CQ

November 1975
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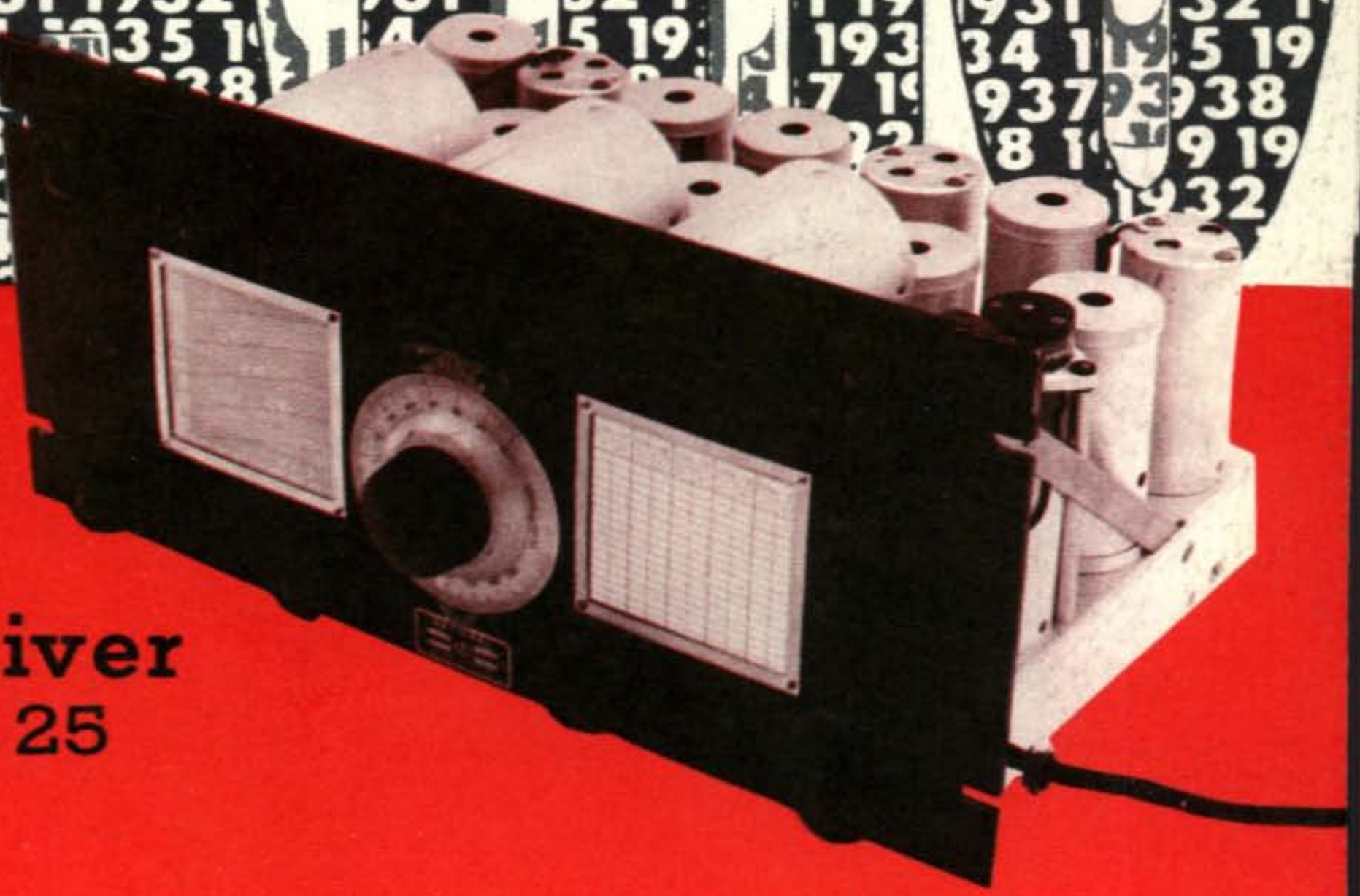
The Golden Years of



The National AGS Receiver

Story on page 25

The Radio Amateur's Journal

Heathkit "104"...

...new performance standard for SSB transceivers

A revolutionary "new generation" transceiver. It's completely solid-state and totally broadbanded to eliminate preselector tuning. And the output can be instantly switched from 100 watts to 1 watt. The true digital readout offers resolution down to 100 Hz and outstanding tuning accuracy. Receiver intermodulation distortion has been minimized and there are very few active devices ahead of the highly selective crystal filter. Adjacent channel overload is negligible, yet sensitivity is better than 1 μV (.6 μV typical) and front-end overload is dramatically reduced. The "104" is 12 VDC-powered for mobility and the optional HP-1144 fixed station supply fits inside the SB-604 speaker cabinet. An optional noise blanker can be installed in the "104" and an optional 400 Hz crystal filter improves CW selectivity.

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Kit SBA-104-3, 400 Hz CW crystal filter, 1 lb., mailable **36.95***
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Kit SBA-104-2, Mobile mount, 6 lbs., mailable **36.95***
Kit HP-1144, Fixed station power supply, 28 lbs., mailable **89.95***

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SB-634 station console combines 5 convenient accessories

The "634" performs 5 important functions—a 10-minute digital ID timer with visual or visual and audible indicators an RF wattmeter that reads 0-200-or 0-2000 watts with ±10% accuracy, an SWR bridge, a hybrid phone patch that can be used manually or with VOX control, and a 24-hour digital clock that runs independently of all other functions. It's a must for every well equipped station.

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Highly visible 1½ x 2" CRT detects problems that can reduce the effectiveness of your signal — nonlinearity, insufficient or excessive drive, poor carrier or sideband suppression, regeneration, parasitics and CW key clicks. It monitors SSB, CW and AM signals from 80 to 6 meters. Push-pull drive for keystone free trace; automatic sync sweep generator with 3 ranges from 10 Hz to 10 kHz. Can be used as an ordinary oscilloscope from 10 Hz to 50 kHz.

Kit SB-614, 17 lbs., mailable **139.95***

SB-644 remote VFO

Designed exclusively for the SB-104. It provides split transmit and receive control and you aren't frequency-limited in any way — transmit at one end of the band, receive at the other. The "644" even has two crystal positions for fixed-frequency control. The "644" has a linear dial, but the exact frequency is displayed on the "104's" digital readout. The display automatically changes when switching from transmit to receive.

Kit SB-644, 10 lbs., mailable **119.95***

SB-604 station speaker — response-tailored to SSB

Designed to match the SB-104 in styling and performance. The "604" uses a 5 x 7", 3.2-ohm speaker. And there's room inside for the HP-1144 power supply. With connector cable and plug.

Kit SB-604, 8 lbs., mailable **29.95***

New Heath Ham Accessories

New solid state Heathkit Electronic Keyer...49.95

Sending code's easy with the HD-1410 whether you're operating base or portable. The dot and dash paddles' travel and tension are easily adjustable. When the two paddles are treated as one, the HD-1410 operates like a single-paddle keyer with dot and dash memories. Iambic operation forms most characters with reduced wrist movement. Dots and dashes are self-completing and always in proper proportion. During construction, you select the speed range you want up to 35 words per minute or up to 60 words per minute. Operates on 120 VAC or 12 VDC. Adjustable sidetone frequency, built-in speaker, headphone jack, weighted base. Styled to match our famous "SB" line.

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HD-1410 SPECIFICATIONS — Keying Speed: Variable from under 10 to over 35 or from under 10 to over 60 wpm. **Keying Output, Positive Line to Ground:** max. voltage open circuit or spikes — 300 volts. Max. current — 200 mA. **Keying Output, Negative Line to Ground:** max. voltage open circuit or spikes — 200 volts. Max. current — 10 mA. **Audio:** internal speaker or jack for optional hi-Z (at least 500 ohms) headphones. **Sidetone:** adjustable from 500 to 1000 Hz. **Internal Controls:** sidetone frequency, paddle tension, paddle travel. **Rear Panel Connections:** AC power cord, 12-volt power input, keyer out, headphones, receiver audio in, ext. key. **Temperature Range:** 0°C to +40°C (typ. −10°C to +40°C) or approx. 50°F to 105°F. **Power Requirement:** 120/240 VAC (±10%), 60/50 Hz, 3.5 watts or 10-14.5 VDC, negative ground, 150 mA. **Dimensions:** approx. 3" H x 5" W x 7½" D. **Net Weight:** 3 lbs.

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The Radio Amateur's Journal

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ZERO BIAS

Conventions and Hamfests

We think they ought to be fun. We think so because they offer a prime opportunity to expose hundreds—even thousands—of non-Hams to Amateur Radio, but if we persist in treating these largely-social gatherings as private parties, by invitation only, we're missing the boat.

Case in point: the ARRL National Convention in Reston, Virginia. It was a lovely affair. Fine suburban hotel in the outskirts of Washington, D.C., cocktail parties, technical seminars, old timers getting together to chew over the good old days, and a delightful restaurant where two people could have an excellent meal for under $30. A lovely affair, indeed.

All you needed to attend for the three days was about $200 of spare cash, minimum, plus transportation. Nothing wrong with that. Except if you're not a Ham. Or except if you're 13 years old. Or if you're out of work. And so we saw very few non-Hams. And very few young fellows and gals, or people trying to survive a depression on an unemployment check.

The purpose of that lovely affair seemed to be a confirmation of what we already knew: That we're all a fine bunch of people, thoroughly satisfied to be where we are and not terribly concerned about whether or not anyone else ever enters the hobby . . . "We're aboard, pull up the ladder!"

Conventions need not be that way, and the growing popularity of the much more informal Hamfest proves the point. The Hamburg International Hamfest in September, for instance, was a large, enjoyable, easy-going affair with many non-Hams and youngsters eagerly soaking up the mood and character of a warm, open, enthusiastic group of fine Amateurs, and that's the way it ought to be.

Even as my sour memories of the Reston Convention are just beginning to fade, plans are being made for carbon copies of it in the Hudson Division (1976), in Denver (also 1976), in Boston (1976), in Seattle (1977), and who knows how many more. With the possible exception of the Seattle show, it appears that all of the ARRL Divisional Conventions, and the National for 1976 will follow the standard pattern of the formal, expensive convention.

For example, the 1976 Hudson Division Convention will be held in Great Gorge, New Jersey, about 1½ hours' drive from the population center of the Hudson Division: New York City. Great Gorge is a winter sports resort hotel with good facilities sufficient to serve a few thousand people. But it's about as far from the "walk-in trade" as it could be. The likelihood of having more than a half-dozen CBers (potential Hams), or other casually-interested persons attend a formal and expensive Ham Convention 70 miles from downtown New York City is nil. First, they won't know the Convention is taking place. Second, if they accidentally learn of it, they're not about to drive 70 miles into the sticks to "drop in and see." Third, if they did happen to show up at Great Gorge they'd better bring a wad of cash or they'll find themselves sleeping under the stars, lulled to sleep by the sound of their rumbling, hungry stomachs.

My estimate of the cost of overnight attendance at any of the formal Ham conventions is $100, minimum, and frankly I don't think most of them are worth that much. I hear a lot of hullabaloo about the great tech programs and speakers that Convention chairmen value so highly, but more than anything else these sessions serve to massage the egos of the participants and the Convention committees, but do little to add to the technical expertise of those attending. Numerically, the attendance at most technical talks is a very small fraction of the total convention attendance. That's significant.

What brings people out to a Hamfest? A flea market and commercial exhibits. Throw in an FCC forum and a few good slide shows about DXpeditions or contests or other special interests, and you've got a great program. Put it all in informal and inexpensive surroundings and you've got a great Hamfest . . . like a Dayton Hamvention. *(Over)*

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What a glorious medium the Dayton Hamvention is for selling Amateur Radio. Ten thousand Hams getting together to enjoy their hobby and their fellow hobbiests, and openly welcoming the layman and the CBer alike to join in the fun.

The Rochester and Hamburg hamfests, too, as well as a dozen more throughout the U.S. do a great job of mixing Ham fun with good Public Relations, to come up with a thoroughly positive Ham "happening." Bravo!

I move that we scrap the stuffy, formal, expensive and self-serving convention in favor of the enormously human Hamfest. Do I hear a second?

73, Dick, K2MGA

OUR READERS SAY

The Endless Wait for a License

Editor, *CQ*:

I read with interest in your Readers Say column last month the letter sent in by an "Awaiting WN5," because I too have waited a rather long time for a Ham ticket to come through from the FCC in Washington.

I sent in a form for a military recreation station last January and to this day they have done nothing to get a ticket to me. It took about five calls to Gettysburg to find out who I should talk to in that office. After that the person informed me that I should not be talking to the Gettysburg office, I should be talking to the Washington office. After about four calls I got the correct person on the line, and the last conversation I had with them was about four weeks ago, and I have yet to receive a license in the mail. Back around the first of the month (Sept.) they advised me that they were working on the application.

The only reason that I took the time to call was because they don't answer letters in the FCC, and it was necessary to call them and pin someone down to get an answer . . .

William Bauman, K2HQU
Hasbrouck Heights, NJ

Counter Feedback

Editor, *CQ*:

I gotta say you did a beautiful job in presenting my counter article on the pages of *CQ* (p. 16, August) . . .

I suppose it is inevitable that there are some errors in it, and you may want to call some of them to the attention of your readers: Under "Time Base," I was way off with the errors; a plus-minus .0005% puts you a maximum of 7.5kHz off at 150MHz (which still ain't very good.) In fig. 2, the HEP 30 should be a HEP 50. In fig. 4, the 10 Hz output to switch should be 1/10th Hz.

It's nice to know that people read these articles so carefully.

Once again, thanks for an excellent job.

Harvey S. Laidman, W6MFK
Los Angeles, CA

Plumber's Delight

Editor, *CQ*:

I read with great interest Sam Guccione's "Plumber's Delight" on page 37 of your September issue. Now Sam does not claim to have originated the information; he says "he stumbled upon an excellent explanation." The piece he stumbled on is apparently my article "Ohms Sweet Ohm," which I wrote and researched for our compnay journal, "Watt's New From Bird." My assumption is based on the nearly identical wording of his last paragraph and our publication.

We have no objection in sharing information of interest with our many friends, but if indeed we were the source, we would much appreciate being credited.

Herbert H. Heller
Senior Staff Engineer, Information Services
Bird Electronic Corporation
Salon OH

It most certainly appears that Mr. Heller is correct. Mr. Guccione's article draws heavily on material appearing in the Bird Electronic Corporation journal, "Watt's New From Bird," for August 1969. Had we known the source of Sam's information, we would have been pleased to acknowlegde it then instead of now. *–K2MGA*

Ohmbrewing

Editor, *CQ*:

The amusing article by Bill DeWitt, W2DD, "True Essence of Homebrewing" in the July issue brings to mind the story of how Georg S. Ohm (1787-1854) formulated the law which bears his name. Since in his day wire was not available at local hardware stores, Ohm, Like DeWitt's hero, had to make his own. This story is told in the text book *Physics The Pioneer Science* by Lloyd W. Taylor, Houghton-Mifflin (1941).

In brief, the story is as follows. Ohm was a high school teacher who wished a university appointment. To obtain one, he realized he needed to produce a piece of scholarly research. He had heard of the work of Fourier on heat conduction and surmised that there is an analogy between electrical conduction and heat conduction with electric current being the analog of the rate of flow of heat and voltage difference playing the role of temperature difference. He then constructed some wires and other necessary equipment and proceeded with and extensive set of experiments which verified the analogy and lead to the formulation of the law.

Unfortunately, when Ohm published his findings, the result was not what he had wanted. The local authorities considered his ideas contrary to the established philosopy, and he was forced to resign his high school teaching position. He lived under impoverished conditions for about six years until recognition of the value of his work by distant readers forced recongiton at home. Finally he received his university appointment, and he was happy in it for the five remaining years of his life.

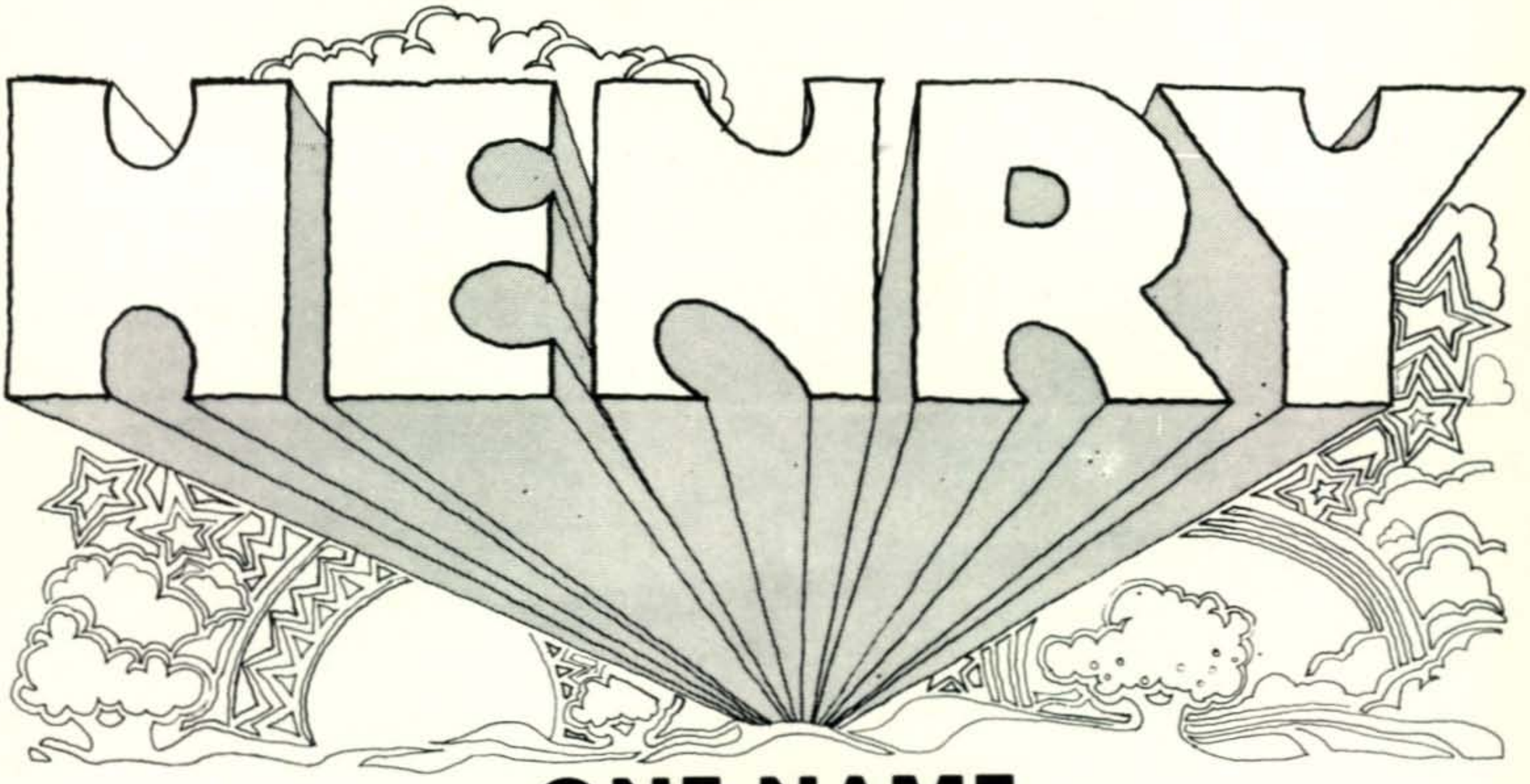
Readers of *CQ* who have an interest in history would enjoy reading the detailed account in Taylor's book.

Yardley Beers, WØJF
Boulder, CO

Announcements

● **North Canton, Ohio** - The Massillon Amateur Radio Club presents the 13th Annual Flea Market and Auction on November 21. The location is the Amherst Park Civic Center, Amherst Park Shopping Center, Massillon, Ohio. Donation at the door is $1. For more information write to Marc, Box 8711, Canton, OH 44711. ● **Sandusky, Ohio** - The Erie Amateur Radio Society's fourth annual Thanksgiving Auction will be held on Sunday afternoon, November 30, 1975 at the Laborers Union Hall, 2109 W. Perkins Avenue, Sandusky, Ohio. Doors will open at 11 a.m.; admission is $1.00 per person. For more information contact Earl Carrier, K8WLP, P. O. Box 2037, Sandusky, OH 44870. ● **Boulder City, Nevada** - The SAROC Eleventh Las Vegas National Convention, January 8 - 11, 1976 will be held at the Hotel Sahara Space Convention Center. Advance Registration is $12.00 per person; a midnight show is $22.00; a dinner show is $29.00. There will be Special Hotel Sahara Safari airfare packages from selected cities with schedule airlines serving Las Vegas. SAROC special room rate extended only to those who advance register or register at the door. Send for details to SAROC, P. O. Box 945 Boulder City, Nevada 89005.

● **Glenolden, PA** - On Sept. 17, 1975 a Heath Model HW29 6 meter amateur transceiver with power supply was stolen out of my car in front of my house with A-50-550 crystal in it. Please contact me: Frank L. Wayland Sr., K3GJL, 374 Hibbs Glenolden, PA 19036. ● **Hendersonville, Tenn** - STOLEN HR2 S.N.04-0281. Please contact K2RTA &/or Metropoliton Police Dept., Nashville, Tenn.



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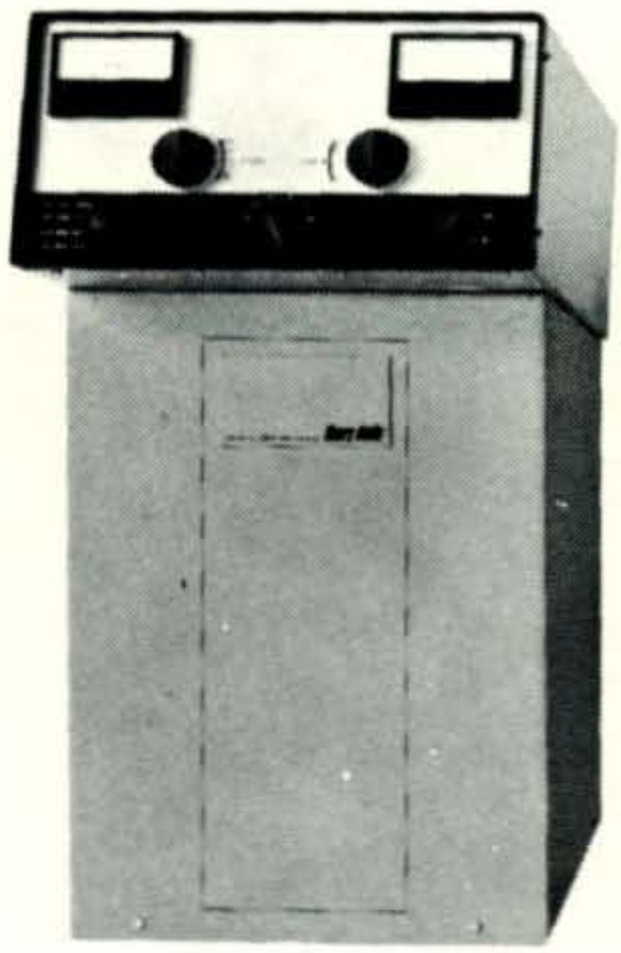

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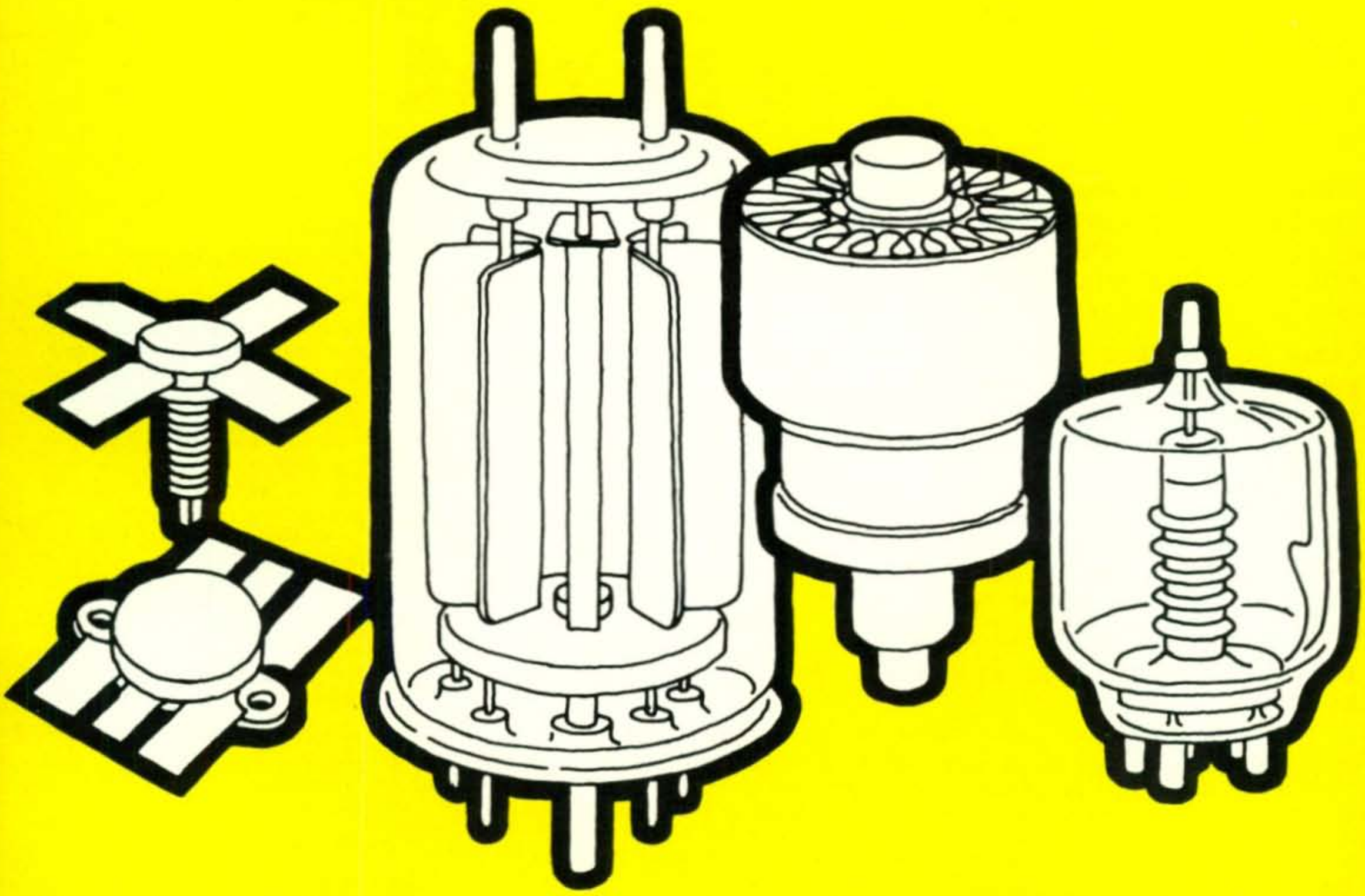

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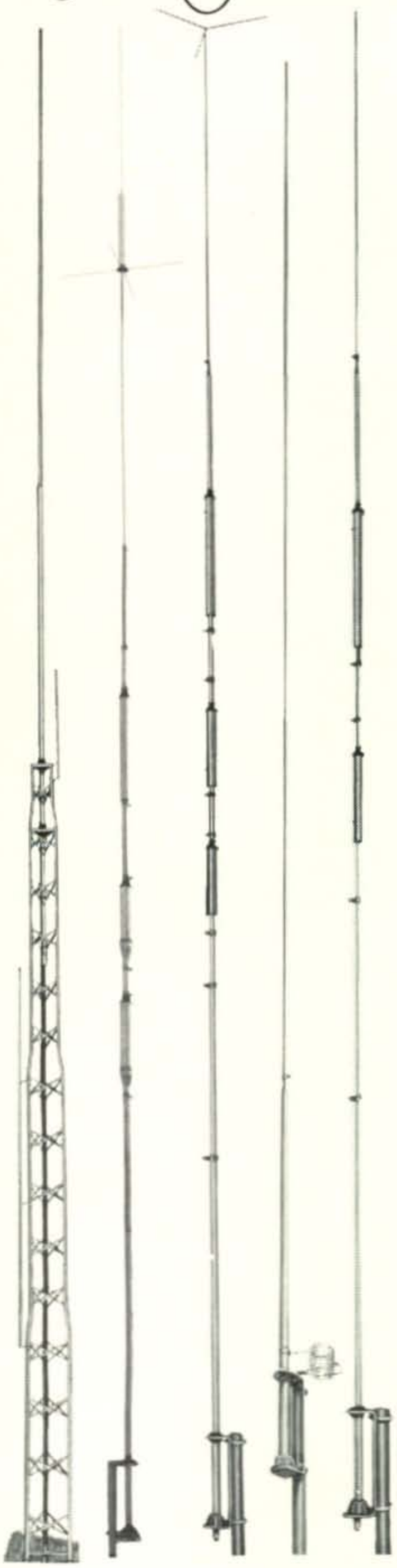

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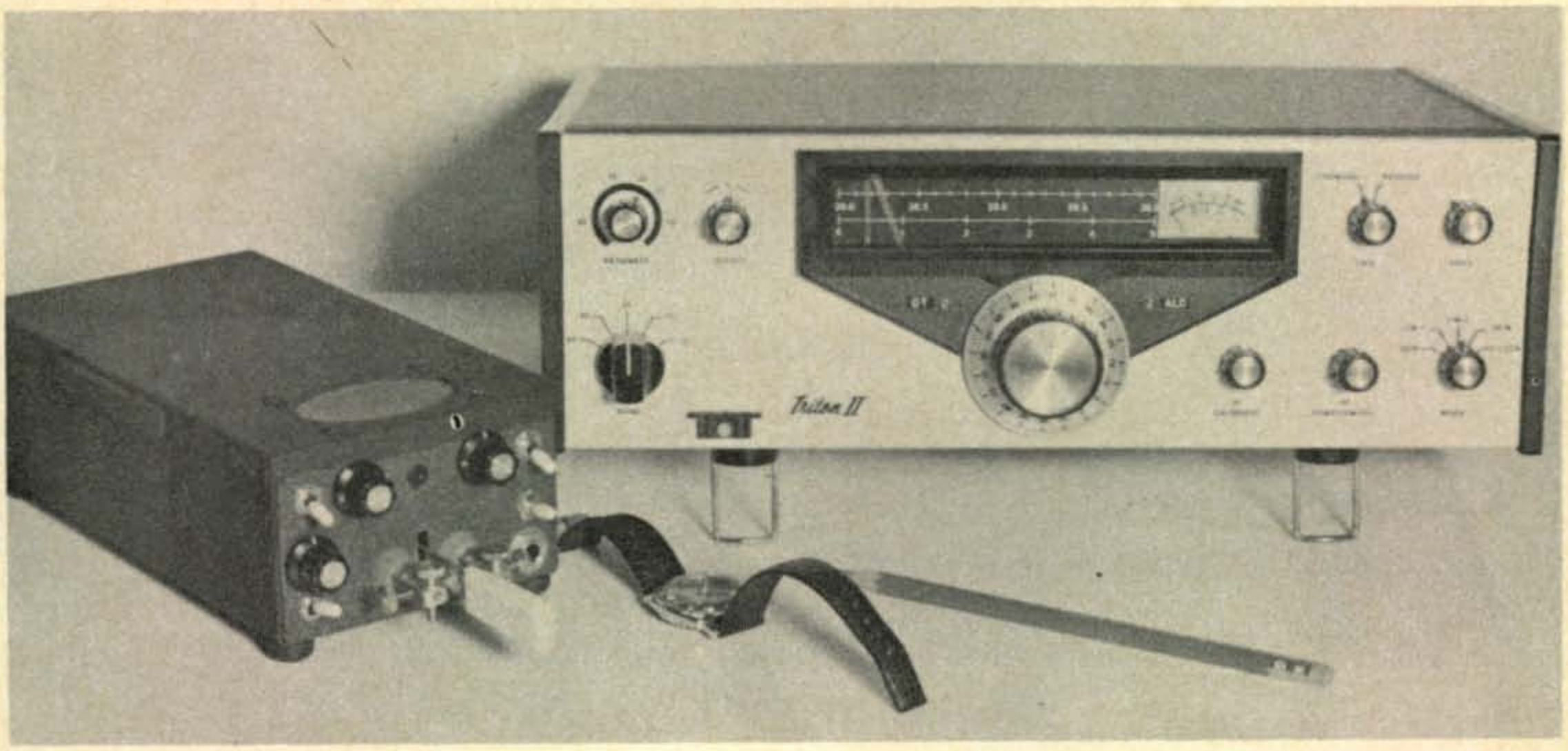


The Version II COSMOS electronic keyer is the ideal companion to a portable rig such as the TenTec Triton II shown here. This keyer will operate for many months from a single set of size-C cells which are self contained. Even when powered by a single 9-volt Duracell, 11 hours of continuous-dash operation is possible with the sidetone oscillator operating.

A Low-Power Cosmos Electronic Keyer In Two Versions

BY THOMAS RAYMOND CRAWFORD,* WB2COE

THREE important design features of any electronic keyer are cost, size and power consumption. The two versions of the electronic keyer described in this article were designed with these features in mind. Both versions offer the standard functions of variable speed, automatic spacing and self-completing dots and dashes. In addition to these, Version II offers a sidetone oscillator and a dash-dot memory. This dash-dot memory enables the keyer to remember a dot which is sent while the keyer is busy generating a dash. In other words, if the keyer is generating a dash and the dot paddle is pressed and released, the keyer will remember this dot and generate it (with correct spacing) after the dash is completed. This feature is of value to a 'tired fist' operating at high speed.

*410 Memorial Drive, Cambridge Mass. 02139.

Beyond these specific functions, both versions offer other important features:

Power: Both versions were designed to use COSMOS (Complementary-Symmetry Metal-Oxide Semiconductor) logic. Although the switching time of COSMOS logic is somewhat longer than that of TTL (Transistor-Transistor Logic), COSMOS requires considerably less power than TTL. Specifically, TTL has a 10 milliwatts/gate power dissipation, while that of COSMOS is only .0005 milliwatts/gate. Also, COSMOS logic has an operating voltage range from 5 to 15 volts. Thus, subject to minimum voltage required by the output relay, the supply voltage for both versions is not critical. When operating at 9 volts, Version I draws a quiescent current of 3 microamps. When generating characters it draws roughly 20 milliamps; however, 18 of the 20 milliamps

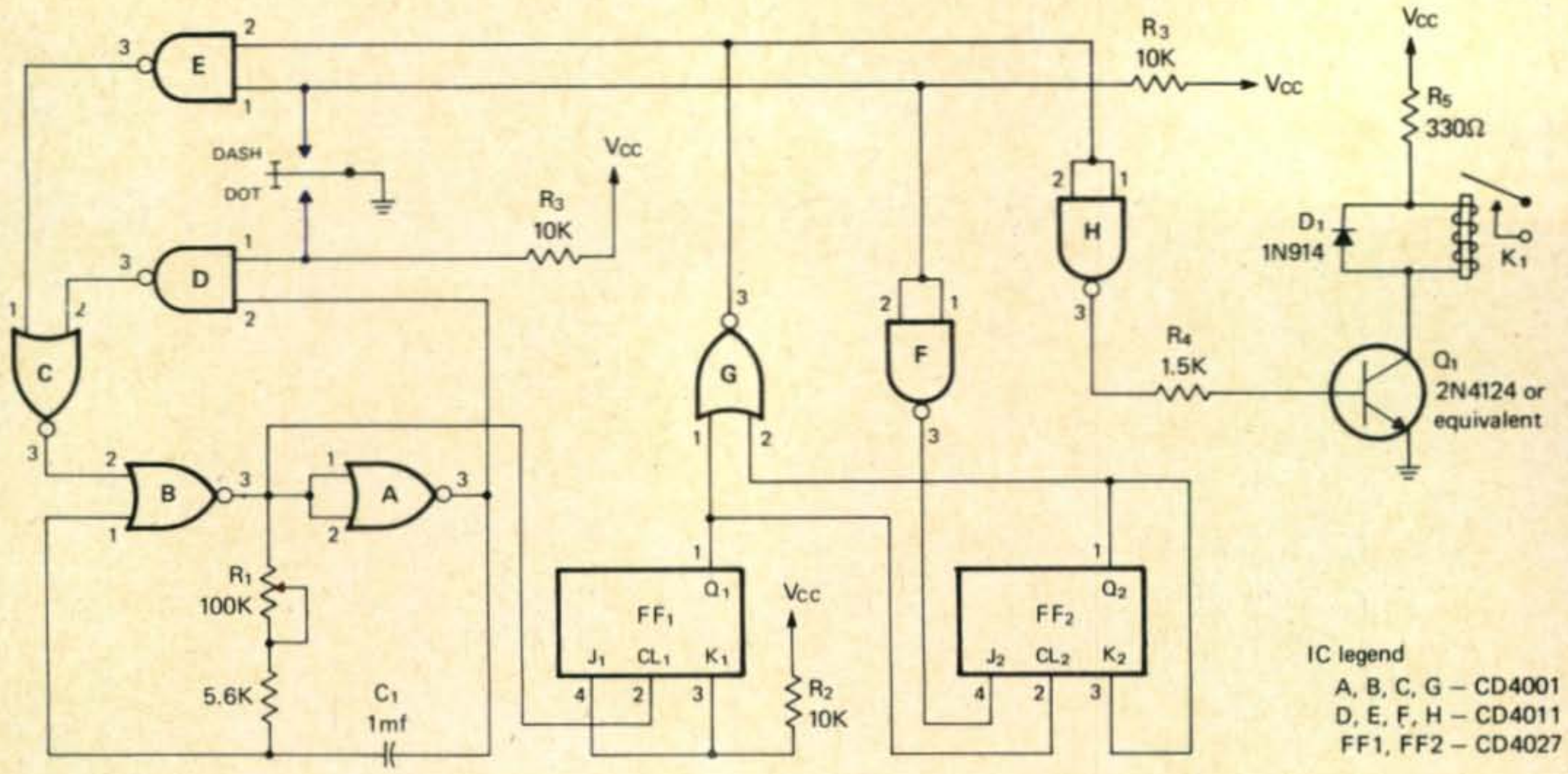


Fig. 1—Schematic diagram of Version I of the low power electronic keyer. For P-C board layout of this keyer see fig. 10. Relay K_1 is a s.p.s.t. reed type available from B & F Enterprises, 119 Foster St., Peabody, Mass. 01960. Part #ERA-21061. IC's are RCA types.

are used to drive the output relay. Using the same supply voltage, Version II draws 4 microamps quiescent current, 20 milliamps when switching the relay and 40 milliamps when driving both relay and sidetone speaker.

Cost: The logic and relay for Version I should cost around $6, for Version II, about $10.

Size: The circuit board for Version I measures 2 inches by 3.9 inches. The board for Version II can be cut down to 4 inches by 5 inches. However, further layout work, along with double-sided circuit boards could greatly reduce the size of both versions.

Version I Circuit Description

Figure 1 shows the overall circuit diagram for Version I. The circuit can be split up into three groups: the gated multi-vibrator,

Initiating/Self Completing — Initiating a shaping.

Gated Multivibrator—The gated multivibrator (see fig. 1) consists of gates C, B and A.[1] A timing diagram for its operation is shown in fig. 2.

The state of C-3 determines whether the multivibrator 'oscillates' or not. When C-3 goes low (upon initiation of a dot or dash), B-3 goes high, A-3 low, and B-1 charges through R_1C_1 from its normally low position to some threshold. When B-1 reaches the threshold voltage, B-3 goes low and A-3 high. The voltage at B-1 instantaneously follows that of A-3, going high. B-1 then slowly decays through R_1C_1 until it reaches the threshold. Once the threshold is reached the entire cycle is repeated. Having the multivibrator change state as soon as C-3 goes low insures that the first period of the multivibrator's oscillation is identical to every other.

Initiating/Self-Completing — Initiating a dot or dash is accomplished by depressing either the dot or dash paddle. When either is depressed, the gate associated with it (E for dash, D for dot) changes its output from high to low. This transition in turn causes gate C to change state. This action gates 'on' the multivibrator as previously described.

There are two feedback paths to ensure self-completion. One path is from A-3 to D-2. This path allows the multivibrator to stop only when A-3 is high. Sinces changes of state for COSMOS flipflops are synchronous with the positive edge of the clock pulse, B-3 is fed into the clock input of the

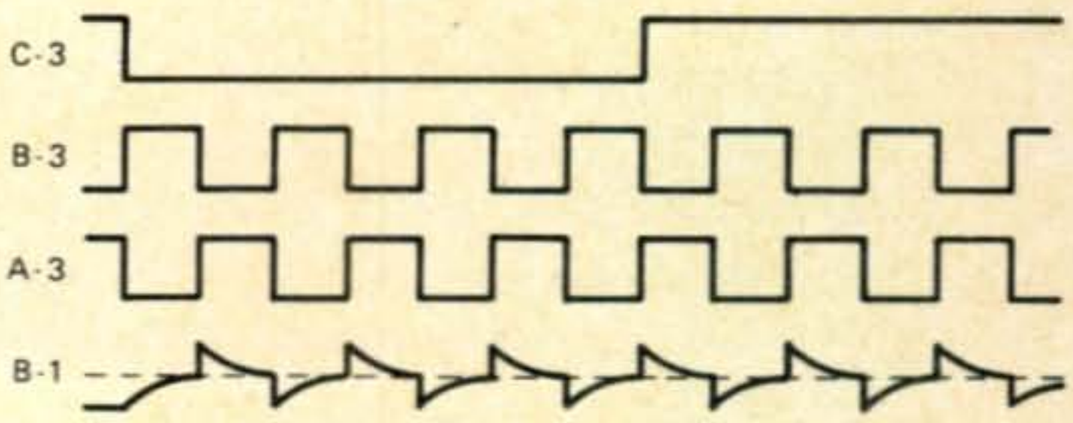
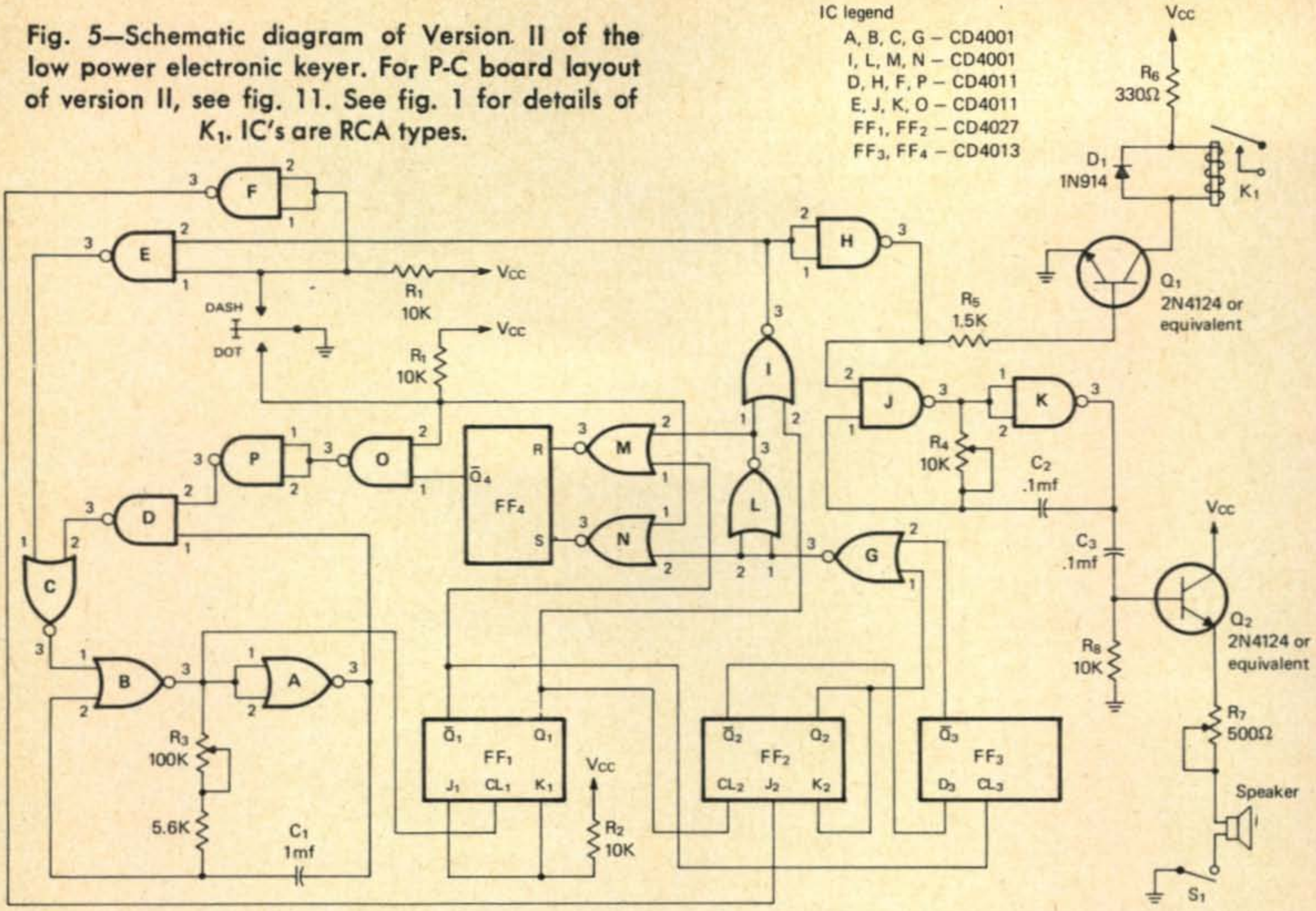


Fig. 2—Timing diagram for gated multivibrator.

[1] Gate C refers to the gate labeled C. C-1 would refer to the terminal labeled 1 of gate C.

Fig. 5—Schematic diagram of Version II of the low power electronic keyer. For P-C board layout of version II, see fig. 11. See fig. 1 for details of K_1. IC's are RCA types.



The generation of dots is easy to see: FF1 divides the clock pulses by two making a dot equal to one complete period of oscillation of the multivibrator. The generation of dashes is accomplished as illustrated in fig. 4. FF2 divides the output of FF1 by two and then the outputs of FF1 and FF2 are logically 'ORed' to provide dashes. Notice that the length of one dash is exactly three times that of a dot. Also note the spaces are one 'dot' long.

The combination of these three parts, the gated multivibrator, the initiating/self-completing circuitry and the character-shaping circuitry make up the whole of the logic for Version I of the COSMOS keyer.

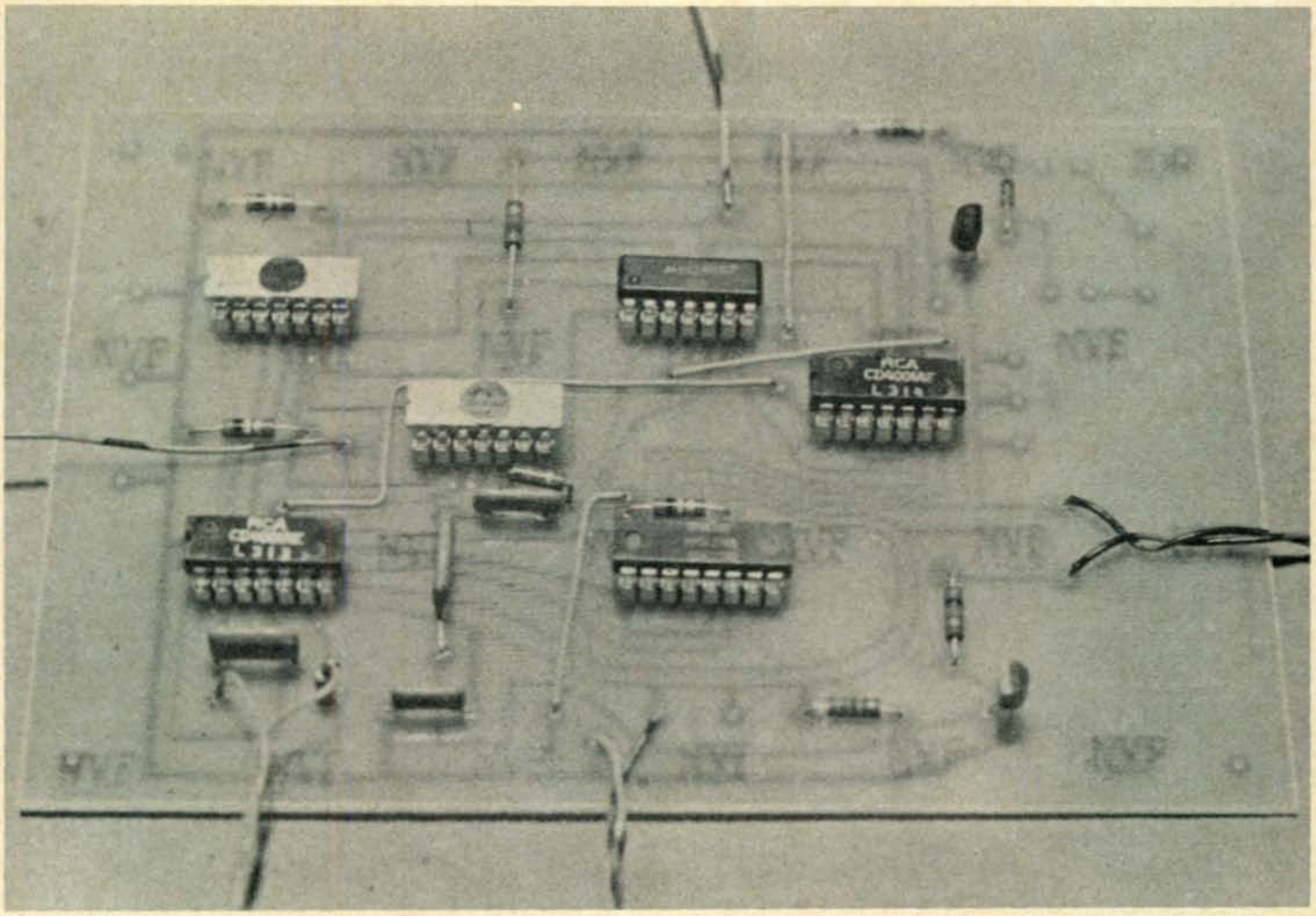
Version II Circuit Description

Version II of the keyer has all of the parts of Version I with a few more added. Its operation can be subdivided into five groups: gated multivibrator, initiating/self-completing, character shaping, dash-dot memory and sidetone oscillator. The circuit diagram of Version II is shown in fig. 5.

Gated Multivibrator — The gated multivibrator in Version II consists of gates (see fig. 5) B, A, and C. Since it is identical to that used in Version I, its operating description will not be repeated here.

Initiating/Self-Completing — The initiating/self-completing circuitry used in Version II is identical to that of Version I with one minor detail; gates O and P are used in addition to gates D and E. These additional gates act together to form an 'OR' gate for the output of the dot paddle and the output of the dash-dot memory; when either goes low, D-3 goes high, gating 'on' the multivibrator and initiating a dot. Thus if the output of the dash-dot memory is low, the keyer will automatically generate a dot.

Character-Shaping — The character-shaping part is very similar to that of Version I. However, in order to implement the dash-dot memory it was necessary to make it more complicated. The components of this part are two JK flipflops (FF1 and FF2), a D flipflop (FF3), and gates F, G and L. FF2 works with FF3 and gate G in such a way as to make G-3 normally stay high but switch low during the generation of a dash. This particular waveform is needed in the dash-dot memory. The somewhat different configuration offers no obstacle to understanding the character-shaping part. The generation of dots is completely analogous to that of Version I; only FF1 operates, dividing the clock pulse by two and feeding the result through gates I and



Component side of Version II keyer PC board showing the sparse parts complement. The reed relay is not installed here, but would be located at the upper right.

flipflops in the character-shaping section. With this feedback, every clock pulse is identical. The second feedback path is from G-3 to E-2. This path prevents the multivibrator from stopping in the middle of a dot or dash. As long as the keyer is generating a dot or dash, G-3 will be low. This insures that E-3 will also be low. The level of E-3 in turn gates 'on' the multivibrator by forcing C-3 to be low. Through these two feedback paths, the multivibrator keeps itself 'on' until the completion of the character being generated.

Character Shaping — The final part of Version I is the character-shaping section. This is the part that takes square pulses from B-3 of the multivibrator and gives perfectly spaced dots and dashes, depending on which paddle is depressed. The components of this section are gates G, H, F, along with JK flipflops FF1 and FF2. FF1 has both inputs tied high and thus acts like a divide-by-two circuit. FF2 has its J input held normally low by F-3. Thus it does not change state unless F-3 goes high; F-3 goes high when the dash paddle is depressed. Timing diagrams for dot and dash generations are shown in figures 3 and 4 respectively.

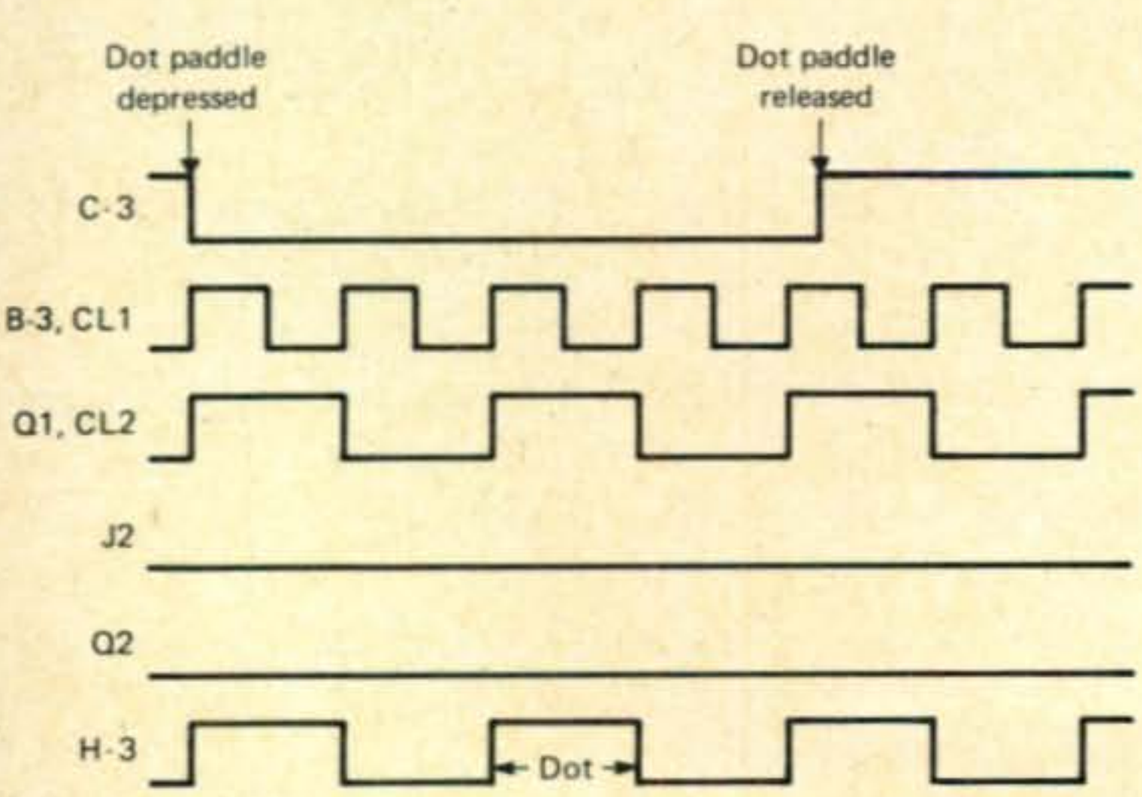


Fig. 3—Dot generation, Version I keyer.

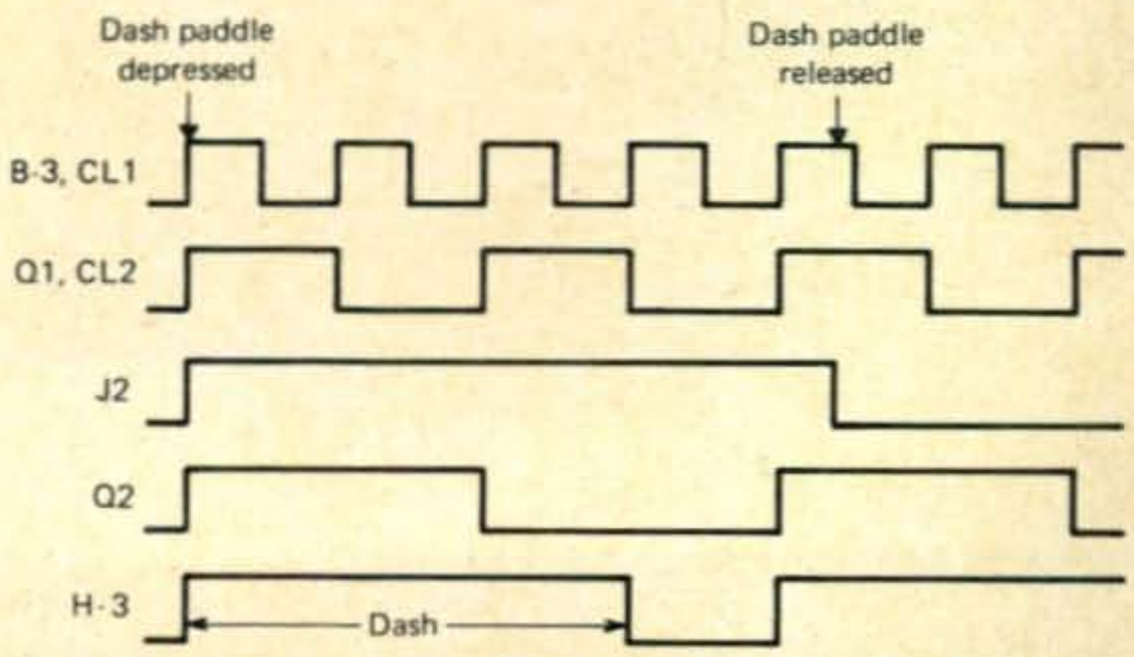


Fig. 4—Dash generation, Version I keyer.

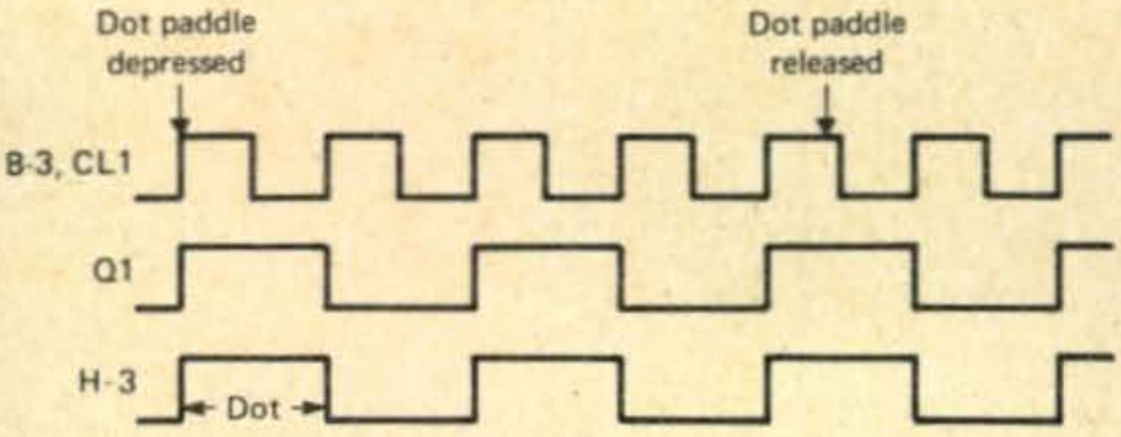


Fig. 6—Dot generation, Version II keyer.

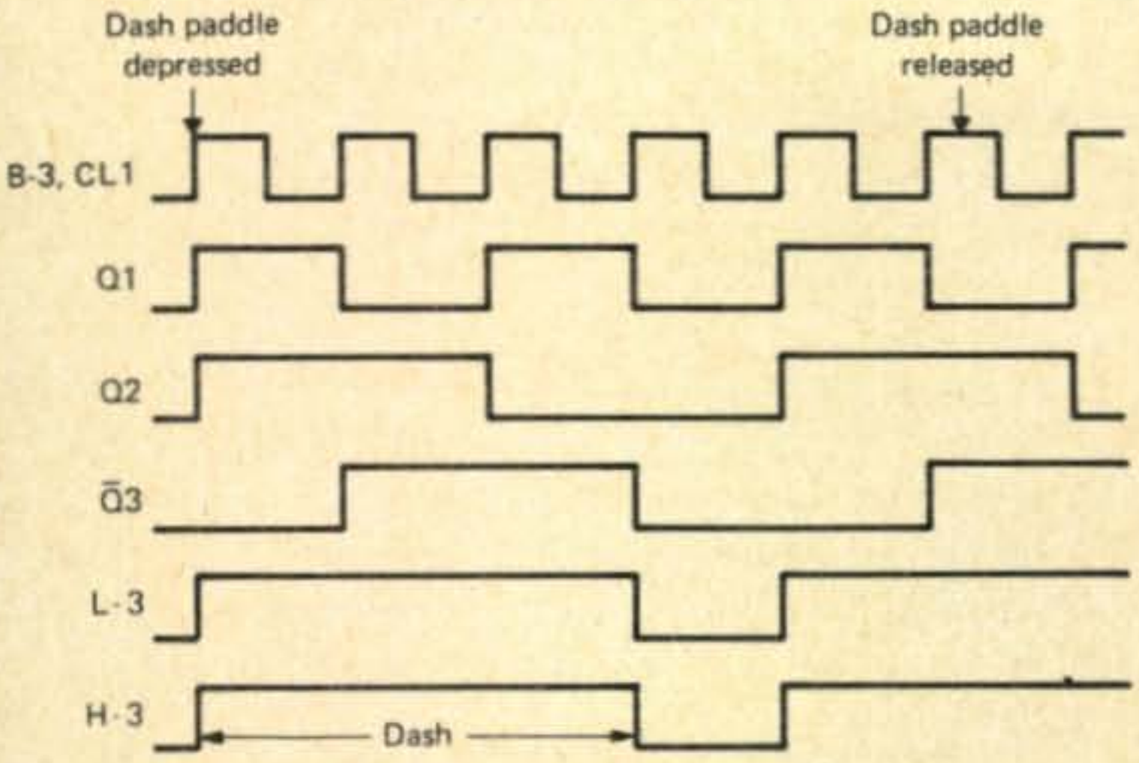


Fig. 7—Dash generation, Version II keyer.

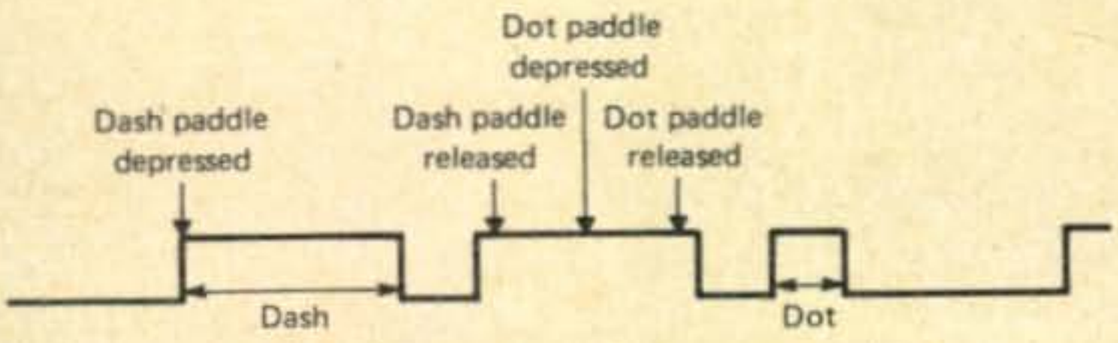


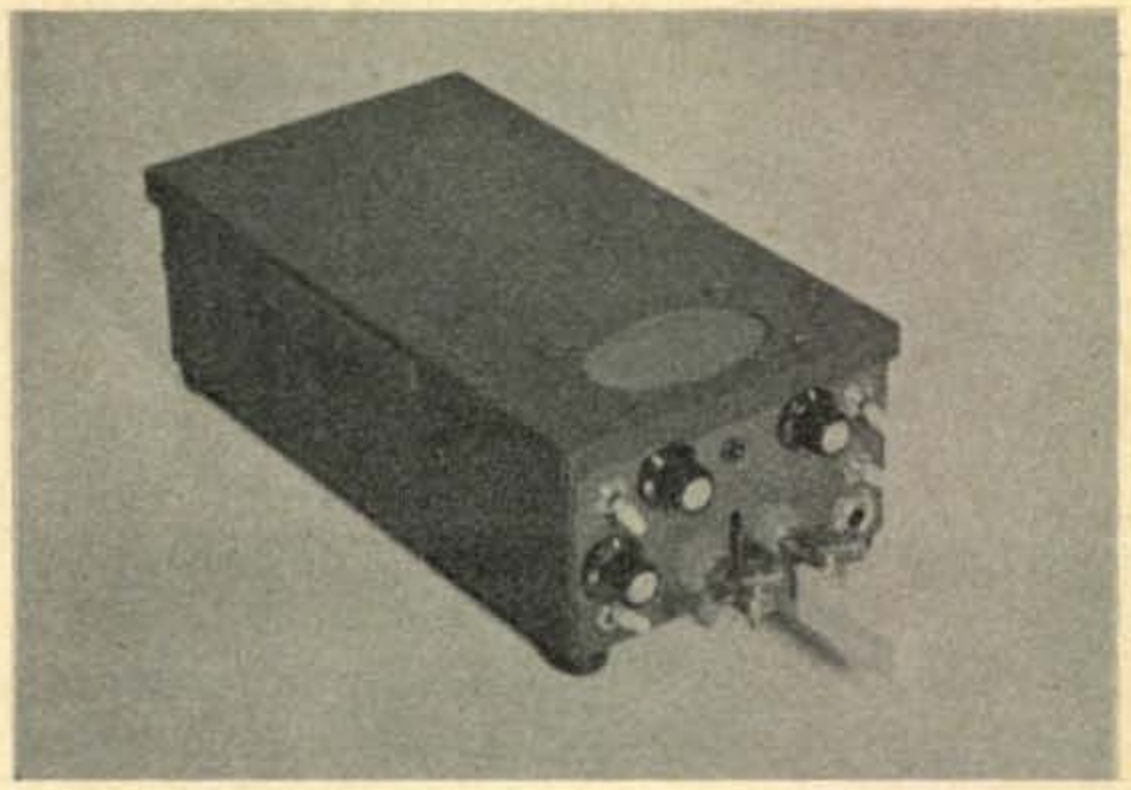
Fig. 8—Output of Dash-Dot keyer.

H to the output. Figure 6 shows the timing diagram for the generation of a dot.

The generation of dashes is also analogous to that of Version I except for the addition of FF3. The timing diagram for dash generation is shown in figure 7. FF3 receives its clock pulses from Q of FF1. The output of FF3 together with the output of FF2 are combined in gate G to provide our desired dash-dot waveform mentioned previously. Notice that although there is redundancy in combining Q1 and L-3 to form a dash, the dash comes out as desired.

Dash-Dot Memory — The main difference between Versions I and II of this keyer is the addition of the dash-dot memory in Version II. As mentioned, its only function is to remember a dot following a dash, if the dot was 'requested' by the operator while the keyer was sending the dash. Figure 8 shows the desired output from a keyer having dash-dot capability.

The components used to implement this function are gates M, N and an RS flipflop, FF4. Actually this RS flipflop is half of a



Front panel of the Version II keyer shows a home-brew paddle assembly at the center with pots for Speed, Sidetone Level and Sidetone Pitch surrounding it. Toggle switches control Power, Tune and other functions determined by the builder's own needs. A small speaker is mounted to the top cover.

dual flipflop COSMOS integrated circuit, half of which was already used in the character-shaping part. However, grounding the clock input to a D flipflop while using only its Set and Reset inputs makes the D flipflop act identical to a RS flipflop.

Setting the RS flipflop by applying a high to its Set input (with Reset input low) causes Q4 to go low. This transition is then fed through Gates O and P to trigger the gated multivibrator. Resetting the RS flipflop is accomplished by applying a high to the Reset input (with Set input low). This resetting forces Q4 to its normal high position. Notice that once the RS flipflop has been reset and self-completion has been accomplished, the keyer will not generate further characters unless they are initiated by the operator. The actual Set input to the RS flipflop is connected to gate N. Its two inputs are connected with one going to the dot paddle and the other going to G-3. As previously discussed, G-3 will be low whenever a dash generation is in progress. The dot paddle connection will be low whenever the dot paddle is depressed. Thus the output from the NOR gate N will be high whenever both a dash generation is in progress and the dot paddle is depressed. This is exactly the condition we need to detect. Resetting the RS flipflop is done with gate M. Its output goes high whenever G-3 is high (signifying a dash generation is *not* in progress) and Q1 is low. Although Q1 goes low several times during a dash generation, the only time its transition will affect the RS flipflop

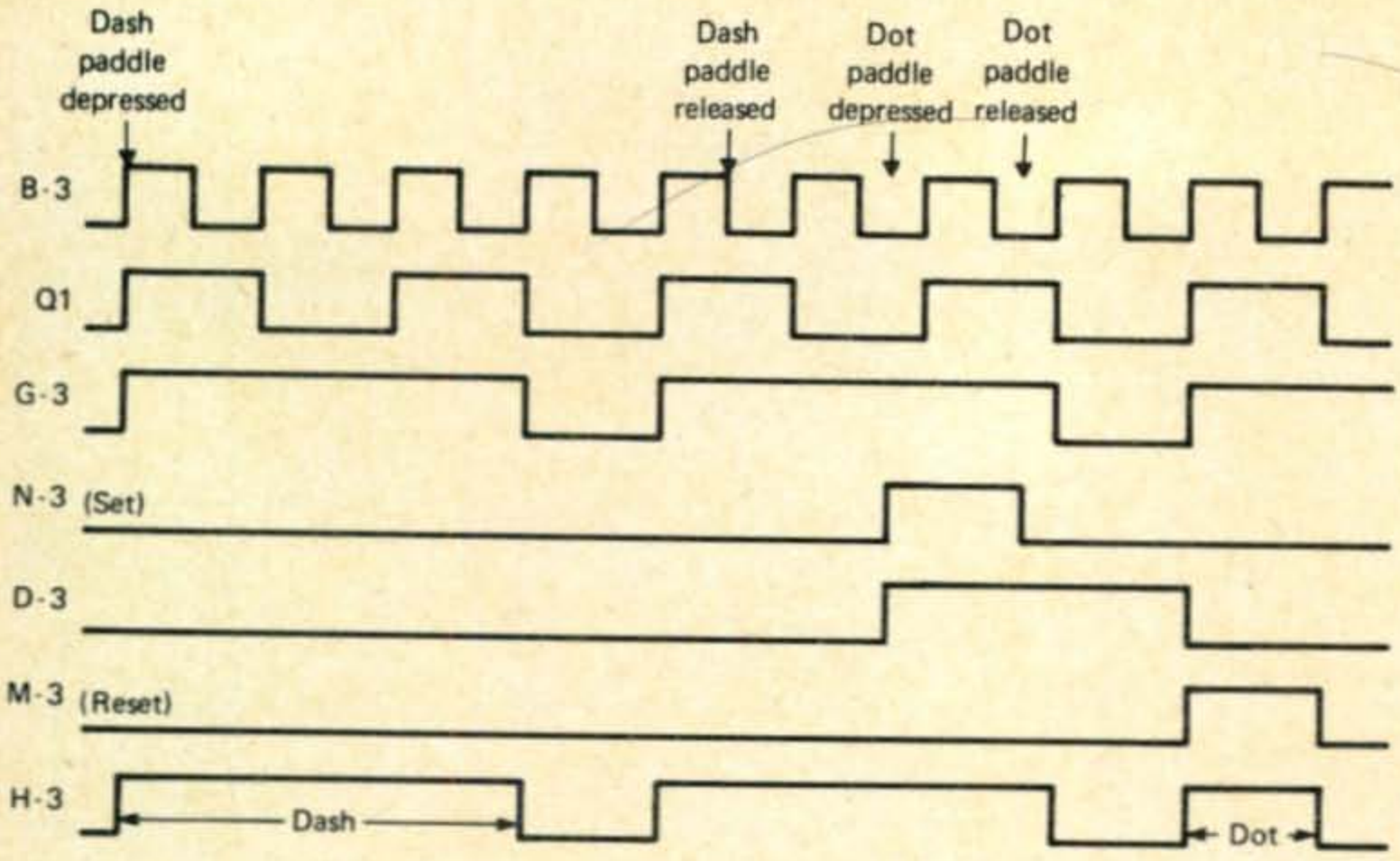


Fig. 9—Waveforms during use of Dash-Dot memory.

is when it goes low while dashes are not being generated. This happens with the first dot following a dash. Thus, when the RS flipflop is set it will generate a dot following the dash being sent. This dot in turn resets the RS flipflop. Notice that since M-2 is the same as 'NOT N-2', both Reset and Set inputs cannot be high simultaneously, a condition which is extremely undesirable. Figure 9 shows the waveforms during the use of the dash-dot memory.

Sidetone Oscillator — The last part of this keyer to be described is the sidetone oscillator. It consists of gates K and J. We have already described its basic operation under the topic of the gated multivibrator. This is the same configuration; the output from the keyer (H-3) gates on the multivibrator which oscillates with a frequency (determined by R_4 and C_2) in the audio range. This frequency is then fed into the transistor driver. The volume of the side-tone oscillator is controlled by R_7.

Output — Both keyers have their logic output drive transistors which operate relays. In the case of Version II, there is an additional driver for the speaker.

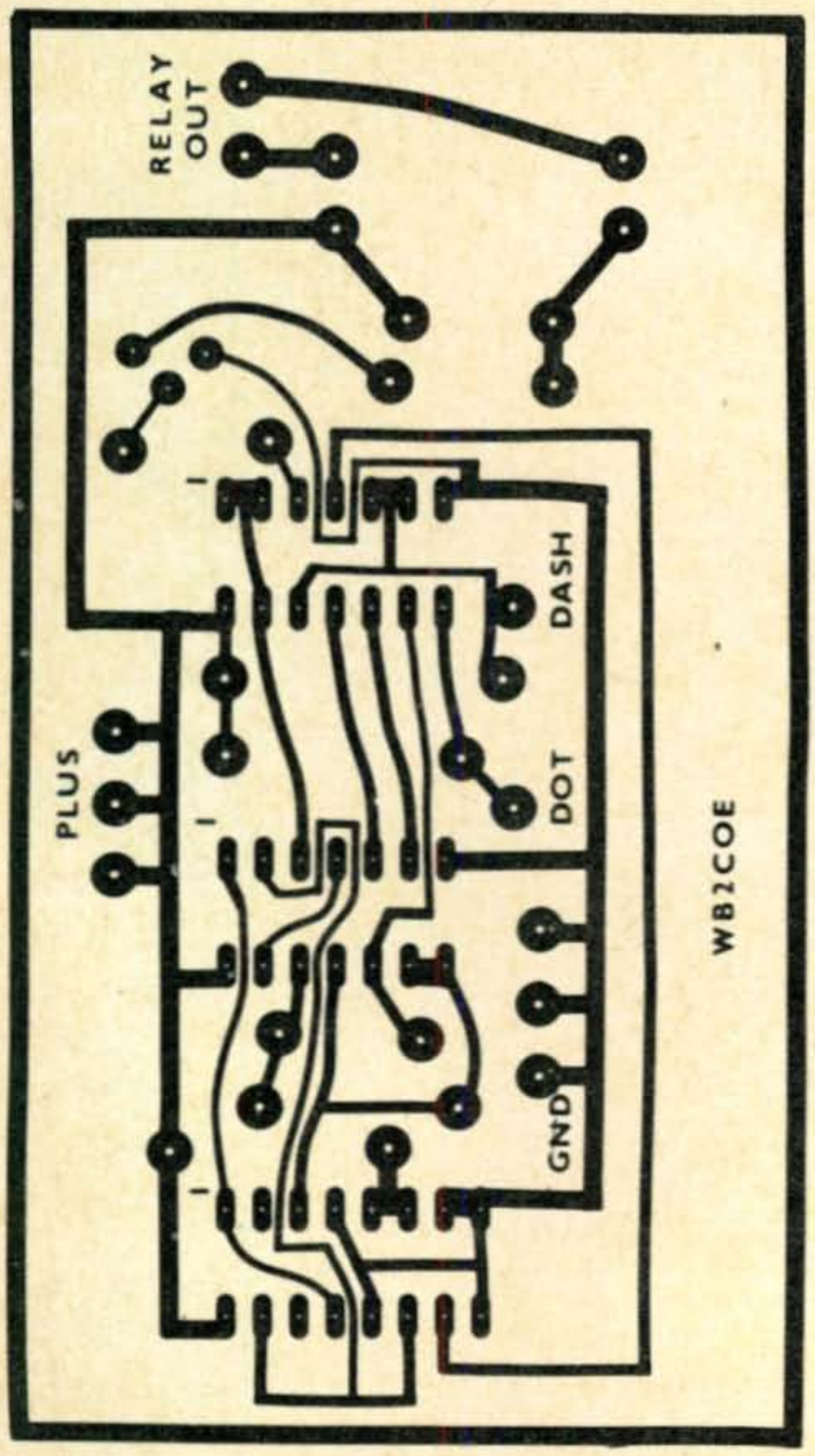


Fig. 10A—Full-size P-C board foil layout for the Version I COSMOS keyer.

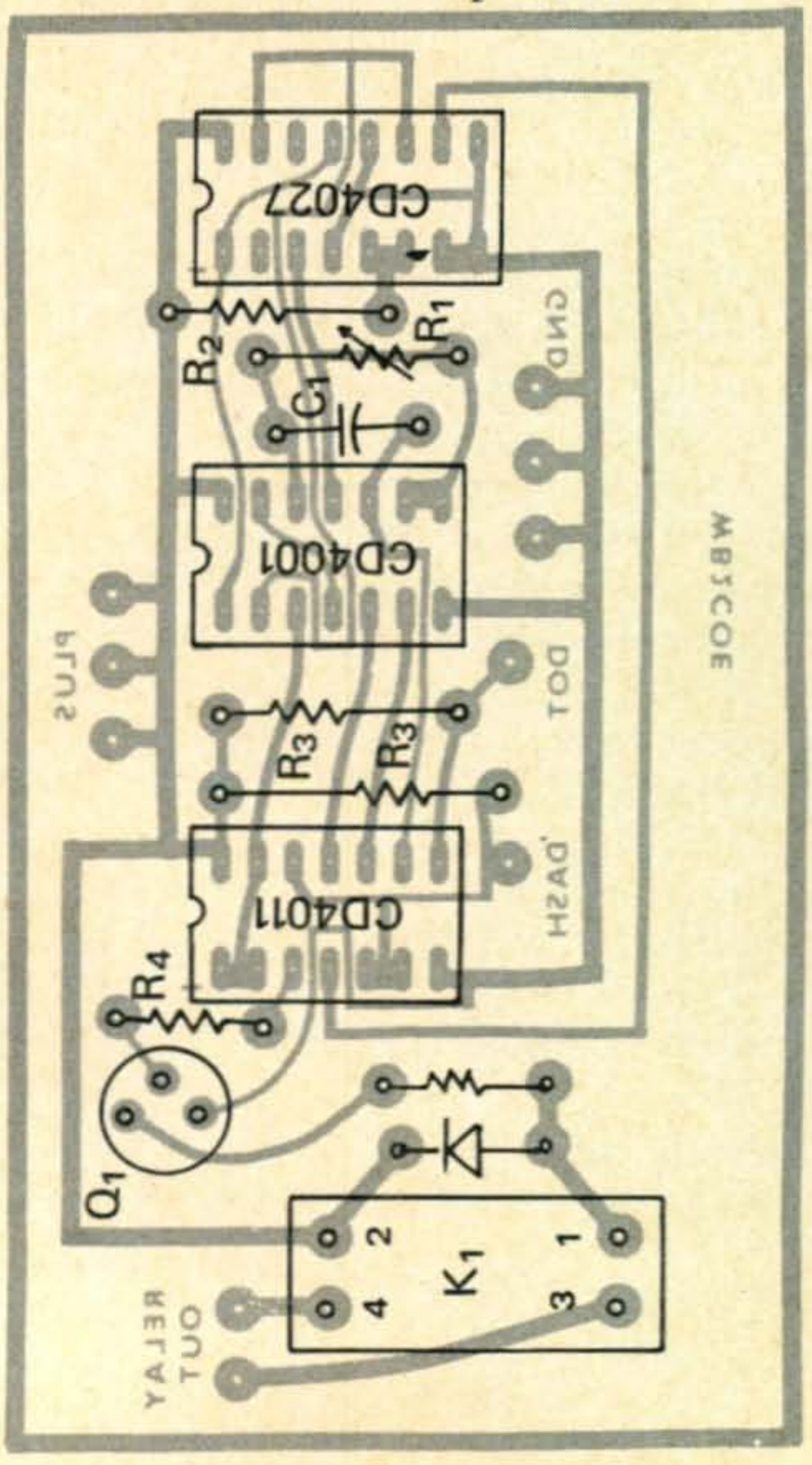


Fig. 10B—Full-size parts layout for the Version I keyer, shown from the component side.

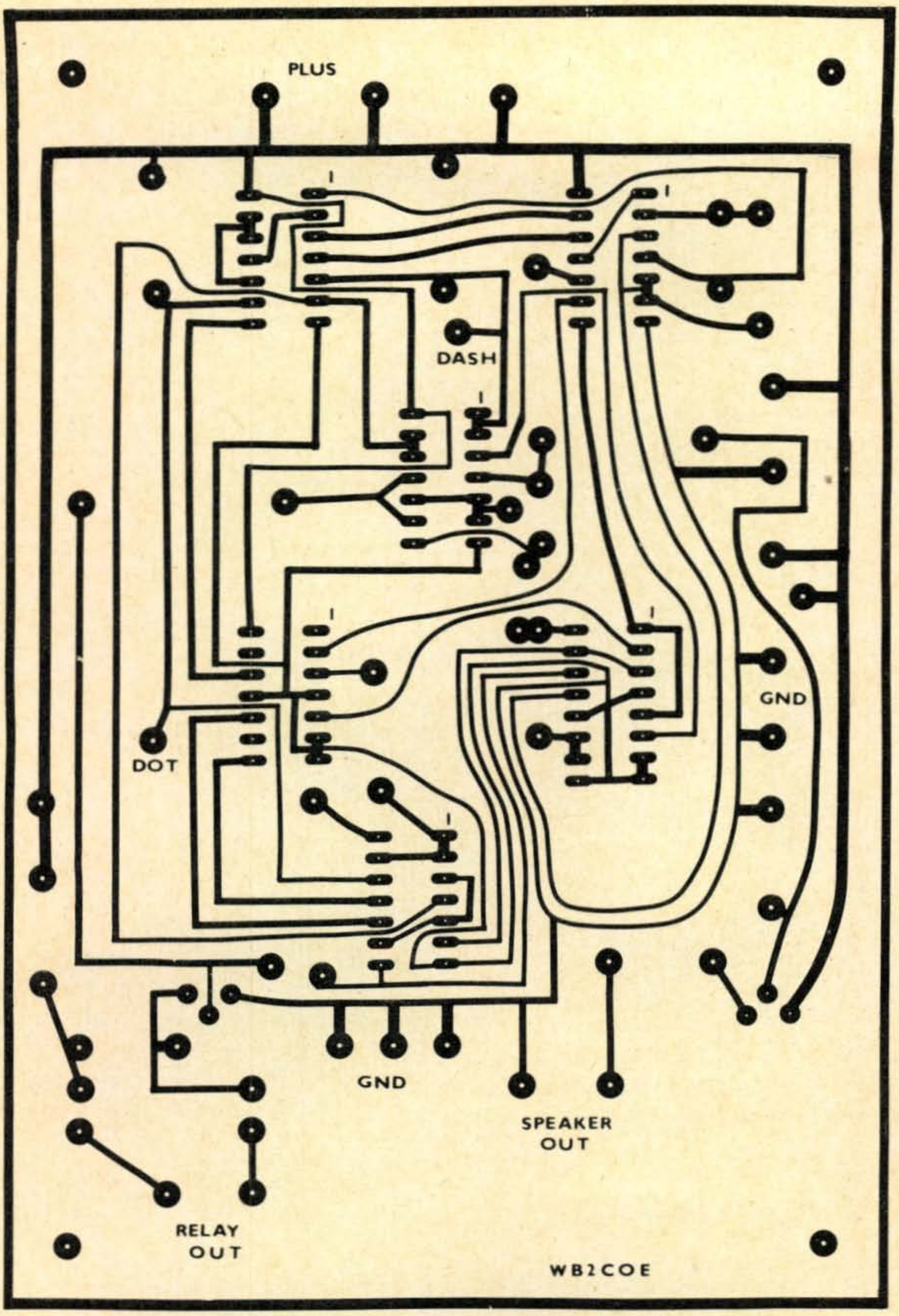


Fig. 11A—Full-size P-C board foil layout for the Version II COSMOS.

Power Supply

Due to the power consumption characteristics of COSMOS both versions can be economically operated from batteries, even a single 9 volt transistor radio battery. Using a 9 volt Duracell battery, Version I lasted 11 hours of continuous dash generation (with both relay and sidetone operating) before the battery voltage fell below the 7 volts needed to trip the relay. Using the relay specified the power supply voltage can be anywhere between 7 and 15 volts.

Construction

Fabrication of the actual circuits can be easily accomplished by using the circuit boards shown in figures 10 and 11. The relay specified will fit directly onto both boards. The pins 3 and 4 are the relay contacts. Version II has four jumpers which must be hard-wired unless double sided boards are to be used. These crossovers are

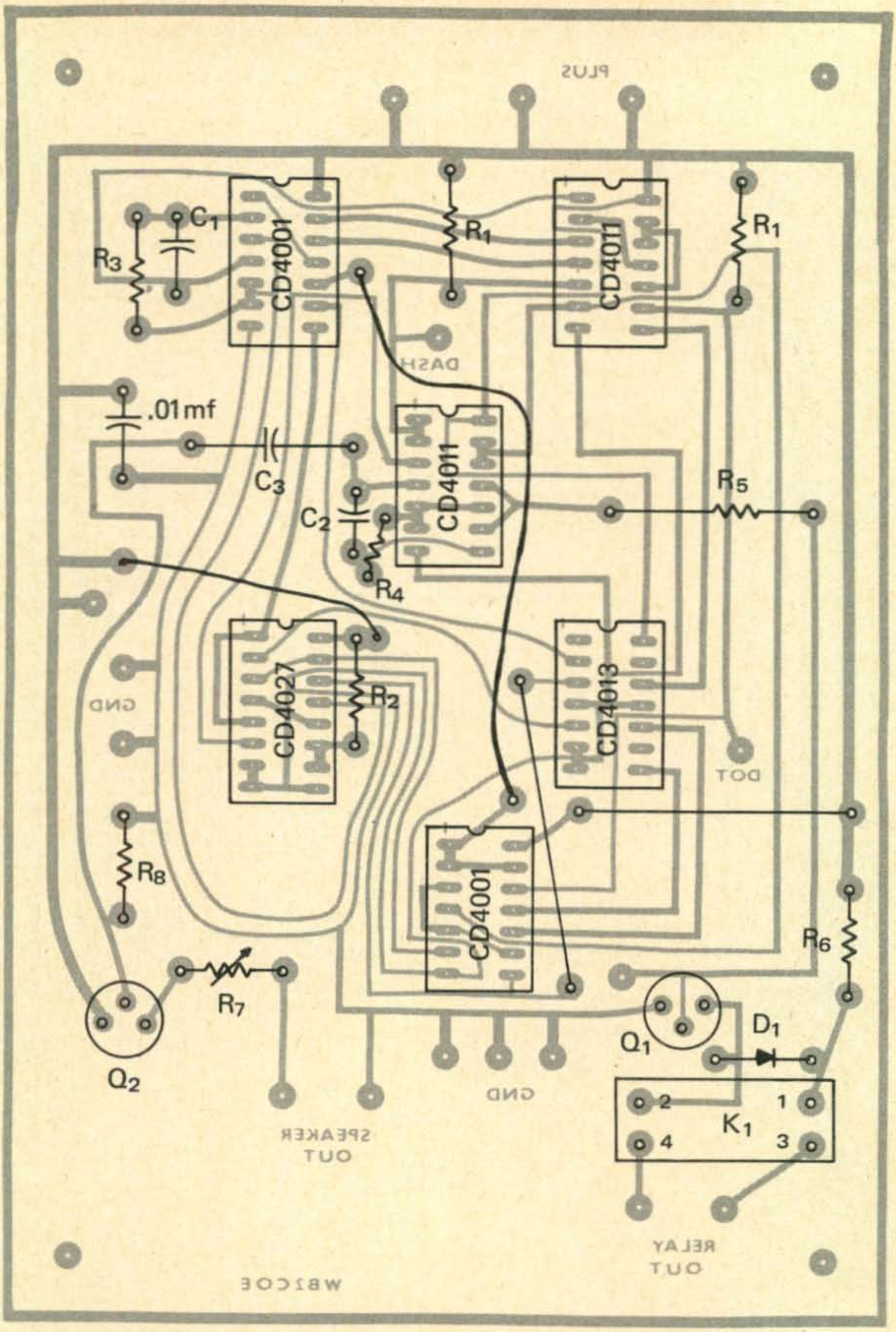


Fig. 11B—Full-size parts layout for Version II keyer, component side.

shown in fig. 11. Additional pads have been left on the boards for extra ground and V_{cc} connections. Also, for Version II, an extra pad on the output has been supplied for external solid state keying circuitry. This pad is found on the base connection of Q_1.

The photographs show a complete Version II keyer. This particular keyer belongs to K2AI and runs off D-cell batteries.

Conclusion

Both versions are particularly well suited for Field Day operation. However, either version can easily be integrated into any station, probably without the use of an additional power supply.

The dash-dot memory is a fairly new feature. Since it is only a necessary feature for high-speed operation, a similar dot-dash memory would not be needed. Getting used to the dash-dot memory should be no problem. However, using a regular electronic keyer after using the dash-dot memory feature might cause some frustration. ■

The Golden Years of Radio—

The National AGS Receiver

BY WILLIAM I. ORR,* W6SAI

MANY years ago, before some of the readers of this magazine were born, the world was in the depths of a great depression. The United States, because of its increasing industrialization, suffered greatly. Factories closed. Unemployment was rampant. The stock market dropped millions of dollars in paper profits. The wheels of industry gradually slowed to a halt. In spite of the economic disaster, however, this was the period of immense growth of the radio industry, The fad of "short wave listening" was popular and the "radio craze" bloomed, as the birth of modern broadcasting came about, in league with the depression. Great technical achievements were made during these early, turbulent years. This is the story of a pace-setting radio that was designed during the golden years of radio—the National AGS shortwave receiver.

THERE was a time when artisans took pride in their work. In the days before the automated production line and the prefabricated assemblies robbed the soul from inanimate objects, wonderful devices were assembled by craftsmen who had an intimate interest in their work. Some of these hand-crafted objects are still with us, but in ever decreasing numbers.

Amazing as it may seem, some radios were once assembled in this fashion. Not all of them, but a small few, were hand built and tested in an unhurried fashion, assembled by engineers who knew their onions and who were loath to allow inferior merchandise to escape with their imprint on it.

A few of these radios still exist today. The early National HRO and SW-3 come to mind, along with the Hammarlund Comet Pro, the early Scott receivers and a few others.

This is the story of such a legendary receiver. The *National AGS,* which was in limited production for a few short years, beginning in 1933. Few old-timers ever saw an AGS receiver except as a blurred picture in *QST* advertisements (fig. 1). No wonder! The receiver, less accessories, cost over $180 which, in terms of 1933 dollars, was nearly one-third the cost of a small automobile! Nevertheless, a few affluent amateurs owned an AGS, and other less

*48 Campbell Lane, Menlo Park, CA 94025.

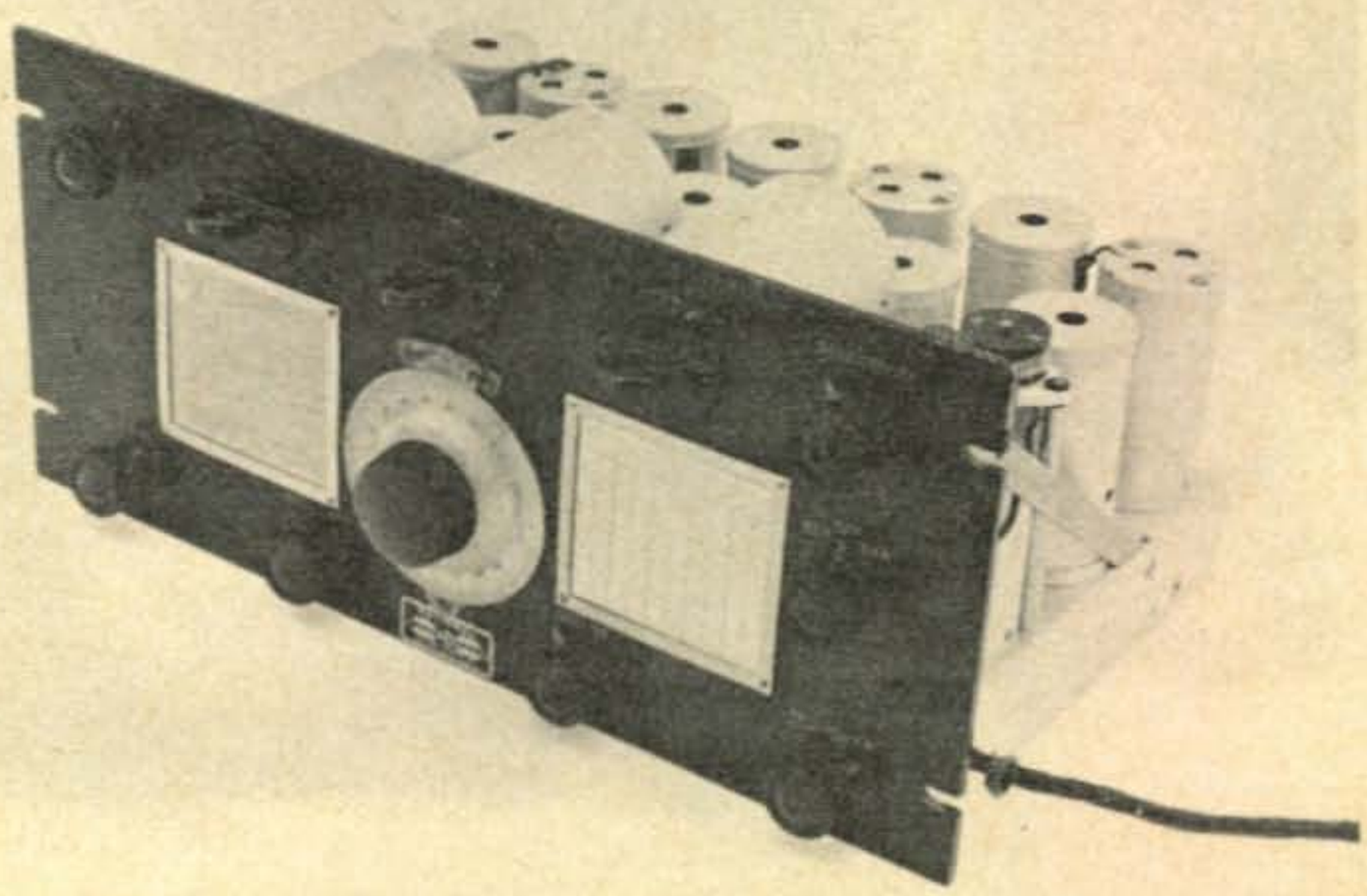


Fig. 1—The National AGS receiver. This 1933-vintage shortwave superheterodyne is the cornerstone of modern receiver design. Components were chosen on the basis of accuracy, ruggedness and reliability. This 42-year old receiver (the property of W6SAI) operated immediately when fired up, after decades of storage. Panel controls are (counterclockwise, starting at upper left): CW oscillator frequency, CW-Voice switch, manual-automatic volume control, volume, telephone-speaker switch, and two controls for the crystal filter (upper right). Three plug-in coils are across the top panel of the receiver.

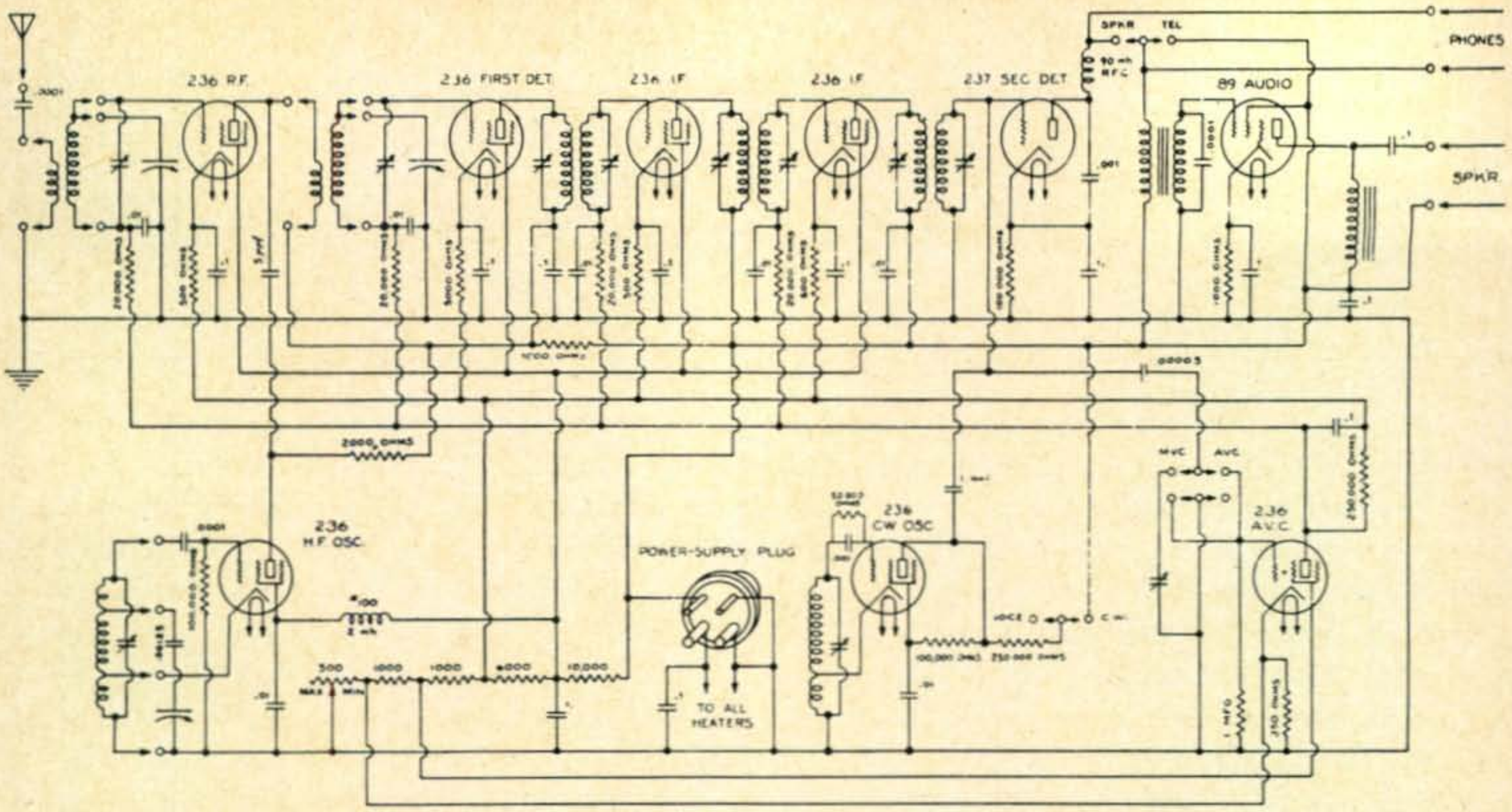


Fig. 2—Schematic of the National AGS receiver. This single conversion superheterodyne set the pace for a generation of shortwave receivers, up to—and through—World War II. The AGS used the (then) newly-developed 236 and 89 tubes, designed for extended life in mobile service. Either general coverage or bandspread coils were available for the AGS. Oscillator tracking was accomplished by a single series-connected, fixed trimming capacitor, plus adjustment of tap on oscillator coil. A small capacitor was placed in series with the antenna coil to prevent primitive automatic volume control circuit from being overloaded on strong broadcast signals. Note that no standby switch was in the circuit. The only way to mute the receiver was to turn down the r.f. gain control.

fortunate hams would come from miles around to look upon this wonderous receiver.

The Beginning

In order to appreciate the status of the AGS receiver, it is only necessary to leaf through the pages of a 1933 issue of *QST* to understand the state of the art as it concerned shortwave reception. The "Communications Department" of *QST* reveals that the great majority of amateurs operated with home-made 2 tube regenerative receivers. A smaller number owned the popular National SW-3 receiver, which boasted an r.f. stage in addition to the regenerative detector and single audio stage. The more advanced amateur (who had the ready cash —for few sales were made on the installment plan) spent up to one hundred dollars for a Hammarlund Comet Pro receiver and for a few sets of plug-in coils for his favorite bands.

While it is true that the Comet Pro was an effective superheterodyne receiver, it lacked an r.f. stage and had poor selectivity, at least as far as the crowded amateur bands were concerned. Moreover, as any amateur knew, the superheterodyne just wasn't suited for shortwave reception, and was not nearly as sensitive to weak signals as was a good regenerative detector and one-step audio amplifier!

It was in this chilly atmosphere that Jim Millen, W1HRX, and other engineers of the National Company of Malden, Mass. commenced the design of an advanced, shortwave superheterodyne receiver. As with many other projects of that time, the initial demand came from the federal government. The Bureau of Air Commerce (the predecessor of the present Civil Aeronautics Authority) was in the process of supplanting the revolving light beacons used for air navigation by a comprehensive ground to air radio network. The communications system was broken down into three groups: the ground transmitting equipment was to be developed and manufactured by the General Electric Company, the airborne radio equipment was to be developed and manufactured by Aircraft Radio Corporation (later to become famous as the developer of the World War II type SCR-274N radio) and the ground station receivers were to be made by the National Company.

A contract was signed between the BAC and the National Company for several hundred Aviation Ground Station (AGS) receivers to replace the antiquated regenerative

receivers in use at that date. Development of the advanced receiver was conducted under the supervision of W1HRX. Starting from ground-zero, the new receiver slowly took form and substance.

In truth, the self-appointed project leader didn't have much background information to go on. The previous experience of the National Company had been with the famous Browning-Drake broadcast receivers of a few years previous, plus the development of the popular SW-3 and SW-5 regenerative short wave receivers. The problem of working the "bugs" out of the SW-3 and SW-5 receivers, however, had given W1HRX a good insight into the pitfalls and traps of designing an operable shortwave "super-het" receiver. Then, too, W1HRX had worked very closely with James Lamb, W1AL, who had developed the first, practical shortwave communications receiver using the new, improved crystal filter.[1,2] Millen, luckily, had a license to use the crystal filter circuit, whose patent was in the process of being sold to the Radio Corporation of America. The National Company, then had the fortunate advantage of having the best technical brains to apply to the matter, plus the enormous advantage of being able to incorporate the crystal filter in their final design.

The AGS Receiver

Several hundred AGS receivers were made on the government contract and small number of extra receivers were made at the same time to be sold to affluent amateurs. The only difference between the contracted receivers and the ones sold on the open market was the nameplate. It is estimated that only between two hundred and four hundred receivers were made, before the AGS was obsoleted by the famous HRO receiver, which incorporated many of the unique concepts of the grand-father AGS.

The basic circuit of the AGS is familiar to today's communication engineer. A single conversion superheterodyne, with one r.f. stage, two i.f. stages, automatic volume control, a beat-frequency oscillator and an audio stage comprised the receiver. A crystal filter was available, on special order, and the receiver was then known as the AGSX.

[1]Orr, "The Golden Thirties—The Amateur Communications Receiver Comes of Age", *CQ*, July, 1973.
[2]Lamb," What's Wrong With Our C.W. Receivers", *QST*, June, 1932.

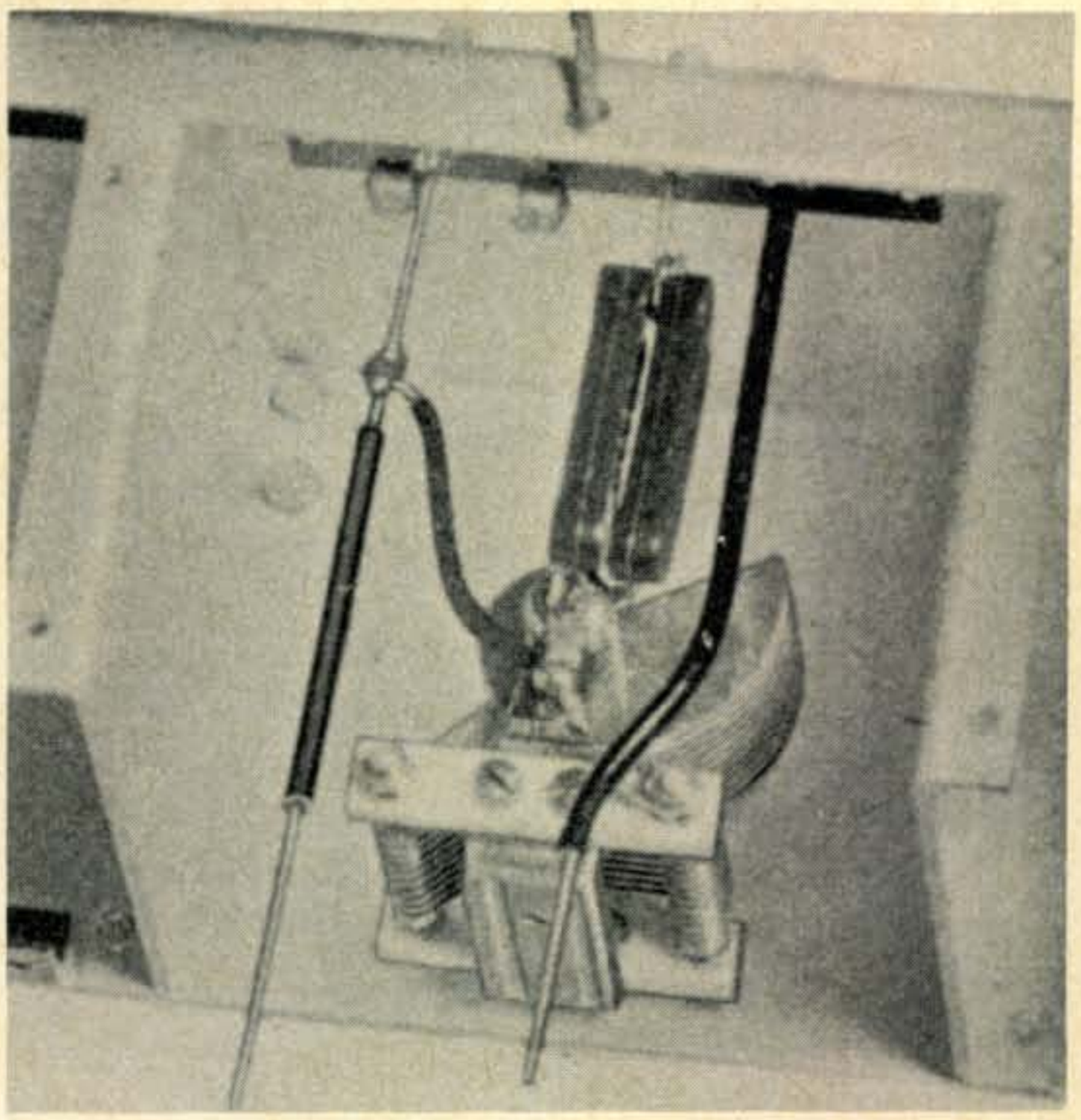


Fig. 3—Discrepancies in the inductance of the wiring of the AGS oscillator are corrected by moving the tap on the slide wire running up to the oscillator coil. This permits a fine adjustment during the final alignment process. The variable capacitors were hand selected to close tolerance limits.

While the circuit, viewed in the harsh light of today, may be uninspiring, the construction of the receiver was decidedly not! A whole new mechanical concept was used in the AGS design, and many of the innovations of this spectacular receiver are incorporated in today's sophisticated s.s.b. receivers.

A schematic of the AGS receiver (less crystal filter) is shown in fig. 2. It has a single r.f. stage and an intermediate frequency of 500 kHz. A triode second detector is used and the receiver incorporates a rudimentary automatic volume control system using a type 236 pentode. The tube functions as a variable resistance connected across the a.v.c. line, the resistance being lowest with no signal input and rising with an increase in the input signal. The tube is operated with the plate at ground potential and the screen and cathode "below ground" to provide a negative control voltage. A large bleeder network in the power supply circuit provides the proper voltages.

Circuit connoisseurs will note that no audio volume control is used, receiver volume being adjusted solely by the bias control potentiometer, which sets the bias level for the r.f. and i.f. stages. Automatic volume control voltage is also applied to the first detector, a scheme that is frowned upon to-

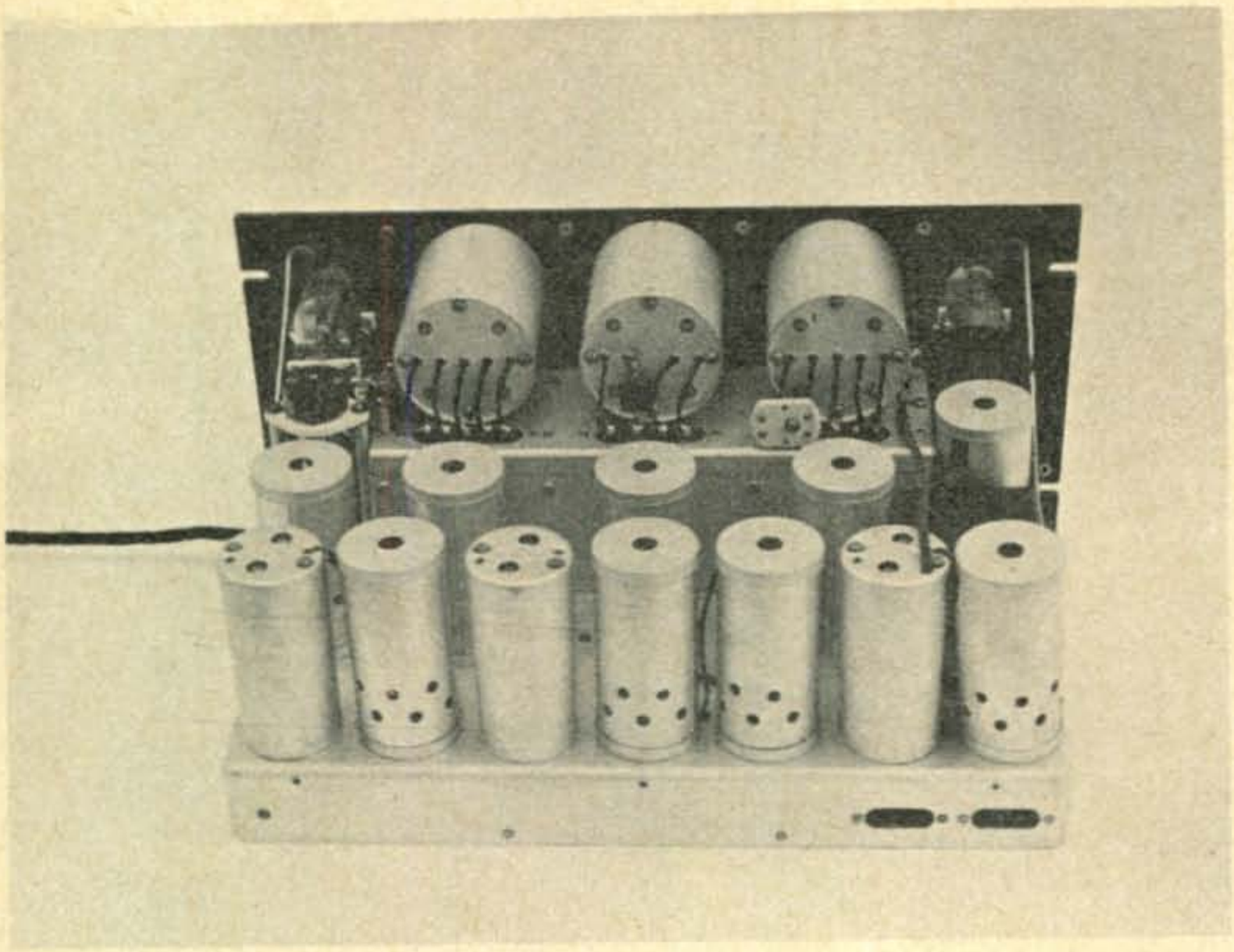


Fig. 4—Rear View of the National AGS. The AGS is built upon a punched and drawn aluminum chassis having rounded corners. The three main tuning capacitors are housed in a sturdy aluminum box running across the front of the receiver. The capacitors are driven from the main dial by a heavy rack and pinion assembly. The crystal filter and selectivity adjustment capacitor are mounted to the left edge of the main panel. Earphone and speaker tip-jacks are placed on the rear wall of the chassis. Normally, the rear components of the AGS are covered by a heavy aluminum dust cover.

day, as the ever-changing control voltage tends to "pull" the high frequency oscillator, imparting a flutter to strong signals. However, the AGS got around this problem by injecting the local oscillator signal into the plate circuit of the r.f. amplifier stage and inductively coupling the mixing signal into the first detector, along with the received signal.

One minor mystery of the AGS is the control of the a.v.c. time constant. This is usually set by a large, fixed capacitor connected between the a.v.c. line and ground. The only capacitor that seems to fulfill this obligation is a 0.1 mf unit connected between the a.v.c. line (at the plate of the 236 a.v.c. control tube) and the cathode return circuit. Interestingly enough, the cathode return circuit is not bypassed to ground so, on the surface, it looks as if no a.v.c. time constant circuit exists. However, time delay in the system is present, and in spite of the odd-ball appearance of the circuit, the idea seems to work. A circuit engineer is left wondering if this arrangement was intentional, or merely a "goof" on the part of the original designer! This particular a.v.c. circuit is used in later National receivers (NC-101X and NC-240D), but in these, the capacitor in question is properly returned to ground.

AGS Alignment Features

One of the aspects of the AGS design that leaves the modern engineer breathless with amazement is the control of residual inductance and capacitance in the r.f. tuned circuits. To permit easy alignment, the modern receiver has adjustable trimming and padding capacitors in the critical circuits and many receivers, in addition, have slug-tuned coils. All this permits the experimenter to align the circuits "on the nose".

These adjustments are not incorporated in the AGS receiver. Rather, the plug-in coils were precision wound on grooved forms to control the inductance to a fine degree. Then, to "zero-in" on the final adjustment, the engineer who aligned the receiver adjusted coil inductance by varying the length of the connecting lead between the grid end of the winding and the prong of the coil form.

Tuning capacitors were laboriously hand measured to assure the proper tuning range and as a final adjustment, oscillator tracking was corrected by moving a tap on the wire connecting the tuning capacitor to the plug-in coil assembly! This final adjustment is shown in fig. 3. As a result of this painstaking procedure, the tuning curves supplied with the receiver were, and still are, correct to a remarkable degree.

Such hand labor to calibrate the receiver, of course, is impossible in today's high priced labor market. But in those long-ago times of the depression it was not uncommon for engineers to receive a salary of $20 to $40 a week, and technicians in the youthful electronics industry earned from 20¢ to 35¢ per hour.

Each AGS receiver, then, was hand calibrated and adjusted so that the frequency calibration on the panel chart was correct.

This meant, of course, that coil sets for the various receivers were not interchangeable if dial calibration was to be held. But the author has found with his AGS that it is possible to interchange coils—and even use FB7 coils in the AGS—provided that the user does not take the calibration chart too seriously!

The Mechanical Construction

As basic as the electrical design of the AGS seems to today's sophisticated radio amateurs, the mechanical design stands as an outstanding accomplishment and the physical assembly of the receiver is something that most amateurs and engineers have never seen. The receiver is solidly constructed on a punched and drawn aluminum chassis made of ⅛-inch thick material. The panel is heavy steel, firmly bolted to the chassis. End braces make an extremely rigid assembly (fig. 4). The three tuning capacitors are in-line across the front of the receiver and are driven from the main tuning dial by a heavy rack and pinion assembly. To avoid tuning backlash, the high frequency oscillator is placed in the middle of the mechanism and is directly driven by the dial. The dial has a 150 degree calibration spread over 270 degrees of rotation and is equipped with a micrometric scale capable of being read to 1/10 division.

The three plug-in coils are mounted in spun aluminum receptacles fixed above the tuning capacitor gang, the oscillator coil being directly above the tuning dial.

Underneath the chassis, all small bypass and coupling capacitors are encased, 600 volt mica units. The larger bypass capacitors are 1000 volt, oil-filled units, imported from Germany (fig. 5). All resistors are wire-wound units mounted on a large terminal board for easy servicing. And, to top it off, the receiver is wired with heavy, solid buss-bar wiring!

Operating the AGSX Receiver

After searching for years, the author finally located an AGSX in seemingly good condition. It is the one shown in the photographs. It was covered with grime and dust of years and the silver dial and aluminum chassis were a nasty, discolored green. After a good, careful scrubbing with a strong laundry soap, the original color of the receiver was restored. A quick check showed no shorted capacitors, so the AGSX was turned on—and played right off the bat! Signals poured in across the dial when a 40 foot length of wire was used for an antenna.

Because of the method of injection and the biasing scheme used on the second detector, the early National engineers unknowingly built a form of product detector in the receiver and s.s.b. reception is excellent! Receiver stability, when compared to the modern crystal controlled, double conversion receiver is poor, but the addition of a small voltage regulated power supply cured most of the long-term drift.

Automatic volume control on most signals was adequate, although the dynamic range of the simple a.v.c. system was overloaded on strong, local broadcast signals. Reducing the length of the antenna solved this problem.

[*Continued on page 80*]

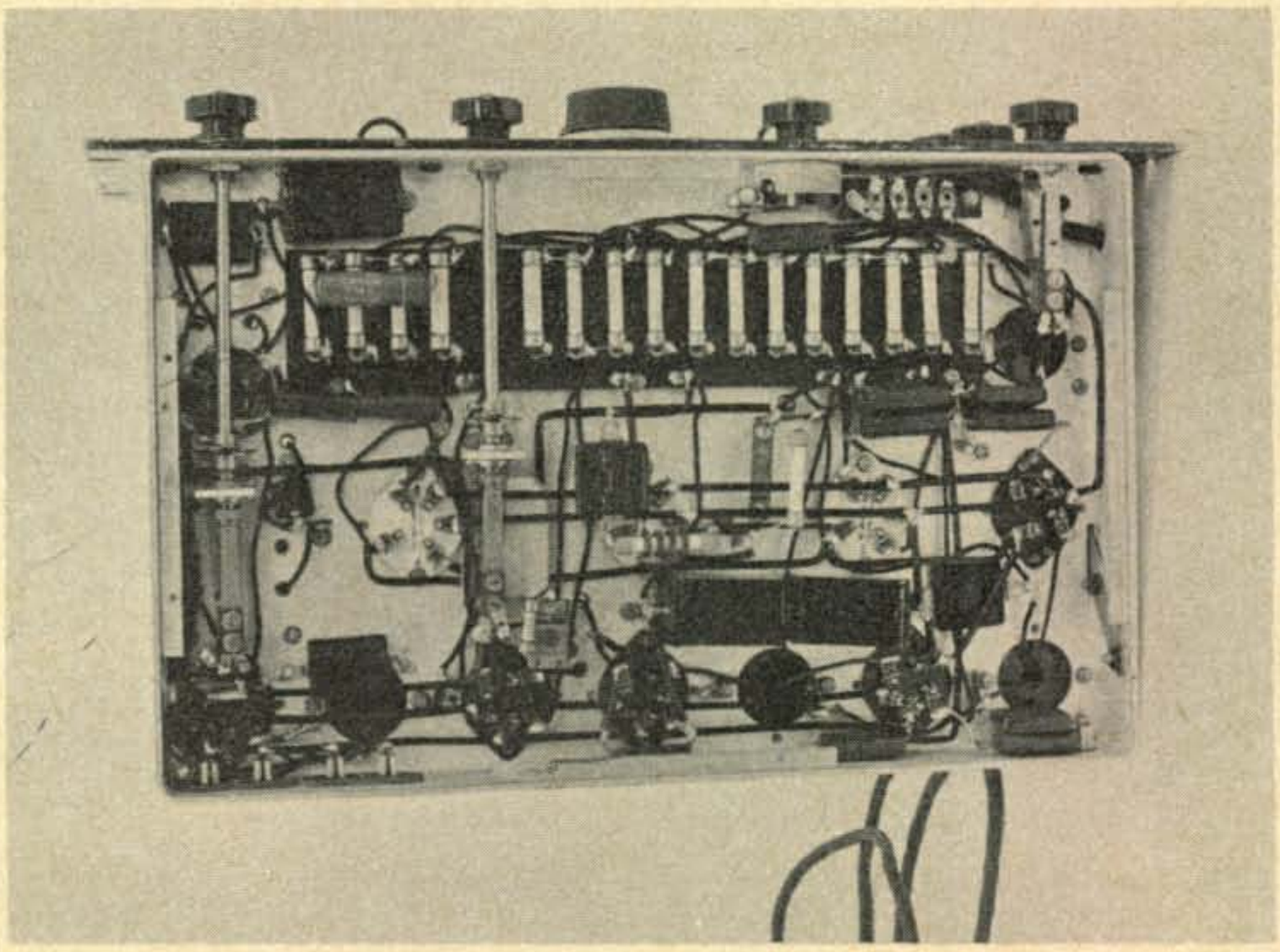


Fig. 5—Under-chassis view of AGS receiver. Most of the power resistors are mounted on a large terminal plate running across the front of the receiver. Major wiring is done with buss-bar. Large bypass capacitors are 1000 volt, oil filled units imported from Germany. All r.f. bypass capacitors are 600 volt, mica units. The c.w. and a.v.c. control switches are mounted toward the rear of the chassis and controlled via extension shafts. Heavy, aluminum bottom plate was removed for the photograph.

Ohms Law of the Universe

BY IRVING M. GOTTLIEB,* W6HDM

INTUITION—borne of experience— is truly the guiding spirit for much of our electronic endeavors. When we construct, operate, service, or even design circuits and systems, where can better opportunity be found to utilize our good old Yankee ingenuity? With our know-how, we find our port of destination; with a time-proven navigational aid known as "cut and try," we ultimately dock at the desired wharf. Far be it from the intent of this article to take issue with this procedure—not only is its practicality patently obvious, but it is often imbued with a mistique bordering on the beautiful. Nonethe less, who would deny that our skills are rendered even sharper when know-how is *augmented by some genuine savvy of mathematics?* It is indeed a tragedy that both books and educational formats on this vital subject are so often boring and non-relevant, if not utterly meaningless! (It sometimes appears that those who purport to translate the hieroglyphics and abstractions for us must be throwbacks from antiquity when the priestly caste saw to it that knowledge was not disseminated amongst ordinary folk.)

More optimistically, it happens that enlightening insights can be attained by developing a "feel" for the basic *essence* of equations. It is not at all necessary to become a biological memory-bank, to produce accurate numerical results, or to grind out a prescribed number of solutions in a limited time—as in classroom exams. Rather, with readily-acquired common-sense approaches making use of dimensional concepts and analogies, one gains understanding of situations previously beclouded by foggy notions of what really goes on. In the discussion which follows, it will be shown that the forebodings we often harbor regarding the extension of our mathematical prowess are naught but foolish fantasies!

We will concern ourselves with a very interesting entity known as "Boltzmann's Constant." It is generally represented by the lower-case "*k*." Rest assured that "*k*" is no mere abstraction dear to the hearts of the ivory-tower fringe. In a real sense, we can say that Boltzmann's constant is the "Ohm's Law of the Universe." Exaggeration? Scan the pages of books on Thermodynamics, Chemistry, Mechanics, Nucleonics, Astronomy, and most certainly, *Electronics*. Most emphatically, *"k"* is saying something of importance to us. Let's explore a few situations in Electronics where we probably have seen this mysterious symbol at one time or another. Perhaps we shall find that the lonely atoms and the unfathomable energies of the cosmos have useful messages pertaining to our very mundane hardware! Four typical situations in electronics where *"k"* is involved are shown in fig. 1.

Consider the equation for the thermal noise (known also as Johnson noise or Brownian noise) of a resistor, or a circuit which can be represented as an equivalent resistance. We have: $E = \sqrt{4kTRB}$. Here, E, is the r.m.s. voltage developed across resistor, R, at absolute temperature, T, and considered, or measured, over a bandwidth of B cycles-per-second. It appears that everything but the kitchen sink has been thrown under the radical sign. How in the world can a *voltage* be forthcoming from such a hodge-podge? As may be suspected, much of the secret is involved in the inclusion of *"k."* But, before proceeding with our analysis, it is apropos to point out that the above equation is *probably the most important of any that we use in the field of communications, radar, or in any process where we are interested in tremendous amplification of weak signals.* This equation sets the approximate *limit* of useable gain. Once noise voltage is of the same order of magnitude as the desired signal, further increase of gain cannot yield improved extrac-

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tion of the signal from the noise. If we want to impart greater amplification, we must be prepared for trade-offs such as reduced bandwidth, lower resistance, or lower temperature. As we well know, we then get into other adversities such as cost, weight, reduced data-speed, etc. And unfortunately, there is one quantity that we can neither make larger or smaller—in this sense, "*k*" is truly a constant! But, other than value invariance, what is actually implied when we call "*k*" a constant?

We know of other so-called constants. Pi is one of these and relates the circumference of a circle to its diameter. Note that Pi is dimensionless—it is described not by feet, pounds, volts, or any other unit. It can be said that Pi is simply a ratio. Another constant is "*c*" the velocity of light in free space. But here, the number cannot stand alone. It must be accompanied by the appropriate units of distance and time, usually meters or kilometers per second. Also, some books speak of conversion factors as constants. For example the conversion factor for expressing inches in terms of centimeters is 2.54. It is dimensionless and is a ratio, but unlike Pi cannot stand alone. One must say that there are 2.54 centimeters in an inch. Relevant to this discussion is the fact that some electronics books use the same lower case "*k*" to represent Boltzmann's constant and the coefficient of coupling between two tuned circuits—two radically different beasts, to say the least. And in equally bad taste, some treatises on thermodynamics use the same "*k*" symbol to represent Boltzmann's constant and thermal conductivity. What price clarity?

No mere ratio or conversion factor is our Boltzmann's constant. Although it naturally has a discrete numerical identity, its primary importance from the standpoint of this discussion, resides in the nature of its *units*. It is easy enough to consult a reference and find that the value of Boltzmann's constant is given as 1.38×10^{-23} joule per degree of temperature on the Kelvin scale. But, lest we be snowed by the jargon of the physicists, let us simplify matters a bit. Because we are interested in dimensional concepts, not numbers, we wind up with joules per degree. And it so happens that a joule is one and the same as a watt-second. The watt-second, of course is a unit of energy, as we well know from our bills for its big brother, the kilowatt-hour. Summarizing, the dimensional concept of Boltzmann's constant is energy per unit of temperature. This is conveniently written as $\frac{P \times t}{T}$, where P represents power and t represents time units.

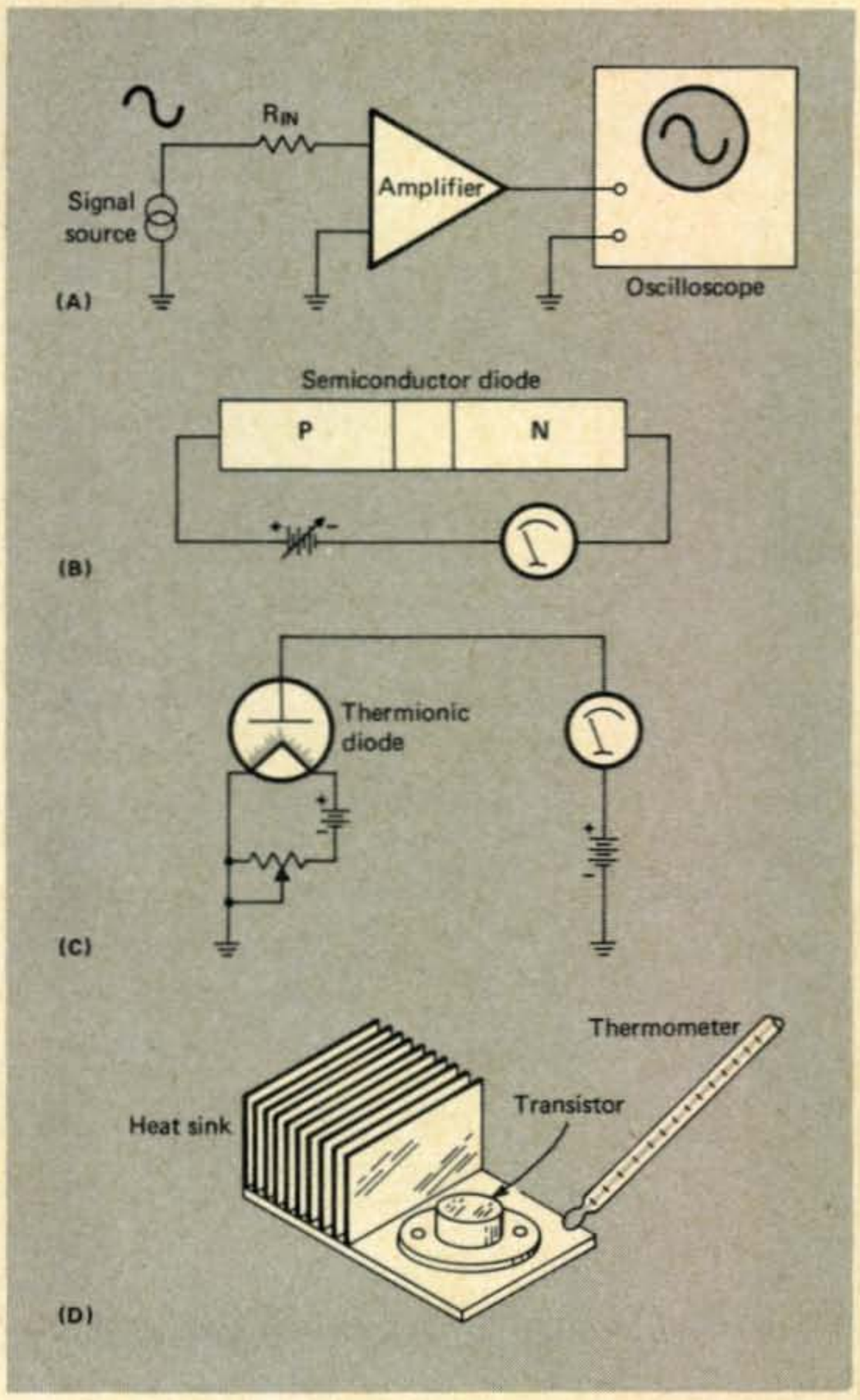


Fig. 1—Common electronic phenomena involving Boltzmann's constant. (A) Noise generated in the input circuit of an amplifier. (B) Current through a semiconductor PN junction. (C) Current from thermionic emission of a heated filament. (D) Temperature rise as a result of power dissipation.

So far so good. The reasoning we have indulged in is known as *dimensional analysis* and entails the reduction of apparently complex expressions to their most basic forms. What could be easier? And soon enough, another question will be apropos, "What could be more useful?"

We return now to our equation for noise voltage and re-write it in terms of simple dimensional units:

$$E = \sqrt{4kTRB}$$

We wish to prove that the right side of this equation is, indeed, a voltage.

Quantity	Electrical dimension	Common symbol	Common unit	Typical electrical formulas
$\frac{kT}{V}$	Charge	q	Coulomb	q = It q = Pt/V
$\frac{kT}{Vt}$	Current	I	Ampere	I = V/R I = q/t
$\frac{kT}{q}$	Voltage	V, E	Volt	V = IR $V = \sqrt{PR}$
kT	Energy	W—h W—s	Watt-hour Watt-second or Joule	W-s = Pt W-s = VIt W-s = qV
$\frac{kT}{t}$	Power	P, W	Watt	P = VI $P = I^2R$ $P = V^2/R$ P = qV/t
$\frac{kT}{qV}$	Dimensionless numbers			
$\frac{qV}{kT}$				

Table I—Boltzmann's Constant and Electrical Quantities. Note that "*k*" is always associated with *T*, so that the dimensional unit of the combination, kT, is *energy*. The quantities shown in the first column often appear in equations as exponents, and particularly as exponents of e.

$$E = \sqrt{kTRB}$$

In dimensional analysis, numbers can be dispensed with.

$$E = \sqrt{\frac{P \times t \times T \times R \times B}{T}}$$

Here, the appropriate substitution for "*k*" has been made.

$$E = \sqrt{\frac{P}{T} \times t \times T \times R \times \frac{1}{t}}.$$

Bandwith, having as its unit, frequency, is replaced by its dimensional equivalent, the reciprocal of time, or $1/t$

$$E = \sqrt{P \times R}$$

Note that T and t both cancel. This equation is valid because it is just another form of the more familiar $P = \frac{E^2}{R}$.

We have now shown that the strange combination of Boltzmann's constant, temperature, resistance, and bandwidth actually represents a *voltage!*

Refering to Table I, it is seen that kT has the dimension of *energy*, $\frac{kT}{t}$ has the dimension of *power*, etc.

In the example just considered, Boltzmann's constant injected the unit of power, *P*, into the equation. This in turn caused the right-hand side of the equation to ultimately represent voltage. A slightly different twist is often encountered when one studies the physics of semiconductors. For example, the all-important relationship between applied voltage and current through a PN junction is given by the following equation:

$$I = I_o \left(\frac{qv}{e^{kT}} - 1 \right)$$

Where V is the voltage applied across the junction, I_o is the saturation current of the junction, and I is the current flowing through the junction as the result of applied voltage, V.

This equation appears quite formidable, although we realize that computational work can be greatly eased by means of a scientific calculator. It may well be that manufacturer's specs serve our practical purposes when it comes to replacing diodes or designing them into a circuit. Just the same, it could be rewarding to understand how Boltzmann's constant operates here. The first thing we can determine from inspection of this basic equation for solid-state devices is that the entire exponent of e must be a dimensionless number. Otherwise, I would not be obtained as a simple current. So, to avoid an I in units of apples, oranges, or bales of hay, the fraction qV/kT must be a number without units. Let us see if this is indeed so. We write:

$$\frac{qV}{kT} = \frac{I \times t \times V}{\left(\frac{V \times I \times t \times T}{T}\right)}$$

or

$$\frac{\text{Current} \times \text{Time} \times \text{Voltage}}{\left(\frac{\text{Voltage} \times \text{Current} \times \text{Time} \times \text{Temperature}}{\text{Temperature}}\right)}$$

As luck would have it, all units cancel, leaving us with a dimensionless fraction, in this instance 1/1. Of course, this dimensionless fraction would run the gamut in value from a very small to a very large number had we dealt with numerical values. Note: q or charge, $= I \times t$, that is current times time.

Interestingly, Boltzmann's constant actually makes this equation much simpler than it would appear to be, for actually we are dealing with an equation in the form of $I = e^n - 1$, where n is the dimensionless exponent—this despite the involvement of charge, time, voltage, and temperature. Summarizing, we see that dimensional analysis provides some common-sense insight into a relationship which otherwise appears to be a mysterious concoction of unrelated quantities.

Although the focus of this article is on practical implications of "*k*" and dimensional analysis, what has just been discussed very naturally leads to an interesting philosophical speculation: If a scientist with near-infinite brains as well as financial resources set about to develop a "triode" in the nineteen thirties with a room-temperature emitter, his efforts would soon convince him that the successful device would be quite different in physical configuration from the then-conventional vacuum tubes. But what would it be like? A reasonably-probable answer can be ferreted out of books dealing with thermionic emission. The equations which describe the emission of charges (Dushman's and Richardson's equations) appear in diverse, but mathematically equivalent form in various references. But the astounding thing is their similarity to the laws governing charge "emission" in semiconductors. Specifically, the exponent, qV/kT is likewise contained in the equations describing thermionic emission from a hot filament. (Although one may not "see" Boltzmann's constant in some thermionic-emission equations, it can very easily be shown that it is, indeed, there). So, our speculation is that, even if we could not anticipate the outcome of the scientists efforts, we most certainly would recognize his final model—a semiconductor "triode," or transistor!

In power electronics, the men and boys are segregated according to their understanding of heat and temperature. For example, anyone who has designed or constructed a large regulated power supply, a powerful stereo amp, or motor control equipment has at least bumped into the equation for "thermal resistance," usually designated by the Greek symbol theta, θ. It is as follows:

$\theta = \frac{T}{W}$ where T is a temperature at some specific point, and W is the number of electrical watts dissipated by an electrical device. The details and intricacies of these quantities will not be covered here. Rather, our interest is a generalized one and has to do with the dimensional significance of a thermal quantity divided by an electrical one. Is it not like apples over oranges? It is true that temperature, T, can be considered to have the dimensions of a "voltage squared." This yields an equation in the form of $R = \frac{V^2}{W}$, or resistance equals voltage squared divided by power. This is a valid relationship inasmuch as it stems directly from Ohm's law. But, what the heck is "voltage squared." Although mathematically OK, we do not feel secure with such a representation for temperature. Nor can we attain clarity by saying that temperature is like unto a voltage and watts are in the nature of a current. A noble attempt to set up an $R = E/I$ format, but it doesn't ring true. Here, we are faced with a dilemma—how can the interaction of thermal and electrical quantities give rise to a quantity which resists or impedes? And what is being resisted and impeded? Unfortunately, those who work with electrical concepts often find that thermodynamic concepts are no push-over. It was illuminating to draw analogies between electrical and hydraulic, or mechanical entities, but thermo is something else again. Although it is possible to establish "one-to one" analogies between electrical and thermodynamic concepts, the required approach to electrical phenomena is generally lacking from the techniques of applied science that most of us work with. Nonetheless, our faithful servant, Boltzmann's constant can bail us out of this one too!

First, let's invert the relationship, $\theta = \frac{W}{T}$, making it $\frac{1}{\theta} = \frac{W}{T}$. This is mathematically permissable. However, if θ is a thermal resistance, then we must call $1/\theta$ a *thermal conductance*. Note that we can make the numerator of W/T assume the form of Boltzmann's constant by multiplying it by t/T where t represents time. But when we do this, we must also perform the same operation on the denominator in order that the value of the fraction remains unchanged. Thus, the procedure is as follows:

$$\frac{1}{\theta} = \frac{\left(W \times \frac{t}{T}\right)}{\left(T \times \frac{t}{T}\right)} = \frac{\left(\frac{Wt}{T}\right)}{t}$$

Note that we could have, but did not cancel the *t's*. Interpreting our final form of the equation, we note that the numerator is dimensionally Boltzmann's constant, that is, energy (Wt) over temperature. Even though Wt happens to represent electrical energy, the definition of Boltzmann's constant is not restrictive. We have the perfect right to assume that Wt can rep-

resent an equivalent amount of other forms of energy. Specifically, we will assume that Wt is *thermal energy*, such as could conceivably be represented by so many BTU if we were interested in numbers. Lo and behold, our relationship now "reads," thermal conductance equals the flow rate of thermal energy per degree of temperature—*this being the actual definition of thermal conductance*. This confirmation is satisfying because it can be readily found in the chapter on heat or thermodynamics in any physics text. Just for kicks, let's work backwards now and see what happens.

Inverting the final equation returns us to a relationship having the dimension of a thermal resistence. Thus, $\theta = \frac{t}{\left(\frac{Wt}{T}\right)}$. It now tells us that thermal resistance is time per unit energy divided by temperature. Such a statement has mathematical and conceptual integrity, but plays havoc with our mental processes. And, if we cancel the t's, we simplify to $\theta = \frac{1}{\left(\frac{W}{T}\right)}$, which transposes right back to the original $\theta = \frac{T}{W}$. This of course, is the very format which provoked our search for an interpretation!

Not yet mentioned, is the specific meaning of temperature T. It always designates a temperature rise with respect to a reference temperature. Unless otherwise stipulated, the reference temperature is that of the ambient. If thermal hardware, or a solid-state device is specified as having a thermal resistance of "x" degrees C per watt, we are being informed that a temperature rise of "x" degrees C above ambient will occur for every watt of dissipation. Usually, the thermal resistance will bear a label, such as θ_j which would signify the thermal resistance of the collector-base *junction* of a power transistor with respect to its case at ambient temperature. In real life, device cases do not operate at ambient because heat sinks have less than infinite heat capacity. So two other thermal resistances must be added on in order to complete the "thermal circuit." One is the thermal resistance be-

[*Continued on page 80*]

Fire In The Hamshack!

BY ALFRED G. SMITH,* WA2TAQ/WA4LDW

THIS topic may at first seem out of place in this publication, however the reader will discover that it concerns everyone no matter what their station in life, and life is exactly what this little story is all about. Whose life? Yours, your family's, your friend's, everyone's life.

In this day and age no parent would ever consider not having their children vaccinated against deadly infectious diseases such as Polio, Scarlet Fever, etc. Today hundreds of scientific groups all over the world are working to find cures for these killing diseases. We seek these cures to extend our life span and yet there is one killer that goes on and on killing hundreds of thousands of people day in day out world wide. The odds on eliminating this killer could be improved immeasurably by use of a sophisticated device that is readily within the financial reach of most people . . . certainly most Americans. The killer is Fire, the device is a Smoke Detector.

National Fire Prevention Association statistics show that, in fires in the home, most victims died because they were overcome by carbon monoxide and other products of combustion in the form of smoke, which filled the house. Most of the victims died because they were asleep when the fire started and didn't wake up in time to escape.

Think about it. Scores die daily for want of spending perhaps 50 to 75 dollars for a smoke detecting unit that anyone can install with two screws on the ceiling of the sleeping area in their homes.

[*Continued on page 80*]

*11 Irving Place, East Rockaway, NY 11518. The author has been in the fire service for over 30 years serving as a firefighter in the U.S. Navy, as a volunteer, and as a professional firefighter in New York City.

Addendum to the 1974 CQ World Wide DX Contest Results

THE RUSSIANS ARE HERE!... THE RUSSIANS ARE HERE!

GOOD news! The batch of several hundred USSR logs which we feared had been lost, (*CQ*, June 1975, p. 24), have arrived . . . nearly three months later than we've ever received them before! As promised, here is a complete tabulation of USSR scores—mostly c.w., but some phone—for the 1974 *CQ* World Wide DX Contest.

USSR QRM

UP2NK: Need rest time for Single Operators. *UK2FAD:* Tnx for the fine contest. 73 from Odessa! *UA9WS:* FB contest, but bad Cndx! *UA3DEA:* Very Happy New Year! *UI8LAG:* I will be in the contest in 1975 c.w. and phone. *UP2PX:* Found a hole in studies, job to be in the contest . . . Sorry, guess I shall not be among those lucky men in Top Six. No chance to reach rarest DX and multipliers in crazy European pileups. 73. *UP2NK:* First time tried to operate Single Band in this nice contest! 73 to Contest Committee. *UK2PAO/UG:* We brought all equipment from Lithuania, excluding 14 MHz beam. More than 250 lbs. for 3 men. So, we were not able to take better antennas with us in our contest expedition. But enjoyed handing out new multiplier to fellow contest men. Maybe Armenia will not be too rare as a contest multiplier after our trip, *i.e.*, local Hams may become more active. 73! *UK9AAN:* A little better conditions, but poor on 15. We need two points for JA contacts. Not easy! *UA3QAQ:* I worked only to 1600, after that my antenna fell down, HI!

USSR Club Scores

Kaunas Polytechnik Institute Radio Club	4,228,144
Tallin Radio Club	1,134,234
Alma ATA Radio Club	246,546
Kiev Radio Club	138,092
Voronezh Region Radio Club	96,458

Number groups after call letters denote the following: Band (A-all), Final Score, Number of QSOs, Zones, Countries. Certificate winners are listed in Bold Face.

USSR PHONE
SINGLE OPERATOR

Asia

Asiatic Russia

UW9WR	**A**	**1,584,000**	**1554**	**93**	**303**

Kazakh

UL7QH	A	14,850	229	18	27

Turkoman

UH8HAS	**28**	**31,570**	**221**	**20**	**50**

Europe

Byelorussia

UC2WAS	**A**	**20,670**	**233**	**19**	**59**

European Russia

UA3VAQ	**A**	**147,568**	**510**	**40**	**144**
UA3DFK	"	100,455	386	41	140
UA4ZA	"	6,845	167	23	58
UV3CE	"	2,553	27	17	20
UA3QBU	21	8,469	61	20	41
UZ3TC	**14**	**115,929**	**738**	**24**	**75**

Estonia

UR2QI	**A**	**449,318**	**1106**	**66**	**205**

Latvia

UQ2HO	**A**	**96,000**	**397**	**44**	**116**
UQ2DV	"	46,632	282	35	99
RQ2GDT	28	455	26	5	8

Lithuania

UP2NK	**A**	**577,281**	**1209**	**86**	**251**

Ukraine

UY5TG	14	56,355	431	25	60

MULTI OPERATOR
SINGLE TRANSMITTER

Europe

European Russia

UK3AAO	**1,349,764**	**1432**	**100**	**304**
UK3AAK	323,845	598	76	195

Latvia

UK2GAG	**203,518**	**733**	**42**	**122**
UK2GCF	86,914	549	36	100

Lithuania

UK2PAA	48,488	273	30	86

Ukraine

UK5IAZ	**1,706,375**	**1969**	**111**	**350**
UK5FAD	480,810	1153	76	206

Asia

Kazakh

UK7GAL	2,960	32	17	23

USSR-CW
SINGLE OPERATOR

Asia

Armenia

UG6EA	**A**	**73,788**	**313**	**23**	**63**
UG6JJ	**14**	**73,040**	**365**	**22**	**58**

Asiatic Russia

UA9OO	**A**	**216,192**	**437**	**59**	**133**
UA9OK	"	**102,778**	**335**	**39**	**95**
UA9XS	"	**100,543**	**338**	**26**	**81**
UA9CN	"	11,914	100	16	30
UA9CBM	**21**	**100,009**	**454**	**26**	**65**
UA9CAL	"	**73,554**	**403**	**20**	**49**
UA9UDR	"	26,359	287	11	32
UA9MQ	"	24,892	196	19	39
UA9JL	"	14,872	172	14	30
UA9YAT	"	2,700	96	6	12
UA9OCI	**14**	**101,566**	**458**	**26**	**60**
UA9CBR	"	53,040	278	20	48
UW9VH	"	25,480	153	24	46
UV9DO	"	23,925	162	16	39
UA9WJ	"	23,320	156	14	39
UA9CBW	"	9,240	100	8	27
UA9OS	"	5,320	66	7	21
UA9WS	**7**	**62,342**	**362**	**13**	**48**
UA9WCQ	"	8,836	102	7	21
UW9WL	**3.5**	**74,529**	**433**	**13**	**50**
UA9AAF	"	**53,676**	**350**	**12**	**42**
UW9DA	"	36,414	264	11	40
UA9MS	"	31,536	241	10	38
UA9WAL	"	9,420	110	7	23
UA9AEQ	"	32	4	2	2
UW9AF	**A**	**275,674**	**620**	**71**	**132**
UA9LU	"	45,344	429	19	33
UA9LJ	"	26,901	261	28	35
UA9AAC	"	13,650	90	30	35
UA9LAF	"	13,575	138	30	25
UA9DV	**21**	**32,208**	**217**	**25**	**41**
UA9ACJ	**14**	**59,908**	**344**	**19**	**49**
UA9CBL	"	38,186	387	25	36
UA9CAY	"	30,240	340	22	32
UA9SAU	"	20,821	273	17	30
UA9JAY	"	13,936	164	19	33
UA9BAC	"	10,249	106	12	25
UA9FCE	"	5,984	155	16	16
UA9LBB	"	4,117	131	4	19
UA9CBW	"	735	21	7	8
UW9LT	**7**	**25,898**	**347**	**16**	**30**
UA9FBF	"	8,670	134	17	17
UW9IX	**3.5**	**2,688**	**113**	**8**	**8**
UW9FB	"	2,002	135	5	6
UA9JAD	"	1,443	102	6	7

Azerbaijan

UD6AM	**A**	**185,760**	**501**	**53**	**119**
UD6DHU	"	**134,667**	**452**	**29**	**88**
UD6DJT	**14**	**76,866**	**410**	**23**	**46**
UD6DFY	"	56,210	311	20	50
UD6DIZ	"	21,996	180	12	35
UD6DFK	"	10,593	115	9	24
UD6AX	"	6,600	256	6	19
UD6BW	"	3,536	44	10	24

Georgia

UF6HK	**3.5**	**13,428**	**137**	**8**	**28**

Kazakh

UL7PQ	**A**	**54,390**	**183**	**34**	**77**
UL7GAV	"	28,922	261	37	61
UL7FM	**21**	**24,393**	**209**	**13**	**34**
UL7QH	**14**	**202,520**	**666**	**34**	**88**
UL7PA	"	97,692	474	26	58

UL7NAA	"	12,782	102	17	32
UL7RM	"	3,692	52	8	18
UL7BAN	**7**	**84,469**	**429**	**23**	**54**
UL7PBM					
	3.5	**35,235**	**311**	**9**	**36**
UL7GW	"	**26,216**	**242**	**15**	**43**
UL7NAF	"	4,896	68	9	23

Kirghiz

UM8FM	**A**	**98,536**	**673**	**51**	**136**

Tadzhik

UJ8AQ	**A**	**107,571**	**318**	**46**	**91**
UJ8AE	"	**57,204**	**308**	**27**	**57**
UJ8AB	"	6,336	51	20	28
UJ8AW	21	396	12	4	7
UJ8JAS	**14**	**117,180**	**493**	**28**	**65**
UJ8AC	"	48,024	365	20	38

Turkoman

UH8BO	**A**	**88,447**	**542**	**60**	**145**

Uzbek

UI8ACI	**A**	**702,596**	**952**	**86**	**210**
UI8LAE	"	**253,270**	**760**	**46**	**111**
UI8LK	**14**	**73,289**	**351**	**26**	**57**
UI8LAG	**3.5**	**92,300**	**555**	**16**	**49**

Europe

Byelorussia

UC2AAP	**A**	**252,700**	**1012**	**44**	**146**
UC2RG	"	**76,200**	**605**	**28**	**72**
UK2AAB	"	14,382	254	14	37
		(Opr. Kosarev)			
UC2WAL	"	12,505	138	19	42
UC2CS	"	9,077	65	26	43
UK2CAQ	"	4,371	79	14	33
		(Opr. Chernow)			
UC2WP	**21**	**32,956**	**190**	**24**	**53**
UC2OAA	"	3,230	32	16	22
UC2CEL	**7**	**11,610**	**217**	**9**	**34**
UC2WG	"	588	24	5	16
UC2WAM					
	3.5	**17,766**	**310**	**9**	**38**
UC2WAS	"	5,148	66	8	31
UC2AAQ	"	120	6	4	5

Estonia

UR2QI	**A**	**424,320**	**986**	**69**	**203**
UR2REZ	"	**366,080**	**838**	**76**	**180**
UR2RHA	"	38,232	306	24	72
UR2GU	"	31,941	301	25	66
UR2AW	21	4,400	52	16	28
UR2RC	"	1,449	36	10	13
UR2GT	**14**	**115,605**	**554**	**28**	**77**
UR2CW	"	107,428	511	30	77
UR2FX	"	2,150	71	6	19
UR2TBG	"	1,798	40	7	24
UR2MG	**7**	**29,100**	**400**	**14**	**46**
UR2TAX	"	10,464	82	15	53
UR2FU	"	7,440	132	11	37
UR2RJ	**3.5**	**46,620**	**496**	**17**	**57**
UR2RCN	"	14,127	226	11	40
UR2JW	"	3,570	107	7	23
UR2CR	"	3,510	107	7	23
UR2FR	"	1,350	43	5	22
UR2DW	"	25	5	2	3

European Russia

UW3HV	**A**	**420,175**	**757**	**92**	**251**
UZ3ER	"	**167,580**	**668**	**43**	**137**
UA3RO	"	141,589	477	48	131
UA3FT	"	124,356	423	48	124
UA1AAU	"	79,735	253	56	129
UA4BI	"	78,080	362	42	118
UA3DFK	"	60,691	317	36	101
UW3EH	"	42,602	223	31	88
UA3DCY	"	34,164	165	36	81
UA3ADO	"	11,700	130	21	44
UA3NBI	"	9,261	108	15	48
UA6HYL	"	7,345	78	23	42
UA3IAK	"	4,067	63	15	68
UA4ZA	"	3,569	85	15	41
UA3LBF	28	1,920	24	14	18
UA3QBG	"	1,755	25	13	14
UA3QBU	"	792	13	12	12
UA4AN	**21**	**78,735**	**471**	**27**	**68**
UW6CV	"	**66,566**	**480**	**25**	**58**
UA4PNF	"	49,275	321	20	55
UV6GN	"	36,000	377	21	51
UW6CW	"	29,140	328	16	46
UA6LWI	"	23,450	193	18	49
UA3XN	"	12,096	127	16	38
UA3LAB	"	11,960	93	19	46
UA3YR	"	9,240	76	18	47
UA3LAV	**14**	**76,798**	**501**	**25**	**69**
UA3GM	"	**70,200**	**272**	**32**	**88**
UA3QAQ	"	40,832	240	22	66
UA3DEA	"	18,136	154	19	49
UA4LAW	"	14,193	151	15	42
UA3QYL	"	13,886	147	14	39
UA3EAT	"	12,298	184	9	34
UA4BB	"	11,046	171	11	31
UW3WZ	"	10,027	201	8	29
UA3IBR	"	9,196	119	10	34
UA3WA0	"	7,242	178	9	25
UA3DCX	"	3,780	117	6	22
UA1UD	"	2,457	65	6	21
UA3XAW	**7**	**10,800**	**162**	**10**	**38**
UV3AP	"	1,272	36	7	17
UA3AAU	"	1,200	36	7	17
UA1DZ	**3.5**	**60,080**	**567**	**18**	**62**
UV3QZ	"	23,280	296	12	48
UA3NB	"	21,006	339	11	43
UA6CQ	"	19,492	370	8	36
UA6LDX	"	9,108	125	6	27
UA6WF	"	9,084	169	8	31
UV3NG	"	4,403	101	7	30
UA1BC	"	1,155	51	4	17

Kaliningrad

UA2DM	**A**	**154,365**	**753**	**56**	**149**
UK2FAS	**7**	**5,694**	**213**	**5**	**21**
		(Opr. UA2-125-217)			
UA2FBG	"	4,234	146	5	24
UA2DC	**3.5**	**2,925**	**107**	**5**	**20**

Latvia

UQ2GBW	**A**	**109,880**	**712**	**27**	**107**
UQ2GCN	**7**	**22,446**	**324**	**13**	**45**
UQ2GW	"	13,802	113	16	51
UQ2GDN	"	1,870	80	5	17
UQ2GEA					
	3.5	**8,960**	**230**	**5**	**30**
UQ2GFM	"	4,653	125	5	28

Lithuania

UP2CY	**A**	**307,764**	**857**	**60**	**189**
UP2BAR	"	**250,446**	**943**	**47**	**154**
UP2OU	"	174,933	473	57	152
UP2PT	"	83,331	411	35	106
UP2MB	"	28,806	369	40	81
UP2PCB	"	20,026	282	12	50
UP2PAP	"	14,417	274	24	84
UP2PBM	"	8,120	133	15	43
UP2BAS	**21**	**18,880**	**121**	**20**	**44**
UP2NK	**14**	**207,232**	**848**	**35**	**93**
UP2PCI	"	58,401	428	21	60
UP2DV	**7**	**21,060**	**300**	**12**	**55**
UP2PX	**3.5**	**60,030**	**723**	**14**	**55**
UP2BBF	"	88	11	3	8

Moldavia

UO5OWK					
	14	**20,600**	**289**	**11**	**39**
UO5GR	"	8,721	78	15	42
UO5OWG	**7**	**8,756**	**149**	**10**	**34**
UO5OWN	"	5,760	122	6	30
UO5SA	**3.5**	**41,553**	**628**	**11**	**46**

Ukraine

UB5BAZ	**A**	**155,928**	**588**	**41**	**137**
UY5TE	"	**99,825**	**439**	**41**	**124**
UB5TAM	"	68,689	318	39	110
UY5DV	"	60,137	327	29	92
UB5CAY	"	56,862	272	30	87
UY5EM	"	42,946	225	30	79
UB5IFA	"	33,108	295	21	68
UB5VK	"	12,852	129	19	49
UY5ZM	"	8,849	111	18	39
UB5UAH	"	6,720	142	10	30
UB5IU	"	6,090	107	18	42
UY5UY	"	3,876	92	10	28
RB5IOV	**28**	**2,618**	**77**	**12**	**22**
UB5AAF	"	1,377	19	12	15
UY5LK	**21**	**126,767**	**538**	**28**	**81**
UY5DP	"	**83,552**	**379**	**31**	**81**
UB5EF	"	6,919	79	11	26
UB5TM	**14**	**107,326**	**516**	**29**	**75**
UY5LO	"	**97,900**	**580**	**30**	**80**
UB5LAY	"	**97,858**	**540**	**31**	**82**
UB5MDL	"	51,514	381	22	64
UB5VAA	"	46,960	383	20	60
UY5ZP	"	45,765	393	21	60
UB5NU	"	25,380	140	26	64
UB5ECN	"	13,515	179	15	36
UT5BW	"	7,840	89	12	44
UT5BP	**7**	**123,016**	**656**	**26**	**78**
UT5GZ	"	32,340	260	17	60
UB5FAQ	"	19,380	175	14	54
UB5TQ	"	18,992	218	16	43
UB5TAN	"	1,380	56	5	18
UB5CI	**3.5**	**112,674**	**864**	**22**	**67**
UY5EX	"	16,830	295	8	37
UB5FAP	"	4,380	142	6	24
UT5SN	"	2,828	65	6	22

MULTI-BAND SINGLE OPERATOR

Asia

Armenia

UK2PAO/UG					
		1,561,989	**1655**	**85**	**246**
UK6GAD		21,672	182	10	33

Asiatic Russia

UK9AAN		**2,902,068**	**2014**	**135**	**372**
UK9ABA		**2,612,282**	**2090**	**126**	**323**
UK9AAG		**1,191,066**	**1198**	**102**	**256**
UK9SAY		870,105	1159	71	204
UK9LAA		494,326	906	66	172
UK9MAA		383,719	889	76	176
UK9OAD		124,533	390	43	94
UK9HAD		94,636	362	39	79
UK9CDI		89,367	335	23	74
UKØAAC		**399,832**	**843**	**70**	**142**
UKØFAA		**390,735**	**1192**	**74**	**97**
UKØFAJ		54,152	666	28	28
UKØCBE		4,008	160	13	11
UKØCAA		3,933	164	10	9

Azerbaijan

UK6DAU		**239,568**	**492**	**53**	**131**

Georgia

UK6FAA		**239,400**	**518**	**45**	**130**
UK6FAB		21,606	192	10	29
UK6QAA		4,320	50	9	21

Kazakh

UK7LAH		**763,291**	**1445**	**76**	**175**
UK7JAA		**312,858**	**785**	**61**	**130**
UK7GAA		62,838	712	47	78
UK7NAA		4,410	54	12	23
UK7PAU		1,986	27	6	16

Turkoman

UK8BAJ		**372,940**	**902**	**36**	**109**

Uzbek

UK8FAA		**27,462**	**244**	**14**	**32**

Europe

Byelorussia

UK2WAF		**368,682**	**869**	**70**	**188**
UK2AAP		64,701	422	31	86
UK20AA		62,640	314	38	107

European Russia

UK6LAZ		**987,160**	**1197**	**124**	**3**
UK3AAO		**976,520**	**990**	**119**	**3**
UK4WAC		**747,091**	**1116**	**95**	**2**
UK3ABB		651,304	1066	101	2
UK3WAA		534,877	1206	76	1
UK3QAE		401,740	1014	72	1
UK4WAB		299,625	711	68	1
UK4AAI		192,699	702	51	1
UK3DAA		181,248	637	52	1
UK3EAK		161,460	604	45	1
UK1ADK		154,700	602	43	1
UK1AAF		143,000	753	35	1
UK1TAB		110,345	761	33	1
UK6AAU		108,144	510	39	1
UK1AAA		90,144	519	25	
UK4YYY		60,368	560	26	
UK1AAG		55,725	455	25	
UK1CID		54,544	358	29	
UK4FAA		51,129	338	30	
UK3MAA		39,468	251	33	
UK3DBG		38,627	187	33	
UK3TAU		12,200	160	13	
UK1ABC		11,856	179	14	
UK6LWW		2,343	55	7	

Kaliningrad

UK2FAA		**212,135**	**637**	**56**	**1**

Karelia

UK1NAA		**40,740**	**258**	**28**	

Latvia

UK2GAN		**404,600**	**973**	**72**	**2**
UK2GAX		**193,664**	**928**	**31**	
UK2GAG		152,950	705	47	1
UK2GAY		21,696	192	23	
UK2GCF		10,140	117	17	

Lithuania

UK2PAF		**799,304**	**1369**	**88**	**2**
UK2BAS		**790,940**	**1199**	**95**	**2**
UK2PBR		298,944	1001	53	1
UK2BBE		154,080	793	36	1
UK2BAD		96,580	610	33	
UK2PAN		23,400	362	11	
UK2BAN		18,354	256	14	

Ukraine

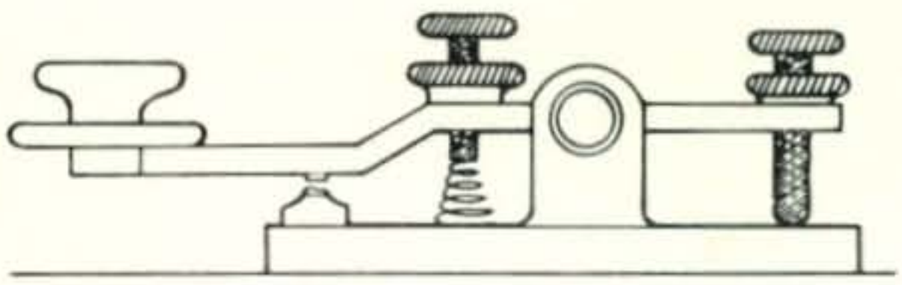
UK5IAZ		**1,808,322**	**1999**	**128**	**3**
UK5WAA		**502,478**	**968**	**74**	**2**
UK5VAA		365,552	950	69	1
UK5QBE		282,003	947	52	1
UK5UAC		154,320	497	54	1
UK5FAD		83,439	554	32	
UK5QAC		63,168	280	43	
UK5UAZ		58,275	465	22	
UK5WAG		56,974	336	28	
UK5AAA		28,980	231	26	
UK5EAQ		6,534	91	15	

STATION OPERATORS—C.W.

Multi-Operator Single Transmitter

UK1AAA: Belyaew, Iwliew. **UK1AAF:** Lublinsky, Levkin Fetisov. **UK1AAG:** Shevchuk, Smirnov, Ivakin, Mickevich Zuev. **UK1ABC:** Born, Namazov, Gladcin. **UK1ADK:** UA1 LG, UA1169570, UA1AAF. **UK1CID:** UA1136341, UA1136 339, Ryhowski. **UK1TAB:** Golynichev, Ivanov, Yolkin **UK1NAA:** Petrovich, Geozgevich, Ivanovich. **UK2AAP** Panchenko, Mazowko, Khorkov. **UK2BAN:** UP2GM, UP2 CV, UP2038191. **UK2BAD:** UP2PBZ, UP2038469, UP2038 207. **UK2BAS:** UP2BBC, UP2PAJ, UP2PAD. **UK2BBE** Rytis, Gied, Arvydas. **UK2FAA:** UA2FBC, UA2FAU, UA2 125151, UA2125178, UA6150215. **UK2GAN: UQ2037116** UO203783. **UK2GAG:** Kolobov, Shyshkamov, Myasded **UK2GAX:** UQ2IF, UQ2GBD. **UK2GAY:** Trizno, Lartchenko Melngalvis. **UK2GCF:** Golovin, Gribow, Manishewsky **UK2OAA:** Shilow, Kazakov, Gordyenko. **UK2PAF:** UP2OX UP2BBT, UP2038225, UP2038362, UP2038549, UP2038 609. **UK2PAN:** Cisma, Girdauskas, Zvanorius. **UK2PBR** UP2SA, UP2BAT, Kisielius. **UK2WAF:** UC2XT, UC2WAN UC200612. **UK3AAO:** UA3ADM, UA3EAI, UK3AAO. **UK3 ABB:** UA3170797, UA3AEM, UA3170888. **UK3DAA:** Fede chkin, Motjakov, Pugach, Shkodkin, Ershov, Kashin Pjanyh. **UK3DBG:** Voronin, Bruck, Tereshenko. **UK3EAK** UA314660, UA314646, UA314792, UA314790. **UK3MAA** Nekrason, Smirnov, Klabukov. **UK3OAE:** UV3RB, UA3QO UA3QBJ, UA3QAB, UV3QE, Samodurov. **UK3TAU:** VA3 122493, VA3122. **UK3WAA:** VA3WZ, UV3WT, UV3WS, UA

[*Continued on page 79*]



Some Ideas on Code Practice

BY SOLOMON KUPFERMAN,* W2GVT

THERE are too many amateurs who have not been able to upgrade their code speed because they were convinced that they were not born with that specific talent. As a result of this self imposed false axiom they have stunted their chance to earn a higher license than the one they presently own.

For some 50 years I too had been a victim of this myth of fixed inborn limitation. As a result of harboring this falsehood my code speed (hand written) never went beyond 18 words per minute. Two fellow amateurs, W2EPZ and K2BF, who were then pushing near 70 years of age, had gotten their Extra Class licenses. They teased me about being bogged down in my Advanced Class since 1934. As a result of this kidding I decided to challenge the myth in order to get my speed up to 25 words per minute.

The only way to analyze the mental blocks that stunt your code speed progress is to dive into code practice by regularly listening to W1AW or your club station code practice sessions. But one should not just jump into a learning endeavor blindly. Guide lines and some elementary knowledge of the laws of learning as applied to the code must be reviewed.

Motivation is the first law. It states to accomplish anything it is important to start with the conviction that action is both *possible* and *desirable*. Then one must choose, or *will* to do it. Constant self-motivation is essential all through the learning process from the very beginning to ultimate success. There are pitfalls, boredom and points where your code speed will come to a halt. Strong self-motivation is the ingredient that will overcome these obstacles.

The application of the law of *repetition* is essential in learning the code. It is the application of this law that breaks down the discouraging plateaus, points where you are stopped from any progress beyond a certain speed. You must convince yourself that repetition, perfect practice, will lift you out of the stall point.

To say practice makes perfect is only a half truth, perfect practice makes perfect. The problem is how to attain perfect practice. First we must overcome bad copying habits. Also there are a series of new, correct habits never used before, they have to be learned.

The main bad habit to overcome is the stopping of copying when a sticky letter or word trips you. One must keep going with the speed of the sender regardless of the errors you may make. The new habit of continuous writing, uninterrupted, must be learned. Where a "sticker" blocks your mind, keep going. Fill in with a random letter or word even if seems like scribbling, but keep going. To your surprise when you examine your copy you will find that many of the random written letters or words are legible and make sense. The appearance of partially correct copy is no accident. This condition of partial correct copying without realizing it is simply proof that you have started to train your unconscious to the right response at the sent code speed. More and more right answers will appear as you continue to practice using non-stop random writing. Ponder a while—when did you dash off script, non-stop for a half an hour or more? Now you will have to learn just that: non-stop writing.

This random writing mixed with periodic scribbling may strike you as a ridiculous waste of time. But this is not so. You are learning to persevere by exercising your will power not to quit. Another interesting point about productive effects of this exercise is that it tends to relax the mind, and the relaxed state is just the mental climate that make fast copy slow down. Actually the sent speed remains the same, but it is your mind that re-interprets the speed to a slower rate.

*157-28 18th Ave., Whitestone, NY 11357.

1/2 GIANT ALBATROSS SALE

(or Marc Gilman where are you?)

Searchers have sunk a shaft through to the trapped *Marc Gilman (CQ's Mailboy)* and are piping through grilled cheese sandwiches and chocolate malts. Marc's spirits are high as *CQ* readers respond to his (and our) plight by buying *CQ* Binders (at a ridiculous price) and it will only be a short while longer before we can actually reach him through the stacks of Binder boxes.

Jack Lewis of Circulation Fullfillment is standing by with the St. Bernards to rush in when Marc is freed. Jack, by the way, found stores of Bound Volumes which we would also like to move out of the searchers way. They are:

1974, 73, 70, 68, 67, 64, 60
1956, 53, 51, 50

You can also help in the rescue by taking them off our hands (and Marc) for only $ 10.00 each.

While it might seem funny to profit by someones misfortune, this is the perfect time to cash in on Marc's problem. Clean up your shack, organize your old magazines, fill in those missing issues and make the XYL happy.

You could even buy presents ahead of time for birthdays, weddings, Christmas, Chanuka and Confirmations. Everyone would think you paid full price and will be amazed at your unbounded generosity.

Remembèr, you're not only saving lots of money by buying single Binders at $3.00, 3 for $8.50 or even Bound Volumes at $ 10.00 each .... most of all you're being a good person. *Marc's wife* thanks you in advance.

CQ Magazine
14 Vanderventer Ave.
Port Washington, NY 11050

OK, I'll do you a favor and take__binders off your hands, and _____ (yrs) Bound Volumes too.

Name _____ call _____

Address _____

State _____ Zip _____

Shortly after learning this phase of perfect practice you will be able to copy short words quite regularly. Beware, it is these learned words that sometimes bring you to a grinding halt, especially when a difficult word follows an easy word. This can be explained because the code student experiences a mild euphoria with his new success and becomes over-relaxed (stops listening) with a feeling of having it made. This bad habit wipes out your needed alertness and concentration, and before you know it a brand new word hits you by surprise and disconcerts you. If this should happen, keep writing, random or scribble—you must obey the sender.

One can use the learned words to his advantage. The easy ones should be written down as quickly as you recognize them so that you can gain time, and now you are the one who is waiting for the unknown stranger that suddenly comes up from the horizon. You are ready to meet him fully alert and relaxed.

You will discover that words you believed you have learned thoroughly will sometimes elude you when they are placed between or after certain words or letters. One must take note of these words that fit into this situation so that they can be given individual attention. This attention, and how it will be handled, will be explained later.

Think back to your early years when you first learned to spell. There was one or more words that took a relatively long time to learn. Believe it or not, these once-difficult words rear their ugly heads when one is learning how to copy the code.

To achieve the ultimate success one must rigidly follow a planned procedure. Plan to listen every day to W1AW or your club station's code practice sessions. While copying have a tape recorder operating. At the end of the practice session play back the copy and pick out your errors, circling the incorrectly copied words. Count the number wrong and write that number on top of the page. Date the paper and save it for reference to measure your progress. Also indicate on the copy page the number words per minute sent to you.

Make a list of the missed words and send them to yourself over and over again. Listen to the words without watching the move-

[*Continued on page 79*]

Results of the 1975 CQ World Wide WPX SSB Contest

BY BERNIE WELCH,* W8IMZ

VP5B TOPS 4Z4HF IN CLOSE CONTEST ACTIVITY——BY ONLY 1491 POINTS

THE super action of the contest was between the multi-multi giants, VP5B, the North Florida DX Assn. WPX-pedition at Providenciales Isle, Caicos Group, British West Indies and the Contest Group Station 4Z4HF at Kibbutz Sasa, Israel. Both crews were really steamed up for this one and when it ended and the smoke cleared, the new world champion high-scoring station was VP5B. The third high score was the WAEDC Contest Manager's group at DK-2BI.

This was another good one and although scores were not as high in some areas as in the past, good activity was evident from all the continents. For the fourth consecutive year there has been a significant increase in the number of logs received. This year it amounted to an additional 127 logs. This should firmly establish the WPX Contest as one of the top three DX phone contests in the world. It was also our 18th annual event, which might mean it has become of age.

Most of this was accomplished with less than desirable band conditions. A special thanks to all who made this achievement possible by participation, submitting of logs, and other assistance.

Unique prefix goodies were plentiful and appreciated. There can never be too many in this contest. Polish stations made their SQ1 thru 9 available in addition to their regular SP prefix. If you were trying to find a Czechoslovakian station with a prefix other than OK3Ø you probably did not have much luck. However, if you needed the Channel Islands you should have had a ball since GC3 and GC4 were readily available from Guernsey, while GC5 was at Jersey. Gaze at this diverse list: CG3, XK3, CVØ, IA5, PA7, CT6, ZY2, ZZ6, ZZ8, CY6, PW4, IT9, JD1, GB3, CQ6, PA5, IØ, ZZ2, PA9, RB5, XX6, PI5Ø, and WN5. Each helped to provide added stimulus.

FCC officials advised that the WN5LVL/K5LZJ type of operation is legal within the rules. The multiplier for contest purposes is the novice station WN5, not the operator's K5 prefix.

The VP5B Champs: (L to R), Allan, VP5M; Al, VP5AH; Bill, VP5WW; Dee, (no call) assistant from Haiti; George, VP5CW; Ron, VP5B. The group is of the opinion that the WPX Contest is generating increased interest in contesting.

*7735 Redbank Lane, Dayton, Ohio 45424.

TROPHY WINNERS

WORLD—Single Operator, Single Band. Jack Reichert, W3ZKH. Trophy. Won by: **Bert Aaron, PT2ZBS** (21 MHz).
WORLD — Single Operator, All Band. Don Murray, K4FMA Trophy. Won by: **Willy Mookhortow, UW9AF.**
WORLD—Multi-Operator, Single Xmtr. Ted Thorpe, ZL2AWJ Memorial, Awarded by Don Miller, W9WNV. Won by: **Club Station UK9ADT. (oprs. UA9AN, UW9BY, UA9AEN, RA9AED, RA9AFC).**
WORLD — Multi-Operator, Multi Xmtr. Chuck Swain, K7LMU Memorial Awarded by Don Miller, W9WNV. Won by: **Station VP5B. (Oprs. W4ORT, WA4DRU, WA4EYR, WB4EYX, WB4QKE.)**
CANADA—Single Operator, Single Band. Gene Krehbiel, VE7KB Trophy. Won By: **Yuri Blanarovich, VE3BMV** (14 MHz).
U.S.A.—Single Operator, All Band. Charles "Joe" Hiller, W4OPM Memorial, Awarded by Jerry Hagen, WA6GLD. Won By: **James Lawson, W2PV.**
U.S.A. — Single Operator, Single Band. Charles "Joe" Hiller, W4OPM Memorial, Awarded by The Virginia Century Club. Won by: **Station K4VX, Opr. Robert G. Cox, K3EST** (14 MHz).
SPECIAL CQ AWARD—Station PJØJR.

3C1AGD operated by SMØAGD was one of a large group of semi-rare DX stations that generated huge pile-ups. Erik's flight to Malabo was delayed and his luggage was lost, but since he always hand-carries his radio gear, he was able to operate almost the entire 20 hours, authorized by his license. Hope he will surprise us from other such rare locations in future WPX Contests.

Alf, LA5QK was the top Norwegian single-op all band station for the 3rd consecutive year. Propagation conditions necessitated the majority of his activity on 3.5 and 14 MHz in this one.

Here's a first from Asiatic USSR! For the past five years, chief operator Sam, UA9AN and the group at UK9ADT have built bigger and better antennas and equipment, and strategically planned their multi-op single xmitter operations and it paid off—as this year they won the ZL2AWJ Memorial Trophy. However, this is a rare double special occasion since Willy, UW9AF in the same geographical area, won the K4FMA trophy. How about that!

PJØJR will receive a special *CQ* Award since operator Jack, W3ZKH feels it would not be ethical for him to receive the trophy he donated.

This year was the final contest activity for XV5AC. We received the only available logs for the period and have now sent them to his QSL manager. Hope everyone needing this country and prefix made a contact.

Some WPX-peditions were IA5BFY at Giglio Island; CVØZ at Flowers Island; GC4DAA on the island of Guernsey, — through the special efforts of the Channel Contest Group; and PJØJR at Curacao. The Cray Valley Central Group ventured from England to France for their first expedition as FØRV. HBØAFI (HB9AFI) and HBØAZD (OH2TW) each made the Principality of Liechtenstein available throughout the contest. JY8BH was none other than Martti, OH2BH at Jordan. Bob, K8HLR was portable KH6 at Hawaii.

Jim Lawson, the OM himself at W2PV, went solo bringing in the highest USA all band score, — while down Virginia way, K4VX was the site of the top single-bander station. The big stateside multi-op score came from the West Coast via the newly formed Rainbow Ridge Radio Assn. Station K6BCE/6.

We always appreciate PY1CK's assistance in making logs and cover sheets available to the Brazilians. Was disappointed however, that no multi-op logs were received from Brazil. Maybe they were lost in the mails?? Disappointing also was the small return from the US Ø District. This is certainly not representative of their activity. Wonder why they failed to send in their logs? What happened to Ron, F5QQ this year?

Comments and suggestions have brought about some changes:

TOP SCORES
SINGLE OPERATOR
ALL BANDS

UW9AF	**2,580,626**	EP2SN	888,180
EA8CR	2,173,824	OA4OS	863,154
CQ6LF	1,802,940	WB2SQN	824,904
HK4DF	1,394,996	CR4BC	821,457
9Y4VU	1,283,928	DK3BJ	795,894
W2PV	**1,003,296**	VU2ABC	785,400

SINGLE BAND

28 MHz

K4HWW	5,400
JA4FHE	4,554
W8WPC	2,310
W5RTQ	1,430
WB2TLD	1,058

14 MHz

PJØJR	**1,893,456**
YV4AGP	1,158,115

21 MHz

PT2ZBS	**1,283,840**
XX6OZ	1,247,145
KH6IJZ	128,400
VK6NE	115,818
VK2XT	78,822
K4VX	**943,824**
VE3BMV	**855,306**
WA3HRV	824,649

7 MHz

YV4YC	605,700
I4BMJ	271,892
K6JAN	270,972
UK3XAA	177,952
I5FCK	150,634

3.8 MHz

I3MAU	449,460
EA4LH	376,350
OH1XX	287,648
KV4FZ	266,840
YU4FDE	234,124
GC3YIZ	205,410

1.8 MHz

DL8PC	6,468
DA2YR/P	3,380
WB8APH	1,848
WA6KAC	1,296

MULTI-OPERATOR

Single Transmitter

UK9ADT	**3,062,605**	G3HTA	1,600,430
CVØZ	1,980,690	OA4AHA	1,554,888
EA8BW	1,966,624	GC4DAA	1,462,188
VE7SV	1,621,074	PJ9EE	1,425,144
DM2DUK	1,604,112	UK3AAO	1,054,920

Multi-Transmitter

VP5B	**4,431,301**	GB3MCG	1,501,136
4Z4HF	4,429,810	K6BCE/6	1,121,488
DK2BI	2,106,054	W9LT	785,288

1. 1.8 MHz is now included with the Top Score Listing.

2. A separate log is no longer required for each band of a multi or an all band operation.

3. The deadline for sending logs is extended to the 10th of May.

A policy that has been in effect, but not overly publicized, is that a certificate of merit will be sent to each participating operator of a winning station—other than his own—provided it is requested on the cover sheet of a submitted log, with all the necessary information, such as full name, call, and mailing address.

To celebrate the 1976 USA Bicentennial, the FCC has authorized USA amateurs to use certain special prefixes—example: AA1, AB2, AB6, AC8, ADØ, etc. During our '76 contest, a double multiplier (2) may be counted once for each different special USA prefix contacted. Wonder who will be the first to pass the 500 prefix multiplier mark in a single contest? Certainly the opportunity will present itself in the 1976 WPX Contest, since this one-time exception has been added to the rules.

Next year's event is on the 27th and 28th of March, a bit earlier than usual. Log forms and summary sheets should be requested from the *CQ* office at an early date to insure your receipt prior to the contest. Please send SASE or IRCs. It doesn't always require a giant score to win a certificate award and this is an excellent reason for sending *CQ* your logs regardless of the score. Watch W3ASK's 'Propagation'—(Last Minute Forecasts) for the best band conditions. Please don't give up on 10 meters. Try 160 meters, too—you may be surprised! As usual the certificate winners will be receiving their awards at the earliest possible date.

What a pleasure it was to see so many of you at the 1975 Dayton Hamvention and thank you for making their first Contest Forum a success. Hope to see many of you there in '76. Thanks to Mr. *CQ* Contest, Frank W1WY (AC1WY in 1976?) for his guidance and support. Hope to work ya in the next one.

73 Bernie, W8IMZ

A big extra WPX surprise was Erik, SMØAGD, operating 3C1AGD at Malabo, Equatorial Guinea. A well-known DXer said he spent almost 2 hrs. of precious contest time in Erik's pile-up before he made contact for a new country.

U.S.A. TOP SCORES

Single Operator

All Band	W2PV	1,003,296
28 MHz	K4HWW	5,400
21 MHz	WA1NZT	64,640
14 MHz	K4VX	943,824
7 MHz	K6JAN	270,972
3.8 MHz	W4BVV	178,200
1.8 MHz	WB8APH	1,848

Multi Operator

Single Xmtr.	W9ZTD	593,655
Multi Xmtr.	K6BCE/6	1,121,488

Number groups after call letter denotes: Band, Score, QSO's and Prefixes. Bold listings are certificate winners.

SINGLE OPERATOR NORTH AMERICA

United States

W1HFB	**A**	**25,800**	**112**	**86**
W1DYH	"	24,682	124	86
WA1QNF	"	19,402	204	89
WA1RGT	"	10,354	71	62
W1GYE	"	1,430	25	22
WA1NZT	**21**	**64,640**	**240**	**128**
W1HDI	"	10,092	76	58
K1YXK	**7**	**12,650**	**97**	**55**
W1WY	"	874	29	23
W1EBC	**3.8**	**110,160**	**279**	**120**
WA1NRF	"	27,612	131	78
WA1JMP	"	17,550	123	65
W2PV	**A**	**1,003,296**	**1072**	**336**
WB2SQN	**A**	**824,904**	**904**	**319**
W2HPF	"	247,170	439	214
W2LEJ	"	67,340	181	130
WB2JJN	"	60,060	189	130
W2GKZ	"	24,108	102	82
WA2ZWH	"	21,420	107	84
WA2LJM	"	20,640	95	80
W2MB	"	15,780	94	60
WB2TLD	**28**	**1,058**	**31**	**23**
WB2ZGI	**21**	**18,426**	**105**	**74**
K2BQO	**14**	**271,026**	**485**	**239**
WA2ECC	"	31,262	134	98
WB2LOF	"	20,648	107	89
K2GI	"	16,046	87	71
W2NIN	**3,8**	**106,704**	**262**	**114**
W2IIJ	"	57,104	267	83
W3EZT	**A**	**226,938**	**406**	**218**
		(Opr. WA3IAQ)		
K3ZOL	"	26,038	102	94
W3HAO	"	17,577	90	81
WA3HRV	**14**	**824,649**	**954**	**321**
WA3SZI	"	85,879	223	157
K3IXD	**1.8**	**480**	**65**	**30**
K4YFQ	**A**	**609,290**	**742**	**290**
WA4LZR	**A**	**323,663**	**549**	**241**
		(Opr. WA4FCT)		
K4II	"	226,114	405	217
W4WRY	"	167,696	325	188
W4WHK	"	61,125	191	125
K4ZA	"	34,662	141	109
W4KMS	"	19,845	110	81
W4UYC	"	16,281	98	67
W4BAA	"	9,360	100	60
W4LGM	"	1,664	40	32
K4HWW	**28**	**5,400**	**56**	**40**
W4WSF	**21**	**59,148**	**216**	**124**
K4VX	**14**	**943,824**	**1004**	**336**
		(Opr. K3EST)		
K4KZZ	**14**	**245,021**	**432**	**203**
W4DQD	"	38,194	137	113
KH6GMP/4				
	"	27,225	351	99
W4EEO	"	1,825	25	25
W4JUK	"	325	13	13
WA4APG	**7**	**11,520**	**63**	**48**
K4KZP	"	6,608	109	59
WB4ZQO	"	16	6	4
W4BVV	**3.8**	**178,200**	**315**	**150**
		(Opr. WA3AMH)		
W4OZF	"	1,200	24	20
K5PFL	**A**	**149,226**	**385**	**133**
W5UOJ	"	57,770	309	109
WB5HVY	"	39,269	387	107
W5OB	"	18,096	126	78
WA7LKI/5	"	8,760	98	60
K5DEC	"	1,106	23	14
W5RTQ	**28**	**1,430**	**35**	**26**
WA5VDH	**14**	**180,810**	**407**	**205**
WA5ZNY	**7**	**99,880**	**301**	**110**
WB5DDI	**3.8**	**14,336**	**183**	**64**
WA5RTG	**1.8**	**598**	**27**	**23**
W6MAR	**A**	**505,476**	**737**	**171**
W6OKK	**A**	**104,490**	**324**	**129**
W6BJB	"	100,800	303	120
K6HIH	"	84,252	303	102
W6YB	"	36,673	169	91
WA6BVY/6				
	"	11,340	88	63
W6YVK	"	9,204	61	52
WA6TKT	"	9,048	80	58
W6CLM	"	6,069	67	51
W6KYA	"	5,920	54	37
WA6UFY	"	2,340	36	30
W6YRA	**21**	**51,516**	**216**	**106**
W6HX	"	48,396	196	109
W6LPM	**14**	**244,188**	**588**	**171**
		(Opr. K6ERT)		
K6SVL	"	198,576	582	168
K6JAN	**7**	**270,972**	**525**	**117**
		(Opr. WB6VZI)		
WA6PDE/6				
	3.8	**8,400**	**62**	**50**
WA6KAC	**1.8**	**1,296**	**40**	**27**
WB7ABK	**A**	**270,840**	**499**	**185**
W7LC	"	5,040	126	56
		(Opr. WA7WVX)		
WA7OBH	"	2,752	49	32
W7AE	"	840	16	12
K7IDX	28	18	6	3
WA7PEZ	**21**	**8,635**	**72**	**55**
K3MNT/7	"	2,294	35	31
W7JST	**14**	**401,115**	**803**	**221**
W7YTN	**3.8**	**69,678**	**274**	**79**
W7AYY	"	6,860	65	49
WB8MMF	**A**	**102,538**	**369**	**167**
WB8IZS	"	51,870	187	114
W8IMZ	"	33,759	139	93
W8VSK	"	5,764	55	44

This is the isolated QTH of KL7IFC, Shemya Island, Alaska. Could this be similar to a good contest location that Steve, WB8IAY is looking for?

W8WPC	**28**	**2,310**	**68**	**35**
W8KOD	**21**	**6,533**	**60**	**47**
K8IDE	**14**	**271,200**	**440**	**240**
K8SMC	"	158,304	374	204
WA8CKT	"	882	21	18
WA8LXJ	**7**	**31,328**	**125**	**88**
W8IHD	"	29,920	122	85
WB8UKX	**3.8**	**50,374**	**245**	**89**
W8FJS	"	8,160	69	48
WB8APH	**1.8**	**1,848**	**85**	**42**
WA9BWY	**A**	**342,720**	**535**	**238**
WB9MKL	"	16,543	121	71
K9HMB	**14**	**561,090**	**788**	**295**
W9YRA	"	274,284	496	228
WA9JDT	"	18,096	100	78
WBØFRM	**A**	**17,112**	**106**	**69**
WØQYG	"	5,423	57	29
WAØTKJ	**3.8**	**22,608**	**220**	**72**

Alaska

KL7IFC	**14**	**71,610**	**398**	**62**
KL7DVE	3.8	2,368	29	16

Bermuda

WA1RFM/VP9				
	14	**46,614**	**185**	**102**

Canada

VE1RQ	**14**	**114,300**	**296**	**150**
VE1AIH	3.8	1,692	20	18
CG3GCO	**A**	**674,625**	**927**	**25**
XK3EUP	**A**	**633,516**	**902**	**26**
VE3KZ	"	579,921	784	24
VE3BBH	"	445,368	704	24
VE3EJK	21	884	20	1
VE3BMV	**14**	**855,306**	**979**	**33**
VE3FLE	"	35,235	188	8
VE3CMV	"	19,019	107	7
VE3BBN	**3.8**	**37,800**	**137**	**7**
VE4RP	**A**	**126,321**	**361**	**12**
VE5RA	**A**	**175,508**	**578**	**11**
VE6MP	**A**	**209,820**	**557**	**13**
CY6AGV	"	99,588	428	8
VE6LB	**14**	**4,674**	**66**	**3**
CY6AO/6	"	2,002	51	2
		(Opr. CY6AV		
VE7AZG	**A**	**70,731**	**256**	**8**
VE7BC	**14**	**460,800**	**1029**	**12**
		(Opr. VE7LI		
VE7WJ	"	408,704	837	20
		(Opr. WA7OT		
VE7IG	**3.8**	**105,708**	**390**	**6**
VE7AON	"	104,400	374	7
VE800	**14**	**21,450**	**131**	**7**

Canal Zone

KZ5WA	**A**	**124,020**	**519**	**7**

Dominican Republic

HI8XAW	**A**	**317,028**	**799**	**17**
HI8LC	**3.5**	**125,178**	**314**	**9**

Honduras

HR1AT	**A**	**101,840**	**442**	**8**

Mexico

XE1LLS	**A**	**111,072**	**614**	**7**
XE1HHH	"	69,160	406	7

Nicaragua

YN1WB	**A**	**8,736**	**100**	**4**

St. Lucia-Windward Is.

VP2LAW	**A**	**31,339**	**180**	**7**

Trinidad and Tobago

9Y4VU	**A**	**1,283,928**	**1528**	**24**

Virgin Islands (U.S.)

KV4AM	**21**	**72,960**	**369**	**5**
KV4FZ	**3.8**	**266,840**	**418**	**14**

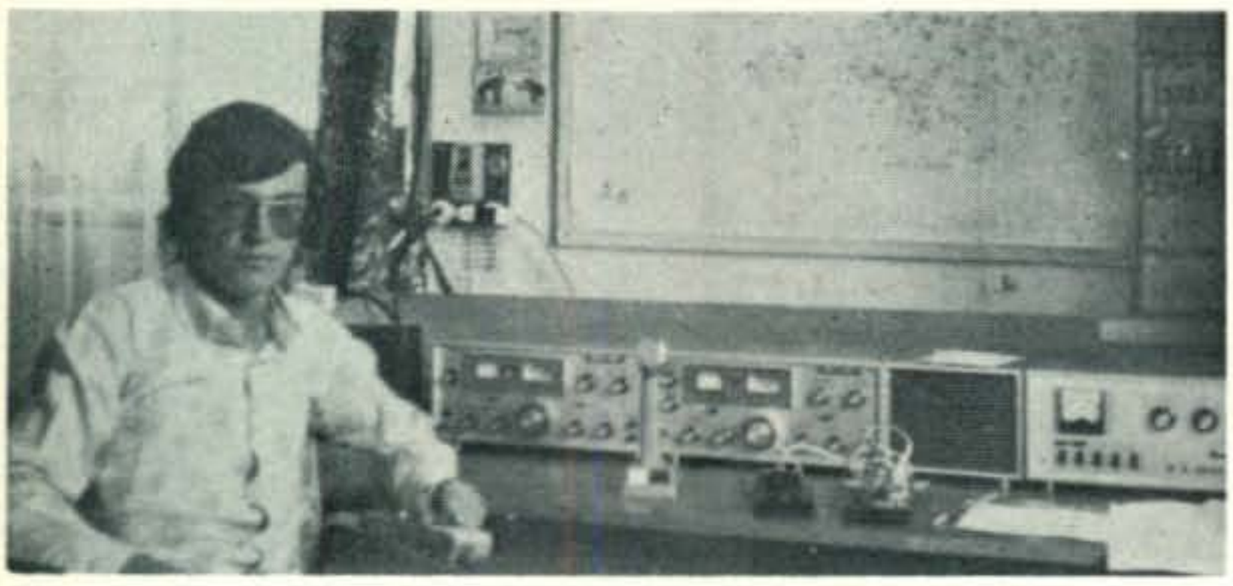
Africa

Angola

CQ6LF	**A**	**1,802,940**	**2025**	**30**
XX6OZ	**21**	**1,247,145**	**1382**	**30**

Canary Is.

EA8CR	**A**	**2,173,824**	**1406**	**35**
EA8HG	**14**	**165,704**	**362**	**1**



George, CR6OZ is responsible for the exotic prefix XX6OZ operation. He was 2nd World High on 21 MHz.

Cape Verde Is.				
R4BC	**A**	**821,457**	**933**	**221**
Equatorial Guinea				
C1AGD	**A**	**124,125**	**350**	**125**
		(Opr. SM0AGD)		
Gabon				
R8DG	**A**	**158,592**	**331**	**168**
Lesotho				
P8AT	**A**	**168,300**	**370**	**153**
Asia				
India				
U2ABC	**A**	**785,400**	**1163**	**255**
U2OO	**14**	**36,660**	**203**	**94**
Iran				
P2SN	**A**	**888,180**	**1119**	**262**
Israel				
Z4NV	**A**	**282,370**	**516**	**187**
4X8UZZ/4X				
	14	**350,987**	**599**	**203**
Japan				
A1PCY	**A**	**182,412**	**466**	**162**
A2KFO	**A**	**170,781**	**420**	**151**
A7KTY	"	38,316	202	93
G1CDM	"	23,384	143	79
H3SBC	"	12,740	92	52
AØSC	"	11,046	115	42
H3SBE	"	8,319	77	47
A4DZ	"	4,836	70	26
A3ELU	"	2,412	54	36
R2FNL	"	2,222	35	22
A4AQZ	"	1,984	42	28
H2BFT	"	1,957	31	19
AØURR	"	1,887	49	37
A1BUI	"	1,342	27	22
A0FMB	"	624	19	12
A2RER	"	616	18	11
H3XCU	"	544	19	17
A4FHE	**28**	**4,554**	**81**	**47**
H1FSF	"	2,268	51	42
H3AKD	"	1,276	34	29
R3STX	"	40	8	8
H2MYN	**21**	**15,400**	**125**	**77**
E1UVT	"	10,098	100	54
E1ULW	"	5,080	66	40
F1RLS	"	4,255	59	37
A3BUB	"	1,728	51	32
A7HYS	"	1,012	24	22
A3YJQ	"	152	9	8
A3WKG	"	45	5	5
H3FYW	"	2	2	2
H1ECG	**14**	**426,734**	**716**	**238**
A9AG	**14**	**161,700**	**403**	**154**
H1KRC	"	136,746	373	142
A6CNL	"	70,144	238	128
A2JSF	"	52,080	214	105
H1DMR	"	45,885	289	69
AØAIE	"	38,285	169	95
A3IBU	"	29,192	172	82
A1EMX	"	28,815	149	85
A6RIL	"	20,672	129	76
A1BHJ	"	18,020	110	68
A5FMT	"	14,912	104	64
H3LCU	"	14,820	103	57
A1PUK	"	12,586	85	58
H2RVP	"	12,444	101	61
AØYBY	"	11,704	107	56
A2HGA	"	7,482	67	43
A1LDJ	"	6,642	85	41
A4UDP	"	6,063	69	43
A2DOU	"	5,460	64	39
A4EE	"	4,466	73	29
A6CM	"	3,876	51	38
A1IZ	"	3,816	49	36
A9LX	"	2,656	50	32
A8BKI	"	1,924	32	26
A1AAT	"	1,386	23	22
A6YY	"	1,254	30	19
G1TIX	"	684	25	18
R3PFH	"	656	24	16
A7KM	"	507	19	13
A4AQR/3	"	403	15	13
A3ARM	"	270	11	10
A3BCT	"	152	10	8
R3TZU/3	"	84	6	6
R3STC/3	"	21	3	3
H3BJN/3	"	10	3	3
A2BET	**7**	**102,960**	**215**	**110**
JA2BAY	**7**	**101,806**	**219**	**109**
JA4BKL	"	7,888	53	34
JA1RUJ	"	119	7	7
JA4GXS	"	48	4	2
JA1JIX	"	24	3	3
JA7KAC	**3.5**	**6,630**	**59**	**39**
JA2AAQ	"	2,304	30	18
KA2PJ	**14**	**63,366**	**214**	**118**
KA6RI	**14**	**39,949**	**186**	**91**
KA6MS	"	19,912	124	76
Jordan				
JY8BH	**A**	**86,940**	**277**	**108**
		(Opr. OH2BH)		
JY8ZB	14	3,192	53	24
Malaysia				
9M2CX	**A**	**388,287**	**1364**	**197**
9M2CJ	"	139,750	802	130
Ogasawara Is.				
JD1AJG	**A**	**31,117**	**488**	**49**
Singapore				
9V1SN	**14**	**135,048**	**730**	**136**
Thailand				
HS2AIG	**A**	**164,400**	**1182**	**120**
Vietnam				
XV5AC	**A**	**38,799**	**397**	**81**
U.S.S.R.				
Asiatic				
UW9AF	**A**	**2,580,626**	**1756**	**389**
UA9TS	"	473,429	747	223
UA9FAJ	"	278,067	478	177
UW9CL	"	3,275	31	25
UW9SG	21	784	19	16
UV9PP	**14**	**640,794**	**1090**	**266**
UA9CBO	"	510,120	739	260
UA9OCE	"	174,249	457	171
UA9OO	"	160,992	414	172
UA9UDR	"	88,400	323	130
UA9OS	"	12,320	150	56
UV9EI	"	5,985	59	35
UK9WBA	"	4,964	52	34
UA9CGL	**3.5**	**35,568**	**119**	**52**
UA9OCA	"	16,640	82	40
UA9CGZ	"	11,280	70	30
UAØUBA	**A**	**78,840**	**453**	**108**
UAØZS	"	40,986	430	69
UAØCBO	**14**	**97,584**	**662**	**107**
UAØCBW	"	67,056	630	88
UAØFBZ	"	58,045	572	92
UA0BAC	"	41,830	188	94
Armenia				
UG6JJ	**14**	**49,797**	**192**	**99**
Azerbaijan				
UD6CC	**A**	**15,695**	**83**	**73**
Georgia				
UF6DZ	**A**	**104,340**	**232**	**148**
Kazakh				
UL7CH	**A**	**18,536**	**113**	**56**
UL7DA	**14**	**183,918**	**534**	**174**
UL7JAW	"	164,175	532	165
UL7YR	"	31,042	154	83
UL7PBE	"	8,760	95	60
UL7LAW	**7**	**54,400**	**171**	**68**
UL7LA	**3.5**	**13,440**	**82**	**32**
UL7YAB	"	5,940	65	30
Kirghiz				
UM8FM	**14**	**32,832**	**142**	**96**
UK8MAA	"	19,200	154	64
Tadjik				
UJ8JGJ	**14**	**523,242**	**935**	**246**
Turkoman				
UH8HAS	**A**	**53,900**	**243**	**100**
UH8BO	"	30,887	166	67
Uzbek				
UI8LAE	**14**	**24,276**	**158**	**68**
UI8LAG	**3.5**	**198,198**	**301**	**121**

Look at the wallpaper! Allenby, VK3SM is the proud recipient of 11 Certificate Awards (count 'em) for WPX-SSB Contests, 1964 thru 1974. Unfortunately his portable operation this year did not qualify, but he indicated he would be trying for his 12th in 1976.

Europe				
Austria				
DK5AD/OE2				
	A	**163,275**	**469**	**175**
OE1NPW	**21**	**11,628**	**78**	**51**
Belgium				
ON4XG	**A**	**53,148**	**209**	**129**
Bulgaria				
LZ2PD	**A**	**131,008**	**454**	**178**
LZ2KBA	"	19,856	152	73
LZ1TD	"	19,106	150	82
LZ2KSU	"	13,520	110	65
LZ1MH	"	3,999	55	43
Czechoslovakia				
OK3ØRZ	**A**	**412,116**	**737**	**244**
OK3ØPEQ	**A**	**131,811**	**417**	**159**
OK3ØEA	"	109,098	304	174
OK3ØBIH	"	89,310	330	130
OK3ØQX	"	84,760	331	130
OK3ØKZ	"	74,528	297	136
OK3ØTCD	"	60,760	251	124
OK3ØAVD	"	46,375	192	125
OK3ØWM	"	30,987	146	99
OK3ØAGN	"	25,198	154	86
OK3ØBEF	"	10,266	91	58
OK3ØFCA	"	8,968	76	59
OK3ØTRP	"	3,610	58	38
OK3ØMSP	"	3,465	46	35
OK3ØEP	"	2,625	48	35
OK3ØBBJ	"	966	27	23
OK3ØLN	"	736	24	16
OK3ØTBG	"	152	9	8
OK3ØASQ				
	21	**1,863**	**34**	**23**
OK3ØATE	**14**	**112,941**	**365**	**141**
OK3ØAHV	"	40,960	209	128
OK3ØCIE	"	15,352	118	76
OK3ØLU	"	11,122	82	67
OK3ØLI	"	7,668	97	54
OK3ØBLC	"	6,157	60	47
OK3ØCFS	"	2,156	40	28
OK3ØKCU	"	1,092	35	21
OK3ØABU	**7**	**23,652**	**140**	**81**

A one of a kind prefix from Oceania is KS6DH. Jerry can always be counted on to keep WPX activity plentiful from American Samoa. We all appreciate it.

The crew at Ohio State University station W8LT used this unique method to maintain an accurate prefix multiplier count. WA1LKU and WB8IBZ can't believe they missed K1 and WA7. Other member WB8JXS took the photo.

OK3ØKR	"	10,248	85	61
OK3ØBYW				
	3.5	**133,352**	**401**	**158**
OK3ØBIQ				
	3.5	**126,716**	**386**	**158**
OK3ØSLS	"	66,820	237	130
OK3ØBLG	"	53,592	232	116
OK3ØIAE	"	43,014	195	107
OK3ØAGA	"	30,600	178	90
OK3ØPCL	"	26,488	150	86
OK3ØSBJ	"	5,452	51	47
OK3ØWN	"	4,816	60	43
OK3ØATO	"	4,680	62	39
OK3ØAMF	"	4,200	51	42
OK3ØAAE	"	128	8	8

Denmark

OZ6RT	**A**	**455,400**	**805**	**253**
OZ5VT	"	28,210	152	91
OZ3KE	"	3,276	44	39
OZ2PG	**14**	**163,214**	**439**	**158**
OZ3ER	"	1,755	35	27
OZ5EV	**7**	**137,886**	**439**	**147**
OZ6XR	"	57,500	244	115
OZ2NU	"	7,008	73	48
OZ8KU	"	4,704	61	42
OZ7FH	"	3,430	47	35

England

G3TXF	**A**	**199,252**	**456**	**218**
G2FNK	**A**	**103,133**	**320**	**151**
G4BBA	"	42,550	205	115
G2AJB	"	27,209	172	91
G3WTV	"	26,481	172	91
G3UBR	**14**	**515,412**	**1003**	**206**
		(Opr. G4BTY)		
G4CVZ	"	56,166	292	138
G6NK	"	1,500	43	30
G3JUL	**7**	**24,576**	**127**	**96**
G3TOE	**3.5**	**112,180**	**328**	**158**

Finland

OH1LW	**A**	**383,958**	**734**	**257**
OH1IG	**A**	**236,577**	**614**	**201**
OH7NW	"	21,845	151	85
OH1QP	"	13,824	88	64
OH3JR	"	13,330	116	62
OH6KT	"	13,179	123	69
OH2EQ	"	10,050	81	50
OH2ZY	"	7,700	74	55
OH6LV	"	1,425	43	25
OH2BMG	"	224	10	8
OH3ZH/1	"	112	8	8
OH1VR	**14**	**548,216**	**1002**	**278**
OH6MM	"	38,622	251	123
OH2BFJ	"	24,660	134	90
OH6XY	"	14,652	129	66
OH4TB	"	12,462	114	67
OH4TH	"	8,642	93	58
OH3KX	"	1,590	30	30
OH2BMP	"	312	14	12
OH5TS	**7**	**15,892**	**102**	**58**

"Zal," VU2DK (above) was 2nd op of the VU2BK multi-op single, Certificate Award winning team. VU2-ABC and VU2OO also each won an award for their respective categories for India.

OH3MF	"	12,978	100	63
OH1UR	"	8,250	70	55
OH2BCG	"	1,314	24	21
OH1XX	**3.5**	**287,648**	**669**	**202**
OH1MA	"	5,166	51	41

France

F9MD	**A**	**177,219**	**430**	**203**
F6BJA	"	20,825	107	85

Germany (DDR)

DM4SOG	**A**	**152,160**	**535**	**160**
DM6TAH	**A**	**137,223**	**406**	**193**
DM2BTO	"	86,660	298	140
DM4UEE	"	82,636	258	146
DM2YLO	"	58,752	240	128
DM3VUH	"	29,798	169	94
DM4YEL	"	5,160	58	43
DM3RTG	"	3,402	74	27
DM4CF	"	2,211	43	33
DM4PEE	"	1,496	30	22
DM3UE	21	200	9	8
DM5UUL	**14**	**2,010**	**39**	**30**
DM2CTB	"	720	17	16
DM2EHL	"	697	23	17
DM2CPE	"	595	20	17
DM2BOO	**7**	**5,544**	**65**	**44**
DM5YVL	3.5	1,224	34	18
DM3YKD	"	672	28	14
DM6AJ	"	576	20	16
DM2FDO	"	544	20	16
DM2CHE	"	72	6	6

Germany (FRG)

DK3BJ	**A**	**795,894**	**1093**	**341**
DK7ZJ	**A**	**77,452**	**291**	**134**
DL1IP	"	39,294	202	118
DK8KC	"	35,394	221	102
DK4IO	"	32,340	185	98
DL1YA	"	28,140	154	105
DL7VB	"	3,277	64	29
DK5VO	**21**	**21,600**	**111**	**80**
DK5OS	14	364	14	13
DL1ZC	**7**	**2,030**	**41**	**29**
DK2LM	**3.5**	**134,400**	**442**	**160**
DJ6TK	"	60,512	250	124
DL8PC	**1.8**	**6,468**	**108**	**33**
DA2EL	**3.5**	**117,504**	**381**	**153**
DA2YR/P				
	1.8	**3,380**	**76**	**26**

Gibraltar

ZB2CJ	A	1,026	21	18

Greece

SVØWSS	**14**	**21,660**	**225**	**95**

Guernsey (Channel Is.)

GC3YIZ	**3.5**	**205,410**	**552**	**167**

Hungary

HA2KRL	**A**	**171,513**	**514**	**177**
HA3OKLU	**A**	**142,560**	**472**	**162**
		(Opr. HA0MM)		
HA5BP	"	51,987	200	129
HA6NP	28	27	3	3
HA5KBS	**14**	**10,030**	**120**	**59**
HA9OT	**7**	**73,408**	**287**	**124**

Iceland

TF3SB	**14**	**15,792**	**155**	**84**

Ireland

EI1AA	**A**	**105,530**	**305**	**173**
EI2CL	"	7,973	88	67
EI4CF	**14**	**305,946**	**836**	**201**

Italy

I3PRK	**A**	**575,985**	**785**	**285**
I1EIS	"	96,135	288	145
I2LPA	**28**	**429**	**15**	**11**
IA5OAK	"	48	4	4
IA5BFY	**21**	**26,789**	**126**	**89**
I2AT	**21**	**25,398**	**112**	**83**
I3FGX	"	17,408	94	68
I4BNR	**14**	**423,060**	**837**	**220**
I1COB	"	79,920	406	135
I6PVH	"	3,528	56	36
IA5DJD	"	208	14	8
I4BMJ	**7**	**271,892**	**493**	**202**
I5FCK	**7**	**150,634**	**355**	**167**
I3MAU	**3.5**	**449,460**	**757**	**227**

I.T.U.

4U1ITU	**A**	**30,478**	**150**	
		(Opr. OZ7D		

Liechtenstein

HBØAFI	**A**	**160,160**	**406**	**1**
HBØAZD	**A**	**67,000**	**260**	**1**

Luxembourg

LX1BW	**A**	**83,590**	**272**	**1**

Netherlands

PA9TOM	**A**	**337,322**	**686**	**2**
PAØGRE	"	3,276	43	
PAØTO	"	2,625	44	
PA1GRE	"	434	18	
PAØJR	"	273	17	
PAØEHF	**21**	**2,987**	**42**	
PA7GBY	14	578	18	

Norway

LA5QK	**A**	**68,175**	**272**	**1**
LA4M	**A**	**34,170**	**218**	**1**
		(Opr. LA2T		
LA2GN	"	31,678	183	
LA2IE	14	1,000	26	
LA4PQ	"	352	20	
LA6HL	"	114	7	
LA2YT	7	750	26	
LA8CJ	3.5	1,950	37	

Poland

SQ9AI	**A**	**350,141**	**785**	**2**
SP8ECV/9	**A**	**155,376**	**463**	**1**
SQ9CTW	"	149,110	420	1
SQ6HAY	"	87,848	329	1
SQ7ETG	"	67,456	258	1
SP9PDF	"	44,800	204	1
SQ9NH	"	25,728	150	
SQ9ZD	"	21,930	133	
SP6DB	"	18,392	120	
SQ8AWP	"	11,900	107	
SQ3KEY	"	9,845	90	
SP9AVZ	"	6,392	81	
SP3BVI	"	5,800	70	
SP6DYD	"	5,546	53	
SP3HTZ	"	3,468	52	
SP9ADU	21	39	5	
SQ4CLX	**14**	**95,630**	**363**	**1**
SQ4AS	**14**	**38,168**	**215**	**1**
SQ6DNS	"	37,107	213	
SP6FSZ	"	25,480	166	
SP5EAQ	"	18,408	134	
SQ8AWL	"	11,152	97	
SQ5EKY	"	5,217	63	
SQ7BFC	"	3,074	40	
SP5GKN	"	780	25	
SQ1II	"	544	18	
SP9EHW	"	84	8	
SQ9PT	**7**	**67,032**	**254**	**1**
SQ9ABU	"	15,336	106	
SP9DH	"	50	5	
SQ3BLG	**3.5**	**118,384**	**393**	**1**
SP5KGT	**3.5**	**69,618**	**261**	**1**
		(Opr. SP5EL		
SQ6AFO	"	23,452	163	
SP2CMB	"	22,792	154	
SQ6GEG	"	13,860	114	
SQ3CB	"	8,772	91	
SP9BLF	"	8,200	79	
SP7FBQ	"	3,038	58	
SP1EIC	"	2,640	48	
SP9ADV	"	1,512	32	
SP6EUD	"	988	56	
SP2IBS	"	624	24	
SQ1EHI	"	384	16	

Portugal

CT6ZG	**A**	**131,408**	**363**	**1**
CT1DW	**A**	**77,935**	**299**	**1**
CT1MZ	"	17,248	90	

Romania

YO6KAF	**A**	**270,364**	**613**	**2**
		(Opr. YO6AWR)		
YO6EX	**A**	**93,812**	**308**	**1**
YO7VJ	"	59,940	222	1
YO3JB	"	23,134	143	
YO7APM	"	12,709	122	
YO5BQ	**14**	**68,740**	**297**	**1**
YO4AUL	**14**	**32,544**	**352**	

[Continued on page 78

ISRAEL
-AND HOW TO GET AN ISRAELI QSL CARD

BY GEORGE PATAKI,* WB2AQC

THIS year we planned a trip to Israel, the Promised Land, a country promised by more Governments to more people than any other country in the world. Even the Israelis love to make promises like, "Tomorrow I'll mail you my QSL card." But most of these cards will probably be delivered by the Messiah himself, when and if He comes.

You Don't Have To Be Jewish . . .

When I told a few friends that we want to visit Israel, the first question was: "Are you Jewish?". Interesting, nobody asked me if I am a Moslem when I visited Mauritania or Morocco.

For a visiting amateur, Israel has lots of attractions; it is easy to get a permit to operate portable 4X, everybody speaks English (and 2-3 other languages) and the country has so many fascinating sights that no matter how long you stay there, you'll never finish discovering new ones.

So we decided to first visit our families in Romania (where I used to be Y02BO), and from there, TAROM, the excellent Romanian airline, took us to Lod Airport near Tel Aviv.

At the immigration desk I asked the Israeli officer not to stamp my passport and he gave me the visa on a separate piece of paper. Some of the Middle Eastern countries won't let you in if you have an Israeli visa on your passport. Contrary to that, the Israels don't seem to care about your previous travels.

We picked up our luggage, loaded up 2 push-carts and started to look for the Customs area. We followed an arrow and pushing our carts around a group of noisy people evidently in some disagreement, we found ourselves on the street. I knew that in the Middle East much of the activities are done outdoors but I doubted that the Customs Inspection was also done on the street. When I asked a taxi driver where the Customs was, he wondered if I was coming or going. I realized then that when I had avoided the group of noisy people, I also avoided the Inspection.

Later I found out that there are 2 ways to choose: one marked with a red light if you have anything to declare and the other one, with a green light, if you are "clean". I always claimed to be clean and probably by my good instinct I went through the green light.

Most of our 3 weeks were spent in Kiriyat

*34-24 76th St., Jackson Heights, N.Y. 11372.

Strulik, 4Z4JT, is the most dynamic organizer and active amateur in Tel Aviv.

In Jerusalem, Ben, WA2BZA/4X spends his time operating while his son Jonathan, WA2NGG/4X attends college.

In the back are Meir, 4X4IA, and Haim, 4X4LC while Aron, 4Z4AG, and Ariel, 4Z4NE, are in the front of the table at the unmeetinglike meeting in Tel Aviv.

Yam B, North of Haifa, but we made several trips to visit amateurs and just sightseeing.

Haifa, The City On Carmel

Haifa located at Mount Carmel is indeed one of the prettiest cities on the Mediterranean coast. I was invited here by Ben, 4X4IL, and his XYL Devora, 4X4NW. I met them in London, about 7 years ago, when Ben was studying at Imperial College and was active as G5AIY.

They live up on Mount Carmel not far from the sea, so their location for antennas is excellent.

While I was visiting Ben and Devora, they were talking on 2 meter f.m. with amateurs in Tel Aviv, about 60 miles (95 km) away.

The new thing in Israel is 2 meter f.m. Some people reached as far as Cyprus and many amateurs operate mobile. It is interesting to watch some of the amateurs operate on 2 meters; while in lower frequencies they behave like amateurs, on 2 meters they sound like CB-ers.

Another amateur I visited was Yair, 4Z4JI, who lives right across the street from the beautiful Dan Carmel Hotel. Yair was blinded years ago in an accident. Arnon, 4Z4JL, taught him Morse code and helped him prepare for the license examination. Yair is attending college, studying Arabic and English. He showed me his special device used for tuning up his transmitter and later he played the piano with great skill.

Yair would like to get some amateur radio magazines written in Braille, perhaps some of the readers can help in this matter.

A couple of days later, Ben, 4X4IL, and Devora, 4X4NW, took us to Kibbutz Sasa, a collective settlement not far from the Lebanese border. Sasa was written up in last month's *CQ* by Laurie Margolis, G3UML.

On our way there, we were in touch on 2 meters with Naftali, 4X4JW, who came from Jerusalem to help the Sasa group.

They were operating the Phone portion of the *CQ* WW DX Contest and the club 4Z4HF had 2 rigs working. One was manned by Ricky 4X4NJ and Yossele 4Z4LF, the second by Laurie G3UML and Emanuel 4X4GV.

Standby operators were Keith, 4Z4IX, and Yossi, 4Z4MD. Yossi is studying at Technion in Haifa, where he operates 4X4HF, the school's club station. And of course Ben, 4X4IL, and Devora, 4X4NW.

There were many more people there but most of them seemed to disturb the operation with their constant yakking, than help it.

Joe, a member of the Kibbutz and an operator of the club station, was coordinating the whole effort, checking the worked stations, repairing the antenna and especially the rotators which kept breaking down.

Yossele, 4Z4LF, who for many years has been a member of this Kibbutz, took us around. He invited us in his house, showed us the childrens' quarters, the school, even the shelter needed because of their proximity to the Lebanese border.

Every visitor was invited for dinner in the cafeteria and on that Saturday there were more freeloaders than Kibbutzniks.

From Haifa we took several side trips. First we went to Rosh-Hanikra, right on the border of OD5, where we reached some interesting natural grottos by cablecar. On another day we visited Nahariya, a beautiful summer resort town and Acco which has a very old Arab sector and a fortification where during the British mandate many Jewish freedom fighters were jailed; some of them executed.

We walked through the ruins of Cesarea, the ancient Roman capital, we saw Nazareth, holy place for Christianity, and we visited Tiberias located about 700 feet below sea level, on the shores of the Sea of Galilee.

We went into the catacombs of Bet Shearim where I even got into a sarcophagus to check its comfort, but I can't recommend it for any long period of time.

Dan, 4X4JS of Tel Aviv (and WA2CRD of the Bronx, N.Y.) chats with Avi, 4Z4MQ.

Jerusalem, Where The U.S. Has 2 Consulates

Jerusalem, because it is the capital of Israel has a United States Consulate. But the U.S. maintains also a second consulate in another sector of Jerusalem, which used to belong to Jordan. So even if this is a very unusual situation, don't worry America, we are well represented in Jerusalem.

The new city is very modern and it is beautiful. The old city with a large Arab population is surrounded by high walls having 8 gates. It is one of the most interesting places in the world with plenty to see and photograph.

In the modern Jerusalem we visited Ben, WA2BZA/4X. He shares his station with his college student son Jonathan, WA2NGG/4X.

Ben spent a big part of his life in the building industry, teaching and writing college textbooks. Now he came to Israel to study the *Talmud*, the basis of the Jewish religion.

We went on the roof of his house to see his beam antenna, his 2 meter antenna and to film him climbing up and down his tower. What wouldn't a man do to star in a movie? Even if it is just a modest Super 8 and the producer, director and cameraman is a one man crew.

I asked Ben, as I asked other Israeli amateurs, how come among approximately 1,000 4X and 4Z amateurs there is not one single Arab. From various amateurs I got various answers and explanations but it just did not seem right that with a quite large Arab population, with many college students and technical people, no 4X amateur is called Ahmed or Mohammed. It is true you can't hear many Arabs from Egypt, Syria, Sudan or Iraq, but we like to think there are better conditions in Israel.

Another of my gripes is about QSLing. It happened to me and I'm sure to many others that after a nice QSO with a 4X station, and mailing him a QSL, despite all of his promises you wait in vain for his. There are many amateurs big in empty promises and in my experience the 4Xs are leaders in this field.

I was trying for the 4×4=16 Award, by working 16 Israeli stations on 4 bands. I contacted more than forty 4X and 4Z stations, everyone promised a QSL, but I couldn't get the necessary cards. Why don't they make an award: "Received 16 Israeli promises"? It would be much easier.

Perhaps I exagerated a little bit. If you really want an Israeli QSL for DXCC or for any other Award, don't despair. All you have to do is to check-in on one of the Israeli nets, move off the net frequency with a friendly sounding 4X amateur, run a half hour phone patch for him and you made it; on your next vacation you can fly down to Israel and pick up your card.

Jack, 4X4CZ, with Eva, WA2BAV/4X. Jack passed away suddenly a few days after our visit.

Tel Aviv—Yafo

Tel Aviv is a modern city definitely worth visiting. Yafo, a very old Arab town is rapidly disappearing to make room for the extending Tel Aviv. A small portion of Yafo was rebuilt for the sake of tourists but it is so unreal, so new and clean, that you have the impression of walking on a Hollywood movie set.

In Tel Aviv I visited an old friend of mine; Dan, 4X4JS. Dan is a Sabra (a native Israeli) who same to New York and for many years worked for the same company I work for; CBS-Television. He became WA2CRD and was a famous DX chaser. Recently he returned to his homeland and became once again 4X4JS.

The day I visited Dan, his wife gave birth to a baby-girl but Dan didn't seem to be half as excited as the day he worked Mongolia, the last country needed for his "Worked All Zones" Award. Strange people these amateurs.

In his home I met Avi, 4Z4MQ, and Myron, W2CFZ/4X, who was visiting from Monsey, N.Y.

With Eva, WA2BAV, and our little Diane we went to see Strulik, 4Z4JT. Strulik a former member of Kibbutz Sasa, is a professional

Yair, 4Z4JI, a sightless amateur is studying Arabic and English. Besides chasing DX, Yair plays the piano very well.

Louis, 4Z4AO, the former YO3GL, of Bucharest, doesn't want to live in a ground floor apartment anymore.

photographer. Last year when we operated from Istanbul as TA1OM and TA1YL, he was very helpful making lists and fighting the pile-ups for us. It was a great pleasure to meet him personally.

In one of the most beautiful suburbs of Tel Aviv I visited Louis, 4Z4AO. I met Louis in Romania about 20 years ago when he was known as YO3GL.

At that time I heard a story and now he's confirmed it. One day he was operating his rig in his semi-basement shack, in Bucharest. The window was open and he was talking English. A policeman passing-by heard him talking a foreign language on his radio station. Convinced that he had discovered a spy, he called for reinforcements, surrounded the house with his group and he personally jumped through the window right on poor Louis's back, arresting him.

It took Louis a long time to convince the policeman that he was a legally licensed amateur radio operator and he had the right to talk to people in foreign countries.

At the amateur gathering in Tel Aviv, Myron, W2CFZ/4X is a good listner while Malik, 4X4JU proves to be a good talker.

Now Louis is safe in Israel but perhaps his past experience made him buy an apartment on the top floor of the building.

In Tel Aviv we went to visit Jack, 4X4CZ, who was at that time President of the Israel Amateur Radio Club. Later we heard with great sadness that Jack suddenly passed away just a couple of days after our visit. Jack spent many years in amateur radio. Before 1948, he operated in the former Palestine as ZC6AB. His XYL is working for the Ministry of Communications and she handles the amateur radio licenses.

In Tel Aviv amateurs have a nice tradition; once a month or so, they meet in a restaurant and have a good time.

We went to such a meeting. It was the most unmeetinglike meeting I ever attended. Nobody opened the meeting and nobody closed it, nobody made a speech and nobody read the minutes. This lasted about 3 hours. People just

In Haifa, Ben, 4X4IL, waits patiently for his XYL Devora, 4X4NW to sign off the 2 meter f.m. rig.

came, sat down, had their cakes and coffees, everybody talked with everybody else, then they said "Shalom" and went home.

There were more than 30 Israeli amateurs and a couple of foreign visitors like Ulf, SM3-CZA/4X who is with the United Nations Emergency Forces in Sinai, Toby, G2FLK, Myron, W2CZF/4X and Jim, WØKBG/4X.

Among the Israeli amateurs there were Aron, 4Z4AG, who is active on SSTV, Yankele, 4X4-AH, whom I met before in New York, Israel, 4X4VB, father and Dov, 4Z4DX, son, both members of a Kibbutz, Ozzie 4X4CW, Haim, 4X4LC, Ami, 4X4DK, Tuvia, 4X4GT, Uri, 4X4OC, and others. Some of them came with their wives but I didn't meet any YL operators. For a country where the women are very emancipated (many of them go to military duty) there are very few YL operators.

[*Continued on page 77*]

MATH'S NOTES

BY IRWIN MATH,* WA2NDM

AFTER a somewhat longer-than-anticipated delay, we have completed the 6 meter version of the two v.h.f. converters we promised several months ago. Our topic this month, therefore, will be the details of this unit.

As regular readers of this column will recall, we set out to develop a highly sensitive converter which would be capable of pulling the weakest signals out of the noise while still maintaining a good large-signal capability and be free from spurious responses.

The circuit shown in fig. 1 is the result. The unit is, of course, fully solid state, employing four JFETS and two MOSFETS. There are two separate r.f. amplifiers driving two separate mixers which are connected to a common local oscillator. Each r.f. section has six high Q tuned circuits between input and output and the crystal controlled oscillator contains two additional tuned circuits connected in a bandpass configuration. All stages are completely shielded and the entire converter is operated from a built-in regulated 12 volt d.c. supply.

Upon examining the schematic a bit closer you will notice that there are two separate r.f. amplifier/mixer chains, switched by S_1. The use of such a scheme was dictated in order to cover the entire 6 meter band without having to unduly broaden the response (at the expense of selectivity and spurious responses) of the unit and to allow tailoring of the overall response of each section. One section therefore is used to cover 50-52 MHz with a flat response while the other section covers 52-54 MHz with roll off beginning at 53.25 MHz to help attenuate channel 2 interference.

Each r.f. amplifier consists of a premium E310 JFET (Siliconix) in a grounded gate configuration. This transistor and circuit offer a noise figure well below the theoretical minimum noise figure for this band. As a result, one can never wonder whether he is "missing anything" while straining to receive a weak signal—even in a very quiet location. If you are not so intent on this point, JFET's of the 2N4416 or MPF 102 variety will perform adequately.

The tapped input tuned circuits for the r.f. amplifiers serve to match the 50 ohm input from an antenna to the 75 ohm input impedance of the JFET's. Two diodes across the input connector prevent the r.f. level from reaching a point that might damage the input circuitry. The output of the r.f. amplifiers is applied to a three-stage lightly coupled bandpass filter which exhibits a high degree of attenuations to undesirable signals both above and below the operating frequency range. A 40673 MOSFET was chosen as a mixer because of its low cross-modulation susceptibility and excellent gate-to-gate isolation. The output of this mixer is further bandpass tuned to the i.f. range. In our case, an i.f. of 28-30 MHz was employed as this entire range was available on our receiver used as a tunable i.f.

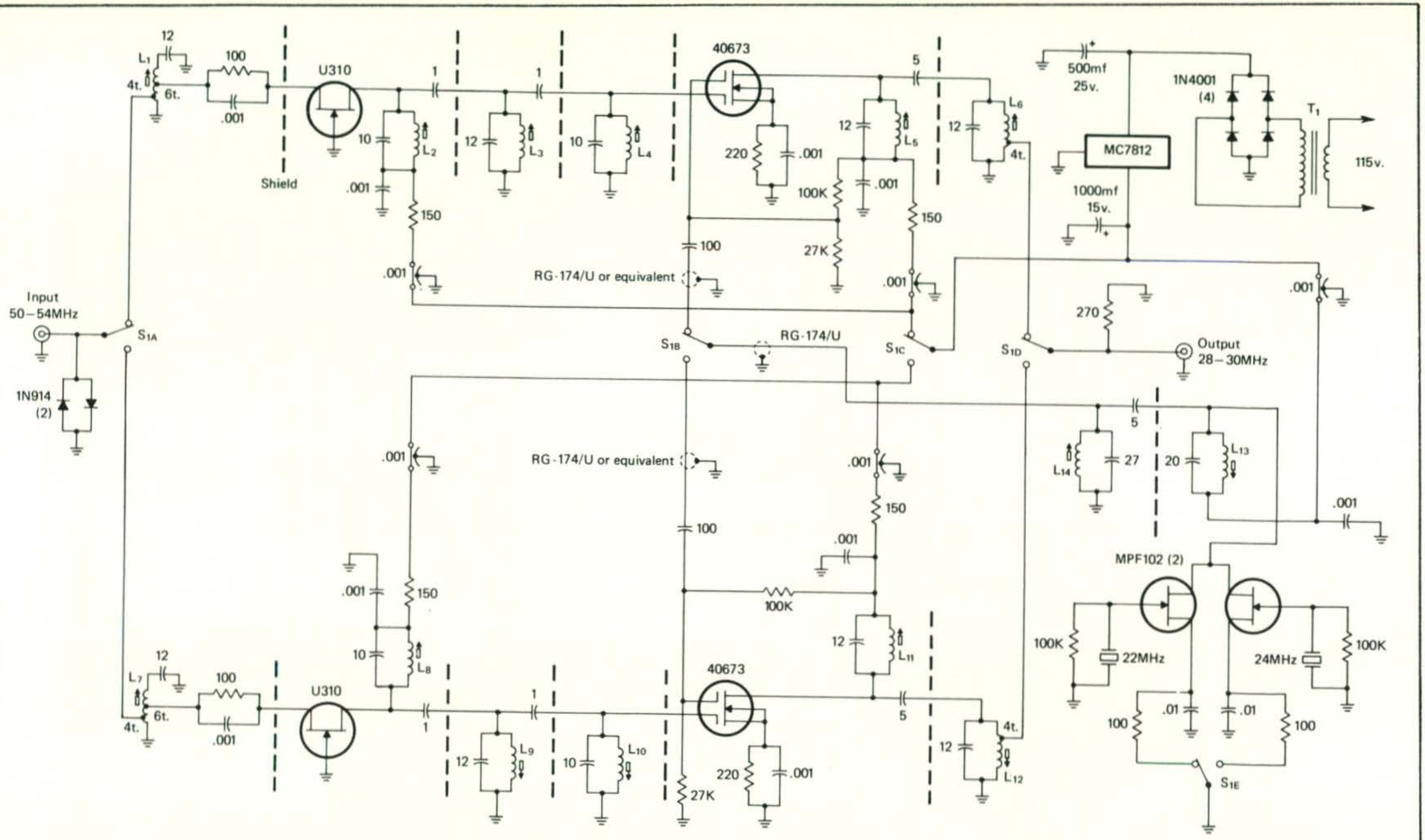
The crystal oscillator employs two JFET transistors in a simple overtone configuration with feedback occurring between drain and gate by means of the internal capacitances of the transistors. Two transistors are employed to simplify switching from one crystal to the other. We could have employed diode switching but this circuit used less components and was much more straightforward. Switching is accomplished by simply grounding the appropriate source.

The output of the oscillator transistor in use is connected to a lightly coupled double tuned circuit which helps keep the oscillator output free from any signals but the one desired.

Figures 2 and 3 are photographs of the top and bottom of the converter showing the various compartments for the different stages. All compartments are made of 1/16" aluminum with simple 90° bends. Dimensions are not given as the use of a file will be mandatory and the components used by various readers will not always be exactly the size of the ones I used. All work was done with a 1/4" hand drill, a common vise, and a pair of tinsnips so don't be afraid to try your hand at building the case and shields. It certainly can be done rather easily. The large amount of shielding is necessary and we would strongly suggest that it all be used if a good converter is desired. The outside enclosure is a BUD CU-247 7 3/8" × 4 1/16" × 2 1/4" cast aluminum box and the bandswitch is made up of two Centralab type PA-5 rotary switch sections and a Centralab type PA-302 switch index assembly. All coil forms are standard 1/4" diameter ceramic ferrite core types. Plastic forms of the same diameter would undoubtably work as well and different core materials would simply necessitate adding or removing a turn or so to achieve proper resonance.

All wiring is point-to-point using component leads wherever possible. All leads should be kept as short as possible, particularly the gate lead of the r.f. amplifiers. This lead should run directly to a ground lug on the chassis. Also,

*5 Melville Lane, Great Neck, N.Y. 10023.



L_1, L_7—10½t. #26e. close wound, ¼"d. slug tuned form, tapped as shown in fig. 1.
L_2-L_4, L_8-L_{10}—7½t. #26e. close wound, ¼"d. slug tuned form.
L_5, L_{11}—16t. #26e. close wound, ¼"d. slug tuned form.
L_6, L_{12}—20t. #26e. close wound, ¼"d. slug tuned form, tapped as shown in fig. 1.
L_{13}—14t. #26e. close wound, ¼" slug tuned form.
L_{14}—15t. #26e. close wound, ¼"d. slug tuned form.
T_1—12v. 350 ma. Stancor P-8391 or equiv.

Fig. 1—Schematic of the six meter converter. Note that shielded wire is used to connect the output of the local oscillator to the two mixers. All capacitors are in pf. except decimal values which are in mf. unless otherwise noted. All resistors are ¼ watt.

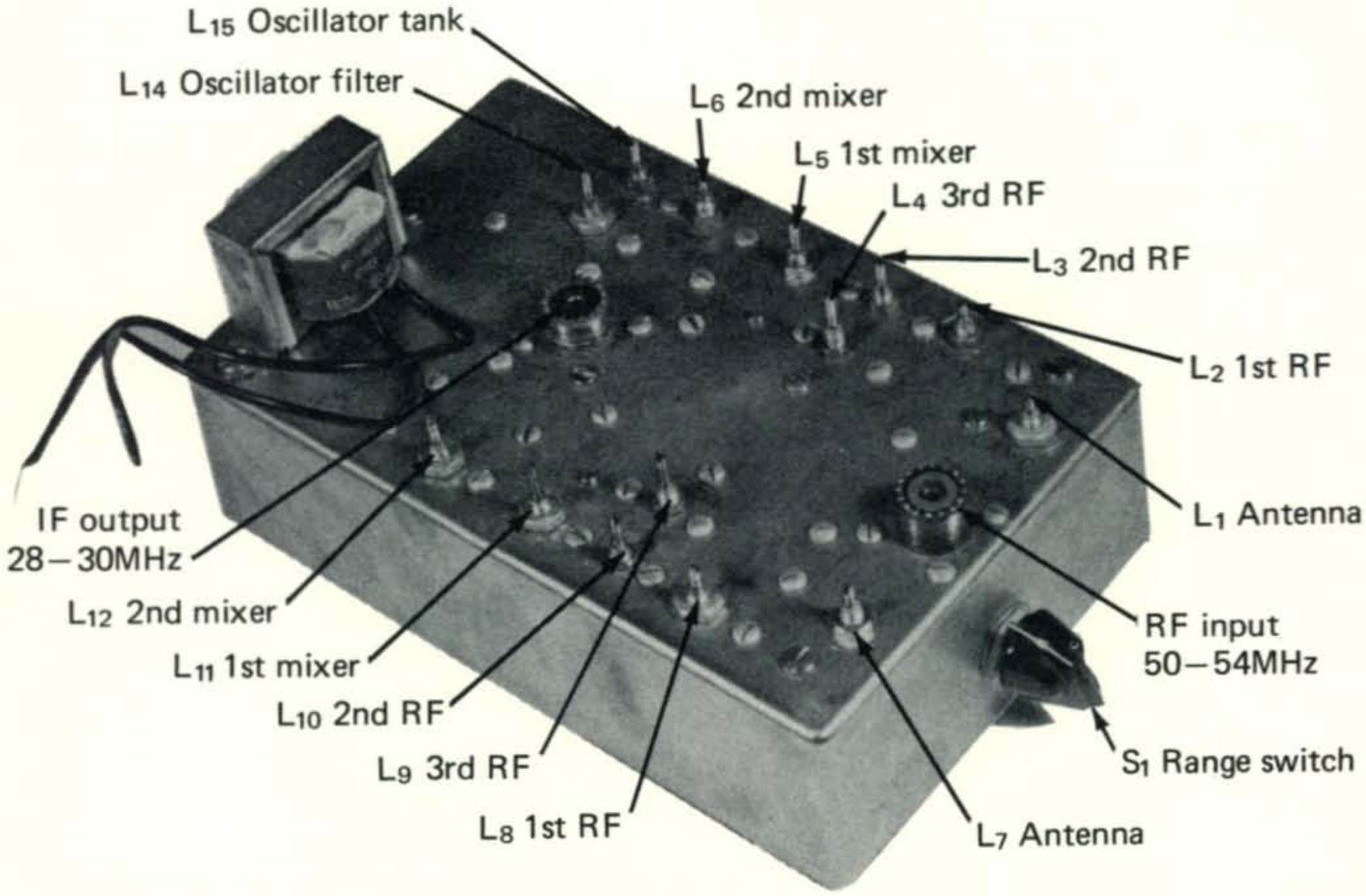


Fig. 2—Top view of the converter with components called out. For further details see text.

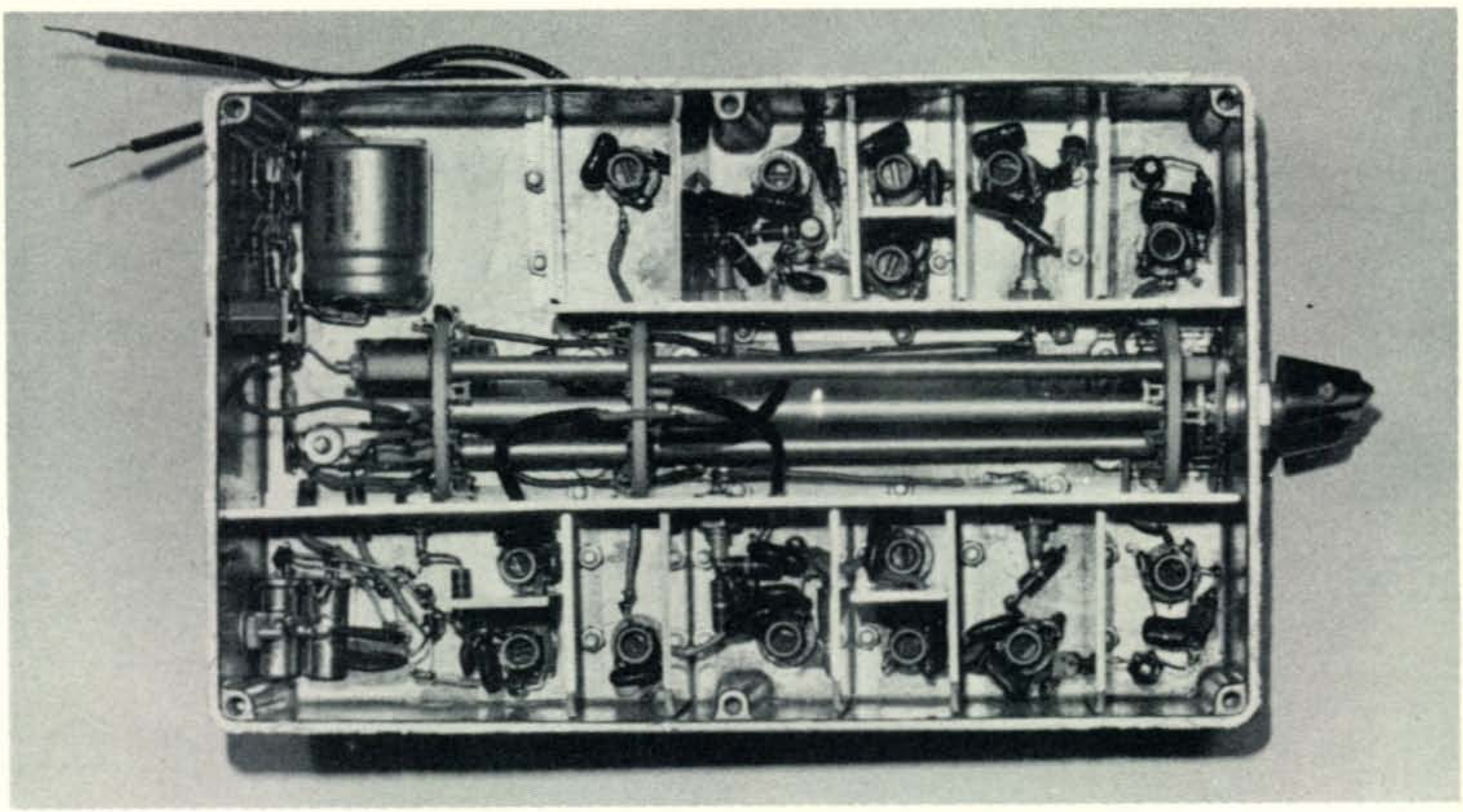


Fig. 3—Bottom view of the converter showing the various compartments. The two separate r.f. amplifiers and mixers are shown in either side of S_1. The common local oscillator is at the bottom left with the power supply at the top left.

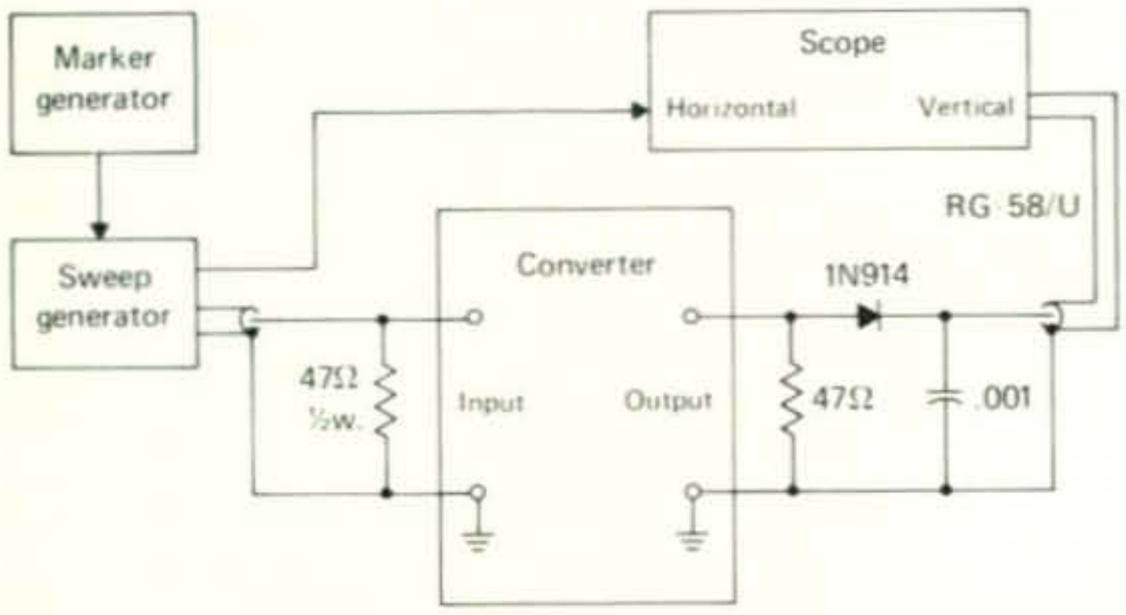


Fig. 4—Alignment setup for adjusting the converter.

when positioning the E 310's be certain that the portion of the drain lead in the r.f. amplifier compartment be as short as possible—certainly no more than ⅛ inch.

After construction is completed the entire unit should be carefully checked for wiring errors and then hooked up in the alignment circuit shown in fig. 4. Each half of the converter should then be aligned so that the sweep pattern matches the ones shown in fig. 5. When adjusting the 52-54 MHz portion, the unit can

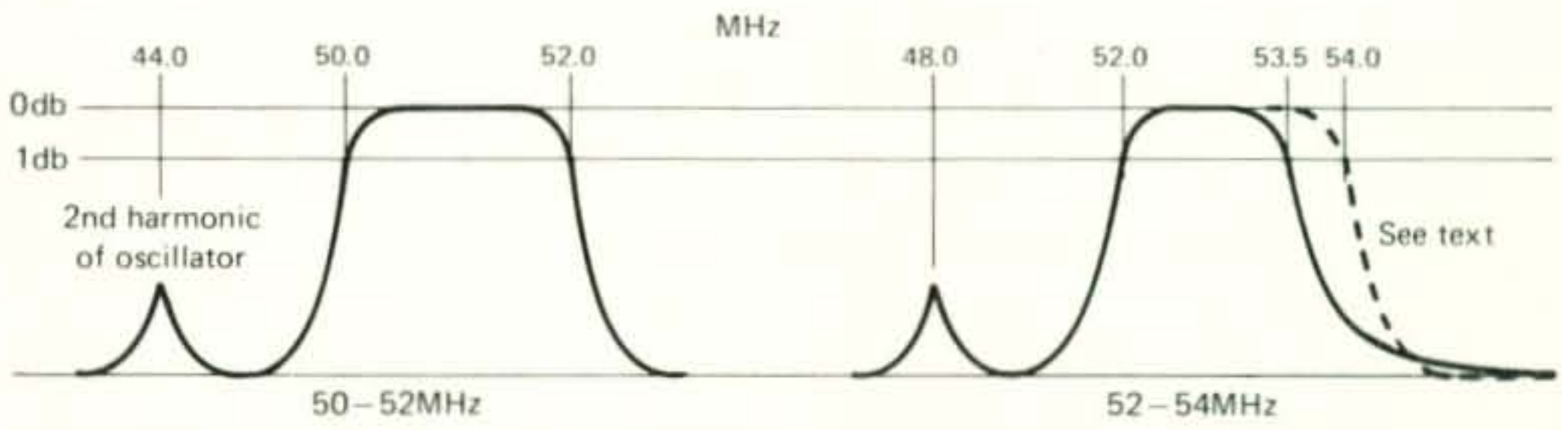


Fig. 5—Sweep patterns desired when aligning the converter.

be made flat from 52-54 MHz if you have no channel 2 problem in your area. In our case, the response shown was necessary to attenuate overload caused by the TV signals. We also had to use a coaxial strip-line filter (similar to the one in the ARRL handbook) ahead of our converter to completely eliminate this source of QRM. I should indicate however that we are line-of-sight with New York City's channel 2 antenna and have about a quarter of a volt of channel 2 signal on our antenna.

If you do not have the equipment shown in fig. 4 you could simply peak all coils in the 50-52 MHz section to 51 MHz and all coils in the 52-54 MHz section to 53 MHz and then stagger-tune them for approximately even noise over the respective band and get an acceptable result. The oscillator coils, by the way, should be set so that each crystal gives about the same amount of r.f. at the output of the second oscillator tuned circuit. This can be measured by means of a simple r.f. probe as shown in figure 6.

Final specifications of our unit are as follows:

SENSITIVITY: .03 microvolt (400 Hz modulation) readable .1 microvolt for 15 db quiting.

NOISE FIGURE: 2.6 db (without excessive "tweaking")

CONVERTER GAIN: 20 db (.1 microvolt in at 50 MHz gives 1 microvolt out at 28 MHz)

28-30 MHz ATTENUATION: —76 db

SPURIOUS RESPONSES: None detectable between 28 and 30 MHz, hovever, the second harmonic of the 24 MHz crystal could be heard at 26 MHz.

TUNABLE IF: SX-101 Mark III used for all tests. Our receiver incidently has no pickup without an external antenna. A poorly shielded receiver as the tunable i.f. can easily produce misleading spurious signals in the 28-30 MHz passband.

See you next month, 73, WA2NDM

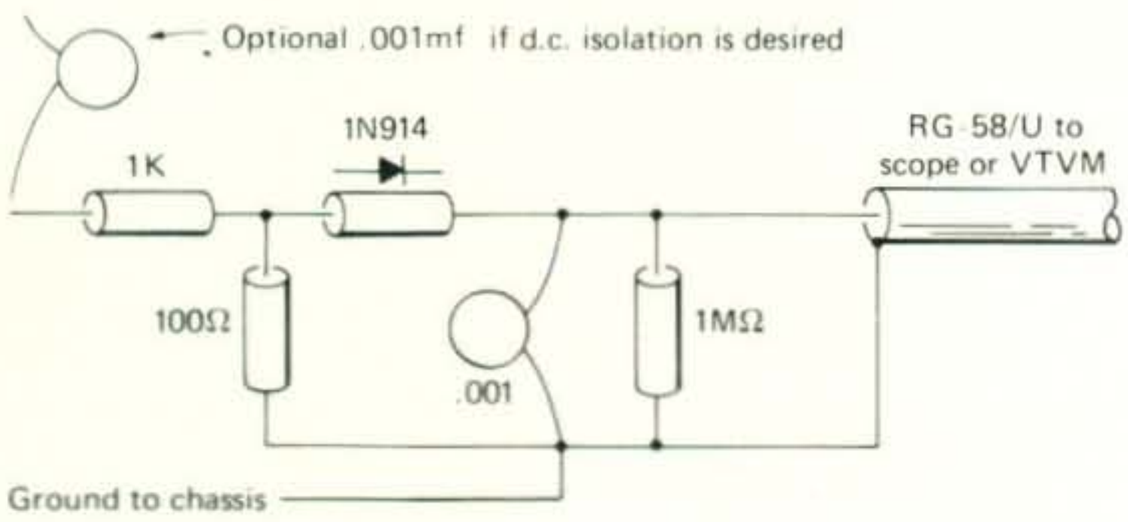


Fig. 6—A simple r.f. probe for oscillator voltage measurement.

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NOVICE SHACK

BY HERBERT S. BRIER,* W9EGQ

Contest Operating

Amateurs who like the thrill of competition and to compare the getting-out capabilities of their stations and antenna systems and operating skills with those of other amateurs should enter a few operating contests. The contests offer excellent opportunities to work new states, counties, or countries and add cards to one's QSL collection. In addition, c.w. contests give operators whose code proficiency is a little shaky concentrated code practice by copying strange call signs, signal reports, and locations many times an hour. In fact, alert amateurs can become sharper operators by participating in a contest or two. We must warn you, though, that contest operating can be habit forming. It can be humbling too when you hear the "rare ones" you call answering your friendly rival across town.

Contest in November And December

SS (Section Sweepstakes): C.W.: 1200 GMT, November 8, to 2359 GMT, November 9. Phone: same times, November 22 and 23. Frequencies: Novices: near 3.71, 7.11, 21.11, and 26.11 MHz. Others: C.W.: 3.55-3.65, 7.05-7.1, 14.05-14.1, 21.05-21.1, 28.05-28.1 MHz Phone: 3.85-3.95, 7.2-7.25, 14.25-14.3, 21.3-21.4, 28.6-28.8, MHz. Operate a maximum of 24 hours in each period exchanging message "preambles" with other station in the 75 ARRL *sections* in the United States and possessions and Canada. Earn two points for a complete, 2-way exchange. Half exchanges earn no points. A station may be worked only once for contest credit. Total score equals contact points multiplied by the number of ARRL sections worked. These sections are listed monthly in *QST*. Message preambles sent are: Number of contact; Precedence (A for transmitting power of less than 200 watts, B for 200 watts and above); Call sign; CK (last two digits of year licensed); Place (ARRL section).

The above information is sufficient to get on the air and make SS contacts; however, to be eligible for a winner's certificate, you must submit a log showing date and time and other data for each contact to: ARRL, 225 Main St., Newington, CN 06111. The best way to assure that your entry is in the correct form in this and most other major amateur contests is to mail a request to the contest sponsor for the proper forms. Include a postpaid reply envelope ("business size"). Be sure to indicate duplicate contacts and deduct them from your point total in figuring your final score.

The American Radio Relay League, Inc., will award separate Novice winners' certificates in sections in which there are at least three Novice SS entries submitted. So if you and two of your Novice buddies enter the contest and submit scores, you will assure that a Novice certificate will be awarded in your section. Besides, a little local competition increases the fun of the contest.

Contest Hints

Probably the first thing that a new contestant learns is that his calls are too long. When CQ'ing, so many other contestants are listening during the active hours, if your signal is readable, many of them will hear it almost from the first dash and will be waiting—but not very long—for you to stand by so they can answer you. If you drag out calls to specific stations, the station you were calling will often be already working someone else when you

Gerhard Hevia, CE6EI, Casilla 505, Osorno, Chile, South America, works 15 meters with a Yaesu FT-101 s.s.b./c.w. transceiver and a vertical antenna. He likes to work stations in the United States, as he studied here as an "exchange student." Gerhard is 22 and studies Agronomy and manages the family farm when he is not on the air. We are sending CE6EI a 1-year subscription for CQ for sending this winning entry in our Monthly Photo Contest. If you wish to try your luck, send a sharp picture of yourself at the controls of your amateur station with details of your Amateur Radio career to: CQ Novice Shack Photo Contest, c/o Herbert S. Brier, W9EGQ, 409 S. 14th St., Chesterton, IN 46304. Suitable non-winners will be published as space permits.

*409 South 14th St., Chesterton, Indiana 46304

Mickey Smith, WN8TEE, Box 1718, Williamson, West Virginia 25661, age 15, worked 39 states and four countries his first two months on the air. He uses a Drake TR-4C transceiver and a half-wave doublet antenna usually around 7140 kHz.

stand by. It is not unusual for a snappy operator to make a complete contact in the time the long caller spends on a call and then work the latter when he finally stands by. An indication of how little time is wasted in contests is that several c.w. operators made 1000 contacts in 24 hours in the 1974 SS—over 41 contacts an hour; the high phone man racked up over 70 contacts an hour for a total of 1688 contacts. Many other phone and c.w. operators in both the low and high-power categories clipped off more than 30 contacts per hour for 24 hours. The highest scoring Novice made 230 contacts at the rate of 15 contacts per hour. In contrast, the winner in the 1975 "Novice Roundup," last January, worked 1008 stations in 30 hours. Maybe you can sharpen up your skills in the SS and beat that record next January.

The *CQ* World-Wide DX Contest, C.W., takes place November 28 and 29. Full details in September *CQ*. To be honest about it, the odds are stacked against Novices in any DX contest, but keep your ear out for stray DX stations in the 21 and 28-MHz Novice bands during the daylight hours on Saturday and Sunday. Mail your request for official score sheets to: *CQ* WW DX, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050.

ARRL 10-Meter Contest, 1200, GMT, December 13, to 2359, GMT, December 14. Suggested frequencies: C.W., 28-28.05 MHz; Novice, 28.1-28.15 MHz; Phone: S.S.B., 28.5-28.6 MHz; A.M., 28.8-29.0 MHz. Everybody works everybody, c.w. to c.w. or phone to phone, in this contest. U.S. and Canadian stations send signal reports and the names of their state or province. Others send contact number starting with 001 and signal report. Each 2-way contact earns two points, except each Novice contact counts double. Each station may be worked once on c.w. and once on phone in the appropriate parts of the band. Multiply QSO points by number of states and provinces and countries on the ARRL country list for total score. Be sure to eliminate duplicate contacts from your log. Request log sheets from and send scores to: 10-meter Contest, ARRL, Newington, CN 06111.

The condensed rules above are based upon last year's official rules. Last-minute decisions by the contest committees may affect the rules slightly. We will tell you about the 1976 Novice Roundup scheduled to start in late January in the January column. For information on other amateur operating events, consult the CONTEST CALENDAR and the AWARDS column in each issue of *CQ*.

News And Views

Edward Peter Swynar, VE3CUI, 326 Lorindale Drive, Oshawa, Ontario, L1H 6X4, Canada, says in part, "Although in Canada no Novice class of license exists, I enjoy reading your column. To get down to business, though, Herb, I wish to register a formal complaint against the 'WN crowd.' Directly at them, I say, 'You chaps are too darn timid whenever a prefix other than 'WN' pops through the ol' headphones. I venture forth into your frequencies—especially 40 meters—whenever I get a chance, because I know that many of you have never worked VE (Canada). But what happens? I slide into a reasonably clear frequency on an active band and call a couple of '3-X-3' CQ's to be met by a wall of silence for five kHz either side of my frequency. I call CQ again. No answer. Ten seconds later, I hear a 599 WN CQ right on my frequency. I answer the WN with a slow, steady call, still no response! But I know he is there and should have heard me. Or have receivers gone out of fashion? A lot of Canadians and DX operators feel it is 'wasted' time to call WN's Do you think that you're not allowed to work anybody else than other Novices?

"Don't tell me, Herb, a WN4 or WN9 can't hear me on 40 meters, because I often manage to work five countries a night outside the 40-meter Novice band with a 75-watt Ranger-I transmitter, a Hallicrafters 77A receiver, and a 30-foot high dipole antenna. I think you should tell your readers to get over their *WN Timidity* to work the Canadians and DX stations that try to work them." 73, Eddy, VE3-CUI. Consider yourselves TOLD!.

Eric Esteran, WB6WNK, 360 Sharon Rd., Arcadia, CA 91006, has gone up in the world since he was written about in the 1974, October column. Besides knocking the "N" out of his call in favor of a "B", he sold his Heathkit HW-101 transceiver and is now using one of

[*Continued on page 77*]

DeWitt In Focus

BY BILL DEWITT,* W2DD

The KH6HJF SSTV picture received by WA6TUF via Oscar 7.

CONGRATULATIONS for a real achievement! On August 21st, Don Muth, KH6HJF, of Kaneohe, Hawaii, and Mike Smithwick, WA6-TUF, of Los Altos Hills, CA., carried out an excellent two-way SSTV contact via OSCAR 7. It was Orbit 34891 at 04:46 GMT with a 2 meter uplink and 10 meter downlink that provided the path for this believed first SSTV/OSCAR exchange between Hawaii and the Mainland. The accompanying photos are good evidence of how well all parts of the system were working. No details at this point on Don's equipment, but Mike was using SBE SSTV gear and a TS-520/TS-900 combination with a Hallicrafters HA-2 converter. He pumps about 30 watts into a 7 element Yagi for the uplink.

Near the end of this column you'll find a comment intended to put the accomplishments of Don and Mike in a little different perspective. But now, hats off to these two talented fellows and on to more SSTV!

By the time this issue of *CQ* hits your mail box I presume that the early production models of both Robot and Sumner scan converters will be in the hands of enthusiastic users around the globe. I had hoped to offer comment in depth on these units by November at the latest, but delays in availability have made this impossible. Looking forward to a greatly expanded market potential, I'm sure that both firms are anxious to get into full scale production. However, ironing out as many problems as possible *before* getting on the market is bound to be appreciated by the customer.

At this writing I have in hand the circuit diagrams for the new Robot Model 300 Scan Converter. All I can say is, "WOW"! On occasion I have rambled on in *CQ's* pages about "glueing together" a storage tube-SSTV Monitor-TV set combination to create a home-brew scan converter. Well, I still think that's possible if you can get your sticky fingers on a storage tube. *But,* Robot's put it all together and I wouldn't care to start from scratch to design the scores of circuit logic functions involved. Robot's Engineering staff has done a fine job of designing and laying out the circuitry. The drawings total about six feet in length if you put them end to end! Note to Joe Hawkins: I would have voted for a double size version of the circuit board, but then, I'm due to get new bifocals this week.

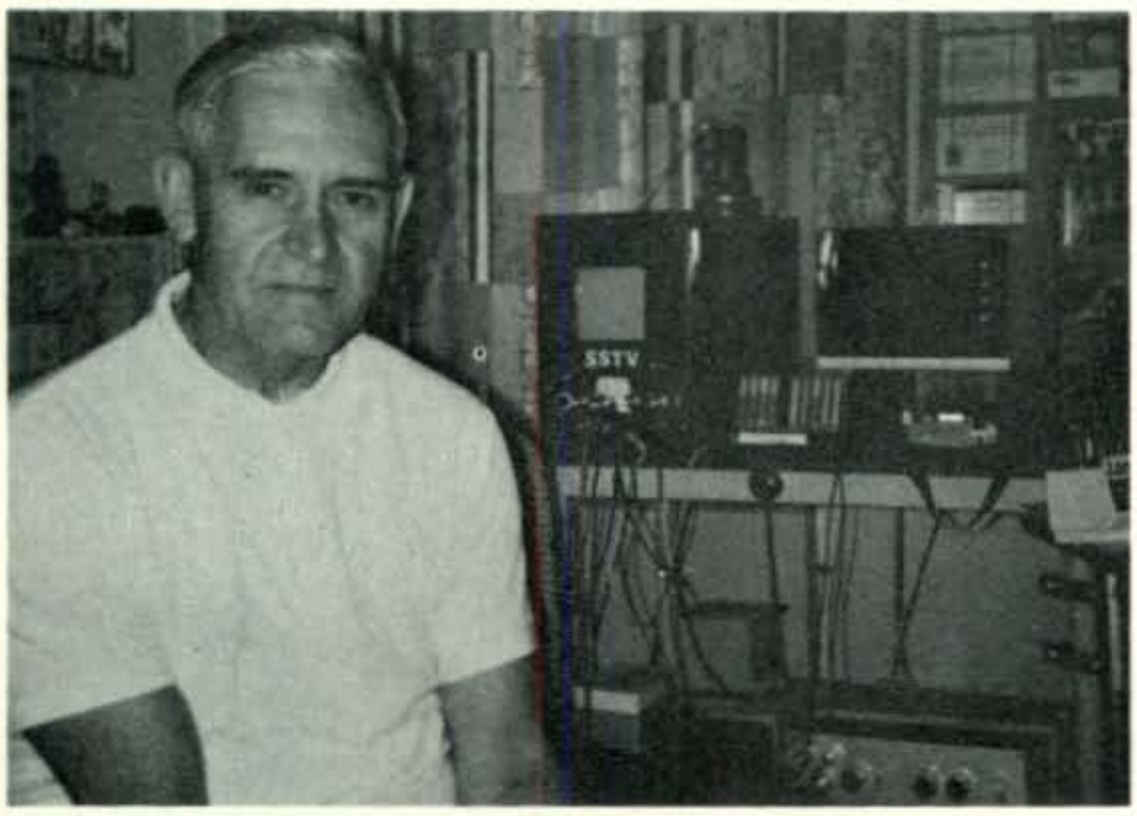
Starting from a handful of dedicated and determined SSTVers at the end of the 50's, slow scan has come a long way. Perhaps a total of 12,000 amateurs owning some kind of SSTV equipment would be a reasonable guesstimate for the present time. With the advent of scan conversion I think that the growth curve for this phase of amateur radio is going to take a steep rise in the next five years.

Taking September 1st this year as a benchmark, I think a fair guess for the total number of slow to fast scan converters in use by amateurs would be "under 25". Would you care to guess what that number will be in 1976?

In earlier columns, I have mentioned the several approaches to scan converter design

The WA6TUF SSTV picture received by KH6HJF via Oscar 7.

*2112 Turk Hill Road, Fairport, NY 14450.

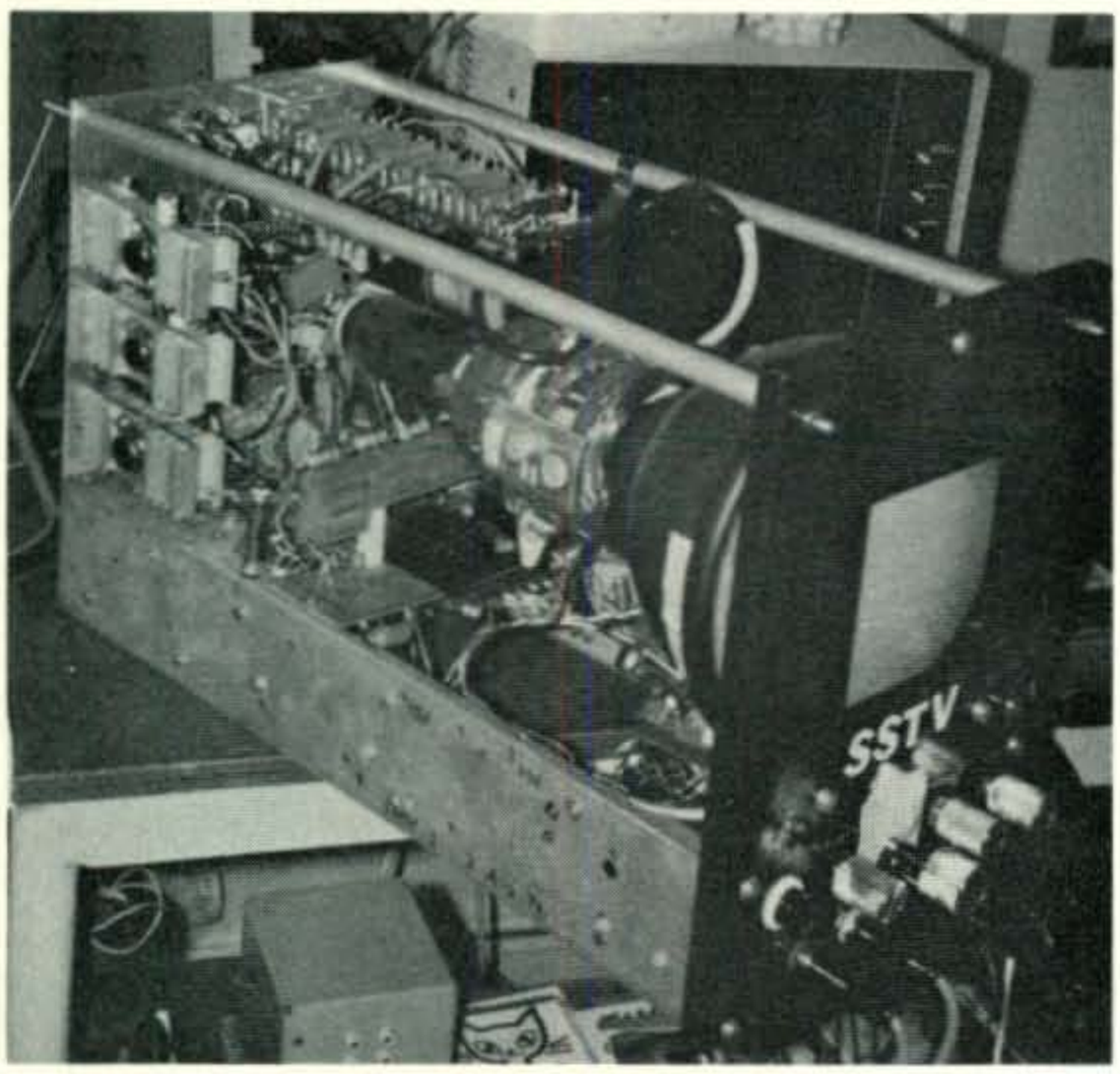


Heinz Engelmann, DL3UH.

with praise for the technical achievements of those who have done the pioneering in this field. Those concerned with the digital approach are (at this writing) "sweating out" the hardware for group construction of published designs. This is a tough job. Next will come massive de-bugging efforts, corrections of publishing errors, and finally, evolutionary improvements will start to occur (some are already under way!).

It's going to be interesting to see how many amateurs go this essentially homebrew route. For those who do, it's going to be a rewarding endeavor.

Tony Gallo, W3LDS, a real pioneer in the construction of the Dr. Suding designed scan converter, has already added Dr. Steber's averaging techniques to his scan converter. In addition, Tony has designed and built the ancillary equipment needed to conveniently switch from camera to scan converter playback and sundry other variations. These features are built into the commercially built scan converters mentioned above, but those who build their own will have to decide how far they want to go in this direction.



The SSTV monitor built by DL3UH.

Walt Bieda, W2ELF, whose scan converted images have been pictured in this column, has also added his version of Dr. Steber's image processing technique to his LMD converter. Walt and Tony have done a mountain of work in interfacing and debugging their gear. It helps a lot to work in pairs on a project like this, but having listened to their project reviews on a daily basis for the last few months, I can tell you that these fellows have really worked hard to secure the results they're getting.

Summing up then, it appears that while those who can handle the complications of building and de-bugging their own scan converter may go that route, it is the commercially built equipment that will have the big impact on the future of scan conversion. Pioneering points the way, but there are a limited number of pioneers.

News And Pictures From Around The World

Neville Jackson, G3IAD, created some late Summer excitement with his slow scan operation as G3IAD, from the Isle of Man. Neville, who is the head of the Technical Studies Department in a College for the training of disabled people, has an impressive list of previous calls on his Sherwood Forest card. During his 29 years as an amateur he's signed VS6CE, VQ4GC, VQ5GC, VQ3GC, 5H3GC, VQ2VB, and 9J2VB, in that order.

It's Neville's forthright opinion that SSTV will be the *major* activity on our bands in another couple of years. Now there's the right point of view!

In the accompanying photo you can see that Neville keeps everything under control. That open drawer on the desk houses his camera, caption holder, and lighting unit! Our thanks to Neville for the picture and the promise of one depicting the GD3 operation.

Another familiar call sign from the UK is G3WW. Richard Thurlow of Wimblington (try that one on your keyboard, Eddie!) is one of those SSTV activists you read about. Once a week he borrows some chain mail and a spear from the Tower of London and charges into BTAC and RSGB Headquarters with tracts extolling the merits of slow scan and demands for more SSTV coverage in *CQ-TV* and *Radio Communication*. There is no question of his tactical success. August *Radio Communication* and the last quarterly issue of *CQ-TV* both carried articles on our favorite subject by G3WW! I'm counting on Richard to forward a stirring account of the SSTV convention arranged by the BATC on October 11th at Aston University, Birmingham.

Now there's an idea! Why don't we get on

the ball and have ourselves an SSTV convention. (That Seminar at Dayton had all the makings!)

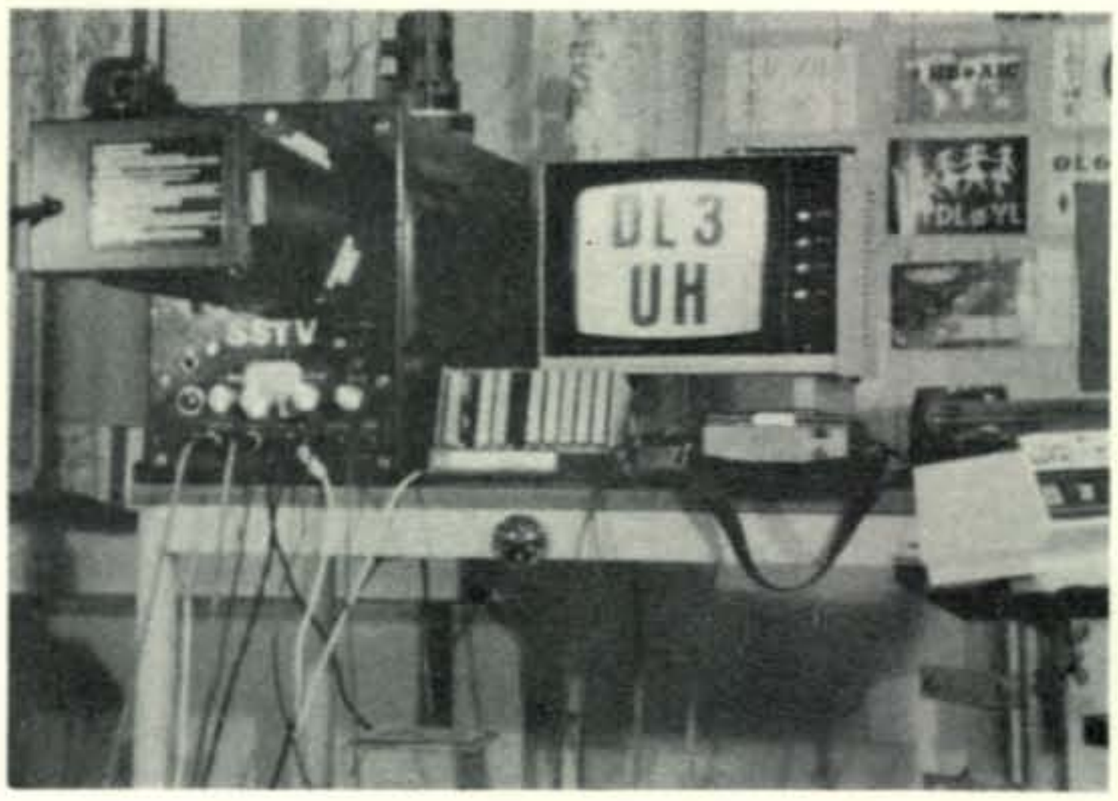
Speaking of *CQ-TV*, the issue just mentioned also carries an excellent article by L. Elmer, G6AGU/T, one of the early-on SSTVers. The article discusses some of the problems with picture quality and turns quickly to the subject of scan conversion. I'm sure that you will find this article and it's planned sequel of great interest. Very lucid discussion of how various memory systems work.

It was sometime in 1973 when Heinz Engelmann, DL3UH was severely bitten by the SSTV bug. As he explained to Jerry Foster, WØQWH in a recent letter, Heinz found very little literature on SSTV available. He read every magazine article he could find, and finally he acquired a copy of the *SSTV Handbook* by Drs. Miller and Taggart. Heinz found this book to be most useful. In a short time he was busily engaged in converting an old 'scope to a slow scan monitor. From the first distorted pictures to the present consistently good results, Heinz has enjoyed every minute of SSTV reception. In his letter, Heinz said that he wanted to thank all of the pioneers of SSTV technology. In his words, "They have opened a Window to the World. Not only to be able to talk to, but also to be able to see the QSO partner—to view his station, and even to look out on the Rocky Mountains from his window, that is a grand experience!"

Heinz uses a fast scan camera with a fast to slow converter designed by DL2RZ. In the accompanying photos you can see that he uses a fast scan monitor to set up his camera. He tapes all of his contacts on a cassette recorder and later photographs the best frames with a Polaroid camera for album storage. The enthusiastic response of Heinz to actual scenes from another land should encourage everyone owning a camera to use it for something other than hand scrawled "Rig here is—" or "K PSE" purposes.

With daily worldwide voice and picture contacts at our finger tips, it might just be that we amateurs as a group accept the accomplishments of our peers as commonplace. When I see what Heinz and others have accomplished on their own with sometimes only the guidance of a handbook or a magazine article (and in some cases a foreign language to contend with), I feel that a lot of us should stand up and sound off a loud "Bravo" for Heinz and his fellow builders around the world!

I hope that everyone will read the story of how SSTV was used as a communications link in connection with a World Scout Rally which appears elsewhere in this issue. Bill Liven, G2CKB, who wrote it was so excited about the interest of the Scouts in SSTV that he phoned me from London in regard to the story. Bill wanted to point out that Scouts



The fast scan monitor at DL3UH.

everywhere should recognize the potential of bringing new young blood into the amateur ranks by interesting Scouts in this facet of amateur radio. Stop and think after you've read Bill's story—if the World Scouts had tried to convey *all* of the information they conveyed by SSTV by voice or code transmission—how long would it have taken? I'm hitting that point again, *Picture Transmission* is what you can't do by voice or code.

Reprise, or a Final-Final on a Touchy Subject!

And now to wind things up for this month, I hope that you will excuse a momentary digression into the realm of the requirements for the Extra Class License. Is this related to SSTV and what KH6HJF and WA6TUF have accomplished? Well, I think it is, and here's way.

Don and Mike have demonstrated their ability and practical knowledge of several phases of amateur radio. Sideband, SSTV, f.m., Satellite operation, antennas, —they put it all together! Now why shouldn't this kind of ability in communications constitute one path to the highest amateur license?

[*Continued on page 77*]

Neville Jackson, G3IAD.

QRP

LOW-LOW POWER OPERATING

BY ADRIAN WEISS,* K8EEG/ϕ

Iron Powder/Ferrite Toroids And Beads

As promised in an earlier column, this month we'll give a run-down on the various types of ferrite and iron powder cores and beads and their various applications. At present, Amidon Associates[1] is, to my knowledge the most popular supplier to the amateur market, so we'll stick their very wide line of types.

If you've glanced at all through an amateur publication in the past few years, you will have noticed the great impact that the little toroid "rings" have had on homebrew construction. There are many reasons for this. First off, of course, is the decided size advantage toroids have over other types of inductor structures. The permeability or "magnification factor" of the iron-powder and ferrite core materials makes it possible to achieve a very high Q inductance in fractions of the space it would take for an air-wound inductor. Further, with a toroid inductor, a high degree of self-shielding is attained—it is generally unnecessary to place a toroid core inductor in its own little metal box so as to isolate it from other circuits. Of course, when we are dealing with a large-signal circuit, leads carrying r.f. to and from the toroid can cause radiation that requires shielding. Even so, most of the r.f. field is contained within the core itself. Finally, cores are available for the entire frequency spectrum used by amateurs.

There are two basic types of toroid cores—iron powder and ferrite. These differ chiefly with respect to permeability and stability. The ferrite core offers a high permeability factor ranging from 125 to about 5000. With ferrite cores, very large inductances can be achieved with small component sizes. However, stability is sacrificed with respect to temperature, flux levels, and d.c. drives. The iron powder core exhibits permeabilities from 1-90 and very good stability. Because of its superior stability, the iron powder core should be used in any narrow-band tuned circuit operating in the range above 100 kHz. The following is intended to provide some hints for the most effective use of toroids.

*213 Forest Ave., Vermillion, SD 57069

[1] 12033 Otsego St., North Hollywood, CA 91607.

Mix	Range	Permeability
Iron Powder		
"3"	50-500 kHz	$\mu = 35$
"15"	500 kHz-1 MHz	25
"1"	1-2 MHz	20
"2"	2-10 MHz	10
"6"	10-20 MHz	8
"10"	20-40 MHz	6
"0"	90-150 MHz	1
Ferrite		
"63"	15-25 MHz	40 (min.)
"61"	200 kHz-10 MHz	125 (min.)
"43"	10 kHz-1 MHz	950 (min.)
"72"	1 kHz-1 MHz	2000 (min.)
"75"	1 kHz-1 MHz	5000 (min.)

Table I—Comparison of mix material, range and permeability for iron powder and ferrite cores. Note: Frequency ranges given are optimum for a specific mix, but the core will be effective over a much wider range. Specific core identification numbers are a combination of core type ("T" for iron powder, "FT" for ferrite), core diameter ("68" = .690) and mix ("2"). Example: T-68-2, FT-50-63.

Practical Considerations

Both ferrite and iron powder toroids come in a wide range of sizes and permeabilities. Table I provides data on the "mix material, range, and permeability of cores available from Amidon Associates. Table III provides size data. The first practical problem usually met in a project is how to determine the number of turns required on a given core for a specified inductance. Amidon provides spec sheets with very helpful data in this regard, and WB9FHC has gone a step further in calculating a relatively simple formula for determining the number of turns for a given inductance:[2]

$$N = K\sqrt{L}$$

(where N is the number of turns, L is the desired inductance in microhenries, and K is a constant for the core being used. Table II gives K for several popular cores.)

Generally the cores noted will provide the proper inductance for most amateur needs. In choosing a core, size, range, and permeability are the chief factors involved. While Table I shows the optimum range for each mix, it should be noted that the cores will serve over a much wider range than the optimum without suffering much loss of effectiveness. The "2" mix will do well in the entire h.f. region.

When Q is a consideration, as is the case in

[2] Gordon, "Calculating the Inductance of Toroids," hr, Feb. 1972, p. 50-51.

a narrowband tank circuit, several rules of thumb should be followed. The coil should be wound over the entire circumference of the core. Second, use the largest size wire that the core will accommodate for a given inductance. If necessary, space the turns evenly over the core if the winding does not fill it entirely. At QRPp levels, power handling capability of the T-50 and T-68 sizes is usually adequate in narrowband tuned circuits. Core saturation is unlikely at these power levels. However, when using toroids in higher-power tuned circuits, Amidon suggests that the T-200 size be used as a standard. The T-200 measures 2 inches o.d. and can handle up to about 100 watts in a narrowband circuit. Amidon offers the following "rule of thumb" for determining the power handling capability of cores smaller than the T-200: when the o.d. of the T-200 (2") is divided in half, the power figure should be divided by four. It is this writer's experience that

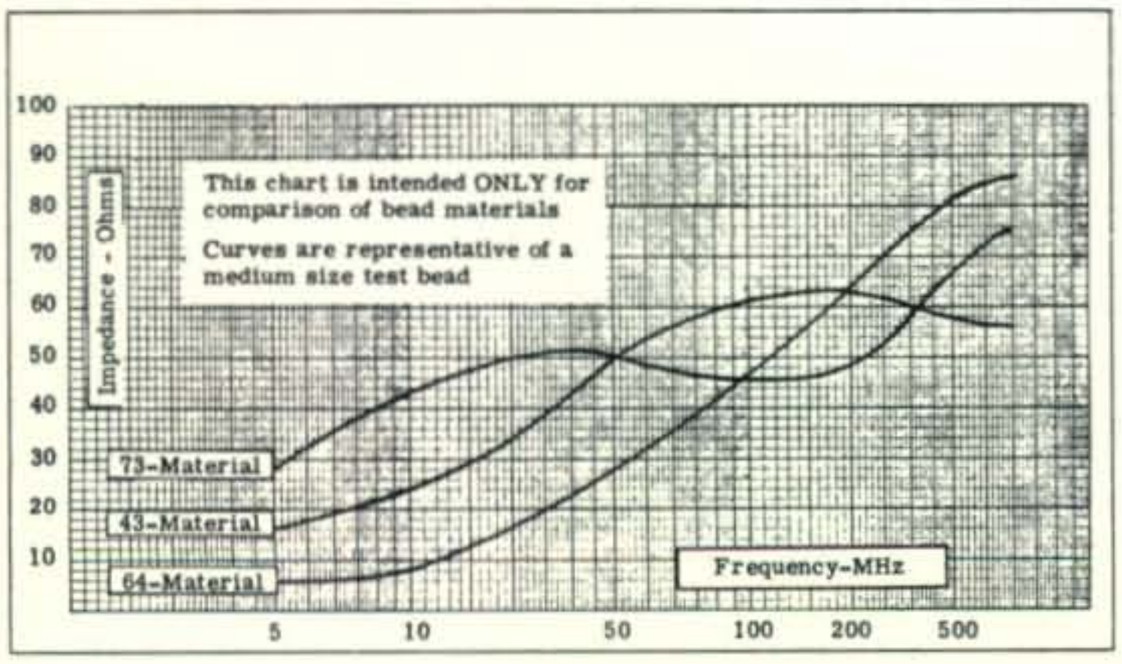


Fig. 1—Impedance *vs.* Frequency characteristics of the three mixes used in Amidon beads.

in amplifiers using a tuned tank circuit and running above 10 watts, power handling capability was greatly increased by going to a T-106 core with #16 wire: this decreased the actual resistance of the winding itself with the result that the high collector current exhibited significantly lower resistive loss. Hence, when space is not a prime consideration, and high power levels are desired in solid-state amplifiers, go to a large core and large size wire.

In small signal circuits, it is advisable to use a core that will accommodate the given inductance with a reasonable number of turns spread over the entire periphery of the core. Avoid core materials with too high a permeability for the given application. In the v.h.f. region, the iron powder toroid is useful primarily for its shielding characteristic and *Q*.

The chief application of ferrite cores for the QRPp builder is in the form of homebrew r.f. chokes. Given the high permeabilities of the "43" and "72" mixes, it is possible to easily wind r.f. chokes for just about every h.f. need.

Core Number	O.D.	Turns #18	#22	#26	#30	Price
T-80	.795"	36	57	90	141	$.80
T-68	.690"	26	42	66	104	.65
T-50	.500"	21	33	53	84	.55
T-37	.375"	14	23	37	59	.45

Table II—Core number, o.d. *vs.* Maximum number of turns of four wire sizes. Note: These are Amidon figures; except about 20-30% fewer turns for a typical winding job unless you are really careful.

The formula for calculating the inductance of a toroid was given in an earlier column (August) and can be used to figure the number of turns for a given r.f. choke. It is wise to have a couple FT-50-43 cores laying around the shack for just this purpose.

Iron powder and ferrite cores have found use in broadband balun transformers and matching transformers, such as in the W5TVW linear which appeared in an earlier column. In such applications, actual core permeability is not critical since the transmission line technique is used there. In matching transformers of the broadband type which transform impedances from a primary-to-secondary winding, core permeability is an important consideration. Generally, ferrite cores with a high permeability should be used in such cases, and serve the purpose of magnifying the inductance at the low end of the transformer frequency range. References to such applications have been given in the May column.

Ferrite Beads

Ferrite beads are the marvels of the electronics space age. They are little ferrite dowels which can be slipped over a wire lead to function as the electrical equivalent of a tiny r.f. choke in providing r.f. decoupling, shielding, and parasitic suppression.

In the August column, we discussed the use of the FB-43-2401 "jumbo" bead as an r.f.

[*continued on page 76*]

Core Size	"2" Mix K	"6" Mix K	"10" Mix K
T-80	13.09	14.54	—
T-68	13.71	14.61	—
T-50	13.49	15.31	16.71
T-37	15.09	17.48	19.1

Table III — Size data of cores available from Amidon Associates. K = Constant used in calculating turns for specific inductance. Example: 10 μh inductance required on T-68-2 core: $N = K\sqrt{L}$, $N = 13.71\sqrt{10} = 13.71(3.162) = 43.4$ turns.

SSTV AT THE FOURTEENTH WORLD SCOUT JAMBOREE
July 29 to Aug. 7,1975
Lillehammer, Norway

BY BILL LIVEN,* G2CKB

For a one week period during a Jamboree of World Scouts held at Lillehammer, Norway, a daily slow scan television schedule was maintained between the Jamboree site and a Scout camp known as Gilwell Park in England 800 miles away. The Jamboree station operated with the call sign LC1J. Call letters at Gilwell Park were GB3GP.

This story is a little different than some of *CQ's* regular fare. Perhaps it's a little bit like those DX-Expedition stories with the emphasis on the human side of amateur radio operations.

We think you'll enjoy reading about the use of SSTV as told by an amateur who'd never used it before—but with a minimal amount of instruction made effective daily use of slow scan as a working picture transmission system. Bill Liven, G2CKB was the operator at GB3GP. Heres' his story.

Editor's Note

IT was going to happen eight hundred miles away in another country and we were not going to be there—so why should we be excited? Because for the Gilwell Scout Amateur Radio Group there promised to be something quite unique and special about the Fourteenth World Scout Jamboree at Lillehammer, Norway.

It was not the first time that a Scout amateur radio station would be operating from inside a jamboree, even transmitting its signals by way of satellites, nor was it the first time we had arranged an extensive display of radio and electronics equipment at the Gilwell radio hut. But there was to be something different, something new. It was while we were making the final preparations for our display (which was to include video tape recording, radio control, treasure hunting, station monitoring, electronic items made by our Scouts, as well as opportunities for visiting Scouts to try their hand at soldering) that we heard the four letters which were to be the cause of our great excitement—"SSTV". Yes, for the very first time ever, the Jamboree amateur radio station would be transmitting SLOW SCAN TELEVISION. This is a method by which a television picture of low definition can be sent in the band width of the normal audio range of frequencies—which means that not only can it be transmitted by an amateur to any part of the world, but it can also be recorded on an ordinary domestic tape or cassette recorder.

In our hut at Gilwell we have a great deal of personal transmission and receiving equipment, but when we heard the news about SSTV we certainly did not possess either the monitor or the ancillary equipment needed to deal with the pictures which were to be transmitted from Nordjamb—nor did we know very much about the process itself! However, in such circumstances it is not unknown for another radio amateur to come to the rescue, and on this occasion it was Ron, G3GRJ, who provided a crash course in SSTV, produced on tape a set of pictures for us to transmit to Nordjamb and even loaned us his personal equipment for the week. We owe him a great debt of gratitude, for without his generous help our "Jamboree week", and this description of it, would have been quite different.

The Jamboree was about to begin. With a

*1 Victoria Rd., Broad Ln., London N 15, England.

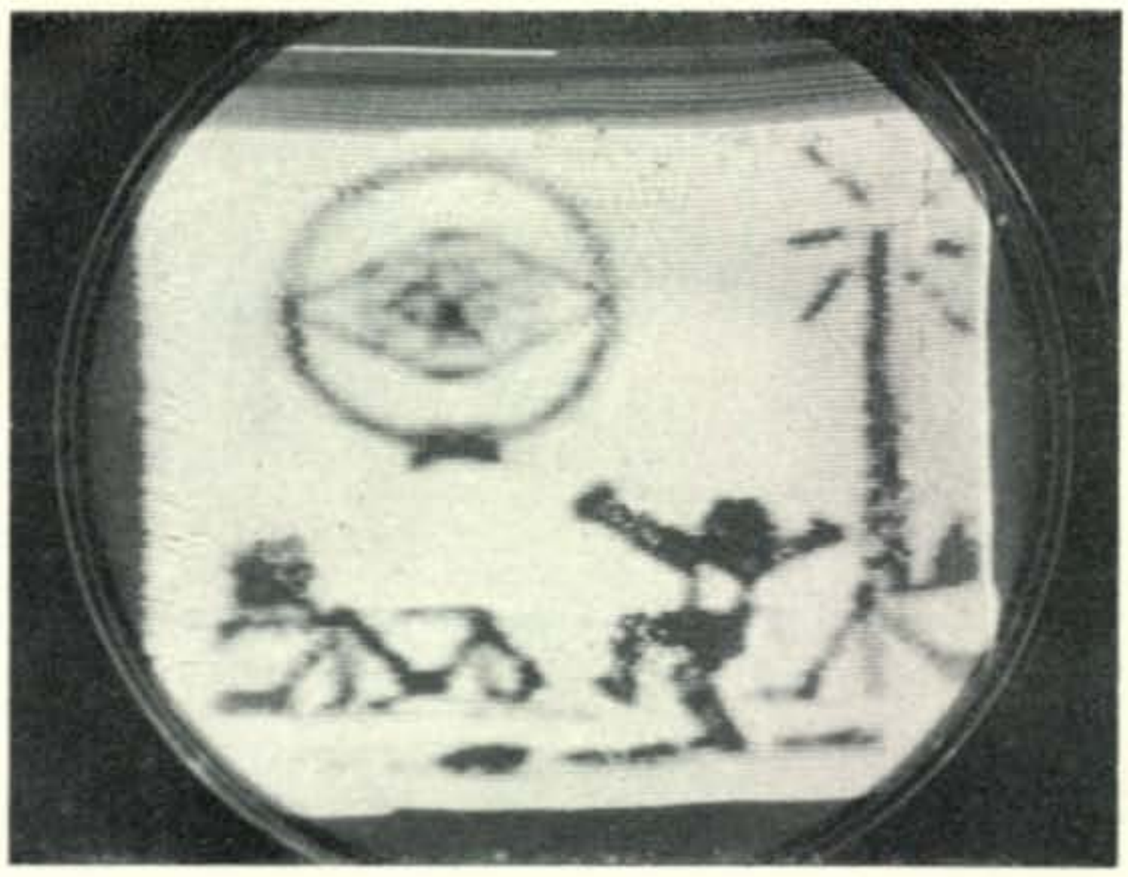
The LC1J SSTV transmission received by GB3GP at the start of the 14th World Scout Jamboree.

feeling of eager anticipation, two of our younger members wound aloft the aerial tower. Our borrowed SSTV monitor and equipment was all set, the rotatable aerial was carefully directed towards Norway and then—pictures! As we gazed intently at the little screen of the monitor and realised that those pictures were being transmitted by our brother Scouts about 800 miles away we did not try to disguise our jubilation. At Nordjamb they knew we were receiving their visual transmissions and in their enthusiasm they used a Polaroid camera to photograph the clouds, instantly transmitting the picture to Gilwell for us to interpret the Jamboree weather at the time as being 5/8ths cumulus. Our hut was a hive of activity: Ken Stubbings (Gilwell staff Scouter) was busy photographing the monitor screen while at the same time we were recording the slow scan pictures on a cassette recorder so that we were later able to provide "action replays" for our many visitors.

We were very fortunate in being able to arrange a regular 'sched'. at 9:30 GMT each day with Hans, the Nordjamb radio operator. Every morning we exchanged greetings and news with him, in both sound and pictures, and thus he quickly became to us not only a friendly voice but also our "eyes" in Norway. He worked extremely hard and with great enthusiasm, bringing us and other Scouts throughout the world closer to each other during the days of the Jamboree. We ourselves enjoyed radio contact with many Scouts during Nordjamb (frequently relaying information to those who were unable to contact the Jamboree because of atmospheric conditions). One of our contacts was Alvar, a British Scouter who had been at last year's Gilwell Reunion and who was now transmitting under callsign VQ9SS/C from Diego Garcia: he explanied that as he was in the Royal Navy he would be unable to attend the next Reunion. But, of all contacts, our particular delight was the daily 9:30 sched. with Hans.

We erected a blackboard and each morning displayed the Jamboree news for everyone at Gilwell — which included Scouts from nine other countries and a Wood Badge course. How often our little hut was crowded with Italians, Koreans, Japanese, Dutch, Americans or others—and how often we had to ask them to leave in the early hours of the morning so that we might have just a few hours' sleep.

Our final contact with Nordjamb was on the last Wednesday at 14:30 GMT—a pre-arranged time at which all Scout stations in the World had been encouraged to be "on the air". However, atmospheric conditions were poor and only GB3GP (Gilwell Park) was able to make contact with LC1J (Nordjamb). What a delight it was for us when we heard, loud and clear: "Hello Gilwell Park, this is the Chief



This LC1J signal received at GB3GP symbolizes World Scout excitement over SSTV.

Scout of the United Kingdom addressing you from the amateur radio headquarters of the World Jamboree in Norway . . ." After listening to the Chief's descriptive account of the happenings at Nordjamb we replied, sending greetings from all at Gilwell, and were then somewhat taken aback to hear another voice from Nordjamb say: "This is the King of Sweden . . ." His Majesty's message received a somewhat shaky reply from Gilwell, though we did think afterwards that, having conversed directly with King Gustav, we might now legitimately call ourselves the Royal Gilwell Scout Amateur Radio Group!

We made tape recordings of the messages from the Chief and from the King of Sweden and these tapes were soon being played to everyone. These messages and our regular daily schedules made us feel that we were perhaps closer to Nordjamb than some of those actually taking part in the Jamboree.

Whatever hopes or dreams we might have had about our radio involvement with Nordjamb certainly came true, and so when it became possible for us to make someone else's dream come true we quickly grasped at the opportunity. During the week we had enjoyed several radio contacts with Shelly, W2GQN/PLA, a New York Scouter who was at Nordjamb, he told us that he had been at the last two jamborees and that although he was a Wood Badge holder he had never been able to visit Gilwell. He sent a special message to the Scouters on the Gilwell Wood Badge course, which we recorded for them. During our conversations, we had learned that on his flight back to the USA Shelly would touch down at London Airport at 10:30 A.M. and take off again at 6 P.M. on a particular day, so—as a surprise for him and with the co-operation of North London Commissioners, we arranged for Shelly and his family (all of whom are in

[*continued on page 76*]

DX

BY JOHN A. ATTAWAY,* K4IIF

Two great individual performances were rendered in the Single Band WAZ program during the past year. Alan Emerald, K6GA, became the first to qualify for a Single Band Award on both c.w. and phone, and receives the unofficial designation of most versatile DXer in WAZ.

Alan narrowly missed winning the first Single Band Award on 20 meter c.w. when he qualified for Award no. 2 on March 5. 1974. To show that he could do it on s.s.b. as well, K6GA submitted the QSLs for 20 Meter, Single Band WAZ certificate no. 15 on Aug. 11, 1975.

The best showing for bands worked on a single mode has been turned in by Fernando-Juan Fernandez, EA8CR, who qualified this month for 40 Meter, Single-Band Phone WAZ certificate no. 1 (numero uno). EA8CR now has Single Band Phone WAZ Awards on 3 bands: 80 Meter Phone no. 1, 40 Meter Phone no. 1 and 20 Meter Phone no. 13. He only needs 2 zones on 21 MHz and has made a good start on 28 MHz. A photo of Fernando-Juan and a description of his station appears on pgs. 58 and 59 of the September, 1975 issue of *CQ*.

*P.O. Box 205, Winter Haven, FL 33880

This is a serious DXer at work! WB5BFZ installing the 7 element Wilson beam at the 145 foot level by helicopter. Phil has a real antenna farm in the Dallas, Texas suburbs.

The following plaques have now been awarded for no. 1 in the Single Band WAZ program: 80 Meter Phone—EA8CR, 40 Meter Phone—EA8CR, 20 Meter C.W.—W8WZ and 20 Meter Phone—WØSFU. Plaques remain to be awarded for the first to qualify on 80 meter c.w., 40 meter c.w., 15 meter c.w., 15 meter phone, 10 meter c.w. and 10 meter phone. By the best possible authority, Walter Geyrhalter, DL3RK, our *CQ* DX Award Checkpoint for Germany, we have learned that a German amateur has worked all zones on 15 meter phone and has an application on the way, so we may have a new first to report next month.

The plaques for no. 1 on each mode on each band are very handsome and make an outstanding addition to any DXers ham shack.

The WAZ Program

Single Band WAZ

40 Meter Phone

1.....EA8CR

S.S.B. WAZ

1278.....CT1BT
1279.....K8SQE
1279.....OZ6SM

C.W.—Phone WAZ

3866.....F6BEE
3867.....HS2AIG
3868.....EA8CR
3869.....WB9FKL
3870.....OK2BDE
3871.....K6DT
3872.....JA1VDJ
3873.....WB2VFT

Phone WAZ

508.....EA8CR
509.....EI6S

Complete rules for the Single Band WAZ prograı appear on pgs. 57-58 of the December, 1972 issue of *C*Q Complete rules for regular WAZ are found beginning o pg. 46 of the April, 1975 issue. Application blanks an reprints of the rules for all WAZ awards may be obtaine by sending a self-addressed, stamped envelope to the D Editor, P.O. Box 205, Winter Haven, FL 33880.

De Extra

Thanks to the *West Coast DX Bulletin* fc this gem: "Some of the local QRPers we around last week, out of sunspots and waitir for the great days to return. They got into discussion of values, and what might be tl most valuable DX item they owned. One QRP spoke and said: 'I got something that few hav a XZ-Burma QSL card. I got it right after was first licensed and had no idea how valuat it was, but it's been accepted for DXCC a the *CQ* DX Awards and Burma is always most everyone's wanted list.' There was gene agreement with this premise and another QRI owned up to having a AC3-Sikkim card, but market value on AC3's had gone down recen The talk went on and on until finally the (Timer dropped by and the question just had be put to him. The Old Timer thought a

and then spoke: 'Once I had a visit from a European amateur vacationing in this country. He went a thousand miles out of his way to visit me. He said it was nothing for a friend. I would hold that the friendship that a DXer gives and receives has no reckoning and must be the most valuable thing in DXing.' And that was all, and no one else picked up the discussion, for truth is simple and one hears it and there is an end to the discussion."

There is an important truth in this parable. At no time in the history of the world has the friendship between amateurs of different countries been more important. Hopefully, the months ahead will see more and greater interest in DX and in DXpeditions by the world amateur community.

Chasing DX and certificates is a very pleasurable pastime for Udo Franz, VE3FFA, of West Hill, Ontario. Udo is a recent WAZ winner.

The CQ DX Award Program

C.W.

182.....WB5DDI

2 × SSB

408.....OK2BLI

S.S.B.

S.S.B.: SM6SWK 310, WA6MWG 310.
C.W.: W4BQY 300, ON4QX 310.

Complete rules and application forms for the WPX and CQ DX Award programs may be obtained by sending a business size, #10, self-addressed envelope to: DX/WPX Awards, Box 3388, San Fafael, Calif. 94902. *CQ* DX/WPX Awards, Box 3388, San Rafael, Calif. 94902.

Operating Practices

The Long Island DX Association recently announced the winners of its special contest to develop good DXpedition operating practices. The first prize, a three year subscription to the *Long Island DX Association Bulletin,* went to K3RLY, while second and third prizes of 2 and 1 year subscriptions respectively, went to W2QHH and W8CSG. The prizes were awarded on the basis of suggestions for both operators of DXpedition stations and stations working the DXpedition. Separate lists of good practices for both DXpedition and DXpedition chaser were organized and presented. They are excellent, and we plan to publish both lists in their entirity. This month, because of the many operations in the *CQ* Worldwide DX Contests, the suggestions for stations working the DXpedition follow. In the December issue we will show the list of suggested practices for the DX station.

Suggested Practices for the DXer working the DXpedition

1. Keep informed about the DXpedition operation in the best ways you can. Nearly all DXpeditions are at least 2 days late. Nearly all DXpeditions are rumored to have been cancelled. Don't believe it for at least 2 days.

2. When the operation is about to begin, be on hand early; the first hour of operation is usually fairly calm compared to later. But don't count on working the DXpedition the 4th day of a planned operation. Storms come up. Equipment fails. Licenses expire.

3. Once the operation is heard, listen for the instructions of the DXpedition operator. Follow his instructions.

4. Once you have found the DXpedition frequency, and heard their instructions, listen briefly to see how he listens for calling stations. DXpeditions generally tune from one end or the other of their announced receiving segment —say 14220 to 14240—toward the middle. Maybe there is a pattern; one from the low side, one from the high side—if so, go to the opposite side from the last QSO. If he moves from low to high, keep a few kHz above him throughout the range. Sometimes, just a little outside the announced segment will do the trick.

5. Stand by when requested to allow areas with shorter propagation times to have their chance. If the DXpedition is calling for a certain area different from yours, don't call.

6. If you *don't* need the DXpedition for credit towards an award, refrain from calling it until the pile-up is thinned down.

7. When in QSO, don't give anything but the simple report; and/or other info as may be requested. Make the contact as brief as possible to give others a chance for a QSO.

8. If you don't know the QSL information for the DXpedition, listen. It will be given at intervals. Don't slow down the DXpedition with lengthy and unnecessary questions.

9. If a station appears to be causing intentional interference; don't let him know how successful

CQ DX AWARD HONOR ROLL

The *CQ* DX Award Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more countries for the mode indicated. The ARRL DXCC Country List, LESS DELETED COUNTRIES, is used as the country standard. The total number of current countries on the DXCC list as of this listing is 321.

C.W.

W6PT 320	W8LY 310	W9DWQ 305	W4BQY 300	K1SHN 289
K6EC 316	ON4QX 310	WØAUB 304	DL3RK 298	WA6EPQ 288
W6ID 316	W4IC 309	K6LEB 302	W6NJU 294	WA8DXA 287
W8KPL 314	W6ISQ 305	YK3AHQ 301	WA6MWG 293	DJ7CX 281
W4YWK 312				

2 × SSB

TI2HP 320	VE3MR 314	W3DJZ 309	K6AQV 299	WA0KDI 288
W2TP 320	W6EL 314	W9KRU 308	HP1JC 298	DJ7CX 287
W2RGV 319	W6KTE 314	VE3GMT 307	WØYDB 298	K1KNQ 287
DL9OH 318	W9DWQ 314	K3GKU 307	K4HJE 297	SP5BSV 287
G3FKM 318	W9JT 314	K6EC 307	W6FW 297	DL1MD 286
IØAMU 318	F9RM 313	K9WEH 307	DK2BI 296	OE3WWB 286
WA2RAU 318	WA2EOQ 313	F9MS 306	YV1KZ 296	K8GQG 286
W3NKM 318	W2QK 313	WA3IKK 306	G3RWQ 295	W3CRE 284
W9ILW 318	W6RKP 313	W9QLD 306	W9OHH 295	DK1FW 282
K2FL 317	K6WR 313	XE1AE 306	YS1O 295	OK1MP 282
W4NJF 317	W6YMV 313	OE2EGL 305	K1SHN 294	VA7WJ 282
W4EEE 316	K4MQG 312	OZ3SK 305	W8ZOK 293	WB6PNB 282
W4SSU 316	F2MO 311	ZL1AGO 305	WAØCPX 293	K8PYD 282
SM5SB 315	IØZV 311	W2CNQ 304	DL6KG 292	WA2VEG 280
W3AZD 315	I8YRK 310	VE2WY 304	WØSFU 291	W6HUR 279
W4IC 315	W6NJU 310	G3DO 303	G3KYF 290	W9YRA 277
W6EUF 315	ZL3NS 310	WA6AHF 303	OE1FF 290	I1WT 275
W6REH 315	ZS6LW 310	W6KZS 303	WB3RLK 290	VE7HP 275
I8AA 314	SM6CWK 310	VE3MJ 302	W6FET 290	K3GUY 274
I8KDA 314	WA6MWG 310	WA2HSX 301	W6TCQ 290	W4WSF 274
IT9JT 314	K4TA 309	WB6DXU 300	XE2YP 289	K9LUI 271
SM6CKS 314	KH6BB 309	K8DYZ 300	YV1LA 289	G3WW 271

he is. Working through malicious interference is the best way to discourage its continuation.

These are good suggestions, well-reasoned and timely. New DXer and old DXer alike can benefit by studying and applying them. The Long Island DX Association is to be complimented.

Gear for DXing on C.W.

In the July DX column we lamented the tendency of most late model transceiver manufacturers to emphasize s.s.b. at the expense of good c.w. design features. Reader comments were solicited regarding transceivers most suitable for the DXer on c.w. The following letters are a good sample of what we heard:

Russ Guidry, K5YMY, is the first representative from the Delta DX Association of Louisiana to the CQ DX Awards Advisory Committee. Russ is a communications technician for Shell Pipeline Corporation. Last spring he operated VP2A from Antigua. He holds an advanced Class license and is club secretary.

de Jack, W4ZC: "—Ten-Tecs Triton-II transceiver is an excellent rig for c.w. DXing. It is one of the very few dual-mode transceivers which makes no compromises for c.w. and still is a fine s.s.b. rig. Moreover, the broad c.w. filter position allows good s.s.b. copy with much less QRM than with normal sideband selectivity. Some of its features are these:

—It has a 150 Hz *active* audio filter which is in the a.g.c. loop. I've used many audio filters following conventional i.f. crystal filters, and found that signals I could not hear through the audio filter would still reduce receiver gain and worse, chop up the desired signal.

—The QSK feature is just great. Not only is it really full break-in, but so much so that you can hardly distinguish your signal (sidetone) from the incoming signal.

—Sensitivity is equal to any receiver I have used, and dynamic range is excellent.

—The receiver has offset tuning capability of several kHz.

—Being fully solid state and broadbanded, band changing is instantaneous and the only limitation on frequency agility is the bandwidth of one's antenna(s)."

de Brian, WA3KOS: "I have a Kenwood TS520 transceiver primarily for c.w. The features most

important to me were 500 Hz filter availability, r.i.t. and 6146 finals. Since then I have built in a MFJ audio filter between the audio output and earphone jack. The MFJ filter is the selectable type with OFF and 3 selectivities: 240 Hz, 180 Hz and 80 Hz, and is switched in bandwidth in the transceiver by using the front panel crystal switch normally used to select crystals for separate fixed channel operation. The 500 Hz i.f. filter and audio filter peak at the same audio frequency so the rig is very selective! I used this rig in sweepstakes and from WA3KOS/C6A and found it excellent. The strong signal non-overload characteristics are better than any receiver I've used including the 75A4. The noise limiter really works and completely blanks ignition noise. In summary, this rig works effortlessly and really reduces contest fatigue. Try it!"

de John, W7VH: "I have the KWM-2 and the 312B-5 which works fine for split operation, especially good since the KWM-2 has off-set keying. Recently, my XYL purchased a Ten-Tec Argonaut for my birthday and it is one fine c.w. rig! *Instant* break-in and the receiver compares with any transceiver and better than most. Am searching for a broad band amplifier circuit to build up to follow the Argonaut."

Prefix News

As a result of newly formed countries, special events stations and licensing changes within countries, the bands are bursting with exotic new prefixes. If thoroughly researched, this section of the DX report could easily become an entire column. Last week when the regular envelope came through from Box 88, Moscow with the UA applications for *CQ* awards, there was one WAZ application, three applications for the *CQ* DX Awards and twenty-six applications for WPX. These were forwarded on to Hugh Cassidy, WA6AUD, our Assistant DX Editor. One of Hugh's jobs is processing WPX. His work is cut out for him.

Here is some of the news on rare and ususual prefixes received during the past month:

C9—The prefix for Mozambique has been changed from CR7 to C9M. CR7AF will now become C9MAF.

CZ3—CZ3EVK will continue active until Dec. 31, 1975 on 10-160 meters. As the only CZ3, he commemorates the first Polish settlement in Canada, using a special QSL in both English and Polish. QSL direct or via the bureau.

HMØ—HMØ is the Boy Scouts of Korea station. QSL to Box 1189, C.P.O., Seoul, Korea.

HP7—HP7XJS, heard recently on 14228 at 0120Z, is the only active HP7.

HR6—HR6SWA is the U.S. weather station on Swan Island. QSL to K3LLL.

IA5-IT9—The DX Old Timers Club of Palermo provides the following breakdown of the prefixes used for the various Italian islands in the Mediterranean:

IA5—Tuscan Archipelago (Elba, Pia Nosa, Gorgona, Montecristo, etc.)

IBØ—Ponziane Archipelago (Ponza Zannone, Palmarola, etc.)

IC8—Neapolitan Archipelago (Capri, Ischia, Procida, etc.)

ID9—Eolie or Lipari Archipelago (Stromboli, Salina Panarea, etc.)

IE9—Ustica Island

IF9—Egadi Island

IG9—Pelagia Islands

IH9—Pantelleria Island

IL7—Tremiti Islands (San Domino, San Nicola, etc.)

IMØ—Minor islands surrounding Sardinia

ISØ—Sardinia

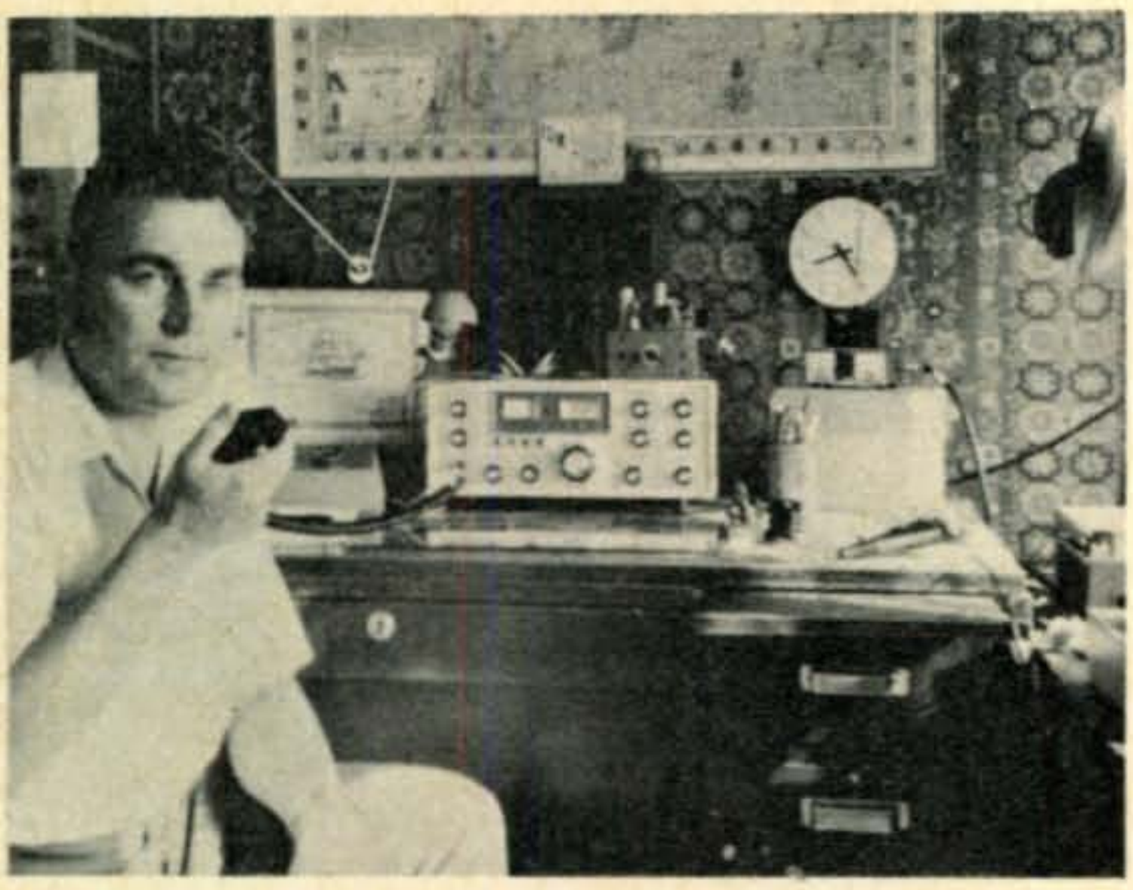
IT9—Sicily

JW5—JW5NM on Svalbard has been very active. He likes 20 meter s.s.b. QSL to LA5DQ.

KD5—KD5OME celebrated the grand opening of the Louisiana Super Dome. QSL to W5UK.

Martin Kumpost, OK1MCW, specializes in 160 Meter operation using a 10 watt transmitter. Note than VK6HD card on the wall. Czechoslovakia to Australia on 160 with only 10 watts is good DXing in anybody's book. *(Photo courtesy W1BB)*

Dr. Sydney Sefton, G3ZBA, of Leeds, Yorkshire, England. Syd has been very active in the CQ DX Award Program and holds S.S.B. WAZ #1231. Ye DX Editor is hoping for an eyeball with Syd in Leeds in a few days.



Paul Kecketsweiler, F3IM, of Saint-Avold France has been an avid DXer since 1954 and recently submitted a successful application for WAZ. Paul uses a 2-element Yagi and an inverted V for the lower bands. As an electricity teacher he gets a lot of young amateurs started in France.

KE2—KE2AN operated in honor of "Education Month" of the New Jersey Bicentennial Commission. QSL to Dr. John Irwin, K6SE/2, Dept. of Earth and Planetary Sciences, Kean College, Union, N.J. 07083.

LB4 & LB6—LB4I was reported on 14051 and LB6B has been heard on 28020. LB is the prefix for Norwegian novices.

LC1—LC1J was the World Scout Jamboree station at Lillehammer. QSL to LA4LN.

ON1—This prefix is now in use by Belgian v.h.f. stations only.

PY—Effective June 1, 1975, Brazilian callsigns were changed to relate to provinces and other geographical designations as follows:
PY1—Rio de Janeiro
PP1—Espirito Santo
PY2—Sao Paulo
PP2—Goias
PT2—Distrito Federal
PY3—Rio Grande do Sul
PY4—Minas Gerais
PY5—Parana
PP5—Santa Catarina
PY6—Bahia
PP6—Sergipe
PY7—Pernambuco
PP7—Alagoas
PR7—Paraiba
PS7—Rio Grande do Norte
PT7—Ceara
PY8—Para
PP8—Amazonas
PR8—Maranho
PS8—Piaui
PT8—Acre
PU8—Amapa
PV8—Roraima
PW8—Rondonia
PY9—Mato Grosso
PYØ—Fernando de Noronha, Atol das Rocas, St. Peter & Paul, Trindade & Vaz

SV4—SV4IFT operated from the Thessaloniki Industrial Fair. QSL to SV bureau.

TF7—A group visited the Westman Islands and used the call TF7V. QSL to TF3AX.

WO8—WO8HIO was a special events station from the Ohio State Fair.

WU5—WU5AST operated from the Johnson Ranch in Texas. QSL to W5LSZ.

WW9—WW9WW was manned by the Sheboygan DX Association during Wonderful Wisconsin Week. QSL to WA9UEK.

XN & XJ—These prefixes will be used by Canadian amateurs from Aug. 1, 1975-July 31, 1976 as part of the 1976 Olympics celebration. VE stations will use XJ and VO stations will use XN.

XW8—XW8HK on 14 MHz c.w. operates from the Japanese Embassy in Saigon.

YR—This prefix was used for contest operations by YO-Romania DXers.

3B9—3B9DA is frequently heard on 14040 kHz from 1130 GMT and again from 1500 GMT.

6D—This prefix was used by XE amateurs on the occasion of the 7th Pan American Games. QSL to normal XE calls, i.e. 6D1AE to XE1AE.

[*continued on page 75*]

The WPX Program

Mixed

495.....WA2FKF
496.....F6BEE

C.W.

1412.....WB4SIJ
1413.....K5MHG/6

2 × SSB

863.....WA2FKF
864.....JA7BJS
865.....VK3WU
866.....LA2CQ

VPX

REF 16903

Endorsements

Mixed: W4LRN 1450, W2NUT 1259, WB2FMK 1100, W8CNL 850, K7NHG 750.
C.W.: W8LY 1229, WB2FMK 1000, WB4KAG 100, WØAUB 900, WA9UES 650, SP1BHX 550, W90YZ 550, OK1DKR 400, W3OJS 400, OK1DKR 350.
S.S.B.: VE7WJ 750, WA2EAH 750, WA5VDH 700, WA5RTG 400, LA2CQ 350, WA2FKF 350.
VPX: W4-10646 700.
80 Mtrs: G5GH, OK1BF, SP1BHX.
40 Mtrs: WB2FMK.
20 Mtrs: WB4SIJ, WA2FKF.
15 Mtrs: WA2AUB, SP1BHX.
Africa: WB4SIJ.
Asia: WA5RTG, JA9BCU.
Europe: WA5RTG, WA2FKF, K9UQN.
South America: LU9FAZ, W4-10646.

Complete rules for WPX may be found on page 67 of the February 1972 issue of *CQ*. Application forms and reprints of the rules may be obtained by sending a business size, self-addressed stamped envelope to CQ DX/WPX Awards, Box 3388, San Rafael, CA 94902.

Propagation

BY GEORGE JACOBS,* W3ASK

THE c.w. section of the 1975 *CQ* World-Wide DX Contest will take place on the weekend of November 29-30. Check the "Last Minute Forecast" at the beginning of this column for a press-time check on expected conditions.

Special DX Propagation Charts for use during the contest period appeared in last month's column. Be sure to check these Charts for band openings forecast for the c.w. section as well.

Contest Tips

Here are some propagation tips that should be useful in working DX during November, and in particular during the c.w. section of the Contest, as long as conditions are at least LOW NORMAL.

Midnight to Sunrise:—Check *20 meters* for openings to South Pacific until Midnight, or perhaps as late as 1 A.M. in the EST and CST time zones, and until 3 A.M. in MST and PST zones. Band may also remain open for an hour or so after Midnight to deep South America and Antarctica. Best band during this time period should be *40 meters*. Look for openings towards Europe, the Middle East and parts of Africa until 3A.M. in EST and 2 A.M. in CST zones. Check for long-path openings towards Europe, the Middle East and parts of Africa until 3 A.M. in EST and 2 A.M. in CST zones. Check for long-path openings between 6 and 8 A.M. in PST zone. Good openings from all time zones towards South America should be possible, with signals strongest to the Caribbean area, Central America and the northern countries of South America between Midnight and 5 A.M. in EST and CST zones and to 4 A.M. ni MST and PST zones. The path towards the South Pacific looks good on *40 meters* between Midnight and Sunrise in MST and PST zones. Weakish openings to the Far East and Asia may be possible from the PST zone from midnight to Sunrise. There's also the possibility of a *40 meter* opening to Antarctica between 2 and 5 A.M. in EST and CST zones and between Midnight and 5 A.M. in MST and PST zones.

*Radio Propagation Editor, *CQ*, 11307 Clara St., Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected For Nov., 1975

Propagation Index	*Expected Signal Quality* (4)	(3)	(2)	(1)
Date				
Above Normal: 26	A	A	B	C
Hig Normal: 10-11, 15-16, 19, 25, 27	B	B	C	D
Low Normal: 3, 5-6, 8-9, 12-14, 18, 20, 24, 28-29	B	C	D	E
Below Normal: 1-2, 4, 7, 17, 21, 23, 30	C	D	E	E
Disturbed: 22	D-E	E	E	E

Where *expected signal quality is:*

A—Excellent opening, exceptionally strong, steady signals greater than S9+30 dB.

B—Good opening, moderately strong signals varying between S9 and S9+30 dB, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of (3) will be fair (C) at the beginning *CQ* World-Wide DX Contest on November 28; fair (C) on the 29th and poor (D) on the 30th, etc.

For updated information dial Area Code 516-883-6223 for DIAL-A-PROP, subscribe to bi-weekly MAIL-A-PROP, P.O. Box 86, Northport, NY 11768, or check WWV at 14 minutes past each hour.

Eighty should open from EST and CST zones to Europe, parts of Africa and the Middle East until 2 A.M., possibly for an hour or so longer in the EST zones. *Eighty* also looks good from PST and MST zones to the South Pacific from Midnight almost to Sunrise, and from the EST and CST zones from about 3 A.M. to almost Sunrise. Check for good *80 meter* openings to the Caribbean, Central America and the northern countries of South America between Midnight and 5 A.M., and to 3 A.M. for deeper openings into South America, in all time zones. There's also a possibility of an opening to the Far East and Asia from the PST zone between 1 and 5 A.M. Openings on *160 meters* should be possible from the EST and CST zones to Europe between Midnight and 2 A.M. In PST zone check for *160 meter* openings towards the South Pacific between 2 A.M. and sunrise. Openings towards the Caribbean, Central America and the northern countries of South America should be possible from all time zones from about 2 A.M. to 4 A.M.

Sunrise to Sunset:—Check for possible *10 meter* openings to Europe from EST and possibly CST zones between 9 and 11 A.M., and for openings to Africa between 9 A.M. and Noon. *Ten Meter* openings into South America should be possible between 9 A.M. and 3 P.M. from all time zones. Check for openings towards the South Pacific between 1 and 5 P.M. in PST zone, and possibly MST as well.

How To Use The Short-Skip Charts

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular Meter band (10 through 160 Meters), as shown in the left hand column of the Chart. For the Alaska and Hawaii Charts, the predicted times of openings are found under the appropriate Meter band column (15 through 80 Meters) for a particular geographical region of the continental USA, as shown in the left hand column of the Charts. A ** indicates the best time to listen for 10 meter openings; * best times for 160 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) " " " between 14 and 22 days
(2) " " " between 7 and 13 days
(1) " " " on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

3. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. On the Short-Skip Chart appropriate *daylight* time is used at the *path midpoint*. For example, on a circuit between Maine and Florida, the time shown would be EDT; on a circuit between N.Y. and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are in HST. To convert to daylight time in other USA time zones, *add* 3 hours in the PDT zone; 4 hours in MST zone; 5 hours in CDT zone; and 6 hours in EDT zone. *Add* 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 P.M. in Los Angeles; 18 or 6 P.M. in Washington D.C; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to daylight in other areas of the USA, *subtract* 7 hours in the PDT zone, 6 hours in MDT zone, 5 hours in CDT zone and 4 hours in EDT zone. For example, at 20 GMT it is 16 or 4 P.M. in N.Y.C.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts c.w. or 300 watts p.e.p. on sideband; The Alaska and Hawaii Charts are based upon a transmitter power of 250 watts cw or 1 kw p.e.p. on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level; for each 10db loss, it will lower by one level.

5. Propagation data contained in the Charts has been prepared from basic data published by the Institute For Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

Look for openings from PST zone to Far East and Asia between 2 and 5 P.M. Conditions may have to be at least High Normal for the *10 meter* band to open. DX conditions on *15 meters* should hold up well during the entire daylight period. Check for openings towards South America as early as 8 A.M., with the band peaking in this direction between Noon and 4 P.M. Good openings are expected towards Africa between 10 A.M. and 2 P.M. in EST and CST zones, and until Noon in MST and PST zones. Band should open to Europe from EST and CST zones between 8 A.M. and Noon, and until 10 A.M. in MST and PST zones. Check for openings towards South Pacific between 2 and 6 P.M. in all zones, with the band remaining open for an hour or so longer in PST zone. *Fifteen meters* may also open towards the Far East and Asia between 4 P.M. and sunset in PST and MST zones. *Twenty meters* should open to almost all areas of the world just after Sunrise and remain open with strong signal levels to at least 10 A.M. From 10 A.M. through the early afternoon signals will probably weaken, with the band open only towards Europe, northern Africa, the Caribbean, Central America, the northern countries of South America and short openings towards the South Pacific. After 2 P.M., signals should begin to peak again on *20 meters* towards Africa, and remain strong to 3 P.M. in the MST and PST zones, and to as late as 5 P.M. in the CST and EST zones. In the EST and CST zones, check also for long-path openings to Australasia between 3 and 5 5 P.M., and look for short-path openings to Australasia from the PST and MST zones between 4 P.M. and sunset. Expect strong signal openings to all of Latin America from about 4 P.M. onwards. *Forty meters* should begin to open towards Europe and to the Caribbean, Central America and the northern countries of South America about an hour or so before Sunset in all time zones, but signals will be weakish.

Sunset to Midnight:—*Twenty meters* is expected to hang in for an hour or so after sunset to parts of Africa from the EST and CST zones. In PST zone check for long-path openings to Europe and Africa on *20* beginning about 10 P.M. The band looks good to most of Latin America to about 8 P.M., and to Antarctica and the deep areas of South America almost to Midnight. *Twenty* should remain open to the South Pacific to Midnight, and to the Far East and Asia until 10 P.M. in all time zones, but openings favor MST and PST locations. Expect some fairly good openings on *40 meters* to Europe and parts of Africa throughout this entire time period, and to most of Latin America as well. In PST zone, check *40 meters* for openings towards the South Pacific beginning about 10 P.M. *Eighty meters* should open towards Europe, Africa, the Caribbean, Central America and the northern countries of South America during most of this time period. Check for possible *160 meter* openings towards the Caribbean area and Central America, and possibly into northern South America, between 10 P.M. and Midnight in all time zones. Openings may also be possible on *160* from the EST zone to Europe between 10 P.M. and Midnight.

Short-Skip Charts

This month's column contains a Short-Skip Propagation Chart for use between distances of approximately 50 and 2300 miles. Special charts for use between the mainland and Alaska and Hawaii are also included. Instruc-

tions for the use of these Charts are given elsewhere in this column.

Sunspot Cycle

The Swiss Federal Observatory at Zurich reports a monthly mean sunspot number of 39.3 for August, 1975. The sunspot cycle index, based on 12-month smoothed running numbers, is now 22, centered on February, 1975. A smoothed sunspot number of 12 is forecast for this November, as the present cycle continues to decline slowly towards a minimum.

V.H.F. Ionospheric Propagation

Two short, but significant meteor showers are expected during November, which should make possible some meteor-scatter type openings on the v.h.f. bands. The *Taurids* shower, occurring during the first week of November should peak between the 4th and 8th, with a count of about 15 meteors an hour. A second shower of about the same intensity, called the *Leonids,* should begin on November 16th and peak on the 17th.

Some auroral v.h.f. ionospheric openings should be possible during November, especially when h.f. conditions are Below Normal or Disturbed as a result of a radio storm. Check the "Last Minute Forecast" at the beginning of this column for the days that are most likely to be in these categories during November.

Good luck in the c.w. section of the *CQ* World Wide DX Contest, and please let me know how the Contest propagation forecasts work out. 73, George, W3ASK

CQ Short-Skip Propagation Chart
November & December, 1975
Local Standard Time At Path Mid-Point
(24-Hour Time)

Band (Meters) / *Distance Between Stations (Miles)*	*50-250*	*250-750*	*750-1300*	*1300-2300*
10	*Nil*	*Nil*	11-16 (0-1)	11-16 (1-0)
15	*Nil*	10-16 (0-1)	09-10 (0-1) 10-12 (1) 12-16 (1-2) 16-17 (0-1)	09-10 (1) 10-12 (1-3) 12-14 (2-4) 14-15 (2-3) 15-16 (2) 16-17 (1) 17-18 (0-1)
20	*Nil*	09-11 (0-1) 11-16 (0-2) 16-19 (0-1)	08-09 (0-1) 09-11 (1-4) 11-16 (2-4) 16-17 (1-3) 17-18 (1-2) 18-19 (1) 19-21 (0-1)	07-08 (0-1) 08-09 (1-3) 09-11 (4) 11-15 (4-3) 15-16 (4) 16-17 (3) 17-18 (2-3) 18-19 (1-2) 19-20 (1)
40	07-09 (0-1) 09-10 (1-3) 10-15 (3-4) 15-16 (2-3) 16-18 (1-2) 18-20 (0-1)	07-09 (1-3) 09-10 (3) 10-15 (4-3) 15-16 (3-4) 16-18 (2-4) 18-20 (1-2) 20-00 (0-2) 00-07 (0-1)	07-09 (3) 09-14 (3-1) 14-15 (3-2) 15-16 (3) 16-18 (4) 18-20 (2-4) 20-22 (2-3) 22-00 (2) 00-04 (1-2) 04-07 (1-3)	07-08 (3-2) 08-09 (3-1) 09-14 (1-0) 14-15 (2-0) 15-16 (3-1) 16-17 (4-2) 17-18 (4-3) 18-20 (4) 20-22 (3-4) 22-00 (2-3) 00-02 (2) 02-04 (2-3) 04-06 (3)
80	08-16 (4) 16-18 (2-4) 18-20 (1-3) 20-06 (1-2) 06-08 (2-3)	08-09 (4-2) 09-16 (4-1) 16-18 (4-2) 18-20 (3-4) 20-06 (2-4) 06-07 (3-4) 07-08 (3)	08-09 (2-1) 09-16 (1-0) 16-18 (2-1) 18-20 (4-3) 20-06 (4) 06-07 (4-2) 07-08 (3-1)	08-09 (1-0) 09-16 (0) 16-18 (1-0) 18-20 (3-2) 20-04 (4-3) 04-06 (4-2) 06-07 (2-1) 07-08 (1)
160	07-09 (3-2) 09-11 (2-0) 11-17 (1-0) 17-19 (3-2) 19-07 (4)	07-09 (2-1) 09-17 (0) 17-19 (2-1) 19-04 (4) 04-06 (4-3) 06-07 (4-2)	06-07 (2-1) 07-09 (1-0) 17-19 (1-0) 19-20 (4-2) 20-21 (4-3) 21-04 (4) 04-06 (3-2)	06-07 (1-0) 07-19 (0) 19-20 (2-1) 20-21 (3-2) 21-04 (4-2) 04-06 (2-1)

See explanation in "How To Use Short Skip Charts" in box at the beginning of this column.
* Indicates best time for 160 Meter openings.
** Indicates best time for 10 Meter openings.
Note: The Alaska and Hawaii Propagation Charts are intended for distances *greater* than 1300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.

HAWAII
Openings Given In
Hawaiian StandardTime

To:	*15 Meters*	*20 Meters*	*40 Meters*	*80 Meters*
Eastern USA	07-08 (1) 08-10 (2) 10-12 (3) 12-13 (2) 13-14 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-13 (2) 13-14 (3) 14-15 (2) 15-16 (1)	16-18 (1) 18-20 (2) 20-03 (3) 03-04 (2) 04-05 (1)	18-20 (1) 20-01 (2) 01-03 (1) 20-22 (1)* 02-03 (1)*
Central USA	09-11 (1)** 07-08 (1) 08-09 (2) 09-12 (3) 12-14 (2) 14-16 (1)	06-07 (1) 07-08 (3) 08-12 (2) 12-15 (4) 15-16 (2) 16-17 (1)	16-18 (1) 18-20 (2) 20-02 (3) 02-04 (2) 14-16 (1)	17-20 (1) 20-02 (3) 02-04 (1) 20-22 (1)* 02-03 (1)*
Western USA	11-14 (1)** 07-09 (1) 09-10 (2) 10-13 (4) 13-14 (2) 14-15 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	15-17 (1) 17-18 (2) 18-20 (3) 20-02 (4) 02-05 (3) 05-07 (2) 07-08 (1)	17-18 (1) 18-20 (2) 20-04 (4) 04-06 (2) 06-07 (1) 19-02 (1)* 02-04 (2)* 04-06 (1)*

ALASKA
Openings Given In GMT

To:	*15 Meters*	*20 Meters*	*40 Meters*	*80 Meters*
Eastern USA	20-22 (1)	19-21 (1) 21-23 (2) 23-00 (1)	00-11 (1) 11-13 (2) 13-14 (1)	07-11 (1)
Central USA	20-22 (1)	17-21 (1) 21-00 (2) 00-01 (1)	01-12 (1) 12-14 (2) 14-15 (1)	07-13 (1)
Western USA	19-21 (1) 21-23 (2) 23-00 (1)	17-19 (1) 19-20 (1) 20-23 (3) 23-01 (2) 01-02 (1)	00-01 (1) 01-02 (2) 02-03 (3) 03-14 (2) 14-16 (3) 16-17 (1)	04-09 (1)* 09-12 (2)* 12-14 (1)*

Contest Calendar

BY FRANK ANZALONE,* W1WY

Calendar of Events

*Nov.	1-3	CHC/FHC/HTH QSO Party
*Nov.	1-2	RSGB 7 MHz Phone Contest
*Nov.	3-9	ARCI QRPp C.W. Contest
*Nov.	6-7	YLRL Anniv. Phone Party
*Nov.	8-9	European RTTY Contest
*Nov.	9	Czechoslovakian Contest
Nov.	8-9	ARRL C.W. Sweepstakes
*Nov.	15-16	Missouri QSO Party
Nov.	22-23	ARRL Phone Sweepstakes
Nov.	29	10 Meter Ground Wave Test
Nov.	**29-30**	**CQ WW DX C.W. Contest**
Dec.	6-7	Telephone Pioneers Party
Dec.	6-7	Delaware QSO Party
Dec.	6-7	Tops 3.5 MHz C.W. Contest
Dec.	6-7	ARRL 160 Meter Contest
Dec.	13-14	ARRL 10 Meter Contest
Dec.	13-14	Spanish C.W. Contest
Dec.	28	Hungarian Contest

*Covered last month

10 Meter Ground Wave Contest

9 P.M. to 1 A.M. EST Saturday, November 29

This operation is again organized by the Breeze Shooters of Pittsburgh, Pa. It should be of interest to stations in Western Pennsylvania and surrounding nearby states.

All modes are permissable and exchange points are determined on a distance and power basis in four circular zones centered on Pittsburgh.

There are special awards for leaders in these areas. Mobiles and Novices will compete in their own categories.

Additional details may be obtained by writing to W3ZCO.

Mailing deadline for logs is December 8th to: Kenneth E. Beal, W3ZCO, 428 Nantucket Drive, Pittsburgh, PA 15236.

Telephone Pioneers QSO Party

Starts: 1900 GMT Saturday, December 6
Ends: 0500 GMT Monday, December 8

This is the 11th annual party sponsored by the Stanley S. Holmes Chapter in which telephone pioneer amateur operators will be able to contact other members in the United States, Canada, and in foreign countries.

Exchange: Signal report, contact number and chapter name and number.

Scoring: One point for each exchange with a Pioneer, and one point for each different chapter worked. The same station may be worked on more than one band.

Frequencies: Phone — 3965, 7206, 14295, 21365, 28675. 50.100 to 50.250 and 144.275 to 145.500. C.W.—3565, 7065, 14065, 21065.

Be sure to indicate your chapter name on your log and mail no later than January 10th to: Gene Przebieglec, WB2ZMU, Stanley S. Holmes Chapter #55, Telephone Pioneers of America, 100 Central Avenue, Kearny, N.J. 07032.

Delaware QSO Party

Starts: 0001 GMT Saturday, December 6
Ends: 2400 GMT Sunday, December 7

The party is again sponsored by the Delaware ARC. (W3SL) Stations may be worked once per band, per mode for QSO points.

Exchange: QSO no., RS(T) and QTH. County for Delaware; state, province or country for others.

Scoring: Del. stations score 1 point per QSO, multiply total by number of states, VE provinces and DX countries worked.

Others get 5 points for each Del. QSO and multiply total by 1 if one Del. county is worked, by 3 for two counties, and 5 for all three counties. (New Castle, Kent and Sussex).

Frequencies: C.W. — 3560, 7060, 14060, 21060, 28160. Phone—3975, 7275, 14325, 21425, 28650. v.h.f.—50.110 & 146.52 Novice —3710, 7120, 21120, 28160. Phone on even hours, c.w. on odd hours.

Appropriate awards will be given, and in addition a certificate to all stations working all three Delaware counties.

Mailing deadline is Jan. 15th to: John R. Low, K3YHR, 11 Scottfield Drive, Newark,

*14 Sherwood Road, Stamford, Conn. 06905.

The PJ9JD crew, winners of the Radio Club Venezolano Multi-Multi Phone Trophy, and the Stu Meyer, W2GHK Contest Expedition Trophy, being introduced at the PVRC/FRC joint meeting in Washington during the Convention. L. to R.—John Kanode, W4WSF; Don McClenon, W3IN; Ray Terkoski, WA3IAQ; Jack Reichert, W3ZKH, Don Search, W3AZD, Bob Cox, K3EST and yours truly, W1WY.

Del. 19713. Include a s.a.s.e. for results or the W-DEL certificate.

Tops 3.5 MHz C.W. Contest

Starts: 1800 GMT Saturday, December 6
Ends: 1800 GMT Sunday, December 7

This is the annual contest for the Tops C.W. Club whose activity is concentrated on 80 meters. For the contest it will be between 3.5 and 3.6 MHz, with DX on the low end.

Exchange: RST report only.

Scoring: Contacts with own country 1 point. With stations on the same continent 2 points. With stations on other continents 5 points. (Each call area in W/K, VE/VO, PY, UA and VK count as separate countries.)

Final Score: Total QSO points multiplied by number of prefixes worked. (Same as WPX).

Entries may be single or multi-operator.

Mailing deadline is January 31st to: Peter Lumb, G3IRM, 14 Linton Gardens, Bury Saint Edmunds, Suffolk IP33 2DZ, England.

Spanish C.W. Contest

Starts: 2000 GMT Saturday, December 13
Ends: 2000 GMT Sunday, December 14

It's the world working the Espanoles on c.w., all bands 3.5 thru 28 MHz in this one.

Exchange: Six figures, RST plus a three figure contact number starting with 001.

Scoring: Contacts between EA stations and the Phillipines or Hispanoamerican countries are worth 3 points. (DU, CE, CO, CP, CX, HC, HI, HP, HR, KP4, LU, OA, PY, TG, TI, XE, YN, YS, YV, ZP or equivalent prefixes.)

Between EA and all other non-Hispano and non-European countries 2 points.

Between EA and Europeans, 1 point.

Multiplier: For EA, each DXCC country worked on each band. Others use EA call districts.

Final Score: Total QSO points from all bands times the sum of the multiplier form each band.

The same station may be worked on each band for QSO and multiplier credit.

Awards: Gold, silver and bronze medals to the first 3 place winners, both Spain and overseas.

Include a summary sheet with your log showing the scoring and other pertinent information, and your name and address in BLOCK LETTERS.

Your entry must be postmarked no later than one month after the end of the contest to: U.R.E. Concurso International, P.O. Box 220, Madrid 4, Spain.

Editor's Notes

I have received a few inquiries regarding licensing procedures in Bermuda. No licenses are issued by mail, however reciprocal licenses are granted to General Class and higher USA license holders. A visit to the Wireless Inspector's office (Ted Pitman, VP9EP) will do the trick. You will have to show Ted your amateur ticket and give him some other minor details as to where you are staying, how long and etc. The office is within walking distance from the shopping area in Hamilton. Any of the VP9 boys can give you the exact location, or you can drop a note to the Radio Society of Bermuda, P.O. Box 275, Hamilton 5, Bermuda.

Each year the Potomic Valley Radio Club (Phone) and the Frankford Radio Club (C.W.) sponsor trophies for the top scoring Single Operator in the USA on All Bands in our World Wide DX Contest. Here are the 1974 winners receiving their awards at the ARRL National Convention in Washington, D.C. last September. Above, Fred Laun, W9SZR, accepts the award as operator of W3AU. Below, Pete Chamalian, W1BGD/2, accepts as the award for highest scoring C.W. entrant.

[*continued on page 75*]

THE awards PROGRAM

BY ED HOPPER,* W2GT

Special Honor Roll
(All Counties)
#133—Margaret D. Tettelaar, VE7ATI
7-12-75

THE November, "Story of the Month," as told by Joe, is:

James J. Slattery, W9DRL

All Counties #69, 12-2-71

"I really started in radio in earnest back in 1936 and started working for my ticket. However, with school, college and a war intervening, I didn't get anywhere until 1955 when I finally got my license. That was in Springfield, Missouri where I slopped around as KØCCL, trying to work DX on 15. Then we moved to Glenview, Illinois in 1960, where I became W9DRL.

"County Hunting won me away from DX when I happened on the ICHN on November 28, 1968. At first I didn't know what I'd gotten into, but worked Ed, WAØSBR in Minnehaha County, South Dakota for my first net mobile. I hung around and when I heard Gil, W4IZR saying he was in a North Carolina County that 'you guys better get,' I got it. I still didn't know why I needed it, but Gil sounded as though he knew what he was talking about. Anyway, I was hooked. Between that date and November 26, 1971 when Walt, WBØCQE made a special trip to give me Whitley, Blackford, Ohio, Switzerland, Jennings and BROWN Counties in Indiana for my 3079, I had a ball with the greatest bunch of guys and gals I've run into. Incidentally, look at a map and see what sort of a trip, giving me those counties entailed. Walt is a real buddy!

"When not following the net, I make my living mostly appearing in television and radio commercials. I've done shows as MC or announcer on the ABC, CBS and NBC Networks. Currently I'm heard as narrator on 'Wild Kingdom.' Aside from the broadcast field, I narrate industrial and training and slide films. Although the bulk of my work is probably 'voice over,' I often appear before the cameras as spokesman or in a variety of roles.

"I'm President of the Chicago Local of the American Federation of Television and Radio Artists, and am National First Vice President of that group.

"I shoot skeet, sail, have a pretty good stamp collection of Vatican City and Ireland, and dabble in photography. I used to work as a commercial pilot years ago as a flight instructor, flew for a Pan American subsidiary, flew during WWII and retired from the Air Force Reserve after 23 years.

"Mary and I have five great children, of whom we are very proud."

*P.O. Box 73, Rochelle Park, N.J. 07662.

Joe Slattery, W9DRL.

Awards Issued

Margaret D. Tettelaar, VE7ATI (exVE6-ABP) won *All Counties* #133 which is #2 to Canada and #5 outside USA. The others being ZL1KG, TG9UZ, VE3CBY and G4JZ. New QTH is Box 55, Anglemont, B.C. VOE 1AO, Canada.

Joe Vaughan, K8NQP was issued USA-CA-3000. The reason for #130 is my error of some time ago, when I assigned that number to Joe, but Joe, honest man that he is, returned the Gold Seal, saying, "not yet."

Ray McGrath, K7CUY obtained USA-CA-2500, endorsed All Fone.

Don Guy, WB9DCZ did a lot of paper work and came up with USA-CA-500 through USA-CA-2500, endorsed All S.S.B., All Mobiles.

Paul Schuett, WA6CPP (also WA7PEI & KQ6ITU) acquired USA-CA-500 endorsed All S.S.B., All 14; and USA-CA-1000 through USA-CA-2000 endorsed All S.S.B.

Ken Distel, WA4AUL (not to be confused with Bud, K4AUL) added USA-CA-2000 to his collection.

John De Graff, W4ISF also did paper work to acquire USA-CA-500 through USA-CA-2000 endorsed All S.S.B.

Michael McNeely, K9HCK applied for

USA-CA-500, 1000, and 1500, endorsed All 2 × S.S.B., All Mobiles.

Clayton Schlenker, W4AZU gained USA-CA-500, 1000, and 1500.

Justino Ramiro Santos, CT1UA who had already received USA-CA-500 endorsed All S.S.B., which was #3 to Portugal (the others being CT1PK & CT1LN); added to his collection, USA-CA-1000 endorsed All S.S.B. & #1 to CT1. His QSL manager for USA-CA is WA3VLB.

Bill Grim, WØMHK got USA-CA-1000.

Chuck Walbridge, K7QFW qualified for USA-CA-500 endorsed All 6 Meter Fone—this is #13 issued for 6 meters.

Victor Culver, K4JNM claimed USA-CA-500, endorsed All S.S.B., All Mobiles.

Marcos Avellan, YV4AGP received USA-CA-500 which is #4 to Venezuela and #1 to YV4.

Joseph Dinger, WA9YZD had me send him USA CA-500 endorsed All S.S.B., All Mobiles.

USA-CA HONOR ROLL

3000

K8NQP 130

2500

K7CUY 194
WB9DCZ 195

2000

WB9DCZ 228
WA6CPP 229
WA4AUL 230
W4ISF 231

1500

WB9DCZ 272
K9HCK 273
W4AZU 274
WA6CPP 275
W4ISF 276

1000

CT1UA 363
WB9DCZ 364
K9HCK 365
WØMHK 366
W4AZU 367
WA6CPP 368
W4ISF 369

500

K7QFW 1055
WB9DCZ 1056
K4JNM 1057
K9HCK 1058
W4AZU 1059
YV4AGP 1060
WA9YZD 1061
WA6CPP 1062
W4ISF 1063

Awards

The Maple Leaf Award: As described in *CQ* of August '74 has undergone some changes, so here is the up-to-date data. The Award consists of two parts, an attractive parchment diploma and a Canadian Maple Leaf flag pin, suitable for wearing. It is available to all radio amateurs and s.w.ls. QSLs must be in your possession, but not sent unless specifically requested. A GCR (Certified List) must accompany your application. The Award is issued in 3 different classes. Class III for working/hearing 15 different Canadian prefixes. Class II for 25 different Canadian prefixes and Class I for 30 or more different Canadian prefixes. A special plaque award will be issued free of charge to any radio amateur who works and confirms fifty (50) or more different Canadian amateur radio prefixes. All contacts for all classes must be made after January 1, 1965, the year in which the Maple Leaf became Canada's official flag. Application, GCR and 10 IRCs or $1.50 or equivalent in any foreign currency should be sent to the awards custodian: Mr. Garry V. Hammond, VE3GCO, Geography Department, L.D.S.S., 155 Maitland Ave., S. Listowel, Ontario, Canada, N4W

Some Awards at CT1UA, showing 5 CQ Awards.

2M4. Oh yes, The Award is sponsored by the Amateur Club of the Listowel District Secondary School, Club call VE3LSS. Prefixes can come from the CF, CG, CH, CI, CY, CZ, VA, VB, VC, VD, VE, VF, VG, VO, VX, VY, XJ, XK, XL, XM, XN, XO, 3B, 3C, and any later ITU assigned callsign allocations.

1976 Olympics Award: Amateur radio operators (and sw.ls), worldwide, are invited to participate in the celebration of the XXI Olympiad to be held in Montreal, Canada, in 1976.

Two different and attractive awards will be issued for working or hearing (for s.w.ls) amateur radio stations per the following rules: **Canadian '76 Olympics Award:** *Communications Canada* has authorized the use of the "XJ" for "VE" amateur stations and the "XN" prefix for "VO" stations during the period August 1, 1975 to July 31, 1976. At least one (1) contact must be made with each of the areas XJ1-XJ8 and XN1 and XN2, for a total of 10 contacts. Any contact with XJØ (VEØ, Maritime Mobile station) or the special Olympics amateur station CZ2O will be allowed as a substitute for any missing call area prefix.

[*Continued on page 75*]

The Maple Leaf Award

SURPLUS sidelights

BY GORDON ELIOT WHITE*

Good old surplus never dies, it just fades away slowly, but one of the most familiar items is about to move farther into the mists of time. The Teletype Corp. is about to drop manufacture of parts for the Model 14, 15, 19 and 20 sets. No new orders will be accepted for these older parts after December 1, 1975.

These are real antiques, as electronic items go, dating back to the 1920's. Most of the machines with which radio amateurs started the RTTY mode 20-odd years ago were World War II surplus 15's, but I have seen some Western Union surplus 14's that were made in 1924 according to tags on the units.

The new wire services kept the old Teletype machines—mostly War surplus— longer than the general commercial users, but the new EXTEL printers have made the 15's obsolete even for AP and UPI. The coming of the CRT press terminals by which reporters originate their copy has signed off on the older units entirely. The amateur market, such as it is, is probably the largest part, today, of the Teletype Corporation's Model 15 spares business. Even most amateurs are using the newer Model 28 machines, relegating the 15 to the deaf teleprinter networks, and museums.

Anyone who wants to stock up on new Model 15 parts before the end had better get his order in quickly. Inquiries may be directed to R. A. Morton, Teletype Corp., 5555 Tuohy Ave., Skokie, Ill. 60076.

Apparently expecting a rash of orders for long-dormant part numbers, Teletype will either fill orders from stock, or manufacture ordered parts, with final delivery by September 1, 1976 on parts not in stock currently.

Parts with part numbers above 150,000 will be kept in the catalog, Morton says, along with lower numbers that apply to the Model 28 and later machines, such as nuts and bolts, greases, tools, etc.

Teletype may sell its older parts tooling and drawings to another company, but that possibility is unclear now. Fairchild took over most of Teletype's Teletypesetter business a while back, and makes a number of Teletype part numbers. I will keep you posted on that, if it happens with the 15 type parts.

Teletype has been very cooperative with amateurs, on its parts. The Company has cheerfully sold one or two items at a time, in contrast to Kleinschmidt's policy of demanding only quantity orders. I find it refreshing that a Company gives notice that it will stop production, rather than just quitting, quietly.

I have some familiarity with the problem, as much of my mail concerns the availability —or non-availability—of parts for surplus equipment. Commercial outfits often have to pay steeply to have special parts made for older equipment. Foreign military services are always ordering parts for U.S. equipment that have to be manufactured from scratch, often without original drawings. The price is obviously more than any of us can afford.

One case in point is the R-390 receiver, now out of production, but still an excellent set. As far as I can find, only Bill Slep, Box 100, Highway 441, Otto, North Carolina 28763, has any stock of 390 parts, having bought out the residue of the Hammarlund production when it ceased.

Teletype parts will be around for quite a while, as there are still tons of the stuff in storage in the military and in dealers' hands, but there may be a shortage of 60 w.p.m. gears, cranks, and other popular amateur items. Old machines can be stripped for keytops and internal items, and the breed kept going for quite a while.

The two dealers I know best who have Model 15 material are Van's Electronics, 550 Springfield Ave., Berkeley Heights, N.J. 07922, and Typetronics, Box 8873, Ft. Lauderdale, Fla. 33310. I have gotten rid of most of my 15 collection, and most of the material I still have is 28 and later.

While the next item I mention is not strictly an amateur radio subject, it is electronics surplus: did you know that a fairly practical, non-polluting electric auto can be made out of an old jet engine starter?

I have seen the mating of a junk Volkswagen and a surplus jet starter made into a nifty commuting car. This might be an interesting thing for the tinkering types—which most surplusers probably are.

The VW is stripped of its gasoline motor, and an adapter made to allow the starter to be bolted to the transmission housing. This is a flat plate, either specially made or bought from the Corbin-Gentry Corp., of Somersville, Connecticut. The Bug's flywheel, clutch, transmission, etc. is used as-is. Power to the electric motor is supplied through an adapted forklift truck controller from a bank of ordinary auto storage batteries in the car's back seat.

You lose the rear seat space, at least in part, but you can get a 45 m.p.h. speed for up to 50 miles between starts. You either charge the batteries overnight, or, if you can, charge during the day where you park at work for more range. This makes a practical commuting car

*1502 Stonewall Rd., Alexandria, VA. 22302.

which runs for about a penny a mile for "fuel."

The starter used should be a 24 or 48 volt type, rated at 800 amps. The 400 amp type is too weak to give usable performance in a car. If you have eight 100 ampere-hour batteries you theoretically have a one hour range at 45 miles an hour. That is probably optimistic, but is gives you the rough parameters.

These starters are popular as electric welding generators, as well as motors, and are sold as welders in surplus.

Corbin-Gentry markets a complete kit of starter, controller, charger, batteries, etc. for $1,250, but will sell each item separately. It's the adapter and controller that are hardest to make at home.

How about the all-electric mobile operation, anyone? ■

Awards [*from page 73*]

World '76 Olympics Award: Work and/or hear amateur radio stations in any fifty (50) countries which will compete at the 1976 Olympics in Montreal, Canada. One contact must be with a Canadian station using a "XJ" or "XN" prefix. A special seal will be affixed for a contact with "CZ2O," the official amateur radio station on the XXI Olympiad site. For either of these Awards send certified log data list and $1.00 or 7 IRCs to VE3LSS, Radio Club, Listowel District Secondary School, Mr. G. Hammond, 155 Maitland Ave. S., Listowel, Ontario, Canada, N4W 2M4.

Notes

Larry Moore, K6SLP pointed out some rather incorrectly worded statements that I made in my July column. I should have said, "Ormsby County, Nevada and Nansemond, Va., no longer exist. The area presently known as Carson *CITY* is an Independent City—thus, although the USA-CA Record Book and rules list 3077 Counties, there are now 3075."

How was your month? 73, Ed., W2GT

Contest Calendar [*from page 71*]

You v.h.f. buffs may be wondering why no Space Net Contest next month. Tony Slapkowski, WB2MTU has moved to Florida and is now signing K4AWS. He will, however, continue the VHF Space Net program from the new location but on a reduced level. His address: P.O. Box 15, Sumterville, Fla. 33585.

We had a very busy week-end during the ARRL National Convention in Reston, Va. (Wash. D.C.) back in September. In addition to all the ARRL forums, there was the National QCWA meeting and the annual PVRC/FRC joint meeting and luncheon. We took advantage of this golden opportunity and presented Trophies won in the 1974 *CQ* World Wide DX Contest to: PJ9JR (2), PJ9JT, CT3WA, W3AU, W1BGD/2, and the PVRC.

Hope you had a good one in the recent Phone Contest. Can't give you a propagation report for the c.w. week-end at this early writing but George Jacobs will have it in his Column. If you did not take advantage of the special Mail-A-Prop contest report you can always call Dial-A-Prop 516 883 6223 for the very latest forecast. Also check WWV at 14 minutes past each hour. Good luck, see you in the pile-ups. 73 for now, Frank, W1WY

DX [*from page 66*]

9VØ—During August, 1975, 9V1 amateurs used the 9VØ prefix to celebrate the 10th Anniversary of the Singapore Republic.

QSL Information

A2CAB—Via WA2LOR
A35AK—To W6KLI
A4VXB—c/o K1DRN
A6XB—Via K1DRN
C31IL—Via WA9INK
CE0AE—To WA3HUP
W9MR/CE0—c/o K3RLY
W9NTP/CE0—Via W9NTP
CR6GA—To WA3HUP
CR6IK—c/o W8CNL
CT2AK—Via W3HNK
CT2BP—To WA6GKJ
CT2BQ—c/o K9ECE
CT2BS—Via WA4CAD
CY6ARQ—To VE6TK
DU1EN—c/o WB2FVO
DU6BG—Via WA7RFH
EP2OD—To K4OD
FC2CD—c/o W4KA
FEARL QSL Bureau—c/o Sam Fleming, GARH-ID-GS-T, APO San Francisco, CA 96343
FG7AN—Via WA3EDS
FG0BUY—To K0SGJ
FM7AQ—c/o K4KQB
FM7WE—Via K4CFB

FMØBQQ—To W6HJP, 1000 Aster Ave., Sunnyvale, CA 94086
FMØBUY—c/o K0SGJ
FO8BO—Via K6ILM
FO8DP—To WB6EDM
FOØVAP—c/o W6VAP
FPØJD—Via W2DEO
FPØXX—To K1DRN
FPØYY—c/o K9OTB
FSØBUY—Via KØSGJ
G4DEM—To VE2YG
GC5AGA—c/o K4II
HC1CW—Via K7NHV
HKØBKX—To WA6AHF
HL9KZ—c/o W7JNC
HL9TO—Via WB6GYS
HL9VR—To WB4ZKG
HS5AKW—c/o W9NGA
HU1JWD—Via W3HNK
HV3SJ—To W6KNH
HZ1TA—c/o W4UL
JE1HUT—Via WBØBQG
JTØAE—To OK3YAO
KA2RT—c/o K4TRJ
KA6RI—Via WB6KGB
KC6VE—To W7PHO
KM2USA—c/o W2AJR
KU2SCF—Via W2AJR
LX1BW—To W3HNK
TI9FAG—c/o HB9AQM
VP2DAJ & VP2DAL—Via VE3LSS
VP2A—To W5NOP
VP2DH—c/o W8HM
VP2KF—Via VE2DCY
VP2MCT—To W6KXT
VP2SV—c/o K3GYD
VR1PE—Via KH6GKD
VU2DX—To E.S.A. Saifudeen, 103, 8th. St., Gandhipuram, Coimbatore—641012, India
WG3AS—c/o WA3NAN
WG4NEP—Via W4LRN
WH2SCI—To K2JD
WU5AST—c/o W5LSZ
YJ8BL—Via W6NJU
ZS6CB & 7P8MA—To S. Meadows, 4417 Scottsdale St., Mesquite, TX 75150
4Z4EV and 4Z4PX—c/o WB4FSV
7X2BK—Via WA3HUP
9L1JT—To W3HNK

73, John, K4IIF

SSTV & World Scouts [*from page 61*]

Scouting) to be met at the Airport, taken to Gilwell for lunch, a guided tour and visit to our radio hut, and then returned to the Airport in time for their homeward flight. Many people talk about World Scouting, but amateur radio is World Scouting.

When Nordjamb came to an end, a somber quietness descended on our hut, which momentarily suppressed the joy we had experienced from the events of the past week. It was during that brief silence that I found myself thinking about the real significance of what we and our brother Scouts at Nordjamb had been doing. Strangely, my thoughts drifted away from the Jamboree and I recalled to mind the joy on the face of a little deaf Cub when we had turned up the volume through his headphones to ear-splitting level and he had actually heard what his friends were so excited about—a Scout speaking from another country: how that Cub would have enjoyed our SSTV pictures if he had been there to see them, Those afflicted with blindness have long been able to enjoy making amateur radio contact with others throughout the world, but now with SSTV the deaf will also be able to "talk" and "listen" worldwide.

We enjoyed Nordjamb but that enjoyment is nothing when compared to the ecstasy of deaf Scouts worldwide who in the future will be able to take part in SSTV communication. We at the Gilwell Scout Amateur Radio Group now set ourselves the task of making an SSTV monitor and equipment: It will be a slow process because our funds are very limited, but when we have finished will you bring your deaf Scouts or Cubs to Gilwell—and make another dream come true? . . . ■

QRP [*from page 59*]

choke in an h.f. v.f.o. circuit where it served as an isolating device. In that application, the shielding characteristic and permeability of the FB-43-2401 were employed. When the beads (see August column for sizes offered by Amidon) are used alone as a bulk impedance (electrically equivalent to a resistance in series with an inductive reactance) for decoupling or parasitic suppression, it is necessary to take into account other characteristics of the bead.

The prime consideration is to determine whether the problem to be solved in a circuit can be solved through the use of a ferrite bead or combination of beads. The graph of fig. 1 shows the Impedance vs. Frequency characteristics of the three mixes used in Amidon beads. Note that in all three instances, the beads will introduce an impedance into a circuit at all frequencies and hence will attenuate signals at all frequencies, but that the amount of impedance introduced increases as the frequency does. In practical terms, an FB-43-801 bead (the .295" × .297" size) will offer about 20 ohms impedance at 7 MHz, about 35 ohms at 30 MHz, and about 65 ohms at 150 MHz. If the circuit problem is a parasitic at 150 MHz and the circuit is operating at 7 MHz, the objective is to select a bead (or combination of beads) that will provide the desired attenuation of the parasitic while attenuating the desired signal as little as possible. In short, ferrite beads are not a "cure all" since part of the desired signal must always be sacrificed in order to remove the unwanted parasitic.

Secondly, note that parasitics below the desired frequency do not call for the use of a ferrite bead. Also, one should consider the nature of the circuit into which the bead is to be inserted. For example, if a bead is placed on a lead which has a capacitance to ground element (parallel), such as the base-emitter capacitance could possibly "tune" the wire-lead + bead inductance to a point in the h.f. or v.h.f. spectrum and introduce a new parasitic oscillation. Adding the bead will create another problem in addition to the original one! The point is that the ferrite bead is just one possible tool to enlist in solving various circuit problems, and is effective only in certain cases. For a rundown on bead selection and application, see K1ORV's treatment of the subject.[3]

Until next month, 73, Ade, K8EEG

P.S.: A recent change of QTH has made it unlikely that I will be able to serve as NCS on the QRP net announced last month (Tuesdays, 2200 Eastern Time, 3540 kHz). The net is still "on" and someone should step in and run it till I get set-up.

[3] Ellis, "How to Use Ferrite Beads," hr, March, 1975, p. 34-36.

Novice [*from page 54*]

the new Heathkit SB-104, solid-state transceivers with digital frequency readout! . . .

Angel Luis Diaz Lebron, Valencia, WP4-EBU, #2, Box 158, Juncos, Puerto Rico 00666, dispells the belief that WN's only work other WN's. He had worked 520 stations and had confirmations from 469 of them when he wrote! Of course, being in Puerto Rico helped get the cards: nevertheless, his WP4 prefix obviously didn't confuse every Novice that heard him. Angel's equipment includes a Conar (National Radio Institute) 15-watt transmitter, a Hallicrafters SX-117 receiver, and a home-constructed, 2-element beam. His DX includes Brazil, Colombia, and Germany. By the way, Angie would have won this month's NOVICE SHACK Photo Contest, except that the color photos he sent weren't sharp enough for magazine reproduction. Hopefully, he will try again with sharp "black and whites." Look for WP4EBJ on 15 and 40 meters, although he hopes to be signing KP4EBJ soon.

We are at the bottom of the page, again. Remember the NOVICE SHACK is your column. Send your suggestions of what you want it to be with *your* "News And Views," pictures, and QSO details. You are particularly invited to send sharp, black and white (preferably) photographs of your self and your station for our NOVICE SHACK Photo Contest.

73, Herb, W9EGQ

In Focus [*from page 57*]

Instead of basing the availability of the Extra Class license (in part) on mastery of the Oldest Living Remnant of Wireless, the *code,* provision should be made for an alternate path to this highest amateur ticket. Equal emphasis should be given to the Newest technology and a demonstrated ability to use it.

And now to the F.C.C., with all due respect, a proposal. (I trust that Cowan Publishing will supply the necessary Xteen copies!)

How about a *new* examination for the Extra Class license? An examination with certain options. For example, Part A, required for all applicants would cover electronic theory. There would then be a choice of Part B or Part C. Part B, receiving and transmitting a 20 or 30 words per minute code, with typing permitted; Part C, a theoretical test based on knowledge of modern day technology related to Satellite communications, RTTY, SSTV, FAX, and FSTV.

In addition, the head of the Amateur Service would be empowered to issue Extra Class licenses to individuals who have demonstrated outstanding ability to either use combinations of existing techniques or who develop *new* techniques or technologies; without formal examination — in recognition of their achievements.

Much has been made of the fact that the number of Extra Class operators has not shown much growth over the years. A major reason for this is that the F.C.C. has maintained high speed code capability as one half of the examination requirement.

Let's take a look at the calendar. It's that Bicentennial Year fellows! It's seventy-odd years since Marconi's dots crossed the Atlantic! Let's make it possible for *all* of those who are pioneering with Today's and Tomorrow's technology to get the recognition they deserve. Right now we are telling the talented designer-experimenter-inventor that unless he can send and receive dots and dashes at a certain prescribed rate, he doesn't deserve to have the highest rated license. Is this logical? (Just in case you're wondering, I hold the Amateur Extra Class license, an ARRL Code Proficiency Certificate for 30 w.p.m. and an Aircraft Radio Telegraph Endorsement for my Radio Telegraph ticket which required 25 w.p.m. straight language, 20 w.p.m. in 5 letter code groups. I learned the code when I was 8 years old and it is no problem to me.)

I have no idea of what class licenses KH6-HJF and WA6TUF possess and so far as I'm concerned, that's beside the point. I only hope that neither Don nor Mike will object to my using their achievements as an example of why there should be a change in a license examination! Congratulations fellows, and my thanks again for the photos.

The response to IN FOCUS has been most encouraging. Please keep on sending your letters and pictures for everybody's interest.

73, Bill, W2DD

Israel [*from page 48*]

In Conclusion

I was asked to write nice things about the Israeli amateurs. After a long search I came up with the following: not every 4X amateur when talking to the U.S. wants a phone-patch, and some of the 4X amateurs sometimes really *do* QSL.

But I strongly recommend a vacation in Israel; there are many fascinating places, the public transportation is good and cheap, the food is excellent and the people are very, very nice.

Don't try to drive on other than the major roads because there are few road signs and those are mostly in Hebrew.

I made a color movie about this trip on Super 8, with commentaries on a cassette. Any convention or major radio club who wants to borrow it, can get in touch with me. ■

CQ WPX Contest Results

[from page 44]

YO7NA	"	31,290	190	105
YO4AYE	"	6,516	111	36
YO4ASG	"	1,224	40	24
YO3BEJ	**7**	**10,704**	**93**	**48**
YO3JW	**3.5**	**152,576**	**421**	**149**
YO6MD	"	50,676	235	103

Scotland

GM3SSB	**A**	**20,160**	**149**	**90**

Sicily

IT9GPP	**A**	**102,485**	**515**	**199**
IT9JT	**14**	**660,946**	**1184**	**286**

Spain

EA2JD	**14**	**75,864**	**332**	**109**
EA2LY	"	5,200	77	52
EA4LH	**3.5**	**376,350**	**554**	**193**

Sweden

SM5AOE	**A**	**412,080**	**737**	**272**
SM5CSS	**A**	**321,783**	**647**	**231**
SM5CAK	"	127,501	333	173
SM7CSN	"	100,800	322	175
SM7BXK	"	13,668	117	68
SMOCGO	"	7,436	85	52
SM4DIG	"	4,578	50	42
SM5ARR	"	2,997	47	37
SM5BNZ	**14**	**217,168**	**532**	**196**
SM7ACB	"	84,956	365	134
SM4CAN	"	73,809	345	139
SM7TV	"	6,348	96	46
SM7ASN	"	736	18	16
SM5EOO	**3.5**	98	7	7

Switzerland

HB9UD	**A**	**18,018**	**102**	**78**

Vatican

HV3SJ	**A**	**71,470**	**338**	**135**

Wales

GW4CYD	**21**	**3,876**	**50**	**38**

Yugoslavia

YU2OB	**A**	**296,548**	**657**	**238**
YU3DXU	"	3,196	50	34
YU1BCD	**14**	**643,135**	**1034**	**293**
		(Opr. YU1QBC)		
YU2CDS	**14**	**634,491**	**1081**	**261**
		(Opr. YU2RNE)		
YU1NZW	"	32,849	181	107
YU3TPM	**7**	**19,564**	**122**	**73**
YU4FDE	**3.5**	**234,124**	**583**	**187**
YU4S	"	78,336	280	136
		(Opr. YU1OIQ)		
JU1ODO	"	35,904	170	102
YU1AGU	"	22,496	152	76

U.S.S.R.

European

UV3DN	**A**	**259,860**	**732**	**213**
UA6YR	**A**	**187,542**	**633**	**207**
UA6LWI	"	123,024	488	176
UA3VAQ	"	105,624	362	162
UA3FT	"	94,556	380	154
UA3ST	"	83,589	303	149
UA3DCY	"	56,400	262	120
UA6HBU	"	50,193	300	143
UA4ZA	"	46,669	259	113
UA1QBE	"	45,954	242	111
UA6LY	"	43,520	244	128
UV3FD	"	32,500	182	100
UA4CAL	"	28,355	186	107
UA3TN	"	26,703	165	129
UA4CAQ	"	20,619	132	87
UA6AJG	"	6,075	64	45
UA3ERD	"	3,120	46	39
UA6ADC	**28**	168	8	7
UV3CE	**21**	**3,196**	**46**	**34**
UA6BV	"	2,607	43	33
UW6CV	"	2,204	37	29
UA6DL	**14**	**479,952**	**1078**	**297**
UW3HV	**14**	**219,177**	**715**	**213**
UA3GM	"	49,594	259	137
UA3DFK	"	44,020	275	124
UA6HZ	"	13,659	145	87
UA3XAN	"	10,877	92	73
UW3EQ	"	6,390	75	45
UW6FZ	"	6,039	81	61
UA1AET	"	5,916	95	51
UA1MU	"	3,915	55	45
UK3QAA	"	2,457	53	39
UK3XAM	"	1,926	53	37
UK3XAA	**7**	**177,952**	**382**	**166**
UA4ACD	"	3,472	45	28
UA3QAQ	**3.5**	**46,060**	**241**	**94**
UW6DP	"	25,060	176	70
UA4UAZ	"	20,520	155	60
UA4PW	"	14,580	109	54
UA6LAD	"	8,976	83	51
UW6NU	"	3,658	54	31
UA3DDF	"	1,254	23	19

Estonia

UR2RJ	**A**	**113,687**	**402**	**149**
UR2MG	**7**	**13,144**	**97**	**62**
UR2RCN	**3.5**	**40,296**	**202**	**92**
UR2QA	"	6,952	76	44
UR2RDI	"	3,224	50	31

Kaliningrad

UA2DM	**A**	**90,182**	**329**	**134**

Latvia

UQ2DV	**A**	**94,254**	**363**	**138**
UQ2CR	**14**	**11,286**	**106**	**57**
UQ2NU	**3.5**	**16,254**	**121**	**63**
UQ2GDQ	"	3,132	56	27

Lithuania

UP2PAQ	**A**	**20,979**	**150**	**81**
UP2CY	**A**	**20,003**	**139**	**83**
UP2BAR	"	8,107	86	67
UP2WN	"	2,618	46	34
UP2BAS	**21**	**1,300**	**23**	**20**
UP2PT	**14**	**11,696**	**126**	**68**
UP2BAW	"	968	24	22
UP20U	**3.5**	**122,404**	**407**	**142**
UP2PBW	**3.5**	**32,800**	**185**	**82**
UP2PBI	"	32,136	199	78
UP2PBM	"	13,908	114	61
UP2PCH	"	9,936	100	46

Moldavia

U05OAA	**14**	**7,308**	**80**	**58**
U05BS	**3.5**	**30,450**	**185**	**75**

Ukraine

UB5WE	**A**	**774,090**	**1121**	**305**
UB5WAD	**A**	**393,876**	**736**	**252**
UB5CAY	"	133,560	434	168
UB5LU	"	29,886	195	102
UB5JK	"	19,669	171	89
UB5PS	"	9,016	77	56
UY5DJ	"	8,526	73	58
RB5IOV	**28**	40	4	4
UY5LO	**14**	**198,749**	**637**	**233**
UB5OD	"	16,776	125	83
UK5KFG	"	3,485	69	41
UY5OQ	"	**37,976**	**173**	**94**
UT5OV	"	1,550	31	25
UB5YAR	**3.5**	**74,240**	**316**	**116**
UK5WAZ	**3.5**	**70,112**	**294**	**112**
UB5QCQ	"	53,732	239	101
UB5UBJ	"	29,600	183	80
UB5VBY	"	24,300	150	75
UB5VAZ	"	7,920	85	45
UK5ECV	"	2,236	43	26

White Russia

UC2BF	A	8,265	70	57
UC2BA	14	2,356	43	31
UC2ABF	**3.5**	**48,174**	**229**	**93**
UC2RZ	"	2,438	56	23

Oceania

Australia

VK4PJ	**A**	**17,100**	**105**	**57**
VK3ND/4	"	4,380	35	30
VK5MF	**A**	**162,946**	**541**	**103**
VK6RU	**A**	**59,745**	**203**	**105**
VK2XT	**21**	**78,822**	**463**	**58**
VK3HE	**21**	**12,060**	**136**	**30**
VK6NE	**21**	**115,818**	**401**	**97**
VK3SM/3	14	1,890	39	27
VK6CT	**14**	**359,784**	**782**	**171**
VK6HD	**7**	**111,916**	**206**	**98**
VK3XB	3.5	540	15	10

Guam

KG6JAR	**14**	**255,936**	**701**	**129**

Hawaii

KH6IGJ	**A**	**662,810**	**1082**	**158**
K8HLR/KH6				
	A	**158,267**	**485**	**101**
KH6IJA	"	84,700	246	100
KH6IJZ	**21**	**128,400**	**536**	**80**

Indonesia

YBØABV	**A**	**143,532**	**465**	**108**
YB9ABX	"	5,624	56	36

New Zealand

ZL1BKX	**A**	**366,080**	**622**	**176**
ZL2ACP	**14**	**52,102**	**177**	**109**
ZL1AMM	"	27,501	121	89
ZL4BO	**7**	**116,596**	**235**	**103**

Samoa (American)

KS6DH	**14**	**711,956**	**1363**	**188**

Western Samoa

5W1AU	**A**	**526,125**	**1337**	**125**

South America

Argentina

LU8A	**A**	**609,612**	**886**	**222**
LU9VAJ	"	2,856	34	24
LU2DEK	**21**	**7,790**	**75**	**38**

Bolivia

CP1EU	**A**	**100,421**	**226**	**137**
CP1AT	**14**	**34,560**	**147**	**96**

Brazil

PW4KL	**A**	**587,512**	**811**	**248**
ZZ6AM	**A**	**536,547**	**805**	**229**
PT1MBN	"	292,528	552	188
ZZ8J0	"	242,028	472	162
PY1MO	"	205,100	418	175
PY3CFN	"	106,449	268	137
PY1BOL	"	50,868	168	108
ZY2JB	"	17,990	106	70
PY3CFP	"	16,790	95	73
PT1AS	"	748	20	17
PT2ZBS	**21**	**1,283,840**	**1708**	**256**
PY1CHP	**21**	**30,705**	**155**	**69**
PY4KB	"	12,366	111	54
ZY5YC	**14**	**101,505**	**362**	**101**
PY1ZBJ	"	28,690	132	95
ZZ2ELZ	**7**	**27,738**	**84**	**69**
PY1DBE	"	6,528	39	34

Chile

CE5GO	21	901	25	17

Colombia

HK4DF	**A**	**1,394,996**	**1555**	**257**

Ecuador

HC1WW	**A**	**129,100**	**415**	**100**
HC5EE	"	13,500	108	45
HC1BI	**14**	**23,465**	**130**	**65**

Netherlands Antilles

PJØJR	**14**	**1,893,456**	**2001**	**324**
		(Opr. W3ZKH)		

Peru

OA4OS	**A**	**863,154**	**1061**	**237**

Uruguay

CW3BH	**A**	**557,536**	**922**	**224**
CX7AQ	**21**	**30,345**	**157**	**85**

Venezuela

YV1AVO	**A**	**321,552**	**565**	**168**
YV5EED	"	30,744	119	84
YV4AGP	**14**	**1,158,115**	**1606**	**245**
YV4TI	**14**	**798,294**	**1196**	**229**
YV4YC	**7**	**605,700**	**589**	**180**

MULTI-OPERATOR SINGLE TRANSMITTER

United States

W9ZTD		**593,655**	**756**	**285**
K8YZW		**346,275**	**535**	**243**
K6ZR		**263,144**	**535**	**148**
W8LT		174,768	389	176
WB4LOK		**119,791**	**300**	**1**
WB8IAY		73,032	235	1
WA6AHF		35,880	169	
WN5LVL/K5LZJ		**7,112**	**99**	
WA9HEU		4,368	71	

North America

VE7SV		**1,621,074**	**2415**	**1**
VE3EDC		**40,014**	**171**	**1**

Africa

EA8BW		**1,966,624**	**1848**	**3**

Asia

VU2BK		**854,715**	**1078**	**2**
VU2GDG		791,858	1172	2

Europe

DM2DUK		**1,604,112**	**1914**	**3**
G3HTA		**1,600,430**	**1885**	**3**
GC4DAA		**1,462,188**	**1829**	**3**
HA5KDQ		**1,016,037**	**1435**	**3**
DLØJK		**1,002,269**	**1497**	**3**
SK2DR		**974,951**	**1971**	**3**
CT6EQ		**800,800**	**1337**	**3**
FORV		**797,049**	**1207**	**2**
SQ6PZB		**761,130**	**1292**	**2**
HA3ØKOB		687,720	1301	2
CT6BY		656,292	1292	2
OH2AW		**508,018**	**880**	**2**
DJØEK		506,499	797	2
LZ2KPD		**471,900**	**1081**	**2**
PA7SMK		**449,168**	**769**	**2**
HA9KPU		443,220	863	2
OK3ØKAG		**411,570**	**740**	**2**
OH3AM		407,296	835	2
LA2S		**394,842**	**799**	**2**
GC5BLE/P		**324,210**	**741**	**2**
IØOU		**309,132**	**732**	**2**
HA5KKN		299,249	896	2
LZ1KDP		298,387	774	2
LZ2KLC		273,705	776	2
HA5KKB		243,540	577	2
HA5KAS		193,865	504	2
OK3ØKPU		167,772	433	1
YU3DMU		**156,464**	**431**	**1**
HA5KKP		126,087	410	1
HA7KMS		111,784	372	1
G4DXD/A		104,004	345	1
YU1AFV		94,913	394	1
HA3ØKNA		92,095	327	1
OK3ØKAP		88,655	298	1
OH7RM		81,750	350	1
SKØHB		68,250	289	1
SQ6PAZ		53,431	230	1
OH5MJ		52,794	278	1
OK3ØKZR		49,839	234	1
OK3ØKKF		46,748	202	1
SQ6KDA		46,090	211	1
OK3ØKUR		37,044	166	9
OK3ØKOK		15,123	113	7
SP9PEZ		12,915	104	6
OK3KWL		10,908	78	5
DK5WQ		7,998	84	6
SP9ZAS		1,012	23	2

Oceania

VK4AAU		**106,151**	**387**	**10**

South America

CVØZ		**1,980,690**	**2181**	**30**
OA4AHA		**1,554,888**	**1706**	**29**
PJ9EE		**1,425,144**	**1671**	**23**

U.S.S.R. CLUB STATIONS

Asia

UK9ADT		**3,062,605**	**2239**	**37**
UK9AAA		914,931	1030	27
UKØAAB		**663,984**	**1209**	**23**
UKØLAB		473,345	1188	20
UKØSAA		265,538	897	18
UK9UAO		230,340	720	16
UK9FER		207,776	406	15
UK9CAN		144,399	385	12
UK7GAL		**117,067**	**307**	**16**
UK9HAF		39,376	207	9
UK6GAD		**30,526**	**117**	**6**

Europe

UK3AAO		**1,054,920**	**1276**	**35**
UK5MAF		**950,060**	**1486**	**33**
UK6LAZ		888,573	1357	32

)K3AAAC	632,668	1208	277
)K3ABB	464,304	993	272
)K3AAI	419,822	987	241
)K3R	391,206	1025	226
)K5MAG	295,236	709	236
)K5JBO	280,140	630	210
)K3QAE	264,440	704	220
)K2AAA	**263,536**	**684**	**208**
)K5EDB	258,428	640	212
)K4WAB	253,368	593	204
)K2PAT	**243,411**	**631**	**201**
)K5QAV	224,540	617	206
)K5EDQ	200,397	700	201
)K2WAO	194,625	558	173
)K5QBE	183,912	541	194
)K5VAP	178,288	584	176
)K5AAO	170,004	547	186
)K2GCF	**125,004**	**459**	**132**
)K2LAH	113,498	408	154
)K5EAQ	110,679	415	163
)K4HBB	108,170	414	145
)K4LAC	108,160	432	160
)K2GAG	104,300	347	149
)K3WAC	98,784	405	147
)K2PBR	93,775	310	155
)K5LAS	50,922	261	123
)K3DBT	44,530	248	122
)K6LEW	43,896	237	124
)K4YAH	43,056	254	104
)K4PBB	42,952	210	118
)K2BBL	**38,250**	**213**	**90**
)K2FAD	**33,810**	**215**	**105**
)K4HAY	27,000	234	100
)K5ICQ	26,565	200	105
)K4HAC	11,523	114	69
)K1QAA	10,269	100	63
)K2PAA	6,426	67	51

Multi-Operator Multi-Transmitter

VP5B	**4,431,301**	**4687**	**329**
4Z4HF	**4,429,810**	**3228**	**385**
DK2BI	**2,106,054**	**2253**	**387**
GB3MCG	**1,501,136**	**1827**	**364**
K6BCE/6	**1,121,488**	**1469**	**232**
W9LT	**785,288**	**926**	**296**
SVØWJJ	**698,560**	**1652**	**296**
SK2AT	**470,932**	**961**	**278**
PA5GIG/A	**307,776**	**645**	**224**
JA6YTU	**238,204**	**475**	**226**
PI50ARU	187,248	489	188
JA3YEJ	14,040	127	60

Our thanks to the following stations who submitted their logs for checking purposes: DM2ARA, DM2CMF, DM2COJ, DM2CWJ, DM2DEO, DM2DGO, DM3BGO, DM3RQG, DM4SHJ, JF1FTU, JG1ELX, JR1YZE, KV4AA, LA3YQ, OH5YX, OK30CAW, OZ1TD, PY7AOR, PY8ALX, SM7BBV, SM7ECX, SM7RS, SP5HFP, SP9HYN, SP9KCB, SQ1AGE, SQ5AMX, UA1WBG, UA3XAW, UA9MQ, UK3SAB, UK3VAJ, UK4NAA, UK5MAZ, UK5QAU, UK6LDN, UK9LAA, UK9OAD, UK9YAR, UKØAAC, UR2FU, UT5HP, UW3IN, UW3RR, UW3TP, UY5YY, WA9UEK, YU2AKL.

STATION OPERATORS

Multi-Operator Single Transmitter

CT6BY: CT1AL, CT1BY, CT1DF, CT1UA. **CT6EQ:** CT1EQ & CT1LN. **CVØZ:** CX1BBL, CX3BR, CX4CR, CX8BE, CX8BZ. **DJØEK** & DJØBA. **DK5WQ** & DJ1YH. **DLØJK:** DK1DU, DK2KX, DK8ZK, DK8ZL, DK9FD, DF1FR, DF2FK, DK7FL. **DM2DUK** & DM2AYK. **EA8BW** & EA8IH, EA8IT. **FØRV** & FØBPG, FØBPI, FØBPM, F2YT. **G3HTA** & G3RUV. **G4DXD/A** & G4BYB. **GC4DAA:** G3FXB, G3MXJ, G3XBN, G3ZQW, G4BUE, G4BVH. **GC5BLE/P:** GC5AVR, GC5BLE, GC5BLF, GC5BLG, GC5BLH, GC5BLJ. **HA5KAS:** HA5CE, H5-304. **HA5KDQ:** HA5FM, HA5HO, HA5MK. **HA5KKB:** HA5LX & Club. **HA5KKN:** HA5KN, HA5-257 & Club. **HA5KKP:** Club. **HA7KMS:** Club. **HA9KPU:** Club. **HA30KNA:** HA3NA, HA3NU. **HA3DKOB:** 3 Oprs. **IØOU** & IØAMU. **K6ZR** & WB6PXP. **K8YZW** & K8DVV. **LA2S:** LA5KO, LA8VP, LA9BM, LA-M5605. **LZ1KDP:** LZ1GX, LZ1-A-508, LZ1-A-584, LZ1-A-616, LZ1-F-37, LZ2-H-57. **LZ2KLC:** 3 Oprs. **LZ2KPD:** LZ2LQ, LZ2VP. **OA4AHA** & OA4AHZ. **OH2AW:** OH2KA, OH2SB. **OH3AM:** OH2KQ, OH2LU, OH2SS, **OH5MJ** & OH5XT. **OH7RM** & OH2BFX. **OK30KAG:** OK30YBD, OK30ZAF, OK30ZFM. **OK30KAP:** OK30GI & Group. **OK30KKF:** Club. **OK30KOK:** Club. **OK30KPU:** Club. **OK30KUR:** Club. **OK30KWL:** OK30BNG, OK30BNX. **OK30KZR:** Club. **PA7SMK:** PA9WRR, PA0SMK. **PJ9EE** & PJ2ARI, WA3UTA. **SK2DR:** SM2CEW, SM2CLY, SM2EKM, SM2GXN. **SKØHB:** SM5CZY, SM5DDZ, SMØCBY, SMØEWM, SMØGBV, SMØGMG, SMØGNU. **SP9PEZ:** Club. **SP9ZAS:** Club. **SQ6KDA:** Club. **SQ6PAZ:** SP6DVP, SP6IGE. **SQ6PZB:** SP6FAF, SP6FIH, SP6-5039. **VE3EDC** & VE3EDG. **VE7SV** & VE7BD, K7JCA, K7VPF, W7EXM. **VK4AAU** & VK4UA, VK4UG. **VU2BK** & VU2DK. **VU2GDG** & VU2BG, VU2DX, VU2MKZ. **W8LT:** WA1LKU, WB8IBZ, WB8JXS. **W9ZTD** & K9OTB, W9VNE, W9ZRX, WA9EED, WA9FUD, WA9NPM, WB9BPG, WB9IVC, WB9LTY. **WA6AHF** & WA6VEF. **WA9HEU** & WB9DRE. **WB4LOK:** W4GTS, WA4AKU, WA4FOU, WB4BCL, WB4TVU, WB4ZBS. **WB8IAY** & WA8LXW. WN5LVL/K5LZJ. **YU1AFV:** Club. **YU3DMU:** Club.

Multi-Operator Multi Transmitter

DK2BI & DK5WL, DK5WM, DK6WL. **GB3MCG:** G3RYV, G3SJK, G3UKS, G3VCT, G3WGN, G3ZPK, G4ALG, G4AYL, G4CDZ. **JA3YEJ:** JE3EVC, JH3BJN, JR3FXN, JR3GVU, JR3STC, JR3STD, JR3TZU. **JA6YTU:** JA6AAB, JA6BPA, JA6BSM, JA6ERR, JA6JVJ, JA6PFZ, JA6QET, JA6RCB, JH6AKT. **K6BCE/6** & K6SEN, W6PVB, WB6YBL. **PA5GIG/A:** PAØBBC, PAØHTR. **PI50ARU:** PAØTO, PAØYZ, PAØCJN, PAØJOZ. **SK2AT:** SM2DHG, SM2DLZ, SM2DMU, SM2DYW, SM2EQT, SM2GBQ. **SVØWJJ** & SVØWGG, SVØWPP, SV-14638. **VP5B:** W4ORT, WA4DRU, WA4EYR, WB4EYX, WB4QKE. **W9LT** & K9UWA, WB9LHI, WB9NIB. **4Z4HF:** G3UML, 4X4IL, 4X4NJ, 4X4NW, 4Z4IX, 4Z4LF.

Russian DX Scores [*from page 36*]

3XJ, UA3WAH. **UK4AAI:** 3 Ops. **UK4FAA:** Volkov, Tshernev, Spodarev. **UK4WAB:** Baranov, Krilov, Kychanov, Sakemin, Kapachinsky. **UK4WAC:** UA4WPX, UA4WAG, UA4WAF, UA4WAD, Shepelin. **UK4YYY:** Danilov, Andreev, Leontev. **UK5AAA:** UB5075188, UB5075174. **UK5EAQ:** Mahonko, Sidorenko, Martinenkov. **UK5FAD:** Platonov, Slesarev, Simonenkovs. **UK5IAZ:** UB5IDZ, UT5XW, UB5-073202, UB5073342, UB5073007, UB5073218. **UK5QAC:** UB5QA, UB5064775, UB5064777. **UK5QBE:** Latyshenko, Shimko, Yakovlev, Lapchenkov. **UK5UAC:** Shevchook + 2 ops. **UK5UAZ:** UY5UD, UB5065482, UB507299. **UK5VAA:** Bondarenko, Dobrovolski. **UK5WAA:** 'UB5068356, UB5-WBS, UB5CN. **UK5WAG:** UY5XB, UB5068292, UB5068302. **UK6AAU:** Elagin, Konovalov, Sklyar. **UK6DAU:** UD6001-220, UD6DHC, UD6DII, Ivanov. **UP2PAO/UG6:** UA6HZ, UP2NV, UP2PAQ, UP2PAX, UW6FZ. **UK6GAD:** Pogosyan, Martirosyan, Geworkyan. **UK6LAZ:** Lesnichy, Tarakanov, Trubchaninov, Vengerovsky. **UK6LWW:** UA6LWG, UA6-LWD, UA6LWH. **UK6QAA:** Wezhowskij, Tchakwetadze, Hzamkina. **UK6FAA:** UF6AD, UF601274, UF6012226. **UK6FAB:** UF6DG, UF6012204, Shengelia. **UK7GAA:** UL7-GBD, UL7GAU, UL701899, UL7018118. **UK7JAA:** Baryshnicov, Diachcov, Kinsvater. **UK7LAH:** UL7LEZ, UL7-026133, UL7026172. **UK7PAU:** Shalamov, Ryzancev, Galushko. **UK8BAJ:** UH8DU, UH8BAU, UH8BAX. **UK8FAA:** UI8FAS, UI8047003, Zulunov. **UK9AAG:** Kocuba, Pichugin, Ruzanov, Cymbal, Krivoshapuo, Gulev. **UK9AAN:** UA9AN, UA9AEN, RA9AED, RA9AFC, UW9BY, UA9-165316. **UK9ABA:** UA9ABA, UA9ACN, UV9AX, UA9165472. **UK9CDI:** UA9154926, UA9154925, Shiryev, Golovin, **UK9HAD:** Garbolinsky, Affanassiev, Bolbin. **UK9LAA:** Kozlov, Kurask, Klocov, Timofeev. **UK9MAA:** Matuhin, Kolobanow, Iwgatow. **UK9OAD:** UA9145280, UA9145281. **UK9SAY:** UA9TS, UA9SAX, UA9SBP, UA9SCU, RA9SEG. **UKØAAC:** UAØACQ, UAØBW, UAØAAK, UVØBB. **UKØCAA:** Laroka, Tereshenko, Kazakova. **UK0CBE:** Fzolov, Turkin, Vlasov. **UKØFAA:** UAØEH, UAØFAM, UWØFM, UAØFBA, VAØFBE, UAØ15379. **UKØFAJ:** VAØ15343, VAØ15380 + 1 op

STATION OPERATORS—PHONE

Multi-Operator, Single Transmitter

UK2GAG: Chuksin, Ajrapetov, Borzenkov. **UK2GCF:** Golovin, Gribov, Manishevsky. **UK2PAA:** UP2PX, UP2PBH, UP2BBT, UA3OG, UP2038308, UP2038439. **UK3AAK:** Zaslavsky, Bogdanov, Baklanov. **UK3AAO:** UA3ADM, UA3EAI, UA3142303. **UK5FAD:** Bojko, Denisko, Dokien, Patsuchenko, Luki, Suzansky. **UK7GAL:** 3 ops. **UK5IAZ:** UB5IDZ, UB5073202, UB5073342, UY5EG, UB50731118, UB50731151, UB50731135, UB5073414, UT5XW.

Our deep thanks to the following stations who sent in check logs, and to those whose logs we solicited for checking purposes:

UA1ABD, UA1CIQ, UA1SW, UA1WBG, UK1NAF, UC2-LAM, UP2BBC, UP2BBD, UP2GC, UK2PAT, UK2-WAR, UA3BC, UA3DDF, UA3DDN, UA3EK, UA3-HK, UA3NBI, UA3TBM, UA3TCH, UA3VAQ, UA3-VAS, UK3AAC, UK3DCF, UK3YAA, UV3CM, UV3-CQ, UV3DN, UW3HY, UW3UX, UA4CAM, UA4CBD, UA4LF, UA4PBW, UA4YAH, UA4-YAW, UK4CAA, UK4NAB, UB5-064-125, UB5ECY, UB-5IDL, UB5LBJ, UB5MDP, UB5MFT, UB5PS, UB5QDU, UB5UAD, UB5UAL, UB5-UBJ, UB5YB, UK5AAT, UK-5EAB, UK5LAP, UK5MAZ, UO5OBO, UT5WW, UA6-AJG, UA6LKC, UA6NX, UD-6DHC, UK6AAJ, UW6AJ, UW6MP, UW6OG, UL7GAA, UL7HD, UL7JG, UL7NAL, UL7PBE, UL7TA, UL7TAK, UL7TAM, UK8AAC, UA9-CAM, UA9CEL, UA9CGL, UA9LAQ, UA9NX, UA9OCC, UA9YAR, UK9HAC, UV9DX, UAØABV, UAØJU, UAØTD, UWØBC, UQ2PQ, UI8ACC.

Code Practice [*from page 38*]

ment of your sending hand. This procedure will give you maximum concentration on *listening* to the difficult words, sending is only secondary. After you feel you have learned how to correctly copy your previous missed words, check them off your list.

Spacing your learning time is an important consideration. Consistent practice is a must. Each practice session should be no more than an hour and not less than fifteen minutes. It is more productive to have

regular unbroken short sessions than irregular long practice periods.

If you find it impractical to meet the regular code practice sessions, replay your old tapes as a substitute at your convenience. This method of practice will etch in your mind words that will appear as while words just like the professional radio operator. Remember, you are using one of the laws of learning, *repetition*.

Anybody can learn to get their code speed up to 20 w.p.m. regardless of their age. If I can do it at 68, so can you, and you may need it when and if license restructuring goes into effect. ■

Ohms Law [*from page 34*]

tween the transistor case and the heat sink. The other is the thermal resistance between the heat sink and the ambient air.

Interestingly, the term, "thermal impedance" is often encountered in place of thermal resistance. It is one and the same animal, however. No need to complicate the issue with notions of *reactances* in the thermal domain!

It is hoped that this less-than-complete exposé of Boltzmann's constant will stimulate the reader's interest to pursue the matter further. But be forewarned—it will be quite a challenge to find electronic phenomena where *"k"* is *not* involved. Even when superficially absent, a little digging towards the core of a cause-effect relationship, invariably exposes this universal "Ohm's Law" as the prime-mover of whatever is taking place! ■

Fire In The Hamshack [*from page 34*]

Radio Amateurs should be particularly aware of the possibility of fire especially in the ham shack, what with the yards of wire running around the room, double plugs, cube taps, octopus set-ups at outlets. Yes, the danger is there.

A new smoke detecting device has appeared on the market in recent years that can operate without a tie-in to an expensive complete home fire alarm system. This device using an element that can detect noxious gasses as well as smoke, contains its own battery power supply which is good for a year or more. It also contains a horn loud enough to wake a heavy sleeper. These versatile units even signal when the battery is weak and needs replacement. Some detectors are capable of being wired together so that if one sounds the other will also trigger, an ideal set-up for one in the radio shack tied to one in the sleeping area. Other models are available that are geared to adding several *heat* detectors as well.

The average person receiving early warning of an unusual body condition such as pain or discomfort will immediately rush to a doctor. Yet the same person will not even consider avoiding a situation constantly lurking about him: fire in the home. Whether you live in a so-called fireproof apartment (the paint and furnishings *can* burn) or a private house, you and your family can be in danger.

The average person in the average home *can* receive an early warning from a smoke detector device, and then with prompt evacuation from the premises, avoid death or serious injury by fire. ■

The National AGS Receiver [*from page 29*]

Interestingly enough, no standby switch or pilot light are incorporated in the receiver. A quick check of receiver advertisements of the 1930 period showed that these two indispensible items of modern receiver design were practically unknown in those dear, dead days.

The AGSX Receiver Today

As far as is known, only a few AGSX receivers are around today. The original production was limited and time and attrition have done most of them in. While the receiver has vanished, its impact on today's communication receiver has not. As the first, modern communication receiver, the AGS and AGSX brought forth a concept that established the general philosophy of receiver design that has lasted for over two decades—until the advent of single sideband with its strict frequency stability requirements caused a revolution in receiver and transmitter design.

The AGSX occupies an honored spot in the W6SAI station, and the author would be pleased to hear from any other fortunate amateurs who have the luck to own an AGS or AGSX receiver. Surely more examples of this fine hand-crafted receiver exist in today's world of mass produced printed circuit boards, cheap transistors and plastic cabinets! ■

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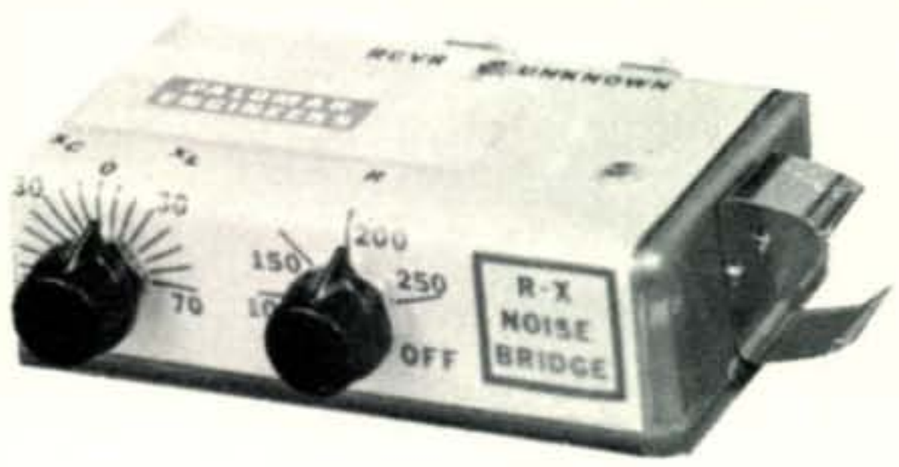

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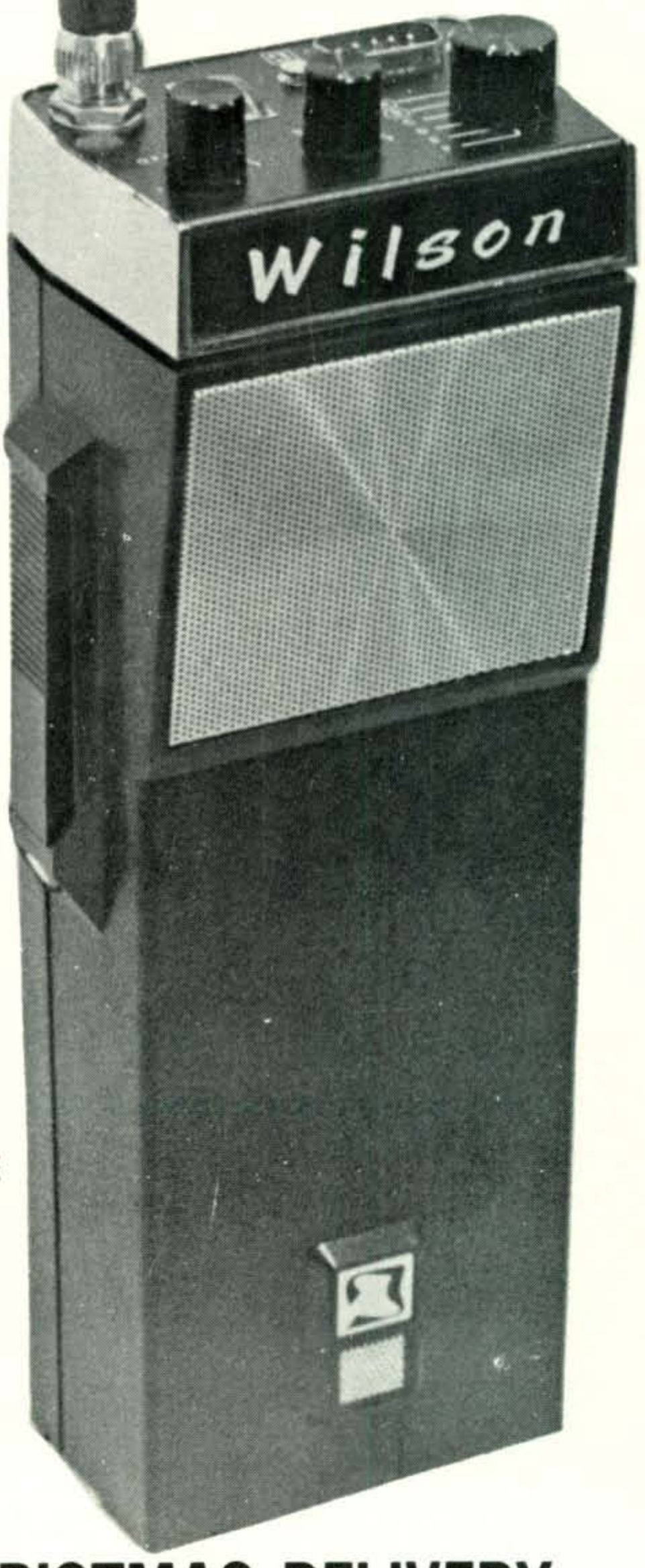

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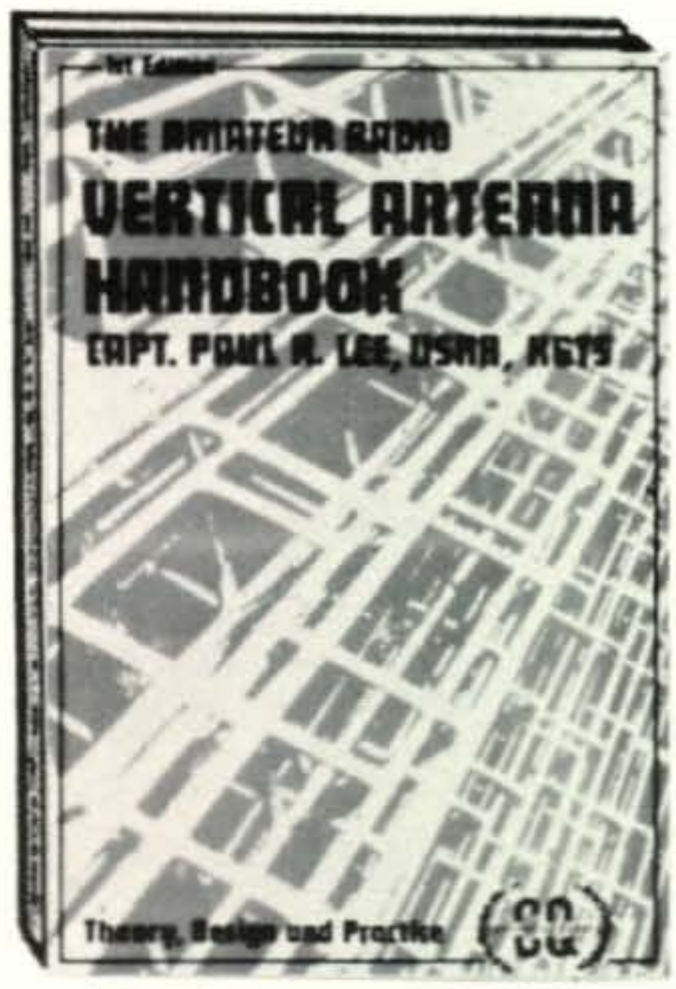

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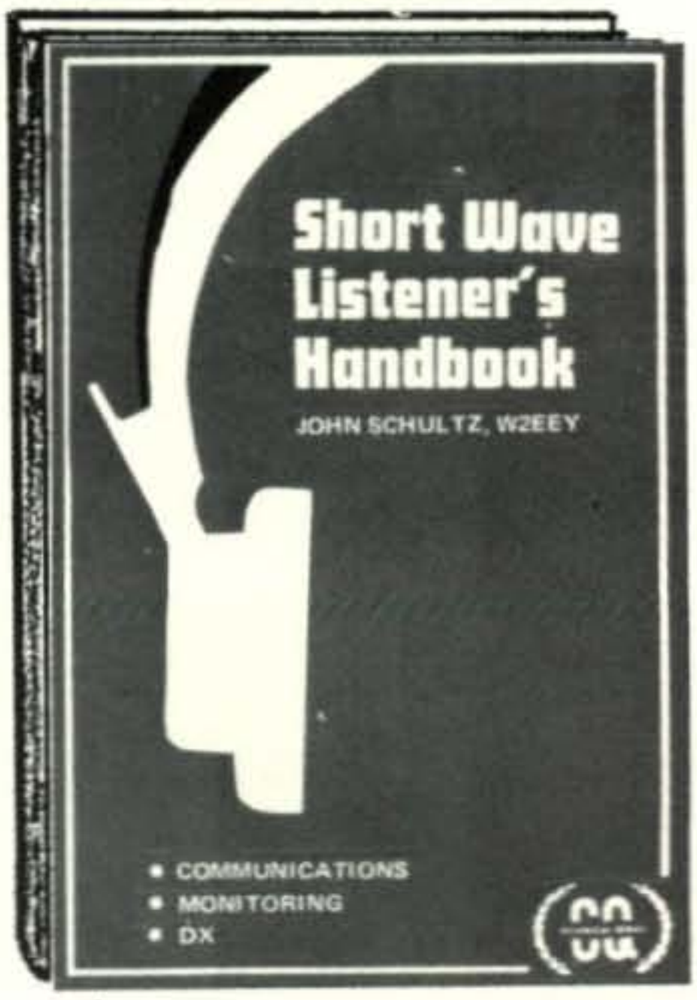

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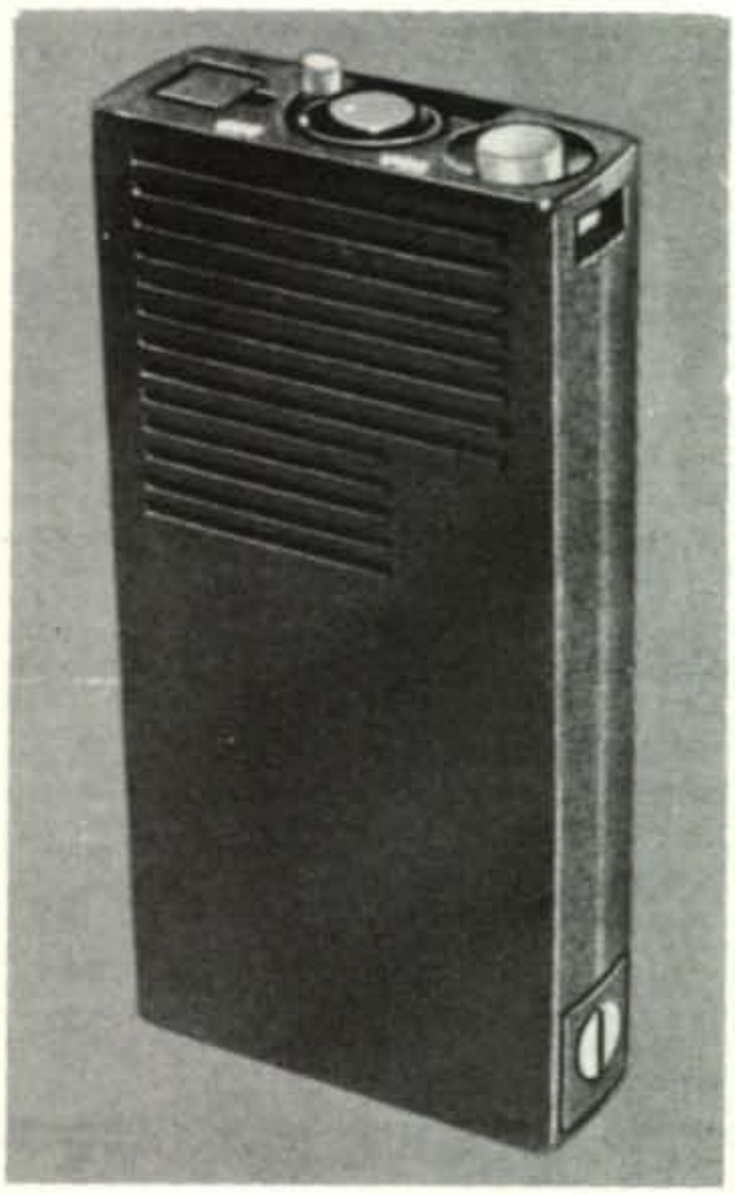

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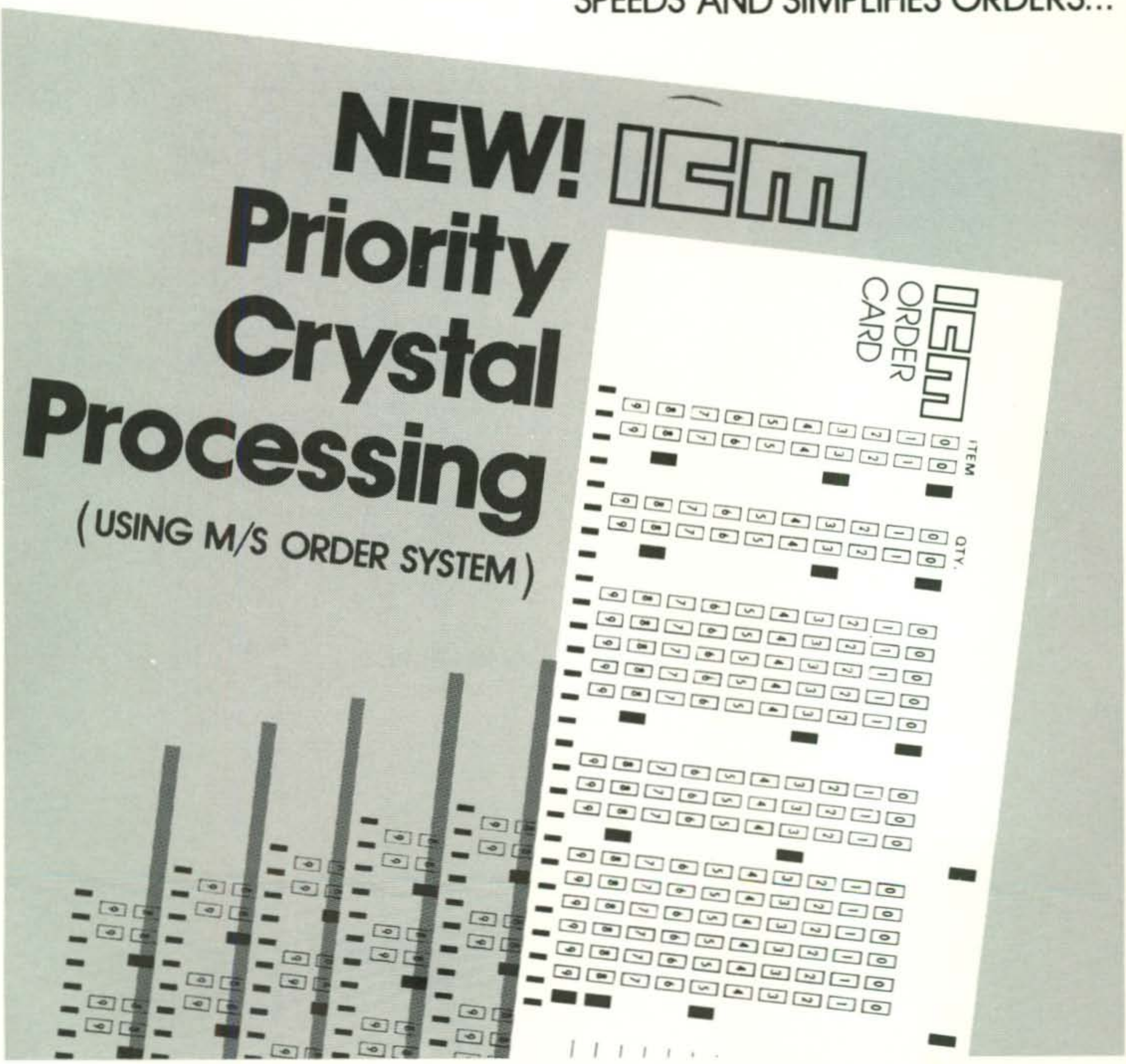

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