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October 1975
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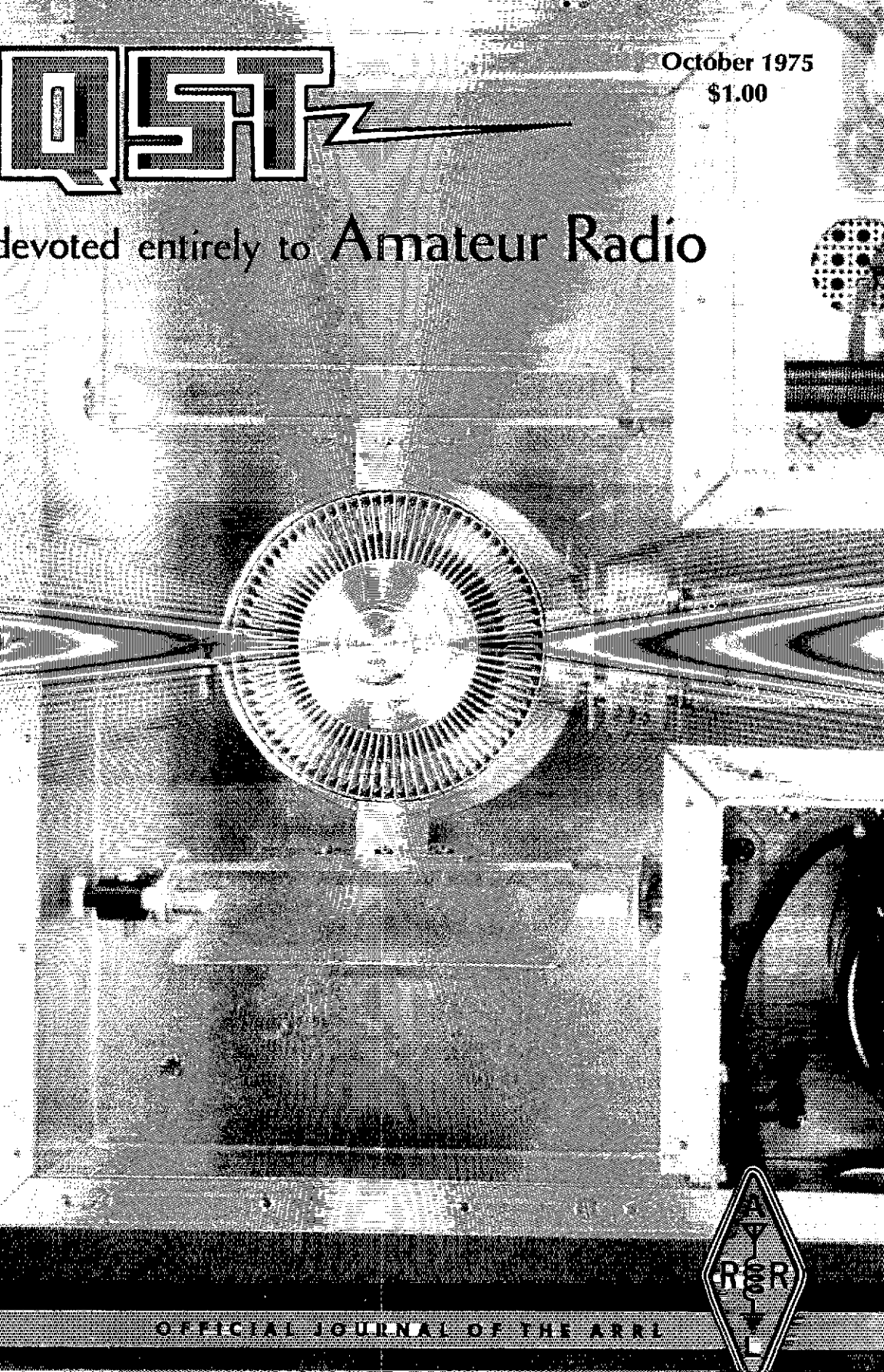

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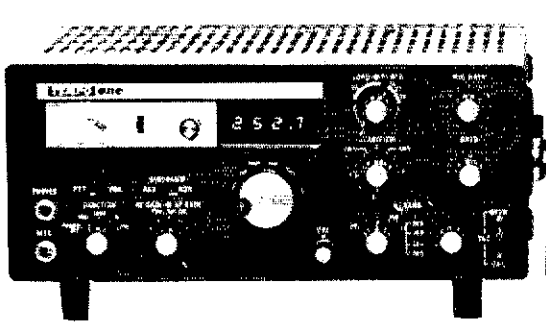

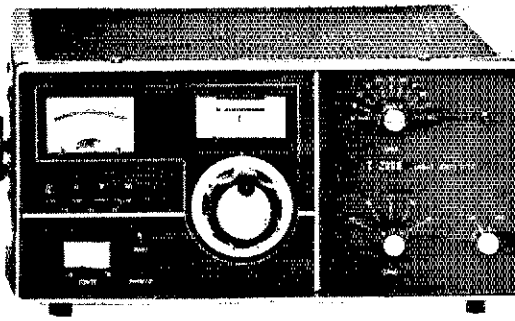

The Tempo ONE *DIGITAL* SSB TRANSCEIVER

The Tempo ONE has been the "best value" in SSB tranceivers for several years. Now Tempo has outdone itself. The brand new Tempo ONE DIGITAL offers all of the proven features of the "ONE" combined with the advantages of a digital readout. Actual transmit and receive frequencies are displayed as fast as the transceiver is tuned. There is no chance of confusion, no chance of operating out of the band. The Tempo ONE DIGITAL, at only $498, is the most inexpensive digital transceiver available.
The famous Tempo ONE, without digital readout, is still available at only $399.00 AC/ONE power supply $99.00. DC/1-A power supply $120.00

The Tempo ONE and T-2000 are available at Tempo dealers throughout the U.S. Specifications available upon request.

Also available is the Tempo 2002, 2006, 6N2, CL-146A, CL-220, DFD/ONE, DFD/K, FMH, RBF-1 and TDC.

The Tempo T-2000 LINEAR AMPLIFIER

The brand new T-2000 linear is the perfect companion for the Tempo ONE. It is compact, reliable, and priced right. Uses two Eimac 8873 grounded grid triodes cooled through a large heat sink. The T-2000 offers a full 2 KW PEP input for SSB operation and provides amateur band coverage from 80—10 meters. Provides a built-in solid state power supply, built-in antenna relay, a relative RF power indicator, and built-in quality to match much more expensive amplifiers. Completely wired and ready for operation . . . only $795.00

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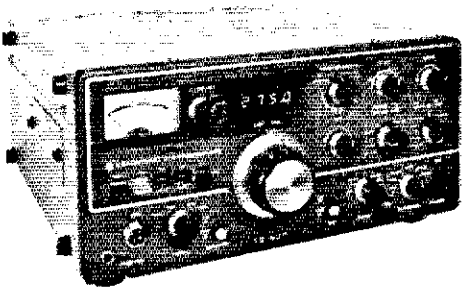
NEW--FROM HENRY RADIO

NOW IT CAN BE DIGITAL... HENRY RADIO'S NEW CUSTOM TS-520



Henry Radio now offers the Kenwood TS-520 with a built-in frequency display. This equipment is a standard, new TS-520 modified by Henry Radio to include a four digit frequency readout to 100 cycles. If you have never experienced the pleasure of a direct frequency readout, you have a big surprise coming.

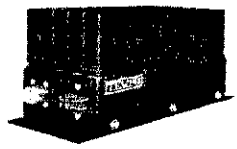
As fast as you tune the transceiver, the TS-520 displays the actual transmit and receive frequencies. The LED readout is bright and easy to read. There is no chance of confusion, no chance of operating out of the band or on unauthorized frequencies. Your new digital system simply brings a new dimension of pleasure and accuracy to amateur radio.

The TS-520 digital offers a four digit instantaneous display of both the transmitted and received frequencies to a resolution of 100 Hz for easy interpretation by the operator. The operation of the display is interlocked into the standard controls of the transceiver; band switching, sideband switching, and RIT are all automatic. The digital circuits are incorporated directly inside the transceiver and do not affect the normal operating characteristics of the equipment.

Henry Radio will also install the digital modifications into any customer's transceiver if the equipment is returned prepaid to our Los Angeles address.

TS-520 Digital Transceiver $729.00
TS-520 Retrofit Modification $129.00

THE FIRST TRULY LINEAR SOLID STATE AMPLIFIER ...TEMPO'S 100AL10



Enjoy distortion free SSB operation with the advantages of solid state circuitry.

Operates in the VHF frequency range of 144-148 MHz with power output of 100W (nom.) with 10W (nom.) in. Guaranteed to effectively increase both the range and clarity of your communications under all operating conditions.

Modern solid state technology is used throughout, along with conservatively rated components to assure the highest possible reliability. Microstrip design on glass epoxy circuit boards give added resistance to damage from shock or prolonged vibration.

The Tempo 100AL10 is available at Tempo dealers throughout the U S. Specifications available upon request.
Also available in the fine Tempo line is the famous Tempo ONE, the Tempo 2000, 2002, 2006, 6N2, CL-146A, CL-220, DFD/ONE, DFD/K, FMH, RBF-1, TDC and a broad selection of RF amplifiers.

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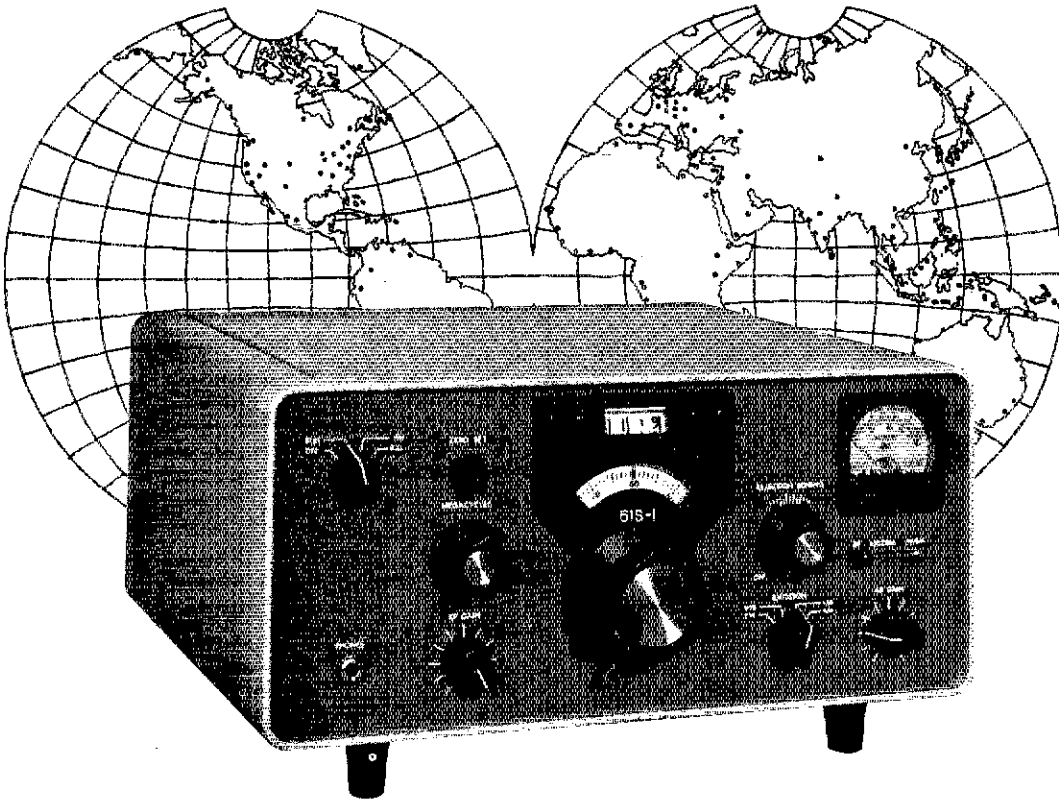
Stand by for the latest word on Collins' 51S-1 receiver.



The word for Collins' 51S-1 is the same today as it's been for every one of its 12 years: outstanding.

Amateurs say it's an ideal addition to their stations as a primary or backup receiver. It's stable, sensitive and extremely accurate, assuring optimum reception of USB, LSB, AM, CW, and RTTY signals in the 2.0- to 30.0-MHz frequency range. With an accessory available that permits operation between 200 kHz and 2.0 MHz.

There's a choice of either 800-Hz or 300-Hz CW filters and of either 2.4- or 2.75-kHz mechanical filters for SSB. For AM, there's a standard 5-kHz bandwidth or optional 6-kHz mechanical filter.

Commercial communicators and shortwave listeners alike appreciate the 51S-1 for its quality reception of signals from anywhere in the world. International news broadcasts, amateur and military nets, air-to-ground monitoring and ships at sea.

The 51S-1 is available now, at a price that makes it very appealing for this class of receiver. See your Collins distributor, or contact Amateur Radio Marketing, Collins Radio Group, Rockwell International, Cedar Rapids, Iowa 52406. Telephone 319/395-4507.

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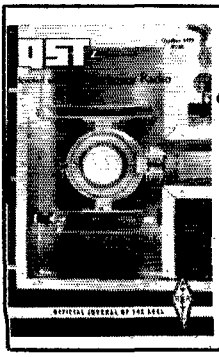

OUR COVER

A close-up look at the business end of K1AGB's 50 MHz Amplifier. Part two starts on page 11.

October 1975

Volume LIX Number 10

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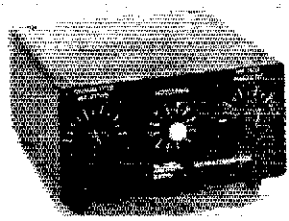

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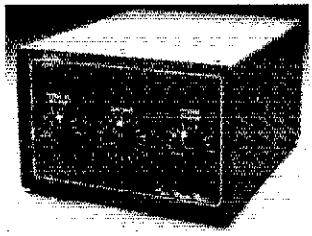
Want an antenna tuner to match everything between 160 and 10 through balanced line, coax line and random line, pump out the full legal limit and look and sound good doing it? Supertuner™ is the one for you at just **$119.50**



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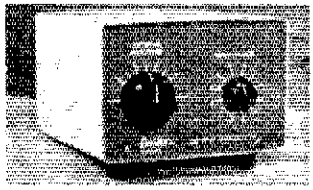
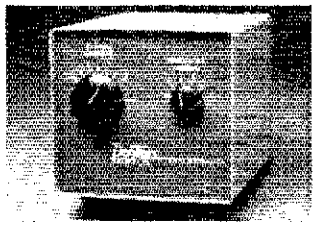


80-10AT SKYMATCHER™

Here's an antenna tuner for 80 though 10 meters, handles full legal power and matches your 52 ohm transceiver to a random wire antenna. 80-10AT is yours for only **$59.50**



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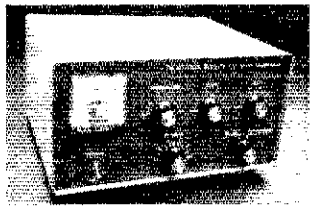

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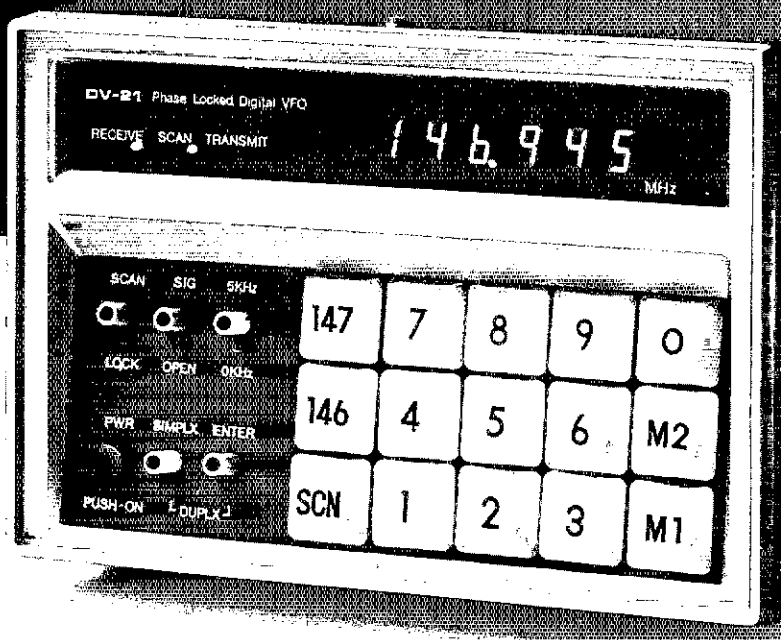
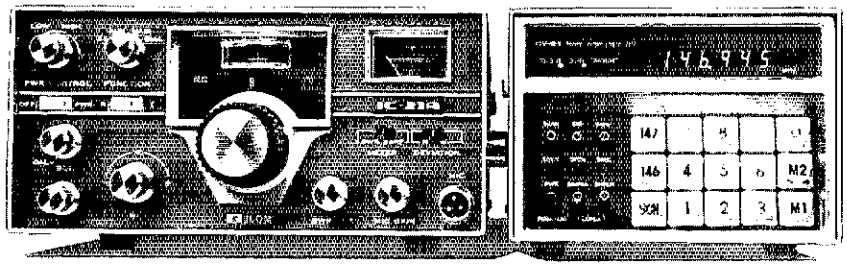


DV-21

The perfect companion for your IC-21A, the DV-21 is an all new unique digital VFO to complete your ICOM 2 meter station. The DV-21 will operate in 5 or 10 KHz steps over the entire 2 meter band. It can also scan either empty frequencies, or the frequencies being used, whichever you select. Complete, separate selection of the transmit and receive frequencies, is as simple as touching the keys. When you transmit, bright easy to read LEDs display your frequency. Release the mic switch, and the receive frequency is displayed. There are also two programmable memories for your favorite frequencies.

You won't believe the features and versatility of the DV-21 until you've tried it. It's new, and it's from ICOM.



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

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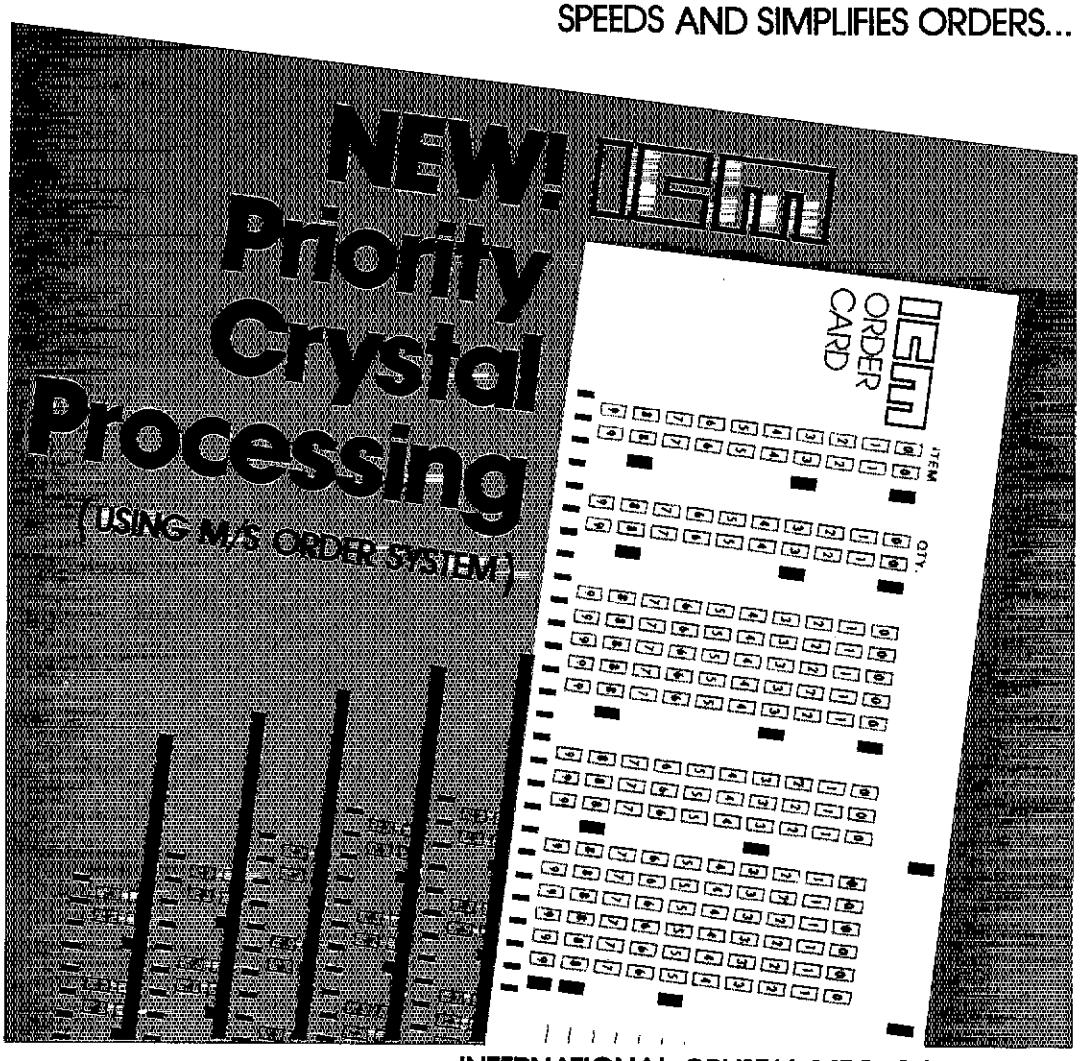

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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors.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

"Of, by and for the amateur," it numbers within its ranks practically every worth-while amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite, although full voting membership is granted only to licensed amateurs.

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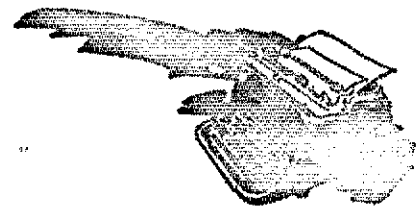
* Member Executive Committee

"It Seems to Us..."



LICENSING DELAYS

YOU'RE ONE of the many amateurs who enjoys helping newcomers to get started in amateur radio. You've just given the code test to a bright-eyed young Novice applicant who is all enthusiasm and can't wait to get on the air. You're asked how long it will take for the license to arrive, assuming, of course, that the remaining hurdle of the written examination is cleared. You think back to your past experiences and say that the written examination will arrive in ten days to two weeks, and the license should arrive about four weeks after the written test is returned to the Commission. Right?

Wrong. In recent months it hasn't been unusual for a Novice application to take *six months* to progress from the code test to the actual license. If you add to that the time it takes to introduce someone to amateur radio in the first place and for him to learn the code, it turns out that a student whose interest is sparked at the beginning of a school year in September will be lucky to be on the air when school lets out the following *June*. It's hardly appropriate that the biggest stumbling block for a prospective amateur should be the surviving of unconscionable administrative delay, yet this is the very real situation today. Similar delays plague license renewals and applicants who appear for Commission-supervised examinations, though the time in these cases is shorter – only one exchange by mail is required, rather than two – and, by and large, these applicants are already on the air with a license of the same or a lower class.

What is happening, and why? More important, what's being done about it?

First of all, it is *not* happening because of incompetence at the Commission's Gettysburg office. The problem is that mail addressed to the FCC, Gettysburg, PA 17325, which had been coming in at a fairly steady rate until earlier this year, suddenly and unexpectedly *tripled* in volume. The Gettysburg office handles aeronautical, maritime, and citizens radio service applications as well as amateur, and also issues restricted radiotelephone operator's permits. Some of the increase is attributable to stepped-up interest in amateur radio, but ironically what has hobbled the handling of amateur applications has been a tremendous increase in CB licensing. The most persistent theory explaining this phenomenon is that the widespread publicity given to how useful CB is in avoiding police radar traps on the nation's highways has been responsible. Be that as it may, the tiny FCC facility in Gettysburg, which used to struggle with 650,000 applications in a typical year, found itself buried in an avalanche of mail. At one point early in the summer there were nearly 200,000 envelopes stacked up awaiting opening. No one at the Commission is to blame for this state of affairs; even the gal on the cover of June *QST* couldn't have predicted this huge increase in the workload.

The Commission people we have contacted about the problem are as concerned as we are, and have been working hard at solutions. One was announced in August *QST* – the establishment of a special post office box for amateur applications. The rationale behind this move is that one of the biggest jobs is simply the sorting of the applications into piles for the various services after the envelopes have been opened to reveal the contents. The P.O. boxes permit the mail to be pre-sorted before delivery. After the mail-opening step is completed, the applications are handled by different people, so an application sent to P.O. Box 1020 should bypass the CB-caused backlog completely.

The Gettysburg situation (which, we hope, has now passed its high-water mark) has also caused an increase in the letters received at League headquarters asking us to "do something" about delayed applications. For special problems such as long-overdue licenses, we're glad to try to help; our major difficulty has been in deciding what constitutes "long-overdue" when the average turnaround time is fourteen weeks. For others we've had to say, please be patient; the Commission staff is doing its best, and if we ask them to give you special treatment concerning your application, it will slow down the processing of everyone else's. – *K1ZND*

League Lines . . .

League members are in the process of choosing directors and vice directors in the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific and Southeastern Divisions. At least eight of the sixteen openings involving at least six of the divisions are contested; ballots will be sent the second week of October to Full (that is, licensed-amateur) members of record September 20. If your friends have ballots but you don't, by November 1, please get in touch with headquarters.

That RFI bill, by Congressman Vanik, HR-7052, is important to the future of amateur radio. Have you urged your congressman to push it? See "Happenings" this month for a resume.

The Jamboree-on-the-Air of the World Scouting movement takes place October 17-19; see "Happenings" this issue for details.

Getting ready for "tomorrow": a Future Planning Conference was held by FCC in July; another meeting of the Amateur Radio Service Working Group in September continued preparations for the World Administrative Radio Conference in 1979. There was, of course, strong League representation at both.

The ARRL technical department is presently involved in a laboratory research program, connected with causes and cures for RFI and TVI. W1YNC of the Hq. staff is in charge of the investigations. Among the entertainment items being studied for susceptability to RFI and TVI are a solid-state color TV set, stereo hi-fi gear, TV masthead amplifiers, children's record players, and fm tuners. A comprehensive QST article on the subject will follow the laboratory investigations, and preventive measures will be recommended.

Certain consumer products, including color TV sets, have one side of the ac line connected directly to the chassis. When performing RFI tests, for example, under no conditions should the chassis be grounded except at the points specified by the manufacturer. A shock hazard or serious damage could result.

The newly revised ARRL Logbook is now ready for distribution. We think you'll find the vertical format a considerable improvement. Price $1.00 postpaid in U.S.A.

The Federal Communications Commission promises faster service on amateur license applications and renewals if they are sent to P.O. Box 1020, Gettysburg, PA 17325. The present fee for a new application (except Novice), straight renewal, or renewal with modification (change of address) is $4.00; fee for modification only (no change in expiration date) is $3.00. Use FCC Form 610 for individual licenses, 610-B for clubs. Remember: that new P.O. box is for amateur applications only!

Got your ARRL Net Directory yet? Close to 600 public service nets are listed alphabetically, by area and by frequency. Send for yours now. A legal size addressed envelope, with 20 cents U.S. postage, will get it back to you pronto - first class mail.

Governor Ella Grasso will open Amateur Radio Week in Connecticut from W1AW, via Oscar 6, some evening in the week of October 26. The Governor will respond to QSLs received as a result of the operation, with New England Director John Sullivan, W1HHR, acting as the "mail drop."

FCC has granted special temporary authority for experimental use of the eight-level American Standard Code for Information Interchange (ASCII) by amateurs communicating through Amsat Oscars 6 and 7 for the period ending February 28, 1976. Identification must be in accordance with FCC rule 97.87. A report to FCC must be submitted to FCC by Amsat at the end of the trial period; in turn, it will need reports from users before that. Amsat will consider specific projects for its Wednesday experimental periods of Oscar use, if notified in advance.

A High-Performance 50 MHz Amplifier Part II

In the first part of this article the rationale and design principles were discussed in preparation for the building of a 50-MHz amplifier capable of handling the full legal plate-input power in amateur service. This section provides more detailed construction information that will enable the skilled builder to proceed. The schematic diagram for the amplifier is given in part one.

BY EDWARD L. MEADE, JR.* K1AGB

Enclosure Assembly

THE AMPLIFIER enclosure is assembled from two 13 × 17-inch aluminum chassis, joined top-to-top. The plate circuit occupies the upper deck which is four inches deep, and the input circuit is in the three-inch deep lower deck. A standard aluminum bottom plate is used to seal the input area.

The plate circuit strip line, which was discussed in part one, can be fabricated by following the dimensions given in Fig. 4. This also provides an indication of the size and location of shields and compartments necessary to isolate the rf circuit from the dc and blower areas.

The upper deck is subdivided by 1/16-inch thick aluminum partitions. All bends along the bottom edges are made in a direction away from the strip line into the dc compartment. One-half inch aluminum angle stock was selected as partition top edges for two reasons: first, it is easy to adjust height if one edge is made movable; and second, when the 1/8-inch thick angle stock is drilled and tapped for cover bolts, there is less chance of metal fatigue and stripped threads than with thinner material.

The blower motor is in its own compartment which is left open to air. Positioning of the blower is left to the discretion of the builder, but he should be aware that wheel diameter will have a strong influence in dictating its location. While other blowers may rely on bleeding a small amount of air from the pressurized compartment through the motor frame for cooling, this particular unit drafts air in axially, through the frame, and vents radially, along the bottom edge, nearest the wheel. Several 3/4-inch diameter holes are cut in the outer walls of the motor compartment, near the bottom, to accommodate this feature. Bearing lubrication tubes on the motor frame are headed out toward the holes, so that they can be reached without

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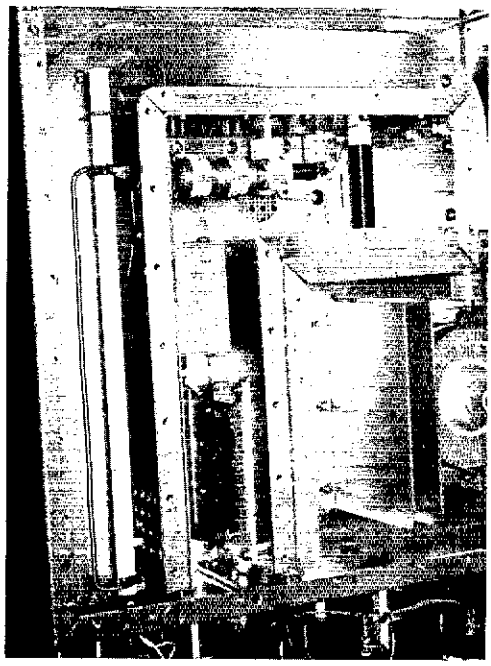


This view of part of the upper compartment shows the output link and the Teflon support drive rod. Inside the L-shaped compartment can be seen the plate rf choke (upper right) part of the output-connector assembly (top center) and the string of meter-multiplier resistors near the bottom of the chassis. The two resistors partially hidden by the aluminum angle are part of the rf-output sampling circuitry. They connect through the wall of the partition into the Minibox near the center of the "dc" compartment.

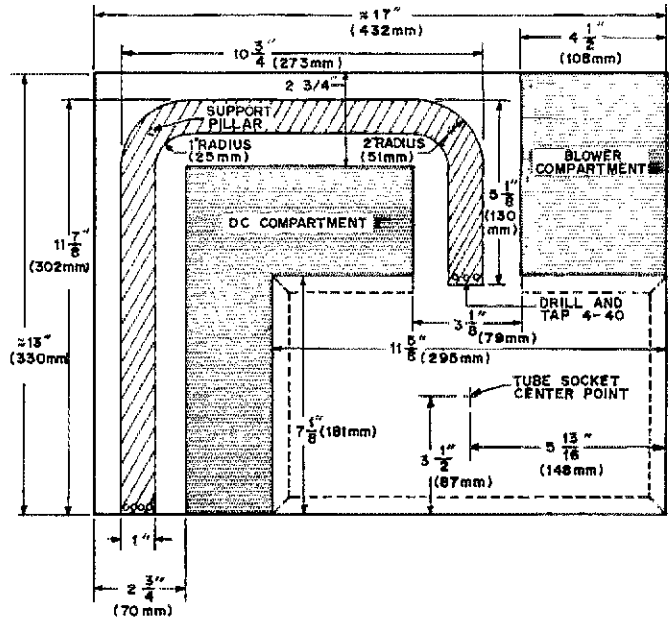


Fig. 4 — Plate tank enclosure, strip line, and partition dimensions. The area over the strip line and the shaded dc compartment is covered by a solid piece of 1/16-in. thick aluminum sheet. The area over the tube and tuning capacitors is covered with perforated aluminum. The blower-motor compartment is left open to air.

trouble. Ample space above the amplifier is recommended to minimize motor ingestion of hot tube-exhaust air.

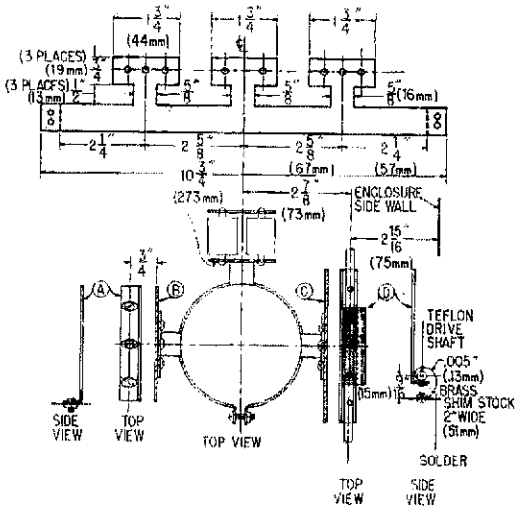
Construction information for the tube-anode contact ring and tuning-capacitor vanes is given in Fig. 5. The ring and solid portions of the capacitor vanes are made of 1/16-inch thick brass or copper flat-sheet stock, silver plated** after forming. The fixed vanes of both tuning capacitors attach directly to this ring with three 4-40 brass bolts tapped into each vane. The plate-blocking capacitors attach to the third "face" of the ring by means of 6-32 binder-head screws and lock washers. Dc connection to the ring is made through a lead which is a continuation of the rf-choke winding. This wire passes through the tank partition in a 1/2-inch Teflon rod serving as a bushing to a solder lug under one of the bolts securing the plate blocking capacitors. The ring is allowed to sit flush on top of the eimac SK 2216 Teflon chimney which directs air flow from the pressurized bottom compartment through the tube anode cooler. Details of this construction can be seen in the exploded view of the tube portion of the tank circuit.

Mechanical assembly of the vane capacitors requires some further discussion. The center line of the 1/4-inch dia. Teflon drive shaft for the movable vane of C4 is spaced 2-15/16 inches from the inside right edge of the tank enclosure (as viewed from the front), and 9/16 inch up from the base. This results in a parallel plate spacing of about 3/8 inch for C4. Although insulation qualities of the drive shaft are not of great importance in this application, Teflon was chosen as it is easy to work with and stands up under both heat and rf. Small aluminum brackets and 1/4-inch panel bushings hold the shaft in alignment. A shaft extender passes through the enclosure front and is attached to the vernier control knob. The Teflon shaft is tapped for 4-40 hardware and the capacitor vane is bolted to it in five places. The shim-stock portion is secured to the rigid vane by three of these screws and a solder bead. The other end of the shim stock is sandwiched to the chassis, near the tube grid-return point, by using a piece of 3/8-inch wide by 1/8-inch thick aluminum sheet pinned from the bottom with three 4-40 screws. This assembly should be completed before the heater transformer is installed beneath the chassis, as its core blocks access to these screws. Be certain to allow enough slack in the shim stock for smooth vane motion toward and away from the tube. The vernier drive knob must have a positive stop, to prevent contact between the vanes of C4 during normal tuning. Alternatively, short lengths of small diameter Teflon rod can be attached to one of the vanes, preventing spacings of less than about 3/16-inch.

The main rf choke (RFC2) is closewound on a 1/2-inch dia. Teflon rod, with wire ends fed through small holes drilled diametrically in the form. These wires are pulled tight to preserve the choke shape. Connection between the choke and all other components is made by means of these wires. Final choke form length is determined by a custom fit after the partitions are assembled. Mounting screw holes are tapped axially to a depth of about 1/4 inch, carefully avoiding exposure of, or contact with, the wire passing across the center. Nylon mounting hardware may be used in this application if desired.

The chimney for the tube air outlet is made from a piece of 2-inch wide, 1/16-inch thick Teflon sheet held together at the junction by using high temperature Teflon tape†. A short length of 3-1/4-inch OD Bakelite tubing keeps it round at

Fig. 5 — Dimensions and placement information for the anode clamp ring and vane type capacitors. The part shown at A is the ground side of C3, 3 × 3-in., with a 1/2-in. lip. Holes are elongated to allow adjustment. At B is the "plate side of C3, 3-in. wide by 2-in. high, mounted 1-in. up from chassis. At C is shown the plate side of C4, 2-3/4 in. square, mounted 5/8-in. from chassis. D is the movable portion of C4, 3 × 3in., with a 3/8-in. lip. All capacitor plates are made of 1/16-in. brass spock. Mounting holes for parts B and C are tapped for 4-40 screws. The screws are filed flush with the face of the capacitor plate.



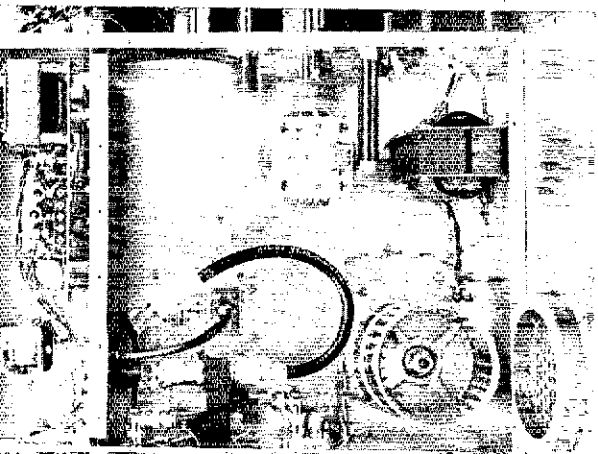
the top. The chimney fits inside the plate contact ring and sits on top of the tube anode itself.

Plate Line

The line is supported by means of porcelain pillars two inches long, located at the center point of each line bend. It is secured very solidly to the enclosure, at the shorted end, by using a piece of 1/2 by 1/8-inch thick aluminum angle stock. Electrical integrity of this junction is extremely important, as this is the high-current end of the line and losses are generally most severe at this point. Connection between the line and plate blocking capacitors is made with a piece of silver-plated copper flashing. Plating is recommended to retard galvanic action. Holes in the flashing strap are elongated to permit a tension-free junction between the line and capacitors. The flashing is sandwiched between the line and a small piece of aluminum which acts as a washer, to assure solid rf contact. Strap shape is massaged slightly to prevent skewing of the tube in its socket and to allow flush seating of the anode contact ring on top of the SK 2216 chimney. This adjustment is best made with the tube seated.

Coupling

The output coupling link is made from a 10-1/2 inch length of No. 10 tinned copper wire, bent at right angles 1-1/4 inches back from each end, and force-fit into No. 36 holes spaced 8 inches apart on its Teflon drive rod. The first link force-fit mounting hole, nearest the front panel, is about 7/8-inch down the rod from the enclosure front. Overall link length, including flexible braid connecting straps, is about 12 inches. The link support is held in place near the output connector by passing the rod through a 3/8-inch hole in a piece of fiber glass sheet stock attached to the partition by means of two small bolts. The support-rod centerline is one inch out from the vertical partition, 15/16 inch above the top edge of the strip-line element, and parallel to both. A Bakelite shaft reducer, pinned to the rod, passes through a panel bushing in the enclosure front and is connected by a shaft extender to a vernier drive knob with about an 8:1 turn reduction ratio. Connection from the link to the output jack and series capacitor is made by means of short lengths of braid from RG 58A/U cable. The braid is wrapped around the support rod and soldered to the wire at both points where it passes through the rod, taking care not to flood the braid, rendering it inflexible. The link is shaped, and the drive stop point adjusted so spacing to the line varies from 1/8 to 1 inch. Any arrangement permitting the connecting straps to flex over the full range, without contacting other elements, is acceptable. The series capacitor, C5, described in the parts list, is mounted below the line, directly to the enclosure front wall, and is hidden from view.



The input circuitry and filament choke (top center) take up only a small part of the bottom compartment. The blower wheel draws air in through the screened hole in the bottom cover (shown tilted up at the right) and forces in out through the tube anode fins. A compartment at the left contains biasing and control circuitry. The coaxial relays, used in bypassing the amplifier for "barefoot" operation, could be mounted esternally if necessary, or eliminated if that feature is not wanted.

TABLE 1

Operating Data: 50-MHz Strip-Line Amplifier

P_{in}	1000 W	2000 W
E_b	2700 V dc	2700 V dc
I_b (idling)	.075 A *	.075 A *
I_b (single-tone)	.370 A	.740 A
E_{grid}**	−12 V dc	−12 V dc
I_{grid}	8-10% I_b (single-tone)	8-10% I_b (single-tone)
P_{drive}	20 W *	40 W *
P_{out}	590 W	1230 W
Efficiency (apparent)	59%	61.5%
Stage gain (apparent)	14.7 dB	14.9 dB
Resonant Load Impedance	4000 ohms *	2000 ohms*
Operating Q	40 *	20 *

* = approximate values

** = bias derived from 1N3311 Zener diode in cathode lead.

Substitutes can be made, as long as they will fit in the confines without contacting the line.

The rf-output connector can be assembled at the discretion of the builder. Available connectors may require spacings different from those in the photograph. There is plenty of room to move the connectors around, and the position of the small vent hole used to create air flow in the line trough can be altered to accommodate these variations.

Rf sampling for the relative output meter is accomplished by two, 7500-ohm, 2-watt carbon resistors connected between the center pin of the rf-output jack and the center pin of a BNC chassis connector which passes through both the tank wall and one side of the Minibox. This box is mounted inside the dc compartment, near the top. Continuity to other components inside the box is completed by soldering a wire directly to the BNC center pin.

The schematic diagram and photographs just about say it all as far as the rf input circuit is concerned. The shaft of C2 is lined up on the center of the tube socket. Both C1 and C2 are spaced 1-5/8 inches from the chassis base to allow uncomplicated mounting of L2 between C2 and the tube socket. C2 is modified per the parts list for a maximum capacitance of 75 pF. The rotor of C1 is ungrounded, as it is in series with L1 and the center conductor of the input line. A small piece of 1/4-inch dia. Teflon rod is used to control C1 via a knob on the front panel. The input-line shield is grounded to a solder lug on the front panel. The rotor of C2 is grounded by use of a small bus wire to a nearby solder lug. C1 and C2 are spaced 2-3/8 inches apart to accommodate L1 and make possible a pleasing front panel layout.

While it is possible to "roll your own" at less expense, an Eimac SK 2210 socket assembly was used for expedience. In this application the socket mounting ring was discarded. Centering information is given in Fig. 5. The socket hole is 3-1/4 inches in diameter with tab-like intrusions remaining inside the hole. These tabs are used to mount the socket and grid grounding clips with the hardware and spacers provided. Two of the clips and tabs can be seen in the bottom view of the input circuit. Be sure to mount the four grid-grounding clips on the input or socket side of the chassis to avoid potential instability. The socket is oriented with the large pin facing away from the heater transformer. One side of the tube heater, pin 5, connects directly to the cathode ring. The other, pin 1, is coupled to the cathode ring by means of a .01 μF mica capacitor.

The bifilar cathode/heater decoupling choke is mounted to the enclosure front by using an 8-32 screw which mates with the standoff form. A phenolic two-terminal tie point and solder lug on the enclosure front are used for connections between the choke, heater transformer secondary leads and bypass capacitors, plus the cathode metering and biasing line from the Zener diode. This line should connect to the choke lead coming from pin 7 of the tube socket. The center tap of the heater transformer secondary is not used, and is left floating.

The bottom cover, with its perforated blower inlet and short length of Bakelite duct tubing, is held to the chassis by 6-32 screws and tapped holes in the chassis lip. This is pretty thin material, so don't get over-exuberant with the screwdriver when snugging up the cover. A flat face is cut on the Bakelite duct tube to permit clearance of the chassis bottom lip and provide solid contact between the lip and bottom cover in this area.

Tuneup and Operation

Before any rf testing is performed, a few simple checks, not requiring an exciter, should be made. An ohmmeter check of the high-voltage circuit will indicate the HV meter-multiplier resistance only. With high voltage off and the bottom cover removed, turn the tube heater on briefly and check heater voltage at the socket terminals or tube pins, to be certain it is within normal operating bounds (5.0 ± 25 V).

A grid-dip meter check of input and output circuits is necessary to be certain both resonate at the operating frequency. The input circuit is checked with the tube in its socket and bottom cover removed. C2 is adjusted to resonate L2 with no cables connected at the input. Resonance in the plate circuit must be determined with the top covers in place over the majority of the tank. A few weights will suffice to hold the covers down temporarily. With the output link spaced 1/2 inch or so from the line, and C5 at half mesh, the

grid-dip meter is coupled to the shorted end of the line, through an access port made by sliding the main cover about 1-1/2 inches to the rear. This leaves the majority of the line covered, except for the access port and a small section over the plate blocking capacitors which can be filled, temporarily, by a piece of aluminum foil. The Teflon upper chimney is seated in its normal position on top of the tube anode cooler. The perforated aluminum cover over the tube and tuning capacitors is weighted in place. Both this cover and the chimney contribute significantly to stray capacitances used to resonate the circuit. C3 sets the low frequency end of resonance with the vanes of C4 between 1/4 and 3/8 inch apart at the top. C4 resonates the circiut externally. Once resonance is acheived in both circuits, all covers are secured in place with a few bolts.

Approximately 90 seconds should be allowed for cathode warm-up prior to further testing and operation. Premature attempts to extract cathode current can result in tube degradation. Once the cathode is up to temperature, about 2500 V dc are applied to the plate circuit. The VOX or other control relay should be tripped to check idling current, which will be about 55 mA at 2500 V plate potential in Class AB2. If it is widely different, the Zener diode should be checked to see if it is actually regulating at about 12 volts. The mica washers supplied with the diode must be used for isolating it from ground, unless some other means is chosen. The potential to ground is small, but if the washers should break down, meter operation will be incorrect. It is wise to use a small amount of nonconducting thermal grease (Dow-Corning 4 is adequate) on these washers to provide a good thermal bond to the heat sink. Once normal idle current is obtained, an rf stability test can be run. To execute this test it will be necessary to short *across* the Zener diode (*not* to ground) to eliminate tube bias. A temporary twisted pair of wires in parallel with the diode, shorted together manually outside the enclosure, will perform this function nicely. Do not run this test at 3000 V plate potential or higher, as the tube ratings will be exceeded. The tube will be operating zero bias and should draw considerable plate current – on the order of 340 mA or so at 2500 V. The grid meter may indicate a small negative current under these conditions. Set the relative-output meter for maximum sensitivity, and position the output coupling link 1/2 inch from the line for this test. With no cables or loads attached to input or output connectors, swing plate and cathode controls C4 and C2 through their ranges while observing the meters for any change. If instability is evident, make certain the grid grounding clips are mounted on the bottom side of the chassis, along with the tube socket and input-circuit components. I experienced no trouble with this amplifier under these conditions. Once the test is complete, open the VOX relay terminals, cutting off plate current, and allow the tube anode and core to cool for several minutes. It has been dissipating more than 800 watts. Turn off high voltage and remove the temporary short from across the Zener diode. The amplifier is now ready for the exciter and rf operational testing.

As with any cathode driven amplifier, excitation should not be applied with the cathode hot and no plate voltage present or output load attached. Operational testing was conducted at 50.1 MHz, as that is where most of the action is on this band. A small amount of excitation (5-10 W) is fed to the amplifier through an SWR indicator to read reflected power. Observing plate, grid and relative-output meters, the plate circuit can be resonated when the drive signal produces about 200 mA of plate current at 2700 V. Grid current should not be greater than about 20 mA at this point. The output-coupling link is spaced about 1/4-inch from the line and C5 is set at midrange. If the plate circuit does not tune through resonance on the first try, as indicated by the relative-output meter, it may be necessary to shut down and adjust C3. If C4 is at maximum capacitance as the output starts to increase, move the adjustable vane of C3 closer to its fixed vane. The opposite is true if C4 is at minimum capacitance, with a spacing greater than about two inches at the top. The zero-limit or stop point of the vernier drive for C4 is set to prevent vane spacings of less than 3/16 inch. Once C3 is set properly, C4 will allow external tuning from 50 to about 52 MHz with no further adjustment of C3. If the plate circuit resonates the first time, excitation and loading/coupling may be increased until a plate current of about 370 mA is reached. Grid current should not exceed 8-10% of the indicated cathode current for any prolonged period, to ensure safe tube operation. If excessive grid current is noted, the output link will have to be coupled more tightly to the line. Excitation must be altered accordingly.

Once the plate tank has been resonated at 370 mA, the cathode circuit should be adjusted for minimum SWR presented to the exciter. This may or may not result in maximum power transfer to the amplifier – that is not the objective. Here we are trying to provide the exciter with a reasonable low-impedance load which does not vary widely when the amplifier goes from idle to full power. Both C1 and C2 are used to adjust the amplifier input. C2 tuning will be sharp, but not awkward, in adjustment; C1 will be fairly broad. An input SWR of less than 1.3:1 should be obtainable. This match condition will hold for plate currents between 370-740 mA over about a 1 MHz range, with no further attention required. The SWR bridge is removed once the input circuit has been adjusted.

When coupling the amplifier to the antenna or dummy load, the position of L4 and value of C5 can be adjusted in conjunction with C4 to obtain maximum output as indicated on the relative-output meter. Once the optimum value of coupling between L4 and the strip line is reached, it is possible to swing the link through this point by over- and under-coupling slightly. When coupling becomes excessive, grid current decreases; when coupling becomes lighter, it increases. It is prefer-

(Continued on page 19)

THE W5DS HULA-HOOP LOOP

BY ROBERT W. EDLUND,* W5DS

During the current sun-spot low, more and more activity takes place on 160, 80, and 40 meters. At times, atmospheric noise can be horrendous on these bands. W5DS shows us how to make listening a little more pleasant and how to increase one's completed-QSO percentage.

COMMUNICATIONS have been difficult if not impossible on 75, 80 and 160 meters a good part of the time because of the heavy incidence of atmospheric noise. Forty meters has had more than its share of static and, on occasion, severe static has been observed on 20 meters. This article describes a method being investigated to improve the situation at W5DS. The author has always been more interested in a readable signal, regardless of strength, than a strong signal masked by noise or static crashes.

Most of us are conditioned to the reciprocity concept for antennas. This has its place but often we overlook the fact that a short and separate receiving antenna can at times make the difference between copy and no copy. An excellent discussion of this is referenced.[1]

The antenna to be described is a simple loop. This type of antenna has been with us in one form or another for over fifty years. Interest is being revived in the loop as evidenced by many articles now appearing in various journals. No attempt is made to describe how a "small loop" operates. This is adequately covered in *The ARRL Antenna Book*, and others. The important thing is that a properly constructed, rotatable loop can be used effectively to reduce static at the receiving end. Also, the antenna can null out or considerably reduce the ground wave of a nearby interfering station.

* Box 58 C-1, Route 2, Crescent, OK 73028.

The author, W5DS, with a Hula-Hoop loop.

By definition a small loop is one in which the current has the same amplitude and phase throughout the loop. A sharp null appears at right angles to the plane of the loop. A *very* important parameter in small loop design restricts the total loop-wire length (regardless of number of turns) to approximately 0.08 wavelength.[2] This is on the order of twenty feet for 75-meter designs. A figure-eight pattern for a typical small loop, free of disturbances, is shown in Fig. 1.

Small Loop Characteristics

A large loop, such as a quad or Delta, has a similar pattern rotated 90° and a small amount of gain is obtained in a direction which is broadside to the loop. The small loop can be a circle, square, triangle, hexagon, octagon etc., with no noticeable difference in performance. As used, the loop is vertically polarized, hence it can be effective in nulling out or reducing vertically polarized waves. The loop is not effective against sky-wave signals in the usual sense. This is desirable in that the loop can be turned to reduce vertically polarized noise or interference sources, yet pick up sky-wave signals regardless of orientation.

The voltage induced in a small loop is directly proportional to the number of turns N, and the area of the loop A, in square meters. This voltage is inversely proportional to the wavelength λ in meters for a given N and A. Increasing the number of turns requires a reduction in area to keep within the bounds of 0.08-wavelength total wire length. One must therefore strike a compromise in the design. The loop inductance, being a function of the number of turns, sets a limit for resonance on a given band.

The small loop is considered an inefficient radiator due to its extremely low radiation resistance. This causes matching problems, and even a simple dipole is a far better radiator. The free-space

[1] Nelson, "Receiving Antennas," *Ham Radio* May, 1970, pp. 56-63.

[2] *ARRL Antenna Book*, 13th Edition, p. 64.

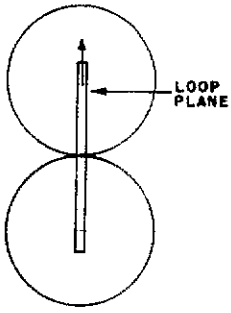


Fig. 1 — The figure-eight radiation pattern from a small loop.

radiation resistance R_r can be calculated from: [3]

$$R_r = 31{,}200 \quad \left(\frac{NA}{\lambda^2}\right)^2$$

N and A are defined as noted before. From this we find that the radiation resistance of a one-turn loop, one square meter in area, would be on the order of 0.76 milliohms on 80 meters!

The price we pay when using a small loop is a greatly reduced signal input to the receiver, as much as 20 dB or more from a reference half-wave dipole. However, the null is often in excess of 30 dB in a well-designed loop. The author's loop has dropped some very strong local signals into the noise under certain conditions.

To bring up the signal somewhat a really available transistorized rf stage, an SAX-1[4] was modified and installed as a masthead preamplifier. Alternatively, it could be located in the shack.

The amplifier shows approximately 12 dB gain with the supply voltage used. Total cost, less rotator, was under ten dollars (making good use of the junk box). The loop was constructed in one evening (see Table I for dimensions) and a day was spent measuring parameters, developing a suitable coupling method, spray painting, and so forth. The loop is mounted on the ham-shack roof, sixteen feet to its center from ground and is turned by means of a surplus TV rotator.

[3] Terman, *Radio Engineering Handbook*, 1943, pgs. 813-814.

[4] International Crystal Mfg. Co., 10 North Lee, Oklahoma City, OK 73102. SAX-1 — $3.50.

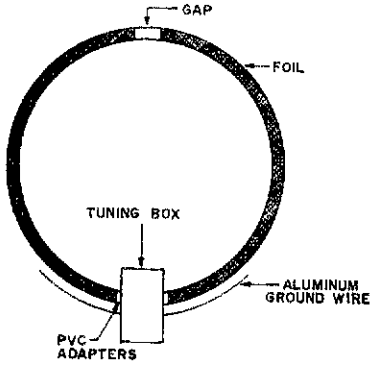


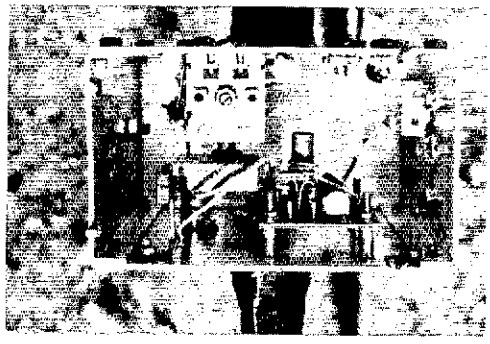
Fig. 2 — Some details on construction and grounding.

Loop Construction

A problem with loops constructed of coaxial cable is that the large distributed capacitance can be as high as 30 pF per foot. This places serious restrictions on good design. For eighty meters coax loops are usually one turn, and when 0.08-wavelength in circumference, self-resonate in the vicinity of 3 MHz. Shunt inductance techniques are often employed to reduce the loop inductance for resonance within that band. This results in a low L-C ratio, low Q and reduced performance. A high Q is desirable not only for greater signal pickup but for better selectivity and noise reduction (narrower passband) as well. Coaxial loops are quite practical for 160 meters however (De Maw, "A Receiving Loop for 160 Meters," *QST*, March, 1974).

In my design the loop is fixed-tuned to 3.79 MHz, the passband desired for the frequencies of interest when chasing 75-meter DX. The loop can easily be set to other parts of the band but is nedeed a noticeably sharp device.

There are any number of ways the loop can be constructed. PVC pipe with 45° els (actually 135°) is one way. The loop shown in the photos is constructed around a Hula-Hoop manufactured by the WHAM-O Mfg. Co. of San Gabriel, California and purchased in an Oklahoma City chain store for $2.44. Start by removing the staples at the joint and also the insert piece of plastic tubing. Discard the three internal "grass skirt" steel balls. At the break, glue two 1/2-inch PVC male pipe adapters to the hoop. I used PVC solvent cement; however, epoxy cement should work as well. Tubing diameter of this particular hoop is 3/4-inch OD and fits snugly into the PVC adapters. A 20-foot length of Twin Lead is fed through the hoop. The pigtail ends will later be cut to length, soldered to tie points inside the tuning box and cross connected to serve as a two-turn loop. Other techniques could be employed. Almost anything, such as a Minibox, can be used to support the very lightweight hoop. The author used a heavy aluminum box which measured 2-1/2 × 4 × 4-3/8 inches. Holes were punched into both sides to accept the threaded ends of the PVC adapters. Once the PVC solvent



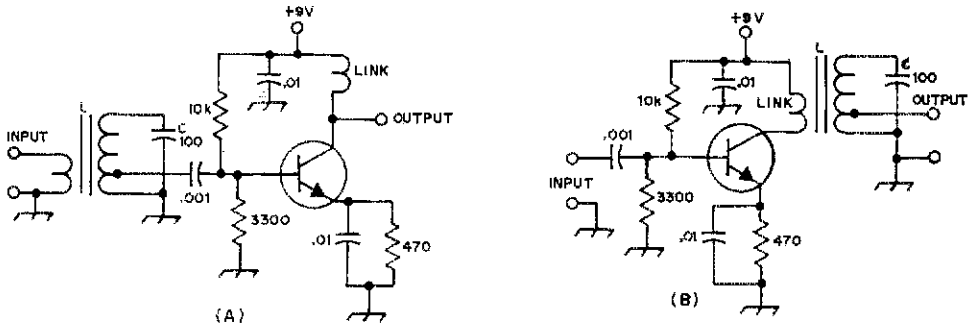
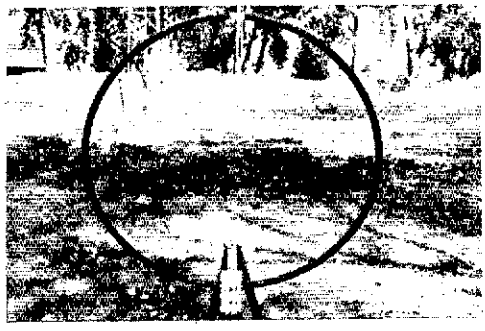


Fig. 3 — Shown at A is the basic circuit of the SAX-1 and at B, the modification described in the text.

has set (about an hour), insert the threaded ends into the tuning-box sides and secure with 1/2-inch electrical locknuts.

The loop must be shielded against electrostatic fields but open to electromagnetic fields. This was accomplished by applying shielding completely around the loop but leaving a 1.5-inch gap at the top. This prevents the shield from acting as a shorted turn to the desired electromagnetic field. The author laid out two 56-inch lengths of 12 inch wide household aluminum foil, then folded the pieces over to form a double-strength 6-inch wide wrap. Earlier a roll of foil was cut into 1-inch wide strips on a table saw in an attempt to wrap the hoop with foil tape. Repeated tearing resulted in failure. Heavier foil might have been satisfactory.

With help from my wife, the foil was secured with masking tape on top of the PVC fittings and against the aluminum box. The foil was wrapped carefully and overlapped around each side and to the top of the hoop. Top center was located with a plumb bob. The foil was secured again with masking tape; then carefully a cutaway of a 3/4-inch piece of foil was made on each side of the top center mark to leave the 1.5-inch gap (see photo). To ground the shield, two pieces of 26-inch long No., 15-gauge aluminum wire were attached to the aluminum box and secured with screws and washers to holes drilled just below the PVC adapters. Aluminum grounding wire was used against the foil and box to avoid setting up contact potentials between dissimilar metals. See Fig. 2 for grounding details.



Here is the completed loop, ready for installation.

The entire loop was then tightly wrapped with black plastic electrical tape, thus bonding the ground wires to the foil and securing the foil to the hoop. The loop and tuning box were given three coats of aluminum spray enamel to improve appearance and weatherproofing. Be sure to mask off the 1.5-inch gap before painting.

Internal parts layout of the preamplifier is not critical. However, some care must be exercised in mounting the preamplifier so that it will not break into oscillation. This was found by experimentation. A photo shows the layout.

The final construction consisted of cutting a heavy piece of aluminum to act as a base plate and support for the rotator pipe. The plate is first center punched for a 0.5-inch hole to provide ventilation for the tuning box and space for the RG-58 U coax and dc supply leads. Dc for the masthead amplifier is supplied through the signal coax, see Fig. 5. The supply must float above ground. A 0.5-inch pipe flange is bolted to the bottom plate over the center hole. The plate is then attached to four spade bolts on the tuning box. A 3/4- to 1/2-inch reducer is then screwed tightly into the pipe flange. A six-foot piece of 3/4-inch iron pipe is then used to mount the loop to the TV rotator.

Masthead Preamplifier

A unique method was developed to use a SAX-1 amplifier. The same company makes a broadband (BAX-1) amplifier that could be used also if the reader has different requirements and wishes to experiment.

The SAX-1 is modified without any changes to the printed-circuit board. The original circuit, Fig. 3A, and modified circuit at B are shown. All parts are mounted according to the manufacturer's data. Instead of connecting the .001-μF coupling capacitor to the coil tap, solder it to the pc pad next to the input stud. From the coil tap connect a wire pigtail to the tap connection on the circuit board. This pigtail is later connected to the center conductor of the transmission line. Wind a four-turn link over L and solder the link ends to the top

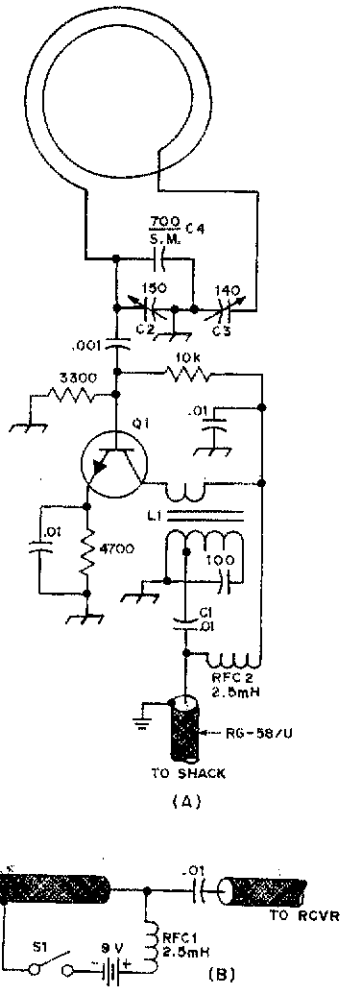


Fig. 4 — At A is the preamplifier circuit as installed at the loop. At B is the power supply, a 9-volt battery that is mounted in a small box at the shack. The part designations are for text reference. S1 is a single-pole, single-throw switch. RFC1 and RFC2 are 2.5-mH chokes (any type is suitable).

of the studs marked LO and HI link. This completes the collector return circuit and the modifications.

Many coupling methods were tried. A balanced loop would seem to be ideal. A two section 365-pF variable capacitor across the loop was tried, both with the rotor floating and grounded. Coupling to one section unbalanced the system and the preamplifier also oscillated. One method would be to place the tuning capacitor at the top of the loop and use link coupling. However, unbalancing the loop showed no detrimental effects and most coupling schemes do just this. The author chose an 835-pF capacitor (700-pF silver mica, C4, in parallel with a 150-pF padder) in series with C3, a 140-pF APC-type loop-tuning capacitor (see Fig. 4). The large capacitor has little effect on loop tuning but presents a 50-ohm reactance across its terminals at 3.8 MHz. (The 50-ohm reactance presents negligible loading across the 450-ohm preamplifier input impedance.) Direct connection to the RG-58 U line produced readable signals. Connecting the preamplifier input across this capacitor yielded a 12-dB improvement with negligible loading. Changing the large C over quite a range of selected values deteriorated performance.

Conclusions

No attempt is made to claim that this loop is a cure-all for static or interference. However, during heavy static the writer can now copy signals that are inaudible on the large horizontal and vertical 75-meter antennas in use here. And that's what counts! QST

50 MHz Amplifier

(Continued from page 15)

able to operate in the more tightly coupled position, and the possibility of excessive grid current is reduced and tube linearity is improved. If very light coupling does not result in higher than desired grid current and/or grid-current variations during normal loading operations, it is possible that either CR1 or CR2 are shorted. Grid-current meter readings will be very low and sluggish if these diodes are shorted.

Operating parameters given in Table 1 are typical and variations are, of course, permissible within tube ratings. It is possible to derive low voltage-high current (1 kW) and high voltage-low current (2 kW) plate operating conditions which provide a single value of resonant load impedance (R_L). Theoretically, this eliminates the need for amplifier retuning when going from 1 kW to 2 kW PEP input. Operation at low voltage and high current may, however, require considerably more cathode excitation than would otherwise be needed to reach 1 kW input. Tube damage can result. Although this dual-voltage current scheme is followed in several commercial amplifiers, it is not necessary or recommended here.

Acknowledgements

In conclusion, I would like to express my appreciation to John "Mick" McManus, K1IKN, for his assistance in making gain and power output measurements; and to Ted Simmington, W1JOT, for his review and comments on the text. Special thanks go to my colleague, William M. Brown of MIT Lincoln Laboratory, for his encouragement in pursuing documentation of the amplifier. QST

**Silver plating performed by using Cool-Amp compound, Cool-Amp Company, 8603 SW 17th Ave., Portland, OR 97219. Other methods are acceptable.

†For the source of Teflon tape, see parts list in Fig. 3, part one.

160-METER DX

.....WITH A TWO-ELEMENT-BEAM

BY JARDA DVORACEK,* OK1ATP

It takes more than desire and imagination to be an effective DXer on "top band," and the impressive record of OK1ATP is proof that some hard work and dedication went into his 60-country total on 160 meters. No doubt his success results in part from the antenna system used at OK1ATP – a two-element fixed-heading wire beam, the details of which are given in this article.

MANY ANTENNAS for DXing on 160 meters have been tried at OK1ATP, but the best results came when using the antenna described here – a two-element inverted-V beam of the driven variety. It is fed with balanced TV line, as shown in Fig. 1. The transmitter is matched to the line by means of a simple tuned network. The beam is oriented to provide maximum radiation to the west. A separate antenna – a single-element inverted V – is used for coverage to the east.

My signals in England are two S units better with the beam than with the single inverted V. Signal reports from the U.S. show the beam to be one S unit superior to the inverted V. My inverted V is the better antenna when working east . . . approximately two S units better than from the backside of the beam. This indicates that there is a significant front-to-back ratio with the wire beam.

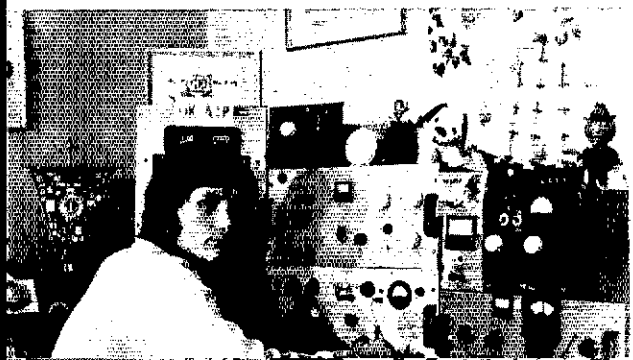
Nylon rope is used to support the beam. The rope is stretched tight between two supports, and the driven element and reflector droop downward from the rope. Knots are made in the rope at appropriate points to hold the elements in place and to keep the T sections the desired distance from the elements (Fig. 1). Open-wire phasing line is used to connect the driven element to the reflector. It is transposed as shown in the drawing. Homemade plastic spacers are used to separate the wire in the T sections, phasing line, and transposition point. The European name for the rope and spacers is "Silon."

Results with the Beam

I have been trying to obtain the DXCC award on 160 meters since 1968 and thus far have 60 countries on my "worked" list. All of the station equipment is homemade, as seen in the photograph which was taken in 1972. Results have been good since erecting the beam, but it takes many hours of listening and operating to catch band openings and be present when activity takes place. Because the band is such a challenging one, my interest remains high. On the average, I devote 20 nights a month to operating – from 2000 to 0100 GMT, and also around sunrise time here. Most of my transmitting is done between 1825 and 1827 kHz in the "DX window."

I have worked 207 U.S. stations, and all call areas other than W7, KL7, and KH6. I have worked VO1, VE1, VE3 and VE7 stations. With W1HGT I've had 60 QSOs so far, and with W1BB there have

* Olesnice 24, 40322 Svadov, Usti Nad Labem, Czechoslovakia.



Completely home built station, OK1ATP. Jarda is known far and wide on 160 meters for his outstanding signal.

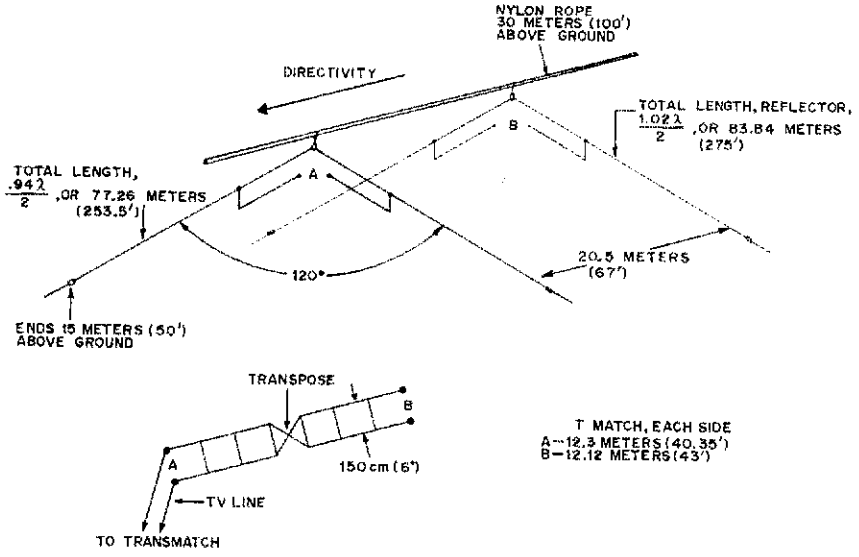


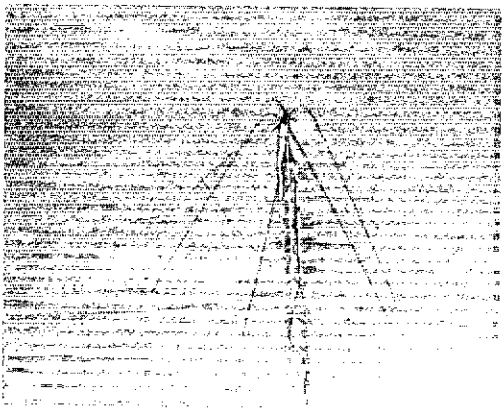
Fig. 1 — Principal details of the OK1ATP 160-meter 2-element beam. Elements are suspended from a heavy nylon rope in which knots were tied to maintain the element spacing. Both are driven by means of the transposed balanced line, as shown. The main run to the station is open TV line. Dimensions are for operation near 1825 kHz.

been 54. I have heard a considerable number of countries which I have not worked.

It is reasonable to conclude from the results I have obtained that the two-element beam is performing well, even though it blew down during our hurricane of December, 1974 when the nylon support rope broke! It has since been rebuilt and is working nicely. It is my hope that this information will be of interest to other 160-meter operators around the world. QST

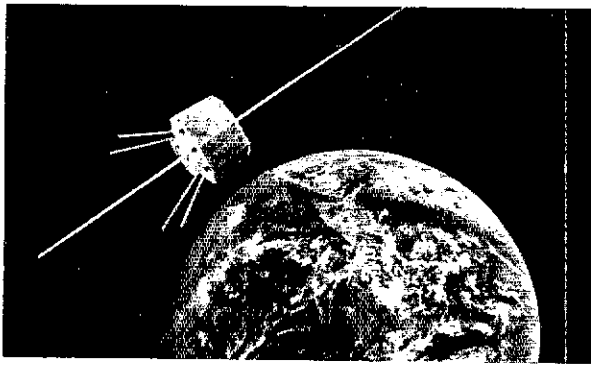
Strays

While we North Easterners have our ice, WA5RSC hereby reminds us of the Oklahoma winds.



Amsat Offers Unique Photo

Photos (8 X 10-inch) of Amsat-Oscar 7 are now available in full-color. They are reproduced from an original artist's conception of Oscar in space. See picture. For only $3.00 U.S. (or 20 IRCs) you may obtain this collector's item by mailing your check or money order payable to AMSAT, who will recieve the proceeds. Postage will be paid by Alan L. Bridge, WB4VXP, VHF Communications South, 2881 South Main Street, Kennesaw, Georgia, 30144 U.S.A.



Shunt Feeding Towers for Operation on the Lower Amateur Frequencies

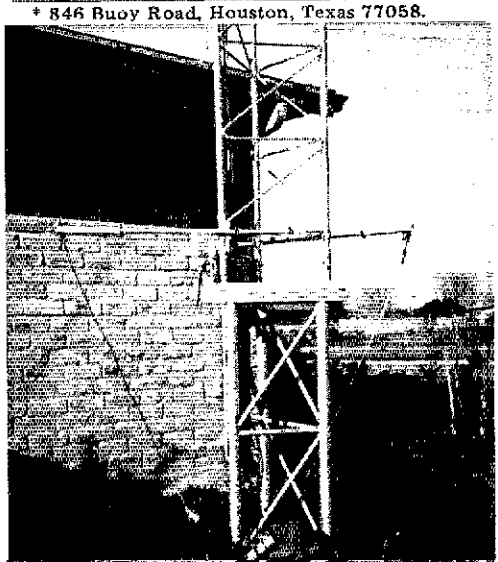
BY EARL W. CUNNINGHAM,* W5RTQ

THE SHUNT-FED VERTICAL ANTENNA has been around for years in many forms, but use of the system for the lower amateur frequencies in connection with tower-and-beam structures has been largely neglected. My interest in verticals developed when, as KL7FRY, in the Aleutian Islands, I noted that the strongest 160-meter signals from the lower 48 states came from vertical antennas. WØVXO in Minneapolis, using a shunt-fed tower, was heard well consistently. Today, as KV4FZ, using a similar method, he has a 160-meter signal known throughout the world. My first use of shunt feed, as W5RTQ, was an immediate success. VK6NK was worked for the first VK6 QSO from this country on 160 in September, 1969. The first W5 160-meter WAC was completed in 1973, by working JA7NI.

Shunt-feeding a tower used to support beam antennas for 14 MHz or higher frequencies has obvious advantages for the amateur who wants to work all lower bands. If a good ground system is installed, the result may be a very effective antenna for DX work on 80 and 160. The shorter tower installations may work very well on 40 meters, if the effective height above ground is less than 5/8 wavelength. Beyond this height the radiation angle goes higher, and the effectiveness for DX goes down.

The shunt-fed tower is at its best on 160, where a full quarter-wavelength vertical antenna is rarely possible. Almost any tower height can be used. If the beam structure provides some top loading, so much the better – but anything can be made to radiate, if it is fed properly. A self-supporting, aluminum, crank-up, tilt-over tower is used at W5RTQ with a TH6DXX tribander mounted at 70 feet. Measurements showed that the entire structure has about the same properties as a 125-foot vertical. It thus works quite well on 160 and 80 in DX work requiring low-angle radiation. It can also be used on 40, but results are rather poor because of high radiation angle. WB5FKX, with a 37-foot tower and a 21-MHz beam, finds that shunt feed on 40 enables him to work DX that he never knew existed before.

* 846 Buoy Road, Houston, Texas 77058.



Close-up view of the base of the shunt-fed tower, showing the two bottom arms and their insulators.

Preparing the Structure

Usually some work on the tower system must be done before shunt-feeding is tried. Metallic guys should be broken up with insulators. They can be made to simulate top loading, if needed, by judicious placement of the first insulators. Don't over do it; there is no need to "tune the radiator to resonance" in this way. If the tower is fastened to a house at a point more than about one-fourth of the height of the tower, it may be desirable to insulate the tower from the building. Plexiglas sheet, 1/4-inch or more thick, can be bent to any desired shape for this purpose, if it is heated in an oven and bent while hot.

All cables should be taped tightly to the tower, preferably on the inside, and run down to the ground level. It is not necessary to bond shielded cables to the tower electrically, but there should be no exceptions to the down-to-the-ground rule.

No rf problems have developed with rotators, beam traps, or even TV sets where the TV antenna is part of the radiating structure, as is the case at WB5FKX. His only precaution was use of coax on the TV antenna. It would be well to proceed with caution, as every installation could be different in this respect.

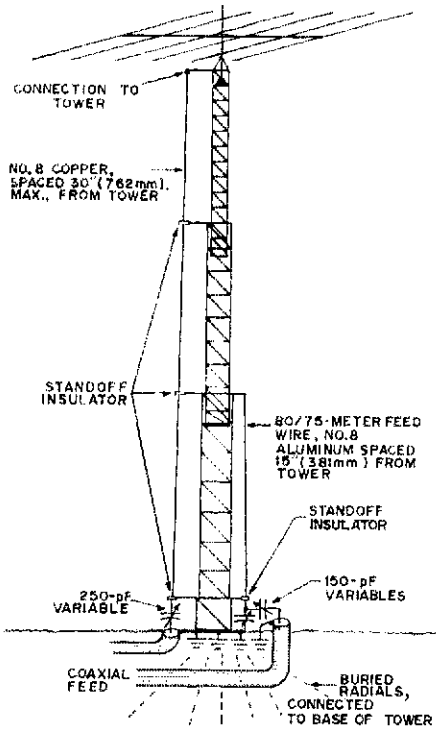


Fig. 1 — Principal details of the shunt-fed tower at W5RTQ. The 160-meter feed, left side, connects to the top of the tower through a horizontal arm of 1-inch diameter aluminum tubing. The other arms have stand-off insulators at their outer ends, made of 1-foot lenghts of plastic water pipe. The connection for 80/75, right, is made similarly, at 28 feet, but two variable capacitors are used, to permit adjustment of matching with large changes in frequency.

Though the effects of ground losses are less severe with the shunt-fed vertical than with the simple quarter-wave antenna, a good system of buried radials is very desirable. The ideal would be 120 radials, each 250 feet long, but fewer and/or shorter ones must often suffice. You can sneak them around corners of houses, along fences or sidewalks, wherever they can be put a few inches under the surface, or even on the earth surface. Aluminum clothesline wire is used extensively at W5RTQ, and it stands up well. Neoprene-covered aluminum wire may be safer in highly acid soils. Contact with the soil is not important. Deep-driven ground rods, and connection to underground copper water pipes, are good, if usable.

Installing the Shunt Feed

Principal details of the shunt-fed tower for 80 and 160 meters are shown in Fig. 1. Rigid rod or tubing can be used for the feed portion, but heavy gauge aluminum or copper wire is easier to work with. Flexible stranded No. 8 copper wire is used for the 160-meter feed at W5RTQ, because when the tower is cranked down, the feed wire must come down with it. Connection is made at the top, 68 feet, through a 4-foot length of aluminum tubing clamped to the top of the tower, horizontally. The wire is clamped to the tubing at the outer end, and runs down vertically through standoff insulators. These are made by fitting 12-inch lengths of PVC plastic water pipe over 3-foot lengths of aluminum tubing. These are clamped to the tower at 15 to 20-foot intervals, with the bottom one about 3 feet above ground. The lengths given allow for adjustment of the tower-to-wire spacing over a range of about 12 to 36 inches, for impedance matching.

The gamma-match capacitor for 160 is a 250-pF variable with about 1/16-inch plate spacing, which is adequate for the power levels presently authorized. The omega match used for 80 and 75 permits retuning for large excursions in frequency encountered in using both cw and phone on this band. Two capacitors are required, each about 150 pF, with plate spacing of about 3/16 inch, if full power is used. They can be mounted in plastic refrigerator containers for protection against the weather. Use well-insulated knobs to avoid rf burns during the adjustment process.

Separate 50-ohm lines run underground to the station. The shield side of their connectors should be grounded to the base of the tower and to the buried radials as directly as possible.

Tuning Procedure

It is suggested that the 160-meter wire be connected to the top of a structure 75 feet tall or less. Note, from Table I, that the monster at K5PFL was fed at 75 feet above ground. Mount the standoff insulators so as to have a spacing of about 24 inches between wire and tower. Pull the wire taut and clamp it in place at the bottom insulator. Leave a little slack below to permit adjustment of the wire spacing, if necessary.

Adjust the series capacitor in the 160-meter line for minimum reflected power, as indicated on an SWR meter connected between the coax and the connector on the capacitor housing. Make this adjustment at a frequency near the middle of your expected operating range. If a high SWR is indicated, try moving the wire closer to the tower. Just the lower part of the wire need be moved for an indication as to whether reduced spacing is needed. If the SWR drops, move all insulators closer to the tower, and try again. If the SWR goes up, increase the spacing. There will be a practical range of about 12 to 36 inches. If going down to 12 inches does not give a low SWR, try connecting the top a bit farther down the tower. If wide spacing does not make it, the omega match shown for 80-meter work should be tried. No adjustment of spacing is needed with the latter arrangement which may be necessary with short towers or installations having little or no top loading.

The two-capacitor arrangement is also useful for working in more than one 25-kHz segment of

Table I

Shunt-Feed details for several Towers used on 160 meters

Station	Height of Tower	"Top-Hat" (Beams)	Average Height of Beam	Height of wire-to Tower Connection	Wire-to-tower Spacing	Tuned Value of Gamma Capacitor
W5RTQ	69' (21 M)	TH6DXX	70' (21 M)	68' (20.6 M)	30" (o.75 M)	150 pF
K5PFL	86' (26 M)	Stacked 40,20,15, 10 M beams	95' (28.8 M)	75' 22.7 M)	24" (0.6 M)	125 pF
K4PUZ	64' (19 M)	TH6DXX	66' (20 M)	63' (19 M)	8" (200 MM)	300 pF
K8KAS	70' (21 M)	TH6DXX	71' (22.7 M)	68' (19.7 M)	24" (0.6 M)	225 pF
W1CER	50' (15 M)	QST 20-M DX Weasel	55' (16.6 M)	47" (14.2 M)	44" (1.1 M)	400 pF

the 160-meter band. Tune up on the highest frequency, say 1990 kHz, using the single capacitor, making the settings of wire spacing and connection point permanent for this frequency. To move to the lower frequency, say 1810 kHz, connect the second capacitor into the circuit and adjust it for the new frequency. Switching the second capacitor in and out then allows changing from one segment to the other, with no more than a slight retuning of the first capacitor.

The omega match is recommended for 80-meter operation, because of the wide tuning range required. It was found that the point of connection could be at 28 feet, using a single support at the top of the first tower section. This served as a mount for the second standoff insulator for the 160-meter feed, as well.

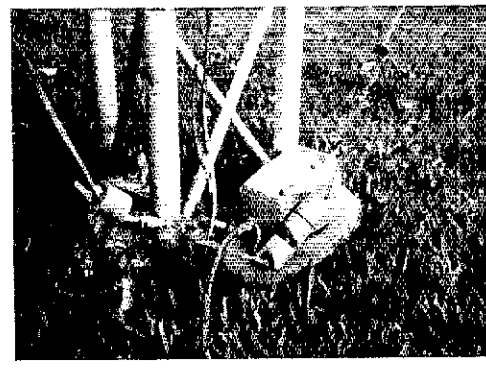
A 40-meter feed, not shown, was connected at about 20 feet up, with about 8 inches spacing between wire and tower.

Substituting Fixed-Value Capacitors

Depending on the frequencies used and the matching problems in a given installation, it may be possible to put fixed-value capacitors in place of some or all of the variables shown in Fig. 1, and then switch them remotely, or by hand, when changing frequency. This was done at W5RTQ. The 160-meter gamma capacitor is now a fixed-value, 150-pF type designed for high rf current service. It does not have to be weather-proofed, and it gives a satisfactory match over the small frequency range used on this band.

Two or three similar capacitors connected in series are used in covering the cw and phone frequencies in the 80-meter band. Operation around 3800 kHz requires about 50 pF in the omega (parallel) capacitor, so the three 150-pF units are used in series. Moving to cw operation near 3500 kHz requires about 75 pF, so only two 150-pF capacitors are used in series. The only variable now in the system is the 150-pF capacitor mounted in the plastic refrigerator box at the base

(Continued on page 26)



Though variable capacitors are shown in Fig. 1, they were all replaced with fixed-value units except one, which is inside a plastic box at the tower base.

Another Method of Shunt Feeding Your Tower

AS A SHORT SUPPLEMENT to the other articles in this issue concerning antennas for 160 meters, the following data is offered. The antenna shown in Fig. 1 is used at W1CER for DXing and local work on 160-meter cw. A Rohn 25 tower is used, and it is set in three feet of concrete. A half-size 20-meter, 3-element Yagi (20-meter DX Weasel, *QST* for September, 1974) is mounted approximately 8 feet above the top of the tower. There are no guy wires on the tower: it is bracketed to the eave at 20 feet above ground.

The more radials the better. However, owing to a miser's outlook on the cost of copper wire, and through a tendency toward chronic lassitude, only 11 buried radials are in use at this writing. The average length of the wires is 110 feet, and some are wrapped around the house in a helter-skelter manner.

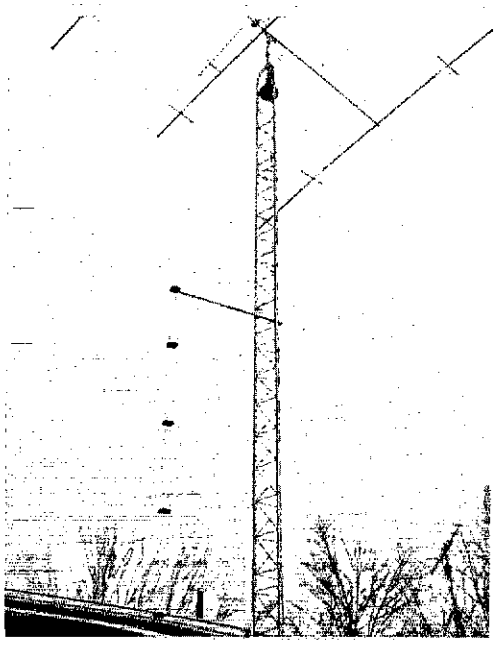
A gamma feed system is used, based on the recommended dimensions given in *The ARRL Antenna Book* (section on gamma design). A 4-inch diameter gamma rod is called for in the general design approach. Not wanting to use expensive tubing of that diameter, and not trusting the continuity of the joints in low-cost gutter pipe, a cage type of gamma structure was built to approximate a 4-inch diameter feed arm. The details are shown in Fig. 1.

A 1-1/2 inch diameter aluminum pipe serves as a yardarm to support the gamma section. It is affixed to the tower legs by means of U bolts. The outer end of the pipe is hammered flat, drilled, and fitted with a 10-32 screw and nut, to which the upper end of the gamma rod is attached.

A horizontal wire extension is added to the top of the tower to act as a capacitance hat for establishing resonance. It does little by way of radiating. Therefore the polarization of the system is principally vertical. The extender helps to broaden the bandwidth of the antenna. The system was first tuned for operation without the wire extension, and an SWR of 1 was obtained. A short version of a folded unipole was the configuration (a No. 10 wire extended to the top of the tower, and spaced three feet from it). The bandwidth was 10 kHz between the 2.5 to 1 SWR points -- hardly adequate for QSYing during contest work. With the configuration illustrated in Fig. 1 the bandwidth is 50 kHz between the 2:1 SWR points. It should be noted that resonance of the system is slightly above the desired operating frequency for a gamma-fed system. In this example the resonance, as checked with a dip meter coupled to a two-turn link placed between the low end of the gamma rod and ground, is 1825 kHz for an optimum operating frequency of 1805 kHz. The extender wire was pruned for that condition.

Adjustment and Results

In theory, if the gamma rod were a solid conductor, a series-tuning capacitor of approximately 1000 pF would be necessary to effect an SWR of 1. The value is dependent also on the ground system, which in this case is of substandard character. The value of the capacitor was measured as 560 pF in this example. A three-foot-long homemade capacitor is used at W1CER. It consists



View of the gamma-fed short tower for 160 meters. A 3-element, half-size 20-meter beam is mounted atop the tower.

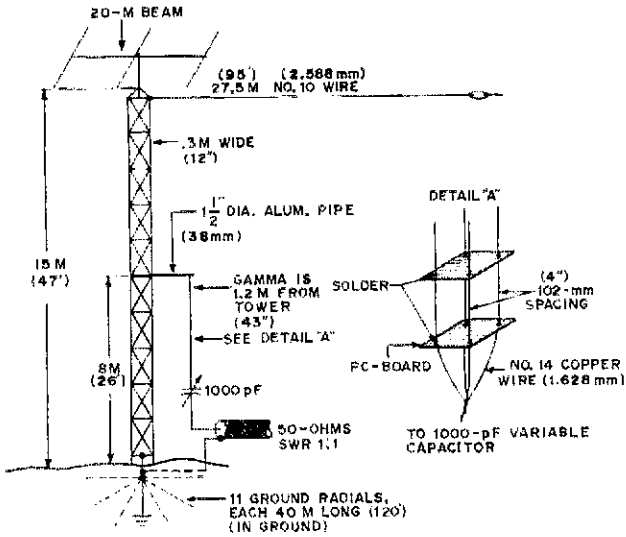
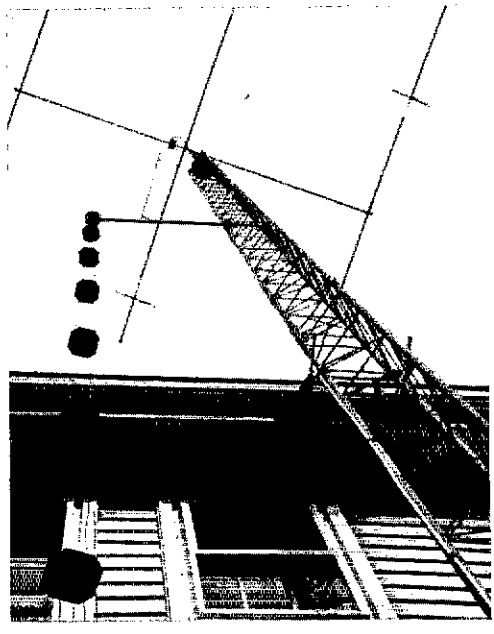


Fig. 1 — Details and dimensions in English and metric for gamma feeding a 50-foot tower as a 160-meter quarter-wavelength vertical antenna. The rotator cable and coaxial feed line for the 20-meter beam is taped to the tower legs and run into the shack from ground level. No rf decoupling networks are necessary.

of telescoping sections of 1-1/2 and 1-1/4 inch diameter aluminum tubing. The inner tube is wrapped with enough polyethylene sheeting to provide a snug fit between the tubes. Scotch tape is used to keep the sheeting in place. The inner tube is slid into the outer one until an SWR of 1 is obtained; then it is secured in position by wrapping the tubing joint with electrical tape.

In two seasons of more or less "casual" DXing from Newington, CT, 33 countries have been worked and confirmed. All DX stations heard were worked except 9L1JT and PY1RO, both of which were called until the writer's keying fingers were worn down to the first joint of each! The power input amount (dc) was 100 watts.

It is worth stating that the 20-meter beam shows no significant effect as a top-loading device. No change in SWR could be observed with or without it on the tower. As is true of all vertical antennas on "top band," the noise level on receive is troublesome much of the time. A small receiving style loop antenna, or a Beverage antenna, is preferable when digging those "weakies" out of the noise. Whatever the situation, the system has given good performance despite its being physically short. – *W1CER*



Closeup look at the gamma-feed system for exciting the tower.

Shunt Feeding Towers

(Continued from page 24)

of the tower. It is the series or gamma capacitor in the 80-meter feed. Even this could be replaced with a fixed unit, as it has been found unnecessary to adjust it in the course of normal operation of the station, if only small changes in frequency are made in using the two modes.

Because every tower installation is likely to be different from every other one in some respects, the values and dimensions given here may be subject to change, but the general principles should hold. Proof of this was found in the May, 1975, issue of *Ham Radio*.[1] wherein W4OQ describes shunt-feeding in very similar terms. He also presented estimates of the electrical height of various tower-beam combinations that prospective shunt-feed users should find of interest.

It is hoped that this information will inspire others to try shunt-feeding their towers. This method offers an effective way to fire up on the lower frequencies that is useful to many who may have wanted to work these amateur frequencies but have shied away from doing so because of limited antenna space. QST

[1] True, "Shunt-Fed Vertical Antennas," *Ham Radio*, May, 1975.

A Morse Code to Alphanumeric Converter and Display

BY THOMAS P. RILEY,* WA1BYM

THIS IS a three-part article which describes the operating principle and construction of a device that converts International Morse code directly into print. Parts one and two cover a device which converts Morse code to ASCII (pronounced ASKEY) code. ASCII is the mnemonic abbreviation for "American Standard Code for Information Interchange." It is a 6-bit code which has been adopted internationally as the standard interface language between computers, teleprinter terminals, video displays, etc. A listing of the 64 different characters and their respective code appears on page 207 of the ARRL Specialized Communication Technique book.

Part III will give construction details on an ASCII-to-TV-display converter. This device converts the ASCII code to standard print and displays it on any unmodified television receiver in a 40-character, single line "Broadway" type format. Any printing device which accepts ASCII code could be used instead of the ASCII/TV display converter. However, the high cost of these commercially available units makes them prohibitive for most amateur users. Also, these devices are not commonly found on the surplus market.

History

I set out in 1971 to build a system with the following goals: 1) extensive use of readily available integrated circuits, 2) all digital approach, 3) not more than two power supplies, 4) small package size comparable to state-of-the-art amateur gear and, 5) reasonable cost.

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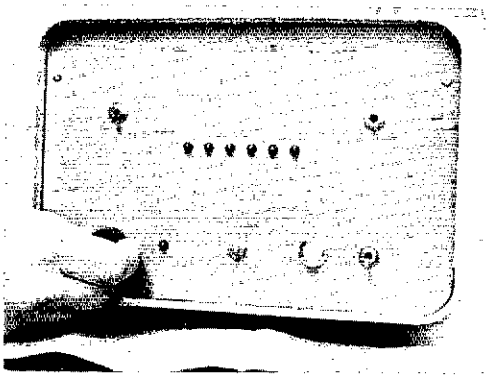


IC technology has now caught up to these goals and made the converter economically practical to construct. The entire Morse/ASCII circuit (excluding an audio band-pass filter and power supply) is assembled on a 4-1/2 by 8-inch perforated board. The circuit uses readily available TTL integrated circuits. Also, a rather bulky diode matrix (consisting of more than 350 diodes) has been replaced with a single IC programmable read-only memory (PROM) whose operation will be explained later in the text.

Block Diagram and Functional Description

The basic code element is the dot and all other elements are ideally integral multiples of the dot length. The proper ratios are: dot, 1; dash, 3; element space, 1; character space, 3; and word space, 7;

The "machine" must measure the length of the received *mark* (dot or dash) or *space* and interpret it properly. Next, it must store the successive marks of a single character and decode that information (i.e. determine which character it is) and then encode it into a format suitable for printing (ASCII).

In order to interpret the marks and spaces properly, a comparison is made between the length of the received mark or space and the average length of all previous dots. The comparison point for marks is set halfway between the two ideals (dot 1, dash 3, unit lengths) at two unit lengths. Thus, a mark less than two times the stored dot length would be interpreted as a dot, and a mark greater than two times the stored dot length would be interpreted as a dash.

Similarly, the comparison points for the space are set halfway between the ideal lengths. A space less than two unit lengths is interpreted as an element space. Greater than two is a character space, and greater than five is a word space.

The block diagram of Fig. 1 shows the signal flow in the converter circuit. The receiver audio output is connected to either a sharp 1-kHz band-pass filter or a 14-dB resistive attenuator as selected by the filter in/out switch. The filter has a −3 dB bandwidth of 100 Hz and −60 dB band-

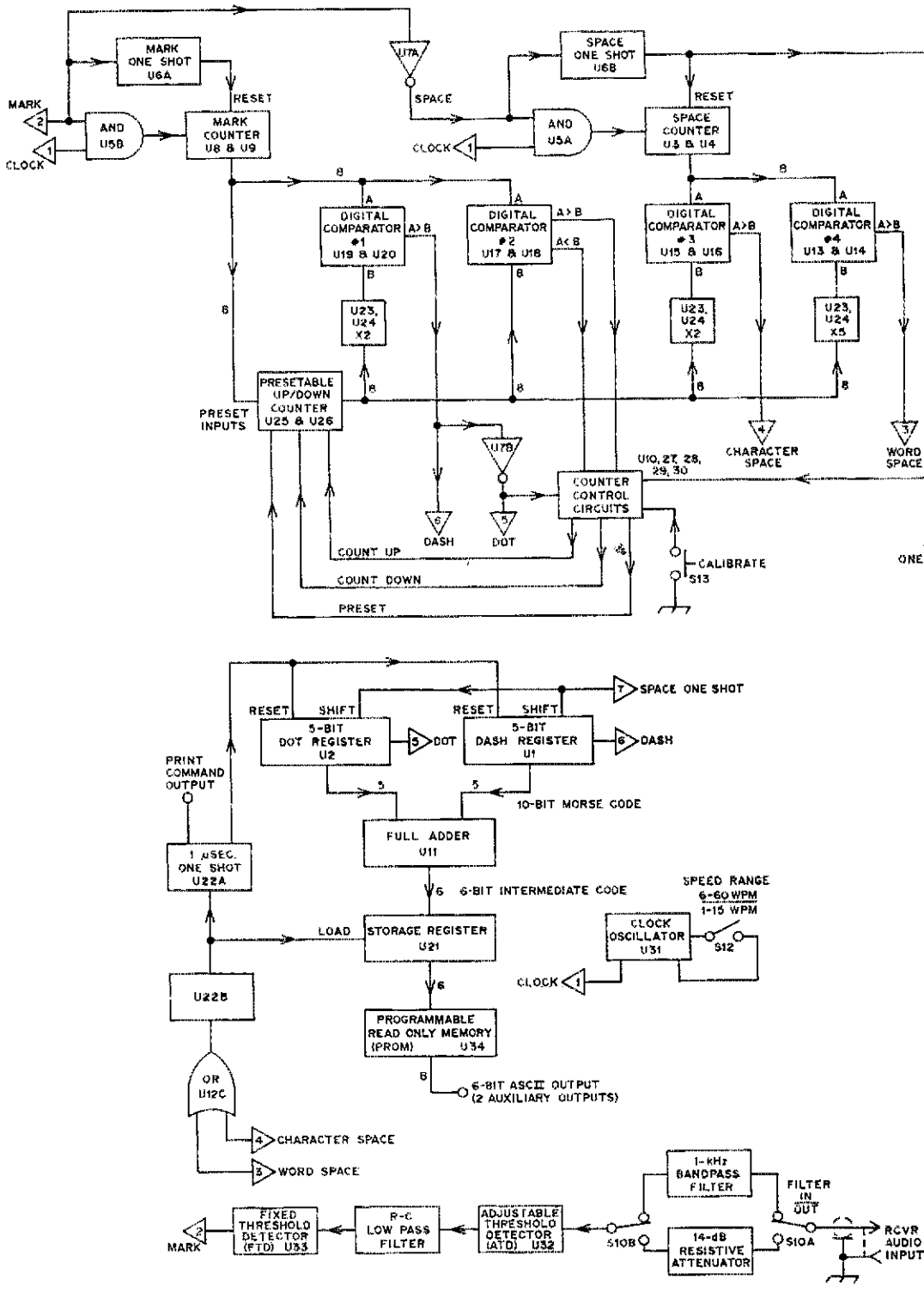


Fig. 1 — Block diagram of converter showing signal flow and circuit function.

width of 1500 Hz. This is sufficiently wide to pass code speeds in excess of 60 wpm. The narrow band-width eliminates much adjacent channel interference on very crowded bands and also

improves the signal-to-noise ratio presented to the input of the adjustable threshold detector (ATD). The filter has a 14-dB insertion loss. When the filter is switched OUT, the receiver audio is attenuated by 14 dB, providing approximately the same signal level as with the filter IN. This eliminates the need for readjusting the ATD each time the filter is switched IN and OUT except under extremely noisy conditions.

The purpose of the ATD, low-pass filter, and fixed threshold detector (FTD) are to convert the audio Morse code to digital Morse code and provide immunity to noise. The desired results are shown graphically in Fig. 2. The ATD provides a logic *0* output whenever the input voltage is below the threshold value and a logic *1* when the input goes above the threshold. The output of the ATD is then applied to an *R-C* low pass filter which averages the input voltage applied to it. Therefore, with a varying amplitude of 0 to +5 volts applied, the capacitor charges to a final value of +2.5 volts. The filter has a time constant of 5 milliseconds and it takes about 5 cycles of the input square wave (1 ms/cycle) for the capacitor to charge to 2/3 of its final value of +2.5 volts, as shown in Fig. 2C. The output of the low-pass filter is then applied to the FTD which has hysterisis. This means that there are in fact two threshold levels, one when the output is in a logic *0* state and a different value when the output is in a logic *1* condition. The threshold values are +0.8 and +1.6 volts which are about 2/3 and 1/3 of +2.5 volts. When the capacitor is charging, the output does not go to a logic *1* until the input exceeds +1.6 V. Then the input must fall below +0.8 V for the output to return to the logic *0* state as shown in Fig. 2C and 2D. Hysterisis is employed to prevent multiple output pulses which could occur when the waveform crosses back and forth over a single value threshold due to ripple present on the waveform. The output of the FTD is called the mark signal.

Mark Detection

The leading edge of the mark signal fires the

TABLE I

	MORSE CODE										INTERMEDIATE CODE							ASCII CODE					
	Dot Reg					*Dash Reg*					*F*	*E*	*D*	*C*	*B*	*A*		Y_5	Y_4	Y_3	Y_2	Y_1	Y_0
A	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	1	A	0	0	0	0	0	1
B	0	0	1	1	1	0	1	0	0	0	0	1	0	1	1	0	B	0	0	0	0	1	0
C	0	0	1	0	1	0	1	0	1	0	0	1	0	1	0	0	C	0	0	0	0	1	1
D	0	0	0	1	1	0	0	1	0	0	0	0	1	0	1	0	D	0	0	0	1	0	0
E	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	E	0	0	0	1	0	1
F	0	1	1	0	1	0	0	0	1	0	0	1	1	1	0	0	F	0	0	0	1	1	0
G	0	0	0	0	1	0	0	1	1	0	0	0	1	0	0	0	G	0	0	0	1	1	1
H	0	1	1	1	1	0	0	0	0	0	0	1	1	1	1	0	H	0	0	1	0	0	0
I	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	I	0	0	1	0	0	1
J	0	1	0	0	0	0	0	1	1	1	0	1	0	1	1	1	J	0	0	1	0	1	0
K	0	0	0	1	0	0	0	1	0	1	0	0	1	0	0	1	K	0	0	1	0	1	1
L	0	1	0	1	1	0	0	1	0	0	0	1	1	0	1	0	L	0	0	1	1	0	0
M	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	M	0	0	1	1	0	1
N	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	N	0	0	1	1	1	0
O	0	0	0	0	0	0	0	1	1	1	0	0	0	1	1	1	O	0	0	1	1	1	1
P	0	1	0	0	1	0	0	1	1	0	0	1	1	0	0	0	P	0	1	0	0	0	0
Q	0	0	0	1	0	0	1	1	0	1	0	1	0	0	0	1	Q	0	1	0	0	0	1
R	0	0	1	0	1	0	0	0	1	0	0	0	1	1	0	0	R	0	1	0	0	1	0
S	0	0	1	1	1	0	0	0	0	0	0	0	1	1	1	0	S	0	1	0	0	1	1
T	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	T	0	1	0	1	0	0
U	0	0	1	1	0	0	0	0	0	1	0	0	1	1	0	1	U	0	1	0	1	0	1
V	0	1	1	1	0	0	0	0	0	1	0	1	1	1	0	1	V	0	1	0	1	1	0
W	0	0	1	0	0	0	0	0	1	1	0	0	1	0	1	1	W	0	1	0	1	1	1
X	0	0	1	1	0	0	1	0	0	1	0	1	0	1	0	1	X	0	1	1	0	0	0
Y	0	0	1	0	0	0	1	0	1	1	0	1	0	0	1	1	Y	0	1	1	0	0	1
Z	0	0	0	1	1	0	1	1	0	0	0	1	0	0	1	0	Z	0	1	1	0	1	0
Ø	0	0	0	0	0	1	1	1	1	1	0	1	1	1	1	1	Ø	1	1	0	0	0	0
1	1	0	0	0	0	0	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0	0	1
2	1	1	0	0	0	0	0	1	1	1	1	1	0	1	1	1	2	1	1	0	0	1	0
3	1	1	1	0	0	0	0	0	1	1	1	1	1	0	1	1	3	1	1	0	0	1	1
4	1	1	1	1	0	0	0	0	0	1	1	1	1	1	0	1	4	1	1	0	1	0	0
5	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	0	5	1	1	0	1	0	1
6	0	1	1	1	1	1	0	0	0	0	1	0	1	1	1	0	6	1	1	0	1	1	0
7	0	0	1	1	1	1	1	0	0	0	1	0	0	1	1	0	7	1	1	0	1	1	1
8	0	0	0	1	1	1	1	1	0	0	1	0	0	0	1	0	8	1	1	1	0	0	0
9	0	0	0	0	1	1	1	1	1	0	1	0	0	0	0	0	9	1	1	1	0	0	1
.	0	1	0	1	0	1	0	1	0	1	1	0	1	0	0	1	.	1	0	1	1	1	0
,	0	1	1	0	0	1	0	0	1	1	1	0	1	0	1	1	,	1	0	1	1	0	0
?	1	0	0	1	1	0	1	1	0	0	1	1	0	0	1	0	?	1	1	1	1	1	1
/	0	1	1	0	1	1	0	0	1	0	1	0	1	1	0	0	/	1	0	1	1	1	1
( )	1	0	0	1	0	0	1	1	0	1	1	1	0	0	0	1	(,	1	0	0	0	1	0
BT	0	1	1	1	0	1	0	0	0	1	1	0	1	1	0	1	-	1	0	1	1	0	1
AS	1	0	1	1	1	0	1	0	0	0	1	1	0	1	1	0	#	1	0	0	0	1	1
KN	0	1	0	0	1	1	0	1	1	0	1	0	1	0	0	0	>	1	1	1	1	1	0
SK	1	1	0	1	0	0	0	1	0	1	1	1	1	0	0	1	]	0	1	1	1	0	1
AA	0	1	0	1	0	0	0	1	0	1	0	1	1	0	0	1	:	1	1	1	0	1	0
AR	1	0	1	0	1	0	1	0	1	0	1	1	0	1	0	0	*	1	0	1	0	1	0
SP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	SP	1	0	0	0	0	0

Table 1 — Binary code information for the intermediate steps of the conversion from Morse-to-ASCII presentation. The last sixteen ASCII codes have no corresponding Morse characters so they should be programmed as a space.

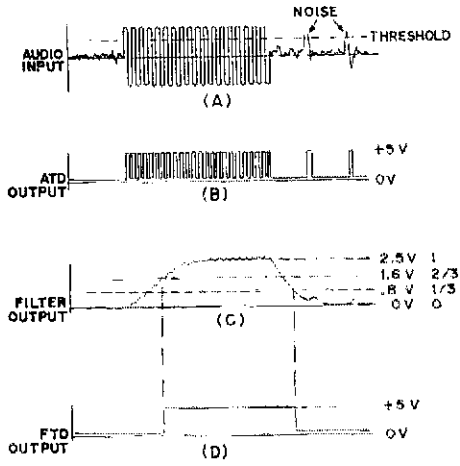


Fig. 2 — Shown at A is the audio output from the receiver as seen at the input to the automatic threshold detector (ATD), at B the output from the ATD, at C the output from the audio filter, and at D the output from the fixed threshold detector (FTD).

1-μs mark one shot multivibrator which resets the mark counter to zero. This counter is an eight-bit binary device which can count from 0 to 255. When the mark signal goes high, the AND gate is enabled and allows clock pulses to advance the counter. At the end of the mark signal, the binary value of the mark counter (which is representative of the time duration of the mark signal) is compared to a number stored in the presetable up/down counter by digital comparator 1 and comparator 2. The number stored in the up/down counter is equal to the average number of counts that all previous dots received. The method by which this is done will by explained further in the text. The number stored in the up/down counter is multiplied by a factor of 2 and is applied to input B of comparator 1. Multiplication by 2 is achieved by simply reassigning the weight of each bit so that each has a value 2 times greater than its original value (i.e. shifting the bits one place). For instance, the binary number 7 is *0111*. If we shift all the bits one place to the left, we have *1110* which is binary 14. The shifting is done by wiring connections and not by any device such as a shift register. Bit *0* of the up/down counter is connected to bit 1 of comparator 1, bit *1* to bit *2*, bit *2* to bit *3*, etc.

If the mark counter exceeds twice the value of the number stored in the up/down counter, the output of comparator 1 goes high indicating that the mark element was a dash. Likewise, if the count were less, the output would remain low indicating a dot.

Comparator 2 and the counter-control circuits determine the operation of the up/down counter. The circuits have two modes of operation, normal and calibrate. The normal mode will be covered first. In this mode the up/down counter functions just as its name implies. A pulse applied to one of its inputs causes the device to count up while pulses to another input cause it to count down.

The trailing edge of the mark signal fires the 1-μs space one shot, indicating that the mark signal has ended. If at this time comparator 1 indicates that the mark was a dot, the outputs of comparator 2 are enabled. If the mark count is greater than the up/down counter (as determined by comparator 2), a pulse is applied to the count-up input of the up/down counter, increasing the stored count by 1. Likewise, if the mark counter were less, a pulse is applied to the count-down input, decreasing the stored count by 1. If the mark count were the same as the stored count, no correction to the up/down counter is made. This is how the device adjusts itself to correct for varying code speeds.

The calibrate mode is used to initially set the up/down counter to the proper value for the speed of the code being received. In this mode the up/down feature of the counter is disabled and the counter functions as a storage register. When the CAL button is depressed the up/down counter is initially preset to its maximum value of 255. A one-shot holds the circuit in the CAL mode for 2 seconds. Each time a mark signal is interpreted as a dot the contents of the mark counter are stored in the up/down counter, thereby entirely correcting the up/down counter rather than incrementing it one count at a time as in the NORM mode.

TABLE II

Element Sent	*Mark Count*	*Up/Dn Cntr*	*2X up/ Cntr*	*Element Received*	
		255	254		Cal button depressed
dash	90	90	180	dot	
dot	30	30	60	dot	System locked
dot	32	32	64	dot	Cal
dash	95	32	64	dash	
noise	4	4	8	dot	Lock lost
dot	31	4	8	dash	
dash	93	4	8	dash	
dot	30	4	8	dash	Norm
dash	91	4	8	dash	
		255	254		Cal button depressed
dot	33	33	66	dot	System locked
dash	98	33	66	dash	
dot	30	30	60	dot	
dash	100	30	60	dash	Cal
dash	96	30	60	dash	
dot	31	31	62	dot	
dot	33	33	66	dot	
dot	30	32	64	dot	Norm
dash	95	32	64	dash	
dot	30	31	62	dot	
noise	6	30	60	dot	System does not lose lock
dot	33	31	62	dot	
dash	99	31	62	dash	

Element Sent	*Mark Count*	*Up/ Down Cntr*	*2X up/ Down Cntr*	*Element Received*

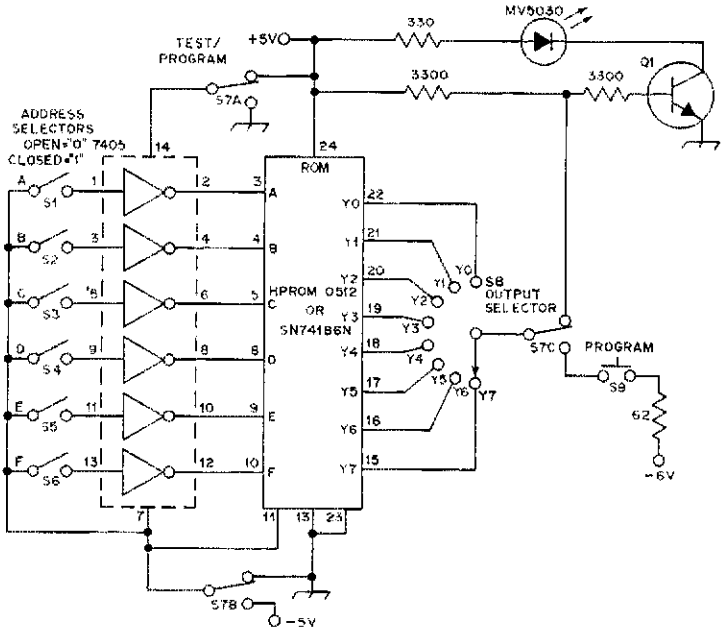


Fig. 3 — Schematic diagram of the programming circuit for the programmable read-only memory integrated circuit. Q1 is an npn switching transistor; 2N1711, 2N1613 and 2N3904 are suitable for use in this circuit. The LED is a Monsanto MV 5030 or equivalent, S1 through S6 are spst toggle switches, S7 is a 3pdt toggle switch, S8 is a sp8t rotary switch, and S9 is a momentary contact push-buttom switch, spst.

This mode cannot be used for normal operation because of its susceptibility to noise. If a noise pulse were received (such pulses are usually of short duration), it would be interpreted as a dot and its resulting mark count stored in the up/down counter. Thereafter, all dots and dashes (being considerably longer than the noise pulses) would be interpreted as dashes and the system is said to have "lost lock."

After two seconds the circuit goes back to the normal mode and the up/down counter is again corrected by only one count at a time. Table II shows how both NORM and CAL modes operate in addition to the effect of noise during both modes. The effects of noise are presented only to emphasize the difference in the two modes. The band-pass and low-pass filters and threshold detectors do an effective job in rejecting noise. However, under adverse conditions some noise will still get through. Note that in multiplying the contents of the up/down counter by two, there are still only 8 inputs to comparator 1. The least significant bit is grounded. Therefore the maximum count that can be expressed is 254.

Space Detection

Space detection is essentially the same as mark detection. The mark signal is inverted to produce the space signal. The leading edge of the space signal (trailing edge of the mark signal) fires the 1-μs space one-shot and resets the space counter. It also tells the counter-control circuits that the mark is completed and it is time to correct the up/down counter if necessary. The up/down counter is multiplied by 2 as before and applied to comparator 3. This comparator makes the decision as to whether the space is an element or character space.

The up/down counter is multiplied by 5 and applied to comparator 4. This comparator makes the decision as to whether the space is a word space. Multiplication by 5 is achieved by first multiplying by 4. This is accomplished by shifting all of the bits two places then adding this result to the contents of the up/down counter in a full adder (i.e., $X + 4X = 5X$).

Decoding

The dot and dash outputs from comparator 1 are applied to the inputs of two 5-bit shift registers designated the dot register and dash register. The space one-shot (which indicates the end of the mark signal) is applied to the "shift" input on both registers thereby loading the dot/dash information into the registers. The registers initially contain all logic *0*s. If the letter B were received, a logic *1* would be shifted into the dash register and a logic 0 into the dot register at the completion of the first element. The next three dots would cause logic *1*s to be entered into the dot register and *0*s into the dash register. At this point the registers would contain a 10-bit representation of the letter B.

Punctuation marks and prosigns, some of which have more than 5 elements, produce unique codes.

For instance, the first 5 elements of a question mark are (..––.). When the final dot is sent, the first dot would be shifted out of the last cell of the register resulting in (.––..). Since this pattern of 5 elements is unique, it is sufficient to represent the character.

Thus, we have a unique 10-bit code representing each Morse character. However, since there are only 48 characters to be represented we have more bits than necessary. Five bits can represent 32 different characters ($2^5 = 32$) and six bits can represent 64 ($2^6 = 64$). Therefore we can represent the entire 48 characters with a minimum of 6 bits. We could of course use the 10 bit code directly. However, reducing the data to only 6 bits will simplify the remainder of the circuitry.

After a trial-and-error approach was made, a simple way of reducing the 10 bit code to a unique 6 bit code was found. By multiplying the value of the dot register by 2 and adding this quantity to the value of the dash register in the full adder, a new and unique 6-bit "intermediate" code is obtained. Refer to Table I for a listing of all codes.

A 6-bit storage register retains the "intermediate" code while the circuit is busy detecting the next character.

Programmable Read-Only Memory (PROM) Code Converter

The final step to the entire circuit is to convert the "intermediate" code to ASCII code for presentation to the printer or other readout device. This is accomplished with the use of a PROM. Before explaining the use of the PROM in this application, a general description of the workings of the PROM and its parent circuit, the read-only memory (ROM) will be covered. A ROM is a device with multiple inputs and one or more outputs. The individual inputs are referred as address lines, while the various arrangements of *1*s and *0*s applied to the address lines are called words. For a simple example, let us assume we have a ROM with 2 inputs and 3 outputs. Since there are four possible words with 2 inputs (00, 01, 10 and 11), this device would be called a 12-bit ROM (4 words X 3 output bits per word). Similarly, a 3-input/4-output device would be called a 32-bit ROM (8 words X 4 output bits per word). A ROM is generally a "special-order" device whereby the purchaser specifies to the manufacturer the desired states of the individual outputs for each possible input word in the form of a truth table. Special-order devices such as these are very expensive as the purchaser usually pays a one-time engineering charge on the order of $500 to $2000 for the manufacturer to develop a photographic mask used in the final fabrication steps of the IC. It is this mask which provides the input/output relationships required by the purchaser. Thereafter, the individual ICs are more reasonably priced, in the $10 to $20 range. At this time there are several manufacturers offering 4096-bit devices with promises of bigger things to come. The biggest use for these "custom" devices are in calculators and computers where outputs are programmed to be the logarithm, sine, cosine, etc., of the inputs.

A more reasonable and less costly solution to achieving the same result is the PROM. As the name implies, a PROM is a ROM that the user can program himself. Several manufacturers are now offering PROMs and each has different methods for programming and operation. Therefore, for the purposes of this discussion, we will cover only the methods used with the particular device chosen for this project.

Programming is performed by actually blowing micro-miniature nichrome fuses within the device. When purchased, all output bits are in a logic *0* state for all input words. Therefore, it is only necessary to program bits which are required to be in a *1* state. Once programmed, the process is irreversible as the fuse cannot be restored. The device chosen is a 512-bit unit arranged as 64 words by 8 outputs. Since only 6 output lines are required for the ASCII code, there are 2 spares which may come in handy in the event that an error is made during programming. For normal operation, only +5 V power supply is required. However, during programming +5, −5, and −6 volts are needed. The −6 V may be a standard lantern battery. The circuit in Fig. 3 is used for programming. Once the PROM is programmed, the circuit is no longer required. The programming procedure is as follows:

1) Plug the IC to be programmed into the socket.
2) Set TEST/PROG switch to PROG.
3) Connect power.
4) Set address switches A through F to word A of the intermediate code (*000101*) as shown in Table I.
5) Set the OUTPUT SELECTOR switch to position Y0.
6) Press and release the PROG switch. This blows the fuse in output Y0 of word A (*000101*) setting that bit to a logic *1*.
7) Set the TEST/PROG switch to TEST. The LED should light, indicating that the bit has in fact been programmed.
8) Set the TEST/PROG switch to PROG.
9) Set the address switches A through F to word B (*010110*).
10) Set the OUTPUT SELECTOR switch to each position where a logic *1* is required as shown in the ASCII code of Table I, then press and release the PROG switch.
11) Set the TEST/PROG switch to TEST and verify that the desired bits have been programmed.
12) Repeat steps 8 through 11 for each of the input words.
13) Disconnect power and remove the programmed IC.

Although it sounds like a lot of work, it only took me about an hour to do. The PROM will now convert the intermediate code to ASCII code.

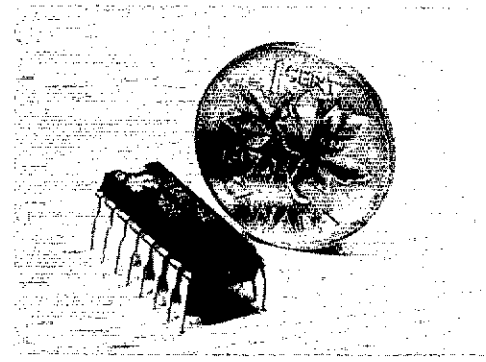
Each time a character space is detected by comparator 3 (which indicates that a complete character is contained in the two 5-bit shift registers) a 1 μs one-shot is fired. The leading edge

(Continued on page 37)

CMOS AND THE HAM

BY RON TODD,* VE2AXW/WA2JAM

Ronald C. Todd, senior design engineer for Siltek International Limited, has for more than five years been involved in the design, testing, and application of complementary MOS (CMOS) integrated logic circuits. As a designer of CMOS ICs, he is aware of the several common misconceptions and consequent misapplications of this family. In this article he not only spells out but also explains the why of "ground rules" for using members of this family in logic-circuit designs.



IT SHOULD BE apparent that CMOS is now a full-fledged family of integrated-circuit logic and medium-scale integration (MSI) functions. Most manufacturers have implemented or are implementing standard outputs and loading rules. While actual implementation of the functions is not consistent, variations encountered are almost always for improved operating parameters. Input protection circuits, however, are not consistent from manufacturer to manufacturer, from device type to device type, and, unhappily, sometimes inconsistent even between inputs of the same device. This last phenomenon is not a result of manufacturing parameter variation, but is due to chip design. Admittedly, there are certain parts which require various different schemes of input protection, such as some types of ac-coupled circuit – astable and monostable multivibrators, for example.

Input Protection

What about input protection? Probably the most notorious feature of CMOS logic is the susceptibility of the gate to damage by discharge of static electricity. Such static charges are of low energy but can be of potentials in excess of 1000 volts, while the breakdown voltage for the thin gate oxide of CMOS circuits (1000 angstroms[1]) is in the range of 50 to 90 volts. In CMOS IC design there are three viable input-protection schemes now being used by manufacturers. The protection circuitry is included on the IC chip. Each of these protection methods is a compromise. In Fig. 1 you may see the schematic differences of these protection circuits. The single-diode protection scheme (A, B, and C of Fig. 1) is simple and requires a minimum of chip area. However, the protection afforded by this method is also minimum. There are several circuits which require the use of this method, notably due to input swings which may greatly exceed the power supply bias in one direction under normal operation. The double-diode-plus-resistor scheme of Fig. 1D offers the best protection of CMOS inputs, but does so by requiring two to four times more chip area than the single-diode method. This scheme exhibits good clamping of transients to the power supply terminals and in addition provides, in combination with the circuit capacitance, an *R-C* delay characteristic before the Zener diode avalanches to ground. This is the most widely used CMOS gate-protection scheme and has many variations in actual implementation. The third method of CMOS input protection, Fig. 1E, is called the transmission-switch method and uses the parasitic diodes of a CMOS transmission switch to obtain its clamping action. This scheme can use an effective area of zero on the chip but is susceptible to rupture of the transmission-switch control gates. As with the double-diode method, this protection scheme provides good clamping to the voltage-supply rails. The transmission-switch method is usually combined in tandem with the single-diode resistor protection characteristics to become, in effect, the double-diode method of Fig. 1D. The transmission-switch method is usually found at either the parallel- or serial-data inputs of shift registers, counters and flip-flops.

At this time, Motorola Semiconductor is the only major manufacturer of CMOS integrated circuits which does not consistently use double-diode (Fig. 1D) protection circuitry. In the light of this variation of input protection circuitry, I

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[1] An angstrom is one ten-billionth of a meter.

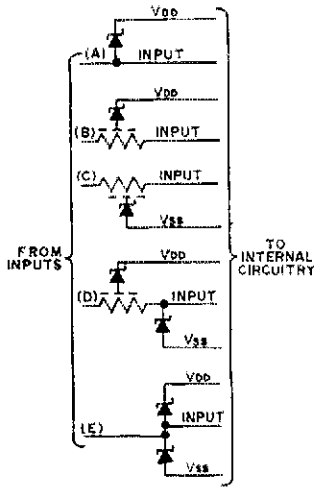


Fig. 1 -- Schematic representations of typical CMOS input-protection networks included in IC chips. The resistor-diode symbol represents a distributed diode structure. In all representations, Vdd > Vss. Typical breakdown voltages for diodes is between 35 and 100 volts. Typical resistance values are from 200 to 2500 ohms.

suggest that if a Motorola part is specified in an ac-coupled circuit, you should use a Motorola part. On the other hand, if a part from say RCA, Solid State Scientific or Siltek have been specified, you may use the same part from any other manufacturer except Motorola. Otherwise, different waveforms and possibly different operation may result. A Motorola part may be used providing a silicon diode is added to the circuit in shunt with the input such as in Fig. 2. Note: Do not use a germanium, hot-carrier or other type of diode which exhibits a forward voltage of 0.5 volt or less. Also there is no need to use a power diode. A good choice would be a 1N914 or similar device. You should realize that this mechanism is not to afford extra input protection but only to make the circuit perform in a more predictable manner. I understand that this difference in Motorola parts may soon be corrected as they retool some of their production components.

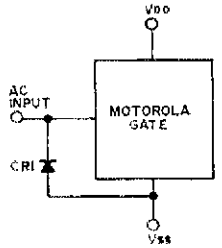


Fig. 2 -- Use of an external diode as a Vss clamp when using Motorola gates in ac circuits. CR1 is a 1N914 or similar diode.

300 pF per Person

As mentioned earlier, input-protection networks have been designed into CMOS circuits for the primary purpose of protecting the fragile gate oxides from damage due to accumulated static charge. The gate circuit of MOS devices may be considered as a low-value capacitor, typically 0.5 pF, and does not provide a dc path for current to flow as does a bipolar input circuit. See Fig. 3. Static charge which may accumulate on this gate capacitance through handling has no way of being "bled off" without input protection circuitry, Fig. 3B. Any charge of 25 to 50 picocoulombs impressed on a minimum-size unprotected CMOS input may destroy the gate dielectric. In contrast, normal operating bias usually covers the range from 1.5 to 7.5 picocoulombs for the same size devices. Consider for a moment now that you, as a human being, average about 300 pF of capacitance and by normal activities can store up to 15 kV. This works out to 4.5 microcoulombs. But, you also average around 50 to 100 kilohms of series resistance which, together with the input-protection networks of CMOS circuits, reduces these charges to safe on-chip values.

If you have trouble visualizing this, consider the equation for charge, $Q = CV$. The gate oxides of CMOS devices exhibit a typical rupture potential of 50 to 90 volts, while their normal operating range is 3 to 18 volts. The obvious conclusion would be: *Handle With Care*. This precaution was a strict requirement before the days of gate protection circuitry. While I do not mean to say that you should be irresponsible in the handling of of CMOS devices, I do mean that grounded working surfaces and static-free environments are not prerequisite to their use. At the very least you should use a grounded soldering iron tip. Any other power tools to be used on the equipment should also have grounds attached. This function is easily provided if you have a three-wire ac power system and conscientiously select and use the proper tools. A recommended soldering iron is the Ungar "Imperial."

Don't throw away your old soldering irons, because with a little ingenuity you can make a workable arrangement by using an alligator clip or banana plug and a length of shield braid from RG-58/U or RG-59/U coaxial line. Secure one end of the braid to the tip of your soldering iron or gun and either plug the banana plug into a ground terminal of a 3-wire ac system or clip it on to your cold-water pipes. The ground and power pins of your circuit board or chassis should be shorted temporarily and also attached to the same ground system in a similar manner. Aluminum foil is a good way to do this. Other power tools (drills, saber saws, etc.) should also be grounded in a like manner, especially if they will be used on this equipment after CMOS parts have been installed. You should also remove fabric rugs from work bench areas. Rubber mats are usable.

One final note on the protection devices is that CMOS circuits generally come packed in black conductive foam or black plastic and metal handler

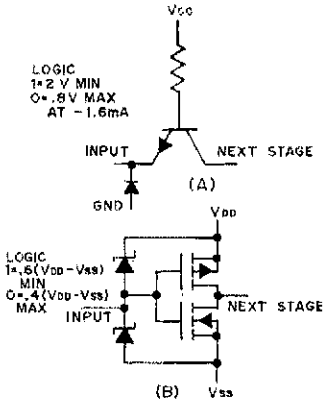


Fig. 3 – Schematic representation and camparison of input stages of TTL (at A) and CMOS (at B).

sticks. Try to leave the devices in these protective mediums until you are ready to use them.

Terminate All Inputs

The unprotected CMOS gate, being a capacitor, provides a mechanism for charge storage instead of dissipation. Unlike bipolar circuits, where the logic levels are dependent on current flow, the logic levels of CMOS circuits are dependent on voltage levels. Fig. 3 illustrates these differences. This characteristic alone sets CMOS apart from all other logic families, especially where energy-stingy applications are concerned such as when battery and portable operation is intended. Because there is no direct-current flow, another caution in respect to CMOS must be mentioned. When designing and constructing CMOS circuits, all unused inputs must be biased. If this is not done, excessive power supply current drain and/or malfunctioning of circuits may occur. Since there is no way for an accumulated charge to drain, a static bias may exist which will put the devices in either a high current dissipation mode or, just as bad, might put the device on the "wrong side of the truth table." This same consideration goes for inputs which might see an open or closed state of a switch. Either the switch should be a double-throw type with both terminals tied to a valid logic level or the normally open condition should be resistor biased to either Vdd or Vss as appropriate. For instance, I once inadvertently left a short metal run off a printed circuit board, resulting in the resets of a flip-flop being unbiased. I was quite sorry not to have a keyer working for the 1973 Sweepstakes. (It is not generally realized but TTL and other bipolar logic families should also have unused inputs terminated for optimum performance.)

Input-protection networks and gates of CMOS devices may also be damaged if inserted or removed from sockets while power and signals are applied. Always turn off power and low-impedance sources before replacing CMOS ICs. Another caution along this line is that CMOS devices may be damaged if low-impedance signal sources are on and driving these circuits without Vdd/Vss power applied. Always turn power supplies on first and off last.

Low Power

While package-power dissipation limitations (200 to 500 milliwatts) are generally not a problem with CMOS circuits due to their near-zero quiescent power dissipation, it can become a factor for reliability considerations when a heavily integrated MSI package is operated at Vdd/Vss magnitudes above 10 volts and at clock speeds near or in excess of 10 MHz. Check device specifications and average current drain if you are in this area. Another suggestion is to use the lowest power supply voltages that will allow reliable operation at the necessary system speed. A second package dissipation problem exists if you try to drive stiff current sinks and/or sources. Check current output levels and voltage drops when driving TTL circuits or LED indicators; you may have to include current-limiting resistors, particularly with LEDs. A final consideration of package dissipation occurs in relation to input protection devices: don't overdrive inputs; keep all input signals to CMOS circuits at levels between the supply voltages. If you cannot do this, limit the current with a series limiting resistor, voltage divider, or diode clamp that can handle the current and keep the signal in the proper range. This caution, though not often remembered in this light, is also necessary in ac-coupled circuits. Watch input current levels (10 mA maximum), particularly when using large capacitors to obtain long time constants or when using very small-value resistors for moderate-length time intervals.

While I have not taken the space here to go into the physics or all the peculiarities of CMOS logic circuits, I have tried to make you aware of some of the more common and more serious oversights which have and still do result in CMOS being the most-cussed logic family. Actually, if you observe 80% of the cautions and commandments that I have given you, you will begin to respect CMOS for all the fine attributes that it has. Fewer CMOS systems suffer from timing problems and system-induced noise on the first design iteration than systems designed with other types of logic, regardless of the care given in design and fabrication.

Who Makes CMOS?

The list of CMOS manufacturers and their device codes given at the end of this article should be of great aid in parts procurements in the event that your favorite distributor does not stock the brand of ICs specified in the article you are referencing. There are three major subfamilies of CMOS. These are:

1) CD4000 series. This is the oldest and most firmly established CMOS family. It contains a good representation of gates, flip-flops, and MSI functions. This is the most widely "second-sourced" family of CMOS but suffers from some system compatibility faults. With the announcement by RCA, the family's innovator, of

its B series specification, the family will now take on standard output parameters.[2]

2) MC14500 series. Motorola introduced early members of this series in 1971 to supplement several obvious holes in the CD4000 series of CMOS ICs. Since then the family has added systems-oriented MSI functions, including several functions patterned after some SN7400-series TTL functions.

3) MM74C00 series. This family and its sister family (MM54C00) were the first CMOS families which could truly live up to the title of a logic family. National Semiconductor, which announced the family in early 1972, notes that its features are true TTL-level compatibility, pin-for-pin CMOS logic equivalents for the SN7400 series parts from which they take their numbers, and true family characteristics.

The CD4000 series is the most widely second-sourced CMOS family. National Semiconductor's MM74C00 series has the next widest second- source capability. Many of the MC14500 series parts, as well as several of the MM74C00 series parts, are now being second sourced by RCA and several other manufacturers. While RCA and the few suppliers who at least partially second source the MC14500 series parts use the 4500 series numbers, we will have to wait and see if the MM74C00 series becomes absorbed by the 4000 series parts; RCA has begun using CD4000-series part numbers for those MM74C00 parts which they second source.

[2] EDITOR'S NOTE: "Second source" is a term used in the industry for manufacturers of devices equivalent to those introduced to the market earlier by an original manufacturer.

Super CMOS

Some vendors, Inselek, Fairchild Semiconductor, and Harris Semiconductor, do not produce conventional bulk-substrate CMOS. These manufacturers use special substrates and/or special isolation techniques in the fabrication of their parts which is most generally seen by the user as higher speed of operation and lower quiescent power dissipation. I would not suggest mixing the parts from these vendors with those of other suppliers unless careful consideration is given the possibility of spike (glitch) hazards in the logic system.

Got a Headache?

Buffered gates, like buffered aspirin, offer some advantages. The buffered gate is contrasted to the simple gate structure in Fig. 4. The prime distinctive feature of buffered gates is the addition

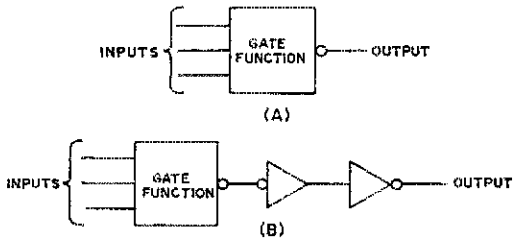


Fig. 4 – Schematic difference between a simple (unbuffered) IC gate structure (at A) and a buffered CMOS gate structure (at B).

Appendix

CMOS Manufacturers and Their Device Codes

Manufacturer	*4000 series code*	*4500(14500) series code*	*74C/54C series code*	*Other codes & types*
Fairchild Semi.	F34000	———	———	———
Harris Semi.	HD4000	———	HD74C00 HD54C00	HD4800♦
Inselek Inc.	INS4000S	———	———	INS4200S★
Motorola Semi.	MC14000	MC14500	———	MC14400▲♦
National Semi.	MM4600	———	MM74C00	———
	MM5600	———	MM54C00	———
RCA S.S.D.	CD4000	CD4500	CD4000	———
SGS-ATES	HBF4000	———	———	———
Signetics	N4000	———	———	———
Siltek Int. Ltd.	SIL4000	SIL4500	SIL4000	SIL4900■▲ SIL1900★
Solid State Sci.	SCL-4000	SCL-4500	———	SCL-4400▲ SCL-5500★
Solitron	CM4000	———	———	CM4100▲
Teledyne Semi.	———	———	MM74C00 MM54C00	———
Texas Inst.	TP4000	———	———	TP/TF
	TF4000	———	———	4300▲★

Symbols for other codes and types:
■Special small-scale integration (SSI) and buffered gates
▲Special MSI/LSI (large-scale integration)
★Memories
♦Analog and interface

of two inverters after the logic block. These inverters contribute some extra delay to the signal but add some other beneficial features: loading on each stage is optimized, the delay of each stage is minimized, capacitance of inputs is reduced due to smaller devices in the logic stage, overall chip size is usually smaller, output characteristics are symmetric and independent of the number of active inputs, the transfer curve is sharper, noise immunity is better, and buffered gates usually exhibit less propagation delay in real systems. Inverting gates may be either simple or buffered depending on the supplier and/or part number, while noninverting gates are now exclusively buffered. To date, only Solid State Scientific and Fairchild Semiconductor supply buffered gates exclusively. Siltek International Limited offers both buffered and nonbuffered (simple) gates. RCA should soon be offering buffered gates as part of their B series specification program. Due to the extra inverters in their circuits, buffered gates exhibit some unique properties in their operation. When compared to simple gates, buffered gates will exhibit higher propagation delay in lightly loaded systems but will show lower propagation delays when heavily loaded by capacitance. This is a consequence of their better and more symmetrical output characteristics achieved by isolating the logic function from the output driving function. The most unique difference in operation of buffered gates is that there is a significant phase shift through them and this may result in erratic performance in oscillator, one-shot and linear circuits. Again, for ac circuits and for linear uses, it would be best to try to stick to the original manufacturer but if you are careful in your choice or are willing to do a little more cut and try than none, the parts from other manufacturers may be used. The appendix lists CMOS suppliers and their device codes.

I realize that many hams and engineers, too, are still stuck in the bipolar logic world and are ignorant of CMOS (many will stay in the vacuum-tube era if possible!). While CMOS cannot solve all your logic problems and falls flat on its nose in other areas, the same can be said for any logic family. CMOS does offer some unique advantages that are just coming of age. At present CMOS is the most energy-conscious logic family and with prices getting lower with increased availability, CMOS may very well become the logic family for roughly 80 to 95% of all ham applications. QST

A Morse Code

(Continued from page 32)

of the one-shot causes the intermediate code to be stored in the storage register. The trailing edge of the one-shot fires a second 1 μs one-shot which resets the two 5-bit shift registers and also provides a print command to the printer or other readout device.

If the character space is also a word space, the one-shots are fired in sequence again via OR gate U12. However, this time the two 5-bit registers contain *0*s which results in an intermediate code of *000000*. This code is stored in the storage register and then converted by the PROM to *100000* which causes the printer to space.

The clock oscillator provides the square wave required to advance the mark and space counters. The mark counter is an 8-bit device and therefore capable of counting to 255. However the dot length can only be allowed to count up to 51. This is because the dot count is multiplied by 5 and applied to the word-space comparator which also has a limitation of 255. A dot count of greater than 51 would result in a number greater than the word-space comparator can handle (overflow). If the minimum allowable dot length is set at 5, then a 10-to-1 ratio of code speed can be achieved with a single fixed clock frequency. However, in order to give the system enough capability for all anticipated code speeds (including those of new Novices where its ability to cope with widely varying weight ratios is extremely helpful) two overlapping ranges were used.

The upper range was set at 6-60 wpm. The clock frequency is then set to give 51 counts per dot at the 6-wpm speed. At this speed a dot is 200 ms long resulting in a clock frequency of 51/0.2 = 255 pulses per second. For the lower range the clock frequency is set to about 64 pulses per second resulting in a range of approximately 1.5 to 15 wpm.

Printer and TV Display

A strip printer was initially purchased for use with the system. It provides good, clear hard copy and is ideal for cw traffic work where it is necessary to have a copy of the messages sent. It required +5 V and +36 V and has a maximum printing speed of 300 wpm. No inking is required as it uses pressure-sensitive paper tape.

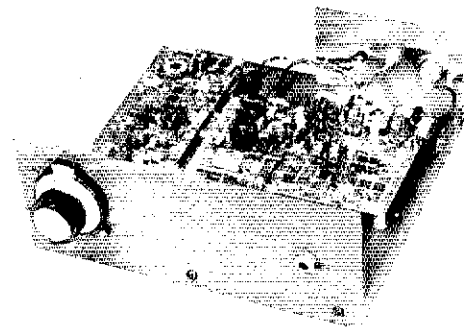
I realized that the cost of such a device would put a damper on building the system for many hams, so I sought a more economical method. This resulted in the ASCII to TV display converter which will be described in detail in Part III.To keep cost and complexity at a minimum, a single line format was used as opposed to a full page display. The characters enter on the right hand side of the screen and continue to shift left as new characters are entered. Video information modulates an adjustable rf oscillator which is adjusted to the carrier frequency of an unused station in your area. No modifications to the TV are necessary. Connection to the TV receiver is made directly to the antenna terminals. QST

Parts II and III of this article will appear in a subsequent issue.

LEARNING TO WORK WITH SEMICONDUCTORS

Part VI

BY DOUG DeMAW,* W1CER AND
JAY RUSGROVE,** WA1LNQ



Part V of this series covered the design and assembly of a 10-watt, solid-state amplifier for use with the QRP transmitter described in Part III of the course. In this concluding installment we discuss some fine points on VFO design and show how to build an extremely stable 80-meter VFO for use with the transmitter.

IN THIS, the final installment of the series, we will examine the basics of solid-state VFO design, then proceed to construct an 80-meter VFO to be used in place of the crystal-controlled oscillator which was described earlier in the course. It will be helpful to the reader if some of the basics of oscillator design are reviewed before getting started with the nuts and bolts part of this installment.

Stability is the primary requirement of any good VFO used in amateur work, and so idealistic a trait is seldom easy to assure. The Colpitts oscillator of Fig. 1 has been proved to be one of the more stable types for use in solid-state circuits. The large shunt capacitance which is used in the feedback network (C30 and C31) tends to "disguise" the changes in transistor junction capacitance, as seen by the frequency-determining part of the oscillator. Changes in junction capacitance at Q5 are caused by internal heating when the operating voltage is applied. Additional changes in capacitance are brought about by changes in room temperature, as is true of most any capacitive type of device.

A JFET oscillator is preferred over one which uses a bipolar transistor. Bipolar transistors are more subject to changes in input impedance than are vacuum tubes or FETs, and impedance changes can cause shifts in operating frequency. However, some change can occur in the FET input impedance, however small, as the sine wave swings through its 360-degree excursion. The effect is most pronounced during the positive-going part of the cycle, as at that time the transconductance of the FET reaches a peak value. To lessen that effect we have added CR1 from gate to ground. It clamps on the positive-going waveform and aids stability. Furthermore, by clamping the positive half of the sine wave we are reducing harmonic output from the oscillator. This results from a significant reduction in junction-capacitance change. The latter, by virtue of a nonlinear change in capacitance, helps to generate harmonic currents. If RFC8 had no dc resistance, the diode would not be beneficial, as the gate-source FET junction would perform in much the same fashion as CR1. But, when source bias is used, or in situations such as this, where dc resistance is introduced in the source return, a diode clamp is worth including in the circuit.

VFO Tank Circuit

In order to utilize the high value of feedback capacitance of C30 and C31 we would normally need a very low value of inductance at L8 – assuming a parallel-resonant tank was used. There are some serious complications to such a design method. Instability can occur almost as easily with low L and high C as it can with the opposite condition – low C and high L. This results from changes in inductance brought on by temperature changes, and this malady is particularly prevalent when inductors with iron or ferrite cores are used: small changes in core properties can cause significant variations in effective inductance at L8.

One easy way to defeat the problem is to use a series-tuned tank. The circuit of Fig. 1 (Q5) shows how it can be done. Old timers will recognize this as the series-tuned Clapp of tube-day popularity. The principal difference between this and the tube version is that tetrodes were used in the tube designs, and rf output was taken from the plate across a broadly resonant reactor – usually an rf

* *QST* Technical Editor
** ARRL Beginner and Novice Editor

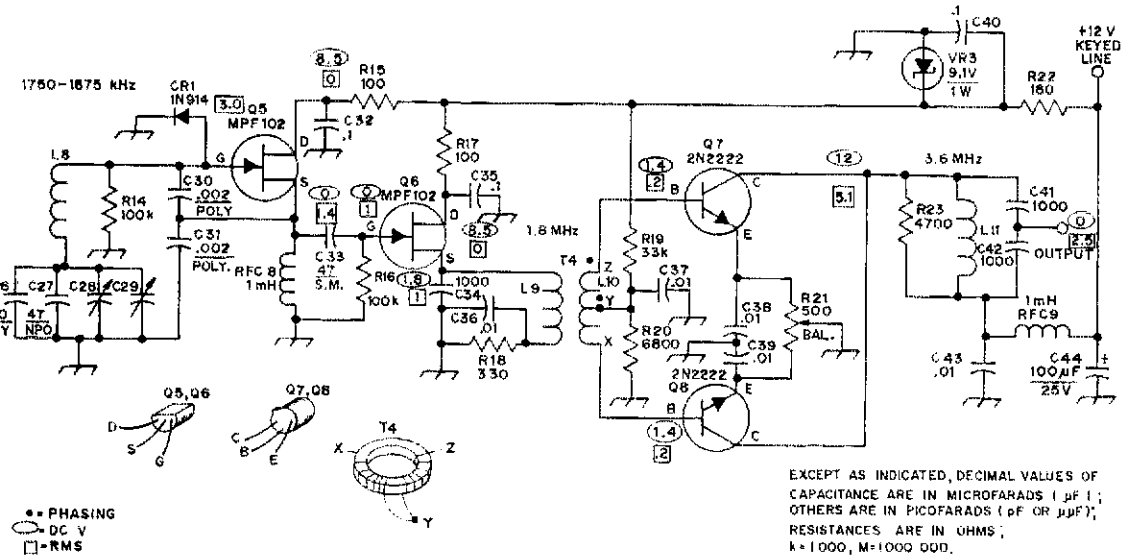


Fig. 1 — Schematic diagram of the VFO. Fixed-value capacitors are disk ceramic unless otherwise noted. Polarized capacitors are electrolytic. All resistors are 1/2-watt composition type. Inset drawings show transistor base configurations and proper phasing of T4 leads.

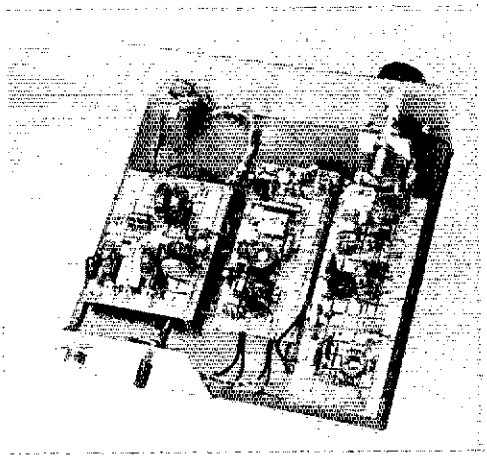
C26 — 240-pF polystyrene.
C27 — 47-pF NP0 type.
C28 — 4.5 to 25-pF ceramic trimmer (Centralab 822-CN or equiv.).
C29 — 4 to 53.5-pF variable (Millen 22050 or equiv.).
C30, C31 — .002-μF polystyrene.
C32, C35, C40 — 0.1 μF.
C33 — 47-pF silver mica.
C34, C41, C42 — .001 μF silver mica
C36, C37, C38, C39, C43 — .01 μF.
C44 — 100-μF electrolytic, 25 volts.
CR1 — Silicon diode (1N914 or equiv.).
L8 — 74 turns No. 30 enam. wire on an Amidon T-80-2 toroid core.
L9 — 35 turns No. 24 enam. wire on an Amidon T-80-2 toroid core.
L10 — 12 turns No. 24 enam. wire, center tapped, wound over L9.
L11 — 24 turns No. 24 enam. wire on an Amidon T-80-2 toroid core.
Q5, Q6 — Motorola MPF102 JFET or equiv.
Q7, Q8 — 2N2222 transistor.
R21 — 500-ohm control (Radio Shack 271-226 or equiv.).
RFC8, RFC9 — 1-mH rf choke (Millen J300-1000 or equiv.).
VR3 — Zener diode, 9.1 volt, 1 watt.

choke. By employing the series-tuned tank we are able to use a more conventional amount of tank inductance than would be typical of a parallel-tuned tank with a high-*C* feedback network. Therefore, we have done two things toward aiding stability . . . designed for high *C and* high *L*. Although earlier in the course we cautioned against using inductors with magnetic cores of powdered iron or ferrite (in the interest of best stability), we have used a toroid core at L8 in what can be called a design trade-off. The oscillator operates at 160 meters, where drift should not be a big problem. Changes in circuits reactances are quite minor respective to a low operating frequency, and by using a high-*L* inductor the temperature-change effect on the core, and consequently the inductance, is small. The toroidal inductor at L8 has self-shielding properties — a characteristic of toroids — thereby lending itself nicely to our open-circuit style of construction in this course.

One more point to be mentioned concerning stability is the choice of capacitors in the tank circuit. For many years it has been a practice to use silver-mica capacitors in VFO circuits, as they exhibit good stability characteristics and have reasonably high *Q*. The writers discovered that much better stability could be realized by using polystyrene capacitors in the tank circuit. They are less subject to capacitance-value change during variations in ambient temperature than is true of silver micas. Rf current flowing through them appears to have less effect than with silver micas. Furthermore, polystyrene capacitors are somewhat less costly than the mica types. An NP0 capacitor is used at C27 to correct a slight drift which was noticed. As the circuit of Fig. 1 is configured, drift is only a few Hz at 160 meters — less in fact than with some commercial VFOs tested in the ARRL lab.

The Buffer

It is wise, if not essential, to include a stage of isolation between the oscillator and its load, or succeeding amplifier stage. The use of a buffer costs little additional, and is well worth the effort of adding it to the lineup. A buffer helps to disguise load changes reflected from the transmitter to which the VFO is connected. As we said



Here is a photograph of the completed 10-watt, VFO-controlled transmitter. The amplifier module is at the left, the driver board is in the center, and the VFO assembly is at the right of the picture. The variable capacitor can be seen at the upper right hand corner of the transmitter.

earlier, changes in impedance cause frequency shifts, and load changes cause variations in the impedances.

A JFET buffer was chosen for Q6 because it has a high-impedance input characteristic. This feature helps reduce loading effects on the oscillator. C33 is a small-value coupling capacitor, chosen to provide ample driving voltage to Q6, but small enough in value to minimize the coupling between Q5 and Q6. One should never use more coupling capacitance than is necessary.

Output is taken from the source of Q6 by means of a tuned toroidal transformer. C34 tunes the circuit to resonance broadly at 160 meters. Source bias for Q6 is provided by means of the 330-ohm resistor at the ground end of L9. A source follower, which is what we are using at Q6, is similar to a cathode follower in vacuum-tube work. It always delivers less voltage output than is fed to it – approximately 0.9 of the input amount. Therefore, it is stressed that Q6 is purely a *buffer* – not a buffer/amplifier.

Push-Push Doubler

A push-push doubler is almost as efficient as a straight amplifier. The input is fed in push pull (base signals 180 degrees out of phase with one

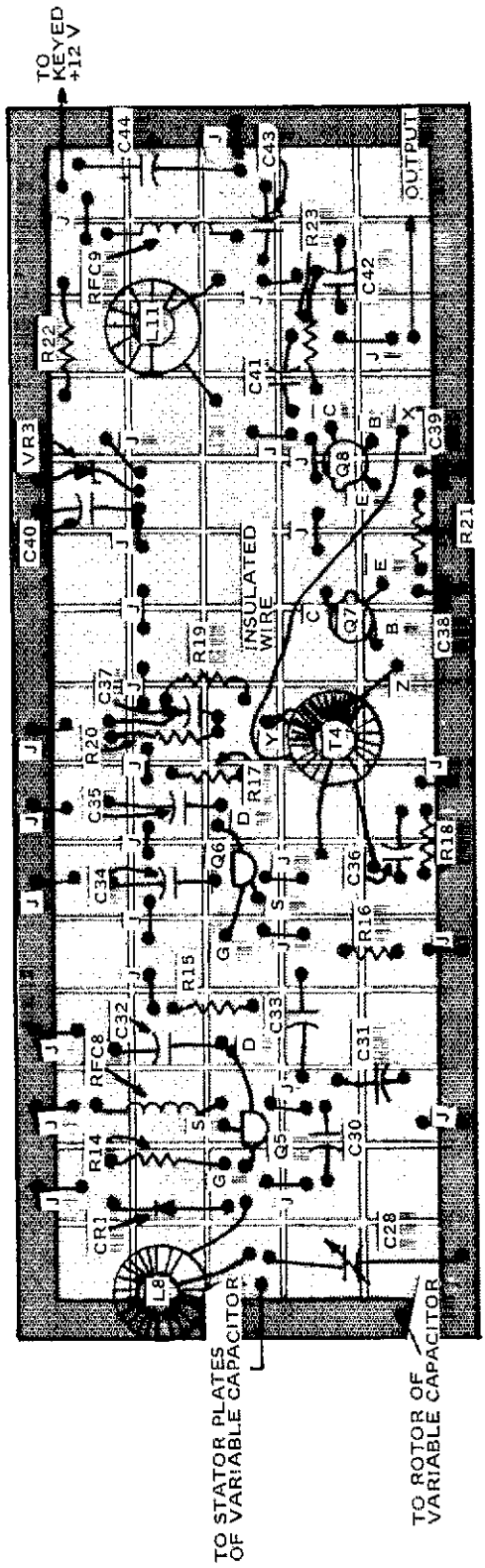
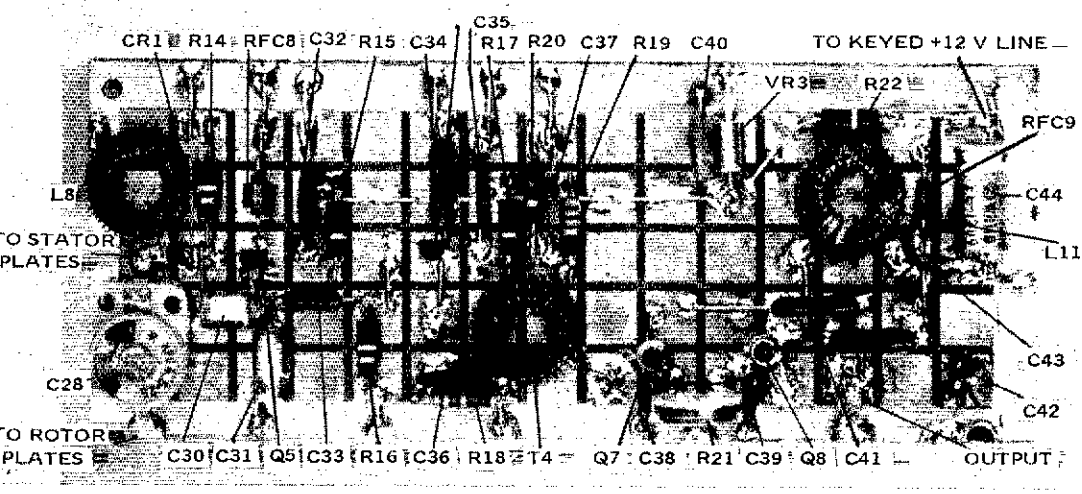


Fig. 2 — Scale drawing of the VFO circuit board showing parts layout. The isolated-pad board is glued to a slightly larger piece of copper-clad board. The latter serves as a ground plane for the composite circuit.



Photograph of the assembled VFO board showing component placement. Due to an oversight, R23 was not connected to the circuit board when the photograph was taken. It should be connected to the board as shown in Fig. 2.

another), and output is taken in parallel fashion from the collectors. The advantage of using a frequency doubler at the VFO output is reduced "pulling" on the oscillator, because the reflected load changes are smaller (less impedance variation). A frequency multiplier provides benefits similar to those of buffers. In this example we can say that *two* buffers follow Q5, even though a push-push doubler is one of them.

T4 is wound so that the secondary winding is split, thereby allowing a push-pull drive to Q7 and Q8. If the polarity of the winding (L10) is not correct, the doubler stage will act as a straight parallel-connected amplifier, and may even be unstable.

Push-push doublers must operate in Class C in order to perform *as* frequency doublers. It can be seen that Q7 and Q8 *appear* to operate Class A by virtue of the base-bias network. Forward bias is used here only to increase the stage gain. The signal voltage drives Q7 and Q8 into the Class C region, and assures good doubling action.

In theory, a push-push doubler should contain two perfectly balanced tubes or transistors. If balance of the dynamic characteristics is not assured, the output waveform will be unclean, containing a goodly portion of the driving voltage which, in this example, would be on 160 meters. We have made it possible to "sanitize" the waveform by placing a balancing control, R21, between the emitters of Q7 and Q8. It is adjusted for best purity of the output waveform. If Q7 and Q8 were perfectly balanced, a pure 80-meter waveform would be found at the collectors, even if a tuned circuit were not used. That is, a 1000-ohm resistor could be used to replace L11, C41, and C42. However, a voltage drop would occur across the 1000-ohm resistor, and that would greatly reduce the available power output. Measurements were made of the circuit in Fig. 1, and it was learned that the 160-meter energy was at least 50 dB below that of the desired 80-meter energy, after balancing by means of R21. Harmonic energy was also well below the desired output signal level – approximately 40 dB.

A capacitive divider (C41/C42) is used to step down the output impedance to a low value suitable for driving the first stage of the main transmitter strip. The lower the output impedance of a VFO chain, the less chance there will be for load changes being reflected into the VFO. In fact, it is common practice to make the VFO-strip output impedance *much lower*, say, 50 ohms, than the input value of the stage to be excited. When this is done it becomes necessary to "beef up" the output power from the overall VFO to make up for power lost through mismatching. This is another acceptable design trade-off. A typical low-level Class A transmitter amplifier stage, to which a VFO is connected, has an input impedance of approximately 500 ohms.

A 4700-ohm "swamping" resistor is connected across the push-push doubler tank to broaden its frequency response. This serves two important purposes: it assures 80-meter output at a relatively constant level, and prevents self-oscillation at Q7 and Q8. The latter can be brought on by the significant mismatch between the doubler stage and its transmitter load. Although a doubler is not supposed to self-oscillate, most can be made to do so if very careful attention is not paid to physical layout. Because of stray rf currents which can flow on a circuit board and through the associated wiring, phase relationships can be such that oscillation will take place.

Regulated voltage is supplied to Q5, Q6, and

the bases of Q7 and Q8. It is provided by means of a Zener-diode regulator, VR3. The regulated voltage is necessary to prevent frequency jumping when changes in supply voltage occur. Now we move to the fine points of VFO construction, checkout, and operation.

Construction

The easy to duplicate isolated-pad circuit board construction technique (used in the workshop portions of Parts I, III and V of this series) is employed in the building of the VFO. A piece of isolated-pad board which measures 2 × 6 inches, and contains four rows of fifteen pads, is affixed to a slightly larger piece of ordinary copper-clad board. The two boards should be bonded together with GE Silastic cement or epoxy glue.

All of the VFO components other than the variable capacitor, C26, and C27, are mounted to the circuit board. The variable capacitor is supported above the wooden chassis by means of an L-shaped bracket which was fabricated from a scrap piece of aluminum sheet. A vernier-drive mechanism is used for the VFO dial, as it provides a more comfortable tuning rate than an ordinary knob with no speed reduction. It is wise to mount the vernier-dial assembly on the front panel before the holes in the L bracket are drilled. In this manner, better alignment of the capacitor shaft and the vernier coupling can be obtained. Also, the hole in the L bracket can be made slightly oversize to compensate for misalignment. If the capacitor shaft and vernier coupling are not in proper alignment, slippage within the vernier can occur. This condition is most undesirable if one wishes to QSY in a hurry! C26 and C27 (as can be seen in the photograph) are soldered to the wires which connect the variable capacitor to the remainder of the circuit.

L8, L11 and T4 should be secured to the circuit board, as any movement of these coils, especially L8, will cause a shift in VFO frequency. This can be accomplished by placing a small piece of circuit board, with the copper foil removed, under each of the coils and then coating the pieces of circuit board and coils with a small amount of *Q* dope. A few drops of dope should be placed on the bottoms of the small pieces of etched board to hold them securely to the main circuit board. *Q* dope is a specially formulated cement that will not appreciably affect the *Q* of the coil. While it hasn't been tried with this project, the writers have found airplane cement to be a reasonable substitute for *Q* dope. The finishing cosmetic touches include spray painting the front panel bright red and replacing the somewhat mundane looking vernier knob with a more stylish one.

Hookup and Operation

Disconnect the wires running from the crystal-controlled oscillator to the driver module. Remove the oscillator module and in its place mount the VFO board. Connect the keyed +12-volt line to the +12-volt pad on the VFO board. Connect the wire running from the output of the VFO to the junction of R5 and R6 on the driver board. Note that capacitor C5 will no longer be used as the coupling capacitor. Use a piece of hookup wire to connect the rotor (movable part) of the variable capacitor to the ground foil of the circuit board. The stator (fixed part) of the capacitor should be connected to the pad marked "to stator plate." The location of this pad can be seen in the parts layout diagram.

For initial tuneup of the VFO, R8 on the driver board should be set to the minimum drive position. Adjust the variable capacitor so that its plates are fully meshed. Connect the 12-volt power supply and dummy load; then plug a key into J1. The station receiver will be used in making the low-frequency adjustment of the VFO. Tune the receiver to 3498 kHz and insert a wire into the receiver antenna receptacle. Place the other end of this wire in close proximity to L11. Key the transmitter and adjust the trimmer capacitor, C28, to bring the VFO on frequency. For the next adjustment, a receiver, dip meter, or oscilloscope may be used. Set the VFO of the transmitter to 3600 kHz and listen for the fundamental output of the VFO (1800 kHz) on the receiver. Adjust R21 for *minimum* signal strength. If a receiver that covers 1800 kHz is not available, a dip meter may be used in its place. Using the dip meter in the detector mode, and with its coil coupled to L11 of the VFO, the meter should deflect upwards. Adjust R21 for a minimum indication on the meter. If the builder has access to an oscilloscope, it may be connected across the output of the VFO, in which case R21 should be adjusted for the purest sine wave obtainable. This completes the alignment of the VFO. R8 on the driver board should be readjusted according to the instructions in Part V of the series. A look at the schematic shows that the VFO is being keyed along with the Class A amplifier stage on the driver board. Although it may seem unconventional to key the VFO, the excellent frequency stability of the VFO permits this type of operation.

The completed transmitter covers the entire cw portion of the 80 meter band – 3500 to 3750 kHz. Its signal is clean, chirp and click free, as indicated by measurements made in the ARRL lab and numerous on the air reports. QST

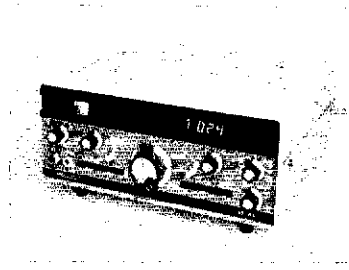
Strays

One of the old-time suppliers of components for radio amateurs passed away on July 7, 1975 – Karl E. Hassel, W9PXW, of Evanston, Illinois. Karl entered amateur radio in 1915 as 8AKG. During World War I he was a radio electrician at the Great Lakes Naval Training Station, where he met R.H.G. Mathews, then 9IK. After the war the two started Chicago Radio Laboratory and jointly operated amateur station 9ZN, which led first to the trade mark, "Z Nith," for their products and then to the eventual name of the company, Zenith, from which Karl retired in January, 1966; he continued on the Zenith Board until 1972.

Recent Equipment

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

The Heath SB-104 SSB Transceiver



THE HEATH SB-104 features an all solid-state design with digital readout. In other respects, the new rig is quite similar to contemporary transceivers in the Heath line. For instance, the basic transceiver mixing scheme and band coverage are the same as the popular HW-100 series and the preceding models of the SB series.

The Digital Readout

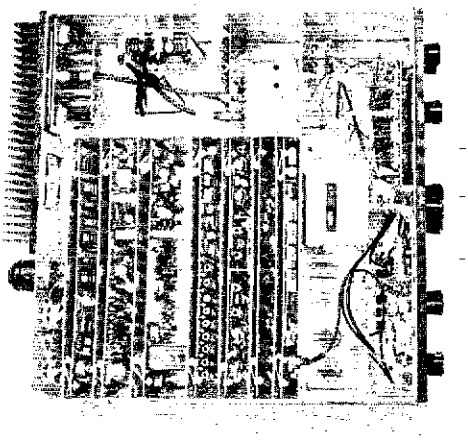
Perhaps the most notable operating feature of the SB-104 is the digital readout. One merely dials up a frequency with the VFO knob until the desired frequency is displayed on the Beckman planar gas-discharge tubes. The arrangement is not only easy to use but the need for a linear master oscillator (LMO) is eliminated as well. The latter presents a problem with analog readouts and requires factory adjustment if highest accuracy is to be maintained. With digital readout, VFO linearity is relatively unimportant. This permits the VFO in the SB-104 to be constructed by the builder.

Designing a digital readout for a transmitter would be a rather simple task. Outputs from the VFO, HFO, and carrier oscillator could be combined in a mixing scheme to provide an output of the operating frequency. An ordinary counter would be sufficient as a frequency readout. Unfortunately, such a system would most likely prove unsuitable for receiving pruposes. A signal at the operating frequency strong enough to drive the counter would require adequate isolation between the signal source and the receiver front end. Considering the small signal levels at the receiver input, such isolation would be very hard to achieve. On the other hand, merely counting the VFO frequency and adding in some correction factor for the other oscillators would result in relatively inferior frequency accuracy.

The digital display in the SB-104 utilizes a modification of the latter method but without compromising frequency accuracy to any noticeable extent. Since the same carrier oscillator is used on all bands, its output is not counted, but the correct frequency is preprogrammed into the counter circuitry. Since there is a different carrier frequency for lsb, usb, and cw, the corresponding frequency must be selected (by means of the mode switch on the front panel).

Output from the VFO and HFO is fed into a mixer and the difference signal between the two frequencies is then conducted to the counter. A "false zero" of 10,000 is selected for this scheme and the count starts from 10,000 minus the required carrier frequency (6603.6 for usb operation, for instance). After the VFO and HFO difference frequency is counted, the last five digits of the count correspond to the last five digits of the operating frequency. The first digit is either 1 or 2 (or is left blank in the case of 3.5- or 7-MHz operation). This first digit is selected by means of the band switch.

The advantages of this system are that no signal at the operating frequency is required and errors caused by any slight deviation in HFO crystal frequency are eliminated. Once calibrated, accuracy of the SB-104 display will be the same for all bands. The only errors that could occur would be changes in the carrier oscillators or counter standard oscillator. However, spot checks with the SB-104 on CHU over a period of months indicated that if any such changes did occur, they were too small to be detected.



Top view of the SB-104 receiver.

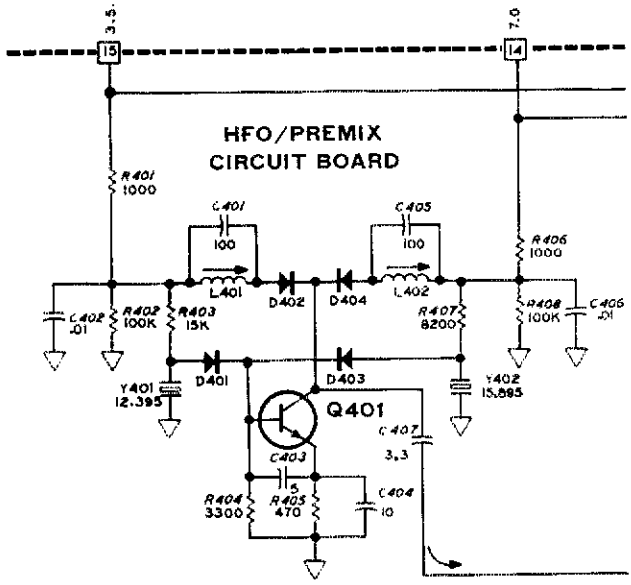


Fig. 1 — Diode-switching arrangement in the HFO/premixer board.

Other Features

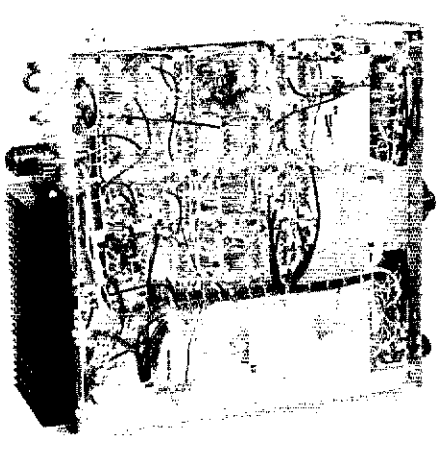
Other features include a modular type of construction, extensive use of diode switching, and a broadband solid-state PA. An extender board supplied with the kit permits in-circuit testing of a subassembly with the circuit board out of its shielded enclosure. This feature simplifies alignment and testing of the transceiver considerably.

Bandpass filters, in conjunction with diode switching, eliminate the need for a complicated band-switching arrangement. However, a separate band switch is necessary for the bandpass filter following the PA because of the power level involved. Voltages routed through another wafer of the band switch are conducted to the various subassemblies in order to complete the remaining band-switching functions. Two examples of how this is accomplished are shown in Figs. 1 and 2. Forward bias is applied to the diodes in the circuits to be activated while the diodes in the unused sections are reverse biased.

The schematic diagram of the PA is shown in Fig. 3. One of the difficulties with solid-state rf power amplifiers is that the devices become harder to fabricate as the power level is increased. Frequency considerations dictate that the internal elements of the transistor be as small as possible. However, gettong rid of excess heat becomes more difficult as the size is decreased. An alternative solution is to design a circuit that uses a larger number of low-power devices rather than a few high-power ones. The heat dissipation is then spread out through a number of units rather than being concentrated in only a few transistors.

The latter approach is evident in the PA for the SB-104. Two push-pull amplifiers are used instead of a single one. At the input of the amplifier, drive power is split equally by the hybrid combiner consisting of L951 and conducted to the push-pull amplifiers. The push-pull configuration has the advantage that even-order harmonics are suppressed, which makes filtering requirements less severe. The output of the two amplifiers is then recombined in the hybrid combiner consisting of L958 where it is then conducted to the ALC/OUTPUT circuit board.

Bias for the amplifier is obtained from the 13.8-V supply through R14 and across D1. D1 is mounted on the same heat sink as the four PA transistors and acts as a compensating network for temperature rises caused by dissipation. The diode conducts more heavily as the temperature increases and lowers the bias current applied to base of the transistors.



Bottom view of the transceiver. Most of the wiring is simplified by the cable and wiring harnesses shown in the photograph. The heat sink appearing at the lower left is for the PA transistors.

Construction

The chassis of the SB-104 serves as a main frame for the transceiver. There are a number of shielded compartments for the various subassemblies which are mounted on plug-in printed-circuit boards. A wiring harness and a cable harness interconnect the shielded compartments together along with the front-panel switches and the rear-panel connectors. The system results in a very neat package with all wiring connections easily accessible. Labels are provided for the circuit-board terminal strips. This helps in identifying test points and reduces the possibility of making a wiring error.

In spite of its complexity, the SB-104 proved to be a rather simple kit to build. Components for each circuit board are packaged separately which makes assembling an SB-104 seem as though a number of small kits were being put together instead of one gigantic one. There is even a map to show the locations of the parts compartments in the packing case. There are no tricky areas in the kit construction and any ham with some building experience should have little difficulty in assembling an SB-104. However, the kit is *not* recommended for a first assembly attempt. One should have mastered the technique of soldering (including IC sockets) and be able to put connectors on cables properly.

Before starting assembly, this writer spent a few evenings perusing the manuals for the SB-104. There are two of them. One covers the construction of the unit and the second one contains theory of operation, schematic diagrams, and test procedures. Photographs of a finished chassis are also included which proved helpful determining cable runs and other facets of construction. Proceeding at a leisurely pace, it took approximately 80 hours to complete assembly. This included frequent double checks on proper placement of components and correct wiring connections. A number of mistakes were found this way and it is embarrassing to note . . . one got through to the testing stage where it was uncovered by the test procedures! The problem was not with the manuals or the kit itself, but was the result of the writer's faltering ability to concentrate for long periods of time. SB-104s have been put together by others in less time and with no mistakes.

Performance and General Comments

The SB-104 either passed or exceeded its

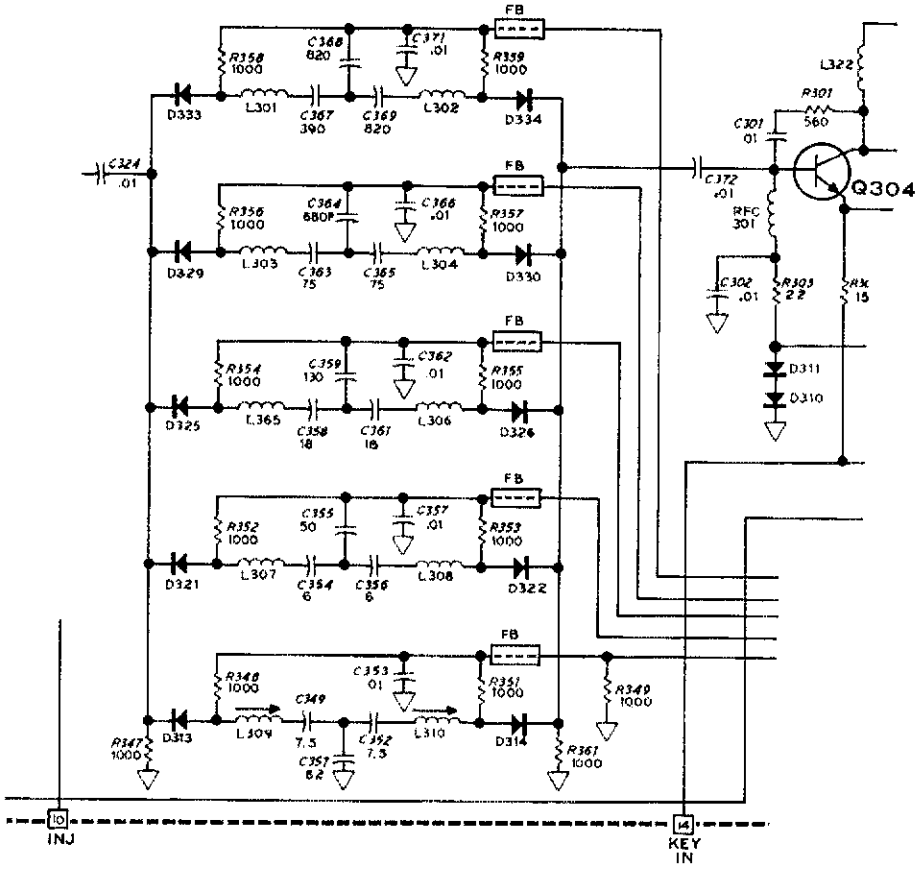
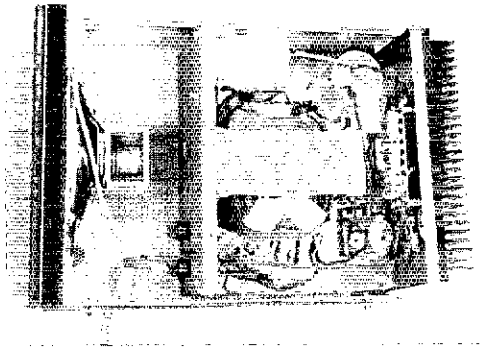


Fig. 2 — Partial schematic diagram of the transmitter i-f circuit board.

Top view of the HP-1144 power supply mounted inside the SB-604 station speaker.



published specifications within the accuracy of available measuring equipment in the ARRL lab. The odd-order IMD suppression is quite impressive as can be seen in the spectrum-analyzer display of Fig. 4. This transceiver is one of the better ones in regard to good linearity. On-the-air reports of audio quality confirmed this and other SB-104s that the writer has heard sounded good.

A wide-dispersion spectral display of the SB-104 is shown in Fig. 5. A *relative* measurement of harmonics and other spurious responses over the frequency range from 0 to 100 MHz can be determined from the photograph. (Accuracy of measurement is degraded somewhat by the frequency response of the coupling network used.) The level of second-harmonic energy is lower than that from other rigs tested but third-harmonic energy seemed somewhat higher. However, the third- and fourth-harmonics shown were eliminated easily with even simple filter networks.

Generally speaking, this writer was pleased with the performance of the SB-104. Receiver age action is quite effective and both cw and ssb signals sound good without the annoying "pumping" found in some age systems. Because it employs broadband amplifiers and bandpass tuning, band switching is simple. There are no tune-up procedures required. Since the specified sensitivity is somewhat lower than that of some other transceivers, there was some concern as to how the SB-104 would perform under typical band conditions. A slight difference could be noted on 15 and 10 meters with weak signals. Greater sensitivity might be advisable especially if only inferior antenna systems are available. On the other hand, the 1-μV sensitivity was more than adequate on the lower bands.

The review unit is from an early production run and some improvements have been incorporated into the SB-104 in later ones. For instance, a number of correction sheets had to be supplied with the manuals, but later editions were revised to include the corrections. There have been some changes to improve keying waveform and VFO stability. Some PA transistors in the early units proved defective and the ones in the review unit had to be replaced after a period of time because

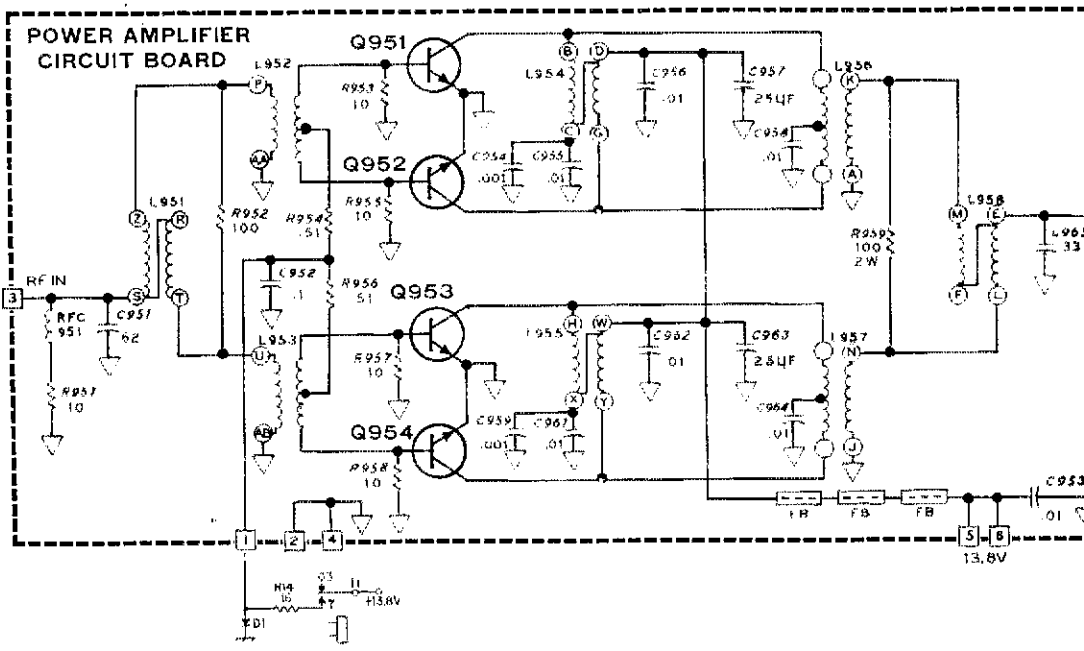


Fig. 3 – Schematic diagram of curcuit board "H," the power amplifier. DI is mounted on the heat sink for the finals but external to the board itself. As the temperature rises, DI conducts and reduces the bias on the transistors thus preventing thermal runaway.

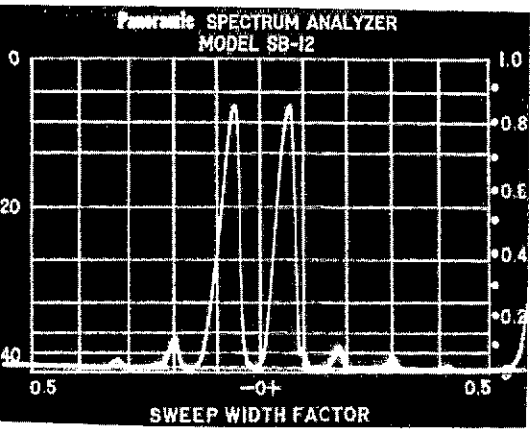


Fig. 4 — Spectrum-analyzer display of the output of the SB-104 transceiver with a two-tone 100-PEP output. The horizontal axis of the display represents frequency, and the vertical axis amplitude. Each "pip" represents a single-frequency component of the rf output. The display is adjusted so the amplitude of each component may be read from the scale at left, directly in decibels below the peak-envelope power (PEP) output, as rated by the manufacturer. Each reticle division represents 5 dB. Responses other than the two individual tones near the center are distortion products; third-order products 35 dB down may be seen here. Individual tones of the two-tone signal are down by 6 dB from the PEP output. This is because the tones are displayed as two discrete frequencies. At the instant when voltages of the individual tones are in phase, they add to produce a peak in the envelope wave-form pattern which is twice the voltage amplitude of a single tone alone. The power at the peaks of the envelope (PEP) is therefore four times that of a single tone, a 4:1 power ratio being equivalent to 6 dB.

of low power output. No difficulty has been encountered in the latter regard since the replacement and full power output has been maintained. The only other difficulty with components was a bad MOSFET in the receiver front end. While such occurrences are unfortunate, they are to be expected with a system containing over 2800 components. Introduction of similar equipment during the writer's former industrial experience would indicate Heath has done a good job in getting most of the bugs out of their gear before it was presented to the market.

Mechanically, the SB-104 seems to be a well designed unit. Stability of the VFO is good and all important control functions are readily accessible from the front panel. The cabinet and front panel are attractively styled, and a rather interesting design permits chassis removal in a matter of seconds. The cabinet consists of two shells for the top and bottom covers and the combination is held together by means of two strips along the side. The latter grip the shells after being compressed by four screws fastened to the chassis.

One of the more common criticisms of the SB-104 is that it doesn't have an option for receiver incremental tuning (RIT). However, this writer didn't find the lack of RIT to be an inconvenience. On the other hand, coverage of the 160-meter band would be very desirable. Because of the solid-state PA, there are some limitations on maximum transmitting time for the various modes of operation. Maximum *continuous* transmit time for ssb is one hour and only the more loquacious might have difficulty staying within these bounds. For ssb, the duty cycle is two units of transmitting time to one unit of receiving time. This restriction would be satisfied under normal conditions of operating and the SB-104 could be treated in the same manner as any other ssb rig. On cw, the restrictions are somewhat more severe with a one-for-one duty cycle and a limitation of 15 minutes for continuous transmitting.

In closing, it might be pointed out that Heath is not a company that lets the grass grow under their feet. It is interesting to speculate what the SB-105 will be like! — *W1YNC*

The Heath SB-104 SSB Transceiver

Dimensions (HWD) and Weight: 7-1/4 × 14-1/2 × 16 inches, 20 pounds.*

Power requirements: 13.8 volts, 2 A receive and 21 A for 100-W output.*

Power output: 100 watts minimum, 3.5 to 21 MHz and 90 watts minimum on 28 MHz.*

Receiver sensitivity: Better than 1 μV for 10-dB signal plus noise to noise ratio on all bands.*

Receiver internally generated spurious signals: Below 2-μV equivalent antenna input except at 3.65, 3.74, 14.24, and 21.2 MHz.*

Price Class: $670.

HP-1141 Power Supply

Dimensions (HWD) and Weight: 7-1/4 × 10 × 15 inches, 27 pounds.*

Power consumption: 75 watts receive and 700 watts for maximum transceiver output (key down) of 100 watts.*

Price class: $90.

Manufacturer: Heath Company, Benton Harbor, MI 49022.

*Measured in the ARRL lab.

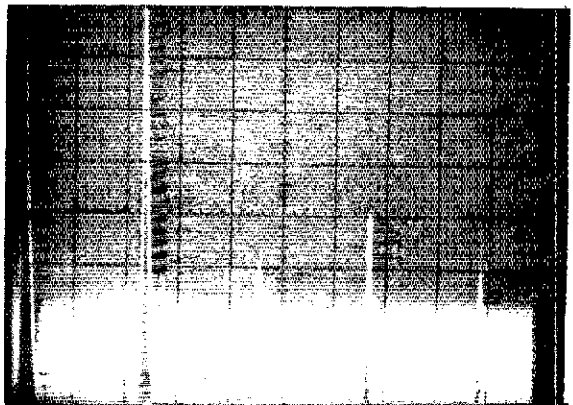
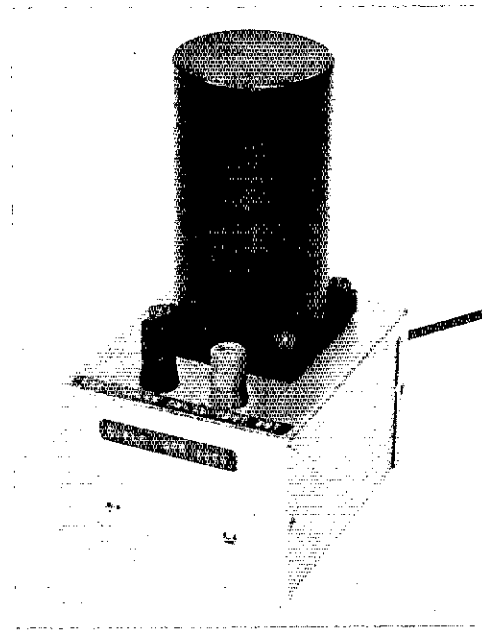


Fig. 5 — Wide-dispersion spectral display of the SB-104 on 21 MHz with 100-watts output.

Hints and Kinks For the Experimenter

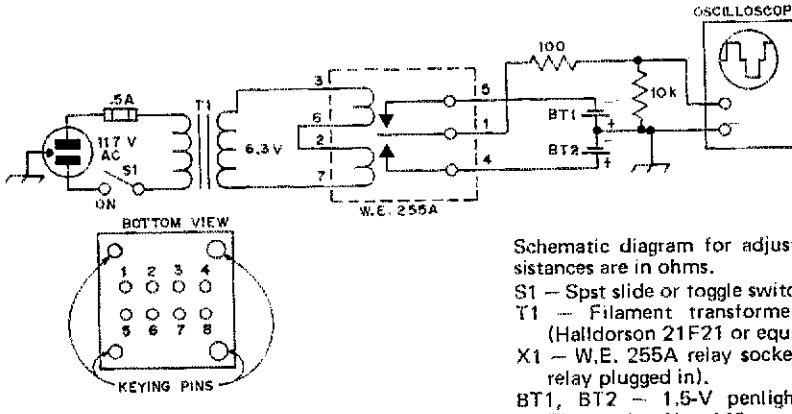
ADJUSTMENT OF POLAR RELAYS FOR RTTY

Almost nobody uses polar relays these days in connection with amateur RTTY operation, but there are still hundreds of them available as surplus, and at comparatively low prices. They have many possible uses besides RTTY. The most common type is the Western Electric 255A, and there are several equivalents manufactured by other companies. If you have one of these relays that you wish to adjust, try this simple procedure. It isn't as precise as you could do with a polar-relay test set, but is plenty good enough for most purposes. You will need an oscilloscope for finest adjustment, although fair results can be obtained using only a dc voltmeter. A small nail or the pointed tip of a soldering aid can be used for the adjustment tool. A feeler gauge might also be helpful.



The circuit for testing the relay is shown in the accompanying diagram. If you plan to check relay adjustments frequently, the circuit can be built into a 3 × 4 × 5-inch chassis box with insulated binding posts provided for scope or meter connections. With S1 closed, the armature (moving contacts) of the relay will move back and forth between the fixed contacts 60 times per second. That's just a bit slower than you would get with an RYRY signal at 100 wpm. The output from pin 1 (through the 100-ohm resistor) will alternate in square-wave fashion, going from +1.5 V to −1.5 V.

Begin the adjustment by disconnecting the ac power. Back off the contacts and the pole pieces (those round-shaped things below the contacts) and check to see that the armature is centered inside the coil opening. If not, loosening some screws on the bottom of the relay should allow you to position the coil for best alignment. After you get the coil set so the armature is centered, tighten all screws. Adjust one contact screw until it just makes contact. Use the dc meter or watch for a shift in the position of the baseline on the scope. After contact is made, back off thirty degrees or 1/12 turn on the contact screw. This should give a .002-inch clearance. Then adjust the other contact in the same manner. You should end up with a symmetric arrangement, with .002-inch clearance on either side of the armature contacts.



Schematic diagram for adjusting polar relays. Resistances are in ohms.
S1 — Spst slide or toggle switch.
T1 — Filament transformer, 6.3 V at 0.6 A (Halldorson 21F21 or equiv.).
X1 — W.E. 255A relay socket (circuit shown with relay plugged in).
BT1, BT2 — 1.5-V penlight cells. A Keystone Electronics No. 140 or equiv. battery holder may be used.

Now turn one pole piece until the armature just touches the *opposite* contact. Then back off on the pole piece slightly less than a half turn and tighten the tension nut. Then adjust the second pole piece so that the armature stands midway between the two pole pieces and tighten its tension nut. The armature should flip to either contact and remain, or else return to center, when moved manually. Slight readjustment of the second pole piece should help if needed here.

Now apply ac power. Look at the waveform on the scope, or use the voltmeter set on a low-value dc range. You should see a symmetric signal on the scope. It will not be a perfect square wave, because some time is required for the armature contact to move from one side to the other. During the travel time, you will see a small part of the waveform where the signal is neither positive nor negative. During contact, the signal should be positive or negative 1.5 volts. Any nonsymmetry can be corrected by a *very slight* readjustment of the *pole pieces* (not the contacts). If you are using a meter for indication, the meter should read zero. Slight pole-piece adjustment should bring the reading to zero, if needed. On the oscilloscope you may observe some amount of contact bounce, as a broken-up portion of the square wave. A very slight readjustment of the contacts may correct this. You won't be able to detect any contact bounce using a meter only.

That's all there is to it. Just a word of caution: once you apply the ac and make readjustments, go very slowly and do not make adjustments of more than a small fraction of a turn. Usually with surplus relays, if they can't be adjusted by very slight trimming, something is defective in the relay. Even if this is the case, compromise settings can sometimes be found which will give quite satisfactory relay operation. – *K1PLP*

DUAL-PURPOSE CARBON MICROPHONE REPLACEMENT

Some of the fm transceivers coming into service in the vhf amateur band still use carbon microphones. A vast improvement in audio quality can be achieved by the use of a dynamic microphone replacement cartridge.

Shown in Fig. 1 is a simple transistor circuit that can be used to adapt a dynamic element to a carbon circuit. The voltage required for the transistor is derived from the same source that originally was used by the carbon element. To make the adaptation of Fig. 1, simply open up your microphone case and determine the positive and negative leads to the carbon element. Remove the carbon element and install a dynamic element. One with approximately 500 ohms impedance is satisfactory; however, I have not found any element that won't work.

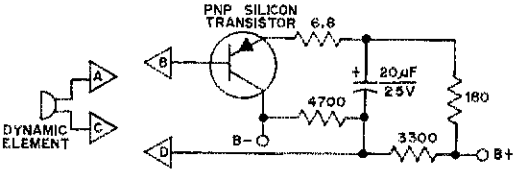


Fig. 1 – Schematic diagram of simple transistor adaptor for dynamic element to carbon microphone circuit.

Distribute the rest of the parts around the inside of the microphone case. Practically any pnp transistor will work in this circuit. Any of the general replacement audio types should do. A drop or two of cement or liquid rubber will hold the parts in place. Connect points B and D to the dynamic element.

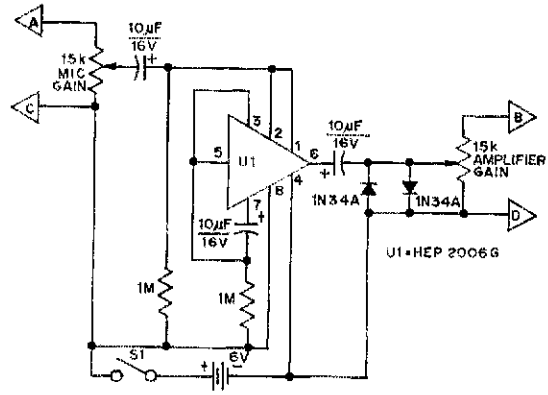


Fig. 2 – Schematic diagram of IC pre-amp for use with desk microphone.

For use as a desk mic, add the IC circuit shown in Fig. 2. Connect the output of the IC points B and D to the input of the transistor circuit, points B and D of Fig. 1. Connect the dynamic element to the input points A and C.

The output waveform is clipped by the 1N34A diodes to prevent overmodulation. Careful adjustment of the input and output potentiometers will result in a distortion-free signal. If the input level is too high, severe clipping will occur. Adjust the input so that normal voice level will just start clipping.

A small 6-volt battery supplies the power for the IC. A switch should be installed in the circuit to prevent running the battery down when the preamplifier is not in use. *Robert D. Shriner, WAØUZO*

BONDING ALUMINUM WITH SOLDER AND FLUX

Several times in the past there has probably been a need to bond something made of aluminum to some other metal used in a home built project. Alpha Metals offers a solder and flux package called "Depend-A-Bond" that does the job quite well. Several repair jobs have been done using the Alpha Metals product with favorable results. A 100-inch coil and 0.35-fluid-ounce package are available as a combination from most hardware stores for approximately $2. – *WA6GVC/1*

MARS Milestone

50 YEARS OF AMATEUR – MILITARY PARTNERSHIP

BY GEORGE P. GRIFFIS,* K7EIS/AFA7EIS

A FEW MONTHS AGO at a busy western city airport, deplaning passengers from a just-arrived jet included an official expecting to be met by at least one radio amateur. He had come from the "head shed" for a weekend regional gathering of hams.

Spotting a fellow who might fill his needs, the passenger approached and asked: "Are you looking for a man from Mars?"

Surprised, startled, trying to escape from this evident nut, the native gave a quick negative shake of his head. Whereupon the passenger, with quick wit and a sense of humor he couldn't resist, asked the escaping greeter: "Venus, maybe?"

Well, this true story proves one thing . . . that the native at the airport was *not* a radio amateur. Had he been he would have known that there *are* men from MARS . . . in fact some 13,750 of them. Every one is a radio amateur. Many thousands of them take part weekly or more often in unique volunteer emergency and current operating communications networks. Many more support these nets with logistic, experimental, administrative and other services . . . all this a direct outgrowth of Congressional actions and Department of Defense directives that have made official a whole dimension of communications that is auxiliary to being a Ham.

50th Anniversary

Next month, November, will mark the 50th Anniversary of MARS – the Military Affiliate Radio System. All three branches of the Defense Department – Army, Navy-Marine Corps and Air Force – are joining in appropriate recognition of the milestone.

Like many historical events, it isn't always possible to sort out with certainty, a half century later, the exact chronology. But, it would seem that the idea of tieing in the interest and expertise of radio amateurs with the Army Signal Corps, originated in the Ninth Corps area. It was probably a Signal Corps officer, who himself was a ham, who remembered the dire need for radio operators in World War I and the way amateur radio operators in many, many instances fitted in with that need.

Anyway, sometime in 1922 or early 1923 (the first amateur two-way contact across the Atlantic took place that same year) the Army Ninth Corps Area came up with a plan for "organizing radio amateur nets." These were to operate on regular amateur frequencies and to "practice" the handling of military type messages on certain nights each month. A headquarters station was to be established at Camp Vail, N.J. Cw was, of course, the mode to be used.

ARRL Helped With Plan

Whether this plan was ever actually operational is not known. But the idea wouldn't die and in October of 1924 Captain Tom C. Rives, a Signal Corps officer while stationed at Fort Monmouth, N.J., sent a communication to Chief Signal Officer, Washington, D.C. (through channels) with the subject: "Organization of the Radio Amateurs into a Reserve Force." The last paragraph of this letter read: "Request that authority be granted for the Radio Division of the Signal Corps to take this matter up with the American Radio Relay League

* Chairman, Air Force MARS Golden Anniversary Committee, 2415 S.W. Scholls Ferry Road, Portland, OR 97221.

First MARS station at McClellan AFB, Sacramento, CA. operating under the call sign of AF6FAV used surplus Army BC610 transmitters. Mildred O'Brien, AF6HTS and Ian Keller, AF6OWJ were early Air Force MARS leaders. In recent years the McClellan station was a gateway for South Pacific traffic. . . much of it handled by radio teletype, but of course using more modern equipment.

MARS station (circa 1929) of Capt. David Talley, early pioneer in AARS - the parent organization and forerunner of MARS. Operations from his Brooklyn location were on regular amateur frequencies with special "Army nets" meeting weekly and monthly.

Headquarters at Hartford, Conn., that they may work out a definite plan along the lines set forth in this letter. The said plan to be submitted to the Chief Signal Officer and for his approval before definite action is taken."

Approval was forthcoming and the proposed meeting was held at ARRL headquarters on March 25, 1925. In attendance, in addition to Capt. Rives, 2CXL, were Hiram Maxim, 1AW, president ARRL, Kenneth B. Warner, 1BHW, secretary ARRL and editor of *QST*, A.A. Herbert, 1ES, treasurer of ARRL and Francis E. (Ed) Handy, 1BDI, member of the ARRL Executive Committee.

"Too bad," says Ed Handy of those planning sessions, "that we didn't have a picture taken as we conferred on successive days and worked into shape the plan that Capt. Rives was to take back with him to Fort Monmouth."

Ed, by the way, retired from the ARRL in 1967 after 42 years of service as Communications Manager and Vice President. He is today an Honorary V.P. of the League and a member of Air Force MARS. Captain Rives retired as a General a few years ago after a distinguished career in Army communications.

AARS Is Launched

On May 29, 1925 the "Original Plan of affiliation of the Signal Corps and the transmitting radio amateurs" was submitted to the adjutant General for approval. After four endorsements to accomplish minor modifications, the plan was approved on September 28, 1925. The October issue of *QST* carried the story and on November 1, 1925 the Army Amateur Radio System, as it was known then, was a reality.

The *QST* of that time said: "Here are all manner of splendid opportunities for us. A chance to serve another branch of our government, another call to answer to organize ourselves to handle emergency communications, a new source of interesting message traffic in large volume, an opportunity to operate in 'tactical nets' which is a new idea in amateur radio organization."

The *QST* story concluded: "If we can put this job over, it will be the biggest thing ARRL has ever done. Certainly it is the biggest opportunity that has ever been offered to us."

Army Amateur Nets Established

Thus was established the Army Amateur Radio System, known as the AARS. The present "initials" of MARS were to come later.

As a starter, the Corps Area Signal Officer, with the recommendation of the ARRL, appointed one amateur in each Corps Area to serve as the "Army Amateur Representative". Individual members with valid amateur licenses could apply for membership. The first year some 500 amateurs affiliated.

In those early days all operations were on cw. The first phone net wasn't established until 1930. The net structure for the U.S. consisted of a so called "Army Net" with the net control centered at Ft. Meyers, Virginia. There were also nets established for each of the nine Corps Areas and further broken down into State Nets, District Nets and Local Nets. There was even a "Governors" net. Frequencies, (except for the Army Net) were all in the 3500 to 3900 kHz portion of the amateur band. The Army Net called for special authorizations and use of 3497.5 and 6990 kHz frequencies, both outside the amateur spectrum.

Emergency Communications Provided

Very early, the AARS helped with emergencies and communications during natural disasters. These included the Florida Hurricane in 1928, the Antelope Valley (Calif.) Sleet Storm in January of 1933, and later that same year the Southern California Earthquake.

But, growth of the Army Amateur Radio System was slow. A lot of the direction and organization was left up to the individual Corps Commanders. They didn't all embrace the idea with the same degree of enthusiasm. Some of the "fast" cw operators didn't like to slow down for the newer members. And even though the traffic content was gradually expanded from military routine and practice messages to the handling of "personal" messages, (Mother's Day greetings, for instance, were an approved type) enrollment was slow. With about 46,000 amateurs in the U.S. in 1934, (about 30,000 of them believed to be active)

ARRL President, Herbert Hoover, Jr. W6ZH receiving plaque from Lt. Gen. Francis H. (Butch) Griswold, K3RBA in appreciation of active part ARRL played in the organization of MARS. The presentation was made at the ARRL National Convention held in Portland, Oregon in 1962. MARS at that time was 37 years old. Navy-Marines announced their participation in the MARS program at this same ARRL National Convention.

only 1133 were AARS members.

On the other hand, some of the Corps Areas had very active programs. The Fourth, headquartered at Fort McPherson, had a monthly publication, the *Dixie Squinch Owl*. The November 1941 edition told of stations handling as many as 2500 messages (hamgrams) per month.

W.W. II Cancels AARS

Then on December 7, 1941, AARS, along with all regular amateur operations, went out of business. How many AARS affiliates ever served in the armed services during World War II is not known. But, it is known that thousands of amateurs took part in the war effort, many of them in some form of communications whether or not they had been "introduced to army methods and procedures" via the AARS organization. The need for communicators was desperate. War industry, civil defense, schools . . . all needed people with any radio background and there was no time to check all credentials.

After the war and with the return of amateur activities to the regular bands the idea of an affiliation of radio amateurs and military communicators again came to the fore. However, when the postwar program was initiated (November 26, 1948) by the Secretaries of the Army and the Air Force, membership was open only to active and reserve components of the military "who possessed a valid amateur radio operator's license issued by the Federal Communications Commission or under regulations of an overseas Military Commander."

AARS Succeeded By MARS

The new program had a broad based purpose including: "to provide auxiliary communications to the military, assist in effecting normal communications under emergency conditions, handle morale and quasi-official record and voice communications traffic for Armed Forces and authorized civilian personnel world-wide." The new activity was given the name Military Amateur Radio System (MARS).

Even though military reservists, National Guard and the Reserve Officers Training Corps members were eligible, activity in MARS was sparse. Totals reached 560 Army and 230 Air Force. So the Defense Department went to Congress for authorization to expand membership to all radio amateurs. Speaking before the lawmakers, Major General Spencer B. Akin, then Chief Army Signal Officer, said:

> "The need for this legislation arises from the fact that upwards of 15% of all military personnel in time of war are engaged in one way or another in operation and maintenance of signal communications and electronics equipment. The time required for training of such personnel is one of the longest periods required of any specialist . . . . It is therefore necessary to foster the interest and training of civilian enthusiasts whose basic training in radio has already been completed to comply with FCC requirements for issuance of their licenses."

Subsequently in November of 1950, membership was opened to civilian personnel who were 21 years of age or older who possessed a valid amateur radio operator's license, and had a radio station capable of operating on certain military frequencies. Three years later the age limit was lowered from 21 to 16 years. (Today it is 14 years and all classes of FCC license holders are eligible including Novice and Technician.)

ARRL Again Takes Part

With the broadening of the membership base, the initial name of Military *Amateur* Radio System was not exactly appropriate. So around this same time the initials MARS were changed to mean Military *Affiliate* Radio System, the name that applies today.

Then, too, an advisory committee was established to guide the rapidly expanding Army and Air Force MARS programs. Representatives on the committee included Red Cross, Civil Defense, FCC, Department of Defense, Army, Air Force and ARRL. The League's representative for a number of years was AARS pioneer Ed Handy, W1BDI. The Navy, who had their own Naval Reserve Radio System, had an observer on the advisory committee. That service, however, did not launch a MARS program until 1962. The announcement was made at the National ARRL Convention held in Portland, Oregon, that year.

MARS Expands and Performs

With the opening in 1950 of the MARS ranks

to civilians having valid amateur licenses, sign-up was rapid. The first was Ernest Storrs, W2SDX/AF2SDX. By 1967 there were 760 military stations operating in MARS and 22,800 civilian affiliates. At that time traffic exceeded 50,000 written messages per month.

Emergency operations were extensive with the three MARS branches operating side by side with amateur emergency nets. Having perfected procedures and traffic handling techniques and having available frequencies that could be cleared for all except emergency traffic, MARS proved on numerous occasions that it could fulfill its assigned mission. Many were the awards won and recognitions received. Hurricane storm activities during Dora, Carla and Buelah, for instance, all provided communications problem solving opportunities. And the suspense filled operations of affiliate and military MARS stations during the Alaska earthquake was commendation winning.

Comments from the press included such statements as: "MARS radio messages were the chief means of communication." And: "MARS is a good example of military-civilian cooperation, particularly in a disaster."

Vietnam Traffic/High Point

But at no time in the 50-year history of MARS did any activity of the system strike as popular a note as during the Vietnam conflict. Here was an opportunity that fitted hand and glove into the MARS mission. Regular amateur frequencies could not be used because Vietnam was a restricted country. But morale traffic and phone patches via the unrestricted and available MARS frequencies were the order of the day.

The Army, Air Force and Navy had their RVN circuits. The stateside MARS members fed in written traffic to gateway stations and the military MARS stations took it from there. Selected CONUS (Continental U.S.) affiliate stations, with proved capabilities and sufficient signals, handled thousands of phone patches . . . over 409,000 by the Army MARS alone in the single year 1971. The Senator Barry Goldwater MARS club station, K7UGA/AFA7UGA, alone handled over 50,000 phone patches on Air Force MARS circuits.

MARS Today Moving Forward

Today, with the Vietnam conflict consigned to the pages of history, MARS is again devoting its efforts to upgrading its primary role of providing back-up and emergency-contingency communications for the military and for civilian government needs. Military and affiliate stations meet nightly and "do their thing" to attain proficiency in fulfilling their mission.

And more often than you think they are operating on a real emergency. As examples here are just a few instances from the service pages of Air Force MARS. The other branches can parallel this record.

a. Enewitok Defense Communications System power failure. An affiliate MARS member fired up and worked Hickam AFB MARS, station providing the only contact with the mainland.

b. An Air Force C-141 crashed with the loss of all on board in the mountains near La Paz, Bolivia. The major rescue effort was conducted on MARS frequencies.

c. An aircraft crashed several miles from Carswell AFB, Tex., Affiliate members manned a portable station at the aircraft crash site for five days, providing communications between the site and the base.

d. A cable cut in Texas completely isolated Reese AFB from the world. Within 20 minutes the MARS station was in contact by radio and phone patch with the Air Training Command and provided the only communications off the base for 12 hours.

e. A tornado wrecked havoc around Central Georgia. The Robins AFB MARS Mobile Communications Facility was dispatched and was ready on scene to provide communications along with back-up affiliate stations.

f. When the thousands of refugees fleeing Vietnam descended on Manila, Wake Island, Guam, and the U.S., MARS was there handling messages to scattered families and friends.

For 50 years the men and women of MARS have been "for real". They are still so today as they look forward to a second 50 years of service working hand and hand with the radio amateurs who dedicate their skill and equipment and time to making MARS and its mission a reality.

There Could Be a Place for you in MARS

Any holder of a valid amateur radio license (14 or older) is eligible for membership in MARS. The class of license does not matter except that Novices are restricted as to power and to the cw mode.

Applicants must have equipment for the frequencies used by MARS or equipment which can be modified for such operation. All popular modes are used including ssb, cw, fm, RTTY. Frequencies from 2 MHz through 13 MHz are used plus vhf, both simplex and through established MARS repeaters.

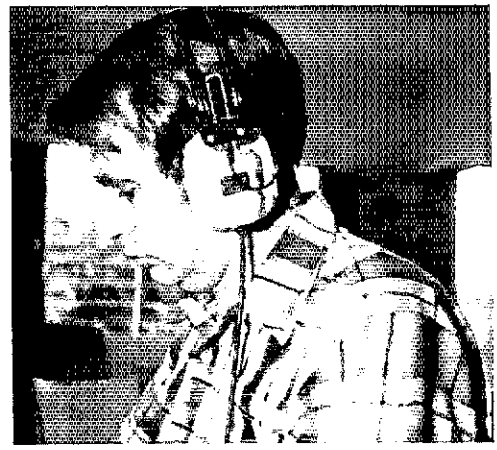
Each service has its own eligibility and participation requirements. The eligibility generally relates to the need for added members in a specific area and the participation is spelled out in hours of activity during a given calendar period.

All membership is strictly voluntary and a member may resign at any time. Appointments run concurrent with your FCC license and are renewable with the re-issue of your amateur license.

Army and Air Force MARS are organized along state lines. Navy-Marine Corps MARS is set up with MARS Districts which relate generally to Naval Districts. In each case it is an all volunteer organization of affiliate MARS members with a minimum of active duty military.

Any local MARS member can direct you to the state or district official who can give you more details and send you the necessary application forms. Or you can write to the specific branch that interests you: Army MARS — Commander USACC, Attn: Chief MARS, Army, Ft. Huachuca, AZ 85613; Navy-Marine Corps MARS — Chief, Navy-Marine Corps MARS, 4401 Massachusetts Avenue, N.W., Washington, DC 10390; Air Force MARS — Command MARS Director, Air Force Communications Service, Richards-Gebaur AFB, MO 64030. QST

Results: 1975 ARRL International DX Competition



PJ2VD

REPORTED BY JIM CAIN,* WA1STN
and JIM WHITE,** WA1NNC

PJ2VD, PICTURED ABOVE, exemplifies a spirit which was overwhelmingly evident among participants in the 1975 ARRL DX Competition; Joeke set a new all-time South American cw record despite poor conditions. He continued a tradition begun many years ago by "Deserving DXers," as a popular DX Bulletin calls them, of making the best of less-than-good odds. The former S.A. record, which Joeke broke, was set by Fred Laun as LU5HFI last year, under not-worth-writing-home-about propagation. We have decided to retire Griznoid and not worry about his infernal sunspots.

In the past, when changes have been made in contest format, we have had to start over keeping records and statistics. The new high- and low-band categories of competition begun this year should not create such problems, however. We shall provide some all-band statistics for your information, relating participation and achievements this year to past events. The high- and low-band records made this year are, of course, all-time records and you may enter them in your notebooks accordingly. If the accent of this writeup seems to be on the all-band competition, it is because that traditional aspect of the ARRL DX Competition was chosen by the majority of the participants. Next year we can discuss high and low band compared to 1975.

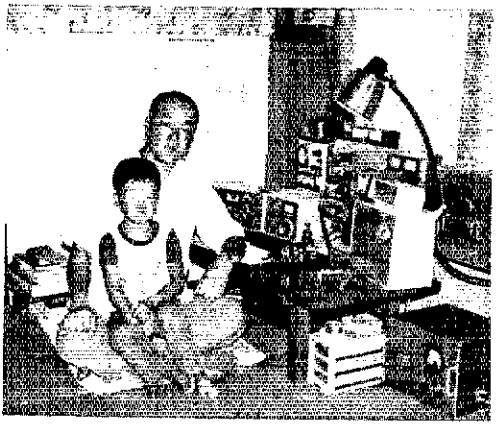
Total-entries data is as follows: *1973*, 2107; *1974*, 1971; *1975*, 1835. The all-time record was 2822 logs received for the 1970 DX Competition. The reason for the down-trend is, of course, worse conditions. Many comments on logs received this year were to the effect that the "little guy" really suffers most when the ionosphere is uncooperative. Suddenly, that vertical or dipole isn't good for 50 or 60 countries on 10 and 15 meters like it was five years ago. As a result, the stations which aren't super-equipped are capable of making perhaps one-tenth of the contacts they could have made easily in 1970. Operators of those stations accumulate only a page or so of contacts and don't bother to send a log in. This applies to both W/VE and DX participants, naturally.

Total phone logs this year: 897; total cw: 938. All-band accounted for 1140 out of the 1835, while high and low-band entries numbered 530 and 165, respectively. A word about these totals is in order, to keep things in perspective. Many entrants did not *specify* entry in one of the specialized categories, even though their operation was concentrated in, say, the low-band area or the high-band area. If an entry was confined solely to low bands or high bands, it was automatically placed in that category for scoring and listing purposes. This is an important point because it underscores the fact that there was not that much actual competition in the specialized classes in 1975, i.e., there were few all-out efforts to achieve a certain score, for instance. Part of this stems from the lack of past experience on which to base our efforts. No one knew what an outstanding low- or high-band effort would be. Next year, with the 1975 benchmarks to go by, competition will probably pick up.

A few efforts by the specialists stand out: the K6SVL high-band phone score of over 900K points would have placed seventh nationally in the *all-band* listing. WA8ZDF's big yagis for the high bands remained deenergized while Doc applied rf to a 3-element rotary on 40, a Hy-Tower on 75, and a dipole on 160, talking his way to the best score in the low-band phone listing. W1EBC managed over 90 multipliers on 75 during his low-band effort, a figure rivaling the multi-operator stations.

* Asst. Communications Manager, ARRL

**Contest aide, ARRL



"We're not going to take these rotten conditions sitting down! — JAØAT

In the low-band cw division, K6OVJ grabbed top spot, thanks to a hoard of Japanese contacts on 40, followed by K5ABV with a nice combination of multipliers and QSOs, with K1NOL close on his heels. High-band cw provided an interesting race between the "coasts," with W2GXD the winner over K6SDR by virtue of about a dozen extra multipliers. The scores are now there to shoot for . . . one can only wonder how many, if any, of the top scores from this year will hold up through the 1976 Test.

Anyone with a $19.75 pocket calculator can dig out the last few years' worth of *QST*s, turn to the DX Competition writeups, and begin turning out statistical comparisons. We'll try to give you a sample, and go from there when you're looking for something to do on a non-contest weekend. The average score on cw among 1975 Top Ten operators was 1.2 million, down from 1.375 million in '74. On phone, the calculation is 1.241 megapoints, *up* from 1.134 in 1974. 1974 will go down in history as one of the worst years on record for phone conditions, both weekends. Things weren't so bad this year, perhaps.

Many individual performances were outstanding this year, and most can be found by scanning the various "leader" boxes in this report. A few valiant efforts were buried among the general listings, however, and we'd like to bring them to your attention. As you can see, the top DX scorers are primarily in North and South America and in Hawaii, where the competition was especially fierce. Lest we forget those DX stations who are located out of the favorable areas but who still accomplished much, we offer the following: ST5CJ, a million points on cw and a half-million on phone; JA2JW, number one both modes, and UAØFGM, number two, from Asia; CT2BN with over a million cw points; ZL3GG, a truly superlative million-pointer on cw and over 300K on phone; ZL1AFW with over 1000 cw contacts; ZS6DW made over a million points on ssb, including oh, so many on 75 and 40; VK4VU managed over 800 contacts on phone. None of the aforementioned appear in the "Top Ten" boxes, but can be found in a potful of W/VE logs.

On the low-band front, we would draw your attention to JR1BRV, cw, and FØAXP, who made 301 contacts on 40 and 80 the second cw weekend operating as C31IU. His card will be showing up in many future 5-band DXCC applications! Outstanding low-band phone tallies came in from JA1ELY, EA4LH, and JA2IYJ, among others.

Top DX high-band cw scores came from KH6s IGC and IEG, followed by CP1EU, KH6IAC and JA2MGE. HC1BU and KP4EAS continued the Western Hemisphere monopoly, running off with the two best high-band phone scores.

On cw (all band), K2SIL operated one weekend using KH6RS and made a Top-Ten score, then loaned his station and other call, KH6GPQ, to pal K2KIR, who proceeded to place *that* call in the Top Ten. Bud (KIR) lost the bet on who could make the better score, due in part to poorer conditions the second weekend (that's what he sez, anyhow). F5QQ used the call FY7AA the first cw weekend, then loaned his station to K3BSY, who keyed FY7AK; both made the Top Ten.

The golden pencil award goes to PJ2VD; not only did Jocke have the highest score in the contest (higher even than the best phone score) but he also sent in nearly the neatest log. The deciding factor was that the PJ2VD log was his original, operating log, not a copy. He clearly marked duplicate contacts in the margin, leaving them in the log for bleary-eyed contest checkers to see. That method is much preferred over recopying the log, at least for checking purposes.

On the affiliated club front, a reshuffling of last year's top three took place, with Frankford moving to the top, PVRC to number two, and Murphy's Marauders to number three. Frankford's victory can be attributed to several eye-popping single-operator scores, a number of excellent multi-operator efforts, and an organization which succeeded in getting many of the "small guns" out making points in bunches. The combination of all three methods of making points was necessary to win, and they did it beautifully.

Dropping out of the Top Ten clubs this year were the Honolulu DX Club and the Indy DXers (Indianapolis); their places were immediately snapped up by the Southern Cal. DX Club and the up-and-coming Northern California Contest Club.

CAC member K8HLR participated Low-Band, both phone and cw.

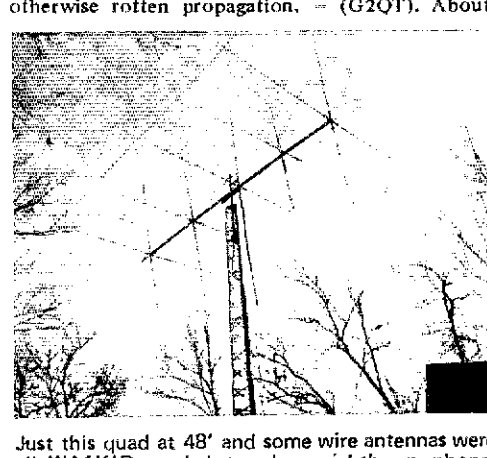
who placed sixth in their *first* DX Competition as an organization. All four entries from W6-land made the top ten clubs listing!

We could go on and on, of course. Main point is that we're all in there working, regardless of conditions. The DX was there to be worked this year, even for the casual participant, and it is that casual operator, both W/VE and DX, who makes the contest great. Our four weekends in February and March are our own method of ionospheric research, practically applied to a set goal; working various parts of the world on given frequencies.

Stand by for certificates around the end of October, then on to the 1976 ARRL DX Competition. Latest word (from our optimistic source) is that conditions will be better than in 1975. We have a pessimistic source, too, but we wouldn't consider for a second paying attention to him!

Soapbox

Fired up my 6AU6 amplifier, adjusted the output to 100 mw, and UKØZAB came back on the first call. for my fifth continent at that power level. – (W9PNE). As the shack warmed up a hornet came out of hibernation, climbed inside my 24-hour clock, and threw the time off one hour. – (W7HS). A lack of Russian stations, with the notable exception of UAØFGM, who was everywhere. (W4BAA). Spent four daylight hours on the tower (130 foot) fixing a busted rotor. – (W3LPL). WØEEE has managed to double its score in each major contest of 1974-75; looking forward to further improvements in the future. – (WBØGQP). I want my own linear or else want everyone else's to blow up. – (WA3SXH). [How about *both*? – Ed.] Had more equipment trouble and wind damage in four weekends than in the previous sixteen years of hamming. – (WA6NYV). Thank goodness for the hundreds of European low-power stations; without them my little ole tribander at fifty feet wouldn't be very competitive. – (W2MB). I can't wait to go to Hawaii or the Caribbean for one of these contests. – (WB2KNZ). I don't know why I enjoy it, but still a lot of fun. – (W2BQF). While WA2SRQ and WB2RKK operated, I served as chief cook, bottle washer, logger, dupe sheet keeper, band changer, beam pointer, and propagation advisor; the youngsters are welcome here as long as they don't start calling me "Pop." – (W2YD). Enclosed pictures were taken during the all-day power failure on Sunday of the second phone weekend. – (W3ZSR). Missed four good hours after nearly being electrocuted by my amplifier. – (K6SVL). Besides DXing during the contest, I practiced some fruitful Official Observing on 14,200. – (WA7OBH). My line noise was about S-6, allowing for easy preselector peaking. – (WB9GGD). Only managed to work BV2B four times. – (W6ONV). After 48 hours of continuous operation during the first phone weekend, I attempted the drive home. When I recovered my car from the ditch the next morning, the side view mirror and radio antenna had been torn violently loose, pieces of splintered wood and barbed wire were caught in the front bumper, horse-hair was tangled in the windshield wipers, and my only clear memories were of the screams of angry razor-back hogs. All of this took place in L.A. City. No problem, though; the logs were intact. – (WB6QLD, opr. at W6HX)[1]. Happiness was finding 3B8CV vainly calling CQ between two large pile-ups and only me paying attention to him. – (WBØHOG). Got 41 countries with an attic trap dipole in a townhouse. – (W4HVU). Just as much fun as it was 40 years ago. – (WØLP). Had no equipment of my own, so I traveled to the home of TJ1EZ for the contest. – (TJ1AD/WB4WHE). My 31st entry in the ARRL DX Competition. – (F8VJ). I have been participating in this event since the 1930's, and 1975 produced the worst conditions in memory; even 160 was down this year. – (EI9J). I only wait for the conditions to become better! – (JH2RVP). Since I could only operate the first weekend, please enter my log for checking purposes only; 1778 contacts is not up to par for me. – (YV5KL) [Thanks, OM; many newcomers will be able to obtain DXCC credit from your log. – Ed.] After three years of waiting, got cable TV two weeks before the contest; love it! – (KH6IAC). The low-band category is ideal for Europeans, since the bands are open when television is not operating, making for fewer TVI interruptions. Conditions were so bad that it was the hardest-working ARRL DX contest I have ever entered. – (G2RO). Conditions the last three hours of the cw contest on forty almost made up for the otherwise rotten propagation. – (G2QT). About



Just this quad at 48' and some wire antennas were all WA1KID needed to place eighth on phone, all-band.

TOP TEN

Single Operator

Cw

W/VE		DX	
W7RM	1,522,248	PJ2VD	4,306,509
W3WJD	1,477,440	KH6RS	2,724,276
W6DGH	1,285,488	KH6IJ	2,599,575
W6MAR	1,277,073	FY7AA	2,566,576
W3LPL	1,238,880	HC1CW	2,237,301
W6OUN	1,108,917	KV4IO	1,854,900
WB4YLG	1,092,960	FY7AK	1,693,089
W7IR	1,063,755	TI2BEV	1,608,810
K4GSU	1,035,828	KH6CF	1,487,244
K3YUA	973,269	KH6GPQ	1,376,892

Single Operator

Phone

W/VE		DX	
W3WJD	2,281,125	KZ5BC	4,157,484
W6RR	1,676,700	6F8J	3,368,169
W6HX	1,562,922	YV4YC	3,110,508
K4VX	1,119,297	XE1LLS	3,056,634
W4QCW	1,063,887	FYØBHI	2,556,576
W3LPL	1,099,314	KH6IJ	2,473,428
W3BGN	1,012,557	TI2WX	2,313,036
WA1KID	910,947	HI8XAW	2,299,209
WA1PID	886,677	ZF1AK	2,015,328
W2MB	829,647	6W8FP	2,015,181

one-and-a-half hours straight was all I could operate, before I just *had* to go swimming. – (ZF1LM/W8LUI). I want to QSO with W stations on Top Band. – (JA5EZI). Made 26 contacts on 7 MHz with 2 watts. – (JA7AVG). Never heard stations that are not W6, 7, Ø; where were they? – (JA4PPR). Heard very little past the East Coast. – (G5BJM/WA2YVK). PAØGN is still active as a memorial station. We are hot on passing the one-million mark, but we'll never reach this goal without more Canadian activity. – (PAØERA). No U.S. signals heard at all here on 15 or 10 meters, although we listened every hour from 1300 to 1700. – (PA9WRR/K6WR). Suggest U.S. stations *listen* below the DX Window on 160; I called many on their own frequencies below 1825 with very little success. – (ZF1AK). QSLs are pouring in (after the contest); the mailman hates me, and we eat on the dining room floor. –(V2PE. . . K2FJ).

Yep, the "59005" from OA8V was for real!

Forty-First ARRL International DX Competition

W/VE scores are listed by call area; DX scores are listed alphabetically by continent and prefix.

Awards: The operator of the first-listed single-operator station in each section or country is the winner for that area and receives a certificate award. The top-scoring multioperator station in each area also receives a certificate award. Awards are scheduled for an October 15 mailing. The top-scoring single-operator DX entrant for each continent each mode, receives an engraved plaque. Affiliated-Club awards are shown elsewhere in this article.

Scores: In the list to follow, read (from left to right): call of entrant, final score, multiplier (total countries per band for W/VE; total states and Canadian call areas per band for DX), contacts, approximate dc power input (A represents power up to and including 150 watts; B, over 150 and up to and including 500; C, over 500; D, combination of A+B; E, A+C; F, B+C; G, A+B+C), total time of operation to the nearest hour. Example: A2CCY 1,135,008-168-2252-A- indicates final score of 1,135,008, multiplier of 168, contacts 2252, power up to and including 150 watts, operating time not furnished.

An asterisk following a call denotes an ARRL Hq. staff member, ineligible for an award.

DIVISION LEADERS

Cw			Phone	
Single Op.	*Multiop.*		*Single Op.*	*Multiop.*
W3WJD	W3AU	Atlantic	W3WJD	W3AU
W9LT	W9DY	Central	WA9BWY	WA9IVL
WAØONL	WAØENP	Dakota	WAØONL	WAØENP
WA5RTG	. . . .	Delta	WA5RTG	W5PBZ
K4GSU	WA8TBQ	Great Lakes	WA8TBQ	W8NGO
W2DXL	W2PV	Hudson	W2MB	W2PV
WØIUB	WØEEE	Midwest	WØPCO	KØKU
WA1PID	W1ZM	New England	WA1KID	W1ZM
W7RM	W7SFA	Northwestern	W9IRH/7	W7VRO
W6MUR	K6AQ	Pacific	W6NUT	W6OAT
K4VX	W4BVV	Roanoke	K4VX	W4BVV
N7HS	WØMYN	Rocky Mt.	WAØCVS	WØMYN
WB4YLG	WA4LZR	Southeastern	W4YWX	WA4LZR
W6DGH	W6ANN	Southwestern	W6RR	W6ONV
K5PFL	WB5DTX	West Gulf	W5NMA	W5BJA
VE3KZ	VE5NN	Canadian	VE3KZ	VE7SV

DX CONTINENTAL CHAMPIONS

Cw			Phone	
Single Op.	*Multiop.*		*Single Op.*	*Multiop.*
5T5CJ	. . . .	Africa	6W8FP	. . . .
JA2JW	KA2AD	Asia	JA2JW	UKØLAB
CT2BN	YU3DBC	Europe	I3MAU	G3TJW
FY7AA	. . . .	N. America	KZ5BC	VP2A
KH6RS	. . . .	Oceania	KH6IJ	KH6GKD
PJ2VD	OA4O	S. America	YV4YC	PT2ZBS

One-Weekend DXpeditions

(All are Certificate Winners)

CW

HBØAHA (HB9AHA, opr.)
FY7AK (K3BSY, opr.)
PJ8AS (WØIPU, opr.)
TI2BEV (K4VW, opr.)
VP2E (K2FJ, opr.)
VP2LBH (K2IGW, opr.)
ZF1LM (W8LUI, opr.)
KH6GPQ (K2KIR, opr.)
C31IU (FØAXP, opr.)

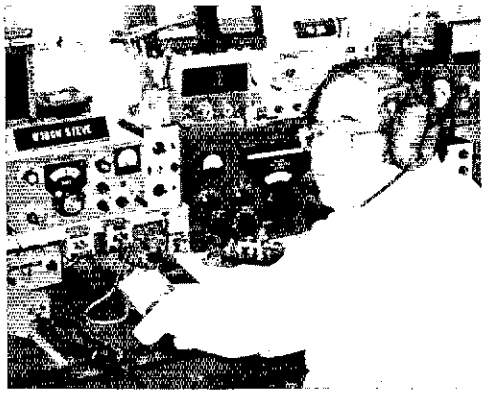
Phone

W4BRB/C6A (+WA4FAP)
FPØMM (W1MIW WA1TZV)
TI2BEV (K4VW, opr.)
VP2A (K5s FVA YMY WA5AMF W5s UDK NOP KP4EAJ VP2AC)
ZF1AU (K4YFQ WB4VVF)
ZF1CW (WØs CW JJC ZTC VE7SV)

1976 ARRL DX COMPETITION

Phone: Feb. 7-8, Mar. 6-7.

Cw: Feb. 21-22, Mar. 20-21.



W3TWZ, shown at W3BGN and a few accessory boxes in use during the contest.

LOW POWER CHAMPS

(150 Watts or Less at All Times)

All Band

Cw		Phone	
WA1SSH	236,826	WA1SSH	194,394
W2IRV	121,380	K5YRK	125,307
W3ARK	105,429	WA3SXH	114,633
WA6TLV	98,748	WA1KOC	37,323
WA2LVV	80,379	W5EDX	23,115
WA2HAI	77,970	W1HDI	21,708
K4KA	62,271	WA3UHJ	19,251
K2MFY	58,656	K4MOJ	18,762
K6YYQ	55,614	WA4JBC	15,792
W8GOC	46,458	WB5HOD	10,584

AFFILIATED CLUB SCORES

Club	Score	Entries	Phone Winner	CW Winner
One-Land				
Murphy's Marauders (Ct.) (3)	27,550,905	56	WA1KID	WA1PID
Two-Land				
Wireless Institute of the Northeast (N.J.) (10)	4,332,732	27	WB2RKK	WB2FIT
Boiled Owls of New York (17)	2,038,080	12	WB2CKS	W2GGE
South Jersey Radio Assoc. (19)	1,008,435	20	W2PAU	W2FYS
Buffalo Area DX Club (N.Y.) (21)	825,174	12	WA2LCC/2	W2HPF
Gloucester County ARC (N.J.) (34)	115,101	6	WB2OSQ	WA2NPD
Lake Success Radio Club (N.Y.) (36)	11,658	9	W2SGK	W2SGK
Three-Land				
Frankford Radio Club (Pa.) (1)	35,068,671	88	W3WJD	W3WJD
Nights of the Round Table (Md.) (26)	361,827	5	WA3SXH	K3IMC
ARINC Amateur Radio Club (Md.) (32)	267,546	10	W3PWO	W3GZP
Four-Land				
Potomac Valley Radio Club (Va.) (2)	29,278,725	67	K4VX	W3LPL
Central Virginia Contest Club (13)	3,014,553	15	W4QCW	W4ZSH
Southeastern DX Club (Ga.) (15)	2,168,517	12	K4JRB	W4YWX
North Florida DX Assoc. (25)	546,327	8	WA4EYR	W4WHK
Mid-South DX Association (Tn.) (28)	341,601	4	WA4FDR	WA4FDR
Five-Land				
Richardson Wireless Klub (Tx.) (5)	7,205,736	28	W5TMN	WA5RXT
Texas DX Society (11)	3,906,705	20	W5NMA	K5PFL
Alamo DX Amigos (Tx.) (20)	960,063	10	K5TSR	K5TSR
Delta DX Association (La.) (23)	638,670	7	K5YMY	W5UDK
Six-Land				
Southern California DX Club (4)	13,242,138	29	W6RR	W6DGH
Northern California Contest Club (6)	6,617,763	27	W6NUT	W6RGG/6
Northern California DX Club (7)	6,213,761	35	K6UJS	W6MUR
San Diego DX Club (8)	6,011,094	23	W6PLH	W6MAR
Seven-Land				
Western Washington DX Club (9)	5,723,148	31	W9IRH/7	W7RM
Eight-Land				
Michigan DX Assoc. (14)	2,736,711	13	WA8TBQ	K8IDE
Central Ohio AREC Membership Inc. (22)	658,398	4	K8MLO	K8MLO
Columbus ARA (Ohio) (27)	350,109	7	W8ZCQ	W8ZCQ
Central Ohio DX Association (29)	293,813	5	WA8ZDF	K8PYD
Ohio Valley ARA (30)	288,630	5	WB8FOS	W8RSW
Nine-Land				
Indy Dxers (12)	3,475,116	15	WA9BWY	W9LT
Northern Illinois DX Association (16)	2,074,527	19	W9OHH	W9RER
Four Lakes ARC (Wisc.) (31)	268,348	6	W9OW	W9LNM
Rockford ARA (Ill.) (33)	195,780	3	W9YRA	K9UIY
Chicago Radio Traffic Association (37)	7677	6	W9HPG	W9REC
Zero-Land				
Twin City DX Association (Minn.) (18)	1,038,192	4	WØNAR	WØNAR
Cedar Valley ARC (Ia.) (24)	586,296	9	WØPCO	WAØVDX
Canada				
Winnipeg DX Club (Man.) (35)	72,816	5	VE4RP	. . . .

CONTINENTAL LEADERS, ALL BAND, QSO/BAND

CW

AFRICA

	80	40	20	15	10
5T5CJ	228	443	719	690	15
ZS6FN	17	38	225	336	

ASIA

JA2JW	89	309	835	276	1
UAØFGM	140	235	727	123	
JA2AXB	27	128	358	87	

EUROPE

CT2BN	310	786	975	389	
I6BQI	219	361	1041	46	
OE5KE	128	84	789	19	
F5IN	57	121	980	10	
I3GNQ	156	231	511	26	

NORTH AMERICA

FY7AA	346	855	890	739	320
KV4IO	239	736	848	708	218
FY7AK	228	423	1025	713	163
TI2BEV	269	262	835	686	338
KP4EAJ	210	262	513	512	221
HR1AT	270	370	313	260	210
KV4CK	200	212	354	799	139
VP2E	213	233	314	512	122

OCEANIA

KH6RS	381	892	913	901	346
KH6IJ	416	675	1243	919	143
KH6CF	316	391	1017	555	93
KH6GPQ	244	630	696	538	85
ZL3GG	178	613	442	398	96

SOUTH AMERICA

PJ2VD	614	844	1416	1271	729
HC1CW	265	558	954	739	553
LU6EF	39	275	560	569	529
LU8ADK	7	284	512	716	290

PHONE

AFRICA

	80	40	20	15	10
6W8FP	371	398	1320	1111	109
ZS6DW	279	334	433	1286	
CR6GA	30	273	1094	1210	25

ASIA

JA2JW	122	244	522	378	
UAØFGM	168	342	654	47	

EUROPE

I3MAU	410	235	1219	62	
CT2BN	72	326	475	170	
I1NUC	62		1209	30	

NORTH AMERICA

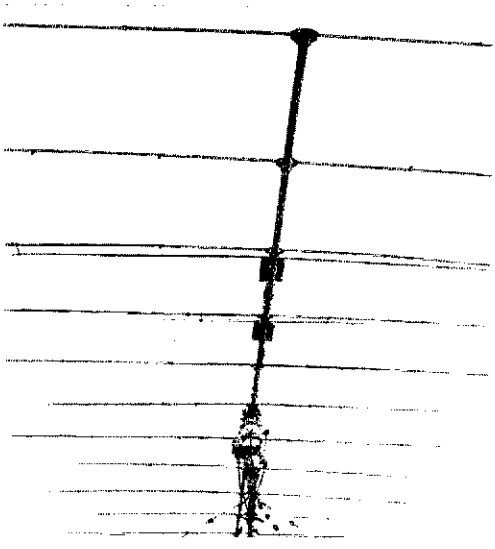
KZ5BC	588	688	1415	1920	545
6F8J	624	671	1550	1404	224
XE1LLS	547	843	1610	1059	222
FYØBHI	605	828	1961	1469	360
TI2WX	330	323	912	1233	388
HI8XAW	228	489	927	1969	54

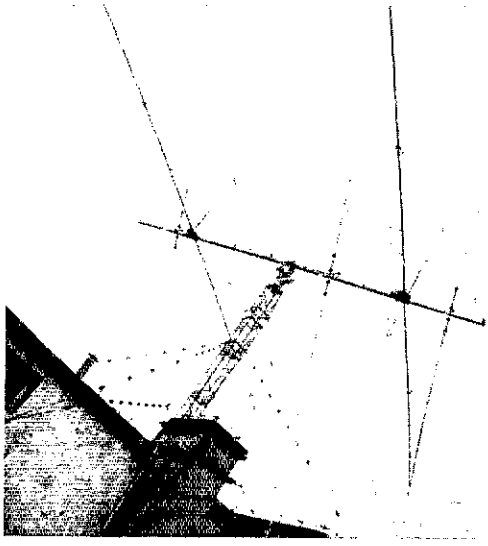
OCEANIA

KH6IJ	643	558	1215	1244	106
KH6IGJ	313	404	1084	922	36
KH6HML	189	249	113	322	51
ZL3GG	133	355	99	300	12
KH6GPQ	84	107	155	482	28
VK4VU	48	247	235	354	

SOUTH AMERICA

YV4YC	645	618	1356	1013	532
LU2A	73	195	976	900	456
LU8A	7	131	431	657	279
PZ5FB	208	163	235	475	84





SP5PWK

Minimums	5	30	50	80	70	20
Band	*160*	*80*	*40*	*20*	*15*	*10*
ALL BAND						
VO1KF	8	45	75	19	7	
VP3KZ		44	52	63	41	13
K1ROF	2	41	41	58	37	12
K1VTM*		40	61	88	47	9
W1CMH		39	46	71	29	4
W1DAL		55	64	76	34	5
W1FJI	8	25	28	70	36	10
W1PL	5	38	46	52	72	6
W1ZM*	13	64	77	103	67	21
WA1ABW		45	63	77	71	10
WA1KID*		30	42	68	21	5
WA1NBF*		29	39	63	22	6
WA1NRV	3	53	81	101	61	11
WA1PID		45	73	71	73	7
WA1SSH		33	53	58	24	9
WA1SIN	1	37	50	75	31	5
WB2CKS		49	49	73	34	11
K2BMI		35	46	71	41	12
K2CWZ*	4	34	71	48	40	17
K2JUC	3	32	53	72	40	12
W2RUF		36	50	76	38	15
W2DXI	6	38	57	69	38	14
W2EVS		30	32	41	21	2
W2GUF		23	65	72	28	7
W2HNO		33	44	61	29	1
W2PV*	23	72	48	110	78	27
W2YD*	2	60	76	96	57	18
WA2BLV*		48	77	96	61	15
WA2WHE		32	39		35	9

Minimums	5	30	50	80	70	20
Band	*160*	*80*	*40*	*20*	*15*	*10*
WA2YHB		32	51	57	24	8
WB2FII		34	62	75	41	16
WB2RJJ		31	52	74	39	11
K3AV		30				1
K3BHJ*		31	58	83	36	10
K3BW		30	62	52	27	7
K3CY		34	30	44	28	4
K3GJD	3	47	61	86	42	8
K3YUA		54	68	88	42	8
W3AFM				102		
W3AU*	20	64	117	115	80	32
W3BGN*		42	72	78	44	11
W3BWZ*	2	68	63	41	18	14
W3EYF		35	35	59	16	
W3FZI*		46	64	84	47	10
W3FRY*	9	48	91	99	64	26
W3GJ	5	35	44	58	30	15
W3GM*	11	59	86	107	70	26
W3GPE*		58	80	105	74	23
W3GRF		31	34	60	33	7
W3LPL		51	78	91	61	19
W3NZ		37	53	66	26	11
W3OOR	6	38	51	75	35	29
W3VT		40	64	87	44	19
W3WJD		58	77	99	65	26
W3YP		39	54	69	38	11
WA3ATX	5	29	41	59	36	21
K4GSU	10	47	74	96	32	17
K4VX		47	61	86	40	15
W4RVV*	20	68	107	109	73	29
W4KFC		40	64	81	45	11

Minimums	5	30	50	80	70	20
Band	*160*	*80*	*40*	*20*	*15*	*10*
W4MYA*		33	43	75	25	16
W4QCW*	11	33	57	56	29	16
W4YHD		45	15		20	
W4YWX	6	35	72	93	42	16
W4YZC		20	25	20	15	
W4ZSH		17	54	57	29	8
WA4CZR*		50	58	65	58	18
WB4BGY		44	68	79	37	13
WB4NRI		5	23	81	23	13
WB4YLG	5	46	60	76	53	13
K5PFL	10	41	56	65	52	22
W5KFT*		50	78	91	55	24
W5MYA*		26	55	84	52	26
W5HTQ	6	52		77	24	7
WA5LES*		46	69	83	65	21
WA5RXT*	7	32	41	65	48	21
WB5DTX*	7	44	77	87	65	24
K6RR*	2	54	58	99	42	16
W6ANN*	2	30	42	71	43	20
W6OGH	5	36	48	77	44	21
W6MAR	1	33	62	59	46	22
W6NLG*	1	44	56	62	47	16
W7IR	4	31	66	77	49	18
W7RM	5	27	53	83	40	13
W7SFA*	13	29	68	77	44	17
W7GUL	6	18	26	24	21	2
WA8TBO*		34	63	87	48	19
W9LT	3	37	55	83	39	16
W9REB		24	46	88	39	12
WA9ENP*		40	56	83	42	17

Minimums	5	30	50	80	70	20
Band	*160*	*80*	*40*	*20*	*15*	*10*
LOW BAND						
K1NOL	5	45	79			
W1BB	12					
W1MX		54	53			
W2EB		32	41			
W2HUG	9	26	18			
WB2JYM	4	45	14			
K4JD		57				
W4PZV	11	11	40			
W4UQ		40	40			
K5ABV	6	15	22			
K6OVT		23	56			
K8HLR		36	19			
HIGH BAND						
K1OPB				60	32	6
W1FBY				98	46	16
WA1NKK				75	29	2
K2UO				93	41	14
W2GXD				104	57	26
W3AFM				107		
W3ZSR				91	29	14
W4WSF				86	55	9
WB4TDH				67	27	20
K5SUR				86	50	24
W6EEY				49	35	25
K8IDF				81	30	15
WB8HPG				65	45	18
WB9LHI				87	22	14

*Multioperator station

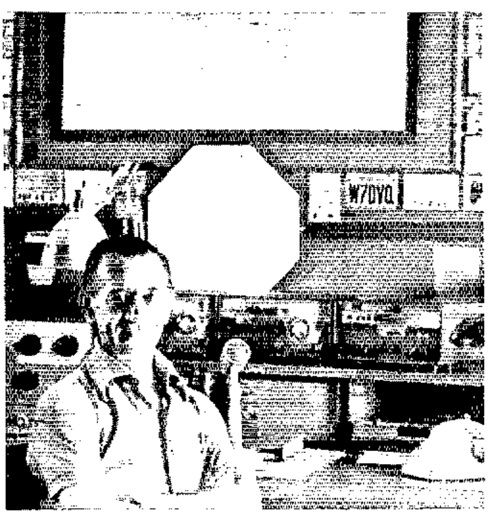
Minimums	5	30	50	80	70	20
Band	*160*	*80*	*40*	*20*	*15*	*10*
ALL BAND						
VE3KZ		58	51	89	53	19
VE7SV*	2	17	32	92	42	1
K1GSL		33	58	101	44	
K1HHN		20	34	85	27	4
K1ROF	4	44	48	81	56	21
K1VTM*		64	51	101	57	15
W1CMH		47	27	100	53	6
W1HFB		36	25	53	27	
W1VV		44	14	64	29	
W1ZM*	2	87	72	129	76	27
WA1ABW		48	46	89	42	10
WA1KID	1	57	36	109	57	10
WA1LNO		33	12	87	39	
WA1NBF*		47	36	72	46	7
WA1NRV		38	45	94	46	12
WA1PID		50	59	97	65	9
WA1SSH		32	28	63	44	12
WA1SIN		46	23	84	63	7
K2CWZ*		37	56	98	48	18
K2EL		37	32	96	50	13
W2EHB		33	37	102	59	14
W2EQK		31	19	77	51	10
W2HBT		9	9	86	38	
W2HHB		34	13	77	27	
W2HMH		44	64	105	66	19
W2HNO		41	35	73	41	7
W2HPF*		59	53	93	56	6
W2MB		57	54	91	56	20
W2PV*	16	90	89	140	90	25
K3BHJ*		45	53	94	54	10
K3BW*		40	41	75	35	4
K3CY		44	32	90	58	19
K3GJD*	1	63	40	84	57	10
K3MBF*			22	104	22	
K3TGM		4	3	83	60	13
K3YUA		39	38	83	57	11
W3AU*	14	91	86	115	91	27
W3BGN		54	55	103	51	12
W3DHM*		55	76	107	75	21
W3EZT		35	35	61	21	6
W3FRY*	6	73	74	118	80	29

Minimums	5	30	50	80	70	20
Band	*160*	*80*	*40*	*20*	*15*	*10*
W3GM*	5	75	79	127	79	28
W3GPE*		94	74	126	81	27
W3GRF		35	36	90	55	7
W3LPL		52	64	109	75	17
W3OOR	2	33	10	94	48	16
W3VT		48	61	95	54	15
W3WJD		51	71	120	79	23
W3YP		40	37	83	59	16
WA3ATX*	1	48	63	96	62	26
WA3NGS*		16	74	110	52	
K4EZ		29	34	82	48	17
K4JRB		35	42	89	45	9
K4KZZ		35	16	35	29	10
K4VX	1	49	45	108	66	19
W4RVV*	10	82	84	127	78	24
W4DFU*		40	71	58	49	15
W4MYA		42	27	85	43	15
W4OZF		38	7	32	35	22
W4QAW		50	14	86	47	13
W4QCW	1	67	68	107	48	26
W4WRY	2	39	43	100	40	16
W4YWX	9	48	50	96	39	17
WA4EYR		37	47	48	36	23
WA4HPF		12	26	55	48	25
WA4LZR*		48	95	89	72	23
WB4BGY*		57	58	109	73	18
WB4OSS		50	65	104	46	15
WB4DZI		15	51	87	66	25
WB4VUP		36	14	88	67	28
K5FVA				90		
K5IZY		27	39	88	58	24
K5PFL*	6	46	49	61	45	14
K5TSR		27	26	48	48	20
W5RJA*		48	51	97	64	18
W5NMA		30	56	73	64	19
W5PAC		25	29	38	45	
W5PRZ*		11	27	42	34	3
W5RTQ	7	29		32	42	3
W5TMN		36	45	85	57	17
WA5RTG	1	30	67	74	55	19
WA5RXT*	1	64	47	81	59	32
WB5DTA*		69	71	109	75	22
W6CHV		33		32	24	10

Minimums	5	30	50	80	70	20
Band	*160*	*80*	*40*	*20*	*15*	*10*
W6OGH*	1	13	16	25	33	2
W6HX	2	48	68	100	63	20
W6DAT		31	26	76	39	11
W6ONV*		40	46	94	56	16
W6RR		41	43	98	62	25
W6YRA*	1	24	37	78	53	27
WA6FPO		35	52	71	51	19
WB6KBK*	1	35	35	64	35	6
W7TMT		22	27	62	36	10
W9IRH/7		30	27	74	27	7
W8LT*		51	47	77	46	16
W8NGO		30	41	97	54	5
W8OKF*		31	11	80	42	2
W8LWA		25	42	84	47	16
WA8TBO		57	58	93	42	15
WA8YWK		23	43	90	39	9
W9CTY		26	34	92	47	13
W9GWD		34	11	74	33	11
W9LT		46	49	92	47	18
W9OHH		44	42	93	46	12
WA9HWY		34	53	105	60	17
WA9IVL*		47	29	88	47	9
WA9VPH		26	23	90	34	5
K0KUS		41	42	85	48	15
W0MYN		38	42	75	57	14
W0FLD		39	38	73	49	6
WA0CWC		38	43	80	56	17
WA0ENP*		46	45	87	36	8
LOW BAND						
VE3BMV		90	16			
VE7EC		34	23			
VE7IG		32	11			
W1EBC	4	97	31			
W1MX		74	46			
WA1FBA		33	27			
W2RAU		33	19			
WA2FCA		52	34			
WA2LGG/7		39	1			
K4BBF		33				
W4BAA		40	44			
W4GIW		39	57			
W4UPJ		80	55			

Minimums	5	30	50	80	70	20
Band	*160*	*80*	*40*	*20*	*15*	*10*
W4YHD		36				
K5ZJP		36	11			
WA5LOM		33	54			
WA5VDH		57	52			
K6OVT		37	41			
W6ITY	1	40	35			
W7YTN		32	36			
K8HLR		47	58			
K8LUQ		35	49			
WA8ZDT		33	63			
W8RZW		54				
W0CH	1	34	40			
W0MLG		52	50			
WA0CPX		40	46			
HIGH BAND						
VE3BBH				109	39	11
K1JHX				99	49	6
K2ROU				93	32	4
W2GXD				107	56	12
W2HEL				60	44	
WB2VFT				89	49	8
W3ZSR				86	59	25
K4JPD				85	48	21
W4CYC				90	60	5
W4WSF				104	68	20
WA4SVO				95	80	22
WB4NRI				106	43	11
K5FVA					90	
K5KSI					101	
W5TWI				82	43	8
WA5IMK				74	58	20
WA5ZNY				31	58	26
K6SVL				100	63	25
WB7ABK				54	40	10
K8IDF				107	59	13
W9IY				98	47	11
W9YRA				101		
WB9LHI				101	50	15

*Multioperator Station



Two very big signals from Spain on all bands are from EA4LH (l) and EA3SA (r).

W/VE CW ALL BAND *CANADIAN*

Maritime

VO1KE 313,962-134- 781-E-
VE1EK 13,965- 49- 95-A-14

Quebec

VE2WA 169,560-157- 360-C-18
VE2AYU 143,910-123- 390-C-68

Ontario

VE3KZ 361,674-213- 566-C-54
VE3EUP 134,747-127- 355-C-

Multi-Single

VE3EDC (+VE3EDG) 40,128- 88- 152-C-

Saskatchewan

VE5RA 78,960- 94- 280-C-
VE5TT 10,320- 40- 86-A-26

Multi-Single

VE5NN (VE5s BX DP DX UA) 72,576- 96- 252-B-77

British Columbia

VE7FE 14,238- 42- 113-A-41

U.S.A.

1

Connecticut

WA1PID* 673,425-219-1025-C-
WA1STN* 568,941-199- 953-F-48
WA1SSH 236,826-177- 446-A-60
WA1LNQ* 219,180-130- 562-C-30
W1HFB 203,136-128- 529-C-27
WA1MAO 194,928-131- 496-C-28
W1BIH 159,840-160- 333-C-20
K1RLU 150,336-116- 432-C-29
W1VV 145,266-142- 341-C-30
W1GPK 111,834-114- 327-C-44
W1AB 60,348- 94- 214-C-19
W1CNU 41,328- 82- 168-B-40
W1VH 34,602- 79- 146-C-41
WA1KOC 14,652- 44- 111-B- 8
WA1QNF 6042- 38- 53-C- 3
W1SK 1140- 19- 20-B-14
WA1SCV 612- 12- 17-A- 3

Multi-Single

WA1KID (+WA1ABV) 355,209-167- 709-C-48
WA1NRF (+WA1OCU) 248,496-167- 496-C-78

Multi-Multi

W1ZM (+K1THQ W1GQO WA1QNF WA2s CLQ LQZ) 2,045,175-335-2035-F-96
K1VTM (+W1s GNC GQO WA1s ABV LNQ) 876,078-238-1227-C-88

Eastern Massachusetts

W1DAL 544,416-214- 848-C-50
W1CMH 423,564-188- 751-C-50
W1PL 258,804-182- 474-B-40
W1PIV 236,205-145- 543-C-56
W1FJJ 235,725-175- 449-E-37
WA1LKX 153,636-124- 413-C-22
WA1SCX 23,187- 59- 131-C-13

Multi-Single

WA1NRV (+K1YKT WA8WNU) 1,196,826-302-1321-C-96
W1AX (+W1EOB) 1188- 18- 22-C-

Maine

K1RQE 275,328-192- 478-C-36

New Hampshire

W1EHT 55,596- 82- 226-B-24
WA1RGU 29,484- 84- 117-B-26
W1HDI 7182- 38- 63-B-22

Rhode Island

W1YNE 1296- 18- 24-C- 1
WA1RFT 60- 4- 5-B- 2

Vermont

WB2CKS/1 360,936-216- 557-C-58
K1HK 69,600-100- 232-C-15

Western Massachusetts

WA1ABW 544,434-226- 803-C-45
K1RQF 45,594- 51- 298-C-17

2

Eastern New York

W2DXL 666,666-222-1001-C-
W2HO 229,272-164- 466-C-54
WA2HAI 77,970-115- 226-A-
WA2LJM 24,576- 64- 128-C-44
W2AWF 10,191- 43- 79-C-12
WA2HHO 2604- 28- 31-C- 7

Multi-Multi

W2PV (+K1s OME ZND W1GQO WA1s JYY NZT WA2s AYC SPL WB2s OEU SQN) 2,126,100-373-1900-C-96

N.Y.C.-L.I.

W2GGE 477,945-195- 817-C-48
WA2YHK 162,024-172- 314-F-37
W2IRV 121,380-119- 340-A-32
W2FVS 80,892-126- 214-C-
WA2LVV 80,379-117- 229-A-
W2GKZ 63,300-100- 211-C-15
K2MFY 58,656- 94- 208-A-36
WB2HZH 37,422- 81- 154-A-55
W2GC 35,319- 61- 193-C-19
WA2KUX 21,240- 59- 120-C-31
WA2LQO 17,982- 54- 111-C-
WB2UHY 9477- 39- 81-A-32
WA2CXQ 1350- 18- 25-D- 7
W2CZZ 630- 14- 15-B- 4
W2OTS 147- 7- 7-B- 3

Northern New Jersey

WB2FIT 537,624-228- 786-C-70
K2BMI 510,450-205- 830-C-75
WB2RJJ 434,655-195- 743-C-61
W2EQK 268,536-167- 536-C-54
WA2UOO 242,064-164- 492-C-33
WA2WBE 66,240-115- 192-B-47
W2CVW 32,004- 84- 127-G-
W2HN 26,208- 78- 112-C-
W2HTR 11,289- 53- 71-C- 9
WB2RKK 9702- 33- 98-C- 3
W2MB 6216- 37- 56-E- 7
WA2EJZ 4611- 29- 53-B-10
WA2DSA 1860- 20- 31-A- 2
WB2VFT 1764- 21- 28-D- 2

Multi-Single

W2YD (+W2HZY WA2SRQ WB2RKK) 1,390,032-294-1576-F-96
WA2DNY (+WB2CST) 168,438-134- 419-C-50

Multi-Multi

K2CW/2 (multiop) 523,422-243- 718-C-62
WB2FTQ (+WB2FUE) 95,823-117- 273-G-72

Southern New Jersey

K2JOC 454,860-210- 722-E-63
W2BQF 430,962-217- 662-C-65
W2HNO 244,440-168- 485-C-68
K2FL 230,580-180- 427-C-50
W2FYS 203,820-158- 430-C-51
W2HBT 168,921-137- 411-E-50
W2PAU 145,632-148- 328-C-50
K2FT 129,564-122- 354-C-37
W2DT 124,488-133- 312-C-
W2EA 92,574-111- 278-B-56
W2TKZ 80,031-103- 259-C-32
W2UI 65,952- 96- 229-B-24
W2EPA 47,988- 93- 172-C-45
K2OO 41,676- 92- 151-A-
WA2NPD 12,267- 47- 87-C-15
W2ZHN 10,296- 52- 66-C-16
WA2VYA 8415- 33- 85-E- 5
W2FGY 7392- 44- 56-B-25
W2HVO 6426- 42- 51-B-22
WA2BZX 4680- 24- 65-B-18
W2FBF 3105- 23- 45-C- 3
WB2BYU 1425- 19- 25-C- 5

Multi-Single

K2KA (+WB2BXV) 95,085-106- 299-C-60

Multi-Multi

WA2BLV (+K3JCT WA3LRO) 1,680,825-307-1825-C-85

Western New York

WA2SFT 41,712- 79- 176-B-
WA2CDV 20,400- 68- 100-C-12
K2IGW 15,810- 62- 85-C- 9
WB2KNZ 1782- 18- 33-A- 5
WB2AIO/2 108- 6- 6-C-

Multi-Multi

K2LWR (+WA2BCK) 253,536-152- 556-C-50

3

Delaware

W3TGF 236,379-143- 551-C-66
W3GL 215,424-187- 384-E-45
W3DRD 32,832- 76- 144-D-22

Eastern Pennsylvania

W3WJD 1,477,440-320-1539-C-85
K3YUA 973,269-261-1243-C-
W3QOR 807,990-230-1171-F-60
W3YP (W3DQG, opr.) 494,316-207- 796-C-80
W3NZ 363,285-195- 621-C-52
W3YIK 263,571-163- 539-C-75
W3OV 230,892-142- 542-C-
K3CY 230,400-150- 512-C-23
K3BW 212,826-158- 449-C-
W3GRS 191,664-176- 363-C-
K3AIG 150,120-139- 360-C-44
WA3SZI 145,734-107- 454-B-72
W3KFQ 130,986-114- 383-C-
W3ALB 129,297-131- 329-C-29
WA3NQX 120,450-110- 365-C-28
W3ARK 105,429-113- 311-A-37
W3GHM 99,375-125- 265-E-29
W3BIP 96,768-126- 256-C-36
W3KV 65,988- 94- 234-C-25
W3CGS 58,869- 93- 211-C-26
WA3YQW 51,480- 88- 195-D-60
K3MBF 46,230- 46- 335-C-12
K4JLD/3 43,095- 85- 164-C-19
WA3SZV 20,955- 55- 127-C-32
W3EVW 20,313- 61- 111-C-16
W3EAN 15,933- 47- 113-C-
WA3WIM 14,850- 50- 99-C-
K3TEJ 7560- 42- 60-B-10
W3HMR 7182- 42- 57-C-14

Multi-Single

W3BGN (+K3JFY W3TWZ) 869,934-247-1174-C-93
WA3ATX (+W5MCO) 326,556-193- 564-E-61
W3KT (+2 meter net) 162,624-154- 352-C-
W3GPE (K3 OIO WJV WA3s COJ FFR WN3VYD) 1,866,306-337-1846-C-96
W3GM (+K3ZGL W3s JSX KFK WA3s JLT JYB) 1,862,748-354-1754-F-96
W3FRY (+K3s DZB HTZ WA3s LNM NAF SWF) 1,472,481-327-1501-F-96

Maryland-D.C.

W3LPL 1,238,880-290-1424-C-70
K3GJD 815,517-237-1147-C-72
W3GRF 282,645-165- 571-C-20
W3MFJ 261,126-163- 534-C-
W3FYF 114,114-143- 266-C-45
W3FA 112,014-127- 294-C-35
K3IMC 61,659- 93- 221-C-48
W3GZP 54,405- 93- 195-E-45
W3TOS 54,126- 97- 186-B-33
W3HVM 26,460- 63- 140-C-14
W3KS 22,896- 72- 106-G-18
W3LMZ 12,789- 49- 87-C-10
W3KA 11,280- 47- 80-B- 8
K3AV 6216- 37- 56-B-
W3ZSX 4995- 37- 45-A-

Multi-Single

W3BWZ (+W3NL WA3NGS K4CFR) 872,772-257-1132-C-96
W3EZT (+K3AV W3s DBT DNY ES WA3GUI K4OMR W5TWT) 666,324-249- 892-C-62
K3BHJ (+WB2MZE K3AVT WA3KOC) 599,064-218- 916-C-84
WA3AFQ (+2 meter net) 55,146-101- 182-C-
W3ZH (W3HVQ W3TUX WN3UUO) 2451- 19- 43-C- 9

Multi-Multi

W3AU (+K3EST W3IN WA3s HRV IAQ UTA WB4MRI) 3,185,604-428-2481-C-96

Western Pennsylvania

W3VT 567,672-248- 763-C-80
W3HDH 34,800- 80- 145-B-17
WA3GSC 12,600- 50- 84-D-19

Multi-Multi

W3TV (+W3s ADH VW) 525,000-200- 875-C-39

4

Alabama

W4RAL 22,110- 67- 110-B-21

Georgia

W4YWX 825,210-265-1038-C-81
K4BAI 92,964-122- 254-C-
W4DXI 29,106- 77- 126-C-31
WB4DPM 1980- 22- 30-B-17

Kentucky

K4GSU 1,035,828-276-1251-F-78

North Carolina

WB4MGB 12,450- 50- 83-E-12

South Carolina

K4II 212,544-164- 432-C-36
WB4NRI 129,630-145- 298-E-65

Southern Florida

WB4YLG 1,092,960-253-1440-C-90
K4CL 278,343-169- 549-F-55
K4HWW 199,080-158- 420-B-70
W4HOS 90,090-130- 231-B-28
W4OZF 30,687- 53- 193-C- 9
WB4WDH 15,480- 60- 86-B-24
W2HL/4 7080- 40- 59-B-10
K4RQE 3072- 32- 32-B- 4
W4FCN 2835- 21- 45-A-15

Multi-Multi

WA4LZR (W4LKG WA4FCT WB4s AEX HYN OGW) 872,250-250-1163-C-96

Tennessee

WA4FDR 137,460-158- 290-C-19
K4MOJ 40,635- 63- 215-A-

Virginia

K4VX (WB4SGV, opr.) 915,732-244-1251-C-72
WB4BGY 699,930-231-1010-C-65
W4KFC 649,371-233- 929-C-43
W4ZSH 173,745-165- 351-E-31
W4DM 121,584-136- 298-C-20
W4HHK 116,907-133- 293-C-
K4ZRX 93,960-108- 290-C-24
K4JM 73,575-109- 225-B-18
K4KA 62,271-111- 187-A-30
W4YZC 37,248- 97- 128-E- 7
K4OD 36,636- 71- 172-C-12
W4YHD 35,040- 80- 146-C- 7
W4NH 30,573- 79- 129-B- 6
K4ZA 29,484- 84- 117-C-19
K4FOK 27,000- 75- 120-B-21
WB4OXD 21,120- 64- 110-A-13
K4JYM 14,994- 49- 102-C- 9
W1FRF/4 14,784- 56- 88-B-15
W4KMS 10,044- 54- 62-E-10
K4EJG 3762- 33- 38-B-36

Multi-Single

W4MYA (+W4LDF WB4BVY) 420,480-192- 730-C-60
W4QCW (+WA8ZDT) 330,444-201- 548-E-45
WB4TBO (WA4s BFY BKQ) 209,763-153- 457-F-45

Multi-Multi

W4BVV (+K3OAE W3BQV WA3HWW K4s GKD YF W4CRW W9SZR) 2,884,560-404-2380-F-96

5

Arkansas

WA5RTG 184,164-149- 412-G-42

Louisiana

W5UDK 100,113-151- 221-E-
W5OB 91,935-135- 227-C-50
K5KLA 22,776- 73- 104-C-22
W5WMU 3843- 21- 61-C- 3

Mississippi

W5RUB 77,625-125- 207-C-18

Northern Texas

W5TMN 148,920-146- 340-C-37
W5PAQ 72,885-113- 215-C-22
K5VTA 60,564- 98- 206-C-36
K5ZJP 46,944- 96- 163-C-24
K5YRK 9024- 47- 64-B-26
K5PXV 7326- 37- 66-A-38
W5SOD 5508- 34- 54-A-25
K5LQJ 1296- 18- 24-A-12

Multi-Single

W5MYA (+WA5JMK) 745,038-243-1022-C-79
WA5RXT (+WA5QXD WB5JJE) 299,730-206- 485-E-68
K5AKW (+K5BE) 36,540- 60- 203-C-40

Multi-Multi

WB5DTX (WB4IEZ K5YAA W5BJA WA5UCT WB5s AOF EEE IZN WA6OHJ) 1,592,748-302-1758-F-96

Southern Texas

K5PFL 949,806-246-1287-C-79
K5TSR 311,220-156- 665-C-
W5SBX 167,508-132- 423-E-29
WA5ZNY 150,423-133- 377-E-31
W5LPO 134,865-135- 333-B-54
K5JZY 47,730- 86- 185-F-32
W5RTQ 44,115- 85- 173-E-14
W5NMA 39,780- 78- 170-B-35
W5PF 36,630- 66- 185-B-41
WA5TPO 24,120- 67- 120-B-20
W5UJJ 15,219- 57- 89-A-29
WB5HOD 6696- 36- 62-A-10
W5OSJ 6480- 40- 54-B-18
K5LZJ 2808- 26- 36-B-10

Multi-Single

WA5LES (+K5s LZO RLW W5WMU WA5WCT) 1,212,354-286-1413-C-96

Multi-Multi

W5KFL (+W5TFC WA5s OCN ZWC WB5DDI) 1,298,088-298-1452-C-90

East Bay

W6RGG/6 493,656-150-1097-C-66
K6HHH 374,448-116-1076-C-50
K6UJS 331,344-117- 944-C-62
W6UZX 90,720- 80- 378-C-

Multi-Single

W6DOD (+W6KG)
486,780-140-1159-C-90
WB6TTB (+W6IAM)
8280- 23- 120-A-40

Los Angeles

W6DGH 1,285,488-226-1896-E-94
W6OUN (WB6QLD, opr.)
1,108,917-201-1839-C-91
W6RR 876,453-197-1483-C-80
WA6EPO 593,370-190-1041-C-56
WA6KZI 417,309-113-1231-C-
WA6ELV 98,748- 78- 422-A-55
K6OE 57,766- 64- 242-C-
K6YYQ 55,614- 62- 299-A-70
W6ANB 31,022- 53- 258-E-11
W6UAB 17,748- 58- 102-B-14
W6UIV 10,179- 39- 87-B-11

Multi-Single

K6ELX (+W6ABP)
53,628- 41- 436-C-60

Orange

K6OS 231,750-125- 618-C-
K6LXA 86,520- 70- 412-C-18
W6CY 83,916-108- 259-C-47
G3DPX/W6 26,208- 48- 182-B-16
WA6RUS 5589- 27- 69-B- 9

Multi-Multi

W6ANN (+WA6s DGQ GLD WH6s PKA PNB)
1,171,248-208-1877-E-88
K6RR (+K6s PDA PJY W6DQA WA6NGG WB6s FDD HDH ZVC WA9UCE)
1,170,792-202-1932-C-

Santa Barbara

K6OW 159,390-110- 483-C-58
W6PN 141,024-104- 452-C-49
K6QPH 63,963- 69- 309-C-18
W6PRP 44,892- 87- 172-C-25

Santa Clara Valley

W6MUR 542,116-156-1137-C-80
W6HJP 286,974-149- 642-C-53
K6DC 218,109-109- 667-C-27
W6EJ 46,740- 82- 190-E-20
WA2HWS/6 33,000- 55- 200-A-25
K6WD 18,480- 40- 154-C-
WA6IKT 14,592- 48- 128-B-11
W6ISQ 10,293- 47- 73-C- 4
WB6EXW 10,044- 27- 124-C-
W6JKJ 2448- 24- 34-C- 4
W6GBY 840- 14- 20-B- 7

Multi-Single

K6AQ (+DJ6RD)
1,089,816-182-1996-C-96
W6OKK (+K1MU) K6AVA WR6s DSV (PK)
645,072-151-1424-C-88
W6OAT (+K6CQ) WA6PMK)
229,425-125- 611-C-45

San Diego

W6MAR 1,277,074-233-1827-C-88
W6RZE 166,114-106- 423-C-33
W6ONV (WA9UCL, opr.)
162,852- 82- 662-C-40
K6FBH 60,696- 72- 281-B-65
W6BS 54,675- 81- 225-C-20
W6ID 30,151- 67- 151-C-17
W6FF 29,232- 48- 203-C-45
WA6UEY 13,485- 41- 145-A-33
WA6OIRJ 2703- 17- 53-A-12
W6MJP 1140- 19- 20-B- 8

San Francisco

W6WB 202,032-138- 488-C-70
W6KHI 18,315- 33- 185-C-

Multi-Single

W6BIP (+WA6DJI)
520,047-153-1133-C-72

Multi-Multi

W6NUI (+K6ILM W6s HQN KHI PAA RNP WAns PMK VEF WB6s AIN CEP)
1,185,723-203-1947-E-96

San Joaquin Valley

W6YKS 41,553- 57- 243-C-16
W6CLP 10,710- 34- 105-B-22
W6AFH 8439- 29- 97-C-23

Sacramento Valley

WA6JVD 432,516-153-1084-C-
K6DR 168,606-102- 551-C-40
WA6NYV 95,192- 88- 454-C-29
K6SG 65,772- 58- 378-C-32
K6RN 27,360- 57- 160-C-17

W6KYA 10,656- 37- 96-B- 5

7

Arizona

W7IR 1,063,755-231-1535-C-81
W7AYV 167,865- 95- 589-C-24
W7GGL/7
116,958-101- 386-E-61
WA7YRP 48,948- 65- 251-C-
W7YS 12,654- 37- 114-A- 8

Idaho

K7NHV 214,020-116- 615-C-24

Montana

K7ABV 55,944- 72- 259-C-22
W7LR 38,430- 70- 183-B-34

Oregon

W7IML 423,765-129-1095-C-59

Utah

W7HS 138,528-104- 444-C-48

Washington

W7RM (K7VPF, opr.)
1,522,248-221-2296-E-92
W9IRH/7
598,128-136-1466-C-78
W7WMY 173,346- 93- 606-C-40
W7LAV 95,637- 71- 449-C-51
W7LZF 42,228- 69- 204-C-21
K7MOK 1938- 17- 38-A- 4
K7EVB 567- 7- 27-A- 6

Multi-Single

K3MNT/7 99,693- 57- 583-C-32

Multi-Multi

W7SFA (+K3MNT K7JCA W7s ENW EXM WA7OTT VE7ZZ)
1,714,920-248-2305-C-96

Wyoming

W7LE 6669- 39- 57-A-18

8

Michigan

K8LUD 184,896-144- 428-C-70
W8LHF 150,024-133- 376-C-37
W8DA 88,011-127- 231-E-33
WB8SIB 48,285- 87- 185-C-21
W8DSO 31,920- 70- 152-B-30
W8IWA 20,400- 68- 100-C-27
K8CVV 1080- 15- 24-C-20

Multi-Single

WA8LBQ (+WA8YVR)
700,839-257- 904-C-90
W8TBZ (+WA8VBY)
78,408- 89- 294-C-25
WA8OLO (+KB8MXC)
43,320- 76- 190-C-45

Ohio

W8KJT 293,040-176- 555-C-85
W8DB 270,810-177- 510-C-43
WB8SW 174,000-125- 464-C-
W8ZCQ 157,352-138- 368-C-37
W8GQU 52,836- 74- 248-C-51
W8FF 52,800- 88- 200-D-50
W8EX 48,825-105- 155-B-
W8GOL 46,458- 89- 174-A-
W8LHV 23,040- 64- 120-B-
K8MEU 17,850- 70- 85-E-29
WB8KOD 9372- 44- 71-B-20
W8DWP 5202- 44- 51-C-
W8KAJ 4752- 36- 44-D- 8
W8PCS 3060- 30- 34-B- 5
W8KPE 1425- 19- 25-C- 6
K8PYD 960- 16- 20-C- 4

Multi-Single

W8LI (WA1LKU WB8s IBZ JOI JXS) 261,117-171- 509-C-49
WA8ZDF (+K8EHU WA8RWU WN8RIJ) 77,175-105- 245-E-20

9

Illinois

W9RER 455,202-209- 726-C-67
W9UDK 161,212-134- 406-C-42
K9UKM 148,863-143- 347-C-35
W9WYB 145,350-150- 323-C-40
W9DWQ 136,680-136- 335-C-36
K9DWK 94,062-122- 257-E-45
W9IIV 59,400-100- 197-B-42
WA9IVL 27,813- 73- 127-C-15
WA9IXF 24,102- 78- 104-B-15
W9YYG 20,235- 71- 95-C-12
W9GSB 4794- 34- 47-A-17
W9REC 3444- 28- 41-B-17
W9IPT 2697- 29- 31-C-12
W9HPG 1122- 17- 22-B-10
W9FNZ 216- 8- 9-A- 8

Multi-Single

W9DY (+2 meter net)
23,856- 71- 112-C-10

Indiana

W9IT 527,775-227- 775-C-80
WA9HWY 356,928-208- 572-C-62
WB9MDB 76,266-114- 223-E-22
W9SFR 22,365- 71- 105-C-10
K9LZT/9 3- 1- 1-A- 1

Wisconsin

W9LNM 94,080-128- 245-E-
WA9KGO 65,448-101- 216-C-29
K9YBC 52,800- 88- 200-E-25
W9KB 37,296- 84- 148-C-33
WB9NME 855- 15- 19-A-10

Ø

Colorado

WØKMV 66,732- 83- 268-C-

Multi-Single

WØMYN (WØMS WBØs CMM HBS)
476,775-163- 975-E-96

Iowa

WAØVDX 133,764-142- 314-C-33
WØEHF 34,702- 82- 137-C-18
WØMJN 912- 16- 19-C-13
KØFLY/Ø 297- 9- 11-B- 4

Kansas

WØIUB 150,495-127- 395-C-23
WØOC 26,676- 78- 114-C-24
WBØKWJ 1953- 21- 31-B-

Minnesota

WØOUE 157,824-137- 384-C-76
WØNAR 93,906-111- 282-C-
KØCVD 23,872- 77- 112-G-20
WAØKQU 4830- 35- 46-C- 6

Multi-Multi

WAØENP (+WAØs BWM MHJ WBØANT)
515,040-232- 740-E-96

Missouri

WAØYET 20,904- 67- 104-B- A
WØUWS 9870- 47- 70-B-16
WBØHDP 108- 6- 6-B- 4

Multi-Multi

WØEEE (WA9EAT WAØACF WBØGQP)
179,928-147- 408-C-78

North Dakota

KØALL 3720- 31- 40-C- 5

South Dakota

WAØONL 187,929-133- 471-C-
WAØCPX 177,408-128- 462-C-75

DX CW ALL BAND

AFRICA

South Africa

ZS6FN 182,952- 99- 616-A-13

Mauritania

5T5CJ 1,106,160-176-2098-B-60

ASIA

Thailand

HS2AIG 9075- 25- 121-C-14

Japan

JA2IW 656,850-145-1510-C-
JA2AXB 122,400- 68- 600-B-47
JA1XMS 106,731- 67- 531-B-38
JH1GTQ 100,425- 65- 515-B-32
JA7AMK 66,978- 61- 366-C-
JA1JKG 66,360- 56- 395-B-
JA2AIR 58,140- 81- 380-C-
JF1XQL 31,992- 43- 248-A-30
JA7YPH 28,968- 34- 284-B-16
JH1OBS 28,560- 35- 272-B-45
JA1YKL 27,216- 36- 252-B-90
JA1UID 25,920- 40- 216-B-30
JA5EZJ 25,389- 30- 217-A-
JA6AKW 23,808- 32- 248-A-
JA7SSY 19,584- 32- 204-A-23
JA3ERG 18,228- 28- 217-B-
JA4UDP 15,399- 29- 177-A-
JA2HI 15,360- 32- 160-B-
JA7KE 14,796- 36- 137-A- 8
JA7YOJ (JA7GQB, opr.)
14,601- 31- 157-A-14
JA7IKH 14,504- 28- 173-C-14
JA3VUV 14,181- 29- 163-A-
JA9LX 14,094- 27- 174-A-22
JA7YZI (JA7EUK, opr.)
14,002- 24- 204-B-
JA9CWJ 11,904- 32- 124-A-
JA2AAG 11,811- 31- 127-A-13
JA7CPW 11,760- 20- 196-A-30
JA2AJA 11,223- 29- 129-B-
JA2IH 10,695- 23- 155-A-30
JA7AEM 7392- 22- 112-C-10
JA9BUH 6624- 23- 96-B-20
JA9IBU 5922- 14- 141-B-25
JH2RVP 5664- 16- 118-B-
JA1BSU 5472- 19- 96-A-17
JA1BNW 4914- 18- 91-C-
JA2UHY 4845- 17-
JAØAE 4347- 21-
JA1IZ 4176- 24-
JR1KYC 4017- 13- 1
JA9BES 2925- 15-
JA1BTH/Ø 2790- 15-
JA9BW 2160- 10-
JA2BCQ 1800- 10-
JA7EYL 1500- 10-
JA1CID 1107- 9-
JA6IQ 990- 6-
JA9BV 861- 7-
JE1AHE 837- 9-
JA1BBZ 798- 7-
JE1UVI 672- 3-
JA6UYE 324- 6- 1
JA5ZK 21- 1-

Multi-Single

KA2AD (W5HWP W9WJB)
254,928- 94- 90
JA9YBA (JA9s DZS GGH JH1GUO JH2SGU JR2AKE
113,400- 72- 52
JA2ZHX (JA2s AO DHL EM JH2HUQ JR2AAZ)
64,296- 57- 37
JA7YAE (JA7s RHJ UIH J JA7-6824)
44,352- 48- 30
JAØYBY (JAØs QYE SWT)
18,240- 32- 19
JA1YHA (JAØGBO JR1NWV
16,008- 29- 18

Asiatic R.S.F.S.R.

UAØEGM 451,656-123-122
UKØEAJ 13,480- 40- 27
UAØGF 510- 10- 1

Multi-Single

UKØLAB (UAØs LH MI NR (T NF) 230,202- 87- 88
UKØZAB (multiop)
127,050- 70- 60
UKØLAO (multiop)
9282- 21- 14

EUROPE

Azores

CT2BN 1,284,120-174-246

Federal Republic of Germ

DL1YA 52,634- 49- 2
DJ4OE 22,311- 37- 2
DJ2YE 7938- 27-

Multi-Single

DKØTU (DK1PD DK5GB DL7s ON QU SI)
180,810- 82- 7

Multi-Multi

DLØTT (DJ7RV DK2IT DK6WJ DK8PI DL8RE)
349,056-101-11

German Democratic Repu

DM3YBF 25,776- 48- 1

Spain

EA1MC 62,481- 59- 3
EA4BV 53,040- 68- 2
EA5BS 43,248- 53- 2

Republic of Ireland

EI9J 95,013- 69- 4

France

F5IN 322,368- 92-11
F8VJ 126,588- 77- 5
F8ZF 63,426- 62- 3
F8IQ 34,155- 55- 2
F6CZU 16,032- 32- 1
F9BB 14,508- 39- 1
F6COH 12- 3-

England

G3MXJ 233,358- 89- 8
G2QT 157,248- 84- 6
G3KDB 103,680- 72- 4
G3ESF 86,292- 68- 4
G3IAS 60,291- 63- 3

Northern Ireland

GI3IEX 39,273- 53- 2

Multi-Single

GI6YM (GI3s AXT IVI GI CWZ GI5UIR)
149,625- 75- 6

Wales

GW3SYL 38,064- 52- 2

Hungary

HA7MC 24,639- 43- 1
HA2NF 15,543- 33- 1
HA6OA 4245- 24-

Multi-Single

HG5A (HA5s HO HP JI M
492,636-122-13

HA5KBM (multiop)
111,156- 59- 636-B-
HAØKLE (HA4s LM LO LZ MJ MK) 89,250- 70- 425-D-
HA9KPU (multiop)
81,972- 66- 415-B-
HA5KKN (multiop)
66,621- 53- 419-B-23
HA8KVG (multiop)
43,542- 59- 247-B-
HA2KRL (multiop)
37,191- 49- 257-B-
HA3KMR (multiop)
36,000- 50- 240-B-
HA5KKC (HA5s LV MA MD MO)
32,634- 49- 228-A-
HA4KYH (HA4s YL YO YX)
30,420- 52- 195-B-
HA1KZB (multiop)
22,533- 37- 215-B-
HA3KGJ (HA3s GJ GQ HE H3-117 H3-118) 5773- 23- 91-B-

Switzerland

HB9DX 34,164- 52- 219-B-

Liechtenstein

HBØAHA (HB9AHA, opr.)
212,139- 97- 729-B-

Italy

I6BQI 675,135-135-1667-C-
I3GNQ 315,780-114- 924-B-47
I1SLJ 230,010- 82- 935-B-48
IT9RAN 213,393- 83- 857-B-38
I8RHZ 22,059- 43- 171-B-20

Norway

Multi-Single

LA1K (LA1ER LA3BO LA4CQ LA5KO LA7s DS SP YN)
100,092- 76- 439-C-

Bulgaria

Multi-Single

LZ1KDP (multiop)
189,540- 90- 718-B-
LZ2KSU (multiop)
39,798- 66- 201-B-
LZ1KAU (multiop)
14,448- 43- 112-B-
LZ2KBA (multiop)
5616- 24- 78-B-
LZ2KSB (multiop)
4698- 27- 58-B-

Austria

OE5KE 335,664-108-1036-B-

Finland

OH7NW 5070- 26- 65-B-
OH9AB (OH9PH, opr.)
1677- 13- 43-B-

Czechoslovakia

OK3ØKFF 141,462- 87- 542-B-
OK3ØAVD 33,793- 47- 263-B-
OK3ØKFO 11,877- 37- 107-A-
OK3ØBEC 1392- 16- 29-B-
OK3ØKZ 324- 9- 12-D-

Multi-Single

OK3ØKAG (OK3Øs CIR ZAF ZFM)
86,904- 68- 430-B-
OK3ØKYS (OK3Øs FRF FVA)
27,462- 46- 199-B-14
OK3ØKYD (multiop)
6954- 19- 122-A-
OK3ØKCF (multiop)
48- 4- 4-A-

Multi-Multi

OK3ØKSO/p (OK1s AAU AEZ AII AMF AXK SF TS WT)
206,670- 83- 830-B-96

Belgium

ON4XG 53,940- 58- 310-A-17

Denmark

OZ1LO 230,520- 85- 904-B-37
OZ5ME 21,390- 46- 155-A-45
OZ1W 17,415- 45- 129-A-

Netherlands

PA9AEH 41,160- 49- 280-A-28
PAØEP 23,862- 41- 194-B-32
PAØLOU 18,765- 45- 139-A- 6
PAØTAU 6384- 28- 76-A-
PAØVB 6084- 26- 78-B-
PAØPLM 3- 1- 1-A- 1

Multi-Single

PAØGN (PAØs BRO ERA GIN NRA OOS PKD TAW)
56,736- 48- 394-A-28
PI5ØARU (PAØs JOZ TO YZ)
18,354- 38- 161-C- 8

Sweden

SM7GGK 12- 2- 2-A- 1

Multi-Single

SK2DR (SM2s CEW CLY EKM GXN) 322,650- 90-1195-B-

Poland

SP7CTY 19,005- 35- 187-A-
SP9AGS 3717- 21- 59-A-

Multi-Single

SQ9KRT (SP9s FKQ HMF)
53,430- 65- 274-B-
SQ6PAZ (multiop)
20,328- 44- 154-B-
SP3KPN (multiop)
3- 1- 1-A- 1

Greece

SVØWGG 6600- 22- 100-B-

European Russian S.F.S.R.

Multi-Single

UK3ABO (multiop)
68,796- 52- 441-B-
UK1ZAA (multiop)
63,936- 48- 444-B-
UK3ABB (multiop)
49,174- 46- 357-B-
UK3AAC (multiop)
35,232- 48- 246-B-
UK6LAZ (multiop)
33,840- 48- 235-B-

White R.S.S.R.

Multi-Single

UK2ABC (multiop)
18,450- 41- 150-B-

Latvia

Multi-Single

UK2GAN (multiop)
14,484- 34- 142-B-
UK2GCF (multiop)
6048- 24- 84-B-
UK2GAC (multiop)
1320- 11- 40-B-

Lithuania

Multi-Single

UK2PBP (multiop)
4410- 21- 70-A-

Ukraine

UY5OO 12,954- 34- 127-B-
UB5ZAT 2431- 17- 48-A-

Multi-Single

UK5KAA (multiop)
28,620- 45- 212-B-

Romania

YO7AWQ 264- 8- 11-A-

Multi-Multi

YO3KAA (YO4HW YO8DD)
45,486- 57- 266-B-

Yugoslavia

YU2RGB 167,730- 90- 619-B-64

Multi-Single

YU1BCD (YU1s NQW NZV PCF QBC) 499,824-117-1424-B-61
YU3CNO (YU3s CV EY TBG)
481,284-116-1383-B-
YU4EPQ (multiop)
19,305- 33- 195-B-

Multi-Multi

YU3DBC (+YU3s EZ TYX ZV)
790,818-133-1982-B-

Gibraltar

ZB2CJ 1710- 19- 30-A- 3

NORTH AMERICA

Bahamas

C6ADF 840- 14- 20-A- 1

Martinique

FM7WH 80,190- 81- 330-A-

St. Pierre & Miquelon Islands

FP8AP 331,200-120- 920-A-

French Guiana & Inini

FY7AA 2,566,576-269-3168-C-
FY7AK (K3BSY, opr.)
1,693,089-219-2577-C-36

Honduras

HR1AT 887,409-207-1429-C-69
HR6SWA 12,513- 43- 97-C- 5

Alaska

KL7HSA 51,330- 58- 295-B-26

Puerto Rico

KP4EAJ 1,149,642-221-1734-C-

Virgin Islands

KV4IO 1,854,900-225-2748-B-
KV4CK 986,616-193-1704-B-43

Canal Zone

KZ5WA 258,903-129- 669-B-13

Greenland

OX3DL 573,480-120-1593-B-
OX3RA 11,340- 30- 126-A-

St. Maarten

PJ8AS (WØIPU, opr.)
653,625-175-1245-B-31

Costa Rica

TI2BEV (K4VW, opr.)
1,608,810-235-2282-C-

Anguilla

VP2E (K2FJ, opr.)
916,965-213-1435-D-25

St. Lucia

VP2LAW 460,167-157- 977-B-20
VP2LBH (K2IGW, opr.)
246,126-127- 646-B-16

Mexico

XE2MX 307-117- 876-B-

Cayman Islands

ZF1LM (W8LUI, opr.)
82,503- 89- 309-A-13

OCEANIA

New Caledonia

FK8BV 29,241- 57- 171-B-

Guam

KG6JAR 48,018- 53- 302-E-

Hawaii

KH6RS (K2SIL, opr.)
2,724,276-262-3466-C-38
KH6IJ 2,599,575-253-3425-E-77
KH6CE 1,487,244-209-2372-C-64
KH6GPQ (K2KIR, opr.)
1,376,892-209-2196-E-29
KH6IJA 349,770-131- 890-B-36
KH6BYG/KH6
29,118- 46- 211-A-50
KH6DSO 1470- 14- 35-B-12

Marshall Islands

KX6BB 132,804-102- 434-B- 9

Australia

VK2GW 273,939-127- 719-A-62
VK4UR 42,552- 72- 197-A-
VK3JI 28,704- 52- 184-A-15

New Zealand

ZL3GG 1,072,467-207-1727-A-52
ZL1AFW 505,248-152-1108-A-52

SOUTH AMERICA

Ecuador

HC1CW 2,237,301-243-3069-C-41

Argentina

LU6EF 1,159,536-196-1972-B-88
LU8ADK 1,047,411-193-1809-B-46

Multi-Single

LU8DQ (+LU1s DAY DZ)
2,746,458-242-3783-C-

Peru

OA8V 27,132- 68- 133-A- 9

Multi-Single

OA4O (OA4AHA CX1AAC)
3,340,500-262-4250-C-

Netherland Antilles

PJ2VD 4,306,509-291-4933-E-69

Venezuela

YV4AKI 782,800-200-1638-A-76
YV1OB 749,916-222-1130-F-39

W/VE PHONE ALL BAND

CANADIAN

Maritime

VE1ANH 81,666- 78- 349-C-38

Quebec

VE2AYU 166,014-138- 401-C-66

Ontario

VE3KZ 643,083-271- 791-B-62
VE3CSN 14,400- 50- 96-E-28

Multi-Single

VE3MCH (VE3s EFD ESH)
93,141-131- 237-C-47
VE3EDC (+VE3EDG)
44,928-104- 144-C-

Manitoba

VE4RP 57,768- 83- 232-B-58
VE4AA 594- 9- 22-B- 3

Saskatchewan

VE5RA 119,238-119- 334-C-

Multi-Single

VE5NN (VE5s BX DX GG UA)
46,560- 80- 194-B-

Alberta

CY6AGV 30,888- 66- 156-C-23

British Columbia

Multi-Single

VE7SV (+K7JCA WA7OTT)
531,744-191- 928-C-

U.S.A.

1

Connecticut

WA1KID 910,974-262-1159-E-61
WA1PID* 886,677-277-1067-C-
WA1STN* 520,344-219- 792-C-40
WA1LNQ* 313,443-171- 611-C-33
WA1MAO 256,968-172- 498-C-34
WA1SSH 194,394-179- 362-A-50
W1HFB 167,580-140- 399-C-25
WA1NZT 139,050-150- 303-B-43
W1VV 123,216-151- 272-C-27
K1RLU 106,929-109- 327-C-25
W1BIH 79,323-137- 193-C-14
WA1KQC 37,323- 87- 143-A- 8
W1GPK 25,296- 68- 124-C-15
W1AB 19,140- 58- 110-C-10
WA1PAX 15,960- 56- 95-C-16
WA1SCV 2835- 27- 35-A- 9
W1SK 768- 16- 16-B- 7

Multi-Single

WA1NRF (+WA1s OCU QNF)
289,536-208- 464-C-80
K1UAT (K1MAR WA1s MNM NCK RQB SUF SUF TDQ TGE UII WN1s IBZ TGW TLH UDO UIX UOK UPS)
152,460-140- 363-C-85

Multi-Multi

W1ZM (+K1THQ W1GQO WA2s CLQ LQZ WB2HZH)
3,194,400-400-2662-E-96
K1VTM (+W1s GNC GQO WA1s ABV LNQ)
1,080,000-288-1250-C-90

Eastern Massachusetts

WA1NRV 721,215-235-1023-C-45
W1CMH 596,247-233- 853-C-52
K1HHN 403,410-170- 791-C-38
W1PIV 222,216-188- 394-B-55
WA1JUY (WA1JYY, opr.)
200,970-145- 462-C-31
W1FJJ 141,036-146- 322-E-27
W1HWM 111,612-142- 262-B-46
W1DYH 27,750- 74- 125-C-51
WA1SCX 20,691- 57- 121-C-13
W1ZIY 8400- 28- 100-C-15
W1CRL 720- 15- 16-A-

Maine

K1ROE 571,500-254- 750-C-57
W1OTQ 9447- 47- 67-B-19

New Hampshire

K1CSJ 790,836-236-1117-C-66
W1EHT 57,888- 96- 201-B-
WA1RGU 35,640- 88- 135-B-50
W1HDI 21,708- 67- 108-A-

Rhode Island

K1HMO 71,340-116- 205-C-26
WA1IJC 53,148-103- 172-B-31

Western Massachusetts

WA1ABW 455,430-235- 646-C-45
W1COI 25,071- 61- 137-B-22

2

Eastern New York

WA2LJM 21,357- 63- 113-C-28

Multi-Multi

W2PV (+K1s OME YKT ZND WA1NNC WA2s AYC EAH SPL WB2s OEU SQN)
3,965,364-458-2886-C-96

N.Y.C.-L.I.

WB2CKS 466,962-223- 698-C-51
W2GKZ 71,280-110- 216-C-16
W2LEJ 69,300-105- 220-B-48
W2IRV 59,850-105- 190-B-20
W2GC 22,425- 65- 115-C-14
K2MFY 3483- 27- 43-A- 5
W2NBI 4278- 31- 46-C-15
WB2GXW 840- 14- 20-A- 4
WA2YHK 432- 12- 12-C- 2
WB2KNK 105- 5- 7-A- 4

Multi-Single

WA2LQO 93,150-115- 270-C-

Northern New Jersey

W2MB 829,647-273-1013-C-78
W2EQK 235,188-188- 417-C-48

WB2RKK 177,024-128- 461-C-22
WB2FIT 56,286-106- 177-C-16
WB2RJJ 34,854- 74- 157-C-12
WA2WBE 18,612- 66- 94-B-30

Multi-Multi

K2CW/2 (multiop)
716,040-260- 918-C-78

Southern New Jersey

W2HMH 826,950-298- 925-C-76
K2FI 432,684-238- 606-C-55
W2HHB 259,116-151- 572-C-52
W2HNO 240,285-193- 415-C-70
WA2BLV 180,180-182- 330-C
K2JOC 141,174-138- 341-C-19
W2HBT 139,302-142- 327-B-45
WB2JJN 118,020-140- 281-E-42
W2UI 113,424-139- 272-B-24
W2PAU 72,114-119- 202-C-48
WB2OSQ 64,200-107- 200-E-32
W2EPA 47,817- 99- 161-C-43
W2FGY 37,422- 81- 154-B-25
W2FBF 19,500- 65- 100-C- 9
WB2BZY 9594- 39- 82-C-24
W2ITG 3060- 30- 34-C-
W2HVO 1800- 24- 28-B-14
WB2UEB 1215- 15- 27-A-11

Multi-Single

W2EHB (+2 meter op't)
454,747-241- 629-B-58
K2FT (+K2KA W2ORA WB2HXV)
199,557-171- 389-C-60
K2AA/2 (W2s EA FYS)
155,601-153- 339-C-50

Western New York

WB2LEJ 34,719- 71- 163-C-36
WA2SFT 10,224- 48- 71-B-16
WA2CDV 2916- 27- 36-C- 4
WB2FXY 918- 17- 18-C-

Multi-Single

W2HPE (+WA2HSU WA3RGW)
714,492-267- 892-C-91
WA2BCK/2 (+K2IGW WA2s AOG EKW LCC MBP)
446,760-255- 584-C-75
3

3

Delaware

W3GL 208,656-184- 378-E-45

Eastern Pennsylvania

W3WJD (WA3LRO, op'r.)
2,281,125-385-1935-C-90
W3BGN 1,012,557-283-1194-C-73
W3QOR 506,688-232- 728-F-51
W3YP (W3DQG, op'r.)
439,624-234- 612-C-70
K3YUA 436,632-226- 644-C-
W3GRS 298,374-223- 446-C-
W3KFQ 174,000-145- 400-C-
K3TGM 168,336-168- 334-C-
W3ALB 159,406-144- 369-C-35
K3AIG 121,410-142- 285-C-34
K3AWZ 112,173-139- 269-E-29
K4JLD/3 108,420-139- 260-C-34
W3KV 85,512-108- 263-C-25
WA3BZI 70,395- 95- 247-B-72
W3CGS 67,089-107- 209-C-
W3KHB 57,222-102- 187-C-24
W3ETB 30,480- 80- 127-B-
WA3NQX 20,034- 63- 106-C-10
K3KRF 17,877- 59- 101-F-22

Multi-Single

K3BW (+K3JLK)
332,280-195- 568-C-
K3MBF (+K3LJZ)
294,372-148- 663-C-37
W3KT (+2 meter net)
252,218-194- 399-C-
WA3IAV (+WA3RCD)
17,640- 56- 105-C-

Multi-Multi

W3GPE (W2HEU K3s OIO WIV WA3FFR WN3VYD I12JCC)
2,678,526-402-2221-C-96
W3GM (+K3ZOL W3s JSX KFK WA3s JLT JYB)
2,360,358-393-2002-C-96
W3ERY (K3s DZB HTZ WA3s LNM NAF RID SWF)
1,987,167-377-1757-E-96
W3DHM (+K3s DPQ JGI)
1,518,900-332-1528-C-
WA3ATX (WA3s COJ GMS KQB MPH)
805,350-295- 910-B-85
K3CY (+W3GHM)
495,720-243- 680-C-52
WA3ATP (+K3NEZ)
94,239-111- 283-C-38

Maryland-D.C.

W3LPL 1,099,314-314-1167-C-70
W3EZT 266,364-196- 453-C-23
WA3SXH 114,633-141- 271-A-50
K3JMC 103,356-132- 261-C-48
W3GRE 89,625-125- 239-C-20
K3ZAW 71,757-119- 201-C-15
W3FA 70,800-118- 200-C-31
K3BNS 50,508- 92- 183-C-32
WA3GZT 44,892- 87- 172-C-26
WA3UHJ 19,251- 69- 93-A-15
W3LMZ 16,182- 62- 87-C- 8
W3JPT 13,884- 52- 89-B-14
WA3JYV 10,296- 52- 66-A- 8
K3IXD 6150- 41- 50-A-23
W3UZQ 1764- 21- 28-A-12
W3ZSX 126- 6- 7-A- 3

Multi-Single

K3GJD (+WA3VDQ W3TWT)
700,500-250- 934-C-81
K3BHJ (+WB2MZE K3AVJ WA3KOC)
561,408-256- 731-C-84
WA3NGS (+W3BWZ)
361,248-212- 568-C-58
W3ZH (W3s HVQ TUX WN3UUO)
14,616- 58- 84-C-21

Multi-Multi

W3AII (+K3EST W3s AZD IN ZKH WA3s AMH HRV IAQ TAI ULA W9SZR LU6HDV)
3,733,695-439-2835-C-96

Western Pennsylvania

W3VT 610,236-276- 737-C-76
W3YX 8640- 40- 72-B-10
K3DR 7482- 43- 58-C-14
WA3MYI 7380- 41- 60-A-24
W3KVS 5382- 39- 46-C-14
WA3GSC 1080- 18- 20-D- 7

Multi-Multi

W3TV (+W1GL W3s AOH VW)
263,424-196- 448-C-29

4

Alabama

K4BYM 16,107- 59- 91-C- 8
WA4JBC 15,792- 56- 94-A-28

Georgia

W4VWX 715,293-267- 893-C-72
W4WRY 375,789-229- 547-E-70
K4JRB 363,636-222- 546-E-37
K4EZ 325,710-210- 512-C-54
W4UYC 89,157-113- 263-B-43
W4DXI 38,715- 89- 145-C-30
W4GKI 24,750- 75- 110-D-40
K4BAI 5985- 35- 57-C- 6

Kentucky

WB4OSS 576,050-230- 545-E-60
WB4KTR/4
17,280- 64- 90-C- 8

North Carolina

K4KZZ 312,930-183- 570-C-40

Northern Florida

WB4UZT 569,850-262- 725-E-67
WB4VUP 560,196-273- 684-C-70
WA4EYR 154,440-165- 312-C-25
W4WKQ 137,034-138- 331-C-39
WA4UPW 20,592- 66- 104-C-15
WB4EYX 14,364- 57- 84-C- 6

South Carolina

K4II 123,156-142- 311-C-35
WA4EWX 116,760-139- 280-E-60

Southern Florida

K4HRL 157,248-168- 312-C-60
K4CL 146,544-142- 344-F-38
W4OZF 97,284-134- 242-C-15
S4UTE/4 72,924-118- 206-B-54
W4ECN 5915- 29- 45-A-20
WB4NTH 66- 4- 5-B- 1

Multi-Single

WA4LZR (W4s LKG ITB WA4FCT WB4s AEX HYN HYY VMH)
883,872-288-1023-C-96
W4DFU (WA4GAJ WB4TTZ)
205,545-193- 355-C-96

Tennessee

WA4KDR 144,744-163- 296-C-21
W4DUP 122,430-154- 265-E-
K4MOJ 18,762- 53- 118-A-

Multi-Single

WA4ZZU/4 (+WB4s RJF TGC)
72,237-121- 199-C-25

Virginia

K4VX 1,119,297-289-1291-E-67
W4QCW (WA8ZDT, op'r.)
1,063,887-313-1133-E-83
W4MYA 396,240-208- 638-C-43
W4QAW 249,021-207- 401-C-48
WA4HPF 238,950-177- 450-C-40
K4OCMF/4 195,144-188- 346-C-40
W4DM 111,720-133- 280-C-20
K4ZA 109,668-148- 247-C-40
K4ZRX 105,222-142- 247-C-27
WA4MYM/4
56,160-104- 180-C-45
K4OD 49,404- 92- 179-C-18
WB4SGV 48,300- 92- 175-C-10
W4JHK 38,628- 87- 148-C-
W4DSW 38,367- 87- 147-C-22
W8QGP/4 34,713- 87- 133-C-26
W4KMS 24,075- 75- 107-B-21
W4HVO 6027- 41- 49-C-16
W4LGM 588- 14- 14-A- 1

Multi-Single

WB4BGY (+WB4s HQF UKA WB8IIN)
1,196,715-323-1245-C-90

Multi-Multi

W4RVV (+W1FLM W3HQV WA3s HWW WJD K4GKD W4CRW WB4MRI LU8AG)
3,039,930-405-2502-E-96

5

Arkansas

WA5RTG 414,904-281- 551-E-70

Multi-Single

W5PBZ (+K5BOC)
98,229-137- 239-C-39

Louisiana

K5KLA 194,805-185- 351-C-45
W5UDK 146,793-167- 293-C-
W5WG 103,578-122- 284-C-47
K5EVA 84,510- 90- 314-C-36
WA5WEY 56,180- 90- 134-C-20
W5OB 30,504- 82- 124-C-30

New Mexico

K5JVK 103,329-129- 267-E-53

Northern Texas

W5TMN 487,920-240- 636-C-71
K5HTM 167,322-158- 353-C-70
K5YRK 145,307-153- 273-A-62
W5PAQ 69,342-127- 182-C-29
K5VIA 63,270-111- 190-B-36
W5AE 27,156- 73- 124-C-25
WB5WBO 15,252- 62- 52-B-13
W5KTR 7290- 45- 54-E- 9
W5SOD 1350- 18- 25-A-15

Multi-Single

W5BJA (+W5MYA)
682,227-273- 833-C-
WA5RXT (+WA5OXD WB5JJE)
457,125-265- 575-E-91

Multi-Multi

WB5DIX (WB4JEZ W5ZSX WA5IOT WB5s AAR FFF IZN WA6OHJ)
1,817,487-357-1697-E-96

Oklahoma

K5DEC 660- 11- 20-B-24

Southern Texas

W5NMA 518,076-246- 702-C-85
K5JZY 349,890-214- 545-E-73
K5USR 211,419-169- 417-C-
W5KCR 108,204-142- 264-C-52
W5LPO 102,582-123- 278-C-52
W5RTQ 84,366-129- 218-E-21
W5IWM 61,755-115- 179-E-
WA5WQF 56,496-107- 176-C-12
WA5AUZ 27,192- 88- 104-E-16
W5EDX 23,115- 67- 115-A-32
W5OSJ 18,414- 62- 99-B-27
K5UKN 16,128- 56- 96-C-13
WB5HOD 10,584- 49- 72-A-15
WA5TPO 8928- 48- 62-B-10
W5PF 7134- 41- 58-B-19
K5LZJ 6090- 35- 58-B- 3
WA5LES 2349- 27- 29-C- 3
WB0HZL/5 1767- 19- 31-B-16

Multi-Multi

K5PFL (+K5s DEG RLW)
338,793-221- 511-C-50

6

East Bay

K6UIS 588,890-145- 894-C-57
K6DYQ 217,728-144- 504-C-60
K6HIH 198,158-105- 629-C-
W6AHD 11,700- 50- 78-B-20
WA6DIL 8880- 37- 80-C- 5
W6KG 147- 3- 7-C- 1

Multi-Single

W6DOD (+W6KG)
600,054-182-1099-C-90
WA6AHF (+W1ARR W6RGG WA6YEB WB6LPK)
396,048-148- 892-C-70

Los Angeles

W6RR 1,676,700-270-2070-C-80
W6HX (WB6OLD, op'r.)
1,562,922-281-1854-C-96
WA6EPO 588,885-215- 913-C-57
W6KNC 348,540-148- 785-E-55
W6WG 3720- 41- 40
WA6OG 1248- 16- 26

Multi-Single

W6YRA (WA6s DPQ NQK WB6s ABP EPS GJO JAN ZSD WA7IAC)
1,010,070-215-1566
W6DGH (+W6DQX)
148,338-134- 369
W6VPZ (K6s HRT KH W6s YOJ WA6BIL WB6WWU)
37,830- 65- 194
WA6NBY (+W3OVV)
14,766- 46- 107

Orange

K6NTXA 101,580- 97- 350
W6CY 26,136- 66- 112
WA6QVA 16,848- 52- 109

Santa Barbara

W6FSJ 270,732-154- 586
WA6VYK 115,405- 85- 331
K6OW 97,200-100- 324
W6PRP 41,580- 84- 165
K6QPH 7770- 42- 70

Santa Clara Valley

W6MUR (K6SSI, op'r.)
243,936-154- 521
K6NXZ 119,070-105- 378
W6BJB 115,842- 86- 449
W6YVK 81,972- 92- 297
W6ISQ 41,262- 46- 299
WB6DSV 2838- 21- 42
K6AQ 1575- 15- 35

Multi-Single

W6OAI (+K6QOF WA6s DIL QGW WB6KRW)
619,515-195-1059
W6OKK (+K1MTJ K6KM WA6s DSV EXW)
584,640-174-1120
WB6PYI (+WA6HCI)
204,930-138- 495

Multi-Multi

WB6KBK (+WA6PGB)
416,178-179- 777

San Diego

K6SOR 219,844-118- 624
W6RCD 175,770-155- 378
W6BZE 118,296-116- 378
W6AXX 94,128-106- 296
K6PO 79,800- 70- 388
W6OHV 52,320-109- 160
W6ID 50,400- 84- 200
W6ABE 36,720- 80- 153
W6MAR 29,151- 74- 123

Multi-Single

W6ONV (+W6MAR WA6UCB)
1,515,024-232-2000
WB6CAJ (+WA6DNM WB6CS
197,376-128- 51

San Francisco

W6NUT (WB6AIN op'r.)
481,362-157-1025
W6WB 88,140-113- 260
W6RNF 40,527- 87- 134
W6KHI 31,584- 72- 132

Multi-Single

W6BIP (+WA6UID)
286,052-139- 684

San Joaquin Valley

W6YKS 51,084- 66- 282
K6AO 14,175- 35- 135

Sacramento Valley

WA6JVD 145,728- 88- 552
K6RN 108,486-123- 297
WA6NYV 30,144- 64- 156
K6OR 18,468- 54- 114
K6SG 408- 8- 17

7

Arizona

W7AYY 143,208-117- 402
WA7YRP 79,254-102- 252

Idaho

K7NHV 66,240- 69- 312

Montana

K7ABV 53,148- 86- 207
WA7OBH 3900- 26- 50

Nevada

W7UOJ 56,036- 78- 156

Oregon

W7TME 514,452-172- 990
WA7IHN 155,688-104- 495

Utah

K1PKQ/7 119,025-115- 360
W7HS 63,450- 94- 225

Clockwise, beginning top left: JA1DD, KH6IEG, WA6HRS, KX6BB, JG1EEE, IVØAMU.

TOP W/VE SINGLE OPERATOR — QSO/BAND

CW

	160	80	40	20	15	10
W7RM	*Verts* 7	*Rotary 8JK* 189	*3-L* 921	*6 over 6* 737	*6/3/3/3* 423	*8L+6L* 19
W3WJD		*1/4λ GP, LW* 213	*2-L* 271	*5-L* 874	*6-L, 4-L* 136	*4-L, 3-L* 45
W6DGH	6	*2-L Wire* 209	*2-L* 820	*4-L* 407	*7-L* 412	*5-L* 42
W6MAR	1	*Dipole* 138	*2-L* 788	*4-L Quad* 399	*4-L Quad* 460	*4-L Quad* 41
W3LPL		*Slopers* 173	*3-L* 312	*4 over 4* 807	*4-L* 100	*3-L* 32
W6OUN	6	*Wires* 225	*3-L* 781	*5-L* 343	*5-L* 453	*5-L* 31
WB4YLG	6	*1/4λ Vert* 146	*2-1/4λ Vert* 256	*4-L Quad* 826	*4-L Quad* 184	*4-L Quad* 22
W7IR	*Vert* 4	*1/4λ Vert* 106	*3-L* 709	*5-L* 460	*3-L* 220	*5-L* 36
K4GSU	*1/2λ GP* 13	*Bobtail* 96	*3-L* 252	*4-L* 792	*3-L* 74	*3-L* 24
K3YUA		*L.W.* 187	*2-L* 216	*TH6DXX* 757	*TH6DXX* 71	*TH6DXX* 12

PHONE

	160	80	40	20	15	10
W3WJD		*1/4λ GP, LW* 389	*2-L* 152	*5-L* 1186	*6-L, 4-L* 170	*4-L, 3-L* 37
W6RR		*Vert* 108	*3-L* 342	*5-L* 764	*6-L* 780	*7-L* 76
W6HX	5	*Wires* 190	*3-L* 470	*5-L, TH6DXX* 524	*5-L, TH6DXX* 609	*5-L, TH6DXX* 56
K4VX	1	*Slopers* 97	*3-L* 98	*4-L Quad, 5-L* 916	*4-L Quad* 146	*4-L Quad* 33
W4QCW	8	*Dipole* 137	*2-L* 173	*TA-33* 680	*TA-33* 94	*TA-33* 35
W3LPL		*Slopers* 98	*3-L* 152	*4 over 4* 716	*4-L* 165	*3-L* 36
W3BGN		*Dipole* 110	*402 BA* 113	*TH6* 840	*TH6* 114	*TH6* 14
WA1KID	1	*Dipole* 93	*Wire Beams* 54	*4-L Quad* 882	*4-L Quad* 114	*4-L Quad* 15
WA1PID		*Slopers* 91	*3-L* 110	*4-L* 721	*4-L* 134	*3-L* 11
W2MB		*1/4λ Vert* 104	*2-L* 112	*3-Band Yagi* 620	*3-Band Yagi* 143	*3-Band Yagi* 34

Each box contains the operator's contacts on a band, plus his antenna(s) for that band.

Washington

W9IRH/7 472,800-160- 985-C-74
W7BRU 79,500-100- 265-C-44
W7LAV 28,080- 60- 156-C-29
W7LZF 22,770- 66- 115-C-14
WA7GYR 9000- 40- 75-E- 8
K7RSB 7350- 35- 70-C-10
K7MOK 1938- 17- 38-C- 4

Multi-Single

W7VRO (+W7s DQM EKM WA7ZWG)
401,166-171- 782-C-42

Wyoming

W7INH 85,323-117- 239-C-38

8

Michigan

WA8TBQ 641,160-260- 822-C-75
W8TWA 348,480-220- 528-C-89
WB8IOT 18,240- 64- 95-C-16
WB8SIB 8280- 46- 60-C- 5

Multi-Single

W8NGO (+W8s CLR ONA SRK)
387,420-220- 587-C-80
WA8YVR (+W8AHB)
62,304- 88- 236-C-15
K8MXC (+WA8DLO)
61,632- 96- 214-C-43

Ohio

WA8YWX 416,160-204- 680-C-74
W8ZCQ 113,787-141- 269-C-31
W8FJS 76,266-114- 223-C-61
WB8FOS 44,145-109- 135-C-20
W8DWP 17,019- 61- 93-C-
K8HBN 8418- 46- 61-C-
W8NPF 7524- 38- 66-C-19

Multi-Single

W8LT (WA1LKU WB8s HHP IBZ JUI JXS OUE)
378,963-237- 533-C-61
W8OKF (+WB8MMF)
233,856-168- 464-C-60
WB8IAY (+WA8s LXW ZAN WB8BIU)
218,124-166- 438-C-80

West Virginia

WB8LPF 6960- 40- 58-D-

9

Illinois

W9CTY 371,628-222- 558-C-60
W9OHH 349,353-227- 513-D-
WA9VPR 206,208-179- 384-C-70
W9IDWQ 149,145-163- 305-C-33
W9WYB 112,140-140- 267-C-
K9UKM 107,325-135- 265-B-32
WB9IYO 14,094- 58- 81-B-30
WB9EBO 14,016- 64- 73-C- 7
W9GSB 8418- 46- 61-A-14
K9DWK 7656- 44- 58-B-11
WA9AAF 624- 13- 16-C- 3
W9HPG 540- 12- 15-A-10

Multi-Single

WA9IVL (+WA9s LZA QAL WA9JHO)
351,780-220- 533-C-86
W9ODK (+WA9PBK)
126,567-147- 287-B-40
W9DY (+2 meter net)
43,428- 94- 154-C-20

Indiana

WA9BWY 646,914-274- 787-C-73
W9LT 619,164-252- 819-C-80
WB9CFP 270,144-192- 469-B-74
WB9MDB 54,249-107- 169-B-17
K9VQK 40,844- 92- 148-C-31
W9CL 20,100- 67- 100-C- 8
W9SER 13,608- 56- 81-C- 9
WA9RJI 7788- 44- 59-B- 9
K5LZT/9 3- 1- 1-A- 1

Wisconsin

WB9GGD 57,942-111- 174-G-44
W9NDS 2970- 30- 33-A- 7

Multi-Single

K9BED (+WA9JOO)
6480- 36- 60-B-17

Ø

Colorado

WAØCVS (WBØDJY, opr.)
650,589-229- 947-C-76

Multi-Single

WØMYN (+WBØs CMM EGZ GAZ HBS)
545,664-224- 812-C-80
KØKKU (+WØs MNI YDM WAØs AWH GWL IMX FTJ YFU WBØNYY)
445,568-188- 790-C-46

WØLJF(+KØPVI)
12,771- 43- 99-C-10

Iowa

WØPCO 203,658-182- 373-C-31
WØFHE 112,140-140- 267-C-30
WAØVDX 100,914-139- 242-C-21
WØEGI 1377- 17- 27-B- 3
WBØGUU 720- 15- 16-B- 8
WØLIJ 189- 7- 9-B- 3

Kansas

WØIUB 181,863-167- 363-C-31
WAØAGN 52,722-101- 174-C-36
WBØKWJ 3936- 32- 41-B-

Multi-Single

KØKU (KØCVA WBØFGV)
392,931-231- 567-C-88

Minnesota

WØNAR 95,580-135- 236-C-
WAØKQU 24,750- 75- 110-C-15

Multi-Single

WBØBQG (WØJIE W9NLC + XYL)
40,656- 88- 154-C-26

Multi-Multi

WAØENP (+WAØs BWM MHJ WBØs ANT DSJ)
333,666-222- 501-G-96

Missouri

WAØPAO 194,706-174- 373-C-55
KØIFL 55,968- 88- 212-B-31
WBØHDP 330- 10- 11-B- 5

Multi-Single

WØEEE (WB4OEM WA9FAT WBØGQP WNØOEK R. Thrasher)
278,586-201- 462-C-75

Nebraska

WAØZPM 33,615- 83- 135-C-30
WAØLRQ 1080- 15- 24-B- 8

North Dakota

KØALL 25,530- 74- 115-C-12

South Dakota

WAØONL 144,144-154- 312-C-

DX PHONE ALL BAND

AFRICA

Angola

CR6GA (CR6XX, opr.)
932,292-174-1786-B-52

Cameroon

TJ1AD 373,296-112-1111-C-29

South Africa

ZS6DW 1,224,300-175-2332-B-40

Mauritania

5T5CJ 416,568-136-1021-B-41

Senegal

6W8FP 2,015,181-203-3309-B-60

ASIA

Japan

JA2JW 473,250-125-1262-C-
JA1XMS 44,145- 45- 327-B-30
JH1GTQ 42,054- 43- 326-B-32
JR1KYC 19,080- 30- 212-B-17
JH1OBS 14,775- 25- 197-A-35
JA1IZ 4029- 17- 79-A- 4
JA1YZK 2964- 13- 76-A- 9
JA3VOV 2058- 14- 49-A-
JA4UDP 651- 7- 31-A-10
JD1AJG 648- 8- 27-A-
JE3CIO 528- 4- 44-A- 5
JA1DO 486- 9- 18-B- 3
JAØHMB 255- 5- 17-A-
JR3RLG 207- 3- 23-A- 4
JA2OZI 24- 1- 8-A-

Multi-Single

JA9YMM (JA9s AG APS BE BJ ESZ LJ)
139,092- 67- 692-C-
JA3ZBI (multiop)
43,092- 42- 342-B-
JA9YBA (JA9s DZS GLL JH1GUO JH2SGU JR2AKB)
42,000- 40- 350-C-
JA2ZHX (JA2s AO EMP JEM JH2s HUQ WAU JR2PST)
3132- 12- 87-B- 6
JA1ROJ (+JA1XMS)
156- 4- 13-B- 3

Asiatic R.S.F.S.R.

UAØFGM 388,731-107-1211-B-

Multi-Single

UKØLAB (multiop)
145,485- 53- 915-B-

EUROPE

Portugal

CT1OY 11,934- 26- 153-A-

Azores

CT2BN 406,770-130-1043-B-

Federal Republic of Germany

DL6WE 89,964- 63- 476-C-
DK5EZ 36,846- 46- 267-C-20

German Democratic Republic

DM3PCK 1386- 14- 33-B-

Spain

EA3SA 322,284-107-1004-C-32

France

F6CLM 3900- 20- 65-A-

England

G2QT 37,962- 57- 222-B-
G5BJM 20,160- 35- 192-A-13
G4BBA 3213- 21- 51-B-18

Multi-Single

G3TJW (+G3s HTA RUV RUX)
1,115,940-140-2657-A-
G3UBR (G3YEG GW3ZQN G4s BCH BTY CQO CVN CWE)
739,332-132-1867-C-96
G3UJE (+G3s SZG VKW ZZI)
560,472-121-1545-B-96
G3RCV (G2MI G3s RZP VLX XMD ZAY G4BAL Bob Chris)
173,052- 69- 836-C-66
G4ALE (G3s SJX UFY WRR XJO ZMF G4CZB)
94,878- 63- 502-B-60

Hungary

Multi-Single

HG5A (HA5s DE FM HO KO HA6NN)
365,700-100-1219-C-96
HA5KKN (multiop)
32,535- 45- 241-B-96
HA9KPU (multiop)
25,164- 36- 233-B-
HAØKLE (HAØs LJ LM LZ MJ M. Roman)
21,930- 34- 215-B-
HA6KNB (HA6s NA NN NP NY Lantos L.)
16,275- 35- 155-B-30
HA3KHC (multiop)
10,980- 30- 122-B-

Italy

I3MAU 803,142-139-1926-B-70
I1NUC 355,173- 91-1301-B-39
IVØZV 160,176- 94- 568-B-20

Multi-Single

I5DFB (WB4ZES WB5FHE)
69,231- 47- 491-C-48

Norway

LA6HL 151,272- 66- 764-B-23

Market Reef

OJØMA 168- 7- 8-B-

Czechoslovakia

Multi-Single

OK3ØKYS (OK3Øs FRF FVA)
20,313- 37- 183-B-14

Belgium

ON4NC 6075- 27- 75-B- 7

Denmark

OZ9VO 2067- 13- 53-A-

Netherlands

PAØAEH 10,788- 29- 124-A-17

Multi-Single

PA7SMK (+PA9WRR)
177,606- 78- 759-B-36
PAØGN (PAØBRO ERA GIN NRA NRN PKD TAW)
65,016- 43- 504-A-24
PAØADC (multiop)
29,007- 33- 293-A-
PI1ARU (PAØs OKE TO VLY)
6561- 27- 81-C- 8

Sweden

Multi-Single

SK2DR (SM2s CEW EKM)
111,492- 57- 652-B-60

Poland

SP5DZI 1680- 16- 35-A-11

Multi-Single

SQ6PZB (SP6FAF W. Nowak)
137,286- 58- 789-B-

European Russian S.F.S.R.

Multi-Single

UK6LAZ (multiop)
28,665- 39- 245-B-
UK1ZAA (multiop)
16,368- 31- 176-B-
UK3ABO (multiop)
15,876- 28- 189-B-
UK3ABB (multiop)
12,992- 29- 150-B-

Ukraine

Multi-Single

UK5MAF (multiop)
6300- 20- 105-B-
UK5IAZ (multiop)
3528- 14- 93-B-

NORTH AMERICA

Bahama Islands

C6ABN 474,180-140-1129-C-22

Multi-Single

W4BRB/C6A (+WA4FAP)
801,420-148-1805-A-42

St. Pierre & Miquelon Islands

Multi-Single

FPØMM (+W1MIW WA1TZV)
63,180- 54- 390-A-31

French Guiana

FYØBHI 2,556,576-269-3168-C-

Dominican Republic

HI8XAW 2,299,209-209-3667-C-51

Puerto Rico

Multi-Single

KP4AXM
(K1OTI, W8KYR, WBØJHW)
2,099,052-199-3516-C-96

Canal Zone

KZ5BC 4,157,484-268-5171-F-61

Costa Rica

TI2WX 2,313,036-242-3186-A-
TI2BEV (K4VW, opr.)
1,540,296-216-2377-C-

Antigua

Multi-Multi

VP2A (K5s FVA YMY WA5AWF W5s UDK NOP KP4EAJ VP2AC)
5,253,147-261-6709-B-48

Saint Lucia

VP2LAW 193,923- 87- 743-B-14

Bermuda Islands

VP2GD 900,000-160-1875-A-31

Cayman Islands

ZF1AK 2,015,328-224-2999-B-48

Multi-Single

ZF1AU (K4YFQ WB4VVF)
1,419,588-188-2517-C-
ZF1CW (WØs CW JJC ZTC VF7SV)
799,848-168-1587-B-21

Mexico

6F8J 3,368,169-251-4473-C-62
XE1LLS 3,056,634-238-4281-C-

Jamaica

K9KD1/6Y5
533,280-160-1111-A-

Barbados

8P6AA 575,586-171-1122-B-53

OCEANIA

Guam

KG6JAR 17,391- 31- 187-C-

Hawaiian Islands

KH6IJ 2,473,428-218-3782-C-72
KH6IGJ 1,666,692-201-2764-C-54
KH6HML 427,800-155- 920-C-18
KH6GPQ 356,454-138- 861-C- 5
KH6RS (K2SII., opr.)
4260- 20- 71-C- 1

Multi-Single

KH6GKD (+KH6s BVS IIX)
2,379,276-212-3741-C-96

Kwajalein

Multi-Single

KX6BU (KX6s LR MV MW MZ)
244,268-108- 757-C-12

Australia

VK4VU 350,064-132- 884-A-30
VK5MF 18,138-155- 39-B-32
VK4PJ 2460- 20- 41-B-

New Zealand

ZL3GG 369,489-137- 899-A-35
ZL2GJ 13,338- 26- 171-B-22

SOUTH AMERICA

Bolivia

CP1AT 65,892- 76- 289-B-12

Argentina

LU2A (LU2AFH, opr.) 1,615,320-210-2564-C-
LU8A (LU8AJG, opr.) 732,312-168-1492-C-32

Peru

OA8V 138,348-126- 366-A

Brazil

PY7AOR 8856- 56- 82-B-

Multi-Single

PT2ZBS (+PT2ZBR PY1ZAE W2SKE) 1,885,884-182-3454-C-96

Surinam

PZ5FB (W2FCR, opr.) 629,100-180-1165-A-16

Venezuela

YV4YC 3,110,508-249-4164-C-75

W/VE CW LOW BAND

CANADIAN

Ontario

VE3RMV 7638- 38- 67-C-22
VE3BVD/3 9555- 49- 69-C-13

U.S.A.

1

Eastern Massachusetts

K1NOL 173,940-130- 446-E-30
W1MX (WAØOCU, opr.) 116,532-117- 332-C-49
W1BB/1 1540- 17- 30-A-

Western Massachusetts

WA1FBX 6480- 40- 54-C-15

2

Eastern New York

WA2AUB 13,096- 56- 72-E-21
WB2FOO 1380- 20- 23-A-

N.Y.C.-L.I.

WA2OVG 126- 6- 9-B-10

Northern New Jersey

WB2JYM 114,243-113- 337-E-50
W2HUG 10,250- 58- 62-A-18

Southern New Jersey

W2ESX 4002- 29 46-C-12

Western New York

W2ER 21,513- 71- 101-C-
WA2QKF 2250- 25- 30-C-18
WA2AOG 48- 4- 4-A-

4

Georgia

WB4RUA 7740- 43- 60-F-

Southern Florida

W4PZV 48,954- 82- 199-C-30
W4BAA 28,314- 66- 143-C-20

Tennessee

K4PR 324- 9- 12-C-

Virginia

K4ID 36,081- 57- 211-C-34
W4IQ 28,320- 80- 118-C-24
W4EZ 1872- 24- 26-C-

5

Arkansas

WA5VDH 58,590- 93- 210-E-35

New Mexico

WS5DO 3402- 21- 54-F-

Oklahoma

K5JVF 3528- 28- 42-B-40

Southern Texas

K5AHV 178,770-118- 505-A-56
WB5DJZ 19,224- 46- 178-D-14

6

East Bay

WA6IQM 106,488- 58- 612-B-

Los Angeles

K6UVJ 232,023- 79- 979-C-42

San Diego

WB6VME 12,096- 21- 192-A-27
WA6PDE/6 1845- 15- 41-B-10

San Joaquin Valley

K6OZL 70,800- 59- 400-C-
K6AO 2415- 23- 35-C-4

Sacramento Valley

W6ZGM 17,622- 34- 138-C-
W6NKR 4896- 24- 68-C-11

7

Nevada

WAØKXJ/7 2130- 10- 71-B-9

Washington

W7YTN 47,040- 49- 320-C-49

8

Michigan

K8HLR 84,420-105- 268-E-42

Ohio

W8IBX 1725- 25- 26-A-11

9

Illinois

WA9JCO 11,250- 50- 75-B-
W9BZW 3020- 45- 52-C-8

Indiana

K9UWA 15,045- 59- 85-C-11

Ø

Kansas

WAØTKJ 5859- 31- 63-E-18

DX CW LOW BAND

ASIA

Japan

JR1HRV 35,466- 46- 257-B-24
JH1REM 17,091- 27- 211-B-
JA7GAX 11,658- 21- 185-A-28
JA2AN 10,935- 37- 135-C-18
JA1DUH 9144- 24- 127-E-16
JH2BFT 8040- 20- 134-E-20
JAØATO 6528- 17- 128-B-18
JA1HOM 6375- 17- 125-C-26
JA7QVI 3454- 13- 86-B-
JA4DIG 3240- 12- 90-A-25
JA1RUI 2805- 11- 85-B-12
JA1BJJ 2475- 11- 75-B-14
JF1SVV 2220- 10- 74-A-14
JH1LKH 2196- 12- 61-B-12
JF1COF 1776- 8- 74-A-26
JA3BCT 1674- 6- 93-A-
JA6GPR 1608- 8- 67-A-20
JR3QVM 1428- 7- 68-A-13
JA1KJW 1260- 7- 60-A-13
JA4GXS/4 1188- 6- 66-A-14
JA3ARM 1140- 10- 38-C-
JH1EGY 1095- 5- 73-A-12
JAØCF 660- 5- 44-A-20
JA7AVG 468- 6- 26-A-
JA8GAZ 420- 4- 35-A-
JH2IRH 360- 30-A-
JH3UWZ 312- 4- 26-A-
JA2HTB 300- 4- 25-A-
JA2OZI 300- 4- 25-A-
JR3SIC 156- 4- 13-A-
JH4FQN 153- 3- 17-A-
JA2CPO 150- 5- 10-A-
JA1JEX 144- 2- 24-A-
JA9LVD 90- 3- 10-A-
JH2AGX 81- 3- 9-A-

EUROPE

Federal Republic of Germany

DL1VU 25,596- 84- 158-E-
DK4EX 6669- 79- 117-C-

England

G3RO 13,230- 30- 147-A-15

Scotland

GM3HKC 810- 10- 27-A-

Switzerland

HB9KC 17,280- 32- 180-B-

Czechoslovakia

OK3ØBOB 18,720- 59- 160-D-
OK3KLI 405- 9- 15-A-
OK3ØAXC 90- 5- 6-A-
OK3ØBIH 60- 4- 5-A-
OK3ØPGU 3- 1- 1-A-

Sweden

SM5AOE 12,420- 30- 138-B-

Finland

SP5GH 1170- 15- 26-B-

Ukraine

UB5VK 105- 5- 7-A-

Andorra

C31IU (FØAXP, opr.) 46,956- 82- 301-A-13

NORTH AMERICA

Alaska

KL7DVF 15,159- 31- 163-B-

Puerto Rico

KP4EAS 253,890- 93- 910-E-16

W/VE PHONE LOW BAND

CANADIAN

Ontario

VE3BMV 17,856- 62- 96-C-23
VE3BVD 4725- 35- 45-C-10
VE3JT 192- 8- 8-A-2

Manitoba

VE4SL 819- 13- 21-C-3

British Columbia

VE7EL 23,958- 66- 121-C-32
VE7IG 11,730- 43- 91-C-27

U.S.A.

1

Connecticut

W1EBC 125,001-129- 323-C-50

Eastern Massachusetts

W1MX (WA1KKM, opr.) 127,080-120- 353-C-

Vermont

WA1PSK 2024- 25- 27-B-

Western Massachusetts

WA1FBX 14,760- 60- 82-C-26

2

Eastern New York

WA2AUB 7656- 44- 58-C-17

N.Y.C.-L.I.

WA2FUA 46,440- 86- 180-C-25

Northern New Jersey

W2RAD 12,324- 52- 79-C-16
WA2DZU 7080- 40- 59-C-

Western New York

WA2LCC/2 8520- 40- 71-E-14
WB2AIO/2 912- 16- 19-C-

3

Eastern Pennsylvania

K3ZOL 3441- 31- 37-C-

Maryland-D.C.

W9SZR/3 10,212- 46- 74-C-14

4

Alabama

K4BRF 6039- 33- 61-C-10

Georgia

W4GIW 48,096- 96- 167-C-20
K4LRO 13,050- 50- 87-C-16

North Carolina

W4UW 1764- 21- 28-C-13

Southern Florida

W4BAA 35,280- 84- 140-C-20

Virginia

W4UPJ 71,190-105- 226-C-45
W4YHD 6048- 36- 56-C-
W4EZ 5076- 36- 47-C-

5

Arkansas

WA5VDH 84,816-114- 248-C-

Northern Texas

WA5LUM 30,825- 75- 137-E-
K5ZJP 22,512- 67- 112-C-

Southern Texas

K5DEG 2652- 26- 34-A-

6

Los Angeles

K6OVJ 109,746- 78- 469-C-

Orange

WAØKXJ/6 60- 4- 5-A-

Santa Clara Valley

W6JKJ 1125- 15- 25-C-

San Diego

W6ITY 63,726- 86- 247-C-
WA6PDE/6 4224- 32- 44-B-

7

Washington

W7YTN 20,358- 58- 117-C-

8

Michigan

K8HLR 81,900-105- 260-C-
K8LUU 39,780- 85- 156-C-

Ohio

WA8ZDF 160,308-146- 366-E-
WA8LXJ 11,475- 45- 85-C-
WB2FGA/8 1932- 23- 28-A-

9

Illinois

W9MLG 39,192- 92- 142-C-
W9CH 25,425- 75- 113-C-
WØBZW 14,580- 54- 90-C-
W9NZM 8580- 44- 65-C-

Indiana

K9UWA 29,748- 74- 134-C-

Wisconsin

WB9MOG 8436- 37- 76-C-

Ø

Colorado

WA2WMT/Ø 15,930- 59- 90-C-

Iowa

WBØOAZ 972- 18- 18-C-

Kansas

WAØTKJ 16,416- 57- 96-E-

Missouri

WAØJNF 6372- 36- 59-A-

South Dakota

WAØCPX 39,732- 86- 154-C-

DX PHONE LOW BAND

ASIA

Japan

JA1ELY 28,476- 28- 339-B-
JA2IYJ 28,188- 36- 261-C-
JA7GAX 6588- 18- 122-A-
JH1APZ 5856- 16- 122-B-
JA1HOM 936- 8- 39-C-
JA1JIX 225- 5- 15-A-
JA9LVD 153- 3- 17-A-
JA4GXS/4 144- 3- 16-A-
JA2AIR 99- 3- 11-C-

EUROPE

Portugal

CT1MW 28,796- 46- 208-C-

Spain

EA4LH 104,400- 60- 580-E-

France

FØAXP 10,266- 29- 118-A-
F5AD 9180- 15- 204-A-

Italy

IVØAMU 41,454- 47- 294-E-

NORTH AMERICA

Guadeloupe

FG7AR (W2TTG, opr.) 1420- 19- 60-E-

OCEANIA

Australia

VK3XB 15,318- 46- 111-B- 7

New Zealand

ZL1AGO 28,224- 49- 192-A-
ZL2HE 22,833- 43- 177-A-

SOUTH AMERICA

Bolivia

CP1EU 11,616- 44- 88-C- 3

Brazil

PY2ELZ 9599- 29- 111-B- 4

W/VE CW HIGH BAND

CANADIAN

Ontario

VE3CSZ 106,512-112- 317-C-51
VE3BBH 99,750- 95- 350-C-
VE3EJK 15,552- 54- 96-B-30
VE3DCI 11,703- 47- 83-C-36
VE3WW 3828- 29- 44-B- 5

Alberta

VE6ATT 2016- 16- 42-B-18
CY6AVO 1020- 10- 34-D- 8

British Columbia

VE7BBD 1470- 14- 35-A- 5

U.S.A.

1

Connecticut

W1FBY* 478,560-160- 997-C-
K1DPB 276,120-118- 780-C-40
K1JHX 268,149-113- 791-C-30
WA1NKK 214,926-113- 634-C-
K1GUD 13,860- 33- 140-C- 7
W4WF1./1* 2550- 17- 50-C- 3
WA1FCN 1887- 17- 37-B-

Eastern Massachusetts

K1AGB 100,368-102- 328-B-34
W1OPJ 4134- 26- 53-B-18

Maine

K1OEY 91,134- 83- 366-C-66

New Hampshire

K1LMS 47,085- 73- 215-A-36
W1GME 4860- 30- 54-B-

2

Eastern New York

W2AO 94,668- 92- 343-C-24

N.Y.C.-L.I.

W2AX 72,420- 85- 284-C-22
W2AYJ 56,376- 87- 216-C-14
WA2DLV 16,695- 53- 105-B-10
W2AFM 16,128- 56- 96-B-30
WA2FNY 8991- 37- 81-C-16
WB2NDR 2139- 23- 31-B- 2
WB2AMU 2001- 23- 29-B- 9
W2SGK 936- 13- 24-C-
WB2GXW 450- 10- 15-A- 2
W2TUK 108- 6- 6-C- 1

Northern New Jersey

W2GXD 582,912-176-1104-C-60
K2EAC 102,078-107- 318-B-60
WA2ZWH 48,840- 74- 220-A-32
K2GI 14,637- 41- 119-C-21
WA2SLF 798- 14- 19-B- 4
W2UL 12- 2- 2-A- 1

Southern New Jersey

W2BZL 28,968- 68- 142-B-
K2BG 10,530- 39- 90-B-12
W2SDB 4176- 29- 48-C- 6
W2LYL 2139- 23- 31-B- 4
W2IFE 2112- 22- 32-B-20

Western New York

K2TQC 346,458-146- 791-C-40
W2HPF 181,602-118- 513-C-35
WA2MBP 165,600-115- 480-C-
W2SEC 19,665- 57- 115-B-36
W2FUI 15,750- 50- 105-C-47
WA2LCC 108- 6- 6-A- 1

3

Eastern Pennsylvania

K3DPQ 179,292-134- 446-C-40
K3LJZ 36,456- 62- 196-C-24
W3BB 32,490- 57- 190-C-25
WA3UNR 1920- 20- 32-B-12

Maryland-D.C.

W3ZSR 255,564-124- 687-E-51
K3ZAW 96,075-105- 305-C-20
W3AFM 87,516-102- 286-C-48
WA3JYV 7560- 42- 60-A-10
WA3TKP 7029- 33- 71-B-16

Western Pennsylvania

K3DR 11,040- 46- 80-E-13

4

Georgia

WB4TDH 148,170-110- 449-B-48

North Carolina

K4YR 125,112-104- 401-C-32
WA4MWP 8979- 41- 73-B-12
WB4JYB 7638- 38- 67-B-

Northern Florida

W4WHK 48,462- 82- 197-A-40
W4EEO 4680- 39- 40-A-20

South Carolina

WA4EWX 69,696- 96- 242-E-48

Southern Florida

WB4ICJ (WB4LHK, opr.) 46,125- 75- 205-F-23

Tennessee

K4PUZ 57,720- 74- 260-C-15

Virginia

W4WSF 319,422-139- 766-C-50
K4JWD 68,580- 90- 254-C-30
WA4QOC 13,230- 42- 105-C- 7
W4HM 10,416- 28- 124-C- 5
W4GF 4284- 28- 51-C- 6

5

Arkansas

W5QKR (WA5YMW, opr.) 146,250-115- 424-E-63

Northern Texas

K5KSI 43,050- 70- 205-C-36
W5UCE 14,700- 50- 98-B-13

Southern Texas

W5GO 116,280-120- 323-C-
WA5OKC 55,704- 88- 211-C-40
W5BWN 3591- 21- 57-B- 9
WA5WQF 27- 3- 3-C- 1

6

Los Angeles

WA6OWM 4320- 18- 80-A- 3
WA6ZKI 1740- 20- 29-B-10

Santa Clara Valley

WA6WEI 113,229- 69- 547-B-40
K6FD 26,190- 45- 194-B-31
W6CLM 17,850- 34- 175-G-27
W6ATO 5214- 22- 79-C-18
W6SC 72- 3- 8-C- 2
WN6BYO 3- 1- 1-A- 3

San Francisco

W6ZT 73,872- 57- 432-B-51
WB6ZUC 20,910- 34- 205-B-18

San Joaquin Valley

K6DSK 25,926- 58- 149-B-28

San Diego

K6SDR 541,920-160-1129-C-68
W6PLH 399,360-130-1024-C-30
W6ITY 220,815-105- 701-C-

7

Idaho

W7VSS 24,480- 51- 160-B-31

Montana

W7GKF 82,179- 69- 397-C-30

Nevada

WA7WYF 3060- 20- 51-B- 9

Oregon

WB7ABK 200,700-100- 669-C-54
K7IWD 78,045- 55- 473-C-27

Washington

W7VRO 92,625- 65- 475-C-25
WA7JCB 47,151- 39- 403-C-22
W7GYF 13,500- 45- 100-A- 6
WA7UQG 9516- 26- 122-B- 9
W7FD 4104- 19- 72-B-16
W7MH 1305- 15- 29-B- 6
WA7GYR 252- 7- 12-C- 1

8

Michigan

K8IDE 243,432-126- 644-C-67
W8VSK 106,251-107- 331-E-
W8IJQ 71,535- 95- 251-A-42
W8SS 15,132- 52- 97-C-18
WB8DTT 6615- 35- 63-B-21
WB8CKW 4554- 33- 46-A- 8
K8QWG 4050- 27- 50-B-21
W8FZG 48- 4- 4-A- 1

Ohio

W8KGE (K8RMK, opr.) 123,480-105- 392-C-35
W8YGR 15,921- 61- 87-B-11
WB8QIS 15,609- 43- 121-C-22
WB8BOR 5355- 35- 51-B-13
W8VZE 3444- 28- 41-F- 5

West Virginia

W8CDV 6195- 35- 59-C-26

9

Illinois

W9OHH 139,482-123- 378-F-
W9PNE 6669- 39- 57-A-32
WB9NOZ 6612- 38- 58-A-10
W9WR 2112- 22- 32-B-22
W2UJ/9 192- 8- 8-A-

Indiana

WB9LHI 297,321-139- 713-C-51
WB9BPG 253,524-148- 571-C-39
W9WCE 26,082- 63- 138-B-30
K9VQK 1071- 17- 21-C- 5

Wisconsin

W9GIL 95,811-109- 293-C-
W9OW 42,048- 73- 192-C-22
W9BG 28,356- 68- 139-C-20
W9HE 11,562- 47- 82-C-14

Ø

Minnesota

WØHW 68,172- 92- 247-B-20
WØLP 10,707- 43- 83-C-23

Missouri

WAØPAO 94,080- 98- 320-C-49
WAØNVZ 58,872- 88- 223-B-42

Nebraska

WNØMQM 270- 9- 10-A- 5

DX CW HIGH BAND

ASIA

Japan

JA2MGE 126,819- 63- 671-C-32
JR1JFO 62,400- 50- 416-B-
JA1PCY 46,230- 46- 335-B-
JH1PBR 43,800- 50- 292-B-16
JR1FVW 37,125- 45- 275-C-12
JA1WL 27,639- 37- 249-B-21
JA1PS 24,753- 37- 223-A-20
JG1EEE 23,154- 34- 227-B-23
JH1MTR 18,009- 29- 207-B-16
JAØSC 16,044- 28- 191-B-19
JH3LCU 15,543- 33- 157-B-
JA7KXD 14,355- 29- 165-B-14
JF1MYI 9768- 22- 148-B-25
JA1WWO 9576- 28- 114-B- 7
JA5BLF 8970- 23- 130-B-
JA2EG 4914- 18- 91-A-
JA4DZ 4680- 26- 60-B-
JA2BNN 2376- 12- 66-A-
JA1EMX 2310- 14- 55-B- 4
JF1CUA 1890- 9- 70-A- 9
JA1CVP 945- 7- 45-B- 5
JA3XRC 720- 5- 48-A- 4
JA9IBK 705- 5- 47-B- 6
JA7NY 672- 7- 32-A- 7
JA2GXD 375- 5- 25-A- 3
JR1JUR 159- 3- 18-A- 3
JR1MRG 90- 3- 10-A- 8
JA1AAI 42- 2- 7-B-
JA1LRP 18- 2- 3-A- 1

Asiatic R.S.F.S.R.

UAØCBO 33,372- 36- 309-B-
UAØJAY 15,428- 28- 185-A-

India

VU2ABC 576- 12- 16-A- 6

EUROPE

Federal Republic of Germany

DK4PH 83,520- 48- 580-B-33
DJ2AA 80,325- 51- 525-B-24
DJØXT 31,050- 46- 227-A-
DF2SN 13,950- 30- 155-B-
DL1GN 12,267- 29- 141-B-
DJØVO 11,400- 25- 152-B-25
DA1GS 7920- 24- 110-E-
DJ7JJ 5184- 24- 72-B-
DK8KC 4029- 17- 79-B-15
DJ7SN 1806- 14- 43-A-

German Democratic Republic

DM3BE 11,532- 31- 125-A-
DM4YEL 10,640- 28- 127-B-
DM2CXE 5148- 22- 88-A-
DM2CMF 4599- 21- 77-A-
DM2CYE 4320- 24- 60-A-
DM3XUE/a 2835- 21- 45-A-
DM2CPE 1596- 14- 38-A-
DM3OML 1554- 14- 37-B-
DM2DRN 1512- 44- 12-A-
DM2CUJ 702- 9- 26-A-
DM2BNB 231- 7- 11-B-

Spain

EA2CR 18,120- 40- 151-A-

Balearic Islands

EA6BD 9324- 28- 111-B-

France

F6DNR 8788- 26- 113-A-
F6DBY 5670- 21- 90-B-10
F5AI 4599- 21- 73-A-
F8FE 3009- 17- 59-A-
FØBHC 1620- 15- 36-B-
F6DFT 1287- 13- 33-B-

England

G3FXB 188,811- 63- 999-A-45
G5ANV 88,110- 55- 534-A-
G3SXW 67,169- 49- 461-A-30
G3IXF 49,368- 44- 374-A-25
G6NK 5733- 21- 91-A-
G3CWL 810- 10- 27-A- 3

Hungary

HA2SD 30,969- 37- 282-B-
HA5JK 6804- 28- 81-A-

Switzerland

HB9AYZ 5229- 21- 83-B- 7

Italy

I2FGP 72,576- 48- 64-B-13
I3MGN 23,826- 38- 211-B-33

Sardinia

ISØPJP 9630- 30- 107-B- 6

Norway

LA5SH 18,360- 40- 153-B-20
LA2Q 6885- 27- 85-B-
LA4PQ 2862- 18- 53-A-

Bulgaria

LZ2RF 2100- 14- 50-B-

Austria

OE1ZGA 20,064- 38- 176-B- 8

Finland

OH6OB 24,564- 46- 178-B-
OH2LU 16,896- 32- 176-C-
OH9TD 6324- 31- 68-A-
OH2BMG 5694- 26- 73-B-
OH6MM 4488- 22- 68-A-
OH7SC 3375- 25- 45-B-
OH2BCD 1512- 14- 36-B-
OH3XJ 376- 8- 16-B-
OH1HU 198- 6- 11-B-

Czechoslovakia

OK3ØQX 22,914- 38- 201-C-
OK3ØKAP 11,880- 30- 132-B-
OK3ØMIN 10,881- 31- 117-A-
OK3ØBLG 5985- 19- 105-A-
OK3ØDI 4026- 22- 61-B-
OK3ØFAM 3960- 22- 60-A-
OK3ØKHD 3366- 17- 66-A-
OK3ØEA 2838- 22- 43-B-
OK3ØRO 2703- 17- 53-A-
OK3ØBSA 2180- 19- 40-A-
OK3ØPEO 1548- 12- 43-A-
OK3ØMSP 930- 10- 31-A-
OK3ØZAQ 735- 7- 35-A-
OK3ØMKU 726- 11- 22-A-
OK3ØIAS 702- 9- 78-A- 4
OK3ØBIP 462- 7- 22-B-
OK3ØAIA 240- 8- 10-A-
OK3ØTW/p 144- 6- 8-B- 1

Denmark

OZ6XT 21,440-107- 67-A-
OZ1HX 12,192- 32- 127-A-
OZ4HW 3363- 19- 59-B- 6
OZ7BG 3180- 20- 53-B-
OZ5UY 1890- 18- 35-A-
OZ1AMP 1125- 15- 25-A-

Netherlands

PAØEHF 4623- 23- 67-A- 5
PAØUV 2646- 18- 49-B-
PAØPHK 729- 9- 27-A- 5
PAØINA 702- 9- 26-A-
PA9WRR 144- 6- 8-A- 1

Sweden

SM5CAK 29,796- 39- 764-B-
SMØCCE 20,265- 35- 195-B-
SMØBDS 15,147- 33- 153-B-
SM5DNI 8064- 28- 98-A-
SMØDJZ 4136- 22- 63-B-
SMØFY 3432- 22- 52-B-
SMØCGO 3000- 20- 50-A-
SM5FUG 2430- 18- 45-A-
SM5BAX 2160- 15- 48-B-
SM6DJI 2112- 16- 44-A-

SM7ASQ 936- 12- 26-B-
SM6DGR 480- 10- 16-B-
SM5LVC 297- 9- 11-B-
SM7ILL 297- 9- 11-A-

Poland

SP3EAH 4140 20- 69-A-
SQ2DMU 3591- 21 57-A
SP6BFY 2028- 13- 52-A-
SP3GCT 1560- 14- 40-A-
SP5AIO 627- 11- 19-A-11
SQ6UK 315- 7 15-A-
SQ6EJG 180- 6- 10-A-
SQ9FUZ 108- 7- 8-A- 2
SQ8ENA 54- 3 6-A-
SQ8GSI 3 1 1-A- 1

European Russian S.F.S.R.

UA1ZEA 19,038- 58- 161-A-
UA4GM 9858- 31- 108-B-
UA1DDF 1114- 14- 27-A-
UA4ZA 144- 6- 8-B-

Ukraine

UY5LF 4284- 21- 68-B-
UB5QRG 870- 10- 36-A-
UK5QBF 308- 7 15-A-

White R.S.S.R.

UC2CLD 612- 12- 17-A-

Georgia

UF6CX 957- 11- 29-A-

Armenia

UG6JJ 27- 3- 3-A-

Estonia

UR2RDQ 694- 11- 21-A-

Romania

YO4AXP 120- 4 10-A-

Yugoslavia

YU2OB 24,020- 42- 284-B-
YU4VBR 16,182- 31- 174-A-
YU1SF 1722- 14- 41-A-

NORTH AMERICA

Alaska

KL7HMO 41,300- 47- 300-C-
KL7HNN 14,148- 36- 131-B- 7
KL7EWA 6975- 25- 93-A- 3

Greenland

OX3AB 58,140- 57- 340-A-

OCEANIA

New Caledonia

FK8AH 22,560- 40- 188-A-

Hawaiian Islands

KH6IGC 659,244-137-1604-E-30
KH6IEG 301,350- 98-1025-B-16
KH6JAC 264,792- 88-1003-B-36

SOUTH AMERICA

Bolivia

CP1EU 274,743- 89-1029-B-18

Ecuador

HC8FF 3120- 26- 51-C- 1
WB8ABN/HC1 2601- 17- 51-A- 1

Brazil

PY1BOA 85,424- 79- 357-A- 8

W/VE PHONE HIGH BAND

CANADIAN

Maritime

VE1FK 4185- 41- 45-A- 8

Quebec

VE2WA 18,468- 54- 114-E- 9

Ontario

VE3BBH 389,232-150- 816-C-
VE3ELE 18,876- 82- 121-C-13
VE3EJK 11,850- 50- 79-B-23

Manitoba

VE4JK 13,509- 57- 79-B-18
VE4SN 945- 15- 21-A-

Alberta

VE6AJT 17,325- 55- 105-A-24

British Columbia

WA6GUK/VE7 6696- 24- 93-B-30

U.S.A.

1

Connecticut

W1IBY* 297,234-147- 674-L-
K1HX 240,702-154- 521-C-20
WA1NKK 182,574-126- 484-C-
K1YXQ 17,442- 57 102-D-12
WA1NRG 12,300- 41- 100-C-13
K1DPB 11,781- 51- 77-A- 3
WA1KOJ 8737- 33- 65-C-18
W3WEL/1* 4602- 26- 59-C- 4
K1GUD 4176- 24- 58-C- 4

Eastern Massachusetts

WA1LKX 330- 10- 13-B-

Rhode Island

W1YNK 252- 7 12-C- 1
WA1RFT 27- 3- 3-B- 2

Vermont

K1HK 4374- 23- 54-C- 3

2

Eastern New York

K2BQO 202,395-131- 515-C-26
K2RES 2070- 23- 30-B-15

N.Y.C. L.I.

W2MOY 45,936- 88- 174-C-25
W2ASJ 30,827- 79- 121-C-10
WB2ESH 23,925- 55- 145-C-26
WB2NDR 21,105- 67- 105-A-
K2OVS 6528- 32- 68-A- 8
W2SCR 4692- 34- 46-C-
WB2UHY 4500- 30- 50-A-16
W2IUK 462- 11- 14-C- 1
W2CZZ 300- 10- 10-A- 3
WB2NXF 297- 9- 11-C- 6

Northern New Jersey

W2CXD 572,418-177-1078-C-61
WB2VFT 157,680-144- 365-D-
WA2ZWH 29,145- 67- 145-A-29
K2GT 29,064- 56- 173-C-37
W2KXD 22,880- 64- 120-C-22
WB2IIU 18,984- 56- 113-C-17
WA2SLE 1134- 18- 21-A-55
W3UE 264- 8- 11-A- 8

Southern New Jersey

W2DU 103,896-111- 312-C-
WB2EZL 49,950- 90- 185-F-
K2SNB 25,875- 69- 125-C-14
W2PHQ 20,820- 60- 114-B-35
WA2CDB 12,672- 48- 88-B-18
K2QQ 10,152- 47- 72-A-
WB2HYU 8514- 45- 66-C-11
WA2VEA 8505- 35- 81-C- 3
WA2NPD 6435- 33- 65-C- 9
W2SDB 60- 4- 5-C- 2

Western New York

W2RLL 189,126-143- 474-C-50
WB2LOF 29,337- 77- 127-B-
W2WZO 24,192- 63- 128-B-37
WB2EZO 5040- 30- 56-A-10
WB2GTB 630- 14- 15-C- 2
WA2AOG 36- 3- 4-A- 1

3

Delaware

WA3DRD 3276- 28- 39-D- 8

Eastern Pennsylvania

W3EVW 60,768- 96- 211-C-20
W3YFV 21,576- 62- 116-C-20
W3EAN 1440- 20- 24-C- 3

Maryland-D.C.

W3ZSR 193,866-158- 409-E-31
W3PWO 90,978-118- 257-C-45
W3MEJ 70,713- 97- 243-C-
WA3VPI 62,928- 92- 228-C-15
W3HVM 27,324- 66- 138-C-13
W3CDG 15,330- 65- 94-C-29
W3GZP 9855- 45- 73-A-30
WA3VSG 1440- 20- 24-A- 5
W3ENS 363- 11- 11-C- 4
W3BVO 273- 7- 13-A-

Western Pennsylvania

W3PIX 20,736- 64- 108-B- 8
K3BWI 960- 16- 20-B-10

4

Alabama

W4CYC 396,645-155- 853-C-49
WA4ENJ 68,328-104- 219-E-33
W4DS 7656- 44- 58-B- 9

Georgia

K4JPD 329,148-164- 669-C-57
W4DQD 186,615-145- 429-C-29

Northern Florida

W4ZTW 120,651-131- 307-B-41
W4WHK 75,582-114- 221-A-48
W4WEG 39,312- 84- 156-A-45
W4ELO 4800- 40- 40-A-20

South Carolina

WH4NRI 169,440-160- 353-E-64
WA4UZA 31,959- 67- 159-C-26

Southern Florida

WA4SVO 352,674-189- 622-C-56
KH6GMP/4 46,269- 87- 159-C-
W4EPZ 31,464- 76- 138-B-34
WA4LWL 23,004- 71- 108-A-24

Tennessee

K4PR 1448- 24- 34-C- 8

Virginia

W4WSP 486,720-192- 845-C-50
K4IWD 214,368-144- 464-C-40
WB4OXD 115,200-128- 300-A-21
WA4QOC 114,330-103- 370-E-40
WB4HBO 87,288-115- 254-E-26
K4JYM 20,844- 64- 107-C- 8
WA4RIX 18,903- 57- 93-A-15
W4JVN 8552- 49- 62-C-10

5

Arkansas

W5QKR 118,686-131- 302-C-52

Louisiana

K5YMY 148,835-145- 367-C-35
K5LVZ 19,890- 67- 99-C-37
K5BLV 6408- 35- 61-A- 8

Mississippi

W5MUG 107,085-121- 295-C-40

Northern Texas

WA5JMK 143,988-142- 338-C-50
K5KSI 109,080-101- 360-C-62
K5UTW 84,249-111- 253-B-
W5UCE 39,672- 87- 152-A-26
W5IO 26,061- 93- 119-E-13
WB5CRG 7752- 38- 68-B-15

Oklahoma

W5TWI 144,039-133- 361-C-46
WA7LKI/5 720- 12- 20-A- 5

Southern Texas

WA5ZNY 248,985-165- 503-C-60
W5UCL 10,368- 48- 72-A-22
W5IUN 2916- 27- 36-A-12
WS5BX (WA5WCI, opr.) 1404- 18- 26-A- 2

6

Los Angeles

K6SVL 924,396-188-1659-E-71
W6OK 52,800- 64- 275-C-31
WA6OWM 4836- 31- 52-A- 4

Santa Clara Valley

W6EYY 152,484- 97- 324-C-30
WhHXW 102,672- 94- 368-C-48
WA6WEI 101,640- 77- 440-B-40
W6EJ 69,936- 94- 248-F-25
W6HJP 60,720- 80- 253-C-29
K6ED 30,152- 62- 162-A-40
W6CLM 16,380- 42- 130-G-21
WA6TKT 13,104- 39- 112-B-20

San Diego

W6PLH 467,229-133- 1117-C-37
W6EI 28,728- 57- 168-C-35
K6KBH 11,868- 46- 86-A-12
WA6IBY 11,760- 35- 112-A-25
K6LIE 1350- 15- 30-A- 6

San Joaquin Valley

WA6CPP 24,021- 51- 157-E-10
W6KPZW 14,040- 40- 117-E- 9

Sacramento Valley

W6KYA 22,853- 43- 177-B- 8

7

Arizona

K7PXI 63,279- 89- 237-B-35

Idaho

W7VSS 3864- 28- 46-B-13

Nevada

WA7WYF 714- 14- 17-E- 4

Oregon

WB7ABK 281,802-143- 701-C-50

Washington

K3MNT/7 113,760- 80- 474-E-19
W7NP 109,200- 80- 455-C-46
WA7JCB 79,608- 62- 428-C-22
K7LAY 18,750- 50- 125-C-40

W7QIQG 3744- 26- 48-B-
WA7YDR 3036- 22- 46-B-
K7LVI 2574- 22- 39-A-
W7EO 2040- 17 40-B-
K7NWS (WA7VNI, opr.) 528- 11- 16-C-
W7MH 72- 3- 8-B-

Wyoming

W7JLI 20,955- 55- 127-C-

8

Michigan

K8IIF 391,680-170- 768-C-
W8NWO/8 120,360-136- 295-B-
W8SS 23,110- 70- 111-C-
WB8B7 15,876- 49- 108-C-
W8EJO 14,792- 52- 82-A-
WB8RWU 189- 7- 9-B-

Ohio

WB8IZS 113,184-131- 288-E-
WB8MVX 59,784- 94- 212-B-
W8BKO 35,090- 90- 167-B-
W8MBB 28,764- 68- 141-C-
K8DJL 10,437- 49- 71-A-
WA8YGR 9570- 55- 58-A-
W8VZE 8970- 46- 65-C-
WB8HOR 5928- 28- 42-B-
K8PYD 2280- 20- 38-C-
K8MLO 468- 12- 13-B-

West Virginia

WA8VZO 4410- 30- 49-B-

9

Illinois

W9IY 280,848-156- 536-C-
K9EGA 143,112-134- 356-C-
W9YRA 133,722-141- 317-C-
K9IDV 77,115-105- 229-C-
W9EHH 48,825- 93- 175-E-
WA9SVZ 21,909- 67- 109-E-
W9IIH 4780- 28- 45-C-
K9IIY 2958- 29- 34-A-
WA9BLF 297- 9- 11-C-
W9RJC 162- 6- 9-B-

Indiana

WB9LEH 125,692-166- 654-C-
W9LQ 69,000-115- 200-C-
K9OIP 8775- 39- 75-C-

Wisconsin

W9LQO 37,665- 81- 155-C-
W9UIL 15,807- 83- 143-C-
W9HE 3024- 28- 36-C-
WB9OWJ 741- 13- 19-A-
W9IW 120- 4- 10-B-
WB9NME 12- 2- 2-A-

0

Colorado

WØBWJ 14,630- 37- 150-C-
WAØLAM 10,800- 45- 80-C-

Iowa

WBØHOG 63,180-108- 195-A-

Kansas

WAØYJL 8601- 47- 61-C-
WAØUOZ 2688- 28- 32-A-

Minnesota

WBØHAI 42,840- 85- 168-C-
WØHW 42,585- 85- 167-C-
WBØNGL 15,138- 58- 87-B-
WØLP 7881- 37- 71-C-

Missouri

WØCDC 21,168- 72- 98-C-
WØEPI 5742- 47- 62-C-

Nebraska

KØGCJ 9954- 42- 79-C-

South Dakota

WØWUU 3192- 28- 38-C-

DX PHONE HIGH BAND

AFRICA

Canary Islands

EA8HG 40,248- 52- 258-A-

Liberia

EL4D 214,851- 91- 787-C-
EL5G 41,451- 41- 337-C-

South Africa

ZS6FN 240,400- 96- 800-C-

Mauritius

3B8CV 171,954- 82- 699-C-

Lesotho

7P8AT 123,327- 71- 583-C-

Zambia

9J2EP 358,221- 97-1231-B-

ASIA

Thailand

HS2AIG 84- 4- 7-C- 4

Japan

JA1BAX 96,195- 53- 605-B-28
JA1PCY 86,715- 47- 615-B-
JA2MGE 23,400- 30- 260-C-13
JA1PUK 11,760- 28- 140-B-10
JH1ZIS (WA3VWJ, opr.)
11,151- 22- 177-A-12
JA7AMK 6534- 18- 121-C-
JA1EMX 6222- 17- 122-B- 9
JA2HGA 5280- 20- 88-B-
JA0AYR 4248- 8- 177-B-
JH2RVP 3060- 10- 102-B-
JA1AAT 3024- 16- 63-B-
JA1WL 2844- 12- 79-B-11
JA3BUB 2268- 7- 108-A- 6
JA7NY 2196- 12- 61-A-14
JA3IBU 2130- 10- 71-B- 5
JA6JRI 1890- 9- 70-B- 7
JA0AIE 1782- 11- 54-B-
JA0FXV 1701- 9- 63-B- 7
JA1WWO 1683- 11- 51-B- 6
JA9LX 1560- 10- 52-A- 9
JH1MTR 1416- 8- 59-C- 5
JA7KXD 1380- 10- 46-B- 6
JH3XCU 1092- 7- 52-A- 4
JA0YBY 918- 6- 51-A- 7
JH3FYW 738- 6- 41-A- 3
JA0URR 675- 5- 45-A- 3
JA7CPW 480- 4- 40-A- 5
JA1BUI 396- 6- 22-A-
JG1QXE 360- 3- 40-A- 3
JA2TKO 324- 4- 27-B- 2
JE1UVT 306- 2- 51-A- 5
JR2NFJ 300- 4- 25-A- 4
JA3BX 252- 4- 21-B- 6
JR2JZR 252- 3- 28-A- 5
JA4PPR 225- 3- 25-C- 6
JA7KM 162- 3- 18-B- 3
JA2BNN 144- 4- 12-A-
JA1EOH 135- 3- 15-A-
JA3YJQ 114- 2- 19-A- 1
JA3ELU 72- 3- 8-A-
JA1BTH 66- 2- 11-A- 1
JA2ATE 36- 1- 12-A-
JA7BCE 30- 2- 5-B-
JR3CVO 27- 1- 9-A-

Asiatic R.S.F.S.R.

UA0CBO 30,336- 32- 316-B-

India

VU2GDG 4440- 20- 74-B- 3
VU2ABC 3360- 16- 70-A- 8

EUROPE

Portugal

CT1CV 54,522- 39- 466-A-22

Spain

EA3XA 50,922- 41- 414-B- 4
EA2JD 35,793- 41- 291-A-20

Federal Republic of Germany

DJ0BA 184,860- 60-1027-C-30
DJ2AA 77,490- 42- 615-B-19
DA1ET 27,720- 35- 264-D-24
DK5VO 13,608- 27- 168-A-24
DK4EX 4380- 20- 73-C-
DL1RO 3078- 18- 57-B-
DL1YA 1872- 16- 39-B-

German Democratic Republic

DM2DRN 240- 8- 10-A-

France

F5RC 29,274- 34- 287-B-
F0BHC 1023- 11- 31-B- 3

England

G3SWX 3186- 18- 59-B-

Wales

GW4CYD 2805- 17- 55-B-

Italy

I6FLD 252,858- 67-1258-B-
I3GRX 25,194- 34- 247-B-22

Norway

LA3JQ 14,280- 35- 136-A-
LA3UQ 2106- 18- 39-B-
LA1HI 378- 6- 31-B-

Finland

OH2LU 1890- 15- 42-C-
OH7SC 1683- 17- 33-B-

Czechoslovakia

OK3ØATE 60,984- 42- 484-B-
OK3ØPEQ 5796- 21- 92-A-
OK3ØFAR 1980- 15- 44-A-
OK3ØAJN 1050- 12- 30-B-
OK3ØBIH 726- 11- 22-A-
OK3ØKZ 294- 7- 14-A-

Belgium

ON4XG 4320- 20- 72-B-

Denmark

OZ6MJ 7392- 22- 112-B-
OZ1HX 3162- 17- 62-A-
OZ6PI 336- 8- 14-A-

Netherlands

PAØEHF 7521- 23- 109-A-10

Poland

SQ9KRT 29,376- 34- 288-B-
SQ6PAZ (SP6DVP, opr.)
306- 6- 17-B-
SP9AVZ 264- 8- 11-A-
SQ6FJG 48- 4- 4-A-

Sweden

SM5CAK 7848- 24- 109-B-
SM7BXK 198- 6- 11-B-

Greece

SVØWGG 19,845- 35- 189-B-

Ukraine

UY5OO 528 8- 22-B-

Yugoslavia

YU3EY 109,950- 50- 733-B-20
YU2OB 9198- 21- 146-B-

Gibraltar

ZB2USA (W9JVF, opr.)
31,284- 33- 316-A-11

NORTH AMERICA

Alaska

KL7HQR/KL7
55,050- 50- 367-C-30

Puerto Rico

KP4EAS 1,399,464-132-3534-C-49
K1HMU/KP4
664,416- 96-2307-C-25

Canal Zone

KZ5WA 61,566- 62- 331-B- 2

Saint Maarten

PJ8AA (W2BBK, opr.)
510- 10- 17-B- 1

Bermuda Islands

W6PEV/VP9 42,924- 49- 292-A-15

Nicaragua

YN3ZLW 5040- 24- 70-A- 7

OCEANIA

New Caledonia

FK8AH 6450- 25- 86-A-

Hawaiian Islands

KH6GQW 790,704-114-2312-C-46
KH6IGC 364,206-101-1202-F-17
KH6IJA 26,532- 44- 201-B-24

Australia

VK4UR 15,120- 30- 168-B-
VK2OW 648- 9- 24-B-

SOUTH AMERICA

Chile

CE6EZ 1,669,416-152-3661-C-

Uruguay

CX6CT 211,680- 98- 720-D-12

Ecuador

HC1BU 1,769,427-183-3223-C-
WB8ABN/HC5
368,532-116-1059-C-11
HC1CW 143,910- 90- 533-C- 5
HC1MM/HC5
65,025- 75- 289-B- 3

Peru

OA4CJ 126,000- 80- 525-B-10

Brazil

PY4KL 348,300-135- 860-C-
PY7VNY 257,898-106- 811-C-
PY4ALC 236,964- 98- 806-
PY3CFP 191,187- 97- 657-B-30
PY1CHP 181,578-106- 571-B-22
PY1MO 148,212- 92- 537-B-30
PY2EGM 133,500- 89- 500-A-
PY1FI 25,602- 34- 251-C-
PY1BOL 1131- 13- 29-C- 1

*Denotes headquarters staff, not eligible for awards.

CHECK LOGS

W/VE CW W6BYB/VE1, W2NCI, W2RRY, WA3LBG, W4JUK, W6EYC, W6HPB, W6IRA, W6KG, W6RQZ, W7WV, W8FEM, W8SS, WBØFGF. DX CW CO7SG, DJ9HD, DL1RB, DL-610/1491158, DM2BNJ/p, DM2CCM, DM2CHN, DM2COJ, DM2CYO, DM2CZJ, DM2DXD, DM2YLJ, DM-SWL-5599/L, F3IM, G2AJB, HP1AC, KL7PI, LA4DM, LZ1KSP, OE3EVA, OK3ØAEH, OK3ØBGR, OK3ØBOV, OK3ØTDC, OK3ØUS, OK3ØVK, OZ1TD, PAØTA, PY2FRW, PY8AHS, SM2COR, SMØGBB, SMØIX, SP4AVG/6, SP5GOL, SQ3CB, SQ6FER, SQ7EJS, UA3ACD, UA3DDF, UA3ST, UA3VAQ, UA3XAW, UA4BI, UAØBAC, UAØBBF, UR5FAQ, UB5MDL, UB5MDP, UB5ZAT, UC2CED, UK5EDQ, UK5UAC, UK8MAA, UY5LO, UW4NH, UW6CV, VP2KX, YU3AE/X, YU3DBJ, YV5KL. W/VE PHONE VE3DCI, VE6AKL, VE7AXI, W2CVW, WB2FXY, WA3AFQ, K4KPH, W4IUK, W4TL, WB4IQI, WB4OSN, W5UCY, W7AE, WØDGS/4, WØYUQ. DX PHONE CT1OY, DM2COJ, DM3WCG, G3ZKE, HK3CFF, HV3SJ, LA3KT, LA4DM, OK3ØKAP, PAØRWS, PAØWAC, PY1DBE, PY2ELV, SM5GH, SP5GKN, SP6DB, SM7ECX/SM7, SQ5AMX, SQ7FTG, UA3VAQ, UP2BAW, 9Y4T.

DISQUALIFICATIONS

Phone: W6CCP, K6JAN, WB4QWM, KH6BZF, K2FJ (opr. of VP2DX), K2BPP and K2JAO (oprs. of VP2FEE).

FEEDBACK

Feedback from the November, 1974 Sweepstakes Contest. See results in May, 1975 *QST*.

1. KH6RS should have been listed as the Pacific Division leader, multi-operator, cw, instead of W6BIP.

2. WA5LES should have been listed as Clean Sweep *both* modes, W2FR and W5ONL/VE3 both Clean Sweeps on cw.

3. WA3PHQ (EPa, cw) should have been listed as low power, and the cw winner for the Penn Wireless Association should have been K3HNP, *not* WA3PHQ. WA3PHQ was listed as WA3PHO in the phone scores.

4. WB8JBM and all operators there were incorrectly listed as WN8 callsigns. Also, WB8JBM/8 should have been listed as the Great Lakes Division leader on *both* modes, multi-op category.

5. WAØRLD, low-power class, Minnesota, phone, should have been listed as sixth, with a score of 20,094. The Minnesota low-power phone winner then becomes WØOWY.

6. K4FOB should have been listed as low power, phone, North Carolina, instead of high power. That places him first in N.C. in the low-power category and seventh in the "QRP Champs" listing on phone.

7. WA8YWX (cw, Ohio, low power) was operated by WN8RQU. That makes him the top Novice score, with 27,018 points.

In the MAVTI-40, Part I, June *QST*, in Fig. 1, page 36 the value for C6 should be 180-pF, silver mica. Also, R19 should be 6.8 ohms, not 6800 ohms.

In Part III of "Learning to Work with Semiconductors," for July 1975, the following changes and additions should be noted. In Appendix I:

$$X_{RFC1} = 10 \times Z_{IN} = 1320$$

$$X_{RFC2} = 10 \times Z_O = 50$$

$$X_{C1} = \frac{A}{Q+B} = \frac{2244}{25.16} = 89.19$$

$$C_1 = \frac{1}{2\pi f X_{C1}}$$

In Appendix II:

$$X_{L4} = \frac{QR_O' + (R_{IN}' \; R_O'/X_{C14})}{Q^2 + 1}$$

$$X_{L5} = \frac{QR_O + (R_{IN} \; R_O/X_{C16})}{Q^2 + 1}$$

AMATEUR RADIO PUBLIC SERVICE

NTS RACES AREC

In the Public Interest, Convenience, Necessity

CONDUCTED BY BILL MANN,* WA1FCM

Speaking of an Honor Roll . . .

CLYDE: WHEN IS ARRL GOING TO wake up to the need to spotlight amateurs who devote a good deal of their time to public service activities?

Section Communications Manager: Why don't you submit totals for PSHR listing in *QST*, Clyde?

Clyde: What's a pshr?

SCM: You know, the monthly listing in the Public Service column which honors versatile amateurs who report into nets, are net controls, are liaisons to other nets, handle phone patches or emergency traffic, make BPL or are net managers.

Clyde: Yeah, I do all that. But it's too easy to make. Guess I'd get around 60 points each month.

Herb: I don't think it's so doggone easy. I report in regularly – in fact just about every night – to my section phone and cw nets. I only get 20 points . . . far short of the 40-point minimum. Aren't section nets the backbone of traffic handling? Why can't I qualify by this activity?

SCM: As I understand it, one of the purposes of the PSHR is to stress versatility – that is, rewarding amateurs who perform various tasks, not just limited to only checking in, just phone patching, only liaison work, etc. That's why there are limits on most of the categories.

Herb: Then let's increase the maximums on checking in to, say, 25 points each for cw nets and phone or RTTY nets.

SCM: But stations could easily make the 40-point minimum by only reporting into phone and cw nets.

Herb: Okay, so the point-total minimum is changed to 60. Maybe that would appease Clyde and make it more meaningful to apply for PSHR.

Chris: I'm hungry.

Clyde: If this thing is supposed to be *public service* honor roll, why don't I get any "points" for reporting an accident via a repeater or through WestCARS?

Herb: Good point. How about a "handling an emergency situation" category with 10 points each, no maximum.

Clyde: And maybe five points for participating in an organized public service activity such as providing communications for a walkathon?

SCM: That might "reward" more Amateur Radio Emergency Corps and repeater-type activities.

Chris: Any of you work the BY1 on 160 last night?

Herb: Speaking of net activity, I find one of our shortcomings seems to be in the delivery of traffic. Everyone is willing to originate some, send and receive some, but some shy away from delivery. Let's add a category which yields one point for each delivery (to a third party, of course) with no maximum.

Clyde: That's crazy. Keep traffic counting functions in the Brass Pounders League. In fact, I'm for removing the three points for BPL right out of PSHR!

Chris: The hot dogs are ready.

Herb: Let's add another incentive: a certificate. Rather than just a monthly listing, points can be cumulative. When someone has received 500 total PSHR points, he gets a nice certificate. Endorsements for each multiple of 500. Since ARRL Hq. is already burdened with paper work, the SCMs can do the record keeping.

SCM: Now just a cotton-pickin' minute, fella. How can I –

Chris: Pass the mustard, please.

SCM: How can I keep track of the running scores of all the members in this section? Some people will be turning in only a dozen or so points each month. I'll have to keep files on over 50 people. And what happens in sections where the SCMs are not as efficient as I am? C'mon.

Herb: Easy, Ole Boy.

Emergency Coordinator WA3REY operating from the Indiantown Gap (PA) Military Reservation handling over 2000 messages on behalf of Viet Nam refugees.

* Assistant Communications Manager, ARRL.

Clyde: Ah, let's suggest a certificate to be issued to anyone making PSHR for 12 consecutive months or for 18 months in a 24 month period. For practical reasons, it will probably be a one-shot-only award like the BPL Medallion.

Herb: Well, we could go on discussing PSHR for days and still not be in total agreement.

SCM: Yeah, let's eat.

Chris: I'm all done. Anyone for discussing incentive licensing?

Discussion of improvements in the Public Service Honor Roll is far from a new topic. WB6AKR came up with some suggestions which he has circulated to a number of active public service types and asked for their comments. Bill has shared their responses with Hq. and the above ideas were some of those mentioned. The PSHR topic was also covered in WA6DEI's column in *Worldradio* in August, 1974.

One thing apparent in all PSHR discussions is that there is no consensus as to exactly how the points should be distributed; it is at best a compromise. Yet, we're willing to incorporate any changes which will *improve* the PSHR. A recap of some of the suggestions being bandied about is:

Increase or eliminate maximums on check-ins to nets. (Category 1 and 2).

Upgrade or eliminate the BPL category (Category 7).

Add a "message delivery" category.

Add an "emergency situation" and/or "public service activity" category.

Change minimum total number of points needed for listing.

Issue PSHR certificates or cards.

Oh, there are more, but these should inspire some thinking. Does PSHR need to be changed? Are any of the above ideas essential to a more meaningful honor roll? Review previous discussions of PSHR which have appeard in this column frequently since PSHR's initial description in July, 1969, *QST*. Then let us know what *you* think. – *WA1FCM*

On Emergency Communications

On Sunday, June 13, WB4SGA (Asst. EC, Alamance County, North Carolina), and his wife, WB4SGC, decided to survey water levels in the northern part of the county. This followed seven straight days of rain. They checked each state road that had a bridge and discovered that several were under water. WB4SGA called in on WR4AGC, alerting members of the Alamance ARC to the emergency conditions. WB4VHE and WB4SGB responded and WA4FFW, EC of Alamance County, was notified. He then assumed net control of the AREC net on WR4AGC.

WB4GSN and WA4IUX were dispatched to State Road 19, and were instructed to stop traffic and warn motorists that the bridge was under water. WA4FFW informed the Dept. of Transportation about the situation. The DOT sent out their crews and also requested the AREC to survey other points in the county. WB4SGA/SGC and WB4GSN were dispatched. Later, the situation seemed under control and the AREC prepared to secure.

Suddenly, WA4IUX/mobile 4 called in from Death Valley Bridge, saying that he thought he heard someone calling for help. Unfortunately, he had no way of getting across the water-inundated bridge. WA4FFW called WB4SGA and WB4SGC, who were already home and just about to eat dinner. They left immediately for the west side of the bridge. At 0201Z, WB4SGA radioed that there were three persons in the water. WA4FFW sent WB4GSN to the scene, as well as contacting the county rescue squad. At 0210Z, WB4ZIN assumed NCS as WA4FFW went to the scene. By 0235Z, rescue members and lifeboats arrived. Fifteen minutes later, two of the people were pulled out of the water. The search continued for the third person, who was found two days later. According to WA4FFW, " . . . today all those eight years of drill and lessons came to life and an evaluation today says if the AREC net is never activated again for an emergency, it has paid for itself, in a way that nothing else on earth can equal, and that is the saving of human lives." – *WB2NOM.*

■ For July, 39 Section Emergency Coordinators reported a total AREC membership of 13,895. At this time in 1974, the same number of reports were received with a membership of 13,790. Sections reporting: Ala, Alaska, Alb, Ariz, Colo, Conn, Del, EMass, Ill, Ind, Kans, Ky, Mich, Miss, NLI, NC, NFla, NNJ, Ohio, Okla, Ont, Org, Ore, Pac, RI, SV, SDgo, SBar, SCV, Sask, SFla, SNJ, STex, Utah, Va, Wash, WMass, WNY, WPa.

Active traffickers WBØEVQ, WAØTNM, and WAØKKR get together at the South Dakota ham picnic.

Traffic Talk

" . . . Speed in sending and receiving grows more essential as one progresses up the line in NTS but speed in copying and sending is absolutely useless, unless accuracy is equally emphasized . . ." sez WA5ZZA, RM La., in a recent letter. Jay stated that she originated one message to Puerto Rico and one to Washington, D.C., with less than satisfactory results. Both messages were garbled in transit and HX prosigns were apparently left out or ignored somewhere along the line. Similar experiences have been

WA9EZV/KG6 handled over 250 messages involving Viet Nam refugees.

reported by other traffickers. When a message is received containing handling instructions, HX prosigns should be considered an integral part of the message, just like the number, or the place of origin, etc. Let's pay attention to the handling instructions when relaying traffic. Also, let's make sure when we roger the message, we *really* roger the message. Don't assume that a particular message is too unimportant to require a service message to satisfy the handling instructions included by the originator. Remember, importance is in the eye of the originator. – *WB2NOM.*

■ If you're planning to witness any of the Olympic Games scheduled for Montreal, Quebec, between July 17 and August 3, 1976, you might also squeeze in a smidgen of traffic activity. Traffic handling is slated to be an integral part of the amateurs' public service performance for the international event. VE2DRC advises the need for amateurs who can assist with the origination and relay of traffic. For more information contact Pierre Boileau, VE2DRC, 195 Marcotte, St-Laurent, PQ H4N 1A5 Canada.

■ It's no easy task to start up a successful section net. But when your section (Pacific) consists of KB6, KC6, KG6, KH6, KJ6, KM6, KP6, KS6, KW6 and KX6, a few other problems crop up. Yet, KG6s JAQ JED JEU, KH6s FSH IAC KX6LJ and others, are doing a good job in establishing the Western Pacific CW Traffic Net. Net time? Well, if you're in Hawaii, it meets at 1700 local time. In Guam, zero beat at 2100. Frequency is 14.110. – *WA1FCM*

■ *National Traffic System.* Approximately 50 people attended 1RN picnic at W1QYY's; WA1JHT was presented with a 1RN certificate. 2RN also had picnic at the QTH of W2MTA with a good turnout. WB2FLF made the biggest splash at the event – he was thrown in the water. W3NEM attended and sold all his Polish sweepstakes tickets. W2FR made it to both picnics. D3RN mgr. WB2FWW/3 commends W3CWC, WA3QOZ, and WA3WRN for outstanding liaison work. DRN5 mgr. W5KLV sez "vacation is about to get us but so far skip hasn't." WB8IJW, W8JD and W8QM received 8RN certificates. Managers indicate traffic way down on DEAN, 3RN and RN5.

July Reports

Net	*Sessions*	*Traffic*	*Avg.*	*Rate*	*%Rep.*
EAN	31	1281	41.3	1.041	96.2
CAN	31	920	29.7	.730	100
PAN	31	969	31.2	.715	97.3
DEAN	31	177	5.7	.032	75.3
1RN	58	465	8.0	.471	88.9
D1RN	–	–	–	–	–
2RN	62	555	8.9	.620	100
D2RN	–	–	–	–	–
3RN	60	277	4.6	.300	91.3
D3RN	31	94	3.0	.297	96.7
4RN	55	396	7.2	.323	84.6
D4RN	–	–	–	–	–
RN5	62	538	8.6	.256	80.4
DRN5	30	45	1.5	.093	68.5
RN6	62	570	9.2	.346	100
DRN6	–	–	–	–	–
RN7	62	334	5.3	.393	88.0
DRN7	28	20	.7	.079	26.2
8RN	57	288	5.1	.306	85.5
D8RN	31	54	1.7	.220	69.9
9RN	62	452	7.2	.296	87.1
D9RN	30	72	2.4	.172	91.7
TEN	–	–	–	–	–
DTRN	62	24	.3	.58	–
FCN	62	201	3.2	.278	81.2
TWN	59	329	5.6	.231	80.9
DTWN	23	80	3.5	.139	51.6
CTN	29	303	10.4	.243	85.2
TCC Eastern	116[1]	587			
TCC Central	87[1]	486			
TCC Pacific	118[1]	690			
Sections[2]	4337	16936	3.9		
Summary	*5386*	*27143*	*5.0*		
Record	*4845*	*26748*	*15.2*		

[1] TCC functions not counted as net sessions.

[2] Section and local nets reporting (129): AENB AEND AENM AENW (AL), ASN (AK), ATEN HARC (AZ), AMBN ARN ATN OZK (AR), NEN NCN NTN SCN (CA), CCN (CO), CN CPN CSN NVHFN (CT), DEPN DTN (DE), EAST EMTN FPTN GN NEPN QEN QFTN TPTN VEN (FL), GSBN GN (GA), IMN (ID,MT), ILN (IL), 175N TLCN (IA), KWN QKS QKS-SS (KS), KNLN KTN KYN (KY), LAN LSN LTN (LA), MDD MDCTN (MDC), EMRI EMRIPN EM2MN HHTN NENN WMEN WMN WMPN (MA), MACS QMN WSBN (MI), MSPN MSN MSSN PAW (MN), MSBN MSN MTN (MS), MON MOSSB MSSN PHD (MO), WNN (NE), NHTN (NH), NHVTN (NH,VT), NJN NJPN NJSN (NJ), NLI NLS NYS (NY), CN NCSSB THEN (NC), NDRACES (ND), BN BNR OSSBN 06MTRN (OH), OAN OLZ OPEN OTWN STN (OK), BSN OSN (OR), EPAEPS TN PFN PITN WPA (PA), SDEN (SD), EN TNN (TN), TEX TEX-SS TLN (TX), BUN UCN (UT), VSBN VSN (VA), NSN WSN (WA), WVN WVFN WVMN (WV), BEN BWN WIN WNN WSBN (WI), APSN (AB), MTN (MB), APN (Mar.), CMN OBN ODN OPN OQN WQV/UHF (ON).

Transcontinental Corps

At the 1RN picnic, W2FR presented TCC-Eastern Certificates to WA1MSK and WA1POJ. TCC-E seems to be having its share of casualties says W2FR. TCC Pacific Dir. K5MAT says "all-in-all not a bad month."

Area	*Functions*	*% Successful*	*Traffic*	*Out-of-Net Traffic*
Eastern	124	95.9	1485	587
Central	93	93.5	1020	486
Pacific	124	95.2	1390	690
Summary	*341*	*94.8*	*3895*	*1763*

The TCC roster (July): Eastern Area (W2FR, Dir.) – W1s NJM QYY, K1GMW, WA1s MSK POJ QOP, W2s FR GKZ KAT/3, WA2s DSA ICB PIL UWA, WB2s PYM RKK, W3EML, K3s CB DZB MVO, W4UQ, K4KNP, WB4SGV, W8PMY, K8KMQ, WA8HGH, VE3s GOL SB. Central Area (KØAEM, Dir.) – W8PMJ, K8KMQ, WA8HGH, VE3s GOL SB. Central Area (KØAEM, Dir.) – WB9NOZ, WØs HI INH

UCX QMY ZHN, KØCVD, WAØs MLE TNM. Pacific Area (K5MAT, Dir.) – W5RE, K5MAT, WB5KSS, W6s BGP BVB EOT MLF QAE VZT, K6s AQ HW, WA6DEI, WB6s DJP OYN, VE7ZK, W7s BQ DZX GHI KZ, K7s IWD NHL NHV QFG, WØs LQ LRN, KØDRL, WBØHCK.

Independent Nets (July)

Net . . . . . Sessions		Traffic	Check-ins
Central Gulf Coast Hurricane	31	68	1908
Clearing House		313	656
Hit & Bounce Slow	12	24	70
IMRA	35	598	1371
Mission Trail	31	174	1269
North American SSB . . .	27	153	297
Washington Region	12	35	135
20 Meter ISSB	22	1124	270
75 Meter ISSB	31	407	1086
7290 Traffic	44	487	1485

Public Service Honor Roll July 1975

This listing is available to amateurs whose public service performance during the month indicated qualifies for 40 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 10; (2) Checking into phone/RTTY nets, 1 point each, max. 10; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned liaison, 3 points each, max. 12; (6) Phone patches, 1 point each, max. 20; (7) Making BPL, 3 points regardless of traffic total; (8) Handing emergency traffic directly with a disaster area, 1 point each message; (9) Serving as net manager for entire month, 5 points.

W5KLV 64		WBØKWJ 45
WB5LJI 64	WBØJGT 53	W1BVR 44
WA1MSK 62	WB6BDI 52	WA2PCF 44
WA2DSA 61	WB9MDS 52	WA2ROK . . .44
WB2PYM 61	WAØFMD . . .52	K3YHR 44
WA3DUM . . .61	WB2WRT 50	WB4DKN 44
WA3PHQ 61	WB2EDW 49	WB4EKJ 44
WA4FBI 61	W2OE 49	K5ROZ 44
WB4FZQ 61	WB2RMK . . .49	WB6AKR 44
WB4HKP 61	WB4DJU 49	WA6DEI 44
WB5IGF 61	WB5MTQ 49	WB6FYA 44
WA5IQU 61	VE4PG 49	K17JDO 44
WA5ZZA 61	W5MYZ 49	WB9NME 44
W7OCX 61	WB6OYN 49	W9NXG 44
W9MFG 61	W7GHT 49	KØCVD 44
WBØCZR 61	WA7MEL 49	VE3GOL 44
WBØHBM 61	WA9QVF 49	VE3GT 44
VE3GFN 61	K9ZTV 49	VE3SB 44
W4OGG 59	KØMRI 49	WB4BAX 43
WB5AMN . . .59	WBØOCT 49	K4YRL 43
VE3FRG 59	WØOTF 49	WAØYNP 43
K9LGU 58	WØOYH 49	WA1MJE 42
K1PAD 56	WB2LZN 48	WA1RFT 42
WA1OKD . . .56	WA3PZO 48	W2MTA 42
W2MLC 56	K4FLR 48	K3KAJ 42
WB2OYV 56	WBØLOR 48	WA5VBM . . .42
WB2RKK 56	WA1POJ 47	WA1QME/Ø . .42
WB4JHQ 56	K3OIO 47	WA1RXA . . .41
WB4YKM . . .56	WA3VBM . . .47	WA3EOP 41
W5GHP 56	WA5YEA 47	K6MQX/7 . . .41
WB5LBR 56	WB6PVH 47	W7LG 41
WA5TQA 56	WBØGVR 47	WB8JGW 41
WA8HGH . . .56	W5UGE 46	W2ER 40
WB2THS 53	W5UIJ 46	WB2LZN 40
WA3WRN . . .53	W6RFF 46	K6UYK 40
WB4GHU 53	WA61VA 46	K7OUF 40
W6INH 53	WA4EPJ 45	WB9KPX 40

Public Service Diary

■ Madera, CA – June 3. WA6DPY used the 2-meter fm autopatch to call the highway patrol after sighting an injured woman on the side of the road. – (WB6BFK)

■ Baja, Mexico – June 30-July 1-2. An emergency net was setup on 3855 kHz to provide communications for a search for three missing persons. An aeronautical mobile was also utilized. – (W6GBF, SCM SDgo).

■ New Orleans, LA – July 2. W5NVU phone-patched emergency medical instructions for WB6GAC/R2, operating from a yacht near Samoa, to aid an injured person on board. 5W1AN, net control of the Pacific Maritime Net, relayed between the two stations. – (W5NVU)

■ Snoqualmie Pass, WA – July 4-5. The BEARS Net furnished a communications link in the search for a lost hiker. – (W7RJW, EC King Co.)

■ Baja, Mexico – July 6. XE2BY contacted W6YES on 7255 kHz requesting air medical evacuation for a child suffering a head injury. WA6ODQ was contacted and he notified the San Diego County Sheriff's Aero Squadron, who flew the child to the hospital. – (W6GBF, SCM SDgo)

■ Sterling, IL – July 12. Members of the Whiteside Co. (IL) RACES Net participated in the search and rescue of a woman missing from a nursing home. – (WA9SJE)

■ Seattle, WA - July 13-14. The BEARS Net assisted authorities in the search for a missing airplane. – (W7RJW, EC King Co.)

■ Canton, IL – July 23-24. Amateur radio was the only source of communications when a tornado struck the Canton area. Traffic was handled on 75 and 2 meters. – (WA9KFK)

■ Baja, Mexico – July 30. 75, 40 and 2 meters were utilized as five amateurs assisted authorities in a search and rescue of three Americans, missing on a fishing boat. – (W6GBF, SCM SDgo)

■ *Repeater Log.* According to reports received, repeaters were used to report 23 traffic accidents and related occurrences, 2 fires, and 1 dangerous situation. The following repeaters were involved: WR1AAC, WR3ACH, WR4s ABR ALM, WR6ACF, WR8ABD and VE3OSR.

■ *Special Activities. December.* WB9MGP was Santa Claus, as a 2-meter fm link was established to enable children at the University of Wisconsin Hospital to talk to Santa on December 24. – (K9QXY, EC). *May.* The AREC of Tioga Co., NY, handled communications for the March of Dimes Walkathon, on May 3. – (W2EWO, EC). *June.* Eleven amateurs provided communications for a raft race on the Susquehanna (NY) River on June 14. – (W2EWO, EC). Monroe Co., IN, amateurs supplied communications during the Governor's

(Continued on page 77)

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for July Traffic

Call . . . . . Orig.	Recd.	Sent	Del.	Total
W3CUL 511	1473	1973	41	3998
WØWYX 35	821	262	559	1677
W3VR 231	502	733	15	1481
WA3UKZ 507	54	518	0	1068
W3AVI 0	543	518	0	1061
K9CPM 0	253	438	277	968
W6RSY 3	380	344	31	758
WA9VGW 0	382	292	25	699
WB8MZZ 4	275	315	27	621
KØZSQ 0	271	0	271	542
KH6IAC 32	204	232	64	532
WB9NVN 0	235	271	1	507
WA9VGW(June) . 14	346	252	68	678
WA3QYY(Jan.) . 101	230	218	1	550

More-Than-One-Operator Station

WF6OCF 298	2	249	2	551

BPL for 100 or more originations-plus-deliveries

W9NJP 130	WBØKWJ . . . 108	WB8KQJ . . . 102	
WAØVAS . . . 116	WA1POJ . . . 103	WA3ATQ . . . 100	
WA3WRN . . 110			

BPL Medallions (see December, 1973 *QST*, p. 59) have been awarded to the following amateurs since last month's listings: KG6JAQ.

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

Hamfest Calendar

California – The Hillbilly Radio and Mountain Goat Dehorning Society's second annual mountain oyster roast is October 12 at the Masonic Recreation Hall. Registration $4.50 includes lunch. Write Grant E. Storey, W6NTK, PO Box 471, Bass Lake CA 93644.

Georgia – The Northwest Georgia Amateur Radio Club's annual Rome hamfest is Sunday, October 26 at the Tome Civic Center. Further info from Harold Dale, Box 274, Adairsville GA.

Indiana – The Spring Mill hamfest is Sunday, October 12, sponsored by the Hoosier Hills Ham Club at the Spring Mill State Park, near Mitchell. Entertainment for the whole family. Advance registration: Hoosier Hills Ham Club, Pc Box 375, Bedford IN 47421.

Iowa – The Cedar Valley Amateur Radio Club's hamfest is at the Hawkeye Downs fairground on Sunday, October 5 (Hwy. 218 and 30). Talk-in 16/76, 52 simplex and 3910. Advance registration $1.50; at gate $2. Two local surplus layouts plus flea market indoors. Write: CVARC, PO Box 994, Cedar Rapids IA 52406.

Louisiana – The Jefferson Amateur Radio Club's hamfest is at the International American Motor Inn, Metairie (west of New Orleans). Meetings and seminars on Saturday, October 11. Featured speaker at banquet is Richard H. Everett, assistant chief of FCC Amateur and Citizens division. The next day fest is at the Rummel High School. Talk-in 34/94 and 3950. Contact John Fuitner, WB5APK, Box 1233, Metairie LA 70004.

Massachusetts – The Minute Man Radio Association's annual auction is Sunday, October 12, at Stoughton High at 12:30. Three skilled auctioneers presiding, talk-in, quality food and snacks, everyone invited.

Michigan – The Central Michigan Amateur Radio Club and the Lansing Repeater Association's annual swap n' shop is October 12 at the Marshall Street Armory, Marshall and Saginaw St., Lansing MI, 9 AM to 5 PM. Talk-in 34/94 and 52 simplex. Write: CMARC, Box 73, Lansing MI 48901.

Minnesota – the 5th annual Southern Minnesota swapfest is October 11. Doors open at Waseca Community High School at 9 AM. Sellers bring your own tables. Contact VARS, Box 3, Waseca MN.

New York – The eleventh annual radio amateurs of Greater Syracuse hamfest is Saturday, October 11, from 9 AM to 6 PM at the Syracuse Auto Auction, 4 miles south of Syracuse on US 11 between Newrow and LaFayette. Flea market, cw and wiring contests, forums, panels and eyeball QSOs. Lunch counter, nearby campsite and apple festival for the family. Talk-in on 31/91. Donation $2 at the door; $1.50 before October 1. Contact Allan Brown, WA2UBT, 128 Atkinson Ave., Syracuse NY 13207.

Ohio – The Northwest Ohio Amateur Radio Club's hamfest is October 12 at the Allen County fairgrounds, Lima. Manufacturers displays, 150 inside tables, dealers tables, free camping space Saturday night. Tickets $1.50 advance; $2 at the gate.

Ohio – The Parma Radio Club fleamarket is October 10, from 8 to 10:30 PM. The location is 5839 Ridge Road in the basement of the Cardinal Savings and Loan building. Bring folding tables. $1.50 donation at the door.

Ohio – The Marion Amateur Radio Club's heart of Ohio Ham-fiesta is Sunday, October 26, at the Ohio National Guard Armory, 2 miles east of Marion on Rt. 309. Advance registration is $1; $1.50 at the door. For info: Earl Adey, W8EDO, 2697 Curren Dr., Marion OH 43302.

Pennsylvania – The annual banquet of the Penn Wireless Association is November 1, at 8 PM at the Hilton Hotel Northeast, in Trevose PA (located on Rt. 1). Guest speaker is Rosalie Cain, WA1STO, ARRL assistant communications manager. Live music for dinner, dancing following. Choice of roast beef or stuffed flounder. Tickets $11. Advance registration checks to: Penn Wireless Association, Box 311, Bristol PA. Reservations by October 25.

Virginia – The Foundation for Amateur Radio's annual hamfest is at the Gaithersburg Fairgrounds, Sunday, October 19. Large flea market, food service, exhibits, ladies events, supervised children's programs. Main events are indoors. Picnic grounds available. Free parking. Rain or shine. Participation $1.50, sales space $5, talk-in, motel. For info write Bill Miller, K4MM, 10919 Woodfair Rd., Fairfax Station VA 22039.

COMING ARRL CONVENTIONS

October 4-5 – Delta Division, Memphis, Tennessee

October 10-11 – Great Lakes Division, Columbus, Ohio.

October 17-19 – Midwest Division, Lincoln, Nebraska.

October 24-26 – Southwestern Division, Ventura, California.

November 1-2 – New England Division, Hartford, Connecticut.

NOTE: Sponsors of large ham gatherings should check with League Headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance.

NEW ENGLAND DIVISION CONVENTION

Hartford, Connecticut **November 1-2**

Pioneer Valley Repeater Association will sponsor this year's ARRL New England Division Convention, November 1-2, at the brand new Sheraton-Hartford Hotel and the Hartford Civic Center in Hartford, Connecticut. Registration will start at 4:00 PM on Friday, October 31st. No formal program is planned for Friday, but several clubs plan to hold open house hospitality rooms at the hotel Friday evening. The formal program starts Saturday with 8:00 AM registration, exhibits opening at 9:00 and forum activity beginning at 9:30. There will be extensive talks on antennas, TV, vhf and repeaters, micro-processors, Oscar, contests, MARS, AREC, featuring such speakers as Walt Maxwell, W2DU; Jerry Sevick, W2FMI; Bob Stone, W3EFG; By Goodman, W1DX; Les Cushman of Cushcraft, and from the headquarters staff K1PLP; W1ICP; W1HDQ; W1SL; and W1YL. FCC will conduct exams for General Class and higher. On Saturday afternoon the FCC forum features Charles Higginbotham, Chief Safety and Special Radio Services Bureau; Ray Spence, W4QAW, Chief Engineer; John Johnston, K3BNS, Spectrum Management, and other staff members.

There will also be free bus tours to W1AW and ARRL Headquarters. The banquet will feature FCC Commissioner Robert E. Lee. Afterwards, there will be entertainment and dancing followed by the Royal Order of the Wouff Hong initiation at midnight. Sunday morning following several special breakfast meetings, the exhibits and forums will continue, ending at 2:00 PM. The prizes include such items as an Atlas 5-band transceiver, Clegg FM DX 2-meter transceiver, and lots more. An extensive ladies' program has been planned for both days including WRONE luncheon, arts and crafts, fashion show, shopping and historic tours. Early-bird reservations are $3.50 admission and $14.50 for the roast beef banquet, via Skip Colton, W1FTE, 94 Cobblestone Way, Windsor, CT 06095, and with a check or money order payable to New England Division Convention Committee. Prices at the door will be $4.50 and $15.50. Hotel reservations should be made direct to Sheraton-Hartford, Trumbull Street, Hartford, CT or by toll-free phone dial 1-800-325-3535. Be sure to specify ARRL convention for special rates: $21.00 for single and $26.00 for double, including parking.

MIDWEST DIVISION CONVENTION

Lincoln, Nebraska **October 17-19**

The 1975 ARRL Midwest Division convention happens October 17, 18, 19, at the Lincoln, Nebraska Hilton hotel. The Lincoln Amateur Radio Club Incorporated will be hosts. Convention co-chairman Steve May, WAØASM, and Reynolds Davis, KØGND, report that some interesting innovations have been added to this year's get-together. Special interest display fair booths will be set up featuring demonstrations and explanations of a variety of amateur specialties such as RTTY, repeaters, slow and fast scan television, and so forth. "By setting up displays for a variety of interests," Steve May told *QST* "we can eliminate conflicts in the formal program so that at any given time, there is only one program being presented to the group."

Formal presentations will include a discussion of the role of amateur radio in public service and methods of generating public recognition of such service with Reynolds Davis, KØGND, President of the Lincoln Club. Also speaking will be Tom McMullen, W1SL on fm and repeaters; Bill Tynan, W3KMV, on the world above 50 MHz; and Andy Andros, WØLTE, on antennas. An ARRL forum will be hosted by Dick Baldwin, W1RU, from ARRL; Midwest Director Paul Grauer, WØFIR, and Nebraska SCM Dick Dyas, WØJCP. By way of an amplified conference telephone call, Russ Ritzman, WAØLGR, will discuss DX with Gay Milius, W4NJF, Katashi Nose, KH6IJ, Andy McLellan, VE1ASJ, and Herb Schoenbohm, KV4FZ. A pertinent FCC forum will also be presented to discuss upcoming rule changes, and license examinations will be held Friday afternoon (October 17) -- pre-registration via Form 610 will be required.

The featured speaker at the Saturday night banquet will be FCC Commissioner Robert E. Lee, and the traditional Wouff Hong initiation will follow the banquet at midnight.

Further information on the convention may be obtained by contacting the Lincoln Amateur Radio Club Incorporated, P. O. Box 5006, Lincoln, Nebraska 68505.

SOUTHWESTERN DIVISION CONVENTION

Ventura, California **October 24-26**

The 1975 Southwestern Division ARRL convention, sponsored by Ventura area amateur radio clubs, will be held October 24-26 at the Holiday Inn in Ventura, California. The Holiday Inn is located on the beach just off highway 101 along the picturesque Ventura coastline. This year's convention will be a fun-filled weekend with a wide variety of highlights planned. Featured banquet speaker will be NBC news correspondent Roy Neal, K6DUE, the network's leading expert on aerospace coverage. Additional highlights include tech sessions on every phase of amateur radio, ARRL forum, vhf-uhf antenna measurement contest on 144, 432, 1296, and 2300 MHz, Ham of the year awards, transmitter hunt on 146.52 MHz, Wouff Hong, FCC exams for General Class and higher, and much more. An additional highlight will be an after banquet dance with music provided by Alvino Rey, W6UK. For the XYLs, an arts and crafts show and a fashion show/luncheon are planned.

This is the convention that you will truly not want to miss. With downtown Ventura only a few minutes away and a beautiful view of the channel islands, the convention promises to be a memorable event. Pre-registration is $12.50; $14.00 at the door. Tickets are available without banquet or for banquet only. Tickets for the ladies' luncheon/fashion show are not included in the registration package and are $5.00. There are also 150 recreation vehicle spaces available at $4.50 per night. Hotel rates are $18 single and $24.00 double. Registration tickets and information are available from Charlie Ellis, W6PNM, P.O. Box 5131, Ventura, CA 93003. Additional convention information can be obtained by writing to Hamcon, Inc., P.O. Box 5131, Ventura, CA 93003.

Public Service

(Continued from page 75)

Cup sailboat regatta on June 28. – (WA2VKU/9, EC). *July.* Bellingham, MA, AREC members handled communications during bicentennial celebrations, July 3-4. – (W1EQH, EC). Thirteen amateurs coordinated communications for the Howard Co., MD, Fourth of July activities. – (WA3SWS, EC). Monroe Co., IN, AREC members provided communications during the Bloomington Freedom Festival Parade on July 12. – (WA2VKU/9, EC). Fifteen amateurs supplied communications for a Boy/Girl Scout beach-cleanup day, in San Diego, CA, on July 12. – (W6GBF, SCM). Six amateurs handled communications for a sailboat regatta on Lake Winnebago (WI) on July 17-19. – (WB9ANR, EC). Fifteen Maritime area amateurs supplied communications for the Nova Scotia Highlands Car Rally on July 26-27. – (VE1AY EC). *August.* Members of the Tompkins Co. (NY) ARC provided communications for the National Junior Olympics, held in Ithaca, NY, August 8-11. – (W2CFP, SEC).

Correspondence From Members-

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

DXer's CRYSTAL BALL

● I've appreciated the two very fine articles you've presented in *QST* correlating solar phenomena with radio propagation in a manner within the means and understanding of the amateur (radio operator and astronomer, both). My own involvement with this heroic combination stems from personal research into the propagation of noise from the eastern Caribbean and its effect on transequatorial 4 MHz circuits. Congratulations on doing such a fine job. – *Hugh S. Pettis, K3EC, Silver Spring, MD*

● Your recent articles on "DX-ing" are great. Very informative to this relative beginner in the art. – *Stephen W. Gibson, WB4NBI, Vienna, VA*

MORE FOR APARTMENT DWELLERS

● I'm sure many readers are faced with the problem of apartment living and restrictions on antenna structures. However, I do not agree that the solution is to be found by relying on antenna manufacturers. If hams rely on the equipment manufacturers to solve most of their problems, we are no better than the CBers who buy everything ready made, including the antenna.

There is no efficient small-sized antenna for the low bands that can be clamped to a window frame. When size gets small, radiation efficiency goes down, and ground loss becomes high. It's a situation that must be tolerated. It is surprising how well some of the short, loaded antennas do work. Milton Drake, W2JPN, does have one of the answers available to the ham forced to operate from an apartment where outside antennas are not permitted. His May 1975 article is worth rereading. – *David L. Hays, WØFCL, Great Bend, KS*

SOFTEN THE BLOW

● After all these years of having *QST* arrive in one size, the new 8 by 11 format will be a pain for those of us who have made long-range bookshelf plans based on the old size. Perhaps you could soften the blow by emulating other magazines using the larger size and run a centerfold each month. Just don't follow the trend toward those fuzzy-focus photos. – *G. W. Hippisley, K2KIR, N. Syracuse, NY*

QSL WOES

● The special ITU call signs may be a great idea for some. For the QSL Bureau managers, particularly those handling the "I" suffixes, ITU cards are nothing but a pain in the neck.

Last year, two W8/K8 stations sent envelopes to our bureau for their ITU cards. So far in 1975, only one has. Therefore, we have to maintain cross-reference lists to properly route these cards – *if* we can find out who holds the special prefixes. It all adds up to an awful lot of extra work for the bureau managers.

If you guys with ITU calls want your cards, how about sending in envelopes for them? – *W. R. Gary, K8CSG, Worthington, OH*

● After reading "Getting QSLs" in the July issue, I get the feeling that the DX must be part of the deity. I QSL to all received, both local and DX, and my cards are made out with the date in month, day, and year order, and time in EST. Honestly! When I get a bunch of cards from the bureau, I have to decipher the hierogiyphics before I can answer them. I have to convert their date and time, so why should they not do the same? Some cards date back two years and require digging through a half-dozen or more logs. CQ Deity Xray – CQ Deity Xray – CQ Deity Xray – *George A. Schopperth, K2IVG, Haledon, NJ*

● Where some amateurs probably think it is impossible to make an error in filling out a QSL card, I have found, from processing a large stack of cards from my KQ6ITU operation, that it is more of a problem than one would suspect. Over a quarter of the cards did not have the proper time. A significant number didn't even have the right date. About 5 had both the time and date wrong. I even got cards from stations I did not contact with the information indicating operation when I wasn't on the air. I used one of the ARRL's cross check sheets to make a cross reference of contacts which was helpful in noting the ones that sent me cards without working me – no panic in looking through the log. I returned a couple in their s.a.s.e.'s when it was impossible to locate them in the logs.

Several times a year *QST* admonishes operators to use care in filling in QSL cards; it must not register universally. – *Paul Schuett, WA6CPP/WA7PET, Wallace, CA*

WARNING!

● A word of warning to individuals using trichloroethylene in the processing of printed circuit boards: a "memorandum of alert" has been issued listing this chemical as a possible carcinogenic. High dose levels produced tumors in mice, but current data indicate no danger to man if adequate ventilation is used. – *Alex Marion, W2CUE, Great Neck, NY*

A GOOD IDEA

● I read with interest the Technical Topics article in the August 1975 *QST* concerning the difficulty of obtaining and high prices for construction parts.

The Palomar Radio Club of San Diego County has come up with a very good solution. The first Saturday of every month they sponsor a flea market. Several hundred amateurs from all over the county come and bring their wares selling from the back of their autos or on card tables.

At this flea market is almost any item a person might want, varying from old to manufacturers' surplus of new parts. Condensers and resistors on the order of one cent, tuning capacitors 25 to 50 cents, all new. Bargains in old and new ham

equipment are plentiful at very little cost.

I might suggest that more clubs start flea markets to solve this problem. It is terrific not only for parts but also to meet your fellow amateurs for an eye-ball QSO. – *Ed Marriner, W6BLZ, LaJolla, CA*

INTERFERENCE TO NETS

● The problem of QRM on nets has arisen again, but the true cause and cure seem to be overlooked. QRM is often blamed on "others" but most often is caused by net members themselves; secondarily, provoked by the net's conduct; thirdly, by others' jamming.

Many a rag-chew has been finished by the whistle and moan of net stations tuning up their rigs – without listening, courtesy, or ID. It doesn't make a good impression, and that net deserves all the QRM it gets, as does any net that claims a frequency and orders other stations off.

Late check-ins often tune up on frequency, which works fine unless the transmitter offsets on tune. Rigs that shift by a thousand cycles should move up that much so as to zero the net.

These carriers, and others that appear on frequency, hold up the net because the NCS often stops to deliver a volley of insults to the still-transmitting signal. Better he should wait and ask the station to move.

Other QRM comes from the "helpful comments" made without permission by net members. Even without doubling (which often happens) these people lower the net's efficiency as much as any other jammer.

The honest-to-goodness interference that does occur is best handled by simply ignoring the jammer and making no comment about him. Net members who state their opinion are prolonging the agony. I always follow a jamming transmission by ending a sentence, as if I never heard him; it has never failed. Not being "heard," the jammer won't stay around long. – *Tom Carten, WA1DJC/9, Notre Dame, IN*

JUPITER EFFECT

● I read W3MR's August *QST* article on interstellar communications with interest. However, I feel it necessary to correct a few of his statements. Although the initial discovery of Jovian radio noise was made by an Australian radio astronomer named Shain, the relation between the radio noise and the satellite Io was recently made by myself. It is now believed that Io's sodium ionosphere is responsible for modulating the radio bursts. None of the other Jovian satellites has any effect on the radio noise which is caused by cyclotron radiation, not thunderstorms.

Monitoring of the Jovian radio noise is a worthy project for amateurs and is responsible for my becoming a radio astronomer. – *Chip Cohen, WA1JHQ/1, Waltham, MA*

NICE FOLKS

● The next time anyone says FCC examiners are ogres, tell them it's not so. Those people at the Atlanta office are very nice folks. I got there about ten minutes late for the code exam. Since I had traveled 153 miles, they took me into a small room and gave me the code test by myself. I noticed several other courtesies extended to other people taking exams. – *Leland E. Patience, Bolton, SC*

OZONE DEPLETION

● We all are aware of the considerable amount of talk and controversy about the possible effect of aerosols containing fluorocarbons on the ozone content in the ionosphere. However, I have never heard anything on the possible effect on the ionization of the ionosphere as far as high frequency propagation is concerned. It seems to me that, if destruction of the ozone can be as dangerous to human life as predicted, it can also be disastrous to DX conditions. If true, this effect may show up sooner than the effect on humans.

Now, I wonder if hams, with their vast knowledge and ingenuity, could conduct research into these effects and help to determine if these dire predictions can be true or false. Possibly a comparative study of DX conditions vs. sunspot activity in past cycles might give some clue as to what's going on up there. – *William W. Lamb, W8BJ, Wheeling, WVA*

● I was discussing the ozone-depletion problem with an old timer, "Shucks," he said, "I know the easy answer. All us hams will just go back on spark, which creates ozone. One Field Day on that mode ought to take care of a year's damage by aerosol cans!"– *P.F. Williams, W1UED, Unionville, CT*

FORMAT CHANGE?

● My "ten foot shelf" of *QST* continues to elongate, as it has for many years, and I consider it a fine source of technical and construction information. However, it is very frustrating to me to try to recall just where I have seen a particular article in past issues which might be helpful in a current home-brew project.

I would like to suggest that your format be changed to show the contents of each issue on the cover to replace the sometimes juvenile and zany art work that now appears thereon –(no offense to the artist; let him put his embellishments around the table of contents).

I am sure that this change would surely appeal to the serious-minded technically inclined subscriber who can underline items of interest and thus have a ready reference to desired information. *Reader's Digest* has followed this format for many years, and I am sure has not suffered a decline in subscriptions as a result. – *Frederick N. Yale, K6KC, Sherman Oaks, CA*

KUDOS

● In addition to technical accuracy of advertising, you are to be complimented on keeping the tone high. It is true that the advertisers expect to use the space they pay for the way they want to, and that's only fair. But there must be some influence at work that has kept them advertising their rigs on the basis of their performance, rather than on their glamour or snob appeal. It is true that some of that does get into some ads, as well as an occasional bit of cheesecake (but at least the gals are dressed up), but compared to other sheets, such ads are conspicuous in *QST* because of their rarity. Perhaps advertisers realize that, while OMs may like the pictures, when it comes to parting with their dough they may be inclined to decide that any gear that needs that kind of promotion must not have much else to recommend it. Here's hoping it stays that way. – *Chuck Clark, WB4OBZ, Moncks Corner, SC*

IARU News

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

IARU WORLD CONFERENCE ANNOUNCED

The president of the International Amateur Radio Union, Noel B. Eaton, VE3CJ, has announced that a conference of the three Regional Divisions of the IARU has been scheduled for April, 1976, in Miami. The conference will take place immediately after the triennial Conference of the *Union Interamericana de Radio Aficionados – IARU Region II*, at which time all three Divisions will have adopted their respective positions toward the World Administrative Radio Conference scheduled for 1979 by the International Telecommunication Union. Regions I and III already have adopted their positions, as reported in July *QST*, page 86.

The World Conference is being hosted by the *ARRL* as headquarters society. In addition to the representatives of the Divisions, delegates from individual IARU member-societies will be invited to participate as observers.

AMATEURS IN GREECE GAIN ACCESS TO OSCAR 7

Earlier this year, the *Radio Amateur Association of Greece* requested assistance from IARU headquarters in obtaining permission for SV amateurs to use the frequency band 432.125 to 432.175 MHz, which is the input passband for one of the translators aboard the Oscar 7 satellite. Amateurs in Greece had already been quite active using the 145.9 MHz input of Oscar 6 and Oscar 7, but were not permitted by their authorities to use the higher frequencies.

We are pleased to report that, as a result of presentations made to the Greek government by the *RAAG*, SV amateurs are now permitted access to this sub-band and are continuing their pioneering efforts in satellite communication. Greece thereby joins 39 other countries with amateur stations using the 432 MHz satellite input frequency. The Radio Amateur Satellite Corporation (Amsat) reports that amateurs in more than 90 countries have used one of the two satellites currently in operation with 145.9 MHz inputs and 29.5 MHz outputs.

FINLAND-CANADA RECIPROCITY

The Canadian Department of Communications has announced the existence of a reciprocal operating agreement between Finland and Canada. The agreement, which was concluded some time ago, was not announced earlier because of an oversight. A complete list of countries with which the U.S. and Canada have reciprocity appears elsewhere in this column.

DX OPERATING NOTES

Reciprocal Operating

United States reciprocal operating agreements exist only with: Argentina, Australia, Austria, Barbados, Belgium, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Denmark, Dominican Republic, Ecuador, El Salvador, Fiji, Finland, France,* Germany (Federal Republic), Guatemala, Guyana, Honduras, India, Indonesia, Ireland, Israel, Jamaica, Kuwait, Luxembourg, Monaco, Netherlands,* New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, Portugal, Sierra Leone, Sweden, Switzerland, Trinidad and Tobago, United Kingdom,* Uruguay, and Venezuela. Several other foreign countries grant visiting amateurs operating privileges on a courtesy basis; see the list in this column for November 1974 or *ARRL* headquarters for details.

Canada has reciprocity with: Belgium, Brazil, Costa Rica, Denmark, Dominica, Dominican Republic, Ecuador, Finland, France, Germany (Federal Republic), Guatemala, Honduras, Iceland, Israel, Luxembourg, Netherlands, Nicaragua, Norway, Panama, Peru, Poland, Portugal, Senegal, Sweden, Switzerland, U.S., Uruguay, Venezuela, and Commonwealth countries.

Banned Countries

Canadian amateurs may not communicate with Iraq, Khmer Republic (except XU1AA), Libya, Pakistan, Somalia, Turkey, Viet Nam (except XV5s AA AB and AC), and People's Democratic Republic of Yemen. Prefixes to be avoided by Canadians include AP TA XU XV YI 3W 5A 60 and 70.

* Agreement includes overseas entities.

Recent *ARRL*/IARU headquarters visitors include husband-wife team DK5XR (left) and DL1FK. Richard is technical editor of *CQ-DL*, the monthly publication of the *Deutscher Amateur Radio Club*.

Happenings of the Month

RESTRUCTURING, CONTINUED

The gigantic pot which contains FCC's restructuring proposals, Docket 20282, continues to simmer with these events which have occurred since September *QST* went to press:

Filing deadlines, originally June 16 for "comments" and July 16 for "reply comments," were extended to July 16 and August 18 at the request of the League, as has been reported here. The "reply comment" deadline was again set back, to September 1, at the request of Jeff Bixby, WA3WQF who wanted more time to analyze the comments filed by ARRL.

The League has filed two papers, one a request for oral argument, the other a response to comments made by other parties.

"Oral argument" is the term used in Government circles for a public hearing before the seven Commissioners. It provides an opportunity for the League and other petitioners to answer questions the decision-makers may have, and to clear up points difficult to explain in writing. Typically, FCC staffers would also be present, defending viewpoints and answering questions, too.

Our reply comments point out that some of the responses in the docket come from people who are specialists interested mainly in just one or two phases of amateur radio. Their ideas are valuable contributions to the Commission in the study, but may fail to take into account the interests of amateurs engaged in other phases of the hobby. The League's comments on the other hand are based on inputs from across the length and breadth of amateur radio and represent a consensus on which the Commission could readily act.

The League asks again that no change be made in power levels presently authorized for amateurs, nor in the means of measuring these levels (except to return Novice computations of power to the same basis other licensees use). If the Commission wishes to pursue a study of changes in power measurements, it should do so in a separate docket limited to the one subject.

NORDJAMB 75

In late July and early August this summer, over 17,000 Boy Scouts from 95 nations attended their 14th World Jamboree – NORDJAMB-75 – near the town of Lillehammer, Norway, about 120 miles (200 km) north of Oslo. Amateur radio was there as well.

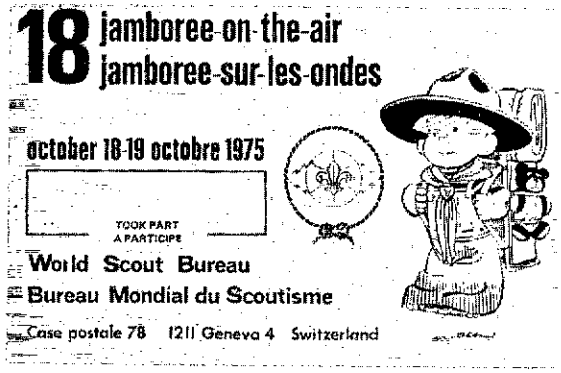
The Jamboree had its own special-event station, LC1J, for Lillehammer Camp Jamboree. LC1J contacted more than 1400 stations in 79 different countries, and was active on cw, ssb, RTTY, SSTV and vhf fm. Some 30 contacts were also made via Oscar 6 and 7. The Jamboree included its own repeater as well, LA5JR.

Special "Join-in-Jamboree" amateur stations around the world in such countries as Algeria, Brazil, Malaya and Italy allowed many more Scouts to join in on the Jamboree radio activities, and hear descriptions of the gathering from those fortunate enough to attend. RTTY bulletins were sent to the Join-in-Jamboree station in Holland, and SSTV was used to send pictures of the Jamboree around the world.

A popular activity at the Jamboree was "fox-hunting," or hidden transmitter hunting, known as Radio Orienteering in Europe. Special equipment developed by the Norwegian Radio Scouting Committee was available for use at the fox hunts, and complete kits of this equipment were sold to interested scouts and scout masters. Participants who located the "fox" (including our correspondent, WB2SZV) were awarded a certificate of achievement.

To introduce scouts to general electronics, an inexpensive two-transistor kit was available, along with work benches and expert assistance. The kit could be wired as a code practice oscillator, flash unit or audio amplifier.

A conference for Jamboree-on-the-Air organizers met on August 1st to discuss the role of radio in the Boy Scouts. The camp newspaper quoted the participants in the conference as saying: "Radio Scouting can play a valuable part in the Scouting program, and the part that it plays could



This card, designed by Hank Ketcham, creator of Dennis the Menace, will be sent to all participants – amateurs, Scouts, listeners – who submit a report to the National Organizer after the Jamboree on the Air October 17-19.

be greatly increased in most countries without unbalancing the program."

Some of the amateurs participating in the Jamboree included LAs 5QP, 5CH, 3ZP, 5OQ, 4LN, 2SR, OH2BHU, SM7CZV, OZ2YS, TF3DX, DU1RC, OE5FJL, HB9AOF, FI2CA, JA1JAM, G3BHK, ZL2APE, HB9ASM, and K9ECE. Their work, and the assistance of many other hams, scored another big plus for amateur radio this summer.

Special thanks to Ian A. Cook, WB2SZV, a 15-year-old Eagle Scout from Bronxville, NY, who provided this information.

JAMBOREE-ON-THE-AIR

The best opportunity of the year to expose youngsters to amateur radio occurs between 6 P.M. Friday October 17 and midnight Sunday, the 19th local time: Scouting's *Jamboree on the Air*. Radio amateurs, whether regular participants in Scouting or not, may invite Scouts to the hamshack for demonstrations on how amateur radio works and for friendly chats with other Scouts visiting at other amateur radio stations. Or amateurs may bring amateur equipment out to the site of a Camporee (a popular Scouting activity in October!) and show off amateur radio to a few hundred boys all at the same time. It's a good chance for Scout/hams to talk to others, too, and swap information on activities. Emphasis is on quality of contacts rather than quantity – no prizes for numbers of stations worked.

Phone frequencies are 3940, 7290, 14,290, 21,360, and 28,990 kHz, as well as popular spots on 6 and 2. You may also want to listen on 3740 and 7090 for phone signals from amateurs in other countries. On cw, the frequencies are 3590, 3740, 7060, 7140, 14,070, 21,140 and 28,190 kHz. These are congregating frequencies – spread out if things are humming; call CQ JOTA or CQ Scouts to stir up a dead frequency.

Logs and reports go to the National Organizer in each country: For USA, it's Walt Maxwell, W2DU, c/o National Headquarters BSA, North Brunswick, NJ 08902. For Canada, it's Ken Driscoll, VE3EIV, Boy Scouts of Canada, P.O. Box 5151, Station F, Ottawa.

The same 40- and 80-meter frequencies are now used throughout the year for informal Scout nets on Wednesday from 2000 to 2300 local time; the 20-, 15- and 10-meter spots on Saturday 1000-1400 local time. Listen for K2BSA or call CQ BSA/CQ Scouts.

PETITION FOR DEAF FILED

The Mt. Diablo Amateur Radio Club, Inc. has asked FCC to include in its permanent rules provisions for deaf people to take the Morse code test by vibrations from a transducer or by reading flashes of light. (Up to the present, FCC has waived its normal code test procedures for deaf people on a case-by-case basis.) The petition has been assigned the file number RM-2567.

Those wishing to comment on the petition may do so by letter addressed to Chief, Amateur and Citizens Division, FCC, Washington, DC 20554.

RFI BILL – HR 7052

A measure to eliminate RFI problems at the most common source – the home entertainment equipment itself – has been introduced into Congress by the Honorable Charles A. Vanik of Ohio. The bill, HR 7052, would give FCC authority to require that television sets, stereos, tape decks, casette recorders and other electronic devices be designed and built to reduce interference to the equipment from radio frequency energy.

The bill has been assigned to the Subcommittee on Communications and Power, headed by the Honorable Torbert H. Macdonald of Massachusetts. The first step in getting this measure moving is to convince the subcommittee that it should promptly hold hearings. One's own congressman should be made aware of one's interest in the measure, too. Hq has a list of all members of the House; an s.a.s.e. will speed a copy to you.

The text of the bill is on page 76, September *QST*; other information appeared on page 37, August and page 79, July *QST*.

AMATEUR RADIO WEEKS

Amateur Radio Week in Manitoba was July 12-18, 1975, coinciding with the annual International Peace Garden Hamfest sponsored by amateur radio clubs in Manitoba and North Dakota.

In making the proclamation, Manitoba Premier Edward Schreyer cited the amateur radio operators for playing a vital role in establishing a modern communications system and through it, helping develop more complete international understanding through more direct contact. Premier Schreyer also noted the particularly close relationship between hams in Canada and in the U.S.

August 11-17 was Delaware Amateur Radio Week, coinciding with the 3rd annual Delmarva Hamfest at Harrington. The statement by Governor

At the retirement party: A. Prose Walker, W4BW (left); John Jacobs, W4ZDN; Vern Wilson, W4MA *(K4WAX took the picture – thanks)*

Sherman W. Tribbitt mentioned "dedicated volunteer public service in the interest of community, state and national welfare," international goodwill, and message handling by amateurs.

One-seventh of an amateur radio week was observed in New Hampshire: September 6 was Amateur Radio Day and it featured an amateur radio exposition and flea market at the Nashua mall, sponsored by the Interstate Repeater Society 25-85. Governor Meldrin Thomson, Jr., wrote of communications during floods, fires and other emergencies; of international friendship and of career exposure for youngsters in his proclamation.

TEN THOUSAND OLDTIMERS

The Quarter Century Wireless Association has recently accepted its 10,000th member - J. H. Hank Johnston, W5COC, of Waco, Texas whose first license was 5ANW in 1923. Like many of the QCWA members, Hank's first receiver featured a Quaker Oaks box wound with yards of wire; the transmitter was the typical Ford spark coil.

QCWA is a friendly, fraternal group of amateurs who were first licensed as amateurs at least twenty-five years ago. National officers are Frank A. Gunther, W2ALS, president; Harry S. Gartsman, W6ATC, vice president; Mark J. Devaney, K4IDC, treasurer; Harry W. Wills, W1DJ, secretary; J. R. David, W4YK, G. D. Meserve, WØHG, Art Miligan, W8KW, H. H. Robinson, W4QR and Clarence Seid, W2KW/KV4AB, directors, and – last but important – Ethel M. Smith, K4LMB, executive secretary. It is to Ethel one writes about joining the outfit: her address is 2012 Rockingham Street, McLean, VA 22101.

A. PROSE WALKER RETIRES

A Prose Walker, W4BW, chief of the Amateur and Citizens Division, Safety and Special Radio Services Bureau of FCC since 1971, retired on July 31, 1975. He graduated from Denison University in 1932 (physics and mathematics) and did graduate work at Ohio State and the Industrial College of the Armed Forces. He first came to FCC in 1939 and, during World War II, served in its Radio Intelligence Division overseas. In 1946 he became chief of the TV Allocations Branch, Broadcast Bureau. A position as manager of engineering, National Association of Broadcasters, took him away from the Commission in 1953 and it was followed, in 1961, by positions with Collins Radio, developing amateur and broadcast equipment and later serving in their Washington office. For the three years before he returned to FCC, Prose was privately engaged in consultant work. His first amateur license was as 8AIE in 1924; the Extra Class license was obtained in 1953. Prose has attended the past two World Administrative Radio Conferences and heads up the Amateur Radio Working Group for the U.S., in preparation for the 1979 WARC. He was elected a Fellow of IEEE in 1964. A reception was held at FCC on his last day in the office with good wishes from both fellow employees and the "customers." General Counsel Robert M. Booth, Jr., W3PS, represented ARRL at the affair.

W3GGO NEW RULES AND LEGAL CHIEF

Joseph M. Johnson, W3GGO and ex-K9YNG, has been named chief, Rules and Legal Branch, Amateur and Citizens Division, the post earlier held by another "JJ," John Johnston, K3BNS. Joe received his BSEE from the University of Illinois in 1970 and joined FCC that year as an engineer in the Industrial and Public Safety Division. He's 27 years old, resides in Accokeek, Maryland, and enjoys "QRQ cw" and DX chasing.

The position is the one responsible for drafting rules changes in the Amateur and Citizens Radio Services, an important spot indeed – congratulations, Joe, from your fellow amateurs.

Mayor Tom Moody of Columbus, Ohio, has proclaimed the week of October 5 through 11 as "Radio Amateur's Week" in recognition of the ARRL Great Lakes Division Convention being held in Columbus on October 10 and 11 (see September *QST* page 73 for further information). Pictured above at the signing are Wes Lomboley, W8FMG, Convention cochairman; Mayor Moody; and Dick Egbert, W8ETU, Great Lakes Division Director.

YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* W3WRE

"YL, A GENERAL TERM denoting any licensed amateur feminine operator, regardless of age or marital status," is the definition that was adopted by YLRL in 1940, when the club was just getting started. So we have defined ourselves in our club names, our contests and our certificates in all the 125 countries around the globe where there is at least one feminine touch to the amateur radio picture. We range from 7 through 80 years, for age is no governing factor in that hard earned license where the only criteria are knowledge of the code, and the theory to get us on the air.

While Deanna, WNØKID, still holds the record for being the youngest YL to receive a call, at the age of seven, most of the young YLs are in junior high school when they develop an interest in amateur radio, although several have received Novice at the age of ten.

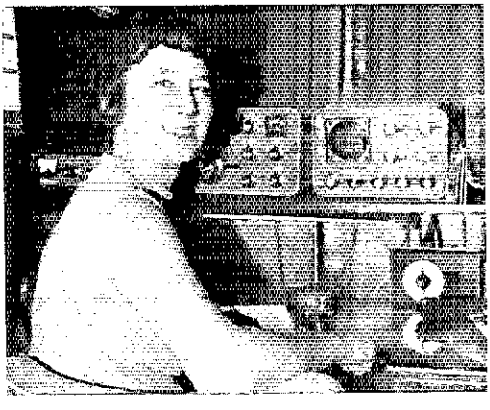
Recently Hope Cliver joined a very exclusive group within the YL ranks when she passed the General Class examination at the age of 10. She very recently passed the test and has not yet received her call from FCC. The only other gals on record who have achieved this were W6JPL, in 1950, and also both daughters of the Atlantic Division Vice Director, W3KT, who were generals at the age of 10, Jane, W3OVV, in 1948, and Alice, W3SKQ, in 1951.

We are all YLs whether we are 7 or 100 in age. We are the gals like W6NZP, Evelyn Scott, who was in her late 70s when she suddenly decided to become the first YL to operate from Antartica during a vacation trip, and WN9QZA, who decided to study for a license at the age of 79, and finally W6PAU, whose skill and ease on the air belie her age of 88.

There is one important criterion by which we qualify as contacts in our nets and contests, or in a lazy chat with another amateur, that outweighs our age, or the fact that we are what has been termed "the distaff side of amateur radio." That feminine voice or the "age hr is" of a QSO isn't half so important as the technique we use on the air. We might be one of the very young ladies, an applicant for medicare, one of the permanently bedfast members of a handicapped group, or a budding TV starlet. The skill and individuality that identifies our voices or fists is the real standard by which we are judged as a call to be remembered and, to quote Kipling, "very much sought after." Thus, in the YLRL definition, all of us are YLs, even as all men operators are defined as "OMs."

* YL Editor, *QST*. Please send all news notes to W3WRE's home address: 305 N. Llanwellyn Ave., Glenolden, PA 19036.

Newly elected 1975-76 officers of MINOW Net are l-r, President, Joan, WA7BDD, and Vice President, Pat, WA7GMX.



VE3ARG, Thelma Tuttle, found on 80 and 20 MHz. She is an active member of CLARA and the Ontario Trilliums.

TYLRUN Anniversary

The Texas YL Round Up Net will celebrate the net's twenty first year on the air at the annual TYLRUN party, to be held at the Western Hills Inn, Euless, Texas, November 7, 8, 1975. All licensed women amateur operators are invited to attend and help the net members celebrate this special anniversary.

XE2CI, Nellie, with KV4GP, Ron, and CR6CA, Joe, at a recent YLISSB meeting. Nellie is the first woman to be appointed to a Directorship in the Mexican Radio Emergency System. *(LMRE Photo)*

The meetings will include a luncheon and buffet, with the theme "Nostalgia," and gift exchange. Those planning to attend should apply to Myrtle Stinnet, WB5FGM, Rte. 7, Box 349-A, Fort Worth, Texas, 76119, before the reservation deadline of November 1, 1975.

Canadian YL Nets

The 1975-76 schedules for the Canadian YL Nets have been announced to assist those who are interested in acquiring contacts for the CLARA and TOT certificates, as well as the gals who are interested in checking into these nets.

Maritime Sparkettes Net

Wednesdays	1330 GMT	3.770 MHz.

CLARA Nets: Tuesday, 1900 GMT, 14.160 MHz; 4th Tuesday of each month, 0100 GMT, 3.750-55 MHz, 0800 GMT, 3.695 MHz. **Maritime Sparkettes Net:** Wednesdays 1330 GMT, 3.770 MHz. **Ontario Trilliums Nets:** Saturdays 1700 GMT (1600 GMT when DST), 14.140 MHz, Saturdays 2100 GMT (2000 GMT when DST), 3.770 MHz Wednesdays.

(ew practice net)

Note: the call for all Trillium Nets is VE3TOT.

A further net is planned as the B.C. Dogwood YL Net. Those YLs who are interested should contact Jeanne Williams, VE7JB, 2332 140th Street, White Rock, B.C. V4A 4H7.

XE1CI Named to Position in LMRE Affiliate

For the first time since its founding 15 years ago, the National Radio Emergency System, an affiliate of the Mexican League of Amateur Radio Operators (LMRE), has named a YL director, Nellie Saltiel de Lazard, XE1CI. Nellie's new duties will include the direction and coordination of the more than 400 stations located throughout the Mexican Republic which make up the amateur emergency system. This system is on the alert 24 hours a day, ready to help in any and all cases of emergency such as tropical storms, floods, forest fires, and earthquakes, as well as other natural disasters. Nellie, who is a member of YLISSB and CLARA, represents the 25 women who are members of LMRE.

YL Harmonics Directory Issue

YL Harmonics publishes an annual Directory Issue, listing the full membership of the current year. At intervals this issue becomes an enlarged publication including brief biographical sketches of the membership.

The 1975 Directory Issue is a complete change in the format of this publication. The editor, Carrie Lynch, WA4BVD, has introduced a new size, 8 1/2 × 11" with a heavy paper cover. The material not only includes the scheduled YLRL activities, nets, and contests, but also a history of this oldest of all YL radio clubs. Vada Letcher, W6UFE, has written of the period 1939 through 1960, while Marcia Rast, K6DLL, has summarized 1961 to the present. This 1975 Directory Issue of *YL Harmonics*, which is available to the membership, is a very excellent addition to the YL library.

ZL YL Certificate

The women radio operators of New Zealand have a certificate that is available to all licensed women amateur radio operators who are ablt to submit the qualifications required by the ZL-YL Net. The award requirements are that ZL and VK stations work 12 members of the WARO; other DX stations work 5 members, including the one contact with each of the four ZL districts. All types of emission are accepted. All contacts must be made after June 1, 1969.

While net contacts do not qualify, the possibility of locating the few YLs in New Zealand is made easier by identifying them on the ZL-YL Net that meets nightly at 0500 on 14.175 MHz.

VE3ARG, Thelma Tuttle

As with so many of us, Thelma wasn't particularly sold on amateur radio in the beginning when the OM received his license, but after their son followed his father and got a ticket, she suddenly became a silent spectator at the dinner table. So, following the code and theory classes sponsored by the Scarboro ARC, Thelma broke the family communications gap as VE3ARG.

Just name the amateur activity and you can be sure that she will have been a part of it, for her interest ranges through DXing, certificates, handling messages and traffic, and phone patches. She is active in CLARA nets both as a participant and as an occasional net control, and she holds a regular NCS assignment in the Ontario Trilliums Nets.

A member of ARRL, CLARA, TOT, Scarboro ARC, Radio Society of Ontario, Thelma holds the SARC award for working 100 or more stations during the first year that she was licensed. She also holds the Winnepeg Award, and the Calgary Centennial Award. At present whe is working towards acquiring both DXCC and the newest CLARA certificate, Canadian Families. VE3ARG is 1975 membership convenor of the Ontario Trilliums and the VE3 representative for CLARA. QST

The World Above 50 Mc.

CONDUCTED BY BILL TYNAN,* W3KMV

THE 1975 Central States Vhf Conference, held August 15 through 17 at the Western Hills Lodge near Tulsa, followed previous conferences in presentation of excellent talks by well-known vhfers and in the general good fellowship which prevailed. K5BXG, the Society's president for 1974/75, and his crew of able assistants including W4FJ, the organization's perennial secretary, did a splendid job of putting this year's conference together. Talks included a very informative, if somewhat pessimistic presentation by Mel Wilson, W2BOC, on sunspots and aurora and a look into the future hamshack by Dick Allen, W5SXD, who discussed amateur applications of microprocessors. Jan King, W3GFY, gave another glimpse into the future, as well as highlighting the present, with a talk on Oscar 7 and future Amsat projects. The concept of high altitude satellites providing common visibility between many nations of the Northern Hemisphere for hours at a time, intrigued many of those in attendance. Also on the satellite front, Ron Dunbar, WØMJS, presented details on an RTTY terminal unit especially well suited for copying teletype telemetry from Oscar 7. John Fox, WØLER discussed work that he and Ron have been doing in analysing satellite transmitted data. Their work indicates that the attitude control system in Oscar 7 is behaving just the way it should, countering the comments of some that the satellite is tumbling wildly in orbit. The spacecraft does flip over but only when it should under control of the bar magnet which lines it up with the magnetic field of the earth. The 1975 Chambers Award was presented to WØLER for his part in this work.

Other high spots in this year's conference included a second talk by W2BOC on the E_s conditions existing on July 20 which resulted in a massive 2-meter opening involving the entire eastern part of the country. That same opening provided a lively topic of informal discussion among the conference attendees. Many had made tapes of the opening and it was interesting to hear the same QSOs from opposite ends of the path.

EME was another topic which was extensively discussed both in the sessions and in the halls and other gathering places. Kelly Scheimberg, W8KPY, gave a very interesting and amusing talk entitled "Rabbit Fading on EME" in which the cause of fading of moon reflected signals is attributed to a rabbit in orbit around the moon. Kelly stated that this theory stemmed from a gentleman named Sir Eric during a period of libation, which has nothing to do with libration. In addition to its jovial side, Kelly's talk included very interesting slides of some of his antennas both before and after disaster struck them. Kelly also played some tapes of an EME QSO which he had completed with VK5MC. This included both cw and ssb. Signals from down under were particularly impressive when one considers that VK5MC was running 150 watts input. His rhombic makes up a lot of the difference between the power run by stations in other parts of the world. EME operation on 432 MHz was discussed by Al Katz, K2UYH. He made good case for the advantage of being able to rotate the plane of polarization to counteract Faraday rotation and provided a good summary of EME antennas suitable for 432. Marshall Williams, WA5UNL, presented an interesting and informative talk on his new polar mount collinear EME antenna for 2 meters as well as explaining, in practical terms, the design and construction of vhf amplifiers employing boiling water as the cooling medium. Hank Oredson, WØRLI, described alerting systems for detecting band openings using the video carriers of TV stations. Antenna design using multi-driven elements was discussed by Mike Staal, K6MYC and Tom McMullen, W1SL, of ARRL headquarters staff gave a talk entitled "After EME, What?". Tom urged us all to continue in the ham spirit of pioneering new techniques and pushing the frontiers of propagation. He emphasized the importance of technical accomplishment in justifying amateur frequency allocations. West Gulf Division Director Roy Albright, W5EYB, gave a

(Continued on page 138)

* Send reports to Bill Tynan, W3KMV, P. O. Box 97, Burtonsville, MD 20730 or call (301) 384-6736 and record your message.

Moonbounce forum held Central States Vhf Conference (left to right) K6MYC, W6KJD, WB6NMT, W1SL, K2UYH and KØMQS.

How's DX?

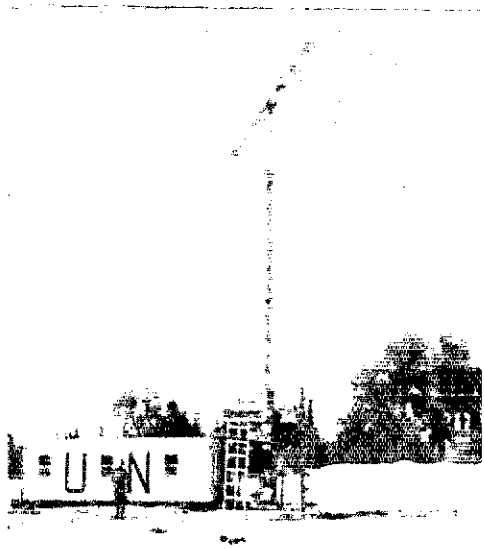
CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

So long, bright summer — hello, fall! 'Tis an appropriate season to dwell a spell on nostalgic tales of Elmer. He is, as you now must know, our designated embodiment of the helpful ham next door. . . .

I was the curious high school kid who delivered newspapers to W8CPT 45 years ago. I often found him at his rig in the garage and would watch in amazement as he talked with other hams in remote lands. With Henry's encouragement I learned cw and became W8LPZ in '33. Old W8CPT was Elmer to a whole bunch of hams-to-be in Urbana, Ohio. Now retired in Tampa as W4NNT, he still pounds away on 20 and 40 after a communications career that goes back to days of spark. (W4UD) . . . I'm well aware that a Novice license is no big deal, but to me it's like winning the Nobel prize. Know the story about the sorcerer's apprentice? I feel that it applies to me because I've always regarded my Elmer, W4NTO, as a magician of the highest order. Fritz not only heeded my own voice in the wilderness but has helped many a future Spartanburg ham. W4NTO administered my exam, helped me set up my station, and became my first QSO. I intend to pass along his teachings. (WN4UKU) . . . After spending many a breathless evening listening to far-off stations on WA5NNO's beautiful layout, this "kid across the street" started on his own ticket. Something always cropped up to interfere, however, and it wasn't until I was stationed at Pearl Harbor with the Navy that Elmer No. 2, WA4GIF of KH6SP, patiently coaxed me through cw and theory for my Novice license. Hats off to two of the finest hams around! (WH6INU) . . . I was one of the scared guys who took the Novice test given by KH6BZF at Honolulu's Iolani High School last year. This March I managed to pass the General and Advanced exams, and I'm thankful to Lee for getting me started. Amateur radio needs more KH6BZF's. (KH6IKL) . . . My Elmer goes back to the third grade of elementary school when I first met the future WB4DRB. We were the usual good buddies who kept getting interested in each other's hobbies — stamp collecting, tropical fish, ship models, etc. One day when we were about 13, I found Marc building a crystal receiver. I soon followed suit, and when he discovered amateur radio it wasn't long until the two of us had our Generals. WB4DRB showed me that hamming was much more than just "talking to people by wireless." He interested me in traffic nets, DXing, contesting, vhf fm, Amsat, etc. We're Extras in college now and we both owe much to the game. (WB4FDT) . . . Dad, formerly W8ZAA and ex-Navy radioman, bought me an S38C receiver for my eleventh birthday and taught me the code. Uncle Bill, then W8AZU and now K4RT, demonstrated operating techniques in the course of his many visits to my radio room. These family-type Elmers must have done a thorough job. Fourteen years later I'm still enjoying this great hobby. (W9MYP) . . . After listening to friendly W9UQT call the Illinois Emergency Net together at nine a.m. every Sunday on 3940 I finally met him at a Sangamon River Radio Club meeting and Field Day. Doc, a Silent Key now, was a grand OM and my Elmer of 27 years ago. (W9FSK) . . . Mine was W2BU, also encountered through a local amateur club, and he sponsored my slow journey to Novice status. After thanking him on the air for my ninth QSO of 1975 he replied in droll fashion, "What are you trying to do, Leon, win the world championship for fewest QSOs in your first year as a WN?" Little did he know that I had previously qualified for that sorry award. Once before, when the Novice license was good for a year, I played with a homemade set and achieved a grand total of zero contacts in twelve months. Why? No Elmer.

* c/o ARRL, 225 Main St., Newington, CT 06111.



LU2DZ/SU, with the United Nations contingent at Cairo, shares this "QTH of the Month" with VE3HEY/SU. Carlos likes 14,210 kHz beginning at 1900 UTC, also 21,300 kHz at 1200 and 1500 when the band sounds promising. A homegrown quad supplements that log-periodic rotary.

PUØYS makes Fernando da Noronha look easy in this July photo but half the battle is getting there. Joe, who signs PY7YS back home, gave this new country to quite a few 160-meter buffs. *(Photo via W4BRB)*

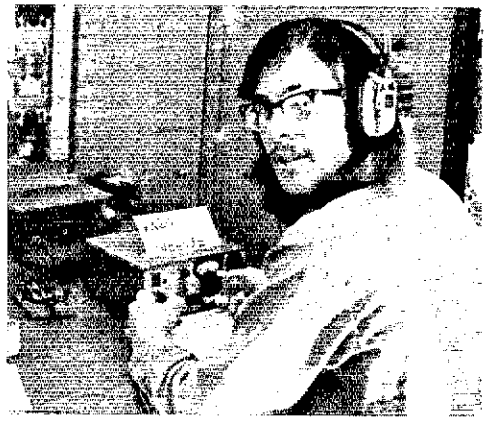
(WN2WQL) . . . WA2IJB assisted me with the code and WB2GLI taught me theory, both members of Thomas Edison Amateur Radio Association. Bob, now WB4GLI/4, also stuck by me whenever Murphy raided my shack. I'm sure there are Florida WN4s already calling him Elmer. (WN2WIO) . . . As a third-grader I remember watching WØGMO work someone on cw back in '68. Other interests prevailed, though, until I visited Dave again years later. This time he was chatting with a New Yorker on phone and the ham fever hit me good. I studied all that summer and finally got enough code speed to read some mail on an HW16 borrowed from WNØHKJ. WØGMO had moved a little too far away to give me my Novice test, but I luckily found WØIV for the job. By the time my ticket arrived Dave had helped me set up my station by landwire consultations and he became my first contact. Thanks mainly to his patience with a nuisance pain-in-the-neck, next month I go for General. (WNØNHA) . . . This year marks the 40th anniversary of my introduction, as a short-wave listener, to amateur radio. G5WW, on the other side of London, was the first ham I ever heard. This was on 160-meter a-m , right at one end of the dial on the family two-valve battery bc receiver (no ac mains in those days). I was only ten at the time; thousands of fellows young and old must have started out the same way. Then followed an 0-V-0 kit for my eleventh birthday. How many of today's young'ns know what 0-V-0 or 1-V-2 mean? Early in '41 some hard-earned savings went into the purchase of a semi-communications five-valver. Then came wartime service in Royal Signals, a disability pension, and return to SWLing. While engaged in the electronics industry in 1951 I finally became G3IDG. Not a real Elmer in sight all this time, which proves that a determined would-be ham can sometimes go it alone. (G3IDG)

Sure, one can reach the realm of magical Oidar Mah without following our pied cw piper down a yellow brick road. But he can certainly ease the trip. How about *your* Elmer(s)?

What:

10 meters surprised us with an assortment of interesting DX since last we spun the "How's" dial in that direction. Spotty and inconsistent to say the most, yet 28 MHz is giving a far more impressive propagational performance now than during previous sunspot minima. It's difficult to avoid the conclusion that 1975's high-grade equipment, high-gain antennas and high-skilled operators make all the difference. Do we really need an ionosphere? Before we get too carried away let's check recent 10-meter results reported by W9LNQ, K4s BZH DAS, WAs 1QME 4DLY, WB2EOO and the DX press. Voice action, centered around 28,500-28,600 kHz, features As 2CCY 4XFE 4XFW 9XE 9XV, C31s IL IX, CEs 3AL 3AQX 3RC 3TV 3YY 4BK 4EM 6EW 8AA, CN8HD, CRs 4BS 6CD 6LL 6NO 6RJ 6TP 6UE 6VC 6WA 7AF 7GR, CTs 1OU 2AK 2BN, CXs 5BM 6AM 6BF 7BF 8BE 9BT, DK4SX/OHØ, DL7DG, EAs 3AH 4DA 6AU 7PW 8CR 9FC, EIs 7BD 9Q, EL2FN, ET3FF, Fs 6CTF 8RU ØBAL/FC, FC2VN, FG7AS, FH8s CJ CY, FL8s EP PE, FO8DY, FR7BB, FYs 7AQ ØBHI ØFHB, Gs 3TJW 3WBN 4AGZ 4DYO, GC4BSI, G13s IVJ JIM, GM3WTH, GWs 3XCR 4BNJ, HC1JH, HIs 7LC 8EJH 8HA, HK3s CTJ DES, HPs 1CU 3FA, HTØAA, HV3SJ, HZ1KE, Is 1FEJ ØAAF, II4FGM, IS0s FDW HBI NZA, IT9PVO, JAs 1EVY 2NVM 5EXW 7UDF 7WND, JY9DGC, KG4s DS FI FS, KP4s EAK BCL, KS6DH, KV4s AD CI, KZ5s IT SS, LUs 1AJI 1AJQ 1DVT 1TMI 2FAG 5DAK 5EJS 6DEX 7FAG 7MAY 8DTM 8EE 8FEU 8FT, LXs 1ES IRR 2HH, M1C, OAs 4EK 4M 4US 4ZP 6BM, OEs 2WSL/5B4 5CA/YK 5CUL 8RPK, OH5AF, OJØMA, ONs 4VU 6VL 8WW, OYs 3H 5NS, PJs 2RR 9JR, PT2ZBS, PYs 2CK 3CKJ 4SA, PZs 1AE 1AP 5FB, RAs 6AEH 9HDC ØLET, RD6DIF, RL7PFH, RP2BCZ, RQ2GDT, SKs 2AT, 3AL, SM4HJ, TA3AB, TF3GK, TG9s PK YN, TIs 1K 2AV 2LCB 2WX 8PE, TU2EH, TR8DG, UAs 9FCT0 ØUBD, UC2OAF, UF6FBH, UL7AAC, UO5OBG, UP2PD, UR2AR, VKs 6AB 6AH 6EW 6HR 6KG 6KZ 6NS 6PM 6QL 6SM 6TX 8RR, VO1FG, VPs 1FF 2AA 2AH 2F 2GMB 2KJ 2LAW 2LBX 2MSU 2VZ 2SG 5WW 8GD 9AD 9GE 9HM, VQ9s BP BYH GP HCS SS, VSs 6BL 6DO 6HI 9MB, VU2s ABC DK GBG, W6GBY/6Y, YNs 1AA 1FWN 7XVS, YS1MAE, YU1AFV, YVs 1AQE 4AGP 4TI 5CSV 5MM, ZB2A, ZC4KW, ZDs 7FT 7HH 8MH, ZEs 1AV 1BP 2JV 4JW 6JL, ZK1DX, ZLs 1ANE 1OY 1PD 2AHF 2BAO 3GG 3RB, ZP5AN, ZSs 1XG 2AE 3AK 3WK 6AAM 6AJL 6ARH 6BJ 6TE, 3B8s BJ CV, 4M6AW, 4W1AF, 4Z4s BS DC LA MQ, 5B4s BL CY ES, 5T5s GG GS, 5U7BA, 5V7WT, 5W1s AP AU, 5X5NK, 5Z4JE, 6W8s AAD DY FP, 6Y5s DE HM, 7Q7DW, 7X4MD, 8P6FV, 8R1G, 9G1s AR CO, 9H4K, 9J2s BO CL DT WR, 9L1JM, 9M2s DQ DW, 9V1SH, 9Y4s EH NP TS VT and VU. The cw slot usually doesn't start jumpin' til the phone subband saturates, a rare occasion these skipless days, but these radiotelegraphers are indicated downband: A9XU, CE8AA, CR6s AL DN, CV8B, CX8BBH, DL7AQ, EAs 4BV 6AU, FK8BV, FL8CE, FRØBCS, FY7AM, GIs 2DZG 6YM, HC1s CW XG YL, HS2AIG, JA8PM/mm, LA2GS, OD5s EX LX, P29PN, RL7AAK, UA9CAE, UH8MAI, UI8ACI, UJ8AG, UL7s PN FA, UN1BA, VKs 2EO 3HA 8NT 8OM, VO1FB, VPs 2AA 2LAW 8NT, VR1AA, YJ8GS, YU1AFV, YV5s CEP FPQ, ZEs 1EW 3JO, ZD7PS, ZL3GQ, ZS6s CS JM, 3B8s DN MS, 4X4LC, 5T5ZR, 5Z4PP, 7Q7DW, 8J1RL, 8Q6AH, 9H1CH, 9J2s BO CL and XZ. The 10-meter beacon network often gives tip-offs on favorable conditions: DJØIJI, 28,195 kHz; DLØAR, 29,000; JA1IGY, 28,190; VE3TEN,

VK6OH (WB6KJI) enjoyed QRP with the State's gang from his uncle's home in East Freemantle before returning to California last month. Dave reports good results with a mere dipole hooked to that HW7.



28,175; ZC4CY, 28,180; ZL2MHF, 28,170; and 3B8MS, 28,200. Keep in mind, however, that 28-MHz openings often are so sharply selective that stations a few miles off a breakthrough path may be shut out. Any WNs scoring QSOs on the new 10-meter Novice subband? Autumn is traditionally ten-meter time so let's stir things up with plenty of CQing. Not too soon to start shaping up for the League's annual Ten Test in December.

W h e r e :

NORTH AMERICA – WØPRY, Ks 2GBC 4DAS, WAs 2CXQ 3SWF 9CUH, WBs 2EOO 8FLE, WN6GKE, KH6CF and VE3AXO nominate these "QSLers of the Month" for particularly prompt pasteboards: CRs 4BS 6GA, DU6BG, FA9EP, EP2EA, FG7AM, FH8CJ, FK8BV, FR7AI/t, FWØGA, FY7AK, GW5BCD, HI8HRM, HKØBKX, JW5NM, JY9CR, KØCGE/HBØ, KS6s DH FF, KV4AA, LA7FJ, LU1ZA, OE5CA/YK, OX5BW, SV1CH, UAØFGM, VPs 2DA 2EY 2GMB 2LAW 2VBK 8HA, VS9MB, VU2GW, YBØABV, YK1AA, ZFIs AU VW, ZM7AH, 3Bs 8CJ 9DL, 5H3JR, 5V4WT, 9K2AU, 9N1MM and 9X5PT, plus DX QSL reps Ws 2SNM 3HNK 3KVQ 5MYA 5ZF 6KLI, Ks 3BSY 4CFB 4VW 6RIR, WAs 1ABV 3KSQ 4BTC 5ZWC 6AHF 7RFH, VE3BOZ, F9GL, G3KDB, LU2AFH and OE5REB. Anyone missed? . . . QSL aides WA6AHF and XYL, frequently listed among your "QSLers of the Month", are appreciative philatelists. (WA2CXQ) . . . I've been QRT since May while changing Alaskan QTH. My gear and QSL records should soon be unpacked and accessible again. Pardon QSL delay and note my new address. (KL7PI) . . . Those wondering about KS4CJ of '71 may be interested to know that my card came via KV4AM-W3ZQ. (WB2MQI) . . . Canadian prefixes CF CG CH CI CY CZ VA VB VC VD VE VF VG VO VX VY XJ XK XL XM XN XO 3B and 3C have been, will be, or are in amateur use. VOs can now use the XN label. (VE3LSS) . . . My periodic ZF1CD work will be QSLd 100 percent. (K7CC) . . . HU is still used by El Salvador on occasion. HU1GMV equals YS1GMV, etc. Also, ZF1VW QSOs dating from June 1, 1975, are confirmable through W4MYA. (DXNS) . . . 'Alp! These parenthesized colleagues need suggestions leading to confirmations from holdouts mentioned: (W4JFE) JY2NZK, KC6s CG TM, SVØWT, YVØAA, all 1961-'62; (W6FF) YI2AM of '55; (K2GBC) VP8MH, 8Q6AC; (K6DR) KW6EK '66; (WA3SWF) ZD9GG, 3A2AB, 3V8BE; (WA4HHG) ET3USE; (WB2MQI) FR7AN, JTØAE 3D6AP all '72; (WB5DDI) JTØAE, OHØMA, UG5ØD, UL5ØA, VR6TC all '72-'73; (WB8FLE) SL8AY/mm, SM7XS/mm, VK3VG; (KH6CF) FM7WH, OY2O and VP2VL. Any aid?

EUROPE – About my observations that LZs are slow QSLers, I just received a batch via bureau. Some cards date as far back as November, 1972. The Bulgarian bureau's outgoing facility must be somewhat less than perfect. And by the way, G3PFU disclaims managerial arrangements with any 9A1. (VO1KE) . . . My QSOs with Europe can be confirmed through DJØFX. (KH6IAC) . . . I note in your July pages that a WB4 hunts my QSL for a 1972 contact. To my knowledge all QSOs for that year have been confirmed. His call does not appear in my log, contests included. (OH2BX) . . . I'll still respond to QSL inquiries concerning my past G15AHS-GM5AHS activity. (WA2DHF) . . . LCIJ and OF3B were Norwegian and Finnish summer specials widely worked. (DXNS) . . . We vow 100-percent QSLing via bureaus for our 4U1ITU contest work last month. Cards should go direct to that station. (DL7RT & Co.) . . . As QSL manager for ZB2CF I must report a three- or four-month lag in receipt of logs because of slow mail. My service is based on self-addressed stamped envelopes from W/Ks, too many of whom fail to comply and cannot be accommodated. (WA2MVQ) . . . Sweden's 7S identifier still appears on the bands, 7SL4BP being SL4BP, etc. YOs sometimes revert to their old YR prefix, YR3KAD same as YO3KAD, etc., and YUs try their luck as YZs now and then. (DXNS)

SOUTH AMERICA – As of June 6, 1975, Brazil's geography divides into states and regions prefixed as follows: PP1 Espirito Santo, PP2 Goias, PP5 Santa Catarina, PP6 Sergipe, PP7 Alagoas, PP8 Amazonas, PR7 Paraiba, PR8 Maranhao, PS7 Rio Grande do Norte, PS8 Piaui, PT2 Federal District, PT7 Ceara, PT8 Acre, PU8 Amapa, PV8 Roraima, PW8 Rondonia, PY1 Rio de Janeiro, PY2 Sao Paulo, PY3 Grande do Sul, PY4 Minas Gerais, PY5 Parana, PY6 Bahia, PY7 Pernambuco, PY8 Para, PY9 Mato Grosso, PYØ all ocean islands. Three-letter suffixes indicate novices except when a "Z" appears after the numeral (as in PY7ZAA) which calls are used by authorized foreign visitors. (PY7AOR of PYDXG) . . . CE9AT of Prat base, South Shetlands, designates CE2MZ as QSL manager and requests appropriate International Reply Coupons for direct response. (W7AWH) . . . W9BNH has no connection with TI9 or 8RI QSLing despite some expressions to the contrary. (WB8FLE) . . . All means have failed to produce a confirmation from VP8MH who has been back in England for more than a year. (K2GBC) . . . YY is still Venezuela as in YV4CVE's alter ego, YY4CVE. (YV4YC)

AFRICA – I've already answered more than three thousand requests for TU2DO's QSLs, those without s.a.s.e. going out via the slow bureau routes. Logs also continue to arrive from EL2BA-5L2BA. (WA2DHF) . . . QSL tender DJ1TC tells me that EL8OM works no cw – scratch another. (WA4UVG) . . . I have no QSL manager and will reply airmail to all cards received direct with s.a.e. and sufficient IRCs. (3B8DA courtesy W2DEO) . . . I find CR6s quite reliable in QSLing but I must agree with VO1KE's assessment of Bulgarians and Cubans. Slow! Incidentally, logs from 9X5KE are far behind schedule. Patience, please. (WB2FOO) . . . Mozambique amateurs make much use of their new C9M tags; C9MIZ is old CR7IZ, etc. (VERON) . . . Anyone needing my ZS6CB or 7P8MA QSLs for QSOs from December, 1974, through this May

can now reach me at 4417 Scottdale St., Mesquite, Texas, 75150. (K6TTF/5)

ASIA — Many DXers have had KA-bound QSLs returned because of a widely disseminated bureau address error. The correct QTH is Far East Auxiliary Radio Relay QSL Bureau, c/o Sam Fleming, GARH-ID-GS-T, APO, San Francisco, California, 96343. (KA2NA-W7IOR) . . . My QSL managership for A4XFV is effective since July 14, 1975. (DJ7OM) . . . Much to my amazement I received some sixty QSLs from European stations intended for one TA2AP mainly for 80- and 40-meter QSOs in March and July of '74. I have no managerial arrangements whatsoever and would like to forward these cards to their proper destination. (K2KF) . . . Finally received my UG5ØE card for a QSO card in '72 and haven't quite given up on UM8KAA worked in '69. (K2GBC) . . . 9V1s may become 9VØs commemoratively, 9VØSH being 9V1SH. (DXNS) . . . Still have all records and a few QSLs from my old TA3AA days of April, 1952, to November '54. (W6FF) . . . Because of our move to Italy we can no longer act as QSL managers for TA3HB. (DA1s CC CL) . . . All my 1975 Bangladesh logs and most QSLs received are held by police authorities there but I do have records for '74. It may be possible to retrieve the missing files at some later date. (PAØIWH courtesy W6TTS)

OCEANIA — KM6EA's contacts with Europe can be confirmed through I2YAE. (DXNS) . . . WA4NRE's stewardship of A35AF QSLing starts with QSOs of July 20, 1975. (WCIDXB) . . . Received a neat but undeserved QSL from JD1ABX confirming a 21-MHz ssb QSO 'way back on March 7, 1971. Someone with a call similar to mine? (W7GAD) . . . Now our usual QTH catalog with our usual caveat: All suggestions are not necessarily either accurate, complete or official. . . .

A35AK, Box 182, La Puente, California, 91747
C21AF, Box 29, Nauru Island
C6ABC, E. Link, P.O. Box 8086, West Palm Beach, Florida
CT2BB, H. Cross (W5URZ), PSC Box 54, APO, New York, New York 09406
ex-DA1CC, R. Crowley, Vicenza American High School, Box 61, APO, New York, New York, 09221
F6DTZ/FO8, D. Dutheil, SP91325, Papeete, Tahiti
FØAHY/FC (via DARC attn. DJØUP)
FB8s XL XM (via F2MO)
FB8s ZG ZH (via F8US)
FG7AR/FS7 (via F6BBJ)
FK8CE, Box 138, Bourail, New Caledonia
FO8DP, via J. Forrest, WB6EDM, 6621 Abrego No. 50, Isla Vista, California, 93017
FO8EH, Box 738, Papeete, Tahiti
HI8HRM, Box 951, Santo Domingo, D.R.
HK3DAQ, P.O. Box 52660, Bogota, Colombia
I2YBC/IA5, P.O. Box 26, I-21100, Varese, Italy
IT9AZS, Box 10, Trabea, Sicily, Italy
IT9SKO/IG9 (via IT9PUG)
K4TF/VP2A (via K4TJ)
K5ETA/6Y5 (to K5ETA)
KØCGE/HBØ (via WØIPU)
KB6CU, J. Dudek, Box 1158, Canton Island, 96736
ex-KH6AIK/KG6, F. Merrill, W4JEE, 6775 Bison St., Springfield, Virginia, 22150
KL7PI, J. Paquette, Box 244, Yakutat, Alaska, 99689
LZ1CY/6W8, A. Gugov, Box 185, Dakar, Senegal
OD5IO, Box 4201, Beirut, Lebanon
OH5MJ/DL/HB/OJØ (to OH5MJ)
VE2FBQ/5B4 (via VE2RCS)
VE5FP/P29 (via ZL2FA)
VR1AT, Weather Stn., Funafiti, Ellice Islands
VR4JA, H. Satoh (JR1GWR), 4131-837 Seya, Seya-ku, Yokohama 246, Japan
WB6IRE/KS6, L. Landes, c/o KVZK-TV, Pago Pago, Samoa, 96799
YB7AAU, W. Miller, Box 47, Balikpapan (Kal-Tim), Indonesia
YBØMC, Box 2761, Jakarta, Indonesia
ZP5XU, USAID Paraguay, APO, New York, New York, 0988
4K2AB (via CRC attn. UP2BAS)
4Z4s EV PX (via WB4FSV)
SN2NAS, Nigerian Army Signals Radio Club, Apapa, Lagos, Nigeria
7Q7HR, H. Russell, P. O. Box 5050, Limbe, Malawi
ex-9G1DY, N. Price, P.O. Box 12, Freetown, Sierra Leone
9J2s KC SJ TJ WK (via W3HHV)
9J2s US YL (via W3HNK)
9Q5BG, P.O. Box 5202, Kinshasa, Zaire

A35AF (via WA4NRE)
A4XFV (via DJ7OM)
C31JA (to HB9APJ)
C31JF (via DK3SF)
C31JK (to G3VPW)
C9MJK (via CR7BS)
CE9AT (via CE2MZ)
CT2BS (via WA4CAD)

TI9FAG, a DXpeditionary delight in late April and early May, was the multiband handiwork of (left to right) HB9AQM, TI2FAG, SWL Francisco, HB9s Ahl AEE and W4VPD. Enos, the latter, is shown fending off massive queues of world-wide DX hounds seeking rare Cocos Island. *(W4VPD photos)*

CT2BQ (via K9ECE)
CX3BR (via W3HNK)
DA1CL (see DA1CC)
DA15VF (to DA2QW)
FG0BUY (to K0SGJ)
FM7AQ (via K4KQB)
FM0BKZ (to F6BBJ)
FM0BUY (to K0SGJ)
FP0FC (to F6CEK)
FP0YY (to K9OTB)
FS0BUY (to K0SGJ)
FY7AX (via W3HNK)
GD3IAD (to G3IAD)
HI3JEI (via W2KF)
HL9KZ (to WA3WZF)
HL9UB (to W7ISG)
HU1EMW (to YS1EMW
IB0DMK (to I2DMK)
IF9JLG (to IT9JLG)
IM0DM (to I2DM)
IZ9SML (to IT9RAN)
JW5DQ (to LA5DQ)
KA6RI (via WB6KGB)
KH6IAC (see text)
KL7IAG (via K1KDP)
KM6EA (see text)
LC1J (via LA4LN)
LZ43BF (to LZ1KRB)
OF3B (via SRAL)
OJ0MJ (to OH5MJ)
P29CD (via ZL2FA)
PJ8DZ (via K0SGJ)
SV1GA/a (to OH2BH)
TA3HB (see text)
TR8SS (via DJ5IO)
TU2DO (see text)
VP2KU (to VE3EWY)
VP2MGJ (via K0SGJ)
VP8OD (via W3HNK)
XN1KE (via WA1QBH)
YY4CVE (to YV4YC)
ZB2RB (to G3VGW)
ZF1CD (to K7CC)
ZF1MA (to VE3BWY)
ZK1CL (via WA2YJN)
ZS6CB (see text)
3A0HD (to F6DPA)
3A0HF (to F5HO)
5L2BA (via WA2DHF)
5L2FW (to EL2FW)
5L0P (via ON5YL)
5L0V (via LA7RF)
7P8MA (see text)
7SL4BP (to SL4BP)
7X2FL (via ARA)
8P6FV (via W3HNK)
9V0SH (via W7PHO)

For the preceding glossary a sweep of the "How's" hat to contributors Ws 1OPJ 2DEO 3LE 7AWH 7IOR, Ks 2GBC 2YTU 3RDT 4DAS 4KCK 9ARZ, WAs 2CXQ 2DHF 3SWF 4HHG 4UVG 7NWL, WBs 2EOO 2MQI 4LRH 8FLE 8LNF, KH6CF, KL7FBI, VE3s AXO LSS, VO1KE, DL7PD, Columbus Amateur Radio Association *CARAscope* (W8ZCQ), *DX News-Sheet* (G. Watts, 62 Belmore Rd., Norwich, NR7 OPU, England), International Short Wave League *Monitor* (E. Chilvers, 1 Grove Rd., Lydney, Glos., GL15 5JE, England), Japan DX Radio Club *Bulletin* (JA3KWJ), Long Island DX Association *DX Bulletin* (WA2RJZ), Canadian DX Association *Long Skip* (VE1AL/3), Newark News Radio Club *Bulletin* (M. Witkowski, Rt. 5, Box 167, Stevens Point, Wisconsin, 54481), Northern California DX Club *DXer* (Box 608, Menlo Park, California, 94025), North Florida DX Association *News* (WA4UFW), Royal Signals Amateur Radio Society *Mercury* (G3DPS), Southern California DX Club *Bulletin* (WA6KZI), VERON's *DXpress* (PA0FO), West Coast *DX Bulletin* (WA6AUD) and Western Washington DX Club *Totem Tabloid* (WA7JCB). Encore!

W h e n c e :

OCEANIA — Western Pacific CW Net meets daily at 0700 UTC on 14,110 kHz. I serve as net manager. Check-ins with or without traffic are welcome. (KG6JAQ) . . . A New Zealand net on 3808 kHz at 1030-1130 UTC turns up DXceptional Pacific tidbits from time to time. Also check the Pacific net on 14,265 kHz at 0600. (LIDXA) . . . With a modified one-transistor HW7 running a whole watt aboard USNS *Sealift Mediterranean* off the Azores I've worked as far as ZL2AGY on 40 cw. (W3MWY/mm) . . . Brisbane DX Club, celebrating its 25th anniversary, offers a certification for QSOs with five or more members. Inquiries are welcome. (VK4EZ) . . . YB9ABX of Irian Jaya signed on for another year there and likes chasing wallpaper. Hal has about 30 states toward WAS. He schedules SM6CAM near 14,295 kHz weekdays at 1330 UTC. YB9ABX plans a coast-to-coast tour of our country a year from now. (K3RDT) . . . A35AF interested 15-meter Novices this summer with early evening appearances just above 21,100 kHz. (WA7NWL) . . . FK8BV likewise for the 40-meter WN gang, 7123 kHz at 0030 UTC. Louis tells me he's leaving Noumea to become F0BWT. (WN6GKF) . . . I was glad to be WH6IMT's Elmer. He's now awaiting a DA call in Augsburg. (KH6IAC) . . . Club newshawks provide more Oceaniagrams: KH6EVM/KP6, 14,265 or 14,310 kHz at 0600-0800 UTC, expects to be working on that Palmyra construction project well into '76 . . . By midsummer KS6FF needed only Delaware, Maine and Vermont to salt away ARRL's widely southt WAS diploma. Mike likes cw between 14,035 and 14,055 kHz . . . 9M8HG is doing well with 70 watts and a multiband dipole slung between rubber trees . . . Australia's winter Antarctic radio team includes VK0s CC CG GW at Casey Base, AL at Dovier, IN at Mawson and DA on Macquarie Isle . . . VK4OR (KH6GLU) is arranging an operational visit to Australia's Hutt River Principality as a guest of Prince Leonard who declared the region independent in 1970. "Application has been made to the International Telecommunications Union for prefix allocation." . . . Speaking of energy conservation (?) G8TK recalls a QRP QSO in 1947 with VK7CK who was pedaling a bike-type generator far ahead of his time.

NORTH AMERICA — North-south 14-MHz propagation is fine business for my six watts and dipole. A35AK and 5W1AR were my 22nd and 23rd ssb QRP countries (KL7IAK) . . . Lately you'll find C6ABC most active on 20-meter SSTV. (K2YTU) . . . Occasional DX openings barely keep up my interest under generally poor conditions in Tennessee. (K4KCK) . . . Summer DX doldrums here, too. Found CX4LO on 15 cw the other day, an LU1 on 10. Good short-skip signals keep one from getting too lonely on 21 and 28 MHz. In fact I'm up to thirty states worked on ten now, en route a cw-only 5BWAS with verticals and 100 watts. (K4DAS) . . . Guess I'll have to become a DX man to work Alaska, one of my last WAS holdouts. (WB2FIG) . . . Club station KL7FBI and I keep Shemya Island workable, me with 73 countries on SSTV. I swap pix daily on 14,240 kHz at 2200 UTC with an SR2000 and Telrex TB6EM. Should remain hereabouts at least into '76. (KL7IAG-W8PEY) . . . CZ20 will represent next year's Olympics at Montreal on DX bands. QSOs with that station plus a specific assortment of other Canadian and overseas DXers may qualify you for the Canadian '76 Olympics Award and/or the World '76 Olympics Award, details available through this station. (VE3LSS) . . . Looks like vertical is the way to go for that 80- and 40-meter DX. College studies limit my present operating and QSL-managing time but I've reached 160/135 worked/confirmed. (WB2EOO) . . . Good to be back at the knobs chasing DX after a thirteen-year layoff. Newly retired, I find the game still fun despite the great proliferation of elaborate kWs and beams. (W4JFE) . . . A card from UA0FGM for a 75-meter QSO finally closes out my 5BWAC. Mere ground-plane radiators and 150 watts are good enough for 130 quick sideband countries here. (W0PRY) . . . Conditions on 20 cw are very erratic in Ohio but 1975 has produced eighteen new countries so far. (WB8FLE) . . . My 45-foot-high 2-element quad collected forty countries in June, stuff I couldn't even hear with the previous skywire. (WA9CUH) . . . Veteran Pernambuco amateurs have formed the PY DX Group for serious practice and promotion of DX interest. (PY7AOR) . . . FG7AR/FS likes his 20 sideband around 2300 UTC. Alain anticipates a two-year tour on St. Martin. (DXNS) . . . K1DRN amassed 1163 contacts with 46 states and 61 countries in July as FP0XX, FP8DH's trusty 204BA helped. (WCDXB) . . . Ex-4W1GM is down south awaiting an 8R1 call. (W3HNK)

EUROPE — OE6MKG is the first native Austrian to collect ARRL's 5BDXCC. He used a mere indoor-dipoles arrangement for 7 through 28 MHz, an outdoor job on 80. Are DX conditions really so bad?

Operating Events ..... de W1YL

OCTOBER

1-30 ***RTTY Art Contest***, p. 95 Sept.

1 ***West Coast Qualifying Run*** (W6OWP prime, W6ZRJ, alternate). 1035 wpm at 0400Z on 3590/7090 kHz. This is 2100 PDST the night of September 30. Please note that dates are always shown at least 2 months in advance and times are always the same local "clock time," i.e. 9 PM local Pacific time. Underline one minute of the highest speed copied, certify copy made without aid and send to ARRL for grading. Please include your full name, call (if any) and complete mailing address.

4-5 ***California QSO Party, CARTG RTTY SS, Rocky Mountain QSO Party, VK/ZL/Oceania DX Contest phone, CQ-WE Contest***, p. 95 Sept.

11-12 ***CD Party*** phone, open to all ARRL appointees and officials, notified separately by bulletin. (Note, it starts 2300Z Oct. 11, ends 0500Z Oct. 13.) ***VK/ZL/Oceania DX Contest*** cw, p. 95 Sept. ***Big 15 QSO Party***, sponsored by the big 15 Club, designed to stimulate activity on 15. QSOs on 15 only, cw and phone. You need not be a club member to participate. Full 48-hour period UTC. Exchange RST, state, country or province and name (members also transmit membership no.). Stations in the same country count 1 point, other countries on the same continent 2 points, with DX or other continents (including Hawaii) 3 points. Member QSOs count 10 points. Double your QSO points if contact is with zone 15 and triple points on your 15th QSO. Multiplier is the sum of states, provinces and DX countries worked. Score equals QSO points times multiplier. Awards. Anyone sending in a log with an s.a.s.e. and requesting results will be mailed a membership card. Mailing deadline Nov. 15 for No. America, Nov. 30 for all others. Logs go to Pete Falsen, WN9PIC, 622 East 2nd St., Carlinville, IL 62626.

12 ***RSGB 21/28 MHz Telephony Contest***, p. 95 Sept.

16 ***W1AW Qualifying Run***, 1035 wpm at 0130 UTC transmitted simultaneously on 1.805 3.58 7.08 14.08 21.08 28.08 50.08 and 145.588 MHz. This is 2130 EDST (9:30 PM local Eastern time) the night of Oct. 15. Underline one minute of top speed copied, certify copy made without aid, and send to ARRL for grading. Please include your name, call (if any) and complete mailing address. An s.a.s.e. would be appreciated.

18-19 ***Manitoba QSO Party, RSGB 7 MHz DX Contest cw, WADM Contest***, p. 95 Sept. ***CD Party***, cw.

25-26 ***CQWW phone.***

27 ***Special W1AW Qualifying Run (Evening)***. Sunday night local time. Details same as under the Oct. 16 listing. 9:30 p.m. EST.

NOVEMBER

1-2 ***RSGB 7 MHz DX Contest phone***, see cw event listing p. 95 Sept. ***Worked All El Paso Contest***, sponsored by the El Paso Amateur Radio Club, open to all. Starts/ends 2300Z. 10-meters only. Anyone 50 or more miles outside of El Paso working 15 El Paso stations is eligible for the WAE certificate (for this award QSOs are not limited to 10 meters). Send QSL info. to the club, 1501 Golden Hill Terrace, El Paso, TX 79902. ***North Carolina QSO Party***, sponsored by the Alamance Amateur Radio Club, 1900Z Nov. 1 through 0100Z Nov. 3, open to all. Suggested freqs. plus/minus 10 kHz from: cw, 3560 7060 14060 21060 28060; novice 3720 7120 21120 28120; ssb, 3900 7270 14290 21390 28590. Out-of-state stations send RST and state, province or country. NC stations use report and NC county. One point per NC QSO, same station worked on different bands, modes, or in a different NC county counts as a new contact. QSOs times total no. NC counties worked equals final score. For NC stations the multiplier equals the total of states, provinces, countries, NC mobiles use the no. of counties operated from as an additional multiplier. Usual log info. Send signed log plus name, call, mailing address, claimed score, county/state/province/country from which you operated and calls of all ops. Postmark no later than Dec. 12 and send to the Alamance ARC, 2822 Westchester Dr., Burlington, NC 27215. S.a.s.e. appreciated. Awards. NC Counties Award certificate to those participants whose log verifies contacts with 80 or more NC counties during the party (and who has not previously been issued such a certificate by the AARC).

6 ***West Coast Qualifying Run.***

8 ***Frequency Measuring Test***, open to all, begins with a callup at 0230 and 0530 UTC Nov. 8. (Remember, this is the evening before, local time!) The periods for measurement start at 0237 (20 meters), 0245 (40 meters) and 0253 (80 meters); for the late run, 0537, 0545 and 0553 respectively. Note the reverse order of measurements and measure 20 first. Each measuring period lasts five minutes. Submit your averages for each 5-minute period which will be compared with the umpire's averages during the same period. (The umpire is a professional measuring laboratory.) Tell how many readings you took to form your averages. Approximate frequencies for the early run are 14,108 7102 and 3526 kHz. Late-run frequencies are 14,097 7085 and 3554 kHz. Your entry must be received by Nov. 19 to qualify for the *QST* report of the competition. W1AW will start transmitting the official results in a special bulletin Nov. 20.

8-9 ***Trillium Weekend Contest*** sponsored by the Ontario Trilliums Ladies' Amateur Radio Club, open to all ops., 24-hour period 0030Z Nov. 8 through 0030Z Nov. 9, Call CQ TOT, the Trilliums will call CQ TW. Each Trillium station may be contacted twice. For example: one phone and one cw contact (same band), 2 phone contacts (different bands), 2 cw contacts (different bands), one phone and one cw (different bands). Exchange signal report, name, QTH (Trilliums will give their club numbers). No cross band although cross mode is permitted. Usual log info. All logs must be signed by the op. Five points for each cw or phone contact. Low power multiplier of 1.25 for all transmitters running 150 watts cw, 150 watts am, 300 watts PEP and under. A bonus of 100 points for working 10 club members, an additional 100 to 20, etc. Logs must be postmarked by Dec. 31 and received no later than Jan. 15. Send to Joan Powell, VE3FVO, 39 Brightbay Crescent, Thornhill, Ontario, Canada, L3T 1C2. Awards. The TOTs will operate all bands but special frequencies to watch are 3770 3855 3685 7240 7103 14280 14140 14035. ***SWEEPSTAKES CW!***

European DX Contest RTTY, rules p. 106 July.

9 ***OK DX Contest***, open to all, sponsored by the Central Radio Club of Czechoslovakia, full 24-hour period UTC, all bands. Crossband and crossmode not permitted. Exchange RST plus ITU zone (map on p. 87 April 1977 *QST*, copies available from the CRC for 2 IRCs). Each OK contact counts 3 points, others 1 point, your own country zero points. Multiplier is the sum of ITU zones from all bands. Categories are single op, all band, single op, single band, multiop, all band (clubs are in the last category). Separate logs for each band. Usual log/summary/declaration. Awards. Logs must be postmarked by Dec. 31 and sent to the CRC, Box 69, Prague 1, Czechoslovakia.

14 ***W1AW Qualifying Run.***

15-16 ***All Austria Contest***, sponsored by the OE Society, 160 meters cw only. Note the following are OE sub-allocations: 1823-1838, 1854-1873, 1879-1900 kHz. Call CQ OE. Send RST plus QSO no. starting with 001. The exchange must be confirmed by repeating the exchange code. One point per QSO. Multipliers: two points for every OE Bundesland (OE1, OE2, etc.); one point for every prefix. Score equals total of QSOs times multipliers. A station may be worked once only. Awards. Logs plus summary, station description and usual statement should be mailed by Dec. 15 to Viktor Patek, OE3VP, A-2103 Langenzersdorf, Box 7, Nieder-Oesterreich (AUSTRIA). ***Missouri QSO Party***, sponsored by the St. Louis Amateur Radio Club, open to all from 1800Z Nov. 15 through 2300Z Nov. 16. The same station may be worked once each band/mode. MO mobiles will count separate from each different county. Exchange QSO no., report and QTH (county for MO, state/province or country for others). MO mobiles will start with no. 1 from each county activated. Frequencies on most bands will be 60 or 70 up from the low end. Score 1 point per QSO, MO use state/province/countries for multipliers, others use MO counties (maximum of 115). MO mobiles total separate score from each county activated. Awards. Mailing deadline Dec. 15. Send to the St. Louis ARC, K9UIR, 842 Tuxedo Blvd., Webster Groves, MO 63119. S.a.s.e. for results.

22-23 ***SWEEPSTAKES PHONE!***

29-30 ***CQWW cw.***

(Continued on page 107)

Operating News

GEORGE HART, W1NJM
Communications Manager
ELLEN WHITE, W1YL
Deputy Communications Mgr.

Working W1AW. Would you like to work W1AW? The schedule is elsewhere in these pages, and is published every month, with a monthly update on some of its variable aspects. Unfortunately, it's a little complicated, because there are so many needs to be met, so many bands and modes to be covered, so many different functions to be performed. The time differences don't help any, either. The times are given for the Central Time zone (CST or CDT, depending on what we are currently observing) and for Coordinated Universal Time (UTC), which is the new name for GMT. W1AW operates at some time or other on each from 160 through 2 meters, using most amateur modes. If you don't believe it, check the schedule and see for yourself.

Following the schedule to the letter isn't always possible, but we do the best we can. Perhaps a review of some of the problems and habits will enable more amateurs to contact the headquarters station.

W1AW has two operating positions, the main console and the visitor's console. The latter is used, as the name implies, mostly by visiting operators. The former is used for all other operating, including bulletins, code practice and general contact with any amateur who wants to make contact with the headquarters station. One of the most popular times to do this is after bulletin or code practice transmissions. The printed schedule indicates where listening is to be done, but an announcement is made in addition. Unless a novice period is listed, the same crystal-controlled rig used for the transmission is used, so in such cases it isn't convenient for W1AW to QSY. Where a novice period is called for, the sign-off will indicate that any calls will be answered on the caller's (novice band) frequency, and one of the auxiliary VFO rigs at the main console is used for this purpose. So if you're a novice and want to work W1AW, give us a call on the indicated band after any transmission in the table bearing a footnote*. We tune the novice band from the low end up. If no calls are heard, the operator may call someone CQing (novices have been known to faint at getting a call from W1AW), or find a comparatively clear spot and call CQ. Incidentally, we always try to answer at the same speed you call us, so call at the speed you want to copy.

During other scheduled general operating periods one of the several transceivers available is used. Frequency is as listed, but not always on the nose, because it may already be occupied, so tune around for us.

As you probably realize, W1AW has many visitors, especially during the summer season – thousands of hams from all over world, and one of the things most of them want to do is operate the station. So we set them at the visitor's console, tune up a rig, and let them operate where they wish – that is, if there are no scheduled bulletins or code practice. Yes, this includes novice visitors. So there may be times, especially during summer afternoons, when you will not find W1AW on the "advertised" band. In such cases, try 20-meter sideband, around 14,290. This seems to be the preferred band by most visitors.

Contrary to the apparent belief of many, the W1AW operating position is not located in the midst of other headquarters office operations, and staffers are not available for immediate consultation. If you have a question on rules and regulations, contests, DX, traffic handling, etc, the W1AW operator will answer it if he can, or get an answer for you, perhaps by later mail. But remember that W1AW is an amateur station and must observe all amateur regulations even more carefully than the average amateur, so don't ask W1AW to handle any kind of League business. If the operator should decline to do so, don't get mad at us; just reduce the matter to writing and drop it in the mail or, if you're in a rush, call us on the telephone. Avoid the latter if you can. Nobody at headquarters sits around doing nothing, and if you telephone you *are* interrupting something.

QSLs? You bet. W1AW QSLs 100% on initial contacts and keeps complete records. Unless you specifically request it, you won't get a QSL for a second or subsequent contacts unless five years have elapsed since the last one. No s.a.s.e. is necessary, but if you don't get a card within a reasonable time after the contact, let us know. Lots of things can happen, all inadvertent. Ask Edsel Murphy, *he* knows; he invented the law: "If anything can go wrong, it will."

Incidentally, when you QSL W1AW, your card doesn't get deposited in the round file. If you don't believe it, drop in some time and take a look at our display of over 50,000 cards arranged in alphabetical order, going all the way back to 1938 when the present W1AW was dedicated. There are just a few missing; they were sent down to the Smithsonian Institution to be part of a ham display there. – *W1NJM/W1WPR.*

W1AW SCHEDULE (effective February 23, 1975)

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M. - 4 A.M., Saturday 7 P.M. - 4 A.M. and Sunday 3 P.M. - 11 P.M., (all times local Eastern). The station address is 225 Main Street, Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent upon request. If you wish to operate, you must have your original operator's license with you. The station will be closed Mar. 28, May 26, July 4 and Sept. 1, 1975.

Times/Days							
CDT	*UTC*	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*	*Sunday*
0740	1240	← Oscar[9] →					.....	.....
0800	1300	CODE PRACTICE[1] (5-25 wpm MWF, 35-15 wpm TTh) Details Below					.....	.....
1200-1300	1700-1800	21/28 cw[7]*	7.290*	21/28 cw[7]*	7.290*	21/28 cw[7]*	.....	.....
1300	1800	← Oscar[9] →					.....	.....
1320-1400[4]	1820-1900[4]	14.290*	14.080*	14.290*	14.080*	14.290*	.....	.....
1400-1500	1900-2000	7.080*	21/28 ssb[8]*	7.080*	21/28 ssb[8]*	7.080*	.....	.....
1500	2000	← CODE PRACTICE[1] (10-13-15 wpm) Details Below →					.....	Oscar[10]
1530	2030	← CW Bulletin[1] →					.....	.....
1600-1630[4]	2100-2130[4]	7.1 Nov.[5]*	21.1 Nov.[5]*	28.1 Nov.[5]*	21.1 Nov.[5]*	7.1 Nov.[5]*	.....	Oscar[11]
1630	2130	← RTTY Bulletin[3] →					.....	.....
1700-1800[4]	2200-2300[4]	CPN[6]	14.095 RTTY*	3.625 RTTY*	7.095 RTTY*	CPN[6]	.....	.....
1800-1830	2300-2330	.....	CN[6]	.....	CN[6]	.....	.....	.....
1830	2330	← CODE PRACTICE[1] (10-13-15 wpm) Details Below →					.....	.....
1900	0000†	← CW Bulletin[1] →					.....	.....
1930-2000[4]	0030-0100[4]†	3.7 Nov.[5]*	14.080*	14.080*	7.1 Nov.[5]*	14.080*	.....	.....
2000	0100†	← Phone Bulletin[2] →					.....	.....
2010-2030[4]	0110-0130[4]†	3.990*	50.190*	145.588*	1.820*	3.990*	.....	.....
2030	0130†	← CODE PRACTICE[1] (5-25 wpm TThSatSun, 35-15 wpm MWF) Details Below →					.....	.....
2130-2200[4]	0230-0300[4]†	3.580*	.....	1.805*	.....	3.580*	.....	.....
2200	0300†	← RTTY Bulletin[3] →					.....	.....
2230	0330†	← Phone Bulletin[2] →					.....	.....
2240-2300[4]	0340-0400[4]†	7.290*	3.990*	7.290*	3.990*	7.290*	.....	.....
2300	0400†	← CW Bulletin[1] →					.....	.....
2330-0000[4]	0430-0500[4]†	3.7 Nov.[5]*	7.080*	3.580†	7.1 Nov.[5]*	3.580*	.....	.....

[1]CW Bulletins (18 wpm) and code practice on 1.805, 3.580, 7.080, 14.080, 21.080, 28.080, 50.080 and 145.588 MHz.**

[2]Phone Bulletins on 1.820, 3.990, 7.290, 14.290, 21.390, 28.590, 50.190 and 145.588 MHz.**

[3]RTTY Bulletins on 3.625, 7.095, 14.095, 21.095 and 28.095 MHz.** Bulletins at 170 Hz shift, repeated at 850 Hz shift when time permits.

[4]Starting time approximate, following conclusion of bulletin or code practice.

[5]W1AW will tune the indicated band for Novice calls, answering on the caller's frequency.

[6]Participation in traffic nets.

[7]Operation will be on one of the following frequencies: 21.02, 21.08, 21.11, 28.02, 28.08, 28.11 MHz.

[8]Operation will be on one of the following frequencies: 21.26, 21.39, 28.59 MHz.

[9]When an Oscar satellite is in orbit, daily updated orbital data is sent at 18 wpm on cw frequencies.

[10]Oscar orbital data for the coming week, on cw frequencies.

[11]Oscar orbital data for the coming week, on RTTY frequencies.

* General contact period.

** No 10- or 15-meter activity from 2030-0000 CST.

† Indicates following day when UTC is being used.

All frequencies are approximate.

W1AW CODE PRACTICE

W1AW transmits code practice according to the following schedule. Approximate frequencies are 1.805 3.58 7.08 14.08 21.08 28.08 50.08 and 145.588 MHz. For practice purposes the order of words in each line may be reversed during the 5-13 wpm transmissions. Each tape carries checking references.

Speeds	*Local Times/Days*	*UTC/Days*
10-13-15	7:30 PM EDST dy 4:30 PM PDST	2330 dy
10-13-15	4:00 PM EDST MTWThF 1:00 PM PDST	2000 MTWThF
5-7½-10-13-20-25	9:30 PM EDST SnTThS 6:30 PM PDST	0130 MWFSn
5-7½-10-13-20-25	9:00 AM EDST MWF 6:00 AM PDST	1300 MWF
35-30-25-20-15	9:30 PM EDST MWF 6:30 PM PDST	0130 TThS
35-30-25-20-15	9:00 AM EDST TTh 6:00 AM PDST	1300 TTh

The 0130 UTC practice is omitted four times a year on designated nights when Frequency Measuring Tests are sent in this period. To improve your fist by sending in step with W1AW (but not over the air!) and to allow checking the accuracy of your copy on certain tapes, note the UTC dates and *QST* practice text to be sent in the 0130 UTC practice on the following dates, from the Aug. issue.

Oct. 8: It Seems to Us
Oct. 12: Correspondence
Oct. 18: League Lines
Oct. 25: ARPS
Nov. 5: World Above
Nov. 7: YL News

5-BAND AWARDS

(Updating the September 1975 listing.)

5BDXCC: (Starting with number 443), K9PQG DJ4AX K4KJN DJ8SW WA4FDR YV4AGP G3HTA W5GTW OE1ZGA CR4BC.

5BWAS: (Starting with number 225), W9KB.

Filthy and Repulsive. Recently we received a letter from an outraged member who heard some "filthy and repulsive" language on the air. Nothing new about this, that's for sure, but it's still not good. This particular letter expressed concern about the matter but confessed some uncertainty about what could be done about it.

Well, our correspondent above reflects the concern of a great many of us. It is hard to believe that some of the language used, subjects discussed and inferences and innuendos made on the air are the type of thing that these people ordinarily would say in front of their wives, kids, mothers, sisters and church congregations. Yet they feel they have a perfect right to do so through a medium which encompasses any or all of the above and more. They are apt to retort that what they talk about to their contacts is their business, and if you don't like it there is always that handy gadget called a dial or an even handier one called a switch, either of which will eliminate it quickly. Which, of course, is a complete evasion of the point, because whether or not it offends us as individuals, a more important consideration is the impression it gives the casual listener. Have you ever been demonstrating your gear to a non-amateur friend when you tuned across some kind of drivel that made you utterly ashamed and greatly embarrassed? It is getting to be a more and more common experience.

But what to do about it? Well, perhaps the first thing to do is get our tolerance level cranked up a bit. When that's as high as you can conscientiously wind it, from there on up you have to rely on your personal opinion as to what is acceptable, what is questionable and what is decidedly improper, or "filthy and repulsive." When you hear something that fits your definition of the latter, believe it or not the most effective thing to do is to drop the guy a card or letter or even a telephone call (but keep it off the air) telling him *your personal opinion* of his conversation. If he gets enough of this kind of protest, he may get the message. There are a few amateurs, no doubt (sorry to say), who get their kicks from using off-color language or conversation on the air. A great many more, however, just don't think – don't stop to realize, that is, that they aren't just having a private confab with a buddy, that they are talking over an international facility which can be monitored, and frequently is, by just about anyone. Let's make our yak-yak exemplary of a responsible service – and let's tell those who don't that we don't like it. If everybody just wants something done about it but isn't willing to do something about it, it will just go on and on.

So Long, Bill. A shocker, for sure. WA1FCM has resigned from his position as Assistant Communications Manager for Public Service. Bill's name was becoming well known on the pages of *QST*, in all ARRL official circles and in federal government agency circles as well, but has decided to return to Maine, where you will still hear him using the same call. We're sorry to see him leave the Headquarters family and wish him well in any new endeavors. He'll be sorely missed.

This leaves Bob Halprin, WB2NOM, as the sole occupant of the Public Service corner of the department, at least temporarily. The feelers are out for additional personnel. See August *QST*, page 102, last paragraph, and let us know if you're interested. – *W1NJM.*

New A-1 Operators

W1ITO W5IJW W5SIH WØCHJ KØFTT WAØIJV WAØKYM WBØNJX HC1XG I3BRM.

SCM ELECTION NOTICE

To all ARRL members in the Sections listed below.

You are hereby notified that an election for Section Communications Manager is about to be held in your respective sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been both the holder of amateur Conditional Class license or higher (Canadian Advanced Amateur Certificate) and an ARRL full member for at least two years immediately prior to receipt of petition at headquarters. Petitions must be received on or before 4:30 PM Eastern local time on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, Zip code of the candidate and signers should be included with the petition. It is advisable that a few extra full-member signatures be obtained, to insure that it will be valid.

Elections will take place as soon after the closing dates specified as full information on the candidates can be obtained. Candidates' names will be listed on the ballot in alphabetical order.

The following nominating form is suggested. (Signers should be sure to give city, street address and Zip code.)

Communications Manager, ARRL (Place and date)
225 Main St., Newington, Conn. 06111

We, the undersigned full members of the . . . . .ARRL Section of the . . . . .Division, hereby nominate . . . . .as candidate for Section Communications Manager for this Section for the next two-year term of office.

You are urged to take the initiative and file nominating petitions immediately.

George Hart, W1NJM, Communications Manager

Section	*Closing Date*	*Current SCM*	*Present Term Ends*
Vt.*	10/20/75	J.H.Viele, W1BRG	3/1/74
Sask.*	10/20/75	P.A.Crosthwaite, VE5RP	4/10/75
S.N.J.*	10/20/75	C.E.Travers, W2YPZ	3/4/76
Okla.*	10/20/75	C.C.Cash, W5PMI	3/19/76
Conn.*	10/20/75	J.J.McNassor, W1GVT	4/12/76
Idaho*	10/20/75	D.A.Brock, WA7FWV	4/23/76
Ohio*	10/20/75	H.R.Greeb, W8CHT	4/29/76
E.N.Y.*	10/20/75	G.G.Berry, K2SJN[1]	6/10/76
N.N.J.	12/19/75	W.S.Keller,III, WB2RKK	5/11/76
Mo.	12/19/75	B.H.Moschenross, WAØHMD	5/11/76
Quebec	12/19/75	L.P.Dobby, VE2YH	6/1/76
S.C.	12/19/75	R.H.Miller, WA4HCI	6/5/76
W.Pa.	12/19/75	D.L.Myslewski, K3CHD	6/12/76
E.Mass.	12/19/75	F.L.Baker, Jr., W1ALP	6/15/76
Wyo.	12/19/75	J.P.Ernst, W7VB	6/26/76
Minn.	12/19/75	T.Olson, WØIYP[2]	8/1/76
W.N.Y.	12/19/75	G.W.Hippisley,Jr., K2KIR[3]	8/18/76

*Repeat Solicitations
[1] Resigned 6/15/75
[2] Resigned 9/1/75
[3] Resigned 8/18/75

SCM ELECTIONS RESULTS

Valid petitions nominating a single candidate were filed by members in the following sections, completing their election in accordance with applicable rules, each term of office starting on the date given.

S.D.	E.C. Gray, WAØCPX	11/1/75
N.C.	C.H. Brydges, W4WXZ	11/10/75
Ind.	M.P. Hunter, WA9EED	1/12/76
S.Fla.	W.Huddleston, K4SCL	2/4/76

Balloting Results: In the Washington Section, Mrs. Mary E. Lewis, W7QGP and Mr. Julian Dewaele, W7PWP were nominated. Mrs. Lewis received 663 votes and Mr. Dewaele received 445 votes. Mrs. Lewis's term of office began July 2, 1975.

DX CENTURY CLUB AWARDS

New Members

Radiotelephone listings follow the general-type "New Member" and "Endorsement" listings – July 1-30, 1975

W8OBI	259	W3ACE	169	W4IML	143	K4JPD	108	K1GBU	103	WA1TLL	101
YU1NYP	244	JA7BJS	163	JH1YDR	138	K9UWA	107	W1GPK	102	WB4WDH	101
W4HNW	230	WA6AIL	150	W3HAO	128	WA2GUR	105	W7CRC	102	F9UB	100
W6DAB	212	WA3NGS	148	W2FHU	118	WB2BXL	105	WA7JRL	102	WA1STO	100
YU1NSX	186	JA8HQI	146	YU1WD	112	WA8TEJ/YV6	104	GC5AGA	101	W4UBE	100
K2KA	185	WB2BXV	145	WØOAV	110	JE1HUT	103	WA1RGP	101	WA4MTZ	100
YU1NZR	185									WB8MTR	100

Radiotelephone

K7BCX	274	W4AAA	160	JH1YDR	138	SP9EES	105	WA1JZC	102	K4NJS	100
K2SHZ	241	W6DAB	158	JH1LBR	122	WB2CIS	105	W2GBI	101	K6TLG	100
YU2DK	169	WA6AIL	147	LA2DR	111	DK9KD	104	W4UW	101	WB2SKT	100
W3ACE	169	JA8HQI	146	G4BYX	108	W1DS	103	WA7TTM	101	WA7UVO	100
JA7BJS	163	K2KA	139	W7RIR	106	W1KE	103	IA2MTM	100		

CW

K6VY	101
OZ1VY	100

Endorsements

In the endorsement listings shown, totals from 120 through the 240 level are given in increments of 20, from 250 through 300 in increments of 10 and above 300 in increments of 5. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

W6PN/DL	320	W2AJR	300	WA2UWA	270	W4DSW	240	W7WMY	180	W4KEB	140
W3BWZ	320	YV5AK	300	WØAO	270	W4UPJ	240	K4PHY	160	WA6DNM	140
DJ2AA	315	EP3AM	290	DJØMW	260	W4WRY	240	K4UEE	160	K2IJ	120
W1AA	315	W1LQ	290	K6DT	260	WØYZB	240	K7PFU	160	WA1JZC	120
W3LPL	315	WB2NUU	290	W8CQ	260	W3VRT	220	K8EDQ	160	WA2KFN	120
KV4FZ	310	WA5RIG	290	WA9NHQ	260	WA3HRV	220	K9UTN	160	WA3RBN	120
SM6AEH	310	SM2EKM	280	DJ4AX	250	WA3DMH	200	PY1EMM	160	WA4ENJ	120
W1FJJ	310	W4OQN	280	WA2CCF	250	WB4MKB	200	WA1KRG	160	WB4EDD	120
W1IFL	305	W7YTN	280	W3ZSR	250	W1HM	180	YU2RIO	160	W6LQO	120
WB8EUN	305	W9LW	280	WA6CMX	250	WA1UC	180	K1FNU	140	W6NSK	120
W9TKR	305	YU1EXY	280	WAØONA	250	WA1NSJ	180	K3ENB/1	140	W9LUH	120
K9OTB	300	VE3BMB	270	G3TOE	240	W4JVN	180	K9HQM	140	W9VWV	120

Radiotelephone

K8DYZ	315	W9BEK	290	WA5RTG	250	W8PNC	220	W4JVN	180	K3DH	140
W1AA	315	F6AOI	280	W7YTN	250	I2CYJ	200	W7ZH	180	PY1EMM	140
W5NOP	315	W2RAD	280	W8FPM	250	PY7BSH	200	WB9HAK	180	VE3EFX	140
W6KZM	315	SM2EKM	270	G3TOE	240	VE3FFA	200	K2DA	160	WA3HRV	140
WB6UDC	310	DL7FP	260	K4MEZ	240	W1WXZ	200	VE3FJE	160	WA8ZCO	140
W9OHH	305	W1FJJ	260	W4WRY	240	FP8DH	180	W3KV	160	WA9HRN	140
DJ2AA	300	W5HCJ	260	W6DOD	240	G3YJI	180	W4EBO	160	K9HQM	120
KV4FZ	300	WA2CCF	250	W3ZSR	220	K6DT	180	WB6BMW	160	WA4DHO	120
W6YO	300	W6KG	250	W4OQN	220	WB2GYD	180	WA8UUY	160	WB4PAB	120
										W9LUH	120

CW

W1DAL	120

July "Open" CD Party
High-Claimed Scores

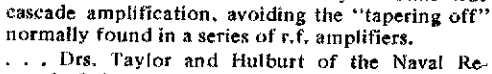
The following are high-claimed scores. They read, from left to right: call, score, QSOs, sections, hours of operation. Final scores will appear in the October CD Bulletin. – *WA1STN*

CW

W9YT (K9ZSE, opr.) 448,440-1212-73-20
K4PUI7 435,585-1220-71-20
W2YD (WA2SRQ, opr.) 431,200-1226-70-20
W3LPL (WA2LQZ, opr.)* 421,030-1181-71-20
WA2UOO 419,300-1191-70-20
K2KJR 418,680-1155-72-20
WA5LES 404,640-1117-72-20
K7NHV 386,400-1096-70-20
WA8YVR 381,980-1069-71-20
W1ZM (WA2CLQ, opr.)* 375,120-1035-72-20
K6OVJ (WB6ZVC, opr.)* 371,160-1024-72-20
K0GXR 366,735-1063-69-20
WA0ENP (WA0WEZ, opr.)* 362,600-1030-70-20
WA1STN 352,515- 987-71-20
WB0DJY* 351,900-1035-68-20
WA3NWH 350,765- 953-73-19
WB2RKK 350,520-1008-69-20
W8LHE 347,190- 978-71-20
W3IN 333,345- 933-71-20
K9UKM* 329,088- 922-71-20
W8FAW/4 324,850- 884-73-20
WA9BWY* 320,565- 899-71-20
K9IU (WB9GVT, opr.)* 312,225- 901-69-20
WB8AYC 309,540- 920-67-20
W7IML 306,950- 877-70-20
WB8YBL* 302,940- 887-68-19
K6RR (WA6TLV, opr.)* 297,160- 867-68-20
W4NQA 295,320- 850-69-17
K2JOC 290,110- 862-67-20
WA1QNF 290,110- 862-67-20
WA2DSA 285,420- 845-67-20
WA3FAL (WA3SZX, opr.)* 279,650- 799-70-17
K7LTV 258,405- 742-69-17
WA2MBP 258,300- 733-70-19
K1JYN/6* 255,955- 711-71-17
WB2NJG* 248,565- 675-73-19
WB9KSK* 241,740- 711-68-19
K9UIV 237,360- 684-69-19
WB2AEH 230,750- 710-65-18
VE3BVD 230,145- 687-67-20
K0ZXE 230,115- 663-69-20
WB2QBP (WB2UFG, opr.) 230,080- 711-64-18
K8VTA* 225,550- 691-65-19
W7GHT 225,400- 637-70-15
WA9MXG 219,420- 632-69-18
W8EDU (WA3BGE, opr.) 218,620- 638-68-11
WB2PYM 207,360- 644-64-12
W4BTZ/4 206,655- 592-69-19
WA3JYB 206,380- 600-68-20
WB0GEX 203,680- 603-67-16
WA8POS 202,230- 637-63-16
K8RMN* 198,990- 599-66-20
W1FCC/3 197,440- 581-68-
W1OP (WA1POI, opr.) 197,275- 607-65-17
W6BIP 196,700- 562-70-16
WA4UAZ 194,480- 567-68-19
W0FTT 192,165- 557-69-15
WB9KMQ 183,950- 562-65-20
WB6DJP 179,400- 515-69-17
W0DTF 178,500- 519-68-16
K6VNX* 177,550- 526-67-17
WA6OTU 172,720- 502-68-17
WA4KKP* 170,300- 519-65-20
W1DAL 168,300- 503-66-10
WA7GOO 163,680- 491-66-20
K8YQW* 159,390- 501-63-14
WB2WBH 154,050- 472-65-20
WB6BBC 153,300- 434-70-
K4HZL 151,470- 451-66-13
K9EYA 151,090- 521-58-17
WB8NUA* 148,525- 454-65-19
W7ZMD 145,180- 427-68-15
WB2UJD 141,600- 469-60-19
WB9DED 141,215- 459-61-14
W6IKW 140,175- 439-63-20
WB2FIT 136,945- 449-61- 9
K8MLO 134,970- 405-66-11
W5WG 133,960- 390-68-19
VE2BYR 132,900- 443-60-15
K3HXS 132,600- 438-60-14
WA1NNC* 130,650- 397-65- 7
W8RC 127,890- 400-63-
W4HIR 122,060- 359-68-12
WB4EZQ 121,500- 405-60-19
WB2WZA* 120,900- 367-65-17
W4OYI 118,925- 348-67-10
WB2HZH* 118,560- 415-57-20
WB4DNB* 117,440- 363-64-20
W9YH (WB2SMD, opr.)* 114,165- 380-59- 8
W9EI 113,665- 332-67-16
WA2DLV 113,085- 356-63-13
K3DTD 112,200- 369-60-18
KIWKJ/4* 111,210- 330-66-16
WB9LHI* 110,565- 346-63- 5
W8HK* 110,080- 337-64-15
WA2ROK 109,740- 366-59-13
WA3QLG 109,740- 350-62-17
WA2DRC 107,445- 370-57-14
WA6UCS 106,420- 308-68-16
WA3VBM 105,300- 346-60- 9
W2TE* 102,785- 332-61-15
K2DW* 102,400- 317-64-18
WA2SLF 101,790- 373-54-13
WB0JGT 101,760- 338-64-16
WB8BPY 101,745- 323-63- 7
W6OQX 100,800- 330-60- 5
W2SZ (WA2s AYC FBI SPL WB2OEU) 554,070-1511-73-20
K1VTM (+WA1s ABV LNQ W1GNC) 501,120-1387-72-20
W8LT (WA1LKU WA7ISP WB8JXS) 307,360- 898-68-19
WB2AXV (+WA2s AVB ENG WB4SON)* 214,900- 610-70-20
WA1RWU (+WA1LPJ) 190,080- 591-64-17
WB4UIH (+WB4MWC) 157,120- 487-64-20
WB6AKR (+WB6OYN) 142,025- 435-65-16
K0LIR (W0IBH WB0IKR)* 108,045- 336-63-14

PHONE

W2YD (WB2RKK, opr.) 564,095-1581-71-20
W3LPL (WA2LQZ, opr.)* 556,200-1540-72-20
W2SZ (WB2OEU, opr.)* 544,580-1492-73-20
WA9BWY* 488,370-1334-73-20
W6MAR (WA9UCE, opr.) 432,750-1154-75-20
W9YT (WB9FRG, opr.) 400,770-1093-73-20
WA2NPP (WB2FLF, opr.) 395,715-1140-69-19
K8FVA 384,800-1040-74-17
WA3SWF 382,520-1040-73-20
K2JOC 364,665-1053-69-20
W4NQA 361,800- 999-72-19
WB2QBP (WB2UFG, opr.) 341,280- 940-72-18
WB6YBL* 335,650- 955-70-19
WA4QOC* 286,200- 792-72-18
VE3BVD 283,800- 880-66-20
WA1ABW 282,100- 861-65-13
WB0IWL 280,800- 780-72-20
W7TML 279,000- 775-72-20
K0GXR 278,120- 818-68-14
WB9KMQ 264,610- 734-69-20
WB0NHG (WA2WMT, opr.)* 241,850- 691-70-14
WA1STN 226,125- 669-67- 8
KZ5WA 221,400- 612-72-17
WB6HJW 211,935- 597-71-20
WA9MXG 209,145- 569-73-12
WA1RWU 207,365- 616-67-11
WA2DLV 192,320 598-64-18
W8RC 186,990- 536-69- 6
W4WKQ* 185,640- 546-68-11
W0LJF (K0PVI, opr.) 166,850- 470-71-16
WA1NNC (WA1VCH, opr.)* 164,125- 600-65-11
WB2JSJ 162,300- 538-60-11
W2GLE (WB2OYV, opr.) 160,185- 537-59- 9
K3HXS 159,940- 504-61-14
WB4KXF/0* 156,160- 512-61-20
K7NHV 154,360- 446-68- 5
K3HBP* 152,130- 461-66-15
WB2SJG* 151,875- 399-75-14
K9UIV 144,845- 487-59-17
WB5HVY 135,340- 400-67-20
W5WG* 132,330- 397-66-19
WB4TPU 129,310- 384-67- 8
W8LHE 127,410- 411-62- 4
WB9LHI* 126,790- 404-62- 4
WA3LMY 120,065- 404-59-16
WA3VQE* 119,480- 412-58-15
WB2PYM 117,425- 423-55- 6
K4TXJ 113,150- 358-62-14
WB9AMC* 108,385- 404-53-11
WA3YGH* 107,970- 362-59-16
W9CUS* 105,280- 376-56-20
WA3WRN 104,980- 358-58-15
WB0JGT 104,940- 315-66-12
K9EYA 103,545- 351-59-12
K9BGL 103,360- 323-64- 8
WB2NDR 102,950- 355-58-11
WA4JQX* 100,725- 395-51-15
W9LT (+K9LUS) 353,225- 990-71-20
WB8AYC (WB4VBG WB8s FFZ QVC) 351,555-1015-69-20
W8LT (WA1LKU K8MLO WB8s IBZ JXS) 340,445- 955-71-19
W8FAW/4 (+WB4FZQ) 294,920- 802-73-18
WA6DIL (+WA6DEF) 282,240- 784-72-19
WA0FKJ/0 (+WB0IRL K0FPC) 281,400- 800-70-18
WA1QNF (+WA1OCU) 255,605- 759-67-20
WB2AXV (+WA2s AVB ENG WB4SON) 193,800- 601-64-20
WA3FAE (+WA3s SZX WIK) 157,080- 462-68- 7
WA3QYV (+WA3VDQ WN3ZRR) 116,025- 450-51-12
WB2HZH (+WA2CLQ)* 110,505- 414-53-20



October, 1925

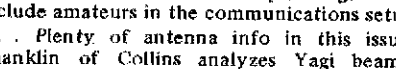
. . . Dr. Hull of Radio Frequency Laboratories describes a receiver which he says obtains true cascade amplification, avoiding the "tapering off" normally found in a series of r.f. amplifiers.

. . . Drs. Taylor and Hulburt of the Naval Research Laboratory have an extensive and classic treatise on h.f. wave propagation, a scientific analysis which leans heavily on amateur experience, including the Reinartz "skip" theory. The phenomena of light rays moving between air and water furnish excellent analogies.

. . . The Army Signal Corps and the League have worked out a plan for cooperation between the military and transmitting amateurs. It visualizes an amateur station active at each National Guard and Organized Reserves unit in the country.

. . . Ralph Batcher of the Grebe company takes us through the design of a "detector and one step" short-wave receiver, with especially useful information on coil winding.

. . . Regulations prohibiting pecuniary interest are not quite so sticky, so you can win prizes for, as an example, working the most miles per watt this next twelve months.



October, 1950

. . . The National Security Resources Board, responsible for civil defense planning, intends to include amateurs in the communications setup.

. . . Plenty of antenna info in this issue. J.P. Shanklin of Collins analyzes Yagi beamwidth, complete with formulae and charts showing the effect of element spacing. W1BOD adds to the data with new light on the subject of driven-element length. W9EH describes his 36-element 10-meter rotary atop a 125-foot tower! W1HDQ summarizes amateur progress in all-metal ("plumber's delight") beams for 2 meters. And W8TWQ shows us how to rotate an end-fire array for 10 and 20.

. . . Continuing the attack on TVI problems, WITS has designed a medium-power transmitter with double shielding accomplished by copper screening.

. . . W1VG discloses the secrets of getting useful QSLs for your contacts – involving card design, completeness of information, and techniques for exchange.

. . . LU7CW hasn't access to U.S. war surplus such as the BC-453, so has built his own version of a Q5-er to achieve desired selectivity. – *WIRW*

The WR4AAG ATV Repeater

BY BRUCE J. BROWN,* WB4YTU/WA9GVK

IN MUCH THE SAME WAY as 2-meter repeaters have greatly generated interest in vhf and fm experimentation, the use of omni-directional, fast-scan television repeaters will expand interest in uhf and television techniques.

Successful implementation of the amateur television repeater concept, by WR4AAG[1] in Alexandria, Virginia, has been achieved and results documented.[2] Situated in an urban area filled with high-rise buildings that block and attenuate signals, the repeater has provided reliable communications otherwise not possible using the simplex mode. QSOs between stations using low power T44s[3] or CMU-15s[4] separated by 50 miles are commonplace. In addition to providing increased range through amplification and establishment of a geometric line-of-sight propagation path, the repeater provides other noteworthy benefits:

A) A single home TV set can be used to receive both the sound and picture from the repeater since the audio signal is transmitted 4.5 MHz above the video (standard commercial format).

B) Stations can use fixed directional antennas. Round-table QSOs are thus easily implemented.

C) Since the repeater generates a video i-d as a receipt for a received signal, it provides a simple "go, no-go" transmitter tested for users.

The basic repeater configuration as shown in Fig. 1 is fairly self-explanatory. Note that simultaneous video reception and re-transmission is achieved using a circulator and 8 MHz wide, sharp-skirted, interdigital filters[5] as opposed to employing a narrow-band cavity resonator duplexer normally used by fm repeaters. The latter device is much too narrow to pass a 4-MHz TV signal. Also keep in mind that transmit-to-receive isolation requirements for TV operation are far more stringent than that required for narrow-band fm repeaters since the amplitude-modulated TV signal is easily degraded by low levels of interference.

* 4801 Kenmore Ave., Apt. 1022, Alexandria, VA 22304.

[1] Supported by Metrovision TV Club, P.O. Box 408, Falls Church, VA 22046.

[2] Brown, "WR4AAG Fast-Scan Amateur Television Repeater," May 15, 1974, submitted to the FCC.

[3] McLeod, "ATV with Motorola T44 UHF Transmitter," December, 1972; February 1973, *QST*.

[4] Ohara, "Practical Ideas for the ATV Enthusiast," February 1975, *QST*.

[5] Fisher, "Interdigital Bandpass Filters," March 1968 *QST*.

Repeater Components

1) "Video" antenna — 10-dB gain, 7-degree beamwidth, vertical omni, factory tuned for 227.25/439.25 MHz, 250-watts average power, 25-feet long; Phelps-Dodge 455-509.
2) 20-dB directional coupler — PRD No. V4420-20.
3) Circulator — 20-dB isolation, 420-450 MHz, 300-watts average power max, Merrimac FCC 17763.
4) Receive interdigital filter — 2, 4-pole filters in series, tuned to 439.25 MHz, Ref: March 1968 *QST* p. 32. Cut "finger" bars approximately 1/8" shorter than specified.
5) Pre-amp — Janel No. 432PA tuned to 439.25 MHz.
6) Receiver — T44 receiver using 6C4 buffer to output 1st i-f (69.817 MHz), Crystals = Y1: 30.78607 MHz; Y2: 8.700 MHz.
7) TV receiver/monitor — Zenith E1335 modified to provide video output; tuned to CH4 to demodulate 69 MHz i-f from T44.
8) System control unit — Activates transmitter upon receiving signal; inserts character generator video identifier; records key-ups and in-use hours; WB4YTU homebrew.
9) Character generator — 4 page, 10 by; 16 characters per page; WB4YTU homebrew.
10) Video exciter — T44 transmitter modified per *QST* Dec. 1972, Feb. 1973; tuned to 427.25 MHz, set for about 8-watts output.
11) Transmitter interdigital filter — 4-pole bandpass filter tuned to 430 MHz. Ref: March 1968 *QST* p. 32. Cut "finger" bars 1/16" longer than specified. (Filter provides partial suppression of lower sideband and attenuates undesirable higher frequencies.)
12) Linear Amplifier —AM-1178 modified per A5 magazine Nov.-Dec. 1973, p. 24.
13) Audio exciter — 431.75 MHz T44 transmitter, ±25 kHz deviation.
14) "Audio" antenna — 4 dB gain vertical omni, homebrew.

[EDITOR'S NOTE: WR4AAG, ATV, is operating under special temporary authorization. The author has petitioned the FCC to amend the amateur rules, specifically 97.61 (c) to permit an input frequency of 439.25 MHz using NBFS Type I modulation and an output frequency of 427.25 MHz using NBFS Type I or II, with a total bandwidth, receive and transmit, of 8 megahertz. We would appreciate hearing from frequency coordinators and other interested parties to provide guidance for VRAC and the Board of Directors in establishing a formal position in connection with this petition.] QST

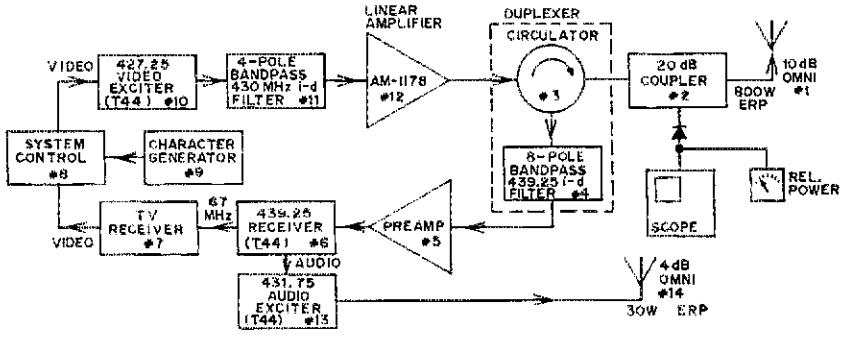


Fig. 1 — Block diagram of the repeater configuration.

All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

DELAWARE – SCM, Roger E. Cole, W3DKX – SEC: K3KAJ. RM: W3EEB. PAM: WA3DUM. PSHR: WA3DUM 61, K3YHR 44, K3KAJ 42. Delaware lost an active ham when W3HUG became a Silent Key. Happy Uncle George was noted for his potent 2-meter signal from atop the Dorset Apts. W3BHG worked W6PO in Calif. via moonbounce and WB5LUA in Texas via meteor scatter for his 37th & 38th states on 2 meters. WA3WPY received his 25 wpm endorsement and has 16 states QRP with an HW-7 with 3 watts on batteries. WA3THL worked his 1st VE1 on 6 meters. K3YHR & W3EEB are trying to work out a Northern De. Ham Campout for the last week end in Sept. at the AOK Campground near Glasgow. DTN: QNI 308, QTC 38. DEPN: QNI 59, QTC 12. Traffic: K3KAJ 50, W3EEB 49, WA3DUM 44, WA3KDR 29, W3DKX 21, WA3WUL 11, WA3WPY 5, K3YHR 5.

EASTERN PENNSYLVANIA – Acting SCM, Paul D. Mercado, W3EBF – SEC: W3EBF. PAMs: W3AVI, WA3PZO. RMs: K3DZB, W3EML, K3MVO, WA3PHQ, WA3WOE, WB2FWW/3. Comments on July heat from W3EML, W3ID & WB2RBA/3. K3MVO & W3BNR traveling around U.S. FT101 to W3BUR. 6 fm, RTTY, & a little cw to WA3PZO. WA3VCS showing off 2 Model 28s. W3GMK has antenna up, received fixed and transmitter down. WA3VDQ enjoying CD party. WA3FMP passed Paramedic test. Congrats. WA3YQE has General. WA3YBT up to Advanced. W3HYT finishing cubical quad. K3ENX & W3UZU have Advance. After 19 years W3HMR worked Vt. and has WAS. Bucks Co. happy with SFT results. PWA & DLARC had a good FD. WR3ABZ, Radnor, 147.66/.06 has AREC Net, ARRL bulletin and cw practice. Viet Refugee traffic still flowing. WA3WOE building keyer. Glad to see new faces on nets. EPAEP&TN, 3917, 6 PM Dy, QNI 260, QTC 67; PFN, 3960, 5:30 PM M-S, QNI 537, QTC 474; PTTN, 3610 6:30 PM Dy, QNI 113, QTC 35; EPA, 3610, 7/10 PM, no report; CMTN, 3720, 7 PM Dy, no report. Traffic: W3CUL 3998, W3VR 1481, WA3UKZ 1068, W3AVJ 1061, WA3ATO 366, WA3PHQ 196, W3EML 170, WA3PZO 91, WB2RBA/3 67, W3WRE 60, W3IPX 52, K3OIO 37, K3MVO 36, WA3REY 36, W3ADE 25, WA3IWX 22, WA3NDQ 21, K3BHU 20, WA3TAV 19, WA3VDQ 18, W3LC 17, W3BNR 16, WA3SVJ 15, WA3RCA 11, W3BUR 9, W3ID 9, W3CL 8, WA3TMP 7, W3HK 4, K3HXS 2.

MARYLAND-DISTRICT OF COLUMBIA – SCM, Karl R. Medrow, W3EA – SEC: K3LED. RM: W3FZV. PAM: WA3EOP. NCM: WA3LPL. Top honors MDCTN for July go to WA3WRN, W3LDD, WA3EOP, W3ADQ and WA3PRW. MDD top brass W3EA, W3FZV and WA3UYF. Congrats. K3GJD keeps the boys informed on 07/67. W3TN sends a nice note on the W3EEB Campsite. WA3JSZ finds no discrepancies in the OO line. K3LFO reports the newly formed Southern Md ARC is organizing emergency communications in Charles County. W3CVE says TCRN meets every hour on 3530/3715, 7045/7060, 14050/14105 for you cw speed merchants. Any NCS volunteers? MDCTN needs week end NCS volunteers. W3BHE talked to the Lions Club on Amateur Radio naturally. WA3SJY hosted KP4EAI for local visits. W3OKN has good antenna prospects, but the grass is too high. W3ZNW is a regular EC reporter. W3EOV is off on another month's trip to the west. W3MWD makes the week day skeds. W3CDQ coming along fine, entertained visitors DJ1TF and VK3LC and XYL. WA3SJS changed jobs which altered his skeds. K3ORW is an umpire in the girls softball league. W3FCS reports steady progress and now has the beam up and rotating at the new QTH. W8BZV/3 keeps things humming at Andrews AFB. K3TNM already has memory added to his solid state keyer. W3FZV had a ball in the open CD party. WA3PRW finds the ten meter openings good. WA3UYF on health care exclusively after successful surgery. WA3UPH has the 2-meter mobile installed with a new mobile antenna. WA3WRN busy making BPL again and working on solid state. WA3KLV spearheads the Antietam ARA exhibit at the Valley Mall Shopping Center to attract new Novices. WA3EOP mans W3CWC with regularity. WA3MSW goes back to school as a graduate student, and sorry he missed the Picnic. WA3ZAS spent much time on W3FA's towers preparing for the fall operations. With the nets it is Freq/GMT/Sessions/Tfc/QNI Avg. MDD: 3643/2300-0200/60/151/6.8. MDCTN: 3920/2200/15/47/10.2. WR PON: 3905/2115/12/35/11.3. Traffic: (July) WA3WRN 311, W3CVE 128, W3FA 98, W3MWD 97, WA3UPH 90, WA3SJY 86, W3FZV 78, WA3UYF 57, WA3EOP 52, W8BZV/3 30, WA3PRW 14, W3EOV 12, WA3ZAS 9, W3BHE 5, WA3SJS 5, K3TNM 4, W3ZNW 4. (June) WA3SJS 5.

SOUTHERN NEW JERSEY – SCM, Charles E. Travers, W2YPZ – The need for AREC members is still very essential. The assistance in recent floods was more than appreciated and all who assisted are to be commended. There is still time to contact your SEC and enroll in this program. WB2RMK reports a record QNI of 329 in 31 sessions and 92 traffic for the Slow Net. WA2DSA reports Early NJN as 483 QNI, 190 QSP and 212 traffic while the late NJN reports 274 QNI with 89 QSP and 144 traffic. A recent ORS appointee is WB2LCV. Dick also leads in the total traffic for the month. Keep the reports and applications coming EC, ORS, OPS, OO. Traffic: WB2LCV 65, WN1VHN/2 43, WB2SFX 9, W2YPZ 9, W2ORS 3, W2REH 2, W2IU 1.

WESTERN NEW YORK – SCM, G.W. Hippisley, K2KIR – Asst. SCM: Richard M. Pitzeruse, K2KTK. SEC: W2CEP. ESS July totals: QNI 246, QTC 78, in 21 sessions. Mgr. K2UIR welcomes WB2KJT to the net. Don't forget the new method of counting your traffic for third-party originations. WA2SMI elated (I can't use his exact words) at passing Advanced Class exam. He's celebrating with a new SB-104 and 18-AVT. Speaking of antennas, WB2THS is going with four elements on 20 (wow!); W2RUT is again active after fixing his, and K2IMI is having trouble with hers. (You can radiate some of the signals all of the time, or all of the signals some of the time, but–). Congrats to WB2KAO and K2VIV, who won the QRP Contest at Rome Family Day. WA2OMN active with K9NBH/9 on FD. Heard in the CW Open CD Party: W2s FZK, FR, K2s KIR, KNV, KTK; WA2s DRC, ECC, LUF, QXA, SON, WDE; WB2s EXL, IKL, THS. Public Service notes: W2EWO, EC Tioga County, reports 11 operators provided comm for the Great Owego Nichols Raft Race, and 16 ops helped out in the May March of Dimes WalkaThon, for which the club received a Certificate of Appreciation from the M of D National Foundation. The Rome Radio Club describes community assistance in the Loyalty Day and Flag Day parades, the WalkaThon, the Onondaga Cycling Club time trials, and the ICC Canoe Races. Also, another very successful emergency drill for the Onandaga County group. Note WB2WPA Rochester area OB transmission on 52 simplex at 2400Z (8 PM) Tue. and Thur. and 1800Z (2 PM) Sat., repeated 10 minutes later on WR2AFJ (69/09). PSHR this month to WB2THS, W2OE, W2MTA and W2FR. I regret that increasing work commitments force me to resign as SCM, effective immediately. K2KTK will serve as Acting SCM until such time as a new SCM election takes place. Traffic: (July) W2FR 359, W2MTA 142, WB2THS 135, W2OE 131, W2RUF 122, WB2VND 105, WB2UBW 61, K2UIR 42, WB2QIX 33, WB2AEK 29, W2RQF 25, WA2DRC 24, K2KIR 18, W2HYM 15, K2IMI 7, WA2EAJ 5, W2IAM 1, WB2WPA 1. (June) W2EWO 123. (May) W2EWO 32.

WESTERN PENNSYLVANIA – SCM, Donald J. Myslewski, K3CHD – SEC: W3ZUH. Asst. SEC: K3SMB. PAM: K3ZNP. RMs: W2KAT/3, W3NEM, W3LOS, W3KUN. WPA CW Traffic Net meets daily on 3585 kHz at 7:00 PM local time. Pa. Traffic Training Net meets daily on 3610 kHz at 6:30 PM local time. Pa. Phone Net meets Mon. thru Fri. on 3960 kHz at 5:30 PM local time. Recent appointments made: K3OYB as ORS, WA3PMT as OPS, and K3JCX as OVS. It is with deep regret to announce the Silent Key of W3KPZ. The following counties have openings for an EC: Potter, Clinton, Fulton, Bedford, Somerset, Fayette, Greene, Beaver, Butler, Indiana, Jefferson, Elk, Clearfield. Interested? Contact me or the SEC for details. Franklin County EC WA3QHR provided AREC communications for Cancer Drive in Chambersburg. K3LVO was WPA Section winner of the Conn. QSO party. WA3WNU finally made WAS by traveling 3000 miles to Nev. to get the QSL! (That's determination). W3YD and W3LQS were visited recently by lightning which entered their shacks and caused minor damage. WA3MPV is building a mini-computer. The Corry ARC and Crawford ARC provided communications for the NW Pa. Firemen's Convention Parade. If there are any WPA members interested in a Bicentennial QSL card for 1976, contact me for details. It is still not too late to get those antennas up before the winter season sets in. Next month's column will include the July WPA CW Traffic Net report along with the month of Aug. because of a vacation conflict. PSHR: WA3VBM 47. Traffic: WA3VBM 120, W3EGJ 66, W3UF 49, K3CHD 26, K3SMB 18, K3ASI 12, W3KUN 11, WA3TQ 10, WA3OKK 6, W3IDO 2, W3TTN 2.

CENTRAL DIVISION

ILLINOIS – SCM, Edmond A. Metzger, W9PRN – Asst. SCM: Harry Stoder, W9RYU. SEC: W9AES. PAM: WA9KFK. RM: K9ZTV. Cook County EC: W9HPG.

Net	*Freq.*	*GMT/Days*	*Tfc.*
ILN	3690	0300/2330 Dy	326
Ill Phone	3915	2245 Dy	399
NCPN	3915	1300 MS	94
NCPN	3915	1800 MS	47
IEN	3940	1400 Su	

WA9KFK has been appointed PAM for the Ill. Section. Ruby has been very active on the traffic nets and brings her expertise to the traffic gang. Our sympathy to the family and friends of K9LVC who was brutally assaulted which resulted in his death in Springfield, Ill. W9YFV has also joined the ranks of Silent Keys. He was an active DXer and will be missed by the DX fraternity. W9QBH the recipient of Hamfesters "Ham of the Year" award at their annual Hamfest. W9PRN received his 25-year ARRL pin. New appointments this month include WB9PRQ, W9LFH and W9LBQ as OVSs; K9CUB as OO and WB9OLF as ORS. The Sangamon County Red Cross first aid stations at the Ill. State Fair were assisted by members of the Sangamon Valley Radio Club amateurs with their emergency

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.

Kit SB-104, 31 lbs., mailable 669.95*
Kit SBA-104-3, 400 Hz CW crystal filter, 1 lb., mailable 36.95*
Kit SBA-104-1, Noise blanker, 1 lb., mailable 26.95*
Kit SBA-104-2, Mobile mount, 6 lbs., mailable 36.95*
Kit HP-1144, Fixed station power supply, 28 lbs., mailable 89.95*

SB-230 — the lowest-cost conduction-cooled linear around

The SB-104's "silent partner." 1200 watts PEP or 1000 watts CW from less than 100 watts drive. It's rated at 400 watts input for slow-scan TV and RTTY. The high-efficiency Eimac 8873 triode is double-shielded to reduce stray RF and a massive heat sink replaces noisy fans and blowers. The "230" assembles in just 15 to 20 hours with no alignment.

Kit SB-230, 40 lbs., mailable 319.95*

SB-634 station console combines 5 convenient accessories

The "634" performs 5 important functions—a 1 minute digital ID timer with visual or visual an audible indicators an RF wattmeter that reads 200-or 0-2000 watts with ±10% accuracy, an SW bridge, a hybrid phone patch that can be use manually or with VOX control, and a 24-hour dig tal clock that runs independently of all other fun tions. It's a must for every well equipped statio

Kit SB-634, 14 lbs., mailable 179.9

SB-614 station monitor shows you how clean your signal is

Highly visible 1½ x 2" CRT detects problems th can reduce the effectiveness of your signal — no linearity, insufficient or excessive drive, poor ca rier or sideband suppression, regeneration, par sitics and CW key clicks. It monitors SSB, C and AM signals from 80 to 6 meters. Push-pu drive for keystone free trace; automatic sy sweep generator with 3 ranges from 10 Hz to kHz. Can be used as an ordinary oscilloscop from 10 Hz to 50 kHz.

Kit SB-614, 17 lbs., mailable 139.9

SB-644 remote VFO

Designed exclusively for the SB-104. It provid split transmit and receive control and you are frequency-limited in any way — transmit at o end of the band, receive at the other. The "64 even has two crystal positions for fixed-frequen control. The "644" has a linear dial, but the exa frequency is displayed on the "104's" digital rea out. The display automatically changes wh switching from transmit to receive.

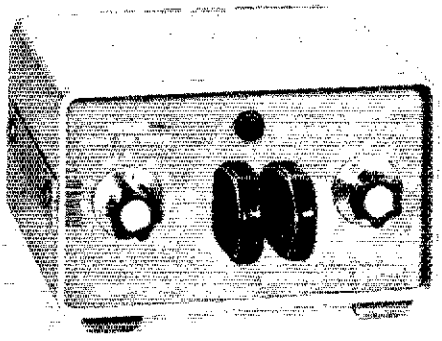
Kit SB-644, 10 lbs., mailable 119.9

SB-604 station speaker — response-tailored to SSB

Designed to match the SB-104 in styling and p formance. The "604" uses a 5 x 7", 3.2-o speaker. And there's room inside for the HP-1 power supply. With connector cable and plug.

Kit SB-604, 8 lbs., mailable 29.9

New Heath Ham Accessories



New solid state Heathkit Electronic Keyer...49.95

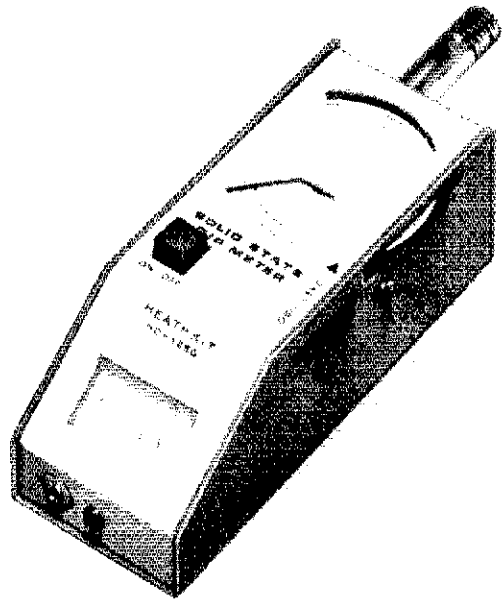
Sending code's easy with the HD-1410 whether you're operating base or portable. The dot and dash paddles' travel and tension are easily adjustable. When the two paddles are treated as one, the HD-1410 operates like a single-paddle keyer with dot and dash memories. Iambic operation forms most characters 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.

Kit HD-1410, 5 lbs., mailable **49.95***

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.

HEATHKIT ELECTRONIC CENTERS — Units of Schlumberger Products Corporation Retail prices slightly higher.

ARIZ.: Phoenix; CALIF.: Anaheim, El Cerrito, Los Angeles, Pomona, Redwood City, San Diego (La Mesa), Woodland Hills; COLO.: Denver; CONN.: Hartford (Avon); FLA.: Miami (Hialeah), Tampa; GA.: Atlanta; ILL.: Chicago, Downers Grove; IND.: Indianapolis; KANSAS: Kansas City (Mission); KY.: Louisville; LA.: New Orleans (Kenner); MD.: Baltimore, Rockville; MASS.: Boston (Wellesley); MICH.: Detroit; MINN.: Minneapolis (Hopkins); MO.: St. Louis (Bridgeton) NEB.: Omaha; N.J.: Fair Lawn; N.Y.: Buffalo (Amherst), New York City, Jericho (L.I.), Rochester, White Plains; OHIO: Cincinnati (Woodlawn), Cleveland, Columbus, Toledo; PA.: Philadelphia, Pittsburgh; R.I.: Providence (Warwick); TEXAS: Dallas, Houston; VA.: Norfolk (Va. Beach); WASH.: Seattle; WIS.: Milwaukee.



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AM-314A

communications. WB9GLQ is planning a WAS award for working all A prefixes. Contact him for details of his project. Many Central Ill. amateurs were active in message handling for the Canton tornado disaster. Marshall Tisler presented an interesting antenna demonstration at the last Starved Rock Radio Club meeting. Wedding congrats to WA9IRZ and his XYL. The Chicago FM Club was spotlighted in the June issue of Worldradio news with a column on their club history. Now is the time for clubs to make arrangements for their fall code and theory classes. Please notify the League headquarters of their program. WN9NFH now WB9NFH as a General Class. WB9KDE is recuperating from recent illness. W9VGW. WB9NVN and W9NJP are BPL recipients for the month of July. Traffic: (July) WA9VGW 699, WB9NVN 507, W9NXG 282, WB9NOZ 163, K9ZTV 144, W9NJP 130, W9JXV 63, W9AES 58, W9LNQ 58, W9KR 57, WA9ULP 53, WB9OLF 45, W9HOT 39, WB9GIU 33, W9HPG 32, W9PRN 20, WA9JJE 12, WB9DED 10, W9OYL 8, WB9NIU 7, W9RYU 6, W9VFY 6, WB9IMV 5, WB9LQC 4. (June) W9OYL 74.

INDIANA – SCM, M.P. Hunter, WA9FED – SEC: W9UMH. Congrats to the Indy Hamfest committee for a good show this year. Attendance was down from last year but the weather can be blamed. Activity seemed good during the June CD Party. The "Ham Splatter" of the Ft. Wayne Radio Club reports W9UIC has been an active member for 56 years. Can anyone top that in time? Word has filtered in that WB9BPG and WB9LHI have been recognized by TARI as having the strongest signals from stateside. WB9PNP reports he has WAS – finally! K9OTB presently active as FP0YV. Congrats to WN9ODH for first place in Ind. during the Novice Roundup. W9EI now sporting a new Drake C-line. Lake Co. ARC reports 2,780 points during Field Day. WB9PNP also advises he has passed his First Class radiotelephone exam. WN9NIF and WN9QPC are awaiting their Advanced tickets. K9CBY reports his antennas have died of component fatigue. W9SFR is in the process of rebuilding after losing his antennas in the spring and now he lost his amplifier. Nets reporting QTC: IIN 478, IPON 6, QIN 131, Hoos. VHF 11. Traffic: (July) K9EZX 228, WB9OMX 136, WB9EOT 128, W9EI 124, W9HUF 115, W9QLW 98, W9UEM 92, WB9MDS 77, W9FWH 72, K9DCX 64, WA9OKK 52, WA9IHZ 48, K9CBY 47, WB9IHR 45, WA9TZP 38, W9DKP 36, W9MCJ 36, K9EQT 32, WB9KTR 27, W9PMI 24, K9YBM 24, WA9OLM 20, K9RPZ 20, WA9OHX 17, WA9TJS 17, K9IQY 15, WA9CYG 12, W9DZC 11, W9KWB 10, W9ENU 9, K9RWQ 7, WB9HCH 6, W9EC 4, W9LIU 3, K9TKE 2, W9BDP 1, WB9BPB 1. (June) WB9OMX 212, W9KWH 170, W9IBQ 163, K9EZX 155, WB9EOT 148, W9HUF 109, WA9TJS 73, W9QLW 66, WB9MDS 64, WB9IHR 51, K9EQT 51, K9RPZ 50, W9DKP 47, WA9IHZ 44, K9CBY 42, WA9BVS 38, W9ENU 37, K9KTB 37, WA9OAD 31, W9MCJ 28, WA9OHX 24, K9IU 20, W9DZC 18, WA9OKK 18, K9RWQ 18, WB9LIJ 14, K9IQV 12, K9YBM 12, WA9CYG 10, WA9NQU 10, W9PMI 10, WB9HCH 8, W9RTH 8, W9DOF 7, W9KWB 4, W9BDP 1, K9TKE 1. (May) W9EI 61, WA9CYG 5.

WISCONSIN – SCM, Roy A. Pedersen, K9EHI – SEC: K9PKQ. PAMs: W9AYK, WA9IRW, K9UFQ. RMs: WB9ICH, W9MFG, K9LGU, K9KSA. Nets, Freq., Time(Z)Days, QNI, QTC, Mgr.: BWN, 3985, 1145 M-S, 403, 380, W9AYK; BEN, 3985, 1700 Dy, 745, 181, WA9LRW; WSBN, 3985, 2215 Dy, 1165, 174, K9UTQ; WNN, 4725, 2215 Dy, 73, 35, WB9ICH; WIN-E, 3662, 0000 Dy, 261, 143, W9MFG; WIN-L, 3662, 0300 Dy, 250, 188, K9LGU; WIBON, 3925, 1701 M-F, 513, 43, WA9NIX. ORS renewed W9WJH. OVS renewed K9OXY. WSBN certificate to WB9KZH. Members of the KRRC of Wisc. had guests from the Holiday Ramblers Campers as follows: W9RXM, WA4GSG, WA6CMW, WA8GMA, K9TWV, K4ISX, K2USG, W9MTW. Does your county have an EC? All nets could use more QNI, hope you all take part in the activities. WSSN will begin on Labor Day. W9KKK was presented a plaque in recognition of his efforts, time in obtaining and performing Public Service at the EAA convention. Congrats. Stations working EQ9EAA QSL via WA9GJU. K9CPM made BPL. WB9NME will soon be on 2 meters. WN9PTX worked ZP5, VP2. WN9NRK came in first for NR. WNA picnic was a big success. New Novice from Burnett WN9ROL. Congratulations. Traffic: (July) K9CPM 968, WB9BJR 389, W9PVH 209, WB9KPX 208, WB9NME 201, W9DND 178, WB9ICH 132, K9LGU 115, WA9QVT 98, W9MFG 82, K9EHI 78, WA9LRW 64, W9PD 60, WA9PKM 60, W9AYK 43, WN9PTX 41, WB9LKC 40, K9UTQ 36, WB9ABF 30, WB9ISW 26, K9IPS 25, WB9LSS 25, K9KSA 22, WN9NRK 22, K9ANV 16, W9BKD 15, WB9NKC 11, WN9PYG 5, WB9HRP 2. (June) WB9HLS 6, K9GSC 2.

DAKOTA DIVISION

MINNESOTA – SCM, Frank Leppa, KØZXE – SEC: WAØUFZ. PAMs: WAØYVT, KØFUT, WBØFTL. RMs: KØCVD, WAØYAH. Chief OBS: WBØLOR. Chief OO: WAØPRS. The Minn. Calling Frequency is 3925 kHz. The Amateur Radio exhibit at the Minn. State Fair was doubly good – the HandiHams had a booth at FAA and the regular group had its own building west of the grandstand. Special credit to WAØEFW, WBØNGX, KØIVO, WBØOCT, KØBUD for their leadership in the exhibit. The Minn. Slow Speed Net (MSSN) 3710 kHz at 6:30 PM is expanding to 5 nights per week – seems like a lot of people are interested in traffic and in cw practice. In July WAØYWA managed to visit WAØYAH, MARC provided emergency phone service for Deephaven July 23 plus help during the Aquatennial. The OVS stations have been reporting excellent condx during July Fs on 2 meters let many work the East Coast. WBØMAO says he won the Minn. honors and Dakota Division in the Conn. QSO party (4 points scored). WØIYP is retiring his four element Quad and putting up Yagis on 40-20-15 and 10. WØGYI was the Director of Radio Week at Camp Courage in Sept. WAØVPN made a Navy cruise as part of NROTC during the summer. WAØVAS back in action made BPL in July. WØZHN spent July in KH6-Land. WAØBWM got his PhD. Traffic: KØCVD 264, WAØVAS 231, KØZRD 187, WØQMY 171, KØZXE 171, WAØQMY 116, WAØYVT 92, WAØTFC 45, WBØOCT 39, WBØCPC 30, WAØWEZ 29, WAØYAH 29, KØZBI 28, KØFUT 24, WBØLOR 24, WAØGLI 21, KØJTW 20, WØHZU 19, WØUMX 18, WAØWOV 18, WAØIIB 16, WBØCYM 8, WAØJPR 8, WBØNGX 8, WØNO 8, KØCSE 5.

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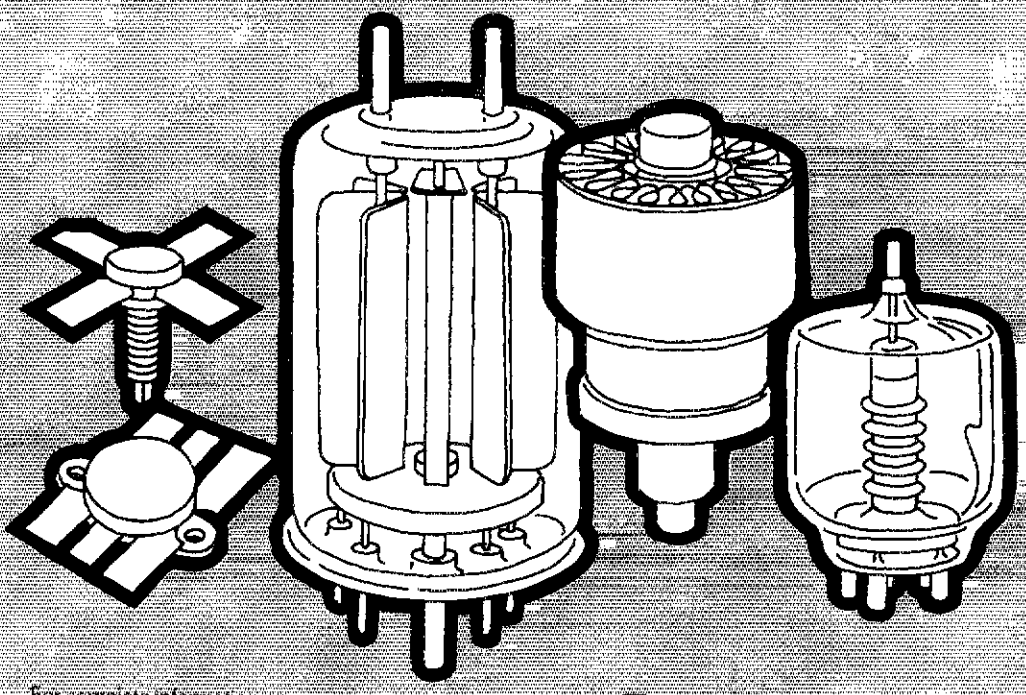

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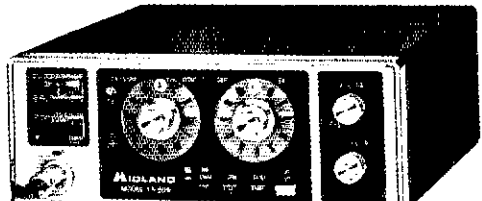

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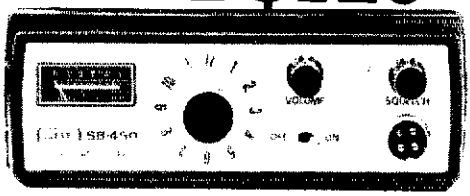

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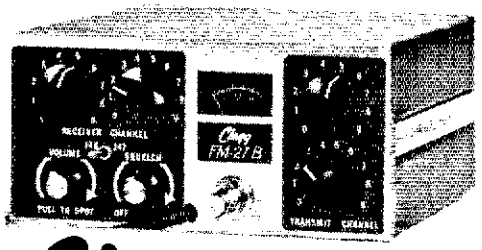

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NORTH DAKOTA – SCM, Harold L. Sheets, WØDM – OBS: KØPVG. OO: WØBE. The 12th Annual Peace Garden Hamfest held July 12, 13 had 250 attending. WBØFUO received the "Ham of the Year" award while VE4QZ for the Canadians. WAØRWM was cited for YL WX Net work and WØDM for working promoting and training young and old to become amateurs. WBØGFZ and WBØAUM are US cochmn. for next year. WØDM reports not up for reelection as SCM. WBØFUO and helpers did an FB job with two day event. WAØRWL spent time at home after his Pacific cruise. WØDM has gone 2-meter mobile. WAØSUF served as net mgr. for DTRN for July. KØPYZ announced his annual corn feed down on the farm, for Aug. 17. Thanks to WAØAYL for finishing this report while Prof on vacation.

Net	*kHz*	*CDST/Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
RACES	3996.5	1830 S-S	29	361	37	WBØATJ WAØSUF
DTRN			41	103	24	WAØSUF, Asst. Mgr.

Traffic: WBØHHC 83, WAØSUF 50, WØMXF 11, WØDM 8, WBØRMG 6, WBØGFZ 4, WAØJPT 3.

SOUTH DAKOTA – SCM, Ed Gray, WAØCPX – League members are encouraged to apply for appointments to your SCM. Reports of your operating activities and your traffic counts would be appreciated and would be of interest to others reading the South Dakota activity report. 160-Meter interest is increasing in South Dakota. As we move into the fall season you might look for the South Dakota gang above 1,975 MHz in the evenings. Net reports: Morning Net – QNI 457, QTC 23, NJQ Net – QNI 476, QTC 34, Evening Net – QNI 941, QTC 25. SDN CW remains active. Traffic: WAØKKR 122, WØHOJ 64, WBØLJM 3.

DELTA DIVISION

ARKANSAS – SCM, S.M. Pokorny, W5UAU – SEC: W5RXU. PAM: W5POH. RM: W5MYZ. Net, kHz, Time/Day, QNI, QTC, Mgr.: OZK, 3765, 0000/Dy, 151, 23; APN, 3927, 1100/M-S, 766, 33, W5POH; M-Bird, 3925, 2130/M-F, 488, 17, WA5ZWZ; ATN, 3995, 2230/Dy, 271, 129, WB5IGF; ARN, 3995, 2330/Dy, 300, 44. Welcome new Novices WN5OUY, WN5OWH. OBS, K5GKN; ORS W5BED. By the time you read this, the Ft. Chaffee Operation AR setup and operators who manned the setup will be history. It is discouraging to note that of the 40 some amateurs in the Ft. Chaffee area, only six could volunteer to operate at the Ft. Chaffee setup. The Ft. Chaffee operation was started May 20, and ended Aug. 15. Those involved were WA5ZEK, WB5CQK, WB5FMJ, WB5FMK, WB5HHM. Congrats on FB job. PSHR: WB5IGF 61, W5MYZ 49, W5EIJ 39, W5POH 27. Traffic: WB5IGF 105, W5EIJ 54, W5MYZ 52, W5UAU 44, WB5FMK 42, W5POH 12, WB5GWU 7, W5TXA 5, W5KL 4.

LOUISIANA – SCM, Robert P. Schmidt, W5GHP – Asst. SCM: John Souvestre, WA5NYY. SEC: W5TRI. RM: WA5ZZA. PAM: WB5EKU. VHF PAM: WA5KND. Regret to announce W5EML a Silent Key. New OPS appointee is WB5KQJ. W5JAH provided emergency tele. service for the Veterans Hospital when their main cable was cut. WR5ACG, Shreveport Repeater now has Autopatch operational. WA5NYY escorted KH6RZI, Hawaii, around during FD. W5OVV in charge of all code and theory classes for the Baton Rouge Club. The La. Council of ARCs elected K5SVD, chmn. of its National Convention committee. The Monroe Club reports a repeater for 45/85 is under construction. WB5FKU, Net Mgr. LTN says that Section Net Certs have been awarded to W5YZL, W5VFM, K5FTC, K5RNM, WA5IQU, WA5JNL, WB5LBR, WB5IKT, WB5JZQ, WB5KFA, WB5ADU, WB5KQJ and WB5MLH. Remember the RTTY net is again active on 3587.5 kHz on Sun. at 7:00 PM CDT.

Net	*kHz*	*Time(PM)/Days*	*QTC*	*QNI*	*Mgr.*
LAN	3615	7:00/10:00 Dy	125	330	WA5ZZA
LTN	3910	6:45 CDT Dy	40	127	WB5EKU
LSN	3703	8:30 CDT M-F	32	90	WA5IQU

Traffic: (July) WA5ZZA 268, W5GHP 179, WA5IQU 149, WA5TQA 35, WB5NWO 32, WA5MMD 20, WB5LBR 18, WB5KQJ 10, W5YN 10, WN5NSR 8, WA5QVN 5. (June) W5MI 101.

MISSISSIPPI – SCM, W.L. Appleby, WB5DUY – Asst. SCM: C.E. Gibbs, W5LL. SEC: WB5FXA. Sec. Freq. Coord.: WA5ELL. Net Mgrs.: MSN WB5MTQ; MTN WB5FHA; MSBN WA5ZLX. Cere of Appn to former MSBN Mgr. WB5BUE, Jackson Mini-fest well attended and included Delta Div. Dir. W4WHN. JARC plans fall blown Hamfest again next year. MCARA also plans first Hamfest in early 1976. WR5AEV, Keesler back to full power on 19-79. Grieve to report W5KMD as Silent key. Welcome new Miss. amateurs WN5 PBH, OVJ, OVN, OVK, OVM, OZT; WB5DUV, WN5s OWK, OUW, OYW, OYY, OVW; WB5OVE; WN5s OZJ & OZV. JCARC plan special call KM5BSA Oct. 17-18; Vicksburg ARC plans Novice & General classes. W5RUB, W5UCY & WB5DCY operated thru Osca 6 & 7 last ew CD Party. Southern Teenage Net started on 3735 MHz, 0100Z Mon. thru Sat. Contact WN5NJZ for details. WN5MDR worked T12WX and other DX goodies on 15 mtrs. WN5NJZ finishe SB102 & SB200. W5CBR active on VHF-FM. WN5MTQ no WB5MTQ took Miss. Section in NR. WB5KQG moved to Tenn WB5IUS & K5EUO have new IC 230s. Understand 31791 repeate planned for Hernando. JARC FC site took lightning hit during FD Tombigbee ARC, JCARC, Pearl River Valley ARC, MCARA Natchez ARC, Greenville & Cleveland ARC also out for FD WN5MDR now Adv. WB5EML on from East Ms Jr. College WB5KUJ op FD with Delta ARC from Memphis. Heard on MTN K5UBL, K4EOH/5, WB4NTB, WB9MIW, K8YUW & WB5NSC Heard on MSBN WB5EHH, W5NRU, K5HCL, W5FUT, WB5KEJ, WB5LVA, W5AMZ & W5UCY rep Miss in VE/W Contest. July MSB QNI 89, QTC 25; MTN QNI 176, QTC 82; MSBN QNI 912, QT 93; CGCHN QNI 1908, QTC 68. Traffic: W5EDT 142, WB5KUJ 6 WB5MTQ 61, WB5FHA 57, WA5YZW 47, WB5DCY 42, W5NC

Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

W1AUX, Alfred F. Tauber, Dedham, MA
Ex-W1CLG, Frederick E. Bieber, Manchester, CT
W1CPB, Henry J. Welsh, North Quincy, MA
Ex-W1OGQ, Walter A. Keeling, Stratford, CT
W2CKX, Thomas A. Deuber, Westville, NJ
W2GZW, William S. Pepper III, Homer, NY
W2PLG, Howard B. Stephenson, Buffalo, NY
W2RZM, Fay R. Ecker, Gloversville, NY
Ex-W3AAJ, Robert N. Eubank, Richmond, VA
K3ABT, Melvin K. Lucas, Hatboro, PA
K3AJT, Robert D. Reed, Sunbury, PA
K3FJN, Robert L. Isennock, Forest Hill, MD
W3FSC, Oscar C. Jacoby, Lafayette Hill, PA
W3GK, Carl E. Mielke, Pittsburgh, PA
W3HA, Daniel I. Farren, Lehighton, PA
K3PDX, Carl H. Drayer, Harrisburg, PA
W3QO, Earl C. Ansler, Oil City, PA
K3WFC, J. Robert Moore, Berwyn, PA
W4AOI, Luther Pippen, Mt. Jackson, VA
W4ATA, Arthur L. Garris, Myrtle Beach, SC
W4AZ, Raymond F. Guy, Lighthouse Point, FL
K4BUR, William J. Karsten, Fairfax, VA
K4DGI, Dr. Siegfried S. Meyers, Harrisonburg, VA
K4DKE, Albert D. Brooks, Jr., Havelock, NC
W4ERW, Eddie W. Smith, Birmingham, AL
W4EXY, John W. Parker, Jr., McColl, SC
K4JBF, Lloyd P. Haslam, St. Petersburg, FL
W4KOU, Harry K. Crosby, Virginia Beach, VA
WB4KAQ, Henry L. Johnson, Dunedin, FL
W4LTK, Allan K. Ross, Sarasota, FL
K4HLC, Albert L. Kemmesies, Tampa, FL
W4NQ, Arnold G. Skrivseth, Chantilly, VA
W4URQ, William J. Caines, Jacksonville, FL
W5ARC, Lloyd B. Cherry, Beaumont, TX
W5CFN, Samuel L. Cron, Hobart, OK
WB5EQV, Ira I. "Buddy" Knox, Port Arthur, TX
W5INN, Horace C. Morgan, Corpus Christi, TX
W5KQW, Henry P. Seay, Voorhees Twp. NJ
W5ROZ, John H. Paulsen, Canton, OK
W5SET, Stephen L. Dale, Carrollton, TX
W5UZR, Percy L. Smith, Beaumont, TX
W5UZX, William O. Todd, Norman, OK
WA5WEJ, John C. Bender, Houston, TX
W6ABM, Errol O. Shour, Sylmar, CA
K6ASG, Dr. Ben H. Dahle, Carmel, CA
W6DGX, William E. Caldwell, Lawndale, CA
W6DXA, Frank C. Camenisch, San Anselmo, CA
WA6EOH, John C. Stoll, San Francisco, CA
W6FT, Charles D. Roe, Glendale, CA
K6HVC, Margery A. Bennett, Rialto, CA
WB6IMT, William E. Donnelly, Indio, CA
K6IY, Gerald O. Crowley, Santa Barbara, CA
WB6JXH, H. F. Neubauer, Pacific Palisades, CA
K6LN, H. Leroy Vanderford, Pacific Palisades, CA
WB6PKE, Kasper A. Erickson, San Leandro, CA
W6RJ, Richard H. McCollister, Sacramento, CA
W7BNY, Donald M. O'Hara, Scottsdale, AZ
W7FGB, Larry Hecox, Livingston, MT
W7FQG, Raymond L. Groff, Moses Lake, WA
W7HYT, Robert Rasmussen, Sun City, AZ
W7VNP, Carl W. Veseth, Malta, MT
W8BFT, Patrick P. Doyle, Rocky River, OH
WB8BXD, Robert B. L. Knisely, Bucyrus, OH
W8CYE, Robert L. Drake, Miamisburg, OH
W8EKW, Almaron H. Ketzler, Grosse Pointe Farms, MI
WB8GOC, J. R. Brubaker, Lakemore, OH
W8HIA, Charles W. Woodin, Franklin, MI
W8TAI, Austin M. Murray, Euclid, OH
W8WEV, George A. Waslo, Cincinnati, OH
W9BTA, William E. Barrett, Sheboygan, WI
K9EGU, Arthur W. Hirshman, Des Plaines, IL
W9FW, Clifford R. Anderson, Andover, IL
WA9GQB, Stanley F. Szerlong, Bensenville, IL
Ex-W9KBB, Arthur F. Bennett, Rockford, IL
W9MRD, Eugene E. Marriott, Clintonville, WI
W9NYD, Elmer W. Zitzman, Alton, IL
W9PAE, Alva B. Lund, Rockford, IL
WA9SMW, Robert T. Willskey, Champaign, IL
W9VPX, Vincent A. Zimmerman, Springfield, IL
W9YFV, Edward G. Schmeichel, Itasca, IL
W0BGN, Henry K. Van Atta, West Liberty, IA
W0CXH, James M. Dawson, North Platte, NE
W0JO, Bruce H. Hart, Pine River, MN
W0LFE, Edwin M. Porter, Bowling Green, MO
WA0OKC, Earl L. Rembolt, Grand Island, NE
WA0PFR, Albert W. Black, Kirkwood, MO
W0QOU, Anthony G. Klein, Snyder, NE
W0RVM, Herman M. Livingston, Wichita, KS
VE6IN, Keith M. Watt, Calgary, AB
VE7ADC, D.A. Ceraldi, Vancouver, BC
VE7AWO, F. J. Broeksma, Prince George, BC
VE7QQ, K. F. Wilmot, Smithers, BC
VP9EU, Max Lambert, Hamilton, Bermuda
ZL3AB, Leslie C. Evans, Christchurch, NZ

Strays

WZ1AEQ/1 the special call of the station accompanying the march reenacting Col. Benedict Arnold's march on Quebec in 1775 started operation Sept. 26 and will continue through Sept. 30 in the USA and from Oct. 1 through Oct. 4 in Canada. (The call will be /VE2 in Quebec.) Op. times will be from 2200Z until ? each night.

Phone operation only. Freqs. 3890 7230 14310 21360 28600. S.a.s.e. for QSL WA3HWZ, 138 No. Blue Bell Ave., Langhorne, PA 19047.

The Liftlock City Award certificate will be mailed to qualifying amateurs who contact two or more Peterborough amateurs using the prefix XK3. The award commemorates the 150th anniversary of the founding of the city of Peterborough, Ontario. For information contact Award Manager John Fisher, VE3ALQ, 645 Weller Street, Peterborough, Ontario, Canada, K9J 4X1.

Operating Events

(Continued from page 92)

DECEMBER

3	*West Coast Qualifying Run.*
6-7	*160-Meter Contest, Delaware QSO Party.*
7	*TU2 Competition.*
13-14	*10-Meter Contest, EA Contest cw.*
16	*WIAW Qualifying Run.*
18	*WIAW Morning Qualifying Run.*
28	*HA5-WW Contest.*
31	*Straight-Key Night.*

Jan. 3-4, VHF SS.
Jan. 10-11, CD Party cw.
Jan. 17-18, CD Party phone.
Jan. 24-25, SIMULATED EMERGENCY TEST.
Feb. 7-8, DX Competition phone.
Feb. 15, Frequency Measuring Test.
Feb. 21-22, DX Competition cw.

Reminder. Complete rules (similar to last year's) for Sweepstakes will appear in November QST.

NEW!

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This New Unit meets the best spec of all: Its Low Price! The GTX-1 is NOT a "cheap" import It IS identical to Genave's Land Mobile and Aircraft units for high quality and reliability. *Compare performance to Motorola, GE, RCA or any other hand-helds that sell for $700 or more . .*

GTX-1 HAND-HELD 2-Meter FM Transceiver

SPECIAL INTRODUCTORY OFFER

NOW CHECK THESE FEATURES:

- **All Metal Case**
- **American Made**
- **Accepts standard plug-in crystals**
- **Features 10.7 MHz crystal filter**
- **Trimmer caps on TX and RX crystals**
- **2.5 watts output**
- **Battery holder accepts AA regular, alkaline or nicad cells**
- **Mini Handheld measures 8″ high x 2.625″ wide x 1.281″ deep**
- **Rubber ducky antenna, Wrist safety-carrying-strap included**
- **6 Channels**
- **Factory-direct to You**

Accessories Available:

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- Charger for GTX-1 battery pack
- Leather carrying case
- TE III Tone Encoder for auto patch

GTX-1
2 Meter 6 channel Hand-Held (without encoder)
$279.95
(Reg. $299.95)

GTX-1T
with Built-In Tone Encoder
$329.95
(Reg. $349.95)

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2-meter FM, 100 channels, 30 watts (incl. 146.94 MHz)
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GTX-200
2-meter FM, 100 channels, 30 watts **was $299.95** (Incl. 146.94 MHz)
NOW **$219.95**

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GTX-100
1¼-meter FM, 100 channels, 12 watts **was $309.95** (Incl. 223.5 MHz)
VERY SPECIAL **$199.95**

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~~$169.95~~ WOW! **$139.95**

☐ 
GTX-2
2-meter FM, 10 channels, 30 watts **was $299.95** (Incl. 146.94 MHz)
NOW **$199.95**

☐ 
GTX-600
6-meter FM, 100 channels, 35 watts **was $309.95** (Incl. 52.525 MHz)
SPECIAL NOW **$199.95**

NEW! For Christmas Delivery

GTX-1
Special Price **$279.95**

GTX-1T
Operate Auto Patch
Special Price **$329.95**

☐ **PSI-11 Battery Pack** (with charger) @ $109.95 $_____
☐ **ARX-2 2-M Base Antenna** @ $29.95 $_____
☐ **Lambda/4 2-M Trunk Antenna** @ $29.95 $_____
☐ **TE-I Tone Encoder Pad** @ $59.95 $_____
☐ **TE-II Tone Encoder Pad** @ $49.95 $_____
☐ **PSI-9 Port. Power Package** (less batteries) @ $29.95 $_____
☐ **PS-1 AC Power Supply** @ $69.95 $_____

and the following **standard** crystals @ $4.50 each: _____ $_____

Non-standard crystals @ $6.50 each: _____ $_____
(allow 8 weeks delivery.)

For factory crystal installation add $8.50 per transceiver.

Sub-Total: $_____

IN residents add 4% sales tax:

TOTAL: $_____
(minimum order $12.00)

CA residents add 6% sales tax:

All orders shipped post-paid within continental U.S.

PHONE_____

NAME_____ AMATEUR CALL_____

ADDRESS_____ CITY_____ STATE & ZIP_____

Payment by: ☐ Certified Check/Money Order ☐ Personal Check ☐ C.O.D. Include 20% Down.

Note: Orders accompanied by personal checks will require about two weeks to process.

☐ 20% Down Payment Enclosed. Charge Balance To:

☐ BankAmericard #_____ Expires_____

☐ Master Charge #_____ Expires_____ Interbank #_____

Prices and specifications subject to change without notice.

22, W8WZ 21, WN8NJZ 10, W8SBM 8, WN8NQS 7, W8BW 3, WN8MDR 3, WB8NSC 2.

TENNESSEE – SCM, O.D. Keaton, WA4GLS – SEC: WB4DYI. PAMs: WB4PRF, K4LSP. RM: WB4DJU.

Net	Freq.	Time(Z)/Days	Sess.	QNI	QTC	Mgr.
TPN	3980	1040 M-F	71	2800	168	WA4EWW
		1145 M-F				W4PEI
		2330 M-S				WB4YPO
		1300 SSuH				
TWN	3980	2100 S				WB4DYI
TN	3635	0000 Dy	25	133	75	K4YFC
TNN	3707.5	2300 Dy	21	69	9	WN4FZU
TTVHFN	50.4	0000 ThS	13	92	0	WA4YKN
TTVHFN	145.2	0000 WF	8	32	0	WB4DZG
TTTMN	28.7	0000 WF	8	94	3	WB4NEI
MTTMN	28.8	0100 TF	9	56	0	W4EAY
ACARECN	146.28 146.88	0000 F	5	89	0	WA4DEI
ECARECN	146.52	2130 F	4	24	0	WA4IPT
WEVHFN	146.37 146.97	2000 S 0130 F	9	94	0	WA4VVX

The Crossville Hamfest was a success with W4AFI first prize winne and WB4MTE, second prize. We were very glad to have ou out-of-state guests, especially Ala. SCM Jim Brashear, all of yo fellows come back. The Tenn. Council of Radio Clubs electe WA4ZBC, chmn.; WB4MPJ, vice-chmn., WB4ZSZ, secy.-treas. Th Council Net meets on 3980 kHz at 2330Z each Sun. Plan to atten the Memphis Hamfest Oct. 5 & 6, also the Delta Divisio Convention. WA4DPF handled 76 phone patches. W4OGG receive the Section Traffic Award for 1975. Traffic: K4UNY 252, W4OG 99, WB4DJU 90, K4KCK 56, WB4DYJ 36, W4RUW 30, WB4ZS 21, WB4YPO 20, WA4GUS 17, WB4ANX 11, K4AMC 10, WB4GTV 10, WB4PRF 10, W4SGT 9, WA4DPF 6, WB4DDV 5.

GREAT LAKES DIVISION

KENTUCKY – SCM, Ted Biddle, W4CID – SEC: WA4GHQ.

Net	Freq.	Time(Z)/Days	QNI	QTC
KRN	3960	1030 Dy	305	19
MKPN	3960	1230 Dy	848	65
KTN	3960	2345 Dy	1065	124
KYN	3600	0000 Dy	295	227
KSN	3600	0200 Dy	275	227
KNTN	3725	0100 Dy	124	35
6DAREC	146.38/98	0000 Th	62	9
8DAREC	146.46	0100 W	87	7

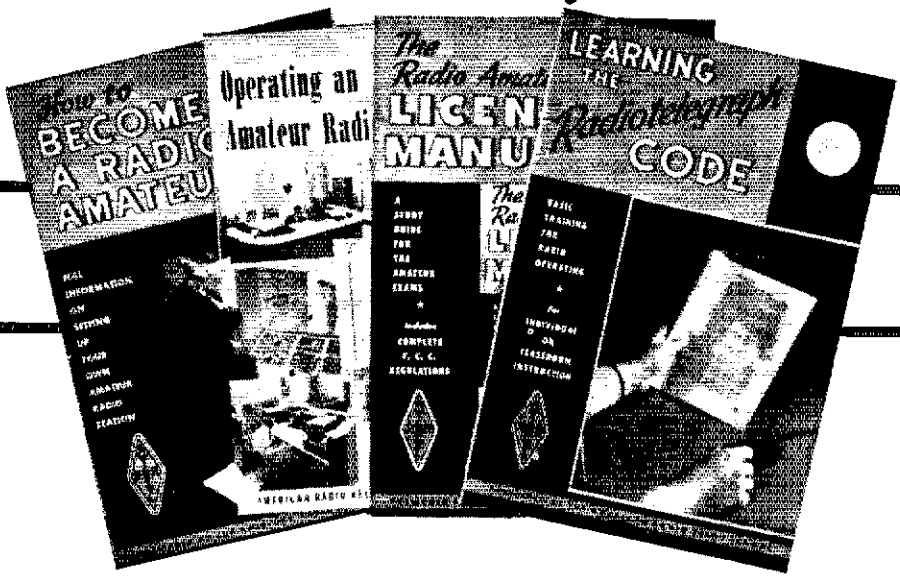
Keep in mind the above times are DST. Some nets move with the time change. K4KCU lost his SR46 to a thief. If anyone has data contact him in Louisville. WA4AGH now RO for Bullit Co. and K4ISI has been appointed RO for Jefferson Co. Don't forget Gt Lakes Convention in Col., Ohio Oct. 11. The BGARC set up a display at the Fayette Mall Sept. 5 and 6. Good PR. WA4NNG has his Advanced ticket. WB4EXQ organized a display for the Shep herdsville fair. XQ 75, W4BAZ 72, WN4GAL 67, W4CID 62 WB4BYV 61, WA4IGS 50, WA4NNG 50, WB4AUN 47, WB4NHC 46, WB4EOR 44, K4IDZM 30, WB4IKF 30, WA4EAF 21, W4VWQ 20, W4CDA 17, WA4AGH 14, W4YLK 7, WB4EAT/8 2.

MICHIGAN – Acting SCM, A.C. Baker, W8TZZ – SEC W8MPD. RMs: W8JYA, W8RTN, W8YIQ, WB8IMI, WB8NI K8KMQ. PAMs: K8LNE, WB8IIX, WB8BYB. VHF PAM WA8WVV, K8AFM.

Net	Freq.	Time/Days	QNI	Tfc.	Sess.	Mgr.
QMN	3663	2300/0200 Dy	501	184	59	W8JY
GLETN	3932	0130 Dy	762	108	33	WB8OB
MACS	3953	1500 Dy	875	376	35	K8LN
BR/MEN	3930	2130 Dy	522	97	31	WB8BY
UPEN	3922	2230 Dy	499	29	31	WB8IE
WSBN	3935	2300 Dy	611	61	31	WB8JI
Mi.6M	50.7	0000 MS	106	19	18	WA8VX

W8CVQ reports SW Mi 2M Net QNI 56 in 4 sessions. 2M Catfish N had 61 QNI in 4 sessions as reported by WA8WVV. GLETN office elected are W8OW, mgr.; W8RNQ, asst. mgr.; WB8OBR, sec W8POZ has a new Tribander and a 40-meter beam 65-ft. u Cherryland ARC has a new call WB8VKB. New licensees are WN UEL, ULT, UVQ, VGG, VGK, VEV, VET, VEU and VE Upgrading Novice to Tech WB8NAC; Advanced Class K8YV K8CCQ, WB8CKW and WB8MWG. Traverse City area repeat WR8AEN now on 146.25/85. BRA ARC has added 4 new membe to its roster. WB8ESK reports latest Kent Cty 2M transmitter hu ended in a draw. Regretfully I report K8LIS and K8EME are Sile Keys. Straits Area ARC participated in Powder Puff Deri Communications, Mich. QSO Party trophies to: WA8MEC c W8CNL ssb; WA1SSH cw, and WB8FCO ssb. Plaques to: WB8BG VHF; W8WG honorable mention. The Club trophy was awarded L'Anse Creuse ARC, Saginaw Valley ARC's claim to conte supremacy is challenged by W8GLC, activities chmn. of L'An Creuse ARC. It appears SS will separate the men from the boy Traffic: (July) W8GQN 708, K8KMQ 207, K8LNE 184, WA8W 179, WB8DKQ 171, W8PDP 147, K8DYF 130, WB8ITT 109, W8C 89, W8MO 82, W8JYA 80, WB8IIX 70, WB8FBG 66, WB8NII 5 WB8POL 54, W8TZZ 51, WA8MDK 50, WB8OBR 50, W8NOH 4 WB8BPY 41, K8JED 41, W8GLC 35, WB8HYB 34, W8LOU 3 K8AMU 30, W8IUC 27, K8WRJ 27, WA8ENW 22, WB8DJS 2 W8SDB 21, WA8TBL 18, WA8CUP 17, W8EU 13, W8UOQ 1 W8YIQ 13, W8QBE 12, W8UFS 12, WB8HYR 11, W8RNQ 1 W8RTN 11, W8IHD 9, K8MJK 9, W8SCW 9, WB8AXI 8, W8JOP K8KCF 8, W8HKL 7, WA8WVV 6, K8ZJU 6, W8EZL 5, W8WVL K8PYN 2, WA8HIF 1, WB8GKB 1, (June) K8KMQ 206, WB8B 62, WB8NCD 48, W8JUP 9, K8MJK 8, W8UOQ 8, W8TBP K8SIL/8 3.

Gateway



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OHIO – SCM, Hank Greeb, W8CHT – Asst. SCM: William K. Shaeffer, WA8MCR. SEC: WA8COA. PAMs: W8MOK, WA8VWH. RMs: WB8KKI, WA8WAK.

Net	QNI	QTC	Sess.	Freq.	Time	Mgr.
OSSBN	2025	872	84	3.9725	1430/2000 /2245	W8MOK
BNR	110	203	31	3.605	2200	K8NCV
BN	449	264	62	3.577	2245/0200	WA8WAK
OhMN	247	70	30	50.160	0100	WA8VWH
OSN				3.577	2210	WB8KKI

Remember – Great Lakes Division Convention, Ohio State Fairgrounds, Columbus, Ohio, Oct. 10, 11, 1975. WB8PIY and WB8TTP are new Generals. WA8MWF now WB8VKS, K8MLO made DXCC. K8YUW proposes an Ohio Bicentennial QSL card. Ideas for design are cordially solicited. Apricot Net set up traffic booth in Cleveland Public Square July 22, for Cleveland's 179th Anniversary. K8ONA received honor award from Dayton Amateur Radio Assn. at the QCWA picnic July 19. WB8NUT, WB8IXS, K8TUT report several Sporadic E openings on 50 MHz. Few reports were received this month, and a couple were late reports from previous months. Reports are cordially solicited, but (except in very unusual circumstances) must arrive by the 7th of the month for activities of the preceding month. Bulletins from club and AREC groups are sometimes an adequate substitute for individual reporting, except the information is frequently out of date or arrives late. Traffic: WB8MZZ 621, WA8MCR 394, K8YUW 374, W8PMJ 248, WB8KQI 199, W8FGD 180, WA8HGH 176, W8ENI 125, W8MGA 90, WB8ZK 85, WB8KWD 78, K8LGA 78, WB8OZA 63, WB8OMO 61, WA8VWH 59, W8ALS 58, W8MOK 54, WB8AYC 51, W8OE 44, WA8DWL 42, W8IBX 41, W8JD 40, WA8SED 40, K8VMI 36, W8CHT 35, WA8IYF 35, K8ONA 34, K8MLO 32, WB8EFZ 31, K8LXA 29, W8TH 27, W8LZF 26, W8IMI 25, WB8JGW 23, WA8VTD 23, WB8CJU 21, W8QIL 20, WB8VKS 18, K8BYR 17, WA8KQO 17, W8WEG 17, WB8RIY 16, K8QYR 15, WB8TEM 15, W8CXM 14, WA8MAZ 12, WA8MHO 12, WA8TSX 9, WA8BOV 8, WB8NUT 8, K8CKY 7, WB8GGR 6, W8DCX 4, WB8IBZ 3, WA8IXM 3, W8BHL 2, W8IPW 2, WA8EIX 2, WA8FSX 2.

HUDSON DIVISION

EASTERN NEW YORK – Acting SCM, Gary J. Ferdinand, WA2PJL – SEC: W2KGC. RMs: WB2IXW, WA2FBI, K2DN (RTTY). PAM: WB2OEL. Traffic nets as follows:

Net	Freq.	Time (local)
Clearing House	3925	1100
ESS	3590	1800
Mic Farad	3925	1400
PON	3913	1645
NYS*	3675	1900
NYS*	3675	2200
NYSPT&EN	3925	1800
NYR(RTTY)	3613	1900

*Denotes NTS section nets. Net statistics: ESS July (QNI 239, QSP 78), NYS July (QNI 677, QSP 305), NYSPT&EN July (QNI 1013, QSP 227), NYS 2nd qtr (QNI 2118, QSP 1062), NYSPT&EN 2nd qtr (QNI 3274, QSP 508). New appointments went to W2CXC OVS and WA2YPO and WB2EMU OPSs. W2ECV vacationed in Ariz. and points west. WA2QUV recovering from auto mishap. Albany ARA boasts new Novices: WN2ABL, WN2AFS, WN2AFV, WN2AXE. WB2OTH got 48th state confirmed on 6. OVS W2CXC reports sharing four new states, too. WA2YPO noticed low power output a few days – brownout. WA2CJY and WB2EMU hold new 2RN liaison assignments in NTS. OO W2DW reports helping a Novice ge from 18 to 21 MHz. WA2PJL's property got hit by lightning, but al gear unplugged. Let's hear from you Novices out there. What are YOU doing? Traffic: (July) WA2PJL 321, WB2RUZ 252, WB2TGI 71, WA2YHC 69, WB2EMU 68, WB2IXW 65, WB2TDX 50, WA2YPO 49, K2OUA 42, W2ACO 36, K2TTG 26, W2WSS 16, WA2CJY 11, WB2BXL 4. (June) WA2PAU 60, WA2BRV 29, W2SZ 9, WN2YBP 4, WA2FBI 2, WN2WJO 2.

NEW YORK CITY-LONG ISLAND – SCM, John H. Smale, WB2CHY – Asst. SCM/PAM: Art Malatzky, WB2WFJ. SEC: K2HTX. RM: WB2IZN.

NLI*	3630 kHz	1900/2200 Dy	WB2LZN Mgr
NLI Phone*	3928 kHz	1730 Dy	WB2PYM Mgr
NLS*	3730 kHz	1830 Dy	WB2EDW Mgr
Clear House	3925 kHz	1100 Dy	WA2DDD Mgr
All SVC	3925 kHz	1300 Su	W2OE Mgr
MIC FARAD	3925 kHz	1300 MTWThFS	W2OE Mgr
ESS	3590 kHz	1800 Dy	K2UIR Mgr
NYSTPEN	3925 kHz	1800 Dy	WA2RSP Mgr

*Denotes section Net, all times are local. Congratulations to new appointees WB2EDW and WA2ROK. OO I and ORS respectively. Aug. 3rd was US Coast Guard Day, and 110 messages were sent from USCG Governors Island by WA2VYQ/2, who thanks WB2FDW and all the other stations who participated. WA2YEI recent upgrade to General. WN2ZGY is now /9 in USNTC Great Lakes (boot camp for the Navy). WA2PLL has finished his 6 transmatch. Great South Bay ARC is working on a club project of getting an Oscar station together. WB2UIF is now an Extra. WA2ARV now an Advanced licensee. W2OOJ advises that Gov. Carey and Gov. Evans of Wash. State were linked by amateur radio as part of Field Day, exchanging radiograms and giving recognition of the public service rendered by hams. WB2VJB handled the traffic on this end. WB2EDW has put out an EB NLS bulletin, lots of tip for the newcomer into traffic, see the top of this column for time and freq. Congratulations to WA2YMX who upgraded from Tech to General. Hall of Science fall license classes got underway with a large turnout. Xavier HS ARC now active with 13 members and awaiting ARRL affiliation. WN2YAY now ORS II, and thanks NLI for getting him interested in traffic. A good time was had by all at the annual NLI Picnic; the NLI team once again won the Hudson Division Director's "Golden Resistor" award for the softball championship. WB2EDW now has first phone with ship's radio

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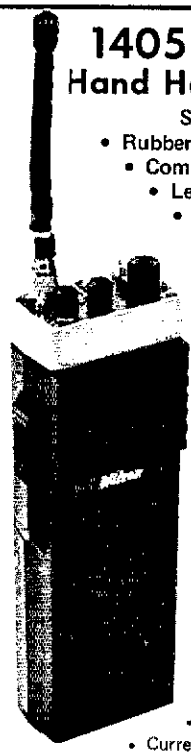

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endorsement. W2PF has been maintaining sked with his son WA1V on 3850 kHz, WB2LZN on vacation with his new Atlas, WB2WRT rearranging his shack now that WA2VEN is in the Air Force and has some room to move around. Suffolk County ARC had K1PLP its speaker for the Oct. meeting. Hope everyone had a nice summ vacation (remember this is being written in Aug.); now is the time start checking into your local ARES/RACES nets and the cw a phone traffic nets, help is needed in all parts of the sectio WB2HLM now active on two with FR22C. Traffic: WB2LZN 26 WB2EDW 251, WB2OYV 178, WB2WRT 124, W2MLC 11 WA2ROK 110, WA2VYQ/2 110, WB2HTM 86, WB2WBH 8 W2HXT 60, W2GKZ 54, WB2WET 19, WN2ZGR 18, K2IFT 1 K2FV 11, WA2JZX 7, W2PF 7, WA2BRE 2, WA2YFI 2.

NORTHERN NEW JERSEY — SCM, William S. Keller, I WB2RKK —

Net	Freq.	Time(PM)/Days	Sess.	QNI	QTC	
NJN	3695	7:00 Dy	31	453	190	WA2DS
NJN	3695	10:00 Dy	31	274	89	WA2DS
NJPN	3950	6:00 Dy	31	512	305	WA2DV
NJPN	3950	9:00(AM) Su	4	49	17	WA2DV
NJSN	3730	8:15 Dy	31	329	92	WB2RM
NJPON /VHF	146.52	10:00 Sa/Su	–	–	–	WA2E
PVTEN	145.71	8:00 Dy	31	–	–	WA2O

SEC: WB2PBO. PAMs: WA2DVE, WA2OPY (VHF), RM WA2DSA, WB2RMK (Training), OPS reports received fr WB2UST, K2EK, WB2TFH and W2TPI. The Old Barney Radio Cl ran a public display of amateur radio, handling over seven messages for the general public. W2OEH was host to the annu NJDXA picnic, a very well run event attended by over 110 peop including BV2A. NJN also held its annual picnic at Shark Ri State Park. This event was well attended by most of the NJ traf handlers. Congrats to WB2RJJ who is the new pres., and WB2VET who is the new secy. of the Old Barney Radio Cl WB2APQ now chasing DX with his new Extra Class privileges. N was well represented in the July Open CD Parties. Among tho heard with big scores were: WA2DSA, WA2UOO, WA2SRO, W2 and WB2RKK. WB2YPM now has a CP20 award. New equipme dept.: WA2SRO, a new linear; WB2RMK, a new HW101 inverted vee; and, WA2DIW, a FR22C 2 meter fm rig. WB2RKK threatens to get on 2 meters. K2KF and WA2SRQ visited Hq. dur July. WN2TRS reports a good turnout for the first session of UFO net, which meets on 21,175 MHz at 7:30 Sat. and Sun. nigh Congrats to WB2HJW who has moved to a new QTH at 6 Crest R in Cedar Knolls. This adds another contester to Morris coun WA2CEZ reports hearing Central America on six meters during first few days of July, and working his first North Dak. station this band during this time. K2QBW, among others, reports tantas VHF band openings during July 20. Attention all appointme holders: After spring, 1975, appointments have been made two y appointments. All appointments dated after Apr., 1974, will renewed in Jan., 1976 for those who still qualify. The two y appointments will reduce paperwork for the SCM. Good luck to in the coming CD parties and Worldwide DX Contests! Traff (July) WA2DSA 439, WB2RKK 383, K2BHC 241, WB2AEH 1 WA2PCF 148, WB2VTT 107, WA2SLF 93, WB2RMK 79, W2S 72, WB2UID 63, W2GU 62, WA2FIW 48, W2CVW 37, WA2D 36, WB2HSG 32, WA2SHT 26, WA2WDT 26, WA2KFE WA2CCF 22, WB2KNS 19, WN2WIW 10, WB2PBO 9, WA2UOO W2WOJ 9, WA2CAK 7, W2YD 7, WB2TDI 6, WA2QIU 5, WA2S 4, K2KF 2, WB2RJJ 1, W2ZEP 1. (June) WA2DIW 32, WB2VFE WB2BKC 2.

MIDWEST DIVISION

IOWA – SCM, Max R. Otto, WØLFF – SEC: KØOOD. V PAM: KØLKH. PAM: WBØAVW. My apologies to WAØNLK and Taylor Co. hams for not mentioning that I received their message. They were the first to report to me while I was mobile, the information was misplaced in my mobile log. Everyone in t area was hoping for no rain for FD. Someone hoped too str because it didn't rain on FD, and it hasn't rained since. WAØVLC on 2 meters with an IC-20. Working at Motorola in Mt. Pleas must put hamming in your blood. WNØPYR is newest ham the and another coming soon. WAØDAG has new beam on 2 mete WBØPNC was logging so fast in last CD party he didn't stop at 24 When he got to 3000Z he figured something was wrong. WBØD and WAØNEK are having good luck with QSOs via Oscar. WAØY is in hospital for some tests. WAØZZG arranged an interview WMT-TV. WAØVDX helped prepare the script, and WAØVUY WØLLI were on camera. This makes for good ham blowing Amateur Radio. WAØSHF reports WAØAUX keeps Iowa alive. DURN, KØSVW on assignment in 4-Land had his 2 meter rig lif from his van. Don't forget the Hamfest Oct. 5 sponsored by Cedar Valley Amateur Radio Club. Nets, Freq., Time/Days, Q QTC, Sess., Mgr.: Iowa 75 Meter, 3970, 1730 M-S, 1399, 82, WAØVZH; Iowa 75 Meter, 3970, 2300 M-S, 900, 37, 27, WAØA Tall Corn, 3560, 2330/0300 Dy, 234, 66, 59, KØAZJ. Traf WAØAUX 240, KØAZJ 177, WØYLS 85, WØLCX 47, WØMOO WBØDGF 32, WBØAVW 18, WØOMV 18, WØLFF 9, WBØENL WBØIZS 2.

KANSAS – SCM, Robert M. Summers, KØBXF – SEC: KØJI RM: KØMRL PAMs: WAØSEV, WBØBCL. VHF PAM: WAØE WAØWOB in the hospital at Kansas City. Several stations taking interest in the OBS appointment. Net reports: OKS-SS WØO nigr, QNI 161, QTC 101, Mid States Mobile Monitor Svc, QNI 7 QTC 47 serving only 22 mobiles. WBØBCL reporting, KWN 427, QTC 122 no severe weather reports. QKS (cw net) KØM reporting QNI 500, QTC 221. Central States Tfc net QNI 683, C 75, WAØQMB net nigr. The heat seems to be slowing down some the NCS reports. PLEASE by the 3rd of the month gang – a must get their reports to me by the 10th. KØJMF reports members signed up for AREC 1431 limited full time*good guys, 110 limited some of the time good guys and possibly a gal or tw

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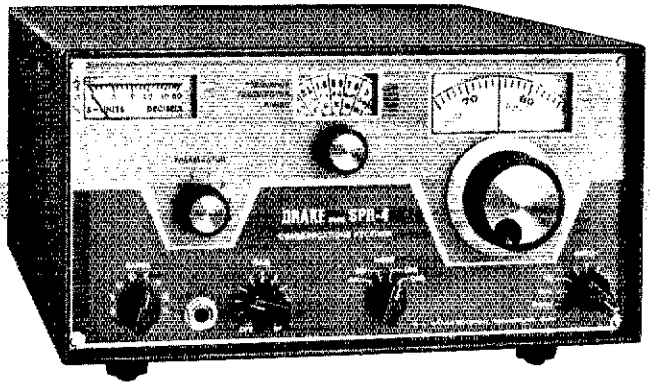

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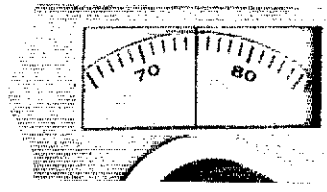

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It is reported WAØIVH got married in July. Grandpa WØPB doin the tellin'. WØINH reporting back into the nets, antenna farm done got sprung up, WBØKWI nearing DXCC, gonna try Oscar next. Say speaking of Oscar have you seen WØCY and his Oscar toys recently'. Don't miss the program Jim gives, if you make the hamfests you'll have a good chance to take in the program. Anyone know of an indicators net, contact KØBXB. Traffic: WBØKWJ 277, WØINH 145, WØOYH 141, KØMRI 114, WØHI 99, WBØHBM 87, WØCHJ 80, WBØCZR 64, WØLBB 61, WBØGVR 57, KØBXB 50, WAØMLE 43, WØGCJ 40, WØPB 27, WBØKWI 25, WØRMJ 24, WØNYG 23, WØHJJ 16, WAØGWH 16, WAØVCE 15, WAØGSG 10, WBØLKA 8, WØFCI 7, WØKL 3, WBØIIX 2.

MISSOURI — SCM, B.H. Moschenross, WAØEMD — Asst. SCM/SEC: Cliff Chatmney, KØBIX.

Net	Freq.	Time(Z)/Days	QNI	QTC	Mgr.
MOSSB	3963	2300 Dy	932	50	WBØLRI
MEN	3963	2230 MWF	395	22	WØNUT
MON	3585	0000 Dy	161	107	WØBV
MSN	3715	2100 Dy	156	53	WØOTP (Actg.)
MON2	3585	0245 Dy	128	75	WØBV
PHD	50.45	0130 T	59	11	WAØKUH
SCEN	07/67	0130 F	57	8	WAØEMD
STLAREC	34/94	0030 T	65	5	KØENH

MSN certificates to WBØMEO, WNØNPC and WNØONC. WBØIISE appointed EC for Franklin, Crawford and Washington Cos. New officers of the Three Rivers ARC are WAØBAY, pres.; WAØIIK, vice pres.; WAØEKD, secy.-treas.; KØUQU, act. mgr. JBARC re-elected KØBVM, pres.; WBØOPO, vice-pres. Don't forget Missouri QSO party sponsored by KØLIR on Nov. 15 and 16. PHD radio class had 40 students out of 87 finish the course. Congrats to The Zero Beaters for a fine hamfest in Washington. PHD amateur of the month was KØOEI. Regret to report WAØKKL a Silent Key. WAØEMX rebuilding an SB-6 for RTTY. KØBQI received his 400 bar for TEN-TEN. WNØOTW passed General, WNØPEU Advanced. New Novices: WNØOCW, WNØOSW, WNØOTW, WNØPGJ, WNØPPK, WNØPPL, WNØPPM, WNØPRP, WNØPRZ, WNØPSE, WNØPSF, WNØPSG, WNØPSH, WNØPSI, WNØPSJ, WNØPSK, WNØPSL, WNØPSM, WNØPSN, WNØPSO, WNØPSP, WNØPSQ, WNØPSR, WNØPSS, WNØPTF, WNØPTZ, WNØPVF and WNØPVK. Congrats to all. Lets have a good show of MO hams at the Midwest Convention in Lincoln on Oct. 17-19. See you there. Traffic: (July) WØBV 154, WBØHSP 138, WØOTF 130, WAØOOA 113, WAØEMD 74, WAØEMX 64, WAØYEF 60, WBØLMW 48, WØOJH 48, WBØMEO 21, WØKNF 16, KØENH 10, WAØKUH 9, KØRWI 5, WBØFKY 4, WAØMOP 4, WBØLTD 3, KØAHC 2. (June) WBØJWM 27.

NEBRASKA — SCM, Dick Dyas, WØICP — WØCXH, WØQO and WAØOKC are Silent KEYS. The Central Nebr. ARA did another fine job of hosting at the Victoria Springs Hamfest. It was well attended with 170 hams registered and over 450 in attendance. WBØGWR and family currently visiting in Germany. WAØDHU and WBØCMC appeared July 18 on the Joni Baillon show, channel 6 Omaha, talked about amateur radio, its purposes and how the ham assisted in the May 6 tornado. WØONM worked 35 states in two weeks on 6 meters using a dipole. QCWA membership total now 66. Clarkson repeater now atop at 160 foot tower, coverage greatly improved. Net reports: Nebr Morning Net, QNI 1040, QTC 4; Western Neb Net, QNI 448, QTC 2; Sandhills Ws Net, QNI 108, QTC 1; AREC Net, QNI 135; QCWA Net, QNI 48; Nebr. Storm Net I, QNI 995, QTC 19; Nebr. Storm Net II, QNI 729, QTC 24; Eastern Neb 2-Meter Net, QNI 260, QTC 18. Traffic: WAØCBJ 31, WØHO 26, WØEOB 24, WØJDJ 21, WØVEA 18, WØICP 15, WAØPCC 13, WBØGMO 11, WAØVYX 11, KØDGW 10, WØMW 10, KØSEA 9, WØGKK 8, WAØLOY 8, WØDMY 7, WAØGHZ 6, WAØQLK 6, WØNIK 5, WØFOW 3, WØVER 3, KØFIT 2, WØLCE 2, WAØLEI 1, WØRJA 1.

NEW ENGLAND DIVISION

CONNECTICUT — SCM, John McNassor, WIGVT — SEC: WIDGL, RM: KIEIR, PAM: KIYGS, VHF PAM: WA1ELA.

Net	Freq.	Time/Days	Sess.	QNI	QTC
CN	3640	1900 Dy 2200	62	420	28
CPN	3965	1800 M-S 1000 Su	51	472	16
VHF-2	28/88	2130 Dy	90	351	10
CSN	3725	1830 Dy	30	159	8

High QNI: CN — WICFI, WA1UAX, WA1RUR and KIEIR. CPN — WINQO, WA1RUR and WA1RXA. SEC WIDGL active on all Nets and will appreciate your efforts in EC work. July reports from WA1NGL, WA1IYP, WA1RXA, WA1LRO, WA1LMV and WA1QPB. Dir. WIHHR tho very busy, will read and acknowledge your letters and requests a copy of all Club Bulletins. Our new VHF PAM is WA1ELA, a well known member of long standing with considerable experience and ability; he extends an invitation for all to join 28/88 each nite. With sincere regret the call of WA1MWH is added to the list of Silent Keys. CN Bulletin has praise for WIQYY, CRN Picnic as the greatest ever — all W1-Land represented including many "locals" and ex-RM WA1HSN! Tri-City invites all to their Club auction, Danbury CARA has Conn. QSO Party each year and has provided complete final results — available from WIGVT. NEWS FLASH: Murphy Marauders beat PVRC in Field Day! Congratulations to WA1ELA, VHF PAM; WA1SSH, Extra Class; WICNY, Advanced Class; WN1UOU and WN1TNT, General Class; WN1SXS new Novice; WA1RUR high QNI CN, CPN July; WA1SSH Conn. QSO Party Section winner; and WB2NOM/1 now at ARRL! Within the coming month you should complete all antenna projects — it will be too cold and too late after that! Traffic: (July) WIFFW 250, WA1FCM 178, WA1GFH 132, WA1RUR 119, WA1UAX 118, WIAW 80, WA1RYL 78, WA1RXA 74, WICFI 54, WIGVT 54, WB2NOM/1 47, KIYGS 45, WA1SSH 44, WA1SOB 37, WIKV 32, WIDGL 27, WN1URA 27, WA1QPB

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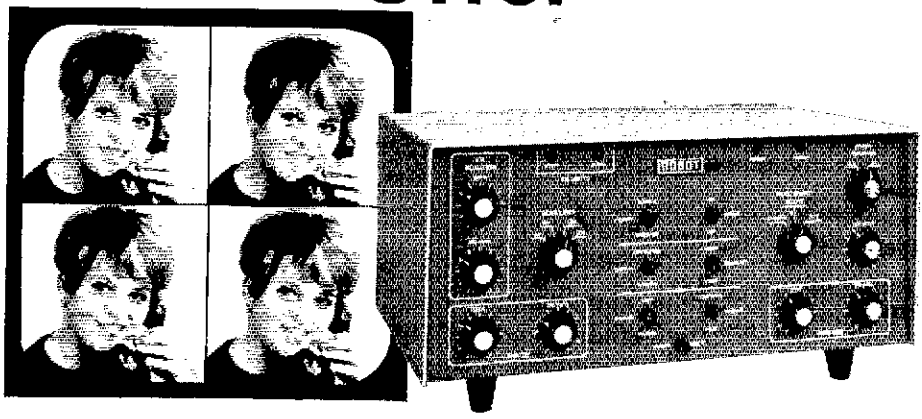

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25, WN1UAS 22, WA1RNA 20, WA1DLI/1 16, WA1HIP 10, WA1IYP 10, WA1OPB 8, WA1QOU 8, W1QV 8, W1CUH 7, W1BDI 6, WA1DNF 4. (June) W1EFW 189, WA1SHO 87, WN1UHN 8.

EASTERN MASSACHUSETTS – SCM, Frank Baker, W1AUP – SEC: W1AQG received reports from ECs WA1KTR, W1BAB, K1ZOP, K1NFW, W1EQH. W1CPR is a Silent Key. W1AAJ worked Nebr. & Kans. opening on 2. W1UUQ working out in Calif. WA1DIS moving out to W-Land. W1JIT on 2 fm. W1POL/VE1 on a camping trip. W1DGD now in W. Bridgewater, MA. W1EJE got married. K1BUE/W1ZOM moved to Manchester, MA. WA1PLK working many Novices on 80 cw. N1EPN had 56 QNIs, 6 OECs. W1LE visited W6BVY, he says local CD net on 147.21 MHz, Emergency Net for greater New Bedford now uses WR1ADR 147.6/147 repeater. W1BEY back from vacation and on CHN. WB2AEK jammed right hand now in a cast. W1HF has 100th card for 75 ssb DXCC. HHTN had 169 QNIs, 50 OTC. HB9AOH & XYL visited WA1MKP. K1CLM has his Advance ticket. W1HP worked VU2GDG on 75. K1UIW has preamp for Oscar reception and has a 432 transmitter. WA1QKD, WA1GGT went to Block Island and had one walt on 2. WB4SMA now handling night time from WIMX. W1CE vacation in Maine. W1EQH had Bellingham ARFC provide communications and Amateur Radio Exhibit at Celebration. WA1SPA now General. WA1POY says Wellesley ARS, W1TKZ, will offer a fall course if enough interest, contact WA1RGA. W1AUG has his 25 year pin. WA1PAZ's HW-100 is out. WA1LCP has HW-7, EM2MN had 48 QNIs, 37 OTC. W1QYY had the annual 1RN meeting at his place, with a good turnout. K1SOP has applied for DVS 100. W1NF in hospital for a visit. K1OKE home from hospital. WA1DSW has 11C 2000. WA1CTF has HW-202. WA3/VW1 is in area from Del. WA1QAA/QAB trip to W-Land, lots of repeaters. The WIDC VHF SS ops had a picnic. G8VG, G1DSN visited W1DAL. Officers of the So. NL DX Assn.: W1JEL, pres.; WA1QBG, Secy.; W1GTJ, treas.; WA1NSE, QSLs; W1DAL, pub. and asst. ARRL Dir. NE-NN report 48 QNIs, 32 OTC. New officers of Whitman ARC: WA1AXK, pres.; WA1DDN, vice-pres.; WN1TSL, secy.; K1UMP, treas.; WA1QER, WA1NHI, WA1DSD. W1GJK, dir. Their tower is up with a beam for 2 & 6. WN1TSL passed his General. WA1FEB passed his Extra Class. W1UUY moving to Calif. WA1MSK put out another copy of Zero Beat for the EMRIN, if your on this list send in your traffic reports. W1NJE has a TS-520 and mobile, had quite a trip back in Jan.-Feb. visiting 3C2CC & KC8BH, also VK2/G Land. W1MCX is an Asst. Harbor Master at Salem. W1FH endorsed as EC & OO. W1DDI on 2 fm. EMRI had 338 QNIs, 294 OTC. W1HGU is ex-W9ZFY. WA1UOH is ex-WA2EHV. WA1HMW has started a Sudbury Radio Club. Traffic: (July) WA1MSK 407, W1PLX 268, W1DMS 137, WA1OKD 132, W1UX 136, W1MX 104, W1CE 82, WA1QWO 75, W1EH 71, K1PAU 61, W1EMG 46, W1EQH 41, WA1POY 21, WA1RGA 15, WA1EFJ 12, WA1QG 9, WA1PAZ 7, WA1MSK 2. (June) W1CF 59, W1EMG 54, WA1PGY 20.

NEW HAMPSHIRE – SCM, Robert C. Mitchell, W1SWX – SEC: K1RSC. RM: WA1GCE. PAM: K1YSD. K1ACT says his new QTH atop Rochester Hill looks promising. W1PEA of the Salem CD will be starting amateur radio classes in Sept./Oct. Interested parties contact Bill at home. K1YSD reports much traffic handled from Boy Scout and Boy's Club camps in NH. K1POV's Ten-Tec from atop Welsh Mountain gave many NH PII exchanges. The GSPN report shows 412 check-ins, 43 traffic. WA1RGP needs 4 more states for 5BWAS. W1EHT operates his new TR-22C when not sloshing around in that 3 foot brook. NH1PN had 92 check-ins, 30 traffic. WA1QCO is the DTRN rep for NH1N. WN1TIR's new HT-37 & Drake 2B await use when the new General ticket arrives. The NHVTN report shows 143 check-ins, 49 traffic in 25 sessions. K1LMS OBS endorsed. The NH1N 1st annual outing was held at K1GDC's with W1QOV, WA1SCE, K1UFI, WA1QCO, WA1IVB, WA1RGP, WA1IOG, K1BRI attending plus families. Traffic: (July) K1BCS 45, K1YSD 42, K1LMS 11, W1RYS 4, W1SWX 1. (June) K1POV 21, K1ACT 11.

RHODE ISLAND – SCM, John F. Johnson, K1AAV – SEC: W1YNE. RM: WA1POI. PAM: WA1RET. Members of the Newport County Radio Club and the Newport Red Cross furnished communications for the 300 year's Celebration of Little Compton, RI. Director WA1AGB along with K1MCT, K1UFR, WA1QKE, WA1BIL, W1PDL, W1IFT, W1IAG and a visitor K1HKQ worked on simplex frequency of 146.52 MHz. The communications were used in the control of the parade. Mr. and Mrs. Morrie Seiple of the Red Cross provided the Red Cross Van and the two groups worked together in service to the public. WEAM has been very active on D and propagation studies. WA1RFT is working openings on 6 meters and working new states using Oscars 6 & 7. New Novice in RI is WN1VFP. New Techs WA1s VGK, VIH and VII. New General WA1VFW. Traffic: WA1POI 200, WA1RFT 69.

VERMONT – SCM, J.H. Viele, W1BRG – SEC: W1VSA.

Net	*Freq.*	*Time(Z)/Days*	*QNI*	*QTC*	*Mgr*
VTSB	3909	2200 M-S 1130	534	30	WA1PS
Carrier	3935	1300 M-S	340	30	W2DS
Green Mt.	3932	2130 M-S	470	48	W1JL
Vt. Phone	3909	2130 M-S	71	4	W1KK
VTPHD	3969	2200 Su	47	?	K1BQ

Welcome new amateurs WN1VGD, WA1VGL, WA1VGM. Southern VT active on 50.11 and 50.4 ssb and am. Look for WA1TBY, WA1NBV and WA1MAG with new 80-ft. tower with 3-1000. VTN Net officers are WA1PSK, mgr.; W1SDG, asst. mgr.; WA1DHJ, secy.-treas. BARC International field biggest attendance ever, over 500. NHVTN looking for check ins with two meter fm capability. Traffic: WA1QQP 81, K1BQB 51, W1LMO 13, K1NKT 9. (June) WA1QQP 65.

WESTERN MASSACHUSETTS – SCM, Percy C. Noble, W1BV – SEC: WA1DNB. 75 Mtr PAM: WA1MIE, CW RM: W1DV. VHF/UHF PAM: W1KZS. Two storm alerts were handled ve

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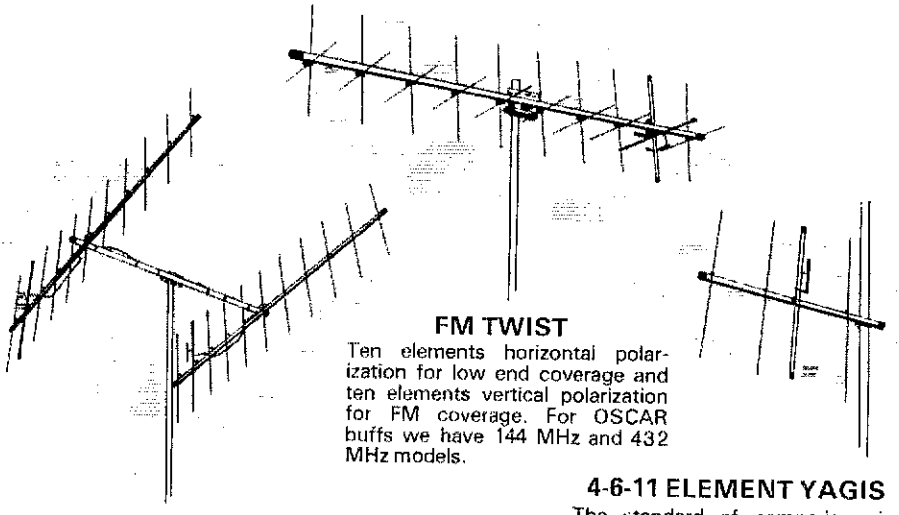

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efficiently by the WM AREC Repeater Assn. and by the NOBARC repeater on Mt. Greylock. Contact maintained between the latte and CD Hq in Pittsfield, information immediately forwarded t Logan Airport. New officers at Worcester Tech RC are: WA1QNX pres.; WN1NKJ, vice-pres.; WA1RGA, secy., WA1QWA, treas W1IBZ putting up a 50-ft. tower. WA1PLS has an IC-230. W1KZ has 48 states confirmed on 6 meters, with WA1REA one state les WITM appointed asst. CW RM. The Sun. WMEN held 4 sessions, 6 QNI on 3935 and 36 through liaison to repeaters. WMPN held 2 sessions, QNI 184, traffic 24, total 55 different stations. WMN hel 30 sessions, QNI 137, traffic 151, WM AREC Assn. Repeater hel 23 sessions, total QNI 24, NOBARC Greylock Repeater held AREC sessions with QNI 27. W1ZPB and family left for the Hawa Preparatory Academy at Kamuela, Hawaii 96743. A great deal traffic handled this month for Camp Emerson WA1KHP, Hinsdal they have a code and theory class in operation. Glad to have been service. Traffic: (July) W1BVR 187, W1DVW 129, W1TM 12 WA1RLP 41, W1KK 33, WA1MJE 25, W1BBI 18, W1SLR 1 WA1PLS 8, W1DOY 7, WA1OUZ 7, WA1DNB 6, WA1RWH WA1OLK 1. (June) WA1RLP 38.

NORTHWESTERN DIVISION

ALASKA – SCM, Roy Davie, KL7CUK – WA7ZZX carried 2 meter QSO from atop Mt. McKinley with Anchorage, Fairbank and yours truly, a first for amateur radio. Photos and more w appear in later issue. KL7HLP reports many stations in Southeaster on 2 meters, The Juneau Club going very strong. KL7GCH enjoyi the 2-meter link with KL7IDO over the Mtns. KL7HLC changing h duty station from Pt. Barrow to Fairbanks. Jim was our EC Barrow and will be replaced by another amateur, reportedly fro HK-Land, SEC KL7IDO has mailed an Alaska AREC Bulletin to AREC members. There are 47 registered members in Alas (ARECI. KL7IMH handling many QTC and OBs. PAM KL7HO reports 481 check-ins for the Ak Snipers Net. KL7DG repor receiving a QSL 21 years old. KL7IFW setting up plans with the R Cross on the Kem. The response this month is outstanding mo news than we have room to include, thanks gang! Traffic: (Jul KL7HLC 47, KL7IDO 11, KL7GUH 8. (June) KL7HLC 4.

IDAHO – SCM, Dale A. Brock, WA7EWV – SEC: W7JH PAM: WA7HOS.

Net	*Freq.*	*Time/Days*	*Sess.*	*QNI*	*QTC*	*Mg*
FARM	3935	0200 Dy	31	1246	35	W7TW
IMN	3635	0300 M-F	23	194	80	W7GE
RALES	3.99	1415 M-F	23	434	10	W7KT
Id. Silver	3.93	0115 MWF				W7

WA7MXN new Boise Co. EC. Spout Springs Repeater, 19/79 no on the air. W7IY made 77 contacts during July's CD Party. W7GE added an SB 200 linear. A QCWA Chapter is being formed, includ North Idaho; those interested contact W7FL. Traffic: W7GHT 34 W7GBO 22, W7KDB 10, WA7ROT 8, WA7PEL 4, W7IUO WA7IEC 1.

MONTANA – SCM, Harry A. Roylance, W7RZY – Asst. SC Bertha A. Roylance, K7CHA, SEC: WA7IZR. PAM: WA7PZ WR7ABY Butte is in its new home on Red Mountain and doing EB job. The Billings repeater is on with a temporary rig installed a plans are being made to go to solid state. W7DEO is busy worki on his second home in Wolf Creek Canyon. WA7OZD has chang his QTH to Missoula. W1MD Hamfest was well attended and a go program was provided with lots of goodies along with several deal present. W7PGY had to cancel his appearance because of a he attack but now is much improved. W1YL from headquarters was present and gave a slide presentation on ARRL headquarte IMN had 23 sessions, 194 QNI and 80 QTC. Still have openings EC and appointments to those interested. Traffic: W7TGU W7NEG 9.

OREGON – SCM, L.R. Perkins, WA7KHU – Asst. SCM: Da T. O'Connell, WA7TDZ. SEC: W4RLE. RM: K7ODE. P K7ROZ. K7HSJ reports some very interesting 6 meter cont during early July. On the 5th Don worked WI, W3 and W0. meter direction finding can be accomplished very easily wit simple full wave-length loop. Why not have a hidden transmi hunt: SCM election coming up, please cast your ballot, give choice all the support and encouragement possible.

Net	*Freq.*	*Time(Z)*	*QTC*	*QNI*	
OSN	3585	0145	118	152	WA7
BSN	3908	0030			WA7
AREC	3993	0220			WA7
		0200			
NUCLEAR	50.250	0130 AM Su			W7

There are several local AREC nets meeting on 2 meters around section. Portland, 04/64, Medford and Grants Pass. Talk it u your area. Contact W7HLF for more information. Traffic: K7 165, W7ZB 118, K7OHF 102, K7NTS 98, K7IWD 97, WA7EXV WA7MHP 75, WA7UJO 61, WA7YEO 49, W7MLM 41, WA7 30.

WASHINGTON – SCM, Mary E. Lewis, W7QGP

Net	*Freq.*	*Time*	*QNI*	*QTC*	*S*
WSN	3590	2045	344	105	
NWSSB	3945	1830	621	40	
NSN	3702	1900	356	129	
NTN	3970	1130	1607	78	
WARTS	3970	1800	2415	242	

Glad to see W7DZX again back in the traffic circle. W7LG rep 2-meter activity around Pt Angeles & Clallam County picking greatly. WA7QWS (age 17) holds an Extra Class ticket. He has selected to appear in Who's Who among American High Sc students – he has founded a High School Amateur Radio (which is in need of equipment). Please call him and give a hel hand. WA7UHW also is a teenage amateur and is actively han traffic on ew nets. Tacoma ARC presented a plaque to W

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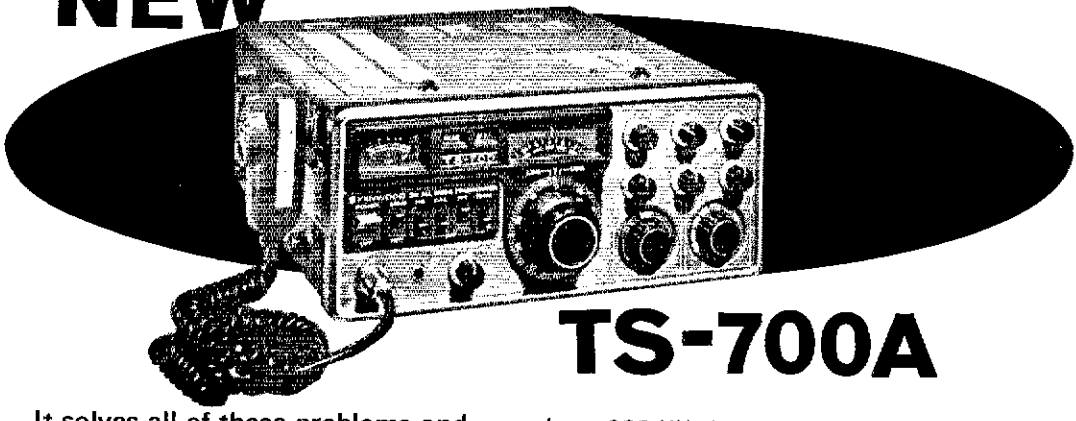

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naming the club's museum in his honor – "The Doc Spike Museum." The Tacoma Cascade Repeater WR7AGJ operates on 147.99/39. Transmitter is on Crystal Mtn. WA7JIN upgraded from Novice to General. K7IPQ now has Extra as does W7PUG. The Spokane Amateur Radio Council held a very well attended & successful first Hamfest this summer. The crew of W7ZLP, WA7OFE, K7VNT, WA7EYU, W7NXN, W7HNZ & XYLs are to be commended. W1YL, Ellen was recent guest at several club meetings or hamfest in the NW & hope she enjoyed our Western hospitality. For those of you who have not seen K7GWE's seminar on Oscar 6 & 7, we suggest you invite him to attend your club meeting. Traffic: WA7BDD 76, K7OZA 72, W7TG 60, W7DZX 57, W7APS 43, WA7VHW 40, W7SYS 34, W7KEJ 32, W7RO 31, W7RUN 29, W7AIB 13, WA7RCR 12, W7AX1 6, W7BCS 4, WA7GVB 2, K7VNI 2.

PACIFIC DIVISION

EAST BAY – SCM, Charles R. Breeding, K6UWR – Asst. SCM: Ronald G. Martin, W6ZF. SEC: WB6RPK. Asst. SEC: WB6DSI. New appointees for the Section are WA6RMV, ORS/OVS and W6SBD, EC for Lake County. Congrats to both. It was noted the Section was very active during July Open CD Party. Remember there are three others on cw and phone open only to appointees. For info drop a card to your SCM, QTH on page 6. W6ZF transmitting West Coast Bulletins at 9 PM PDST/0400Z on the 1st and 3rd Mon. on 3540 at 22 wpm. This is a good source of info and a fine way to get your cw speed up. WN6EAS is new pres. of the East Bay ARC. W6FAA of the Contest Advisory Committee gave a fine talk before the July meeting of the Northern Calif. Contest Club. W6AJA and W6ZR are new members of SARO. WA6WAI working hard on a new HW202. WA6YCF has a fine looking four-element quad up and ready for DX. CCRC reports new calls in the Section. WB6JDU, WN6KZJ, WA6LEY, WB6KZS, WN6LEO, WA6LCX, WA6LCW, WN6KDA, WN6KGI, WN6KCY, WN6KHN, WB6KIS, WN6KHG, WN6KCB, WN6KIT, WN6KCZ, WN6KKS, WN6KKL, WN6KEH, WN6KMD, WN6KHE, WN6KLY, WN6KEQ, WN6KSW, WN6KSR, WN6KNQ, WN6KPO, WN6KQU, WN6KSA, WN6KPV, WN6KON, WN6KNQ, WN6KTL, WN6KSI, WA6KRO, WN6KSP and WN6MIX. Good luck to all. Traffic: K6HW 364, W6LYM 140, W6JXK 78, WA6CAZ 52, K6PMG 14, WB6VFW 14.

NEVADA – SCM, John D. Weaver, W7AAF – This month's column is dedicated to the memory of WA7LEE, who died tragically July 22. Dick was past pres. of LVRAC and a member of LVRA and Navy MARS. He excelled as chmn. of the LVRAC Licensing Class Committee and helped many new hams get started. We will all miss him dearly. K6MQX/7 has turned in his OBS for an OPS appt. WR7AHN, 16/76 for Reno, is moving to higher ground. SNARS is requesting the memorial call W7TA to replace K7UGL. The Reno gang has code practice sessions on 21,150 Mon. at 9 PM. WA7WYE, WA7YYY and K7PRW provided communications from Las Vegas for a nationwide observation by the International Occultation Timing Assn., an amateur astronomy group. Traffic: W7LLX 440.

PACIFIC – SCM, Pat Corrigan, KH6GQW – SEC: KH6IKB. RM: KH6IAC. ORS: KG6JAQ (also WPEN Net Mgr.). Still looking for KH6s to help relay tfc on the W. Pac Tfc Net. Good way to hone up on your cw and msg handling. Pacific Section roster includes many from Samoa and Midway. KM6 is becoming quite active again. Kudos again to WPEN for the great job in handling Viet refugee tfc. KH6IAC received nice letter of commendation from Navy for his part in the effort. SAROC Hawaii appears to have been quite a success despite low KH6 turnout. There are rumblings about another convention next year. KB6CU, KG6JAR were there as well as neighbor island guys. Old timers really came out of the woodwork. Congrats to KG6IEV on again getting his ticket. KH6HPQ heard on Oscar. KH6GKD operated for nearly a month as VR1PE with big pileups. KH6RVS & GRW sporting new Clegg FMDX's. Kauai repeater finally active but still seems to have bugs. KH6BZF had nice visit to W-Land including WØBWJ's place. Carl is also KH6IPY. Send news for the column. Traffic: KH6IAC 832, KG6JAQ 213, KG6JEU 66, KH6GQW 19, KH6IEC 5.

SACRAMENTO VALLEY – SCM, Norman Wilson, WA6JVD – SEC: W6SMU. ECs: K6QIP, WA6MKA, W6GQT, WB6COF, ORSs: W6CEI, W6NKR, W6PU, K6KWN, K6RPN, K6YZU, OPS: K6RPN. OBSs: K6QIF, WA6WOX. OOs: W6BIL, K6GG, K6IRW, WA6OWH. OVSs: W6PBC, WA6IAF, WB6NKO, W6OWP has resumed code transmissions from his new QTH in Paradise. The RAMS provided communications for the 17 bus tour of the American Theater Organ Society in Sacramento. W6NJU installed a fixed three-element beam on his roof and worked Mt Athos, the last he needed to have them all. W6NKR has a new six-element tribander. K6SC building another 4-400 amp. The Sierra Hamfest in Reno looked like a Sacramento Valley section convention. W6QNB/6 operated from Alpine county in the recent county hunters contest. WA6JVD made 5BWAC. Traffic: W6CEI 2.

SAN FRANCISCO – SCM, Rusty Epps, W6QAJ – Expect another big signal from Eureka now that WA6ICB has his new Wilson DB54 beam. Congrats to WN6YIT who passed his Tech exam, and to WN6DXG who received his 15 wpm CP award. WB6IFN, trustee of WB6IEO, rpts activity from the Ferra Lind High School stn on DRN6. MARC provided radio communication for the 6.8 mile Dipsea footrace from Mill Valley to Stinson Beach. OO WB6BDL watching the Novice bands. W6HST now transmitting pix via amateur TV. WA6ICB received OPS and OVS appts. SFRC got great TV and newspaper coverage of its ED activities. The East West Repeater Assn. (Eureka) has informal dutch-treat breakfast the 1st Sun. of each month – contact WA6ICB for details. W6ZR and W6VVT spoke at MARC meeting re Docket 20282. WB6BDL moved to a new San Rafael QTH. CSN (Novice) will QSY from 40 to 80 meters to get better local coverage. Remember the Cal QSO Party Oct. 4 & 5 – see rules Sept. QST. We need letters sent to Congress supporting the RFI Bill, HR 7052. We regret to record the passing of MARC charter members K6RAO and W6DXA who

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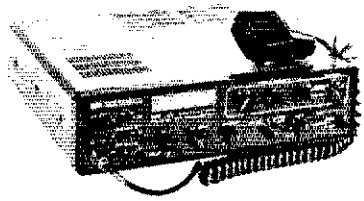

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became Silent Keys in July. Traffic: W6KNL 136, WA6BYV 130, K6FP 71, WA6BTF 25, WB6RDL 10, W6OAT 4, WB6IFN 3, W6GGR 1.

SAN JOAQUIN VALLEY – SCM, Ralph Sarrivan, W6IPO – It is with deep regret that I report the passing of Ralph Jack, ex-W6EPW, W6AHO. Many of the old timers will remember him; also K6DWZ a Silent Key, W6DYL mobiling in Alaska using an Atlas Transceiver. W6SBE heard on 28 ssb. WA6SES received his Extra Class license as did W6PXP, K6IXA busy with his repeater on 2 meters, and flying. K6PKO on 2 meters ssb. WB6RGU has an fc 230. WB6IFM has a GLB synthesizer. WA6GRI now Advanced Class. W6PSO has an IC22 on 2 meters. WB6IFM installing a new tower. W6GRV has a TR2200. W6QKP passed his Advanced Class exam. W6EJQ now Advanced Class. WN6YAB passed General Class exam. WA6EXV busy on 432 MHz. WA6IRR retiring and expects to do a lot of hamming. WA6ONZ, W6KPC and YYLs attended SAROC in Hawaii. K6OZL holding nightly skeds with 4X4CJ on 20 cw. WA6CPP made over 700 contacts in 73 counties, and operated ED as WA7PFL. W6QNB with WA6FAH operated from Alpine, Mono, and Toulumne counties in the County Hunters Contest. Traffic: WA6RXT 90, WN6PPV 6, W6QNB 2.

SANTA CLARA VALLEY – SCM, Jim Maxwell, K6AO/W6CTH – SEC: WA6RXB. W6RSY made BPL; W6REF, WB6IYA made PSHR. 2M ssb mobile is bursting with activity, including WB6INN, WA6UAM, K6KBE, K6MYC, WA6VAB, WB6PMH, K6DIS and WA6FKJ. K6UOH burning up 1215 MHz, recent QSOs with K6ZMW, WA6NRV, W6KQG, WB6BHR. W6DEF will be QSYing shortly to Auburn, NCN is looking forward to having an active Auburn outlet! Ex-SCM WB6IZF now QRV in King City after a 5 year sojourn in the Far East. Congrats to WB6IYA who passed Extra Class exam! The PAARA gang participated in the Redwood City Independence Day Parade, providing communications to tie the whole shebang together. RM W6QNB and WA6FAH straddled the joint boundary of Alpine, Toulumne and Mono counties to exercise their portable rigs during recent county hunting bash. Aloha to Pac. Div. Dir. W6ZRJ, who attended a successful SAROC convention in Hawaii. Also enjoying the swaying palms was W6MMG, who managed a bit of KH6 operation. WB6LRU and W9HVQ/6 are eyeing several Santa Cruz Mtn. sites for their proposed 440 MHz repeater. W6AUC now QRV on 2M fm. WA6DFM enjoying a new TS-520. W6VZT still holding forth as weekly ICC Stn. G. SCVers were saddened to hear that K6CBK is a Silent Key. Stan was one of the Oscar p-neers, and has for many years been one of the most popular and lucid antenna lecturers. Interested in hearing more about ARRL CD activities? Your SCM stands ready to drop by your club meeting and pass the word. Drop a line to the address given on page 6 of QST. Traffic: (July) W6RSY 758, W6YBV 202, W6BVB 110, WB6VRG 109, W6REF 90, WB6IYA 79, W6VZT 60, W6NW 48, W6AUC 44, W6DEF 40, W6OH 21, K6AO 18, W6ONB 14, K6WT 11, WA6WET 7, WA6HAD 5, W6KZJ 5, W6ZRJ 4, WA6NDN 1. (June) W6QNB 19, W6KZJ 9, W6ZRJ 8.

ROANOKE DIVISION

NORTH CAROLINA – SCM, Chuck Brydges, W4WXZ – SEC: K4FBG. PAM: W4OEO. VHF PAM: K4GHR. RMs: WB4EFF, K4MC. EC of the month is W4NZJ covering Rowan Co., give him your support. RARS News featured the departure of W4YDY to Okla City. YDY also held the PRA appointment, will be replaced by WB4ZSM. WB4CES and WB4AMU graduated upgrading class of 11 with 9 Advanced, 1 Tech & 1 strike-out. ECs K4AIH, WB4KHM, WN4NCU & WN4JOC operated exhibit station at Cherokee Co. Fair. K4MC reports RARS having display booth at nearby Cl Jamboree with good response to license classes. Emergency exercis was held in Chatham, Wake, Johnston & Harnett counties by Stat officials; several amateurs were involved including K4FBG, W4FMN WA4RIS, K4HRN, W4VFS and others. Antique Wireless Assn. Mee was held in Winston-Salem July 12. Featured speakers wer W3WRE, W4AA, W4ZM, W4ACY, thanks to W4DBI for a nic meeting. When talking about Emergency Preparedness the ultimat result is the saving of life and amateur radio had TWO cases o five-saving in one month. WA4CBB reports his son WB4IFO wa mountain climbing at Hanging Rock State Park suffering a fal breaking one hand and fracturing his skull. Another member of th party climbed down, got 1FOs 2-meter rig and called on 22/82 Roaring Gap, WR4AGS raising WB4VNZ and WB4FXW wh contacted the State Highway Patrol who activated the Sauratow Mtn Rescue Squad. In Alamance Co. heavy rains caused loc flooding. The AREC group there found three people trapped i Back Creek as a result of road checks being done for Dept. o Transportation. WA4IUX and WB4SCA were at the scene joined b EC WA4FFW, WB4SOC and WB4GSN. Two were saved by the local rescue squad brought in by the EC. The effort was handled throug 22/82. WR4AGC, Durham Rptr. Traffic: (July) W4OEO 14 K4FTB 112, W4RWL 94, W4WXZ 58, K4EZH 55, W4FMN 4 K4MC 39, WB4MXG 25, WB4KHZ 23, WA4KSO 23, K4AIH WB4CES 7, K4FBG 4, WA4MDW 2. (June) WB4OXT 34, W4RW 12, WB4CES 5, WA4KWC 4.

SOUTH CAROLINA – SCM, R.H. Miller, WA4IUO – SEC W4ZMZ. RM: WB4OBZ. This regretfully records the resignation K4GQG as PAM. All SC traffic men are saddened by the passing W4AFA on July 21. CN News, a monthly publication by WB4OBZ serves both the SC and NC contingents of the Carolinas (combine Section) Net. This enterprise fills a long felt need, and is worthy Your support. Winner of the code proficiency contest at the Charl Towne Hamfest was W4IOC, copying solid at 45 wpm and 25% 50 wpm – with a pencil yet! New target date for Novice Net w Sept. 1st. Sked is 3718 at 2130Z daily (5:30 PM EDT). The Novice are our Generals, Advanced, and Extras of the future, so lets gi them a helping hand. You phone men can help too, if you haven lost your touch. Let's get in there and participate. The net needs manager. Capable volunteers please contact RM WB4OBZ. The S AREC is long overdue for a complete re-organization. Please gi your full support to our new SEC, W4ZMZ. Traffic: (July

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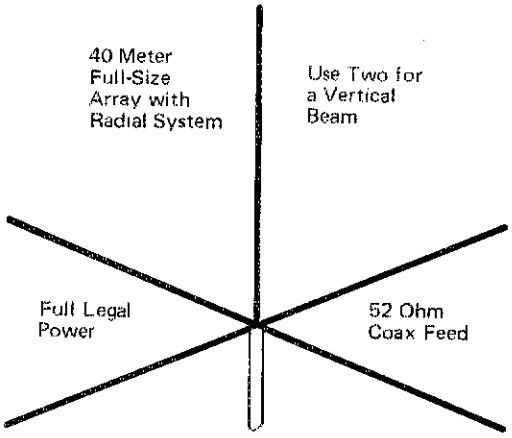

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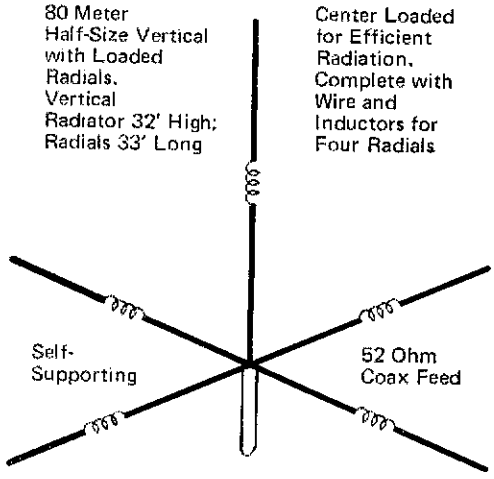

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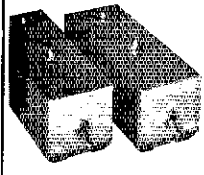

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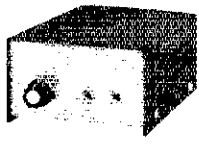

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WB4OBZ 113, W4NTO 70, K4FRX 8, CNE 118, (June) CNE 135 SSBN 82, W4NTO 55, W4WQM 46, WB4OBZ 45, K4FRX 12 WA4LOU 5, WA4UZA 1, (May) CNE 121, W4NTO 95, K4GLT 14 K4FRX 13, WA4IVF 12, WB4OBZ 12, WA4UZA 1.

VIRGINIA – SCM, Robert J. Slagle, K4GR – Asst. SCM: A.I Martin, Jr., W4THV. SEC: WA4YIU. Asst. SEC: WA4PBG. PAM WB4YKM. RMs: W4SHJ, K4IAB, WB2VYK/4. WA4AVN WA4DHY. Va. RTTY Net still struggling to get going; need QNI. 2M rig of WB4DRB stolen – replaced with HW 202; he also passe medical exams. Enjoyed K4CIO back from New Mex. for a while WA4EPJ sweating Drake C twins. WA4CLK household duties intertering. So long to WA9NEW/4 and family to NC; congrats t WB4YKM who replaces him as PAM. SCM candidate W4YZC move to Centreville, Va. K4PIV/4 off on USS Claude V. Ricketts for s months. K4FZJ passed Advanced and Extra! Business and vacation eating at score of W4UO. WA4HHG also sweating Drake twins WA4SMR passed Extra! W4HU in CD party. K2EOP/4 coming t Va. permanently, sweating his "4" call. W5VZO/4 fixed his hail relay. ARRL 1st VP W4KFC back after a 7100 mile trip with XY attended Flagstaff Ariz. Hamfest. W4TZC still catching up WB4HDF/4X back from Israel with 300 QSOs as such. W4JU reports conditions very peculiar. Nets: QNI/QTC – VSN (June 251/114, (July) 344/108, VA PON 52/18, VSBN 1012/21 CV2FMN 476/78. New ORRA officers: W4LMB, pres.; WA4MMI vice-pres.; WA4UIS, secy.; W4IFM, treas.; also providing emergenc power to their WR4ACN. Tidewater SSBN flyer has excellent dop on what a decibel is. VA Beach/Norfolk AREC Newsletter for Au is a must for emergency preparedness. Also heard from W4KX an Vienna Wireless Soc. Guess we will know by the time this gets t print whether our new SCM is W4QDY or W4YZC. We pledg whichever our strong support. Traffic (July) WA4VFW 37 W4QDY 216, WA4EPJ 154, WB4YKM 142, K4MLC 128, K4KN 96, W4SUS 94, W4QO 69, WA9NEW/4 69, K4GR 68, WA4CLK 6 WB4HDF 60, W4YZC 49, WA4YIU 44, WB4KIT 37, K4VWK 3 WB2VYK/4 30, WA4SMR 24, WB4DRB 22, K4KA 22, WA2ICU/ 18, W4WWD 17, W5VZO/4 17, WB4AIA 15, K4CIO 12, WA4PB 12, WA4HUB 11, K2EOP/4 10, WA4HHG 5, W4LGM 5, W4MK W4TZC 4, W4KFC 3, WB4HDF 2, (June) WB4SGV 87, WA4WQG W4TZC 2.

WEST VIRGINIA – SCM, Kay Anderson, WB8DJV – W8HZ back from second vacation trip South. John received warm letter appreciation from WV Governor Moore for traffic relayed fro Michigan's Governor. WB8QPU & WA8FIF happened to catch han opening on 2 meters and worked Texas and Okla. WB8IJW had fu working 10 meters during last CD party. Berkeley County OE conducting mock disaster drill Aug. 13; Opequon Radio Club assist with communications. W3DHQ moved from D.C. area Harpers Ferry, now W8LLH. Mid day Net handled 81 messages, 5 stations. WV Fone Net with 604 stations handled 115 message WVN (cw) with 102 stations handled 89 messages. (June repor WVN 111 stations, 56 msgs.) Traffic: (July) WB8IJW 11 WB8DQX 58, W8HZA 51, KR0EW 26, W8IWX 23, W8DUV WB8CNN 9, WB8PAV 9, W8FUF 8, WB8MKI 6, W8DYB 5, W8F 5, WA8NDY 5, WA8CRW 4, W8JM 4, W8CKX 3, W8CZT WB8DXE 3, W8GWR 3, WB8LAI 3, WA8LEW 3, WB8MAV WA8ZGP 3, WB8BMV 2, W8GDP 2, K8NYG 2, W8SQO WA8YCD 2, K8RCF 1, WB8CPU 1, W8ETX 1, K8NNK 1, K8ZD 1, (June) WB8IJW 91, W8HZA 24.

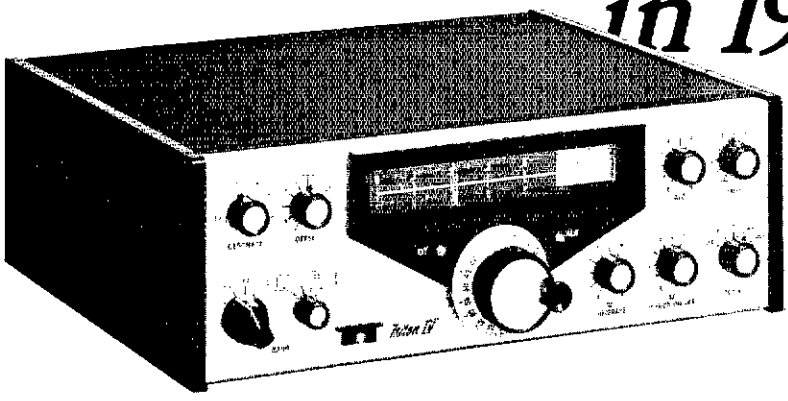
ROCKY MOUNTAIN DIVISION

COLORADO – SCM, Clyde O. Penney, WA0HLO – Sta K0HLO. RM: WB0HCK. PAMs: K0CNV, WA0YGO, WB0IGT h been enjoying contest QSOs during the month of July. A war welcome to a new club in the Colo. section, Ski Country Amate Radio Club, whose pres. is W0IDSW. WA0YNQ announces t formation of the Colo. Ten-Ten chapter of International Te K0HPF worked the CD Phone QSO Party with 68 contacts. C extends a warm welcome to its newest members, WN0MC WN0MIJ, WN8RSH/0 and WN0QEF. W0OIU worked Field D using W0TX/0 call, with 897 QSO phone, and 465 QSO cw, fo total of 1162. Net traffic for July: Columbine QNI 1102, QTC 5 informals 285, 27 sessions, 1297 minutes. Hi-Noon QNI 835, QT 37, 28 sessions, 911 minutes. Late Net Traffic for June: Columbi QNI 1041, QTC 64, informals 224, 25 sessions, 1266 minutes. C QNI 171, QTC 98, 29 sessions. Traffic: (July) W0WYK 16 K0ZSQ 542, WA0UMF/0 215, W0HXB 198, W0ETT 172, WA0YI 166, K0SPR 69, WB0JGJ 50, WB0PVJ 37, W0LAE 36, WA0IM 21, W0PT 19, WN0MCL 16, WA0YBD 7, WA0YNQ 5, (Jun WB0IBS 214, WB0HCK 140, W0LO 92, WA0YNP 88, W0OIU K0PVI 7. (May) W0LO 109.

NEW MEXICO – SCM, Edward Hart, Jr., W5RE – Asst. SC Joe T. Knight, W5PDY. SPC: W5AER. PAMs: W5PNY, W5DM RMs: W5QH, K5KPS. New Mexico Road Runner Net meets at 18 local time on 4040 kHz this month had 640 check ins and handl 39 messages. Southwest Net (SWN) meets at 1915 local time 3885 kHz this month handled 238 messages with 226 check-ins truly outstanding performance. WB5KSS is back in NM after successful shoulder operation. WB5CBC made a contact thru Cis 7, and WA5YWI makes a plug for more satellite work in New M WA5MIY still in camp and not very active. Traffic: W5ENI 2 K5MAF 229, K5KPS 189, WB5KSS 159, W5RE 65, W5HRS WB5NUI 28, W5UTV 26, W5PDY 21, WA5ROU 18, WB5ONQ WA5MIY 7, WA5YWI 3.

UTAH – SCM, Ervin N. Greene, W7OU – RM: W7OC Welcome to new SEC WA7ZBO. Larry is looking for AR members and suggestions for a more extensive organization. Cont him and offer your help. Congrats to WA7ZJD on winning an IL at Utah Hamfest. Activity increasing on IDN. More check-ins needed. WIMU Hamfest a huge success. Utah's turn next ye WA7NYV and WA7ZBO will be in charge. The Hidden Peak repea WR2AGI now on the air. W7UEM and W7KHY reports all Southern Idaho accessable from the Mt. Harrison Repeat WA7OAU reports equipment problems. K7CLD received award

The Transceiver you'd expect in 1980



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The benefits of ALC now extend to output powers less than full rating with a front panel threshold control. When driving linears that require less than maximum available power from the TRITON, or when propagation conditions permit reliable contacts at reduced power levels, ALC will hold your output to the desired level.

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And to top it all off, the highly desirable case geometry has been maintained, but it has a handsome new look. Bold lettering on an etched aluminum front panel and textured black sides and top make the TRITON IV look as sharp as it performs.

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5BWAS. WA7MEL had problems with new rig, returned it to the factory. W7EM/4 working part time for a BC station in Jacksonville, Fla. Ex-W7VTJ now K4KUU. W7KHY building 450 MHz gear from kits. He is looking for any interested in 6- or 2-meter ssb operation. W7VEO is winding up his summer Novice class bringing quite a number of new members to the Ham fraternity. W7OCX reports 76S check-ins on BUN during July. W7BE operating mobile from the high Uintas. Traffic: (July) WA7TSB 62, WA7MEL 59, W7OCX 29, WA7JRC 27, WA7OAU 21, W7RO 16, W7DKB 13, W7ETI 7, WA7ZJD 6, W7HOC 4, W7ITM 2 (June) WA7OAU 99, WA7MEL 47.

WYOMING — SCM, Joe Ernst, W7VB — In 1976 The Wyo. Hamfest is scheduled for the 2nd week end, July 10 and 11, because the ARRL National Convention is being held the 3rd week end in Denver. It is hoped the Cody hams will sponsor next year's Hamfest at the Meadowlark Ski Lodge. 128 attended the Sat. night banquet July 19 at the Ski Lodge in the Big Horns. W7ILL, K7ORA, W7OG1, W7OUX and W7VB from Wyo. attended the WIMD Hamfest at Mac's Inn Aug. 1, 2 & 3. 331 attended the popular Sun. morning breakfast, under the pines. Another new comer to the Advanced ranks is WA7WXO. Remember our Public Service responsibilities by checking into our nets and taking traffic for your area. W7VFW going great guns on the satellites with new antenna. W7RSJ coming along on Slow-Scan. Two meter fans working on Laramie Peak for big state coverage. Traffic: W7UZK 38.

SOUTHEASTERN DIVISION

ALABAMA — SCM, Jim Brashear, WB4EKJ — Congratulations to the Calhoun County Amateur Radio Assn. on receiving a certificate of appreciation, endorsed by Gov. Wallace, for the five-county weather conditions spotting network and Cheaha Mountain relay station it maintains 24 hours a day. K4VF received his rig back and is again active on HF bands. K4UMD has new TR-22 and KLM 10-140. Also has a new Dodge Royal Sportsman Van FULLY equipped with antenna farm and other goodies. Special events station WM4SEC was on the air during the recent Soviet-Apollo flight. Sorry to report W4HEU has resigned as RM after 6 years outstanding service; needless to say, he will be missed! WB4FZQ has been appointed as RM; please give him all the help you can. Welcome to WN4s SBR, SCS, SJO, SKY, SOE, SZA, TJR, TMG, TSK and TUA. WA4s RVZ, SDL, SEG, SEI, SIM, SVM, TCT and UFP. Appointed WA4JBC as OBS and OPS. Appointed WB4EZQ as RM. Traffic: (July) WB4EZQ 110, K4AOZ 107, WB4EKJ 86, WN4JDH 59, WB4RCF 18, W4LNN 17, K4CUU 16, K4VF 12, WA4AJA 11, WB4SVH 9, WB4ZQE 7, WB4TVY 4, K4UMD 3, WA4JBC 2. (June) WB4ZQE 10.

CANAL ZONE — SCM, Roderick J. Isler, KZ5PI — Results for Field Day and related activities were discussed at the July CZARA monthly meeting. This year Field Day was a huge success and it is hoped this kind of club participation will continue in future contests. It was also discussed that the CZARA must strive to achieve some sort of emergency preparedness in the future. The communications problems encountered with Hurricane "Fifi" demonstrated the need for CZ hams to be prepared for the unexpected. CZARA elected KZ5TS as the new club secy. to replace KZ5WA who is departing for a new assignment. KZ5WA will be missed by every CZ ham and good luck in northern Mich. Also, best wishes to KZ5LRT on his new assignment and his recent General Class ticket. KZ5VV is again conducting novice classes and expecting a large turnout.

GEORGIA — SCM, A.H. Stakely, K4WL —

GVEN No. 1	3980	1730Z SU	GSN	3595	2300Z Dy 0200Z Dy
GVEN No.2	146.94	0130Z Dy			
GSBN	3975	2330Z Dy	NEGEN	3975	1830Z Su

SEC: K4KZP. RM, K4FLR. PAM: K4JNL. GSBN QNI 1014, QTC 55; GSN QNI 339, QTC 122 meeting 97% of sked sessions, 90% 4RN skeds and 94% GSBN skeds. Great organization job by K4FLR. Join GSN and have some real fun along with K4YM, WA4LLI, WB4WQL, W4AAY, WB4CIL, W4ELO, K4GXV, K4LRM and K4IJY. New EC for NE Ga. counties, K4CRO who devised and did great job on emergency power SET on 27th. K4YRL still making NW Ga AREC activities meaningful and ready for any emergency. WA4AJV directed search for missing scuba divers assisted by K4PN, K4LLN, K4ZUY and others. K4KZP got Extra Class and high score in Ga and CT QSO parties. WEDIXIE ARC hosting 1975 Western Electric contest. W4BTZ active as DO — better get your sig clean! WA4BZP has Oscar 7 printouts available. K4GXV gone to Turkey. K4FLR and K4YRL make PSHR. K4KZP now has 5BWAS. Traffic: K4FLR 166, W4AAY 44, K4YRL 40, K4KZP 15, W4HON 8, K4WC 8, K4BAI 5, W4JM 4, W4BTZ 2.

NORTHERN FLORIDA — SCM, Frank M. Butler, Jr., W4RKE — SEC: WA4WBM. RM: WA4EBJ. PAMs: WB4VDM/75, W4SDR/40, WB4BSZ/VHF.

Net	*Freq.*	*Time(Z)/Days*	*Manager*
NFPN	3950	2230 Dy	WB4VDM
QFN	3651	2300/0200 Dy	WA4JTB

New/renewed appts: WB4TGW EC of Pasco Co., WA4DWR, WA4EYU & WB4LOQ OBSs; WB4HKP ORS; K4VFY & WB4HKP OPSs; WB4LOQ & WB4HKP OOs; WB4KGW OVS. WB4JHQ & W4SIZ earned SNCs on QFN. SEC WA4WBM visited ECs in NW Fla. FEARA held its annual Fish Fry at W4EFE's QTH. WA4MYF and WN4JCM passed General & Advanced exams. The NW Fla. Rptr Assn. is a new group formed to support the WR4AIW 25/85 repeater. WA4VBA, pres. WB4PGO keeps daily skeds with K5nEV/mm, completing a 2-year world tour in his sailboat. Gainesville hams provided comm. for Fla. Special Olympics. WA4PWF earned ARRL 40 wpm CP award. W4FAT working Ocean 6 and 7. Fla. Jr. College ARC call now WA4STZ. NOTARS elected WA4UBW, WB4DAD, WN4FEK. WN4FCD & WB4ANW. WB4HKE

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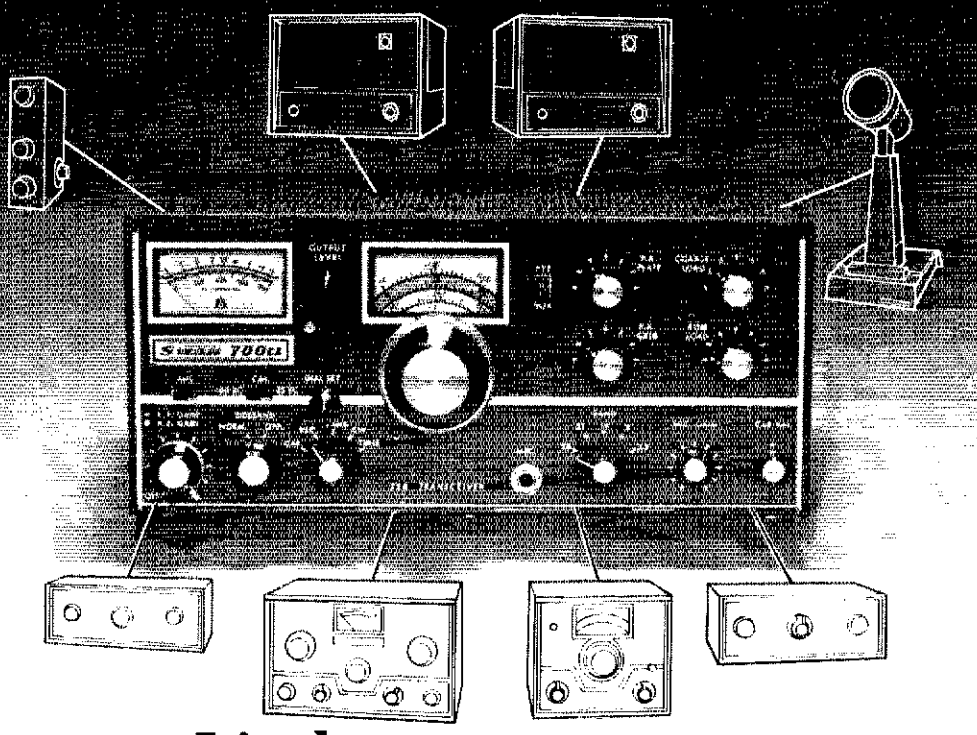

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equipped with emergency power. WB4GHU received 4RN cert., also active on RN5 & (D)EAN. K4RNS new on 34/94 Daytona Rpte WA4DWR, WA4FWA and staff put out another FB edition o Listening Post. K4CVO completed course in radiological monitor ing. Citrus ARA received publicity in local paper about FD. New club active in Zephyrhills – East Pasco ARC with officers WA4ZAZ WB4IUL and WN4JVG. Traffic: (July)WA4BBI 420, WB4GHU 413 WB4HKP 403, WB4JHQ 143, W4RKH 111, W4WNY 109, WB4DXN 98, W4SDR 81, W4KIX 68, W4LDM 67, W7EM/4 53, WA1QAH/4 51, WA4BAX 50, K4CVO 49, WB4DAD 46, WA4CRI 34, K4DD 28, WB4NJI 25, WA4WBM 25, WA4EJY 23, WA4IWW 18, WB4IEI 17, K4OER 11, K4RNS 11, WB4TVQ 7, WA4EYU 6, WB4VAP 5 WB4VYU 5, WB4BMZ 2, WB4TZR 2. (June) WB4HKP 500 WB4DXN 268, WB4GHU 243, W4COE 89, W4LDM 75, W4KIX 66 WB4VDM 42, K4VND 32, WA1QAH/4 21, K4RNS 10, WB4BMZ 1

SOUTHERN FLORIDA – SCM, Woodrow Huddleston, K4SCL – SEC: W4IYT. Asst. SEC: W4SMK. RMs: K4EBE, W4FH WA4GBC. PAMs: WA4NBE, W4OGX. New appointments this month: W4BFQ EC Brevard, K4AIZ ORS. Endorsements: WB4AIK W4GDK OPSs: W4NTE ORS and EC St. Lucie County; W4OZF OO WB4QFH, W4WYR OPSs. OOs reporting: K4CFV, K4DAS, K4JPF W4OZF, K4QG, WA4UVG. K4DAS reports he passed his Extra Class exam and has a new rig Tritton 4. WB4ZSO sporting a new Advanced ticket and CP20. K4QG vacationed in Bahamas early par of Aug. WA4IIH vacationing all of Aug. WA4CTM vacationing up north with new HW-202. Says it's working great! WA4KKE has a new IC22A. K4SCL has new Collins S-Line equipment. After a lightning strike wiped out his Swan, W4GPL acquired a Signal One Summer thunderstorms and QRN made traffic nets rather miserable during July. Sat. morning breakfasts continue popular with St Petersburg area amateurs with generally 35 to 40 in attendance a Howard Johnson's at 9 AM. For further information, call on any o the repeaters or 52.525 or 223.5 or 3940 or 28,600. Traffic: (July K4SJH 432, WN4LGF 381, K4SCL 356, WA4SCK 259, K4TH 102 WB4AJD 83, W4EH 77, W4BCZ 75, WA4KKE 66, W4DVO 65 W4DOS 62, WB4TRI 60, W4BM 53, W4WYR 50, WA4EIC 48 K4RLM 47, WA4IJH 45, WB4ALH 44, W4IRA 43, K4CFV 36 WB4ZSO 24, K4QG 20, W4ILF 18, W4SMK 16, WA4CTM 15 W4IYT 11, W4OGX 10, WA4UVG 8, W4NTE 3, W4KGJ 2, K4IWT 1. (June) K4AIZ 39.

SOUTHWESTERN DIVISION

ARIZONA – SCM, Marshall Lincoln, W7DQS – RM: K7NHL PAMs: WA7KQE, W7UQO. Congratulations to WA7NXL, winner o the Ariz. Ham of the Year award at the Ft. Tuthill Hamfest, for h many activities of service to fellow amateurs and to the gener public. K7ZMA won the grand prize, a Kenwood SSB transceiver, a the Ft. Tuthill Hamtest, which was bigger and better than eve Guest speakers included W6EJI, Southwestern Division ARR vice-dir. and W4KFC, ARRL first vice-pres., both former Ari amateurs. At the hamfest, it was announced there will be no sprin hamfest next year so full support can be given the ARR Southwestern Division convention in Tucson Apr. 9-11. Six mete repeater pairs assigned by the frequency coordinating committee a 52.64/53.64 W7KMA Phoenix/Scottsdale; 52.76/53.76 WR7AC central Phoenix; 52.88/53.88 WR7ABV north central Ariz., an 52.96/53.96 W7WGW Phoenix. W7HXM was elected pres. of th Ariz. chapter of QCWA, not K9DCK, was incorrectly reported he previously. WN7WLS and WN7AVQ passed their General Cla exams, with the latter also getting an ARRL 15 wpm cod proficiency award. WN7ZNI won the Novice Roundup for Ari WA7PDW has been appointed OPS, OVS and OBS. July nets: Cactu Net QNI 1,086, QTC 381; ATEN QNI 493, QTC 35, certificates f W7RQ, K7CC, K7GLA, WA7VTM. PSHR: WA7KQE 47, K7CC 4 Traffic: K7NHL 244, K7CC 65, W7DQS 19, WA7KQE 1 WA7VTM 16, W7RQ 10, WA7PXL 9, WA7ICK 6, K7NMQ K7GLA 1.

LOS ANGELES – SCM, Eugene H. Violino, W6INH – RM WB6OYN, K6UYK. The Telco RC is going great guns getting the 450 MHz repeater going, are expecting to convert late mod Motorola from 150 MHz to 450 MHz. WB6UMQ writes and advis that the correct frequency of the Magic Mtn repeater WR6AHM input 147.135, output 147.735 also reports that his repeater is fa all to use, not just the Santa Clarita RC. The So. Calif. VHF RC preparing a series of tours of the local surplus stores, to uncov choice items at reasonable prices. Partaking were WB6YV WB6IMV, WA6IPN, WA6MEM, WA6LCE, with WA6PMJ preparin the maps for the tour. Mrs. Doris Strong of the Braille Institu called me and wanted to find out if there was any serious amateur the Los Angeles area who would like a part time job. It would be two day a week job teaching amateur radio to the blind. They ha a station and all necessary equipment, this would be nice for son retired person who wants to help. Her tel. No. 663 1111 ext. 2 W6RXP active on the local bands with his new Heath SB-10 W6OAW and AYT are now in KH6-Land taking a tour of the islan and at the same time accidentally happened to find SAROC at o of the local Hotels, furthermore he received a new Handi-talkie fro the Clegg people. W6IIH reports that the "ARTS" groups now me on 7103 and 7108 kHz for rag chewing and traffic handling, al have code practice daily on 7103 kHz at 0200Z, here is your chan to get some code practice. For those interested in performing publ service work there is a Western Pacific CW Traffic Net serving U Possessions and Territories throughout the Pacific area, this net w be found daily on 14,110 kHz at 0700 GMT, no more problem with TH-Land, etc. W6HUJ spent several weeks in Wyo., found it interesting that he decided to go back for another month. K6GI one of our faithfull DRN6 Mgrs, is recovering from a stroke. Hop to be home by the time you read this. RM WB6OYN reports we a getting good check-ins from new SCN members WA6UWW, W6BK hope to have many more members after vacation time. Another fi newsletter from the Mt. Lee repeater assn. This issue included survey by W6IGU on comments from 450 members regardi current 2-meter equipment. WA6PTM presented a talk at the LEF re amateur towers and zoning laws. Traffic: W6INH 311, WB6O

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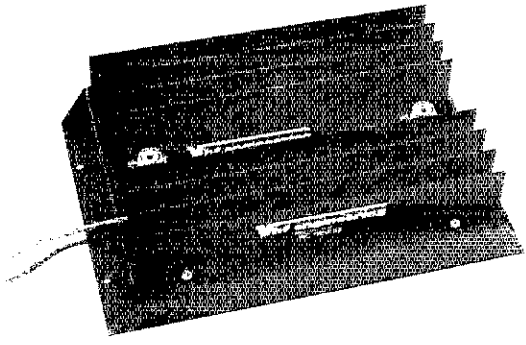

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176, K6UYK 171, WB6DJP 169, WA6TLV 111, W6QAE 84, WB6ETB 37, WA6ICH 30, W6HUJ 27, W6BRO 9, W6USY 9, W6NKE 7, K6CL 6, WA6ZKI 6

ORANGE – SCM, William L. Weise, W6CPB – Asst. SCM: Richard Birbeck, K6CID. SEC: WA6TVA. RM/PAM: WB6AKR. WA6LFE's first contact with new ticket was WA6TVA and W6CPB SCM and SEC Orange Section. Congrats Jim on your Advanced ticket. WA6DBX new OO spent his vacation in Mexico. WB6VTK doing an excellent job handling Orange County traffic from SCN. Chet also assisted in establishing a Ham station at Camp Pendelton Refugee Camp. W6INI and W6GBF also spent many hours at the Camp to put W6AIB on the air. The station plans to handle traffic from the other camps. If you want to operate any day Mon. thru Fri. contact W6INI or W6GBF. WB6WOO has been conducting Novice classes at the American Red Cross Bldg. in Santa Ana. K6EJA administered the slow and fast cw speed for practice. Bill hopes to graduate 20 new hams shortly. Congrats to both. Glad to report that K6GMI is home and improving nicely. Call him on 714-329-7776 or drop a card to Hal Spaulding 15685 Palm Dr. Sp. 22 Desert Hot Springs, CA 92240. W6MN is on the air on 80/75 and 40 meters with Kenwood twins. Welcome back. K6KZI and W6LHQ/6 and the West CARS network was on the job handling emergency communications during the Oroville earthquake Aug. 1. Congrats to all who participated. PSHR: WA6TVA 46 and WB6AKR 44. See you all at the Southwestern Convention in Oct. Traffic: W6OUE 551, WB6VTK 287, WB6AKR 89, WA6TVA 37, W6CPB 17, W6QRD 9, W6WRJ 5, WA6DBX 2.

SAN DIEGO – SCM, Arthur R. Smith, W6INI – SEC: W6GBF. As your SCM for the next two years, I plan to continue the fine programs established by my predecessors and keep the San Diego Section in the forefront of amateur activities, particularly public service. To keep this column a success, I will need the cooperation of all. Send your activity reports by 4th of month to address on page 6. Y'all come to Section pancake bkfst, second Sat. each month, Normal Heights United Methodist Church, 4650 Mansfield. XYLs, harmonics welcome! Palomar Radio Club picnic whopping success. SAROC Hawaii attended by W6DEY, W6PHJ, W6TON. WA6ORJ new Ramona resident. SANDRA's Mt Laguna repeater now on 147.75/15. W6IAB operating at Camp Pendleton refugee center thru efforts of W6GBF. Recent upgrades: WB6CIC, WB6CAO, WB6DPO, WB6FOM, WB6HBO, WA6WTZ. K6DS making plans for 2 meter ssb repeater. W6MNO, W6KCW, TT Ying on 2 meters. Appointments available for qualified amateurs are RM, PAM, EC, ORS, OPS, OVS, OBS, OO. Contact me for info. W6SK convalescing from recent stroke. K6SQ back on air after knee operation. Hope to see many of you at SW Div Convention in Ventura, Oct. 24-26. PSHR: WB6PVH. Traffic: WA6IGF 235, W6GBF 86, WA6DMB 46, W6PZU 26, W6DFY 19, WA6IIK 6.

SANTA BARBARA – SCM, D. Paul Gagnon, WA6DEI – SEC: WB6EIW. RM: K6QPH. PAM: K6YX W6PRP, WB6HJW, K6QPH active in last CD Party. W1UUQ/6 sending general information bulletins on repeater in Santa Barbara each day. Bill is the new EC for that area. W6LLA recently heard wedding bells. WB6GPO in SBar reports WA6BIJ passed his Extra Class exam. He also holds a first class phone and 2nd class Telegraph ticket. Not bad for a 15 year old. Oct. 4 and 5 is the Calif. QSO Party. WB6HJW has new QTH 800 ft. above the average terrain of Santa Maria. Look for him in the contests, using a 500CX. WB6GRW retired from the Air Force and taking over the reins of the Santa Maria AREC. Many thanks to WB6WWY on FB job the past few years. The Santa Maria AREC net meets on WR6AHZ (81/21) on Mon. at 19:30. WB6GRW is net mgr. The SBar AREC net moved to the 31/91 repeater from 52. WB6TGV vacationed on the beach at Morro Bay operating a HW-7 QRP rig. W6EYP gave an old time radio show to the Ventura Co. Club and Division Vice Dir. W6EJJ spoke at the Poinsettia Club in Ventura. The Ventura Co. Interference Group is getting along in Ventura Co. Participants are WB6JKM, WA6LBP, WB6DHW, K6QPH, WN6EIO and others. They need your help; hope to solve interference to TVI, BCI and HI FI interference. PSHR: WA6DEI 44, W6PDU 31, K6YX 29, WA6VBS. Traffic: WA6MBZ 350, WA6VBS 91, WA6DEI 33, W6PDU 11.

WEST GULF DIVISION

NORTHERN TEXAS – SCM, L.E. Harrison, W5LR – Asst. SCM: Frank E. Sewell, W5IZU. SEC: W5SHN. RM: W5QU. PAM: W5GSN. SCM attended UHF/VHF mtg. July 30, Aug. 1,2. Prose Walker feature speaker. Attendance excess 400. Walker's keynote to all hams present was "Grow or Die." Them ruff language to you and I, but mister they are just about as true as any we ever heard. Hams now mail to PO Box 1020 Gettysburg, Penna 17325, so don't forget OMs. Hope to see you at Texoma last week end Oct. Arlington ARC reports K5ITP pres. resigned and new pres. is K5ZGA. W5MTN applied for OPS, certificate forthcoming. SCM error in Mar., failed issue W5TI BPL cert. Hq. covered for me Bill. (bb). WB5MTD applied for EC Smith Co. K5LZA Dallas Co. EC reports emergency communications provided by RACES & AREC. Over 100 active members included Big "D" plus surrounding area & also Skywarn net on 28/88. FB Johnnie. Emergency drills Sun. & PM. Seventeen or more NoTex ECs reporting including WB5BAM, WB5BCB, W5BVN, W5DHP, W5DWV, WB5EYL, WB5LOY, W5OY, WB5EJJ, W5KOW, W5LGY, K5LZA, WB5MDT, K5MWC, K5QKM, K5SHN, W5ZNN plus WA5KHE. Ed Cross, one of our many dedicated NoTex amateurs has agreed to assist SEC Harris in organizing "Eds" City-Wide group of emergency communicators. WA5ZZA interested in locating early morning traffic nets. He is the Asst. Daytime Central Area Mgr. & in case you have not checked it would be wise to see how they make out on the traffic score. The Frequency Sheet (W5SH) FtWorth sez neighborhood Crime Prevention Team directed by WN5OMC doing great job. W5QU elected pres. FtWorth Chapter QCWA Dir. W5COK, W5KSX & W5UHU. Looks like W5JTA has something on this 2-meter deal including the discussion on homemade gear vs factory made gear. W5QPX, NoTx Sr OO organized in San Antonio. Contact W5QPX. Remember our

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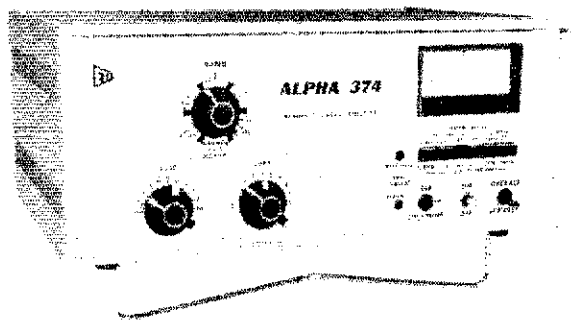

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deadline of seventh. Traffic: (July) W5YK 16, W5LR 7; (June) W5QU 191, WB5DXB 90, W5GSN 30, W5IAR 26, (May) W5QU 170.

OKLAHOMA – SCM, Cecil C. Cash, W5PML – It's good to know someone is trying to keep the old 10 mtr. band open; WS1IIP of Tulsa ex-W9HYT says he is on 29.6 MHz fm. WB5MSU building a new house, should be back on the air soon. Bob is active on AMSAT, Oscar 6 & 7. WB5HLR has his tower and antennas down for installation of 20- and 15-mtr. beams, he also is off the air on 75 mtrs. Another Ham Holiday and Okla. State ARRL Convention is history and it surely was a great one. CORA is certainly to be congratulated for an IB job done. The next one will be the Texoma Hamarama Oct. 24, 25 and 26. W5FW, XYL W5PWN, myself and XYL plan to go to Amarillo, Tex. to their swapfest 23rd and 24th of this month. Congrats to WB5NMZ, WA5MLT, also WB5NXO on upgrading to General. WB5NXO is blind, and is in his upper 60s. Congrats also new Novices WN5OYC, WN5OYH, WN5OZK. Traffic: (July) W5RB 226, WN5NKD 88, WN5NKC 45, WB5AZS 37, WB5HJX 30, WB5KGP 28, W5SUG 26, WB5ELG 22, W5PML 19, WN5OYH 15, W5PW 6, WA5OHV 6, WB5HLR 2, W5JJ 2, (June) W5RB 203, WN5KNK 70, WN5NKD 67, WN5NKC 46, WB5LAY 42, WB5AZS 40, WB5ELG 33, W5SUG 28, W5FW 14, WA5ESN 12, WB5HLR 5, WA5OHV 5, WB5KGP 4, W5LKL 3, WA5WRC 2.

SOUTHERN TEXAS – SCM, Arthur R. Ross, W5KR – SEC: WB5CHR. RM: W5UGE. PAM: WB5AMN. OOs reporting this month: W5NGW, K5JFZ, WB5CTT. OVSs reporting this month: WA5QCP, WB5CTT, WB5HRL, K5LZJ, W5APX attended SAROC in Hawaii. OPS K5RVF attended Army MARS meeting in Columbia, MO. EX-OO/ORS W5RBB has moved to Mass. OVS/OO WB5CTT says Texas Inter City Relay System super between San Antonio and Blanco; will soon reach Austin. RM W5UGE has new 5 kHz oscilloscope. OPS WA5VBM had surgery on right arm and lost tower in wind. OVS K5LZJ reports WN5OKB new in Cleveland. EC/ORS WB5EMA back in Georgetown, says WB5NBX is new in that city. OO K5EQZ has been busy; moved into new house, refurbished Collins 310B, and got married – in that order. OVS K5LZJ made WAS and DXCC in same months – after 18 years of trying. WN0PIX now living in Mercedes, will be looking for his former buddies up north. Handicapper WB5MNJ is mgr. for Handicapper's Net which meets on 3900 kHz every Sat. at 9 AM, Central Time. They welcome participation of ANY amateur, handicapped or otherwise. Donation of equipment for handicappers may be sent to WA5EHN; he will see that such donations are put to good use for their intended purpose. Traffic: (July) K5HZR 320, W5UJJ 225, W5TOP 177, W5IGE 172, WA5YEA 161, WA5VBM 150, W5KLV 117, WB5AMN 94, WB5LII 43, K5ROZ 37, WB5IJR 16, WB5HRL 16, K5RVF 8, W5IFW 5, WB5GQH 4, WB5CTT 2, WB5GVO 2; (June) WA5ZBN 121, WB5EMA 38, WB5GZC 16.

CANADIAN DIVISION

ALBERTA – SCM, Don Sutherland, VE6EK – SEC: VE6XC. PAMs: VE6AEO (APSN), VE6EM (VHF). Thanks for a job well done to VE6AEO on his retirement as PAM. VE6AEO is the new PAM for APSN. VE6EM is planning many improvements to repeaters VE6RPT and VE6VHF. VE6EM has started an E&I net on VE6RPT at 0200Z Dy. He has accepted the position of PAM VHF. Century Calgary convention committee have been working hard. The coming Canadian Div. Convention in Calgary should be a great success. We are looking forward to meeting W2IUK, VE3CJ, VE2MS, VE1SH, W1ICP. Convention work has kept VE6FK off the Tfc. nets: DRN7 Mgr. VE6ES has covered very nicely. Traffic: VE6ES 82, VE6EK 54, VE6AAT/6 6, VE6AEO 6, VE6AVV 6, VE6CF 6, VE6WV 4, VE6FV 2.

BRITISH COLUMBIA – SCM, H.E. Savage, VE7EB – SCM VE7EB is on a 2 1/2 month cross country tour, renewing old friendships and making new ones. We lost a good friend when VE7QO passed away, one hour before scheduled heart surgery. VE7AJU also in hospital. This being the vacation time, there are lots of mobiles around and both traffic nets are very busy, fone and cw. HCEN growing steadily since net speed is reduced to accommodate everyone. 2-Meter activity, both base and mobile, is increasing, due to more excellent repeaters, placed in strategic positions. Traffic: (July) VE7ZK 177, VE7QDF 61, VE7DKY 21 (June) VE7ZK 226, VE7QDF 66.

MANITOBA – SCM, Steve Fink, VE4FQ – RM: VE4PG. PAM: VE4JP. ECs: VE4NE, VE4NW. ORSs: VE4RO, VE4TY, VE4LG, VE4EA. OPS: VE4LU. ORSs: VE4HE, VE4MG. OO: VE4SW. OVS: VE4AS. Amateur Radio Week was observed in Manitoba July 12-18 in conjunction with the Peace Garden Hamfest. VE5BR returns to Winnipeg as VE4QY. VE4IA is sporting a new KDK-144 with twin yagis on 2. Congratulations to new WARC pres. VE4EW on a new XYL, and we welcome VE4YE, a new call in The Pas, MTN: 17 sessions, 73 QNI, 19 QTC. MEPN: 31 sessions, 729 QNI, 14 QTC. Let's all get on for the 2nd Annual Manitoba QSO Party Oct. 19-20. Traffic: VE4PG 43, VE4IX 12, VE4OI 11, VE4UR 9, VE4HA 4, VE4LB 4, VE4VV 4, VE4XN 3, VE4FK 2, VE4PO 2, VE4DS 1, VE4GZ 1, VE4XP 1.

MARITIME – SCM, W.D. Jones, VE1AMR – The Summerside repeater, VE1CFR is now on 146.25/146.85. VE1s AMN, ABU, BCN and VE1ADR are now on 2 meters, thanks to VE1AIC. Traffic: VE1AMR 71, VE1ARR 62, VE1ZH 34, VE1AAO 17, VE1AMB 10, VO1GW 10, VE1AIU 5, VE1ST 5, VE3AMN 3.

ONTARIO – SCM, Holland H. Shepherd, VE3DV – Hamilton amateurs under EC VE3EHQ and using repeater VE3DRW and working under Regional Police took part in a search for a missing child early in June, without success unfortunately as the child was found drowned two days later. ARRL Public service certificates have been recommended for the 28 participants. Montreal Marconigram reports that Canadian Director VE2MS, now VE4IM, has

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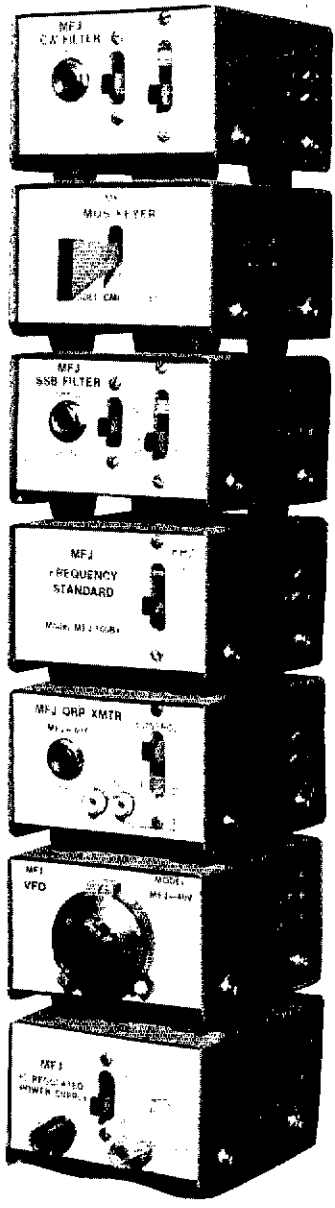

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moved to Winnipeg where he will take up his new position as pres. of an engineering firm. All Ont. League members are asked to keep VE1SH, Canadian Vice Director aware of League problems at the policy level. Incidentally, in case you didn't read the minutes of the May Board meeting the alternate name of the Canadian Division is now officialy "The Canadian Radio Relay League" (CRRL). Credit for this goes to VE2MS Director CRRL. Congratulations to VE3FGI who passed his Advanced in May and received his coveted 35 wpm sticker from Hq. VE3FOH takes over prev. and VE3AVF as vice-pres. of the dynamic Burlington ARC. VE3EHL and VE3HTO of same club got their Advanced. Congrats. Best wishes to 13 year old VE3HWY on getting his brand new call. Ray should remember that his school work must come before ham radio. 245 licensed amateurs registered for the Ont. Hamfest week end at Lawson Park. The program for the 131 ladies and 100 children was a smashing success. Congratulations to the BARC for doing such a fine job on Hamfest Ontario 1975. Traffic: (July) VE3SB 234, VE3GOL 219, VE3EHF 115, VE3ERG 94, VE3HJA 78, VE3GJG 77, WA8ELX/VE3 76, VE3DVF 68, VE3GEN 61, VE3GT 52, VE3AWE 46, VE3DPO 26, VE3BZB 12, VE3GCE 11, VE3GEQ 10, VE3ATR 8, (June) VE3AWE 57, VE3HFV 17, VE3FGV 1.

QUEBEC – SCM, Larry Dobby, VE2YU – Despite previous requests for new members for our traffic system in Que. the response has been anything but enthusiastic. VE2DR and VE2UY continue to be mainstays from the Montreal area but the representation from the rest of Que. is nil. VE2ALH is temporarily absent from traffic with the burden of a new job. Hope he will soon return. If the planning for the heavy traffic during the Olympics in '76 is to have any meaning new people will have to be recruited and trained now. The existing traffic system functions very well but the regular attendees need some moral support from others. Why not take a listen on 3535 at 7 PM and hear how the system functions. Maybe we can get you interested in handling traffic. Appointments to the National Traffic System and the Emergency Corps are available thru your SCM or EC. Traffic: (July) VE3DR 154, VE2BP 32, VE2DRC 30, VE2EC 28, VE2APT 12, VE2UY 11, (May) VE2DR 139.

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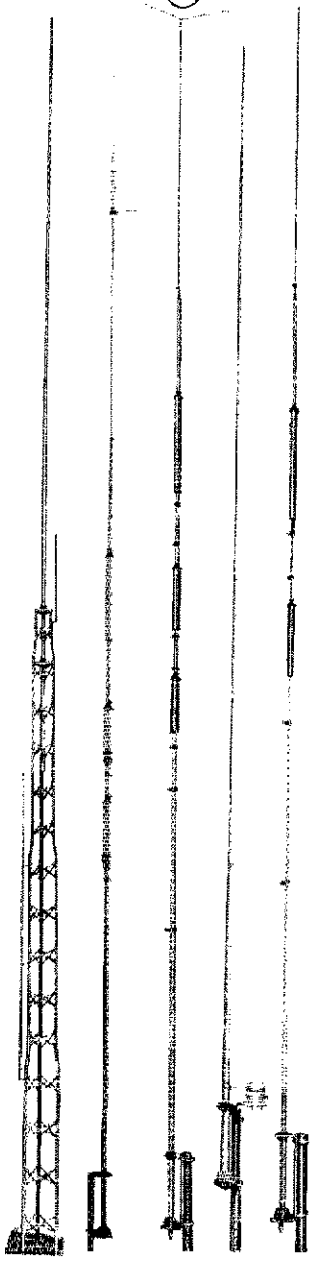

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(Continued from page 80)

short talk on the League's response to Docket 20282. Following his remarks he participated in a lively discussion concerning the position of those interested in vhf/uhf and technical subjects in general, to those hams primarily concerned with other aspects of amateur radio.

Yours truly was given the honor of being the speaker for the conference banquet held Saturday evening. Despite that, everyone seemed to have a good time and vowed to be back next year when Houston will be the site. Officers for the coming year were announced. They are Dick Allen, W5SXD, president, Orville Burg, K5VWW, vice president, Ron Dunbar, WØMJS, treasurer, and, to demonstrate that once you show that you can do a good job and are willing to work, Ted Mathewson, W4FJ, was returned to the office of secretary.

EME Operating Procedure

A topic which received considerable discussion at the Central States VHF Conference was that of the "TMO5" reporting system and the calling sequence used in EME work. The reporting systems employed on 2 meters and 432 MHz are somewhat different, principally in the definition of the "M" part of the reporting system. On 432, "T" denotes some signals but not good enough for complete calls to be copied. "M" is used to convey the information that full calls are being received but that signals are quite weak and spotty. "O" indicates somewhat better copy but still not good enough for a standard RST type report. Five means that solid copy is being received and an RST report is sent. The system used on 2 meters is almost the same except "M" has been taken to mean that copy is not good enough for complete calls to be received, therefore a successful contact cannot be completed with "M's" whereas on 432 it can. At the EME forum, it was agreed that a common system for the two bands would be desirable. The consensus of those assembled, which included many active moonbouncers of both bands, was to use the 432 system. Unless there is dissent, we will recommend that the opinion of the conference be followed. The other issue discussed at the EME forum was that of calling sequence. On the two most active bands the procedures are slightly different, with 2 and 2-1/2 minute sequences both used. It was pointed out that it is easy, with the 2-minute sequence, to get confused as to whose turn it is. During the discussion several alternatives were suggested including 1-minute and 30-second sequences. The strong feeling among the most experienced moonbouncers present was that either of these are too fast for EME with its' quite weak signals and long propagation delay. The overwhelming opinion was that the 2-1/2-minute sequence should be made standard. In addition, it was suggested by K2UYH, and generally agreed, that if no signals are being heard no transmission should be made during the last 30 seconds of each 2-1/2-minute period. Thus, if the other station is receiving signals, the lack of transmission will convey the information that he is not being heard. Another recommendation was made that to reduce confusion among newcomers to EME, the same procedure with respect to who goes first as is used

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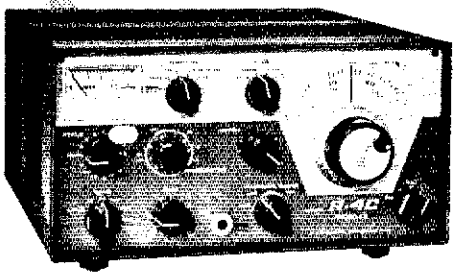

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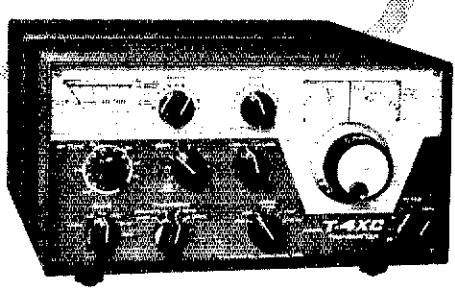

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on ms be adopted. Heretofore it has been understood that on EME the most easterly station transmits during the first part of the sequence. This is just the opposite to the system presently used on ms which calls for the most westerly station to transmit first. No opposition was expressed to changing the EME procedure to match that used for ms except that several noted that local conditions, such as interference between nearby stations, might require its modification in some instances. It was emphasized that these procedures are merely guidelines and in no way should be taken as binding. Thus, if individual situations dictate a different procedure, the stations involved should set up whatever system they feel is best for their situation. For clarification it was pointed out that in defining which station is the most westerly, the international dateline is used. Thus VE7BBG is west of JA1VDV.

Another subject discussed was that of EME frequencies on 2 meters. The present standard is 144.000 to 144.010 MHz. This band does not, however, permit switchover to ssb without QSY. After a number of suggestions and counter-suggestions, it was agreed that 144.175 would be considered for use as a standard frequency to use for ssb. The need to coordinate with the band plans used in other countries was emphasized. Thus we would very much like to hear from 2-meter operators in other parts of the world before recommending the use of this particular frequency for EME ssb contacts.

OVS Reports and Operating News

1975 E_s Summary. As this is being written in mid-August immediately following the Central States VHF Conference, we have a better view of the 1975 E_s season than earlier in the summer. This year's season can now, in this writer's opinion, be characterized as "very good" if not "outstanding." It did get off to a rather late start in the latter part of May but made up for that deficiency almost immediately with good double hop openings and single hop openings with high signal levels taking place. The period around June 17-18, June 22 and June 30 also produced some good openings including very short skip on 6 meters. A few 2-meter E_s contacts were reported on June 30 at about the time that WA5IYX was receiving high band TV signals in San Antonio. For many, the most outstanding day of the 1975 E_s season was July 20. The day began with interesting, if not fantastic, conditions in the form of good backscatter along the East Coast. This writer had a fine ragchew with VE2DFO on 6 meters followed by several QSOs with 1s and 4s via the backscatter mode. A somewhat marginal conventional E_s contact was completed with W1HOY/KP4 and a solid QSO with WB4OSN in Florida. Following that, a short backscatter contact was made with a station in Cleveland who needed Maryland. Then a thunderstorm hit and everything was disconnected at W3KMV. That was about 1930Z. At approximately 2025Z a phone call from W3OTC provided the information that *2 meters* was open for E_s. Immediately upon reconnecting the equipment, 2 meters sounded like 6, with the low end of the band loaded with S9 signals from the Midwest. Apparently I was too late for the 5s from Texas and Oklahoma which had been in earlier but stations in Missouri, Iowa, Minnesota, Wisconsin, Illinois and South Dakota were workable in the Washington, DC area over the next 45 minutes. High- and low-power stations

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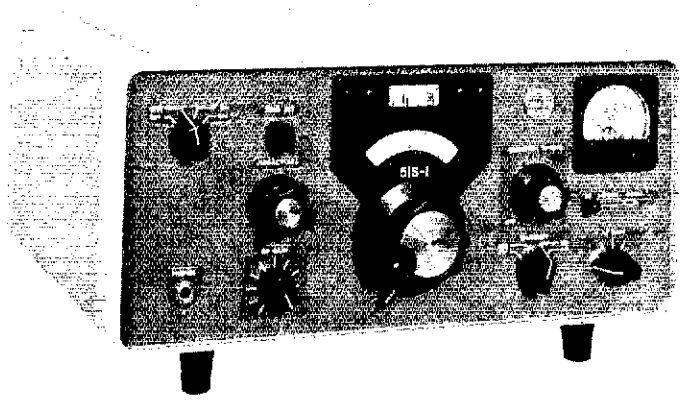

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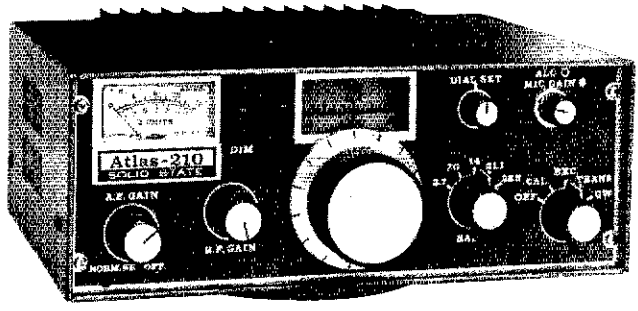

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were both able to participate. K6UA/4 using a barefoot Multi 2000 with an output of about 10 watts was able to work K9OXY Wisconsin, using a quarter wave piece of wire taped to a window of his Alexandria, VA apartment. WA3VUW, just south of Washington, DC, who had been on 2 meters for all of two days with his Multi 2000, also managed his share of contacts. His comment was that 2 meters is great!

In the meantime, 6 meters was going wild with extremely short skip. Eastern 2s and 3s were working 8s in Ohio and West Virginia. A report from WA5IYX San Antonio, TX states that the 6-meter opening on July 20 was one of the longest E_S openings to the Northeast that he has seen in years. Interestingly enough, however, Pat's records show little signs of higher frequency E_S activity at the same time that the East and Midwest were experiencing one of the best 2 meter openings of all time. TV channels, only as high as 3 were reported, as well as some fm broadcast band signals from South Dakota up to 89.7 MHz.

At the conclusion of the 2-meter opening on the East Coast, WA4CQG called on the telephone from Alabama. Dale said that he had been working 1s, 2s, VE2s and VE3s while we were working the other direction.

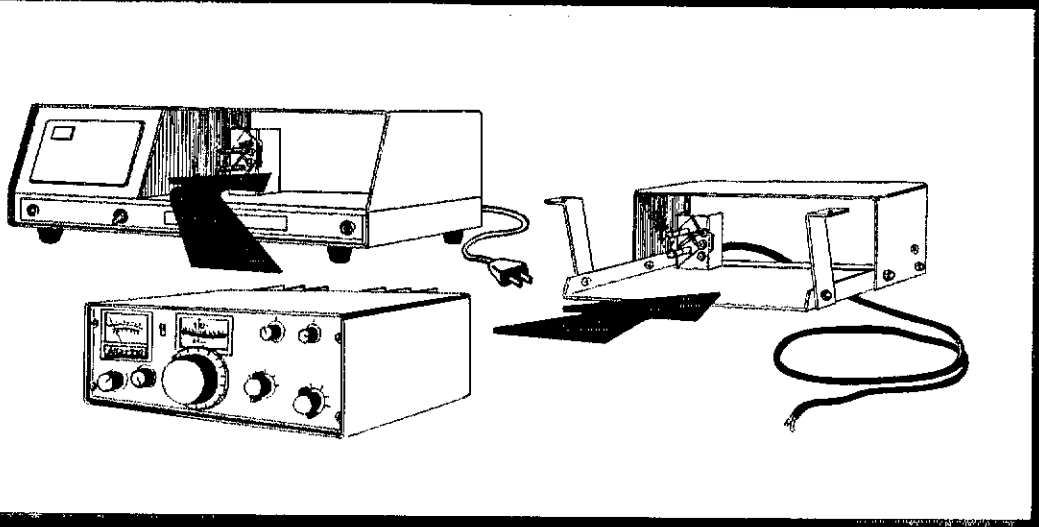
There were many sad stories and snaffoos reported on that wild day but one of the saddest was that of K5BXG. Charlie had been running his equipment for the past several days for ms skeds with no problems, but no sooner had the opening gotten well underway when a resistor burned up in his hf rig used to drive his 2-meter transverter. As a result, K5BXG managed only several contacts.

Credit for discovering the opening goes to the fm boys. In the Washington area, K3GEG spread the word after hearing a number of out of town repeaters. After things closed up to the Midwest, Mike found an E_S opening to VE1 at about 2300Z. At the same time 6 meters was open to most of New England from the Middle Atlantic states.

Although it is not the normal policy of this column to publish lists of QSOs, we are making an exception in the case of the 2-meter contacts accomplished on July 20.

50-MHz Highlights. This year was distinguished by a number of DX stations active and working into the US and Canada. TG9KJ was the one reported most frequently managing to work a number of stations in all US call areas on the many openings in which he was in. Also from Guatemala, TG9SO was worked by quite a few stations including yours truly. TI2NA in Costa Rica was also active, although not as widely worked. Eric's beacon was operating all season on 50.07. He told me, at the Central States VHF Conference, that next year he expects to have it on 50.098. K8LEE reports a confirmed QSO with YV5RT which would be the first activity from that country in a long time. The countries of the Caribbean and northern South America should be readily workable if only the activity was greater. Talking up 6-meter operation on hf contacts with the area this winter may pay dividends next season. Always reliable W1HOY/KP4 lent spice to many openings as did several other Puerto Rican stations. XE1GE was also in on many openings livening things up considerably. Tantalizing many by his known presence was KL7IBG. Another station known to be on from Alaska is K8REG who is operational from Anchorage. Vince's KL7 call is not known at this time. Maybe someone can fill us in on this. We understand that on August 9 KH6EQI was worked

"QRX OM . . . Changing QTH . . .



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by WA7BJU, K7GWE, and K7TUD. At about the same time KH6IJ and WA7BJU are reported to have had a QSO.

Aside from DX, the activity of many previously rare states such as Montana and Idaho, along with the conditions which made them workable from many eastern and southern locations, made 1975 an interesting season on our lowest frequency vhf band.

The SMIRK contest held June 1 saw 99 entrants in 35 states. The top score of 2944 points was turned in by WB4PXW in Florida.

A letter to W1HDQ from JA1VOK reports that at 0100Z May 31, JH1GUL heard transmissions in "fluent" English at a time when the band was open to the northern Japanese islands. The signals peaked to the north. Can anyone shed any light on this?

144 MHz Highlights. Aside from the big E_s opening on July 20 and the ever-increasing pace of EME activity, 2 meters had an about average year as far as tropo is concerned. In many areas activity is on the increase due in part to the availability of the new commercial rigs. As an illustration of what ready access to commercial equipment can do, a card from W4FJ notes that, in a 2-meter contest held last April in England, the winner made 550 QSOs all on ssb. About 95% of the equipment in use in G-land is Japanese with the Liner 2 (known as the Echo 2 in this country) having sold about 1000 units.

Besides the opening on July 20, QSOs of apparent E_s origin also took place on June 30. K4CAW Greensboro, NC reports having worked W5BZB and WA5YBA both in New Mexico through the WR5ABV Roswell, NM repeater at 2130Z. K4CAW runs 450 watts output to a quad of Cush Craft Twist beams at 100 feet and boasts 28 states, all on fm. At about 2300Z on the same day WB5LUA and K5WXZ near Dallas both worked K8RYU in Ohio. Al, WB5LUA, reports that signals were quite strong at times but were gone by 0000Z.

A good tropo opening was also reported by WB5LUA on the night of June 18. Contacts from Big D included K9UYK Moline, IL who was worked with good ssb signals both ways. Al also mentions a tropo sked which he has been running with W5LO in New Mexico. They finally conquered the 560 mile path on June 24 for state number 29 for WB5LUA. Another fine tropo session was reported by WA8ZCO Birmingham, MI. This took place starting about 0000Z August 8. Lloyd says that conditions favored stations to the west with little being heard to the east or south, except for W5MWH in Arkansas. Other stations workable included WØEMS Nebraska, WØMJS, WØKRX and WØRLI Minnesota, KØDAS Iowa, and K9OXY Wisconsin. Lloyd says that WA8HTL, running 8 watts to two 16 element K1Ms worked WØEMS on cw. Speaking of cw and what it can do, WA5THJ near Houston reports having worked K5UGM/M5 in Dallas which is about 300 miles north of Houston. The mobile station was copyable most of the time despite the fact that his cw was coming from a barefoot Echo 2 transceiver.

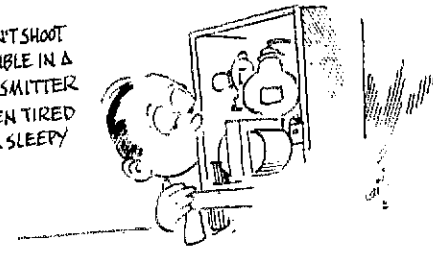
Aurora has been somewhat sparse in this year of low sunspot activity, but a buzz session was reported by K9KQR. Dick states that on July 8 from 0113Z to 0230Z stations in Illinois, Wisconsin, Nebraska, Ohio, Indiana, Kentucky and Iowa were putting signals into his QTH near Chicago with RSTs ranging from 42A to 56A.

220 MHz. W0KZT writes from St. Louis, MO that he monitors 223.5 24 hours per day and would like to set up schedules with other stations, either on this channel or on 34/94. John would also like to trade ideas on 220 MHz operation with others throughout the country. He says there are about 10 fellows on 220 in the St. Louis area at present. From K0OST in Denver comes the information for which W0KZT may be looking. Jim, who is ex-WB8IDD, is planning to publish a newsletter devoted to promoting interest in 220 MHz. Jim's address is Box 842, Denver 80201.

420 MHz and Above. A mystery signal is reported by W4FJ and others. The signal was first heard by WA4PGI in Covington, VA on July 8 at about 0130Z. The signal was very loud and had no form of modulation that could be detected. Turning the beam seemed to have no effect. A phone call to WA4ZRP/2, Flemington, NJ brought the news that he too was hearing a very loud unidentified signal at about 432.015, even though he was using only a dipole on the workbench. They both noted a frequency movement and common dropout time. The next night WA4PGI heard the signal again. K4GL in South Carolina also heard the signal the same two nights. Jack said that it drifted rapidly from 432.008 to 431.165, where his receiver stops. He said that the signal was keyed several times but otherwise had no discernible modulation. The time of reception was 0200 to 0230Z. W4FJ was alerted by WA4PGI and Ted was listening on July 10. At 0239Z he heard an S9+ carrier on 432.013. Attempts to determine a direction by rotation of his 44 element array were fruitless. The carrier was being keyed in an apparently random fashion and drifted up about 6 kHz and then down to about 10 kHz below 432.000, where it remained stable for about 4 minutes. It then drifted lower another 5 kHz again being keyed. Then it reduced in strength to about S5 over a period of about one minute and abruptly cut off. Ted said that at no time during the 13 minutes that he heard the signal was he able to get any directionality on it. The signal has also been heard by W0LER in Minnesota and other 432 operators. Has anyone else heard this mystery signal? We would be interested in receiving any reports.

Franck and Marc at F9FT state that interest in EME is growing rapidly in France and list a dozen stations which are expected to be on soon!

K2UYH says that, despite the fact that everything seemed to be working in good shape, the EME expedition to Wyoming was a total washout as far as completed QSOs is concerned. Some stations were heard weakly but no contacts resulted. High winds and poor moon visibility did not help but, nevertheless, Al says they did have sufficient time on the moon to have had some positive results. Better luck next year Al. QST



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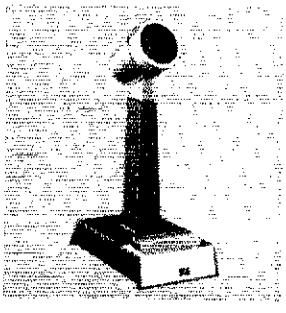

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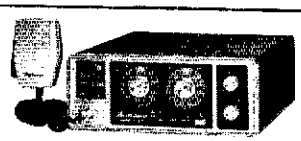

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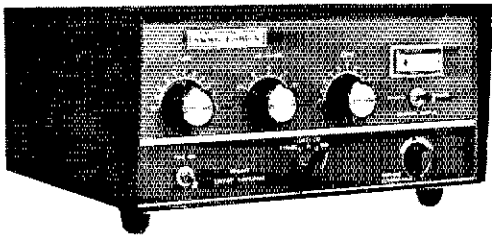

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NEWS BULLETIN

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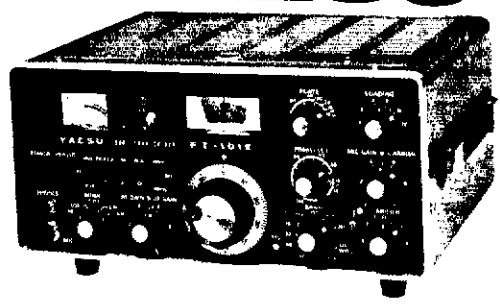

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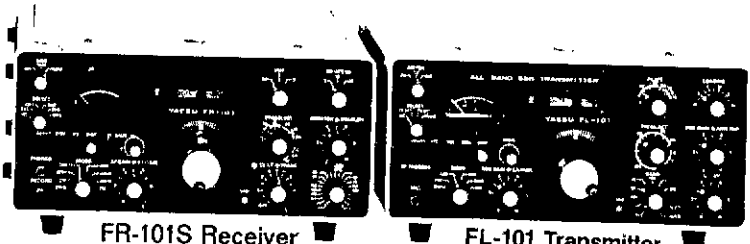

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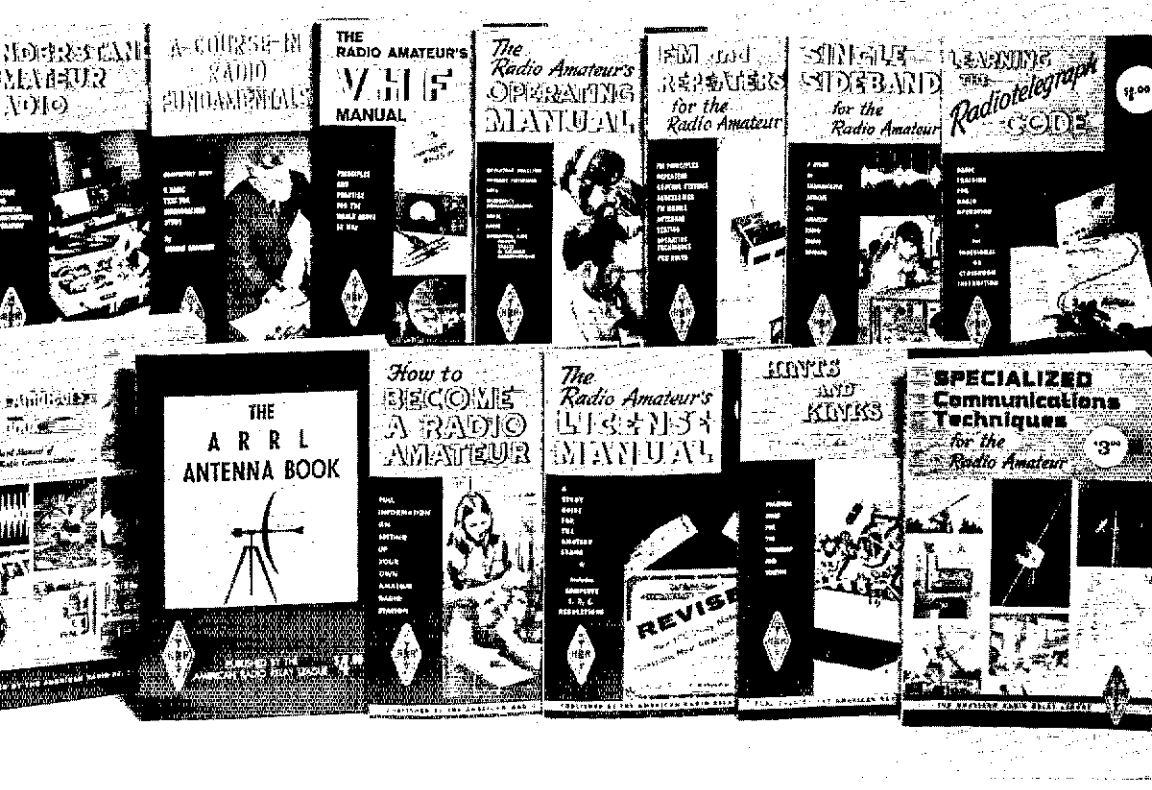

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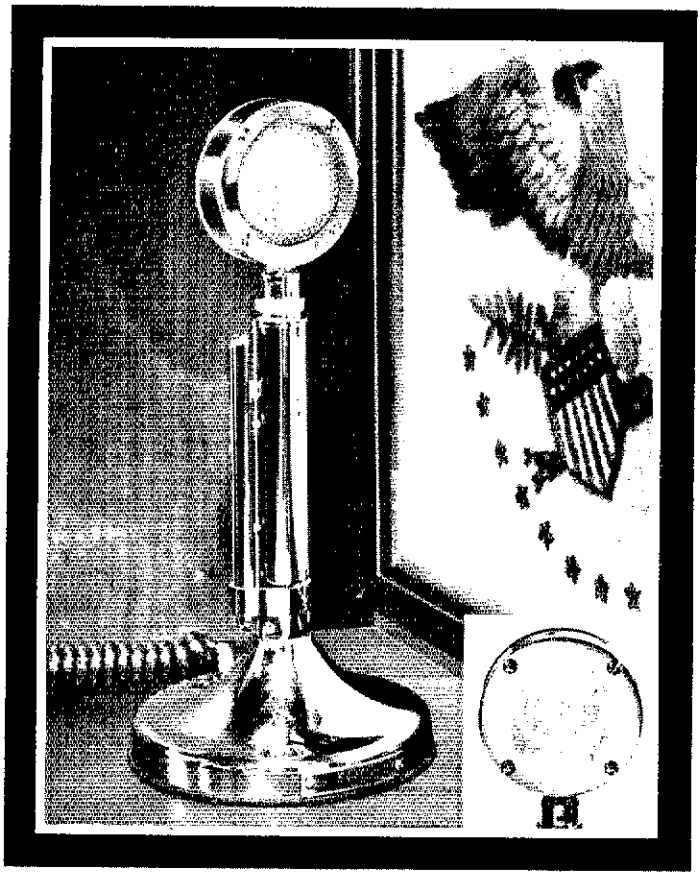

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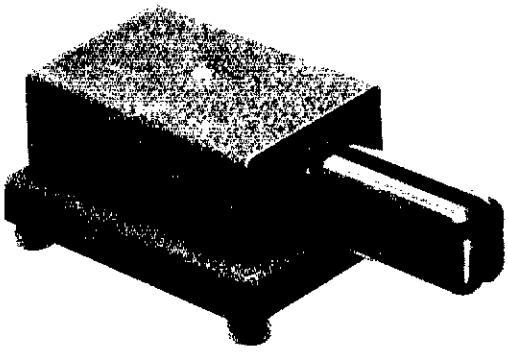

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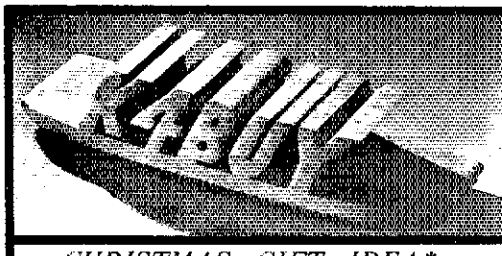

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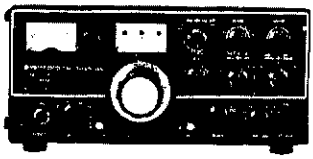

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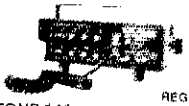

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SOLID STATE SINGLE SIDEBAND TRANSCEIVER
5 Band—200 Watts **10, 15, 20, 40 and 80 meters**
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Noise Blanker Conversion Kit. Replaces PC-100 Board in Transceiver. Model PC-120	48
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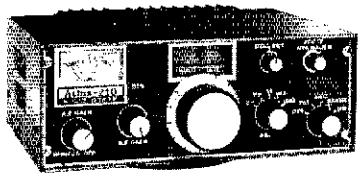

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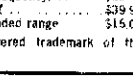

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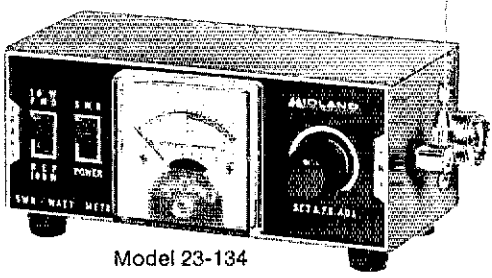

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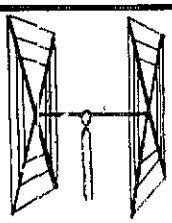

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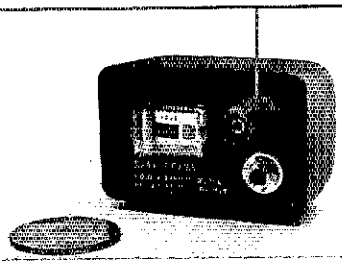

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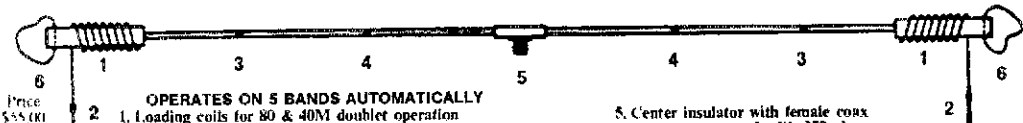

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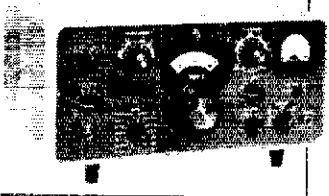

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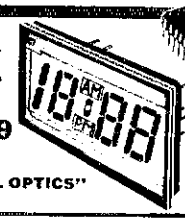

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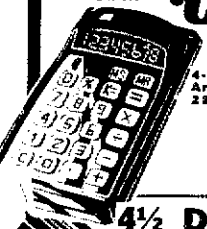

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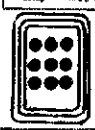

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☐ 746F	.6	Red	3.95	11.00
☐ 747	.6	Red	3.95	11.00

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☐ SN7407	.35	☐ SN7451	.17	☐ SN7496	.79
☐ SN7408	.19	☐ SN7452	.17	☐ SN74100	1.40
☐ SN7409	.19	☐ SN7453	.17	☐ SN74104	.44
☐ SN7410	.16	☐ SN7454	.17	☐ SN74105	.44
☐ SN7411	.25	☐ SN7455	.22	☐ SN74106	.52
☐ SN7413	.59	☐ SN7460	.17	☐ SN74107	.44
☐ SN7414	1.65	☐ SN7462	.22	☐ SN74108	.89
☐ SN7416	.34	☐ SN7470	.29	☐ SN74112	.89
☐ SN7417	.34	☐ SN7471	.49	☐ SN74113	.89
☐ SN7420	.16	☐ SN7472	.29	☐ SN74114	.89
☐ SN7412	.45	☐ SN7473	.36	☐ SN74121	.49
☐ SN7423	.29	☐ SN7474	.36	☐ SN74122	.48
☐ SN7425	.29	☐ SN7475	.59	☐ SN74123	.85
☐ SN7426	.25	☐ SN7476	.39	☐ SN74125	.59
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				☐ SN74154	1.35

☐ SN74155	.95	
☐ SN74156	.95	
☐ SN74157	.95	
☐ SN74158	.95	
☐ SN74160	1.35	
☐ SN74161	1.25	
☐ SN74163	1.35	
☐ SN74164	1.50	
☐ SN74165	1.50	
☐ SN74166	1.50	
☐ SN74173	1.45	
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☐ SN74175	1.30	
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☐ SN74180	.95	
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Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST *are unable to vouch for their integrity or for the grade or character of the products or services advertised.*

QCWA Quarter Century Wireless Association is an international non-profit organization founded 1947. Any Amateur Radio Operator licensed 25 or more years is eligible for membership. Members receive a membership call book and quarterly news. Write for information. Q.C.W.A. Inc., 2012 Rockingham St., McLean VA 22101.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't, police, etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

FREE sample copy Long Island DX Assn. bulletin. Latest DX news. Business size s.a.s.e. to the L.I. DX Assn., P.O. Box 73, Westbury NY 11590.

EDITING a club paper? Need public relations help? You should belong to the Amateur Radio News Service. For information write: Rosemary Willis, 9276 Borden Ave., Sun Valley CA 91352.

THE New York Radio Club invites Hams to club meetings, 2nd Monday of each month, 8:00 PM at the Williams Club, 24 E. 39th St., NYC. For information: Box 614, NYC 10028.

RADIO museum now open. Free admission. 25,000 pieces of equipment from 1850 telegraph instruments to amateur and commercial transmitters of the 1920s. Amateur station W2AN. Write for information. Antique Wireless Association, Main St., Holcomb, N.Y. 14469.

MEMPHIS is beautiful in October! The Memphis Hamfest, bigger and better than ever, will be held at State Technical Institute, Interstate 40 at Macon Road, on Saturday and Sunday, October 4 and 5. Demonstrations, displays, MARS meetings, Flea Market, XYL entertainment, Informal dinners Saturday night. Dealers and Distributors welcome. Talk-in on 3980, 34-94 and MARS. Contact Harry Simpson, W4SCF, Box 27015, Memphis, TN 38127 or telephone 901-358-5707.

ROCHESTER Hamfest 1976 is Saturday, May 22. Your name added to mailing list or information — write: Rochester Hamfest, Box 1388, Rochester, NY 14603.

SAROC Eleventh Las Vegas National Convention, January 8 - 11, 1976, Hotel Sahara Space Convention Center. Advance Registration $12 per person; with midnight show $22, with dinner show $29. Special Hotel Sahara Safari airfare packages from selected cities with scheduled airlines serving Las Vegas. SAROC special room rate extended only to those who advance register or register at the door. Send for details, SAROC, POB 945, Boulder CITY NV 89005.

GREAT Lakes Division Convention, October 10 & 11, Ohio State Fairgrounds, Columbus, Ohio. Many activities for hams and their families: flea market, forums of all kinds, banquet, Ohio Village tours, ceramics classes, etc. $2,000 in prizes including TR4-C & two R4-C's. Advanced registration $2.50. Write Mary Gibb, W8RVP, 293 Ceramic Drive, Columbus OH 43214.

QSLs??? "America's Finest"!!! Samples 50c. De Luxe 75c. Religious 50c. (Deductable). Sakkers, W8DED, Box 218, Holland MI 49423.

TRAVEL-PAK QSL Kit — Send call and 25c; receive your call sample kit in return. Samco, Box 203, Wynantskill NY 12198.

FREE Samples—Stamp appreciated. Samcards, 48 Monte Carlo Dr., Pittsburgh PA 15239.

QSLs, samples 20c. Fred Levden, W1NZJ, 454 Proctor Av., Revere MA 02151.

QSLs 300 for $4.65, samples 20c, W9SKR, Ingleside IL 60041.

QSLs "Browne" W3CJI, 3035A Lehigh, Allentown PA 18103. Samples with catalog 35c.

DELUXE QSLs. Samples 20c. Petty, W2HAZ, P.O. Box 5237, Trenton NJ 08638.

DON'T buy QSL cards until you see my free samples. Fast service, economical prices. Little Print Shop, Box 9848, Austin TX 78766.

FRAME Display, and protect your QSLs with 20 pocket plastic holders. 2 for $1, 7 for $3, prepaid and guaranteed. Tepabco, Box 198T, Gallatin TN 37066.

QSLs. Second to none. Same day service. Samples airmailed 50c include your call for free decal. Rav, K7HLR, Box 331, Clearfield UT 84015.

QSLs — Variety, value, quality, custom. Samples and catalog 20c. Alkanprint, Box 3494, Scottsdale AZ 85257.

RUBBER stamps $2.50 includes postage. NJ residents add tax. Clints Hoar, , W2UDO, 32 Cumberland Ave., Verona NJ 07044.

QSLs catalog. Samples 35c. Ritz Print Shop, 5810 Detroit Ave., Cleveland OH 44102.

CREATIVE QSL cards. Personal attention. Imaginative new designs. Send 25c. Receive catalog, samples. Wilkins Printing, Box 787-I, Atascadero CA 93422.

3-D QSLs — Far more spectacular, little more cost. Samples 25c (refundable). 3-D QSL Co., Monson 2, Mass. 01057.

COMPLETE 36 page QSL catalog! 300 cuts, stock and ink samples. Ten sample QSLs. 25c. Cornelison's, 321 Warren St., N. Babylon NY 11704.

N&S QSLs, samples 25c. P.O. Box 11184, Phoenix AZ 85061.

QSL samples 35c. W9CL Press, 15525 Oak Road, Carmel IN 46032.

CANADIAN Surplus Catalog and flyers $1. Etcox Electronics, Box 741, Montreal Canada H3C 2V2.

VP2M Land: Modern well equipped house overlooking ocean. Constant sea breeze. Hygain quad at 70 ft. $90 one week, $250 3 weeks, $43K for keeps! Beautiful & healthy island for retirement. Good housekeeper available. Doc Beverstein, 60 Amsterdam Ave., Toronto M4B 2C2. Phone 416-755-2117.

WANTED: RTTY terminal unit. Clive Poultney, VE3HEQ. Box 18, AYR, Ontario, Canada. N0B 1E0.

CASH paid for your unused tubes and good ham and commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, NY NY 10012.

CALL toll-free (800) 327-7798. Ask for Bob Hoffman (Jaro Electronics Corp.) We buy all types of tubes. Top prices paid for Varian, Eimac, Amperex. Address: 412 27th Street, Orlando FL 32806. In Florda call collect (305) 843-9551.

SPIDERS for boomless quads. Heliarc welded aluminum. Al's Antennas, 1339 South Washington Street, Kennewick WA 99336.

VERY in-ter-est-ing! Next 5 big issues $1. "The Ham Trader," Sycamore IL 60178.

TRANSFORMERS rewound, Jess Price, W4CLJ, 507 Raehn, Orlando FL 32806.

NOVICES: Need help for General ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information. Amateur License, PO Box 6015, Norfolk VA 23508.

WE BUY electron tubes, diodes, transistors, integrated circuits, semiconductors. Astral Electronics, 150 Miller St., Elizabeth NJ 07207. (201) 354-2420.

MOBILE Ignition Shielding gives more range, no noise. Kits and custom systems. Literature. Estes Engineering, 30 Marine Dr., Port Angeles WA 98362.

TELETYPEWRITER parts, manuals, supplies, equipment. Teroids. S.a.s.e. for list. Typetronics, Box 8873, Ft. Lauderdale FL 33310. W4NYF. Buy parts, late machines.

WANTED: An opportunity to quote your ham needs. 36 years a ham gear dealer. Collins, Drake, Ten-Tec, Swan, Kenwood, Tempo, Regency, Icom, Hy-Gain, etc. Trades, terms. Request catalog. Chuck, W8UCG, Electronic Distributors, 1960 Peck, Muskegon MI 49441. (616) 726-3196.

AMSAT/OSCAR 6-7 slides, set of 5 — $1.25 Lift-Off and Equipment. Proceeds AMSAT, K6PGX, P.O. Box 463, Pasadena CA 91102.

WANTED, Make, Model and Serial Numbers of stolen ham gear, for big list. W7UD, 3637 West Grandview, Tacoma WA 98466.

BUILD your own radio desk/console cabinet. Design drawings, photographs, $4.75. Bill Morris, WA5RSC, P.O. Box 20302, Oklahoma City OK 73120.

WANTED: Any edition of textbook "Antennas" by Kraus. State price to WB4OTJ, 5312 Beacon Rd., Palmetto FL 33561.

SERVICE by W9YKA. Professional grade lab, FCC commercial license. Amateur and commercial SSB-FM equipment. Repairs, calibration, modifications, consultation. Low overhead, reasonable rates. Write or call Robert J. Orwin, Communications Engineer P.O. Box 1032, La Grange Park IL 60525. (312) 352-2333.

BUILDERS Teflon stock. Write W9TFY, Frank Wirt, Alpha IL 61413.

UPGRADE your ham license NOW. Let Posi-Check help you. Original, expertly devised, multiple choice questions and diagrams covering all areas tested over in FCC exams. IBM sheets for self testing. Keyed answers with explanations. Novice Class — $3.35; General Class (including latest rules and regulations) — $5.10; Advanced Class — $4.65; Extra Class — $4.90. Also newly revised Radiotelephone third class elements 1, 2, and 9 — $9.50. First class postage prepaid U.S.A. Air mail 25c extra per copy. Send check or money order to Posi-Check, P.O. Box 3564, Urbandale Station, Des Moines IA 50322.

WANTED: Mobile telephone equipment such as Delco, GE, etc. Also heads, duplexers, decoders. Gred Hyman, WA2OTG, 19 Sicard Ave., New Rochelle NY 10804. (914) 636-2494.

MOTOROLA HT220, HT200, Pageboy, and other popular 2M FM transceiver (Standard, Regency, etc.) service and modifications performed at reasonable rates. Hatfield, WA4FRV (804) 272-8403.

DRAKE R-4B, MN-4, MS-4, Heath DX-60B, HG-10B VFO, IM-18, (all used less than 6 hours), plus tube tester, keys, crystals, 24-hr. clock, relay, dummy antenna, and innumerable accessories. Asking — $650, George Mooza, WA1GQX, 32 Locust Ave., Lexington MA 02137.

ICOM, Swan, Larsen, CushCraft and KLM. W0NGS, Bob Smith, Electronics, 1226 9th Ave., North, Fort Dodge, IA 50501. (515) 576-3886.

WANTED: CE600L, SP600JX, Swan 600T 600R custom two meter gear, Electronic organ, 16MM camera & projector Meg/Opt 2,1/4 X 3 1/4 Uber Nagra III Sync recorder. John Waskowitz, 35-30 73rd St., Flushing NY 11372.

TOROIDS — 44 and 88 mHy 5 — $3.00 P.P. M. L. Buchanan, P.O. Box 74, Soquel CA 95073.

160 METER top loading section for verticals — $34.50 ppd.; 80 meter section — $31.50 ppd. or write for info. Bill Turney, WA0RFF, 1414 East 9th, Hutchinson KS 67501.

MIDDLESEX Electronics — fall catalog — surplus gear, components, etc. Send s.a.s.e., 21 Freestone Ave., Portland Conn. 06480.

DEFECTIVE SB-104 wanted. Send complete history of defects, present condition, purchase date, serial number, modifications, accessories, lowest cash price, telephone number. Write, don't phone. All letters answered. Wolheim, 41 Silversmith Lane, Levittown NY 11756.

COLLINS KWS1 transmitter, 75A4 receiver, mint condtion. Original owner. Little used. Asking $1,000. W2CSZ, 4 Elizabeth St., Glen Cove NY 11542.

MOBILE Ops. Tired of ignition noise? Please send SASE for info on shielded ignition systems. Summit Enterprises, 20 Elder Street, Yarmouthport MA 02675.

RTTY, Hal Tuned ST-6, autostart, AR1, in Hal desk-top cabinet. Model 28KSR page printer, manuals on both with other extras. Will Ship. Quinten R. Grider, Rt. 1, Box 58, Lone Wolf OK 73655.

INTERESTED in obtaining parts, components, etc. concerning SW receiver by Hallcrafter's "Super Skyrider", Serial H54260. Contact S. V. Marlowe, 15 Webster Ave., Jersey City NJ 07307.

SB104/SB230 both new, tested perfect. SB104 with cw filter, HP1144 supply, SB604 speaker, $1095. SB230, $350. Both, $1395. Pickup or pay shipping. Phone nights only, Waters (516) 541-9355.

WANTED: Keys, bugs and sounders — WA0YFD.

WANTED: HW202, HWA 202-2, HWA 202-1, HA202, HWA 202-4. Sell HW 22A, W2UGM, 415 Demarest Ave., Closter NJ 07624. (201) 767-0123.

PHOTO stamps. Personalize and dress-up your QSLs. Free sample, write: WE8B's, Box 6, Morganton NC 28655.

5BWAS your goal? Get a concise accurate "Insta-Gress" Record Book showing which states are worked, confirmed and those still needed — all at a glance! Avoid repeated log searches and lost information. Order now! $4.98 postpaid OS/VE, $5.98 elsewhere. Richard Norley (WA1CFT) PO Box 543QK, Derry NH 03038.

HAM Buy Lines, send name and address for literature. Iacopelli, 1720 77 St., Brooklyn NY 11214.

SELL: Collins 75A4, excellent, no modific. or scratches — $320. Antenna 20M. Mosley & Balun & hardware — $20. Scopeant — $10. WB6EYA, 1608 Charles Rd., San Leandro CA 94577.

NEARLY invisible ham or SWL hertz antenna, 130 foot long stranded stainless steel wire with miniature insulators — $12.80. Wilcox Electronics, Box 1331, S.L.C., Utah 84110.

DRAKE station, SPR4, with TA4 and SCC4, T4XC, C4, AC4, MS4, and L4B. Will sell separate or $1700 for complete station. WA1DTN, Box M, Fall River MA 02724. (617) 674-3531.

DRAKE TC2, SC2, PS1, like new — $475; Drake T4XC, R4C, MS4, AC4 — unused, package — $950. T4XB, R4B, MS4, AC4 — $750; 75S3C — $775; Digital computer lab — Reg. $359, sell for — $125; Johnson SSB adaptor w/ac — $185; HQ 110 receiver — $109. W2FNT, 18 Hillcrest Ter., Linden NJ 07036. (201) 486-6917.

SALE: Heath Linear, needs little work, Hammarlund HQ 100-A, Drake 2C, 2NT, like new — $50 each. Dummy load — $10. No shipping. WA2COE, (212) 222-5927.

FIELD strength meter — ME-61, surplus. Has telescoping antenna, 1-1/2" square meter, headphone jack in 6X6X5 aluminum box with carrying strap. Covers 1.5-24 MHz in three bands. — $12 plus $1 postage. K4CFJ, 265 Kenlock, Lexington KY 40503.

FOR SALE: Two meter repeater, complete with six cavity duplexer, I.D. and all accessories. W4VRO, Ray Crawford, Box 32, Lavonia GA 30553. (404) 356-9258.

COLLINS KWS-1, serial No. 989, in storage for 12 years, very mint, very little use. — $725. W9GIL, 910 E. Calumet Rd., Milwaukee WI 53217. (414) 352-6467.

FOR SALE: Tower, EZ-Way, motorized crank up, tilt-over, 60 ft. RBX 60G with Wonder Post (no concrete) ground post — $399. W4PDK, 141 Elm St., Versailles KY 40383.

WANTED: Heath HW7 transceiver and power supply. Gilly Galbreath, 3235 Jaylee Dr., Santa Rosa CA 95404.

SWAN 270B — $305; Sencore FE-14 — $30 both like new — For Sale. B. Rowan, W2GKF, 55 Runnymeade Road, Berkeley Heights NJ 07922.

ESTATE: Drake line, R4B — $300; T4XB — $325; AC4 power supply — $85; also Heathkit professionally built SB200 — $200. Aluminum tower 35 feet tall, must be picked up — $50. Mrs. F. X. Fallon, 908 West Pope St., Dunn NC 28334.

MAGNUM-Six RF6DB-D5S RF speech processor for Drake T4X/T4XB/T4XC — $100. Ralph Conner, WA3OBW, 149 Gladstone St., Phila, PA 19148. (215) HO2-9293.

AEROTRON Slimline 6N100/mA-2M mobile 100 W. FM amplifier — $50. K2BQO, Paul W. Hazzelia, 8 Yale Place, Armonk NY 10504. (914) 273-9047.

WANTED: Collins F-455FA-15 filter, 1500 cycle for 75S-3B/C. K8YQW, 4540 Foster Dr., N.E., Louisville OH 44641.

SWAN Mark 6B, six meter linear, A-1 — $385. Russell, 19680 Mountville Dr., Maple Hts OH 44137.

FOR SALE: Collins KW-1 (Serial No. 11). Swan 270 B transceiver. Robot Model 70 monitor. Robot Model 80 camera. All in mint condition. Make separate offers. Contact Joe Mullan, W3RLR, (301) 467-3500.

SELL: Heath HW-101 and matching HP-23B power supply. Factory aligned. Now in operation — $280. Local preferred. WB2ZAT, Willingboro NJ 08046. (609) 877-8512.

SELL: Central Electronics 200V. Excellent condition. WB4LPU, 406 Ellen Way, Brandon FL 33511.

DRAKE R4A, T4, AC4, MS4, excellent condition - $490. Adler, 765 Mt. Vernon Ave., Haddonfield NJ 08033.

HW-7 transceiver with power supply — $50. Heath Apache TX-1 and SB-10 — $50. All cables & books. You ship. Trails End Estates No. 10, Winnemucca nV 89445. (702) 623-2493.

HQ 140X — $95, ARC 5 TX RX power supply — $45. Want HW 16 Ken Hand, WB2EUF, 337 Three Mile Harbor Road, East Hampton NY 11937.

SALE: HM-10-A tunnel dipper — $30; Knight SWR bridge — $5; 10-18, oscilloscope — $60; TX-144 2-meter exciter — $5. W2WHK, 210 Utica St., Tonawanda NY 14150. (716) 692-5451.

SELL: Heath HW100, HP23A, and desk mike — $250. Tom Lewis, WB9KSM, 2300 Killdeer Ave., Michigan City IN 46360. (219) 872-7486.

HEATH SB-100 with 400 Hz filter and phone patch, both in excellent condx — $325. W4SGP, 5905 Arbon Ave., Mobile AL 36608.

FOR SALE: HW7, mint, with earphones — $62. Will ship. WB8PON, 2324 Scenic Dr., N.E. Lancaster OH 43130.

SELL: Ten-Tec 405 amplifier — $117; Ten Tec 251 power supply — $45; Waters 359 compreamp — $8; Pickering micro ultimate K-IR keyer — $17; Heath HD-10 keyer (no paddle) — $12. Each in perfect condition and shipped UPS prepaid. Charles Ziegler, W8RV, 23 Public Square, Medina OH 44256.

SELL: Collins KW-1, mint condition, to best offer. W3TV. Shelocta PA 15774.

HAM novice station. Heathkit DX-60B trans., HR 10B rec., HG 10B VFO, Sidetone, key, speaker, phones, mike, relay. — $175. Pick up only. Joseph Souza, WA1UHT, 81 Silver Spring Ave., East Providence RI 02916. 401-438-5417.

MOTOROLA HT-100 2 mtr. good cond., best offer. HP-23 power supply — $20. Used 201-A & 301-A test OK — $4 ea. Bad $1 ea. R. Becker, 1021 Chestnut, Waukegan IL 60085.

YOUR old gear collecting dust? Buyers & Sellers radio brokerage can work for you. Buyers buy free; Sellers pay 10% if you sell. See our display ad or write box 73, Boston MA, 02215.

QST magazine 1924-1968 complete — $150. R. Kampf, 9 Black Birch, Searsdale NY 10583.

JOHNSON transistorized FM transceivers. Fleetcom 527, 25w, 132-174 MHz — $274. Fleetcom 550, 4w, 450 MHz — $245. WB0MPE, 1440 Lakeview Ave., Minneapolis MN 55416.

JOHNSON Ranger Xmtr — $75. Dow key relay — $10. Ray, 2941 Kedron, Winston-Salem NC 27106.

FOR SALE: Military URM-26B signal generator, TS-323 frequency meter. Best offer. Ed French, P.O. Box 249, Aurora IL 60507.

COLLINS Mech filters, 455 J05, J15, J21 — $25. EA. WB6VNT, Box 951, Niland CA 92257.

HA-5 VFO, mint — $50; MN-4 matching network, mint — $80; E-V 729 mike — $5; Shure 522 cardioid dynamic base mike — $30, Swan WM-1500 watt meter — $35; B-W protux 376 coax switch — $9; RCA 110 power line monitor — $10; will ship, WA9SRD, 5103 Arlington St., Loves Park IL 61111.

WANTED — Swan 1200 W-OR-X linear amplifier with manual. Everett Priest, 739 S. Main, Franklin OH 45005.

SHACK cleanup sale: 1973 Gertsch FM-3 with extra 1 meg. crystal, service manual, AC power. I just acquired a measurements T1035B. — WWI aircraft spark transmitter, perfect condition — WWII TCS-6/9 Radio Equipment includes COL-46159 recvr. and CIH-52245-A xmitter with AC power, antenna tuner & remote control. Best offer all or part. Howard Coleman, W6SXW, 30209 Oceanaire Drive, Rancho Palos Verdes CA 90274. (213) 377-5946.

SELL: Two packages: HW12A, HW22A, with one vinyl dust cover & one carry case. HP13A with original length cable and two spare transistors, hanger mounts — $265. SB102 recently rehabilitated tubes, HP23B, cable, speaker, all manuals — $465. Plus shipping. Carl Frank, W0COS (since 1924). R. 1, Rochester MN, 55901. (507) 282-0111.

CENTRAL Electronics 100V — $395; Drake R-4C — $450. Both immaculate condition. T. Lifland, W2RFU, Donmoor Road, Lawrence NY 11559. (516) 569-1687.

WANTED: Coils for (7) Millen G.D.O. (SET) Gonset GSB-2 with ac. Call or write Jim, W1VYB, (617) 922-3850.

WANTED: Data Engineering's Memory-Matic 8000, solid state electronic feather touch key. Fred Nelson, K1AKI, P.O. 8637, JFK, Boston MA 02114. (617) 261-5131.

FREE: 8 extra cyrstals of your choice with the purchase of a new ICOM IC-22A at $249. With the 10 crystals that come factory-installed in the IC-22A, this gives you a total of 18 crystals! For equally good deals on Drake, Collins, Kenwood, Ten-Tec, Regency, Swan, Atlas, Midland, Alpha, JTC, Standard, Tempo, Genave, Hy-Gain, Antenna Specialists, Cush-Craft, Hustler, Mosley and others, write or call Hoosier Electronics, your ham headquarters in the heart of the Midwest and become one of our many happy and satisfied customers. Hoosier Electronics, P.O. Box 2001, Terre Haute IN 47802. New Phone Number: (812) 238-1456.

SELL: 50 unused Analog Devices 119K, 44J, 48J/K operational amplifiers and sockets. Make offer. K7YBF, 1325 Avenida Regulo, Tucson AZ 85710.

DXers: How common is HK92 WB8QMG/HK9 works 14260 Thu.&Sat. evening. QSL via W8VHY. S.a.s.e requested.

SB220, mint — $365; 3 element Minibeam — $25, pick up; boomless quad mount-8 fiberglass arms — $40. Dr. Crosty, Chatham MA 02633. (617) 432-1157. W1QP.

SELL: Drake 2NT xmtr, great condx., orig. owner — $90 or best offer. Hughes, WA6WSJ, Box 573, Camino CA 95709.

EXTREMELY conservative kilowatt 80-10 meter bandswitching amplifier; pair 4-400A's; custom matching power supply; continuous KW power output; plate and screen supplies variac-controlled and everything fully metered; beautiful RF deck and very rugged power supply (0-4000 VDC at 2 amps); includes 5-foot rack cabinet and rollers; $2 for photos, s.a.s.e. for more info. What a contest or DXing rig! Steve Katz, WB2WIK, 636 Succasunna Road, Mt. Arlington, Landing NJ 07850. (201) 398-1528.

WANTED: SB-610 Monitor Scope. Must be mint. WA2QEA, 223 Green St., Herkimer NY 13350. (315) 866-0234.

GENERATOR onan 3500 watts 115/230 volts ac 60 Hz 1800 rpm 12 volt self-start and charge — local or remote control — $350, mint cond. W2BZV (516) 292-8013.

SWAN MK-1, KW amplifier (PR 3-400Z) — $200. Heath Warrior KW amplifier (4 ea — 572B & 3B28 rectifiers) — $125; HA-1 to keyer, Vibroplex Chrome paddle — $50; New Hustler mobile foldover mast, KW coils 15, 20 meters, fender mount — $30; 5 ea. 866A — $15; 2 ea. 811A — $10; 2 ea. 572B — $20; 11 ea. 4X150A — $25. K5MWZ, PO Box 16099, Ft. Worth TX 76133.

DX-60 — $35; HG10B — $45; 40M ARC-5 — $15. Chuck Hiatt, Orion IL 61273.

SELL: Complete station: Drake 2B receiver — $150; Heath HX-20 transmitter — $100; All parts for 500 watt linear using 811As, $50 plus shipping on all. All manuals available. WB9GUI, Tom Albright, RR2, Box 388, Chillicothe IL 61523.

NEED more $ for college: T4X, AC-3, R-4, MS-4, W-4 — $650. SB-200 $190. Paul Cooley, WA0YJW, 1464 South Bluff, Clinton IO 52732.

DISCOUNT prices plus full warranty on new guaranteed items: Standard Horizon 2 (300list)-Write; Midland 13505 (list300.) 250.00 cost; Hygain TH6DXX (240. list) cost 192.00; CDE Ham-2 rotor 117.00; Belden 8448 Rotor cable 13c/ft; CD44 89.95; Mosley Classic 33 179.00; 1 8HT Hytower (260 list) 208.00; 15% discount Tricx W series-FOB Calif; Belden 8214 RG8FOAM 23/c ft; 8237 RG8U 19c/ft; RG62B/U 8c/ft; CDE .001/10KV doorknob 1.95; Raytheon 811A 15.00/pr; Sorensen ACR2000VA AC regulator 150.00; Quote TS520, Atlas 210X; old tubes (1V, 7V, etc) write needs; Collins; Prices FOB Houston; prices good until Nov. 1. Madison Electronics, 1508 McKinney, Houston TX 77002. (713) 224-2668. Nite (713) 497-5683.

FOR SALE: Estate — EZ Way fold over tower 50'; Ham M rotor; 10-15-20 Hy Gain vertical; Hy Duty Johnson Rotor; Reasonable price; other items. S.a.s.e. K3YMY, 17032 . Tele. (717) 896-8019.

MUST SELL: Heathkit SB303, SB401 DX35 VF-1 SWR bridge 15M quad TU-1 filter. In excellent condition. $450 takes all. Call (616) 624-3651, write Coady, P.O. Box 247, Lawton MI 49065.

MOVING — Sell Squires-Saunders SS-1R W/blanker — $350; Heath Lunch box, 2 mtr. HW-30 W/DC supply — $30; Heath SB-200 — $200; Heath HD-10 keyer — $25; Vibroplex bug — $5; Ten-Tec 200 VFO — $40; Ten-Tec trancvr 80-40-20 PM-2B 2W CW — $50; Globe Chief 90A 160-10 90W — $40; Knight P2 SWR bridge — $10; 5-element tri-bander, 35 foot tower rotor — $100. Call W1FZY, (617) 249-9890 after 5 PM.

FOR SALE: Westinghouse MW-2 R.F. assembly (transmitter), 2-30 MHz, 3 kW output. — $500 or best offer. Heathkit OM-1 scope, SD-3 electronic switch, — $40 for both. Frank, WA9ZTO, 1721 Churchill Dr., South Bend IN 46617. (219) 234-2746 after 7PM.

GROUNDED grid filament chokes 30 amp — $5; plate chokes 800 mA $4; 2 amp — $6; PPUSA48, William Deane, 8831 Sovereign Rd., San Diego CA 92123.

WANTED: Heath Monitorscope, Sell, Motorola X53, 2m trunkmount, w/accessories — $100. Swap? WA2VOF, 1678 Northgate, Merrick NY 11566.

FOR SALE: Drake TR4C, AC4, MS4, DC4, MMK3, TR1000LP, EV 729 SRD mike, Johnson 275 watt matchbox with SWR bridge. WA0TST, 1000 North Oak, Creston IO 50801. (515) 782-5187. F.O.B.

FOR SALE: Drake 2-NT — $80; Heath HG-10-B, $30; Heath HW202 — $150. K2LJJ, RD 1, Montour Falls, NY.

KWM-2, 516F-2, Heath SWR meter, 14AVQ antenna, Turner microphone — $800. Dan Reid, 32606 111th Pl. S.E., Auburn WA 98002.

SELL: Television collection 1946 to 1950, $350. Tom Emig, 325 B Sherwood Dr., York PA 17403. (717) 854-2024 nights.

HEATHKIT IO-102 oscilloscope — $120 postpaid, IG-102 Signal Generator — $35. WB2UFN.

432MC/450MC Varactor tripler nucrowave modules MMV432, 20W in 14W out, used little, works excellent, regular $75.20 for $50. W8FVP, (513) 864-2918.

DT76 transistorized VHF mobile radio unit Kaar like new, 40 watts on low, 120 watts on high — $300. Frank Chiorello, 366 Commonwealth Ave., Trenton NJ 08629.

T-4XB — working, on the air — $320 postpaid; 75A4 (Ser. No. 4564) not for $450 from amateur electronic supplier with one filter checked by their technucian, but with three mechanucal filters, aligned by fussy first class telephone (ME), — $410 postpaid, W2ABE.

HEATH HW-101, C.W. filter, A.C. supply, matching external VFO, mint — $400. SB-220 less than 10 hours use — $375; WA1AEZ, Gary Leonard, 76 Sough Harbor Road, Townsend MA 01469.

WANTED: Sensicon PA 8616A-12 surplus receiver, state condition and price. William G. Crist, K6APH, 964 Virginia Ave., Colton CA 92324.

KENWOOD Twins R599, T599, S599 spkr. Manuals, cables and accessories. Original cartons. Excellent condition — $500. Moss, K2JHM, 28 Stone Avenue, White Plains NY 10603. (914) 946-5792.

QST from 1923, 1921, 1920 and earlier wanted. Also looking for ARRL Handbook editions 1, 5, 6. Ed Kalin, WA1JZC/1, 410 Memorial Dr., Room 441G, Cambridge MA 02139.

THE Ten American Districts Award is available from LERC ARC, 2814 Empire Ave., Burbank, Calif. 91504. Excellent first award for Novices. Special endorsements added for one band/mode, OSCAR, QRP, RTTY, SSTV, etc. S.a.s.e promptly brings data sheet.

JOHNSON Ranger — $69; Ham-M/TR-44 control. VE3AXD/W0, Howard Davy, 2710 Monterey, Minneapolis MN 55416.

HEATHKIT, new SB104 digital xcvr, ac power supply & speaker — $725. All mint. W. T. Nystrom, WA2BSI, Box 2323, So. Hackensack NJ 07606. Phone (201) 487-1090.

SELL: National NCX-5 Mark II transceiver, matching VX-501 VFO console, NCX-A a/c supply and XCU-27 100/CC calibrator. All with manuals and in excellent condition. Package deal only — $375. WA2JRY, Ron MacKinon, 11 Whitson Road, Huntington Station LI NY, 11746. Phone: 8AM-4PM (212) 623-8931; 6PM-10PM — (516) 673-8179.

CRYSTALS airmailed: Novice, active FT-243, all frequencies, minimum five 40M, 15M, 10M 99c each, 80M $1.85. Less than five $1.50, 80M $1.95. Novice band, Edge Marker—QSO combination package, 80M, 40M, 15M, 10M — four bands, eight crystals — EBM-QSO-8 — $9.95. Same less 10M pair — EBM-QSO-6 — $7.95. Both novice packages for QSO just inside HI-LO band edge and calibration of your receiver or VFO. Satellite special — 8107 Kilocycle HC-6/u $2.45. 160M FT-243 pins, $2.95, four for — $9.80. Airmail 20c/crystal, 1st.-cl. 15c per crystal. Free listings. 160M — 2M. "Crystals Since 1933" Bob Woods, W0LPS, C-W Crystals, Marshfield MO 65706.

WANTED: Heath HG-10B VFO, mint condition! Call or write Lance White, WN6ADF. (415) 355-6375.

HW-101 with HP23 — $325, top condition. WA1DCR, Carl Pearson, 9 Clark St., Niantic CT 06357.

SAVE, Save, Save — Discounts on tubes, transistors, antennas, speakers, rheostats, Taled Electronics R-2 Pine Tree Hill Road Newtown CT 06470.

BUY-Sell-Trade. Write for monthly mailer, give name, address, and call letters. Complete stock of major brands, new and reconditioned equipment. Call us for best deals. We buy Collins, Drake, Swan, etc. SSB & FM. Associated Radio, 8012 Conser, Overland Park KS 66204. (913) 381-5901.

WANTED: Collins 70E-24 PTO. Mike Mitchell, W8RJ, 2564 Glenwood Ave., Toledo OH 43610.

WANT — Wheatstone perforator in good working condition, with full keyboard for Morse code on 15/32 tape. Offering $25 up subject to condition and transportation. Need tape also. W1ZTK.

SELL: Working with manuals. You pay shipping. Gonset G76 transceiver, 6/80 meters — $50; Swan SW-240 transceiver, 20/80 meters, with power supply — $85; Hallicrafter HA-2 transverter — $50; Heathkit power supplies, HP-23 a.c. and HP-13A d.c., each $25; EICO 955 capacitor tester — $10. WA7T2Q, Bruce Mull, SR 231A72, Wolf Point MT 59201.

SELL: SB220, $300; Argonaut, $180; Dentron 160XV/160 AT $185; TS520 cw filter — $35; VFO 520 — $90; KR20 keyer — $45; Heath 0-11 scope — $45; Gonset G-76 rcvr only — $25; 5-813s/3 sockets — $25; Hygain 1:1 balun — $10; All good condition, with manuals. Following as-is: Midland 100 K mtr volt vom — $5; PA system amp — $10; Sprague cap tester — $5; ARRL SSTV converter — $10; Knight GDO — $15; No phone inquiries, shipping extra. WA7IJN, PO Box 822, Thompson Falls MT 59873.

WANTED: Heath HG-10B & SB-630. W4SHL.

DRAKE 2-C, 2-CQ, 2-AC — $175; DX-60, HG-10, Dow relay, mike — $75. Lafayette 800 B — $75. WN2ZLX, Dobbs Ferry NY 10522.

HEATHKIT SB-301, SB401, SB200, SB600; Bitcil Magnum Six — all for $725. WA0KQU, Ronald Dohmen, 1628 Alabama Ave. So, Minneapolis MN 55416.

FOR SALE: Swan 600T, 600RC with 600 Hz filter, SS-16, special filter noise blanker, IC audio filter, speaker phone patch all in one — $875. I'll ship. J.R. Casian, 19 Peartree, Willingboro, NJ 08046. (609) 877-3420.

SELL: Heath HW101 with 400 Hz cw filter, HP23A supply, speaker and mike, — $300. Excellent condition. WB9CNS, Robert Nave, RFD 5, Box 253A, Huntington IN 46750.

CENTRAL Electronics 200V top shape, with manual — $200. Bob, 15737 Gault St., Van Nuys CA 91406. Tel (213) 785-1214.

TRADE: Heath Apache transmitter, good condition, for Lafayette HA-350 recvr, good condition, no modifications, local pickup only. J. Backus, W3LNM, 106 Upton St., Rockville MD 20850. (301) 762-2491.

WANTED: Allied SX-190 receiver and Knight A-2517 transceiver with power supply. Joe Torzewski, 51625 Chestnut Road, Granger IN 46530.

WANTED: Four WD-11 tubes for RCA Radiola III-A, type RL. Write or call collect (202) 333-4114. Haig Kafafian Ek-N2HRW, 4201 Cathedral Ave., N.W., Washington DC 20016.

EXPERIMENTERS! NPN transistors 100 Hfe 270 MHz 100 mA. Guaranteed all good. 15c order No. 10016C. Include 20c shipping. Parts, 3361 S. Wabash, Chicago IL 60616.

DRAKE TR4 transceiver, AC4 power supply, speaker, works perfectly. $450 shipping paid. Ken Biship, WA5MIN, Official Observer, Box 514, Lake Jackson TX 77566.

SELL Motorola HT-220 12-channel Omi with 7 sets crystals, drop in charger and rubber antenna and etc. — $650; Collins KWM-2 and 516F-2 — $700; Collins KWM-2, PM-2 and suitcase — $650; Collins new 516F-2 — $165; As new Heath SB-104, HP1144, and SB-604, one month old, factory checked out — $725; new Brimstone 144's, unopened carton — $550; new Collins 30L-1 cabinet with ring — $50; cabinet rings for KWM-2 — $10; cabinet rings for 312B-3, 312B-4 and 312B-5 — $6; Collins spinner knobs — $7; Collins Magnum six, both pigtails for S-line and KWM-2 — $120. Richard Schark, K0ZBQ, 417 North Ferry, Ottumwa IA 52501. Ph. (515) 682-5741.

OLD books. Wireless Telegraph Construction for Amatuers, Morgan, 1913. Practical Wireless Telegraphy, Bucher, 1917. Best offer. Magazines: QST — Aug. 66-July 75; Ham Radio — March 68, first issue — May 74; CQ — July 66-May 72, 73, Feb 67- Nov 72. George Stevens, WB2ZFA RFD 1, Box 112, Mays Landing NJ 08330.

SELL: (2) Johnson Messenger 380 220 MHz FM $150 each. C. Carroll, 41 Hawthorne St., New Britain CT 06053.

HOSS-Trader, Ed says "We refuse to be undersold." If you didn't buy it from the Hoss, you paid too much. Shop around and get your best price, then telephone the Hoss last. New Atlas 210 transceiver — $529; Demo TR4-C — $499; New display Swan 700-CX — $509; Demo T4X-C — $469; Demo HR-2B, — $179; New ICOM Demonstrator — $379; new Rohn 50 ft. foldover tower, prepaid — $345; Demo Ham-2 rotator — $116.95; Hoss-Trader "Specials". Drake TR-4 — $395; R4-C — $419; new Heathkit SB-303 receiver wired — $349. New Collins at old prices. Atlas 180 — $479. Moory Electronics Company, P.O. Box 506 De Witt, Arkansas 72042. Tel. (501) 946-2820.

OSCAR: in stock KLM Echo II, amplifiers, antennas. Coming soon KLM Echo 70 432 cw/ssb transceiver. Radios Unlimited, 86 Balch Ave., Piscataway NJ 08854. (201) 752-4307.

HEATHKIT SB-220 — $325; Mosley C1-33 tribander — $125, both in excellent condition. Also, Realistic DX 150A — $75, good condition. WB6YGL, 3196 Andora Drive, San Jose CA 95122.

SELL: Drake station T4XB transmitter, R4B receiver, AC4 and MS4. Absolute mint condition — $750. Robert Weber, Crows Nest, Lakeville CT 06039. (203) 435-9598.

HW32A calibrator, mobile mount, excellent condition — $100, local only. K4BNC/2, 401 Rt. 22, N. Plainfield NJ 07060. 753-6507.

HELP: Would like to buy Swan general Coverage Tuner ($30). For Sale — Nationals HRO50T1 and HR060 with or without coils. All replies answered. Alex Barigian, Phone (219) 674-9213. RR3, Box 119, Elkhart IN 46514.

FINE stainless hardware. Nuts, bolts. Machine, sheet metal, screws! Washers! W8BLR, 29716 Briarbank, Southfield, Mich. 48076.

FOR SALE: HQ100A, excellent condx — $98. Knight T-60, like new, used less than 2 hrs. — $45. Both w/ manuals. I will ship. WB2PSK, Cornwell, RD No. 2, Box 16A, Blairstown NJ 07825.

WANTED: (Johnson) Viking SSB adapter. State condition, price. Edwin Smith, 1715 Central, Wilmette IL 60091.

SELL: HW32, HP23, HP13 — $110. K2JPZ. MO5-8529.

FOR SALE: HW-16 and HG-10B ext. vfo. Both mint condition — $150. You pay shipping via UPS. WB0MLL, Leland Helgerson, Rural Route 3, Canton SD 57013.

SELL-Trade: Eico 710 GDO (kit form), WWII Spy & Emergency rig. RS-6 Collectors item. Complete with manual, hand generator, etc. Navy RD2-1 rcvr. TMC SBE-3 SSB exciter. Oscilloscope, An/USM-24C. BC 221 freq. meter w/ pwr supply. Collins 516 F-2 pwr. supply. R-392 rcvr — 1 Kc to 32 Mc, 28 volt (works on 80, 20 mtrs fb). Make reasonable offer on any of these items. Dudley Spears, K4GDH (502) 864-5154. Burkesville, KY 42717.

75A4 KWS1 WPS, best offer, also SB33. Dan Connolly, 15 Fernwood, Albany NY 12211.

QSTs — 1946-1972 solid except 3 issues-free-you pick up and pay this ad. 58 foot Rohn 25 tower, disassembled, you pick up $100. James Martin, Box 142, Lakeport NH 03246. Telephone (603) 279-8791.

WANTED: Hallicrafters SX28, R, V, Seslar, 7363 Cook Rd, Powell OH 43065.

RTTY, Model 32 ASR — $300. Model 33 ASR — $600. Both like new and working perfectly. Can arrange shipping. K9HJU, Tony (312) 349-9002.

SUPER 144 MHz array consisting 4-14 element Swan type Yagis/phasing lines and mounting framework. — $150. Thomas, W2UK, Juniper Place, Colts Neck NJ 07722.

WANTED for Oscar: Heathkit SB-500 2-meter transverter. Must be wired for 2M and in good condition. WB2FSL, Bob Cascone, 234 E. 19th St., Paterson NJ 07524. (201) 345-4419.

REPAIRS: K6BE. 415-548-1889.

HEATH SB102, HP-23B power supply, SB-600 matchin speaker, 400 hertz cw filter, manuals — excellent condition $275. WA1NGH, Wildcat Hill Rd., Harwinton CT 06790. (203 482-3132.

SELL: KWM-2 516F-2, 312B-4 — $965; MCL-2000 linear $325; Praige wattmeter — $45; Shure No. 444 mike — $3 Cricket I Keyer — $25; Package deal — $1295. J.J. Perr WA2YMS, 177 Paris Road, New Hartford NY 13413. 1-(315 724-5374.

WANTED: Dual lever key, such as kH-1, Vibro-keyer, etc. Als Heath IM-17 vom. WN4ABF, Box 176, Langley KY 41645.

HEATH HW-16 — $100; HG-10B — $50; HD-10 — $25. All le than two years old and expertly built. HW-16 was modifie during construction to operate on 40, 20 and 15. This rig h QSLs from 44 states and 4 countries. WA1STQ, 15 Lakewoo Drive, North Attleboro MA 02760.

SELL or trade Collins 75A4 (mint), need a good linear amp transceiver. W9BPG, 609 Henrietta St., Gillespie IL 62033.

HAVE antennas — need HY-Gain 400 rotor, RG17 or hardlin cable, 50 ohms. Jim Cain, WA1STN, R. 5, Box 23, Ea Hampton CT 06424.

WANTED for cash: 1000-10,000 feet 1/4 or 5/16 galvanized gu wire, guy grips, other tower hardware. Also want fiberglass gu or parts and long run large Heliax or similar coax. W5TMN, Jo Emler, 1615 Nantucket Richardson TX 75080.

4CX5000A w/socket, chimney — $200 postpaid or nearest offe 811's, $5. CE Sideband Slicer, $20. K6SGQ, 2615 Ladoga, Lo Beach CA 90815.

IMPOVERISHED College Student in Boston area looking f station to operate (and win) from in contests; will handle yo QSLing as swap for operating. Jim White, WA1NNC, Box 10 Rich Hall, BU, Boston MA (617) 353-5816.

WANTED: Collins 180L series antenna tuner (manual). W5PQ P.O. Box 707, Seabrook TX 77586, (713) 474-4684.

CALL letter license plates wanted for collection. Will p postage. Art Phillips, WA7NXL, 3401 No. Columbus Apt. 5 Tucson AZ 85712.

SELL: HW16 with SB600; $105; HT18 VFO — $35; You sh WN5MTU, Rt. 2, Box 366, Fairfield TX 75840.

LATEST Robot SSTV monitor 70B, camera with 1.4 mac lens, No. 61 viewfinder, — $820. WN0ZA, Digital keyboard $300. All like new. Bill Ross, W4MSI, 2990 Alton Drive, Petersburg Beach FL 33706. 360-8501.

WANTED: Eldico 100F, central electronics 20A transmitte D-104. WN8VBW, Mike Vais, 1578 Outville Road, Alexand OH 43001.

WANTED: for personal collection — pre 1930 wireless sets, parts, books, magazines, pre 1935 broadcast receivers, Pre 1930 wire telephone and telegraph equipment. Will Nangle, 761 N. 29th St., Milwaukee WI 53208.

KENWOOD twins R-599A, T-599A, S-599 with all cables and manuals, mint condition — $700. I will insure and ship. Monte Mueller, W7GVJ, 2445 61st St. S.E. Mercer Island WA 98040. (206) 232-7971.

"The Radio Amateur's Handbook" by A. Frederick Collins (inventor of the Wireless Telephone in 1899). 413 pages, published 1922. Also, QST 1930's to present. Many other early technical publications, data, etc. Tubes, test sets, other gear, old and new. S.a.s.e. for lists. Joe Harms (W3COP, 1931) W4BLQ. B158 Edgewater FL 32032.

KWM2 round emblem, mint — $850; mint 30L-1 — $360; mint 312B-5 — $360; BTI-2000 — $500; 516E-2 pwr sply — $65; KWM2-A plug relays — $615; want S-line, new 3-1000Z; C-3 console. K6KYB, 5301 Rockledge Dr., Buena Park CA 90621.

WANTED: Collins KWM-2A, late model, with accessories, K3DPQ, 45 Briar Road, Wayne PA 19087.

FOR SALE: Mint condition, Swan 700CX, 117XC, Vox and matching 508 VFO — $750. WA2QZP, 94 Irwin Place, Trenton NJ 08648. (609) 882-7685.

VHF specials: Clegg Thor 6 w/ac supply — $50; Interceptor receiver w/Allbander converter — $150. Contact WB2GWU, P.O. Box 568, Jamaica NY 11424. Phone AC-(212) 647-2730.

MARAUDER HX-10 Heathkit transmitter — $125. WB2JXY, AC-(212) 647-2730.

COLLINS KWM-2A, PM-2, 30L-1, Ham-M. Will ship — $1025. W5IXQ, Box 271, Hondo TX 78861. (512) 426-2762.

WANTED: Drake RV-4 VFO. Please state condition and price. Dave Macey, WØLEZ, 8121 Hedges, Raytown MO 64138.

COLLINS 30L-1 round — $495;very clean 30L-1 wing — $425. 75S-1, clean — $300; HB212 loaded with xtals & mobil ant. — $300. K9IYT (317) 476-7965.

SALE: Collins KWM2A — $695; 312B5 — $395; 516F2 — $125; CP-1 — $225; TA33 Sr. — $60; DX processor — $75; Eico 460 — $120; Eico 710 — $40; Heath HO-10 — $40; HA460 — $80; 6 and 2 meter beams, etc., WA3EPS, Call PM (215) 657-2221.

WANTED: Motorized tower, 80'. WØFDI, Route 2, Box 218, Buffalo MO 65622.

FOR SALE: 71 ft. Rohn 4-section tower. Heavy duty and motor driven raise and lower. H. Badler, 21 Fifth Place, Syosset NY 11791. (516) 921-2585.

WANTED: 0.8 KC Mechanical filter, No. F-455J-08 (part No. 522-9090-00) for Collins 75A-4. WA2DGU, 322 Broughton Ave., Bloomfield NJ 07003.

FOR SALE: Swan 600T transmitter, like new — $390; Drake R4B receiver, excellent condition — $300. Robert White, K9LWA, 2501 Birch Drive, Richmond IN 47374.

DON'T be without this new helpful 'Aid to Better DX'ing'. Tailored to fit your own Q.T.H. Over 340 countries listed. Includes amateur call prefix, country, DX zone, bearing, distance, time differential and more. Only $3.49 each. Send now to Neil Bauman, VE7ANC, 1675 Knight Avenue, Victoria, B.C., Canada V8P 1L6.

WANTED: Keyboard keyer. Lowry, 31 Midwell, Wethersfield CT 06109.

SB-104 Owners club — Covers related Heathkit equipments. Send SASE for details to Chuck Harrison, RD 2, Box 1, Main Street, North Stonington CT 06359.

DRAKE TR4 w/NB, AC4, MS4, and cartons. Mint cond. $450. Will ship. H.J. Robison, 3513 Stonehenge Pl., Birmingham AL 35210. (205)595-3028.

SELL: Heath HW-202 — $100. Baldwin, 26 Ridge Road, Simsbury CT 06070.

SB220 For Sale — Excellent working condition — $325. Vincent Sgroi, 6 Autumn Ln., Plainville CT 06062.

SELL: National NCX3, AC pwr supply, like new — $250 W4JYX, 2214 Janlyn Rd., Jeffersontown KY 40299.

HEATH SB-303/401, Cw, AM filters, all cables and manuals. Ready for RTTY! Precision aligned, reliable rig, FB condx., $450. L&N Model 5300 Wheatstone bridge, $50, G-R model 874-LBA slotted line, many stubs, stretchers, fittings — $100. Keithley 153 microvolt-ammeter, recently cal., $125. Keithley 610BR electrometer — $125. You pay shipping all items. WA1QEV, 3 Hall Ave., Nashua NH 03060.

SELL: New Drake L-4-B linear with p/s — $625. Other items. W3PQK, 615 Market St., South Williamsport PA 17707.

SELL Communicator II 12-volt two-meters with Palomar FM modulator and crystals for 146.52, 146.28, 146.31, 147.66, plus AM crystals. Clean, stable — $84 plus shipping. WB2LRS/1, 21 South Street, Williamstown MA 01267.

WANTED: HRO-5 recv — clean, with all coil sets & manual. Also Heathkit SB-200 linear. W3NRQ, 517 Florida, Reading PA 19605.

COLLINS: Sell 30-S-1, like new, low hours — $1500 or make offer. Will consider trade for KMW-2 and 30-L-1. Call Hal (K3NTT) 215-MO4-5280 or write to me at: 438 Sprague Road, Narberth PA 19072.

HEATH SB-400/401 freq. control, all xtals, new finals, mint — $239. Gonset 1V-6M, 5 xtals and mike — $119. Clean. Want T4X-C. WA2OVG, (212) 889-4303-eves. 796-8617.

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It's all right here.

The HAL ST-6 terminal unit has been hailed by experienced RTTY amateurs. Its immunity to interference and noise is the talk of the RTTY world as the best in the business. In fact, we built it to highest standards — but kept the price in a range that you can afford.

The features of this unit tell the story of why it's so popular: Auto-start operation, separate input filters for each shift, an antispace feature, and switch selection of 850 and 170 Hz shifts are standard. An extra discriminator for a 425 Hz shift is available as an option. A space-saving special power transformer is part of the package; it includes windings for low voltage and loop supplies, and a 115/230 VAC primary. Dual-in-line IC's are mounted in sockets for ease of testing and replacement. Seven G10 epoxy glass boards with reliable wiping contacts hold all circuitry. Tuning is read from a 1 ma. panel meter which, at the flick of a switch, serves as a loop current readout. Other visual indicators display AC power on, Mark, and Space conditions. Two other lamps indicate whether the ST-6 is in the receive or standby mode. For maximum safety, a three-wire grounding cord and grounding outlet for the printer are included. The power supply card contains easy-to-replace clip-in fuses. The ST-6 is available factory assembled and aligned, or in kit form. The PC boards and cabinet only are also available.

A popular option designed to plug right in to the ST-6 is HAL's AK-1 AFSK oscillator. Available assembled or in kit form, the AK-1 is an AFSK oscillator that demonstrates stability and reliability. It provides switch selection of 170 Hz and 850 Hz shift using standard AFSK tones. The AK-1 may also be mounted in its own cabinet for use as an independent unit. Frequencies are set by 15-turn trimmers for ease of accurate tone adjustment. The AK-1 operates on 12 VDC, or directly from the ST-6 power supply.

If you're ready for the very best RTTY at an attractive price, look into the HAL ST-6 TU, the 425 Hz discriminator, and the AK-1 AFSK oscillator. They'll give you all the help you need. Order yours today!

Prices:

Assembled:
$310 — ST-6 Terminal Unit
$350 — ST-6/425 Hz Disc.
$350 — ST-6/AK-1
$390 — ST-6/425 Hz Disc/AK-1

Kit Form:
$147.50 — ST-6 Terminal Unit
$ 35.00 — ST-6 Table or Rack Cabinet
$ 29.00 — 425 Hz Discriminator
$ 29.00 — AK-1 AFSK Unit

All prices postpaid, USA. For air shipment add $4 for the ST-6 kit or cabinet, $1 each for the 425 Hz kit or the AK-1 kit, $10 for the assembled ST-6 with any options.

HAL Communications Corp.
Box 365, Urbana, Ill. 61801
Telephone: (217) 359-7373

☐ Enclosed is $_____ for the following items: ☐ ST-6 Assembled, ☐ With all options; ☐ ST-6/425 Hz Disc; ☐ ST-6/AK-1; ☐ ST-6 kit; ☐ ST-6 Cabinet; ☐ 425 Hz Disc kit; ☐ AK-1 kit.
☐ Charge to my Master Charge #_____
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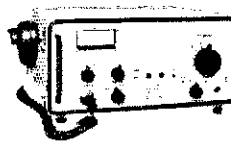
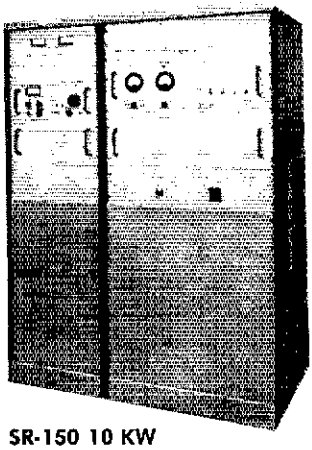


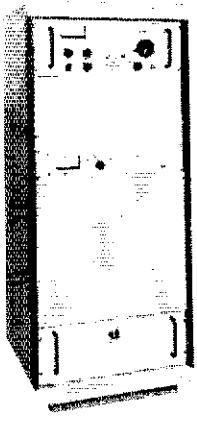
AN/URC-77 150 W
SSB TRANSCEIVER

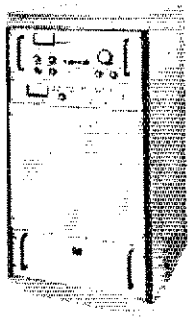
SR-1650
TELEPHONE LINE
REMOTE CONTROL



SR-150 10 KW
SSB/ISB TRANSMITTER

AN/FRT-91 1 KW
ISB TRANSMITTER





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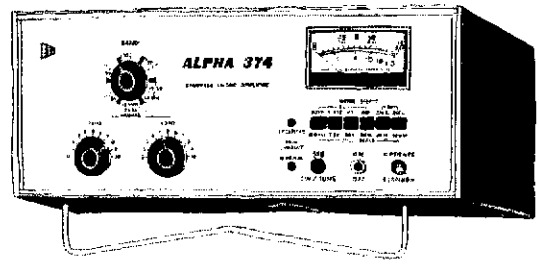
YAESU

The radio.

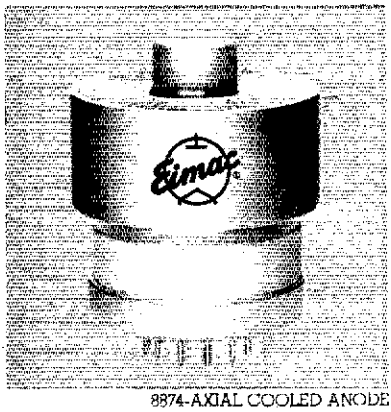
The "no tune-up" Alpha 374 is powered by EIMAC 8874's.



EIMAC 8874s were the first choice of Ehrhorn Technological Operations, Inc. for their desk-top Alpha 374 bandpass linear amplifier. It's designed to make it easier than ever before to run maximum legal power on all popular modes—it's capable of continuous operation at a kilowatt average power input for CW, RTTY and SSTV—with plenty of reserve for two kilowatts PEP on SSB.

Besides power, the Alpha 374 permits total "no tune-up" operation with modern broadband transceivers. With conventional exciters, it eliminates time, confusion and damage risk previously associated with amplifier tune-up. "Manual" or "Bandpass"—the choice is yours with the 374.

An amplifier like this obviously requires exceptional output tubes. And EIMAC 8874 high-mu, ceramic-metal triodes fill the bill. Three 8874s with axial air-flow cooling fit neatly in a corner of the amplifier—keeping the 374 size down to about one cubic foot and weight below 55 pounds. Yet, the EIMAC 8874s provide 1200 watts plate dissipation, allowing the 374 to coast along at maximum legal power.



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For information about the 8874 or other power grid tubes providing the performance, reliability and design flexibility you need, contact EIMAC division of Varian, 301 Industrial Way, San Carlos, CA 94070. Telephone (415) 592-1221.

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