North Bellmore, NY 11710. 516-781-3234

SELL or trade: 304AR cathode ray oscilloscope; R110CR receiver; BC348Q receiver; Mod 13 teletype; TS 174BU freq meter; TS175 freq meter. Best offer or trade for 6-2m gear, Koneczak, Box 737, Chiltoncothe, PA 17925

SWAN 250 with mic. Perfect. Used under five hours. With manual. Rawls, POB 26500, New Orleans 70126. Evenings (504) 643-2231. \$300 f.o.b.

SELL: Collins KWS-1 \$395, 51-J-4 in cabinet plus matching speaker \$550; Hammarlund SP600X in cabinet with speaker \$150; Raycraft DX200L 2 kW linear brand new \$375; Ameco TX-62 \$50; Astatic D-104 with stand \$10; Teletype model 15 with table \$75; Millen 90711 VFO \$200; 90801 75 watt exciter/transmitter with p.s. \$50. Each item excellent working condition and has manual. Contact: Pat Miller, W2YEE, 132 Gertrude St., Clark, NJ 07066. Tel: 201-382-7496

SELL HT32A, \$195, HT41, \$140, HQ 145 with HC10 and matching speaker \$185. Frank Chionchio, 12 Beechwood Pl., Massapequa 11762 LI, NY 516 17-1539

SALE Heathkit: Complete ham radio operating station, \$1500 value. 2 years new. SB401 transmitter SB301 receiver. Heathkit speaker, Swr meter, Phone patch, Electronic keyer, EV 674 microphone. TA33 beam antennae and electronic CDR rotor control. Extras. Sell complete set up only, \$760. Tel: 914-967-3207

COLLEGE expenses, must sell: SBE SB-34, Guaranteed working, shipped U.P.S. \$250. Michael Schwarzchild, WN2NBV, Bennington College, Bennington, VT 05201

WANTED: linear amp for Swan 500C. Mint condition only. Subject to int. inspection, WA2QDR, 190 Church St., New Rochelle, NY 10805

SASE for list reasonably priced used electronic parts, receiver, ham gear, one owner. W2RUK, 7 Charles, Auburn, NY 13021

SELL: Gonset 903A 2 mtr linear amp, mint cond, \$170. Central Elect MM-2 RF analyzer, good cond, \$30. K2AKO, Edna Dr., Hyde Park, NY 12538

WANTED: Hamcrafters HA-5 VFO in good condition, unmodified, please give full description in first letter. D. Whitener, K4BWU, 6601 Ridge Rd., Huntsville, AL 35806

FOR SALE: 32S-1 Collins 10796, 75S-1 Collins 2227, 516F-2 Collins power supply, Collins Keving relay, FD-15 Heath phone patch, T-70F Omega noise bridge, CBS 201 linear amplifier, low pass filter, head phones, mike, code key. All for \$1050. J. M. Guyton, 227 E. Main St., Uniontown, PA 1540

DRAKE TR-4 with AC-3, \$400, Drake MN-4, \$60, WA4VEE/5, 2705 San Jose, Apt. 64, Laredo, TX 78040

PROFESSIONAL service for your quality ham gear. For information send card to Dave WJAAI South Shore Radio Phone, Municipal Airport, Marshfield, MA 02050

FOR SALE: 30S-1, new spare 4CX-1000-A, \$950, 75S-1, 32S-1, 516F-2, 312B-4, \$800, HA-460, mike, \$75, TBS-50-A, ACPS, \$35, 66'er, \$125, 32V-2, \$100, Wanted: KWM-1 (above \$300), 616B-1, KW-1A, 516F-2, 312B-5, James W. Craig, 29 Sherburne Ave., Portsmouth, NH 03801

HT37 for sale. Perfect condition, \$150. K2ANT, 1711 Exton Ave., Trenton, NJ 609-888-2647

YOUR call letters on attractive 4-D magnetic sign for your car. 3" x 10 1/2". Only \$4. Sanco Associates, Box 5, Westfield, NJ 07090

SELL: HQ170 \$140; Apache and SB10 \$210; Heath Phone patch \$15; Johnson Matchbox \$18; Eico 232 VTFM \$25; Eico 460 scope \$85; 10, 15, 20 meter Hustler receivers, complete \$15. All items excellent. Matt Eggert, WA2TVL, RDI, Lafayette, NJ 07848

FOR SALE: FDPM-2 10w 2m fm transistorized 6 channel transceiver with mobile mount and ac pwr supply \$185. Mint NCL 2000 linear \$325. W7YHS, 319 N 26th St., Billings, MT 59101

SB-102, HP-23A, SBA-301-2, 3375, DX-60B \$65. Rhon free-standing 4R tower \$75. Knight TR-106 \$55. Ship collect. Mike Lundy, 802 Highland Park, West Point, MS 39773

MULTILINGUAL amateur wants to contact DXers in south-western U.S. Pat. Box 2128, Culter City, CA 90230

2 MTR. fm - Galaxy FM-210, AC-210 ac/dc supply, mobile mount, 8 xmit & 4 rev xtals, all factory supplied modifications, manuals. \$150. W167B, Smith, 3 Woodlawn, Williamstown, MA 01267

SELL: SR6-34; SR2-1A; Hallcrafters SX-140 rev. WA4CRU, Box 5381B, Vanderbilt University, Nashville, TN 37203 (615) 322-4040

WANTED: R389, R390, R390A, R391, R220, Racial and 51st receivers. SWRC, Box 10048, Kansas City, MO 64111

SALE: QST - 1926-1966 incl., Handbook - 1943-1964 incl., CQ - 1958-1964 incl., 73 - Vol. 1, No. 1-1969 incl. All excellent condition. Best offer any one set or all. No splits. FOB or pickup. W2N6Z, 201-379-2164, 11 Great Hills Ter. Short Hills, NJ 07078

SELL: Johnson KW matchbox/swr, like new \$135; Swan 240 with HP13 & HP25 p/s \$225. Will ship in original factory cartons. Dana Wood, K6AHM, 11325 Isleta, Los Angeles 90049

WANTED: Drake T4X. Southern California area. WA6CMX, 1463 Silvius Ave., San Pedro, CA 90731

CASH for Collins, Drake, Swan gear in need of repair. State condition, price, in first letter. W9HF, 5006 Indiana, Ft. Wayne, IN 46807

WANTED: Hewlette - Packard 117A VLF comparator or other equipment capable of receiving and phase locking to WWVB 60 kHz or WWVL 20 kHz signal. Also want HP 608C, D, or E. Hewlette Packard 477B, 847B, H487B thermistor mounts needed. HP608B for sale, works excellent, recently calibrated by H.R. No dem. holes, or mod. 1 microvolt 5V calibrated output 10-420 MHz, \$375. Also HP625A and TS-621U for sale. Bill Smitherman, Rt 2, Box L, East Bend, NC 27018

"DON and Bob" new guaranteed goodies. Motorola HEP170 Epoxy Glode 2.5A/1000P1V 39c; Amphenol PL259 3.95/10; Ham-M rotor 99, R44 65.95; Quote new discontinued tubes; industrial surplus list. Quate Drake, Galaxy, Hy-Am, Mosley, Tnex, 2 meter transceivers, Tempo, Kenwood. Write specifications. Prices collect. Mastercharge, Bankamerica. Warranty guaranteed. Madison Electronics, 1508 McKinney, Houston, TX 77002

FTDX-400 mint condx with spare finals. New apr 70. \$395. SR-150 mint condx with HB ac supply \$295. Hollister, 6636 Hazel Ln., McLean, VA 22104, (703) 556-8217

FOR SALE: Heath HW-100, HP-23A, SR-600, Turner 350-U mike, \$270. Bert O'Connor, 16 Smithland, Andover, MA 01810

HW-101, HP-23A power supply, factory aligned; Heath keyer, swr, antenna, multi-band vertical, coax, etc. Whole station, \$400. W8BENA, 232 W. Hammond, Otsego, MI 49078, Phone: 616-692-2201

SELLING complete station, Swan 500C with p/s. SR-220 and Swan 508 VFO, Complete \$700. FOB only. Will sell separately. Write for quotes. No trade. Contact Lon, WA2QHV, 245 Speer Ave., Clifton, NJ 07013

SELL: SR102, SB640 ext VFO, SB600 swh. HP 23A, HP13A ac/dc pwr supply. All excellent cond. \$550. Donald Schnoff, WA9BYY5, 306 Lincoln Rd., #19, Columbus, MS 39701, (601) 328-5808

MAKE an offer. R391, excellent condition, Anthony Barsotti, WABXD, Garfield Ave., Newark, OH 43055

75S1 500CPZ filter, cw crystal, high serial #270: 75A2A \$165; HW12 with calibrator, 10 ps \$75. FOB. W9NYS, Box 529, Stevens Point, WI 54481

SELL: Hammarlund SP-600X with crystal control unit, manual, outstanding condx. \$300. Want #144 or R390A. WA2WYQ/9, Stephen Elk, Box 91, Angola, IN 46703

WANTED: volunteer to record actual DX QSO on reel or cassette tape and send to me. Expenses paid and gifts to you from my country. Please write to: Teish Yamada, JA1EQZ, #11 Horinouchi-cho, Sugami-ku, Tokyo, Japan

COLLINS filters for 75S-3/B/C F455FA15 (RTTY), F455FA05 (cw), F455FA06 (cw), F455FA40 (am), \$20 each, PM-Z p/s \$100. All like new. WA2IZU

NEX-3 w/acps perfect condition, \$175. Also HE-45 which needs work \$10. Need antique WD-11 tubes. Herb, RD 2, Selingsgrove, PA 17870, 717-374-1245

COLLINS 75A4, Serial 75629, mint condition. Bill Millholland, W55BK, 1902 Silverleaf Dr., Arlington, TX 76013, 817-261-4819

WANTED: Heath sdb adapter SB-10, Jim Hyde, 2405 Whispering Pines Cir., Albany, GA 31705.

HAM - TV, GPL precision 700 camera, minimum 700 line amplitude, 3 complete transmitters, crystal controlled, vswr \$1800, set for \$315. Hitachi 7145A Vidicon, new, \$20. B&K model 160 transistor tester, manual, \$45. Wanted: 2 or 6 meter transceiver. WB2GKF, Stan Nazimek, Jr., 506 Mount Prospect Ave., Clifton, NJ 07012

WANTED: 432 500 watt amplifier; 1295 100 watt tripler and amplifier; HA-2 transverter; 5000 watt amplifier; 2 sets pair 4CX 1000A tubes; new tubes; \$2 photos; sacrifice \$495. All letters answered. WAUCH

WANTED: Heath keyer HD-10, Trade HW32A for HW 12 A. W2UGM, 66 Columbus Ave., Claster, NJ 07624

JOHNSON Ranger II, clean, good, \$125; Heath SB500 2 meter transverter factory aligned, \$125; Hallcrafters HA6 and ac, like new, \$140; NEX3 and ac, \$175; Swan 140 monobander, \$60. Philip Schwelber, W9GCG, 4536 N 60 St., Milwaukee, WI 53218

7289/3CX100A5 tubes. Ceramic sub. for 2C39A, \$3 ea. \$30 doz. New 2C39A and 6939 same price. Ed Howell, W45OD, Folly Beach, SC 29439

CRYSTALS airmailed: Novice FT-243, active, accurate, one to four - 80M \$1.85, 40M - 15M \$1.50. Novice QST "Novice Special," five or more (band mix OK). Any frequency (.02%), \$4m \$1.75, 40M - 15M \$1.39. Postage/crystal - Annual 12c. Ist.-cl. Bk. General purpose FT-243 any frequency, .01%, 3500-1600 kilocycles, \$1.90, (minimum five same or mixed \$1.75), (crystallize your net, ten same frequency \$1.45), 1700 - 3499 \$2.95, .005% add 50c/crystal, MARS, CD, etc. Free general frequency order-bulletin. Your crystal shop since 1933. Bob Woods, W0LES, C-W Crystals, Mansfield, MO 65706

MOVING, must sell model 28ASR \$800 and model 28KSR \$250, WB5FC1, 4421 Marie, Corpus Christi, TX 78411

SB101 with 400 cy filter, HP23, HE G6813S linear, Hy-gain mod. WA-36, 144 V5, 144 V5, 360 tone, 360 other goodies. You pick up for \$95. M10 Box, Rt. 2, Salem, OH 44460

75A4, Serial 4005, vernier knob, three filters, 7360 mixers; clean, top condition...\$415. Jennings UC5L6000/3KV, \$380. UCSF500/17KV...\$75. Gonsior, W6VFR, 418 El Adobe Place, Fullerton, CA 92632

HEATHKITS professionally wired, tested, Send for quote. Parrish, 306 W. Amherst, Melbourne, FL 32901

HY-GAIN beam 3 band 4 elements \$35. Bert Shapiro, 4 Elizabeth St., Glen Cove, Long Island. Pick up only. Zip 11542

CASH paid for R390A receivers, 618T3 transceivers, and Eimac/Varian tubes. The Ted Dames Co., 308 Hickory St., Arlington, NJ 07032

WANT: KW2000 British made transceiver. W2NX, 29-29 213 St., Bayside, NY 11360

FOR SALE: Swan 260 Cygnat and 1200W linear both mint condition. \$460 FOB. A. L. Feuer, WB4LLR, 1006 Fairfield Dr., Gastonia, NC 28052

SR-200 wanted in excellent condition. For sale: Heath HW-16 with four crystals in excellent condition \$85. Hallcrafters SX-140, in good condition, \$38. Or make offer! Ship. WB9ULU, Larry Tusker, R.F.D.1, Leland, IL 60531

PLATE xfmr Stancor CG-307 commercial grade, continuous duty, 7000CT, 500ma, 230/115V AC primary, 13L 34W 10H WBLBs \$60. K2E6J, Jarvis, 5 Stratford Pl., N. Babylon, NY 11703

COLLINS R388/UR 5-30.5 Mc, w/BK, excellent, \$325. - TS175B/U frequency meter, 85-1000 Mc, new calibration book, modulation, \$45. - Self-Belt, Janyard \$21.50 - Handi-Talkies 145.42 \$50. - Prop pitch rotors \$65. Signal Gen. G/R60B 9.5kc - 30 Mc \$125. Link, 1000 Monroe Trk., Monroe, CT 06468

CIRCULATOR 220 MHz ideal for moonbounce ramp or terrestrial DX, \$15 FOB. W4APL, Box 4095, Arlington, VA 22204

HQ-110A/spkr, DX 60 B and VF-1 VFO. Clean, mint condition. \$270 takes all. Will ship. W8CGJ, John Hynes, Box 386, Belington, WV 26250

WANTED: for my personal collection, all sorts of pre 1940 antenna insulators, pre 1930 vacuum tubes. Walt Lehnert, 5209 Minnehaha Blvd., Minneapolis, MN 55424

FOR SALE: One American transformer. Plate transformer type V, cr. 50/60, 2P 1 primary, 12.7 secondary, 2800/140 volts, ser. no. 434116. And reasonable offer will be accepted. K2LZY, Fred W. Kruger, 6 Reese Parkway, Fredonia, NY 14063

WANTED: tube-type fm tuner, pair 813s and 10 volt 10 amp CT transformer. W4ZMR, T. E. Ramsay, 130 Neely Rd., Brevard, NC 28714

WANTED: Plug-in unit PS 1 (phase-shift network) for Central Electronics 20 A exciter. Please state condition and price in first letter. Mark D. Elliott, W1Y1Y, P.O. Box 165, Concord, MA 01742

VALTEC- VS-II Speech integrators. Immediate delivery from factory. The price - \$44.50 complete. The results - fabulous. Send QSL card for free brochure or order direct; guaranteed. Valley Technics Inc., 2901 Sonora, Kalamazoo, MI 49004

WANTED: Johnson 275 w matchbox in mint condition. WA4KEN, 66 Ranch Dr., Montgomery, AL 36109

HW32A w/HP13, \$145, HT32A 175 HT44 \$220, HT41 \$175, Swan 500C w/117XC one year old \$395. Clegg 999 \$69. Thor VI complete \$125. Johnson adventurer Eric 460 oscilloscope. List of others available. John Kalstya, 18 Hillcrest Ter., Linden, NJ 07036, 201-486-6917

SELL: Hallcrafters SX111 was reconditioned, in excellent shape. \$110. WA3MTF (#12) 827-2767

100 pair stereo headphones, \$10 pair. Retail for \$24. Will consider trade for 5 like gear. H4M, Box 474, Port Hueneke, CA 93041, (805) 649-9058

FINE stainless, other, threaded, washer hardware! Guying accessories! Many ceramic insulators! Lists = small charge or quote! Walt, W8BLR, 29716 Briarbank Ct., Southfield, Mich. 48076

HEATH station, HW-32 with crystal calibrator, ac and mobile factory supplies, Hustler mobile antenna with mounting hardware and microphone. Tel (616) 799-1850 \$155. 389 Penn Ave., Massapequa Park, NY 11762

2M FM, standard 826M, Hustler BBLT-144 ant., extra crystals for 19/73, 22/76 repeat. All 2 months old. \$290. J. Solomon, 24 Brookfield Ln., Centereach, NY 11720

WANTED: 500W 160 meter cw transmitter with VFO. Must include necessary power supplies. No objection to secondary bands. W7CO, 1745 S. Thurmond, Sheridan, WY 82801

DRAKE 2B, calibrator, clean, \$135. K2QLL 08034

NC-300 with crystal calibrator, excellent condition \$175. QST 1940-1969, 30c each, s.a.s. for list please, Frank Wilbur, K1MJC, R.R.3, Box 94A, Coventry, CT 06238, (203)742-5037

HW-16 transceiver, factory aligned with crystals and manual. Excellent condition, \$110 or offer, John Williams, 48-575 Madison St., Indio, CA 92201

DRAKE TR4, AC4, MS4, very good condition, \$500. 2C, 2CQ \$190. Homebrew kW linear, \$100. WA2JSM, 145 Surbeck, Haworth, NJ 07641

QSTs, 1954-1970 complete, \$40 plus shipping. Summers, W4WWR, Box 13, Horseshoe, NC 28742

DRAKE 2-NT xmt, mint, manual, xtl, \$95. FOB. WB8FMB, 5297 Greenleaf, Swartz Creek, MI 48473

3CX2500A3 tubes, wanted. Will consider new or used. Leon Shore, Yaddenville, Route One, NC 27055

SELL: C53GKB - base station, Heath HO13 Ham Scan, HA5 VFO, 2 meter converter with p/s, T53GKT, T43GGT, Ferris signal generator, Taktronics 544 scope, dual tracer, 1A2 plug, with probes, accessories, manual, excellent condition, Beckman 7170 frequency counter, Bell Howell stereo tape recorder, new. Contact Vic, WB2PYE, 201-664-6833

"HOSS Trader Ed Moory" says he will not be undersold on Cash deals! Shop around for your best price and then call or write the "HOSS" before you buy! New Equipment: Factory warranty: Swan accessories, sealed cartons, Swantenna 55, \$92; 117-XC AC supply, \$90; 230-XC (230 VAC) supply, \$92; VX-2 Vox, \$27; SS-16 lattice filter, \$72; New factory warranty Regency HR-2, Reg. \$229, cash \$179. New Rohn 50 ft. foldover tower, prepaid \$235; New Mosley Classic 33 and demo Ham-M rotor, \$209. Used Equipment: T4-KB, \$359; Ham-M, \$86; TR-4, \$409. Moory Electronics Co., P.O. Box 506, DeWitt, AR 72042. Tel: 501-946-2820

READING Radio Club Clearance: Central Electronics 200V, \$300; Clegg Zeus and interceptor, DRake tv1000, relays, \$525; two Westinghouse 2MFM dual frequency base 60W units, \$75 each; Heath HW-16, xtal, speaker, \$85; HQ-180C, \$195; all in mint condition. Prefer pickup, contact K3MGO, Frank, 12 Larchwood Rd., Wyoming, PA 19610. Phone: 215-374-9342

HEATHKITS for sale: SB-300 revr. \$150, SB-110A 6 meter acvt/w SB-600 spkr & HP-23 PS \$200, SB-500 2 m xverter \$80, 9400 117 linear amp \$100, R-X-1 Mobawk rcvt/w 6m converter \$100, VFH-1 Seneca \$50. Contact George Hawyrsko, WB2GWW, P.O. Box 568, Jamaica, NY 11424. Phone AC 212-277-4001

HW-32A, homebrew linear 6 x 6KD6, power supplies, HM-15, perfect condition, \$175. DL 9 WZ / W 1, 5 San Mateo Dr., Chelmsford, MA 01824, 617-256-3267

SELL: FTDx660 with cw filter, speaker, like new condx. \$450. WA3COS, 2307 Eldridge, Pittsburgh, PA 15217. Tel: 412-422-7810

SELL: Ranger II, 75 watts, 160-6, built-in VFO or crystal. Mint! \$130 FOB, K4EJC, 424 Chateau Apts., Chapel Hill, NC 27514

HQ-180C, matching speaker, \$225, Valiant I, JT-30 mike, pit stand, \$110. Both \$300. Xint condx, original owner, Jennings Vacuum variable capacitor 10-300 mmt, \$15. You ship. WA6JKJ, 3308 West Commonwealth, Fullerton, CA 92633

SWAN-240, T.C.U. unit (transceive or independent) and SW 117AC supply, \$300; S.W.R. matchbox \$48; Heath Patch \$20; TR44 rotator \$40; Cubex Fiberglass quad \$45; CEL compressor \$18; KR1 paddle and homebrew keyer \$20; Regency converter \$60; All excellent condition. E. Sapino, K1JMH, Caputo Rd., North Brantford, CT 06471

SELL: National NCL-2000 linear \$350, Collins 351D-2 mobile mount \$75, Collins MP-1 mobile power supply \$100, Hammarlund HQ-180 receiver \$200, C. Lindemann, W1MLM, Zaccheus Mead Ln., Greenwich, CT 06830, 203-661-6140

LAFAYETTE HA-460 6M transceiver, \$75; Hallcrafters SX-71 Gen. coverage receiver, \$75. Both excellent condition. Wilton Spicer, 334 N. Miami St., Trenton, OH 45067

SWAN 260, perfect condition, just returned from Swan factory, \$265. WA6KUS, 6944 Langdon Ave., Van Nuys, CA 91406, 213-782-7934

DRAKE R4B \$300, HT-37 \$125. Both excellent. WA6FKI, 11388 Campus, Loma Linda, CA 92354

SIGNAL-One CX-7 #00858, cash or take KWM2 part trade. KWM2 - want one? Too expensive? I can help you; write only. W0BNF

SELL: NCX-3 ac supply \$160; SB34 accessories \$270. K1WVY, Bruce Tis, 97 St, Stephen St., Boston, MA 02115

SELL: 50 mHz 2 kW linear amp, 3-10007, class B, cathode driven vacuum variable, Pie-I-output with 2.5 kv. p.a. solid state rect. 84MFD filter, \$250. F.O.B. SASE for details or Pix. W6ABN, 101 N. Ladera Vista, Fullerton, CA 92631. Tel: 714-871-0975

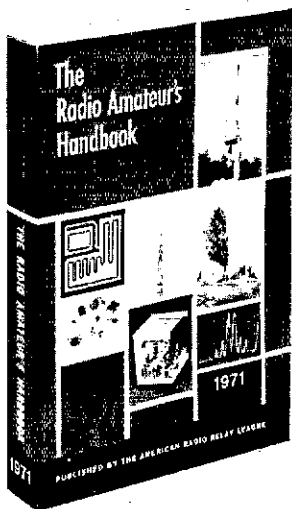
SBE-34 transceiver with mobile mount, calibrator, extra tubes. Works good, \$225, SX-43 receiver \$85. Gary Johnson, K0KLR/Ø, 2121 Hoefler Ave., Rapid City, SD 57701

SBE-34 transceiver, 80-15 meters, \$200; Hustler antenna, 20 & 15 meter resonators, \$20. H. Magnuski, 335A Harvard St., T15, Cambridge, MA 02138

WANTED: Used Vibroflex bug. State model, condition, price. William Lowry, W1RML, 31 Midwell, Wethersfield, CT 06109

SELL: TR-4, AC-3, MS-4, immaculate, \$450, SB301 w/a-m filter, \$200, VHF - Seneca, \$75, All F.O.B. certified check. G3XPM/W1, Tel: (203)666-2679

SWAN-350, 117X supply for sale. Excellent. Sakkers, W8DED, Box 218, Holland, MI 49423



*** QUESTIONS ***

How can I stop the VHF parasitic oscillation in my amplifier?

Where can I find a circuit for a low noise two-meter converter?

What's the filament voltage on a 4CX300A

How do I wind a bifilar choke?

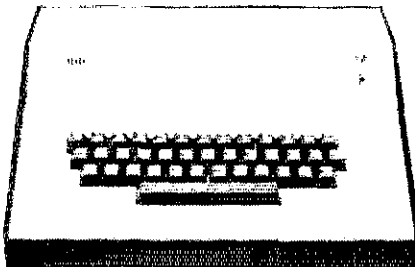
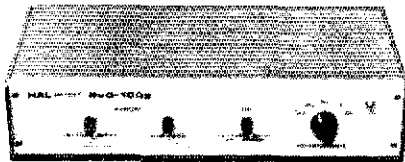
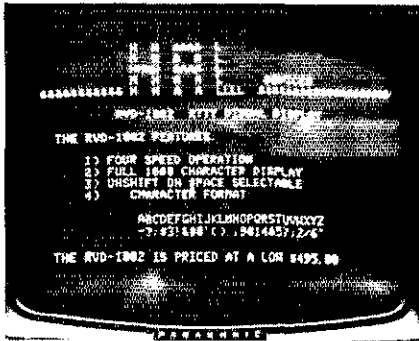
*** ANSWERS ***

You'll find them in the 1971 Radio Amateur's Handbook, the complete manual of amateur radio communication.

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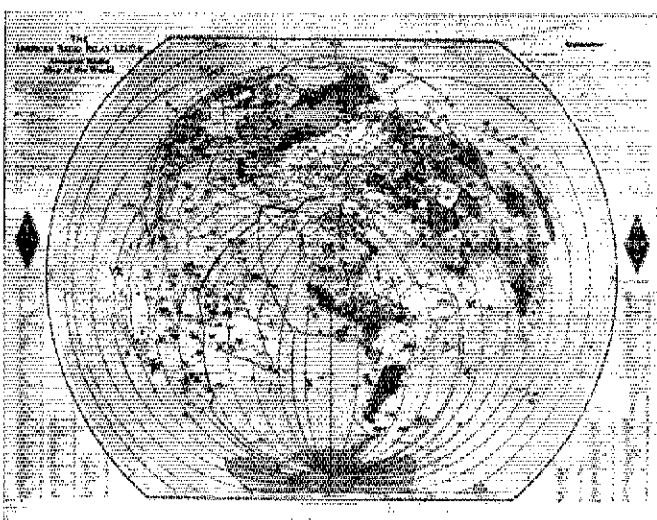


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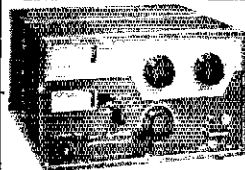
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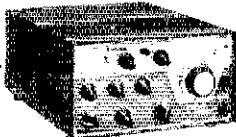
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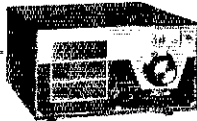
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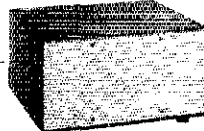
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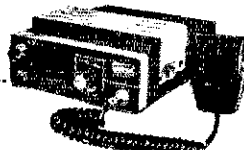
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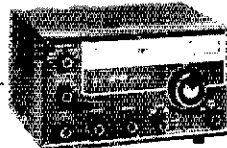
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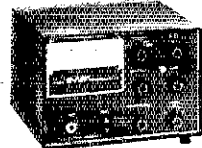
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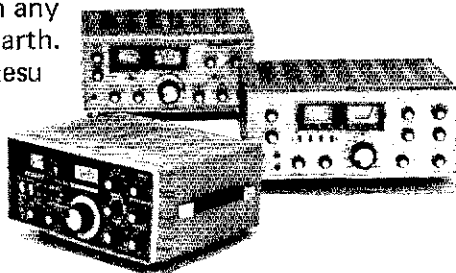
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