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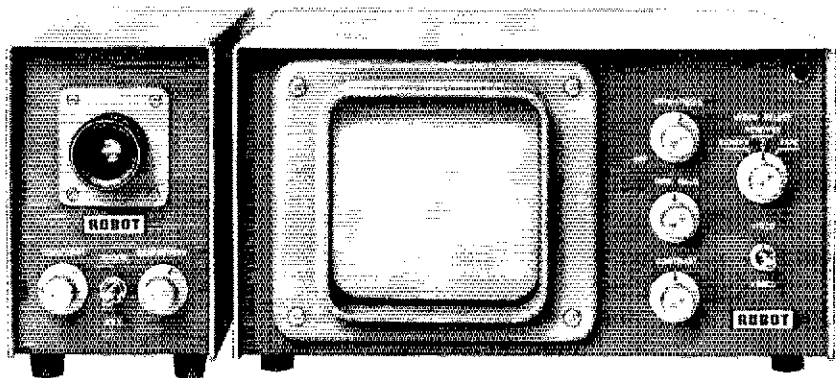
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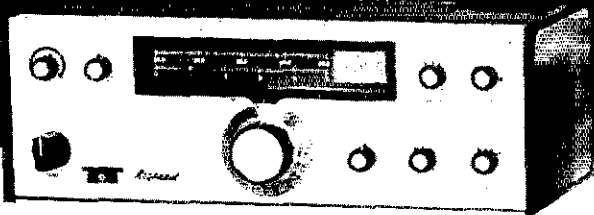
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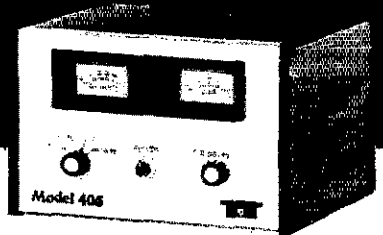
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OUR COVER
 K1ZND is shown at the operating position of this station. Dave is the high cw scorer in the 1972 DX Competition, the results beginning on page 62.

QST

OCTOBER 1972

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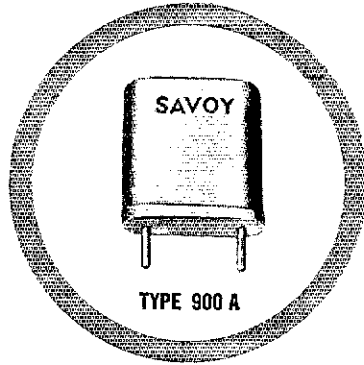
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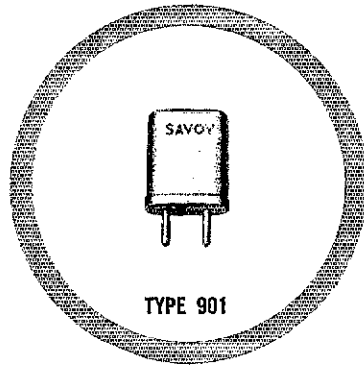
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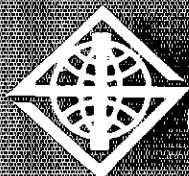
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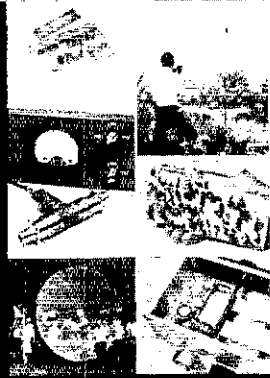
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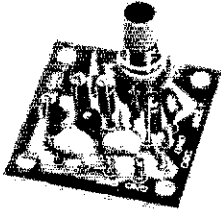
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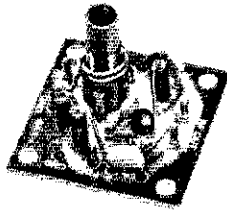
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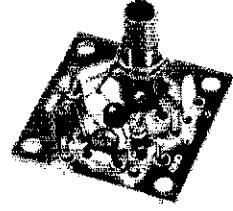
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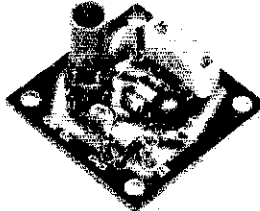
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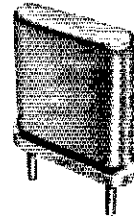
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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors.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

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Vice-Director: George A. Diehl W2IEA
20 Wilson Ave., Chatham, NJ 07928
Midwest Division
RALPH V. ANDERSON K9NL
528 Montana Ave., Holton, KS 66436
Vice-Director: Paul Grauer WA0LLC
Box 190, Wilson, KS 67490
New England Division
ROBERT YORK CHAPMAN W1QV
28 South Road, Groton, CT 06340
Vice-Director: Roger E. Corey W1AX
60 Warwick Drive, Westwood, MA 02090
Northwestern Division
ROBERT B. THURSTON* W7PGY
7700 81st Ave., N.E., Seattle, WA 98115
Vice-Director: David O. Bennett W7QLE
Box 455, St. Helens, OR 97051
Pacific Division
J.A. "DOC" GMLIN W6ZRJ
10835 Willowbrook Way, Cupertino, CA 95014
Vice-Director: Albert F. Gaetano W8VZT
115 Old Adobe Road, Los Gatos, CA 95030
Roanoke Division
VICTOR C. CLARK* W4KFC
12927 Popes Head Road, Clifton, VA 22024
Vice-Director: L. Phil Wicker W4ACY
4821 Hill Top Road, Greensboro, NC 27407
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CHARLES M. COTTERELL W9SIN
430 S. Swadley St., Lakewood, CO 80228
Vice-Director: Allen C. Auten W9ECN
6723 West 67th Ave., Avada, CO 80002
Southeastern Division
H. DALE STRIETER W4DQS
928 Trinidad, Cocoa Beach, FL 32831
Vice-Director: Larry E. Price W4DQD
P.O. Box 2087, Georgia Southern Branch
Statesboro, GA 30458
Southwestern Division
JOHN R. GRIGGS* W6KW
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CA 93401
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3022 Las Positas Rd., Santa Barbara, CA 93105
West Gulf Division
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107 Rosemary, San Antonio, TX 78209
Vice-Director: Jack D. Gant W5GM
521 Monroe, N.W., Ardmore, OK 73401

* Member Executive Committee

"It Seems to Us..."


WE'RE GOING COMPUTER

AUTOMATIC DATA PROCESSING of circulation records of a magazine with 100,000 distribution is the normal thing these days, so a switch to computerization at League Hq. is hardly to be accompanied by a blare of trumpets.

Actually, the question might be asked (and has been!) why it took so long. The answer is fairly simple: our records are not just name, address and subscription expiration data, which is about all most magazines require. They are those of a membership association, including class of membership, section, division, how long continuously a member (including info on any lapses) and the like. They are, in fact, sufficiently personalized that two of our members, professionally employees of the big computer company, once privately pleaded with us not to make the switch to the cold and impersonal electronic systems. "It's not for a membership association," they argued.

For a time they were right; we did have roadblocks. Questions in discussions over several years with standard computer service people produced glib answers of "Sure, we can do all that easily." But the faraway look in their eyes, and the inept solutions which appeared when the oratory was reduced to paper, made it painfully obvious that anything past the name-and-address setup of regular magazines was beyond their actual experience (and we weren't about to finance their experimentation in a new field!). More recently, several outfits have been formed specializing in membership records of fraternities and similar associations, and one of these has provided the breakthrough we needed.

Which doesn't for a moment mean that all the problems have been solved. There are *certainly going to be headaches* in the conversion process, and a lot of foulups. Some will be our fault and some will be the e.d.p. people's fault, and some may be purely gremlins. Whatever the cause, we seek your indulgence and understanding over the next couple of months (conversion of 100,000 names is not a weekend task) as the transition takes place.



By all means let us know promptly of any errors which show up, or any missing *QSTs*. But please allow us a little leeway in making amends. In the past, when we made mistakes, we made them one at a time. When we now program a high-speed computer incorrectly, it will make mistakes by the thousands in mere seconds. So if along about November you get a copy of *How to Become a Radio Amateur* instead of your monthly *QST* . . . or if your name is John Smith and it comes out on the label as Joseph Bfftsplk . . . or if you're a Life Member and yet you get a request for another \$7.50 yearly dues . . . don't panic; just tell us. If our records crew haven't all quit in frustration by then, we'll fix it up.

It's going to be a long, problem-lush autumn; please bear with us. The eventual rewards in speed, efficiency and flexibility are said to be more than worth the trouble.

THAT REPEATER MANUAL

IF IT SEEMS a long time ago that the Board directed the production of an ARRL book on fm and repeaters, it was! Then why hasn't it appeared?

Well, it was also agreed that its issuance should await finalization of the rules for that activity, proposed by FCC in April, 1970 (yes, 1970). The grapevine currently has it that the decisions in this matter have now been made and we can expect an announcement of new rules shortly after Commissioners return from the annual August vacation. That being so, we expect to have the manual in actual production by the time you read this, and copies available some time in November. (If the grapevine is wrong, as it has been before, you'll have to wait a bit longer.)

Our crew, particularly the technical department, has been hard at work this summer preparing and processing the material. We think you'll find the new manual a worthy addition to your library.

League Lines . . .

Even though the FCC decision on repeaters was released two weeks after QST's normal deadline for such things, our IBM in-house composing system enabled us to get the text in this issue, with only a modest amount of extra elbow grease and midnight oil (and, we hope, a minimum of errors).

There's a "heap o' reading" in that 25-page document (see story starting on page 100). By no means is it entirely repeater-oriented. Every active amateur needs to read it, and carefully. Staffer WIUED's introduction was written to give both repeater and non-repeater types a first-look summary of the contents.

Assuming the language means precisely what it says, for the first time in amateur history a visiting non-licensed person will be able to work cw on your station, provided of course you maintain control; previously this privilege was limited to voice or RTTY.

A welcome addition is that notification to the district inspector, which was previously required for portable or mobile absences of 48 hours or more, now is needed only when you "go portable" for 15 days or longer; mobiles don't ordinarily have to notify!

Logging requirements are greatly simplified. A tape record is made legal; you don't have to put it in writing (except for one-time basics) unless called upon. And mobiles are almost completely freed of logging burdens; after the normally-unchanging entries of power, subband, etc., only general location and starting and ending times of mobile operation need be recorded - i.e., calls of those contacted are no longer required!

The above are first-blush appraisals; more comment will follow in future QSTs.

Ballots for the election of ARRL directors and vice directors will be in the mail the second week of October. As we write this, the closing date for nominations is not yet at hand, and so we don't know how many contests there are this autumn, but nominations were called for in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf Divisions.

FCC warns us amateurs (see "Happenings") to be careful about conducting business on ham phone patches. It is very easy on autopatch to forget you're also on the air!

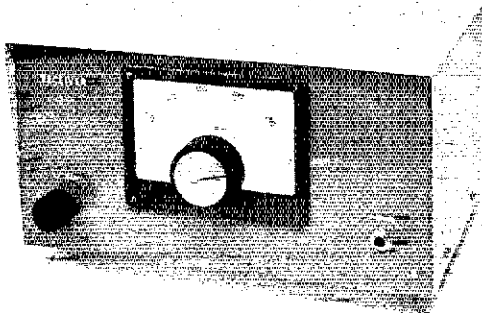
Getting young people into amateur radio is an aim shared by many of us. One of the best ways is through the Scouting movement: See Ham Radio -- Scout Style in this issue.

Obviously confident that FCC's decision on the CB 220-MHz proposal will be favorable, "Electronics Illustrated" ran a "first" for the new breed -- a grid-dipper to "help the CBER tune his rig . . ." Guess we can't be too hard on the CB licensees for not knowing the rules, when even their magazine editors don't! (Part 95 prohibits a CBER from making any tests or adjustments to his transmitter). K2OAW spotted this one for us.

W2EIF, a recent addition to the Contest Advisory Committee, plugs for more 220 MHz activity with a note that on that band his contest crew (Mt. Airy VHF Club) made 55 contacts in 17 sections. Cw was used for 30 of 'em, including all the long-haul contacts.

"The amateur is balanced," says a tenet of our traditional code. One of our members obviously failed to read it, as he made the following inquiry of Hq.: "I am going on a honeymoon to Florida and would appreciate advice on what 2-meter fm frequencies would be most practical to operate . . ."

Exterior view of the three-band beginner's receiver. The dimensions are 11 × 5-1/2 × 7 inches. The vernier dial is calibrated for 10 kHz per division. The front panel is finished in dark blue. White press-on decals are used to identify the gain control and phone jack.



A High-Performance Solid-State Receiver for the Novice or Beginner

BY JOHN KAUFMANN*, WA1CQW
AND DOUG DEMAW**, W1CER

FOR THE BEGINNER or Novice, or even the more experienced amateur, interested in having a fairly simple but good-quality solid-state receiver, this unit should more than adequately fill the bill. Sensitivity, selectivity, and stability are quite good considering the simplicity of the circuit. Plug in a 12-volt dc power supply, headphones, and an antenna, and the receiver is ready to go!

The design is based on the "D.C. 80-40 Receiver" described by DeMaw in *QST* for May, 1969. Changes and improvements include the addition of a stage of rf amplification and the use of a single integrated-circuit audio stage. The emphasis is on high performance at minimum cost.

Plug-in converters for 80, 40, and 15 meters are used to provide three-band coverage for the Novice. The lower 300 kHz of each band are covered so that all of the cw segments are included. Two circuit boards, one for the converter and the other for the product detector, beat frequency oscillator (BFO), and audio stages, comprise the receiver. The detector and the BFO tune 2.2 to 2.5 MHz — the intermediate frequency (i-f) of the converters. An audio filter, employing an 88-mH telephone toroid, provides good cw selectivity. Ssb signals may also be tuned in and a-m reception is possible by zero-beating the desired a-m signal. The receiver may be run for relatively long periods of time from a battery supply, because of its low dc current drain.

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South Glastonbury, CT 06073.

**Technical Editor, *QST*

The use of only two controls (frequency tuning and audio gain) keep the operation of the receiver simple. More than enough audio is available to drive a pair of high-impedance headphones, which are connected to a jack on the front panel.

Building the receiver entirely from new parts should cost approximately \$30, excluding the circuit-board material and the chassis. Of course, one's junkbox may furnish many of the needed components, thereby reducing cost. This unit outperforms many receivers costing much more.

Circuit Information

The design is fairly uncomplicated. A block diagram in Fig. 5 shows the basic stages of the receiver. An rf amplifier tuned to the appropriate amateur bands amplifies incoming signals. The mixer "shifts", or heterodynes, these signals down to the intermediate-frequency range (2.2 to 2.5 MHz), which is the difference between the oscillator frequency and the signal frequency. In the product detector, the BFO signal beats with the i-f signal to produce low-level audio output. Audio amplification is then necessary to raise the audio output to a level sufficient for headphone operation.

The converters for the three bands are basically alike. The rf amplifier, mixer, and oscillator stages each employ a JFET (junction field-effect transistor). The rf amplifier operates in a grounded-gate configuration, except in the 15-meter converter where a grounded-source hookup is employed to provide greater gain. Although a crystal-controlled

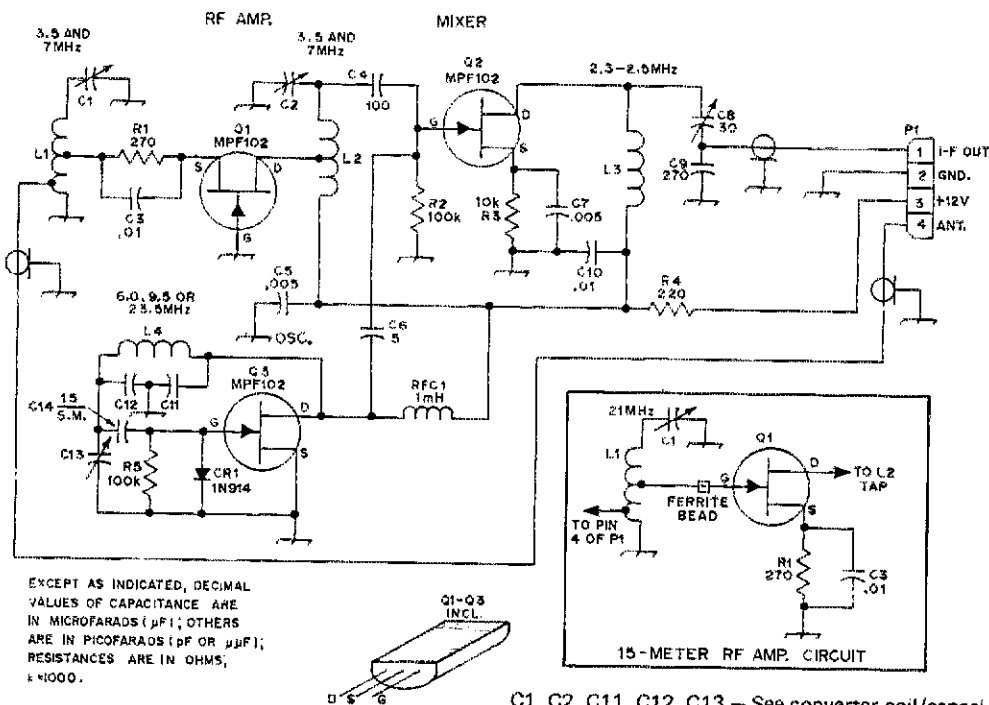


Fig. 1 — Schematic diagram of the plug-in converter front end. Rf amplifier Q1 is wired differently for operation on 21 MHz (see inset), otherwise the circuit is the same for all three bands. Resistors are 1/2-watt composition. Fixed-value capacitors are disk ceramic unless otherwise noted. Numbered components not listed below are identified for circuit-board layout purposes.

oscillator could have been used, a fixed-tuned self-excited oscillator was chosen to minimize cost. It is stable and easy to adjust.

Some Problems

Once the converters were built, it was found that undesired parasitic oscillations were present, as evidenced by loud buzzing, squealing, and general white noise in the receiver. In the 15-meter converter, taps on L1 and L2 (Fig. 1) were chosen to eliminate self-oscillation in the rf amplifier stage. The positioning of the taps resulted in less than maximum gain, but the loss was not signifi-

cant. Also a ferrite bead was slipped over the gate lead of Q1 to suppress vhf oscillations. In the 80-meter converter, oscillations in the mixer stage were effectively damped out by placing a 1500-ohm resistor in parallel with L3. The resistor was soldered into the circuit on the foil side of the circuit board.

The Second Section of the Receiver

The rest of the receiver, laid out on the second circuit board, consists of the integrated-circuit product detector, a JFET BFO, and an integrated-circuit audio amplifier. The detector tunes from 2.2 to 2.5 MHz by means of L2, C1, C2, and C3A. Use of the integrated circuit helps reduce size, cost, and complexity of this stage. The BFO tunes the same frequency range as the detector. The beat-frequency oscillator signal, injected through a 5-pF capacitor, mixes with incoming i-f signals to provide a beat note for cw reception or furnishes a

Bottom view of the completed receiver. The four-pin converter socket is shown at the right center of the main chassis. The i-f and audio-amplifier circuit is assembled on the pc board at the far left.

carrier for ssb reception. The two stages are gang-tuned by means of C3, a dual-section 100-pF variable capacitor. The Zener diodes, VR1 and VR2, help provide greater electrical stability by regulating the supply voltages for both stages.

The audio stage employs an operational amplifier — an integrated circuit capable of high gain. Its level of output furnishes plenty of audio for high-impedance headphone operation.

Between the detector and audio stages is an *m*-derived audio low-pass filter. It is used to reject unwanted high-frequency responses to aid cw reception. It uses a single telephone-type surplus 88-mH toriod, which can be purchased from a number of surplus houses (see *QST* Ham-Ads).

Diode CR4, at the 12-volt dc input, prevents accidental damage to the circuit should the operator connect the wrong-polarity voltage to the

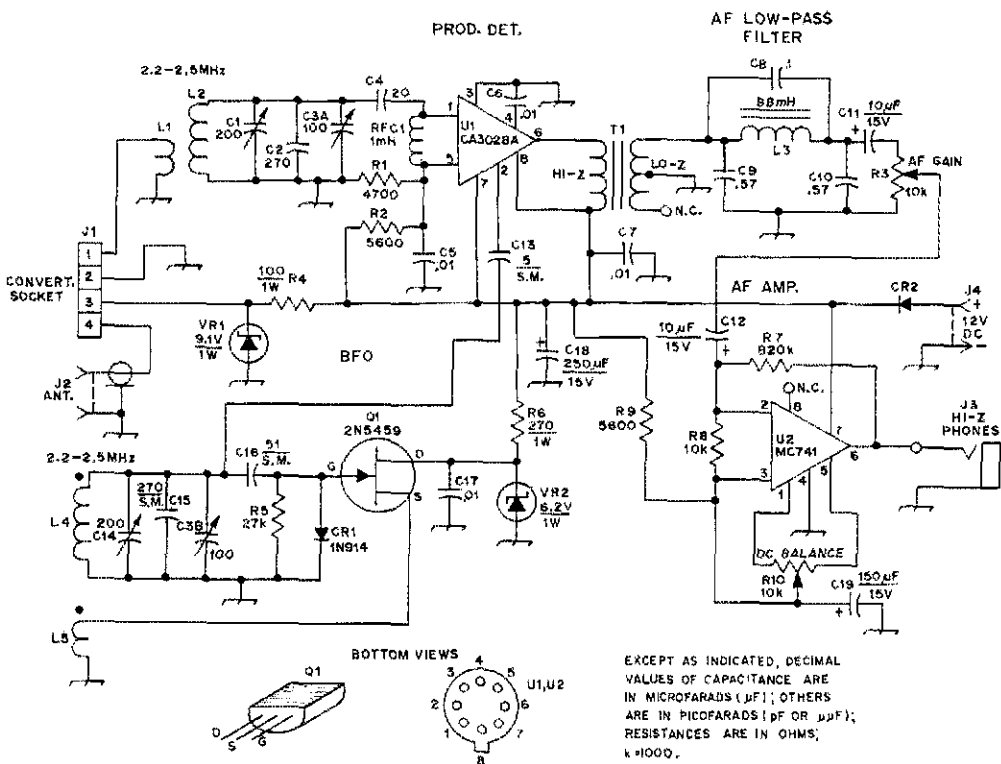


Fig. 2 — Schematic diagram of the tunable i-f portion of the receiver. Capacitors with polarity marked are electrolytic. Fixed-value capacitors are disk ceramic unless otherwise noted. Numbered parts not appearing below are so identified for pc-board layout purposes only.

- C1, C14 — 24 to 200-pF mica compression trimmer (Elmenco Type 42 or equiv.).
- C3 — Air variable, 100 pF per section, split stator (James Millen 26100 RM or equiv.). (James Millen Mfg. Co., 150 Exchange St., Malden, MA. Direct orders accepted.)
- CR2 — Silicon rectifier, 50 PRV at 1 A (IOR 1N4001, Motorola HEP161, or equiv.).
- J1 — 4-pin female chassis-mount socket to mate with P1 of Fig. 1 (Amphenol 77MIP4 or equiv.).
- J2 — Chassis-mount coax receptacle, type SO-239.
- J3 — 2-conductor phone jack (Switchcraft Little-Jax or equiv.).
- J4 — RCA phono connector, single-hole mounting.
- L1 — 5 turns No. 24 enameled wire wound over ground end of L2.
- L2, L4 — 45 turns No. 24 enamel wire on Amidon Assoc. T-80-2 toroid core.

- L3 — 88-mH telephone-type toroidal inductor (see *QST* Ham Ads for suppliers).
 - L5 — 14 turns No. 24 enameled wire over ground end of L4. Observe polarity of L4 and L5 as discussed in the text.
 - Q1 — Motorola junction FET, 2N5459/MPF105.
 - R3 — 10,000-ohm, audio-taper, carbon control.
 - R10 — 10,000-ohm, linear-taper, pc-board-mount control (Mallory MTC14L1 or equiv.).
 - RFC1 — 1-mH rf choke (James Millen J300-1000 or equiv.).
 - T1 — Miniature audio transformer, 10,000-ohm pri. to 1000-ohm secondary (Lafayette Radio 00T6124 or equiv., use 1/2 of secondary winding).
 - U1 — RCA CA3028A integrated circuit.
 - U2 — Motorola MC741 integrated circuit.
 - VR1 — 9.1-volt Zener diode, 1 watt (IOR 1N1770, Motorola HEP104, or equiv.).
 - VR2 — 6.2-volt Zener diode, 1 watt (IOR 1N3828, Motorola HEP103, or equiv.).
- Note: Most of the components used in this receiver are available from Allied Electronics (see *QST* for July 1972, "The Ailing Emporium," for addresses of parts suppliers).

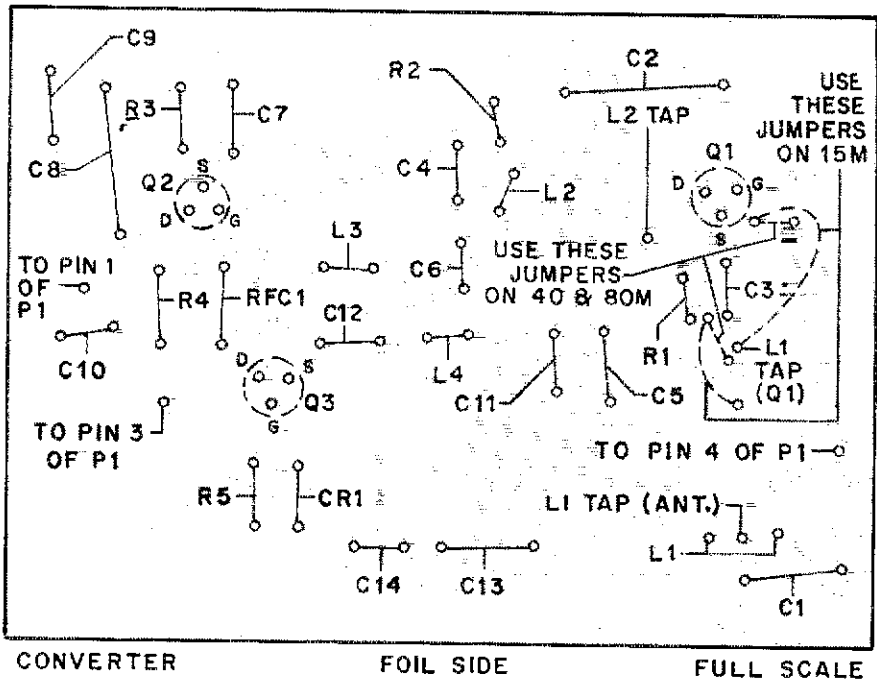


Fig. 3 — Scale template and parts placement for the converter pc board.

power supply terminal. The diode will conduct, and thus allow the receiver to operate only when a positive voltage is connected to the proper terminal.

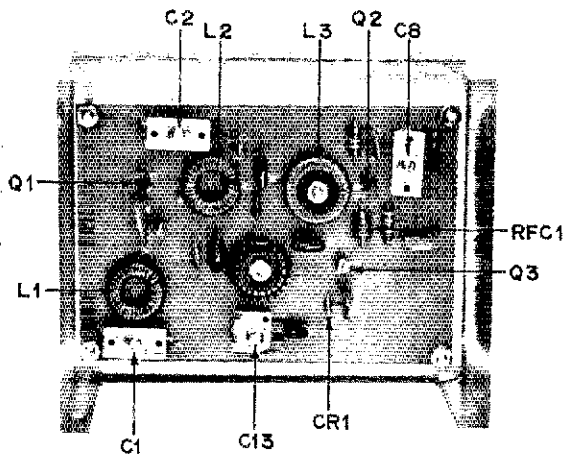
Construction Notes

The converters are housed in 5 × 4 × 3-inch Miniboxes, such as a Bud CU-2105A. Each circuit board, 3 1/4 × 4 1/2 inches in size, is mounted on 3/8-inch metal spacers. A four-prong plug is installed on the bottom of each Minibox so that the converters can be plugged into the main chassis of the receiver when changing bands. Q1, Q2, and Q3

are soldered directly to the board with leads as short as possible to minimize unwanted stray inductance. Plug-in sockets for the FETs are not recommended at these frequencies since the inductance in the leads can cause feedback and thus, unwanted oscillations. The circuit boards are prepared such that either the grounded-gate or the grounded-source rf amplifier can be used in the appropriate converters. It is only necessary to change two jumper wires to employ either configuration. Toroidal-wound coils are employed for all tuned circuits as their self-shielding property greatly reduces unwanted coupling between the circuits. L1 and L2 are held in place on the circuit board by their respective leads. L3 is secured by an insulating washer and a screw which is passed through the toroid core from underneath the board. L4 is fastened in a like manner to enhance the mechanical stability of the oscillator.

The detector, BFO, and audio circuitry are on a 3 × 6-inch circuit board which is mounted directly on top of the chassis. The chassis base, a Bud AC-407, measures 7 × 11 × 2 inches. The 5-1/2 × 11-inch front panel and the chassis cover were homemade, although the cover is not strictly desirable or necessary if one frequently plugs in and unplugs the converters to change bands. The eight-pin integrated circuits are soldered directly to the boards, although sockets can be used if desired.

Top view of one of the converters. The completed pc board is mounted inside a Minibox. The assembly, with cover installed, plugs into the main chassis of the receiver. Significant parts are identified in this photo.



Converter Coil and Capacitor Table

Band	30 Meters	40 Meters	15 Meters
C11	470 pF, s.m.	220 pF, s.m.	100 pF, s.m.
C12	330 pF, s.m.	150 pF, s.m.	100 pF, s.m.
C1,C2	470 to 100-pF trimmer (Elmenco 423)	7 to 100-pF trimmer (Elmenco 423)	2 to 25-pF trimmer (Elmenco 421)
C13	1.8 to 16.7-pF min. air variable (Johnson) 189-0506-005).	1.5 to 11.6-pF min. air variable (Johnson) 189-0504-005).	Same type as for 40 meters.
L1	55 μ H. 100 turns No. 28 enam. on Amidon T-80-2 toroid core. Ant. tap at 10 turns above gnd. Tap Q1 source at 50 turns above gnd.	10 μ H. 42 turns No. 30 enam. on Amidon T-68-2 toroid core. Ant. tap at 4 turns above gnd. Q1 source tap at 21 turns above gnd.	5.5 μ H. 30 turns No. 26 enam. on Amidon T-68-2 toroid core. Ant. tap at 3-1/2 turns above gnd. Q1 source tap at 12 turns above gnd.
L2	Same number of turns and core material as L1. Tap at 50 turns.	Same number of turns and material core as L1. Tap at 21 turns	Same number of turns and core material as L1. Tap at 12 turns.
L4	3.4 μ H. Use 23 turns No. 20 enam. on Amidon T-68-2 toroid core.	2.9 μ H. Use 21 turns No. 20 enam. on Amidon T-68-2 toroid core.	0.9 μ H. Use 10 turns No. 18 enam. on Amidon T-68-2 toroid core.

S.m. = silver mica. All toroid windings are spaced to occupy the entire core circumference, and as uniformly as possible.

Next adjust the balance control, R10, in the audio stage so the dc voltage appearing across the headphone jack is 6 volts (one half the dc supply voltage). Headphones can now be plugged into the receiver. With the audio gain turned up, some hiss should be clearly audible. If not, the audio stage is not working properly.

With converters unplugged, feed a 2.2- to 2.5-MHz signal into the detector through L1, either by direct connection to a signal generator output or by light coupling to a grid-dip oscillator. Adjust the main-tuning dial until the signal from the rf source is located. Peak trimmer capacitor C1 for maximum received signal strength. This ensures that the detector and BFO tuned circuits will track as they are tuned through their frequency range.

One of the converters may be plugged in now. Despite the different frequencies involved, adjust-

ment of each converter is the same. To determine that the converter oscillator is working properly, listen on the general-coverage receiver for oscillator its signal at approximately the frequency on which it should be oscillating. Again the signal should be strong enough to be plainly audible on the general-coverage receiver. Adjust trimmer capacitor C13 until the oscillator frequency is "on the nose."

Next, it is necessary to peak the converter by listening to a signal in the amateur band covered by the converter. Connect a signal source to the antenna input. The main-tuning capacitor should be set to approximately the center of its range, or to the segment of the band to be used most frequently. The 2.2-MHz if corresponds to the high-frequency end of each segment and 2.5-MHz to the low-frequency end. Tune the signal source to this frequency and adjust trimmer capacitors C1, C2, and C8 in the converter for maximum received signal strength. A definite peak should be noted when tuning each capacitor - otherwise the associated tuned circuits are not adjusted to resonance properly. If desired, an antenna may instead be connected directly to the converter and the converter can be peaked while listening to on-the-air signals in the amateur band. Some "pulling" of the converter oscillator frequency may be noted when peaking the rf and mixer capacitors because of a small amount of interaction between the three tuned circuits. C13 in the converter should then be retuned to bring the oscillator back on frequency. This completes alignment of the receiver.

(Continued on page 23)

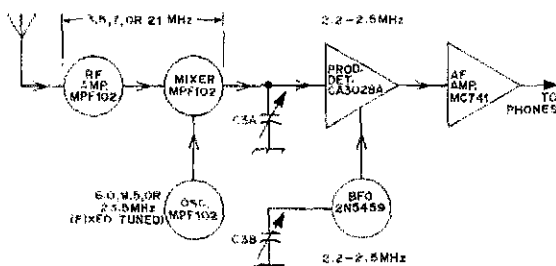


Fig. 5 - Block diagram of the receiver. The arrows indicate the direction of signal travel.

Wide-Band Fm with Crystal Control

Oscillator and Audio Circuits for 50 and 220 MHz

BY CALVIN F. HADLOCK,* W1CTW

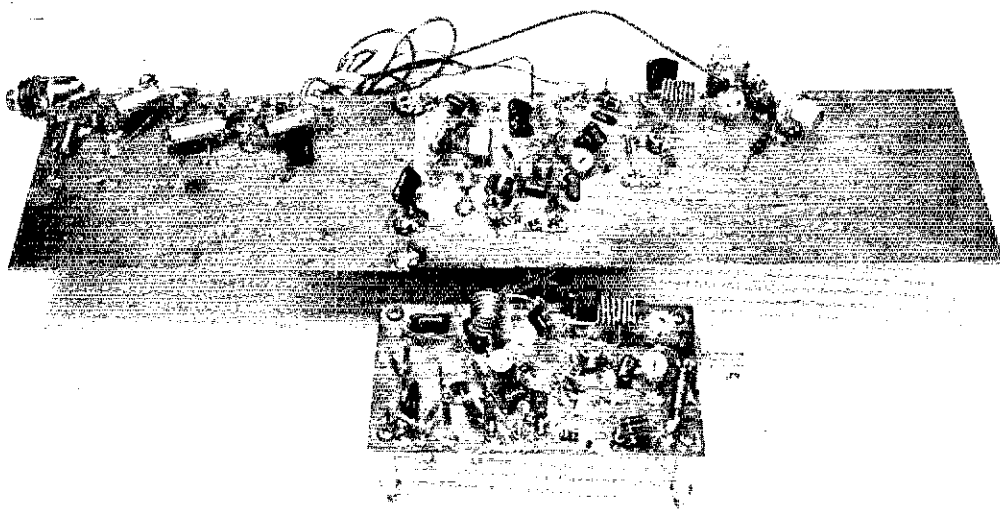
SOME TIME AGO the writer read a statement in a contemporary ham magazine to the effect that use of fm by amateurs owes its very existence to the availability of obsolete commercial equipment. If this statement is true, it is a sad commentary on amateur radio of the seventies. Have we reached the point where any aspect of ham radio is wholly dependent on discarded commercial gear?

* Over more than 40 years in amateur radio, the author of this article always looked for new, better, and simpler ways to do things that hams, especially those on the higher frequencies, want to do. He was convinced, earlier than most of us, that fm had much to offer the vhf enthusiast, and he devoted years to its promotion. This material had been in preparation for some time, having been presented first in a talk at the 1970 ARRL National Convention in Boston. Eventually it would have been a series on fm gear for the higher frequencies.

Corrected page proofs had come back to the editor only a few days before a heart attack ended the unique record of Calvin F. Hadlock, W1CTW, in the advancement of the art through *QST*. For more on the author and his work, see "The World Above 50 Mc," May, 1972, *QST*.

True, much of the equipment in ham stations today is of commercial manufacture, but amateurs pioneered in its development, and in many fields were the first to employ techniques that are in widespread commercial use today. This is certainly true of fm. Its basic principles have been known and understood, if not widely used, by hams for many decades. Much practical material on fm appeared in *QST* as far back as the late 1930s, and a considerable part of this early information is still relevant. It is mainly in the adaptation of long-known principles to modern technology that outstanding progress has been made in the fm field in recent years. If we have not put fm techniques to use in equipment of our own design, adapted specifically to amateur needs, we have only ourselves to blame.

One mode of fm operation has been neglected: true wideband fm, which is allowed on any amateur frequency above 52.5 MHz. The mere fact that surplus gear currently available is mostly unsuited to true wide-band use should not cause amateur radio to standardize totally around narrow deviation, useful and effective though the commercial gear and methods may be. The rush to fixed-frequency transmitters and receivers incapable of continuous tuning, and stations almost wholly dependent on repeaters, smacks of commercialism and regimentation to a degree that leaves a good many experienced amateurs "turned off," even though they may be enthusiastic advocates of fm in principle.



Two versions of the 52.5-MHz fm exciter. The large board at the rear includes an active low-pass filter as the left. The final version, shown in the foreground, has the same rf circuit as the one in the rear. The passive low-pass filter described in the text, is mounted on the underside of the board. The method of assembly uses small glass standoffs, rather than etching of the board material.

Basic Principles

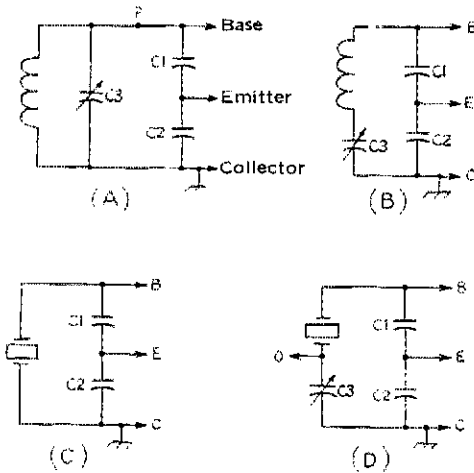


Fig. 1 — Derivation of the VXO, from the Colpitts oscillator, A, the Clapp circuit, B, and the crystal-controlled equivalents of each, C and D.

It is not the writer's purpose to deride current fm methods or equipment used. The utility of modern transistorized fm gear, especially for portable and mobile use, and the worth and great potential of repeaters for extending the range of such stations, is acknowledged. The objective is to point out that there are other uses of fm that should not be neglected, and to show simple ways to get started in wide-band fm work.

The equipment is described to give the fellow who likes to build his own gear an understanding of simple fm circuitry, and an example of a low-power transmitter or exciter, the latter capable of at least 15 kHz deviation at 52.5 MHz. It is also usable for true wide-band fm on the 220-MHz band, with a deviation of 75 kHz. This kind of equipment is intended for use with tunable receivers, as opposed to the crystal-controlled channel equipment.

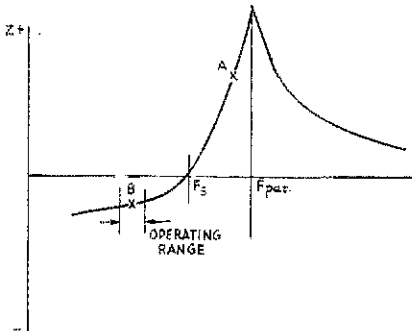


Fig. 2 — Impedance curve of a crystal oscillator. For greatest flexibility, the VXO or frequency-modulated oscillator is operated at point B, on the nearly-linear portion of the curve, below series resonance.

Development of the basic circuit is shown in Fig. 1, beginning with a typical Colpitts oscillator at A. The active device (tube or transistor) is connected across the entire tuned circuit. The fixed capacitors, C1 and C2, are made large enough so that the effects of changes in device capacitance are largely swamped out. Limitation on oscillator stability exists with this circuit, due to (1) very close coupling of the active device to the tuned circuit, and (2) excessively strong oscillation.

Improved stability results from coupling the device more loosely to the tuned circuit. This can be done in circuit A by means of a small capacitor connected at point P. Circuit B is essentially the same, except that by placing the small capacitor (C3) on the opposite side of the coil the capacitor rotor can be grounded. This will be recognized as the familiar Clapp oscillator circuit.

The circuits of C and D are counterparts of A and B, but with crystals in place of the tuned circuits. Output is usually taken from the emitter. This is desirable if harmonic output is wanted. If pure fundamental output is desired, the output can be taken from point O, if the load is a high impedance, such as an emitter follower. The crystal acts as a high-Q filter, preventing harmonic distortion produced by the transistor from getting to the output at O. This circuit uses the parallel-resonance mode of the crystal, and is hence a very stable oscillator, but it is unsuitable for wide-band fm use.

The series-resonant mode of the crystal must be used to produce a crystal-controlled oscillator that is capable of being frequency-modulated over a reasonable wide deviation range. Looking at Fig. 2, we see that the circuit of Fig. 1D will operate near parallel resonance at point A, where the impedance curve is very steep. Small changes in frequency produce large impedance changes, precluding much frequency change from point A.

At point B the impedance curve is relatively flat. Wide changes in frequency can be allowed without excessive change in operating conditions. Hence the "rubberized" crystal oscillator (VXO) is, in effect, operated as a self-controlled oscillator, at a frequency below series resonance (point F_s) with the crystal acting as a gate, to prevent the oscillator frequency from wandering too far from F_s .¹

Development of this circuit for fm is shown in Fig. 3. The Clapp oscillator, A, can be converted to a VXO by inserting the crystal at any of the three points marked X, in series with the tuned circuit. The circuit can then oscillate only at a point of low crystal impedance; that is, near series resonance. The tuned-circuit frequency is made lower than F_s , so that oscillation occurs near point B of Fig. 2.

In Fig. 3B the variable capacitor (C3 in previous circuits) has been replaced by a varicap diode, CR1, opening the way to frequency modulation by varying the effective capacitance of the diode through variation of its operating bias at an audio rate.

¹Shall, "VXO — A Variable Crystal Oscillator," QST, January, 1958.

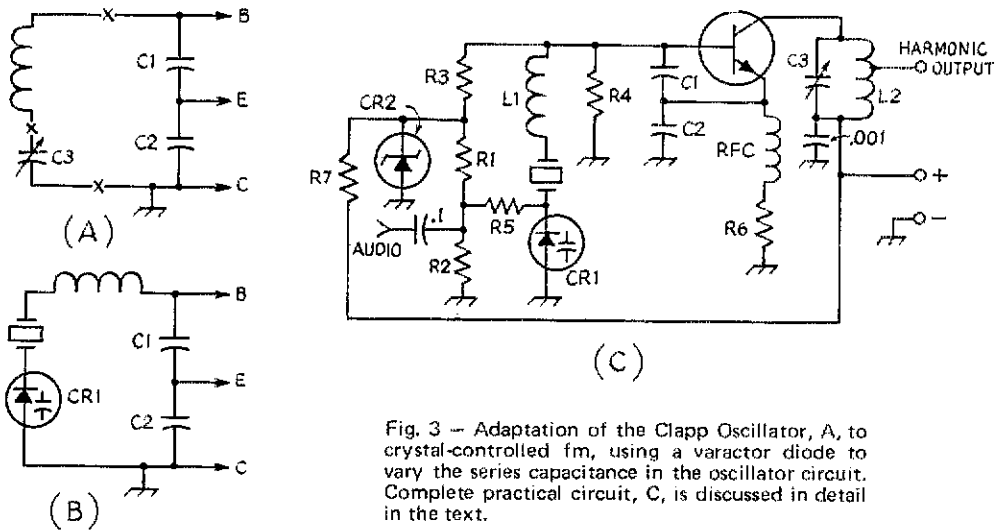


Fig. 3 - Adaptation of the Clapp Oscillator, A, to crystal-controlled fm, using a varactor diode to vary the series capacitance in the oscillator circuit. Complete practical circuit, C, is discussed in detail in the text.

Practical Circuit

Components needed for a practical frequency-modulated crystal oscillator are given in Fig. 3C. Resistor R7 and the Zener diode, CR2, provide regulated voltage for the transistor base and the varactor diode, CR1. It is not necessary to regulate the transistor collector voltage, as the collector behaves somewhat like the plate of a pentode oscillator² and is not critical. R1 and R2 supply the optimum bias to the varactor, and R3 and R4 supply the regulated bias to the transistor base. R5 isolates the audio input from the rf circuitry of the oscillator. R6 is the emitter bias resistor, in series with the rf choke, which prevents R6 from loading down C2.

The collector tuned circuit, L2-C3, can be tuned to harmonics only, and it should have high Q . The oscillator will not function with the collector tuned to the fundamental frequency of the crystal. The Q of L1 must not be too high, or there will be excessive feedback, and a tendency of

²Tilton, "Stable but Variable Crystal-Control for the VHF Bands," *QST* July, 1963.

the oscillator to run independent of the crystal. Coils with a Q of about 40 were used for L1 in the operating unit. If a high- Q coil is used, it should be shunted with a resistor, the value of which will have to be determined by experiment. It should be such that the crystal maintains control at all times.

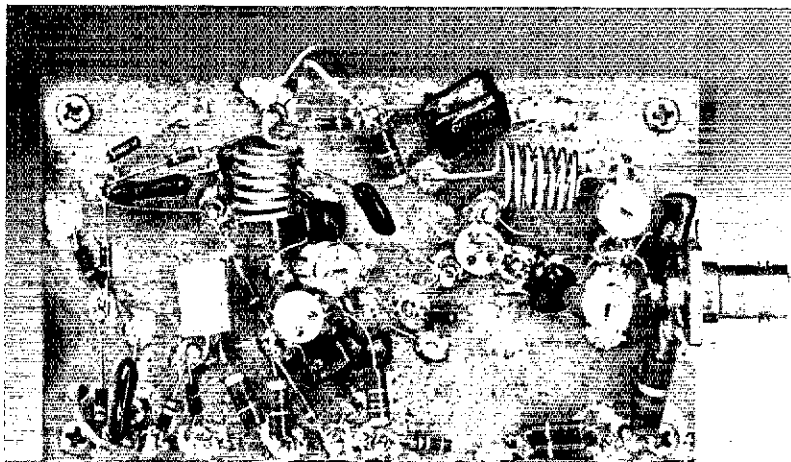
It was mentioned previously that oscillation is lower than F_s . With values shown the frequency with a crystal near 17.5 MHz was actually about 17 kHz lower than F_s . Using the third harmonic, the nominal operating frequency is thus about 50 kHz lower than indicated by three times the F_s of the crystal.

The exciter shown in the photographs will be described in four parts - oscillator, output amplifier, modulator-clipper and low-pass filter. These circuits include several ideas that may be of general interest, for applications other than those described.

Crystal Oscillator

A transistor larger than those normally used in crystal oscillators, the 2N3866, makes it possible to

Closeup view of the 52.5-MHz exciter. The crystal oscillator and varactor modulator occupy the left half of the board, and the amplifier the right half. All audio components are on the underside. Complete unit mounts inside a 2 x 4 x 6-inch box.



get enough harmonic output to drive the 2N3553 output amplifier directly, eliminating the need for an intermediate amplifier. Both transistors are intended primarily for 28-volt service, but they perform well with only a 13-volt supply. The 2N3866 should not be used at much lower voltage, or it may refuse to oscillate. Designing for 13-volt supply has the obvious advantage of being usable for mobile service without circuit changes.

In the complete rf circuit, Fig. 4, R2 and CR1 supply regulated voltage to the varactor diode and the transistor base. R1 and R3 adjust the varactor bias. This can range between 0 and 2 volts, and could be set up to adjust through that range by making R1 variable, if the oscillator was used as a VXO. For widest fm deviation, 0.5 to 1 volt was optimum for this circuit. This should be measured at the junction of R1 and R3, rather than at the terminal of CR2, as there is some rectification in the varicap diode, causing voltage drop through R5. This is not harmful.

R4 is the termination for the low-pass filter, approximately 22,000 ohms. R5 is an rf filter. An rf choke should not be used here, as it could upset the oscillator constants, as determined by L1 and L2 and the varactor capacitance.

Proper bias for the 2N3866 base is obtained by R6, R7 and the thermistor, RT1. If the equipment is not subjected to wide variations in temperature the thermistor can be eliminated, and the value of R6 changed to 3600 ohms. The thermistor used has a nominal value of about 900 ohms, at room temperature. Used as shown it should prevent the oscillator output from falling off in extreme winter temperatures encountered in mobile operation.

The coils L1 and L2 are Weeductors, though any low-Q inductor of about 11 μ H should do. Too high a Q, or appreciably more inductance may

yield more deviation, but it will increase the likelihood of free-running oscillation. If less deviation is wanted at 50 MHz, a lower value of inductance may be used. About 10 μ H should be good for less than 10 kHz.

It is extremely important that stray capacitance to ground at the junction of the crystal and L1 be kept as low as possible. This connection is made "in air" in the model. Small standoffs are unusable. If a printed-circuit board is used, the ground plane should be cut away from the pad used for the connection. It also helps to have the crystal holder ungrounded. A look at the circuit will show that any appreciable capacitance to ground at this point will tend to bypass the crystal and varactor, and will allow the circuit to run free, ignoring those two components. Likewise, any stray capacitance across the varactor will limit its ability to deviate the oscillator frequency.

Capacitors C2 and C3 should be good quality micas. The usual small ceramic capacitors are apt to be unsatisfactory, because of low Q in the vhf range. The Eastrom varactor used has a capacitance of 4 pF at 4 volts, and a Q of at least 16 at 50 MHz. The crystal was supplied by Valpey-Fisher Corporation, Holliston, MA, and is the type used in Sonobuoy transmitters. It is designed to be "rubbery" with a high ratio of parallel-to-series capacitance. This must be a fundamental-type crystal. Because cost and fragility increase with crystal frequency, a 17.5-MHz crystal, tripling, is preferred to a 26-MHz one doubling, in getting to the upper part of the 50-MHz band.

Adequate output on the third harmonic is obtained to drive the 2N3553 amplifier. The important thing is to have as high Q in the oscillator collector circuit as possible. To this end, the coil L3 is air-wound with bus wire, and the

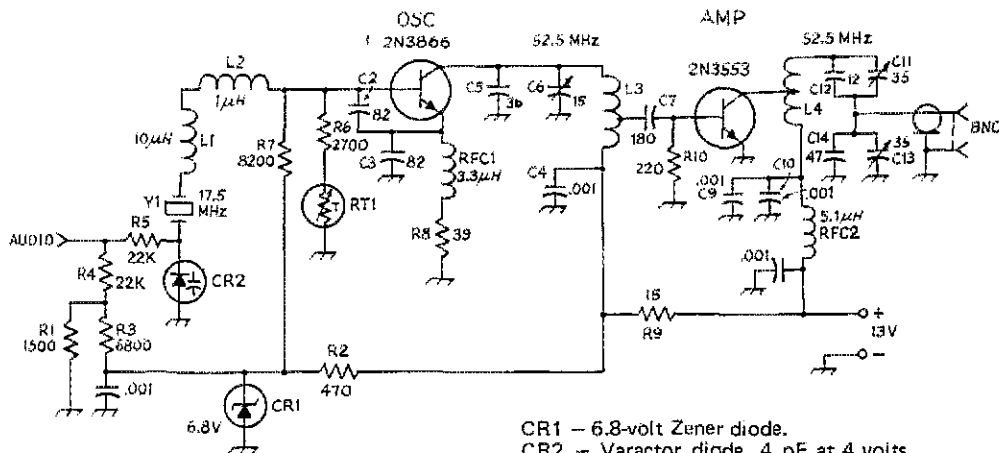
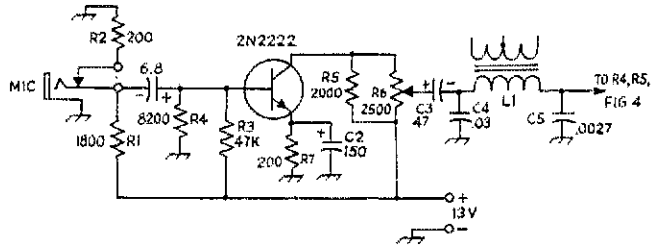


Fig. 4 - Schematic diagram and parts information for the W1CTW 52.5-MHz exciter. All fixed capacitors are mica; decimal values in μ F, others in pF. Parts not described are numbered for text reference.

C6 - 3 to 15-pF ceramic trimmer.
C11, C15 - 9 to 35-pF ceramic trimmer.

CR1 - 6.8-volt Zener diode.
CR2 - Varactor diode, 4 pF at 4 volts.
L1, L2 - Values are for Weeductors. Can be single 11- μ H coil with Q of 40 at 50 MHz.
L3 - 6 turns No. 18, 3/8-inch ID, 1/2 inch long, tapped at 1-1/4 turns.
L4 - 7 turns No. 18, 3/8-inch ID, 9/16 inch long, tapped at 4-1/4 turns from bypassed end.
RT1 - Thermistor, nominal resistance 900 ohms at room temperature.

Fig. 5 — Schematic diagram and parts information for the audio portion of the fm exciter. Parts not described are numbered for text reference. All capacitor values in μF ; polarity marking indicates electrolytic.



L1 — 0.7 Hy (primary of Argonne AR-154 audio transformer).

R7 value can be adjusted for proper clipping.

coupling to the amplifier base is tapped low on the circuit. The bypass capacitor, C4, is a good mica type, soldered in with the shortest possible leads, and pointed back toward the transistor, for minimum path length. Tap placement on L3 was chosen to give adequate drive to the 2N3553, with minimum fundamental and unwanted-harmonic feedthrough. This can best be checked with an oscilloscope having a flat response to at least 50 MHz, connected to the amplifier base. Ripple on the peaks of the 50-MHz wavetrain should be minimal.

Output Amplifier

The 2N3553 amplifier gives up to 0.8 watt output into a 50- or 70-ohm load. Though the 2N3553 is supposed to deliver 2.5 watts output, it has been my experience that running 1 watt or more output usually results in a burned out transistor before long. With the "tin hat" type of case, a derating factor of about 3 is required for the transistor in air. Various kinds of heat sinks will help some, and transistors that are arranged so that the chassis or circuit board can be used as a heat sink can be used with a derating factor of about 1.5 from the 25°C ratings.

Note that the amplifier collector is tapped halfway down the tuned circuit, L2. The collector impedance of a bipolar transistor is low, so tapping down is necessary to maintain tank circuit Q. The 5.1- μH choke, RFC2, helps to keep unwanted harmonics from getting in and out "by the back door."

Modulator

The modulator circuit shown in Fig. 5 performs several functions: microphone input matching, speech amplifier, modulator and speech clipper. A single-button telephone microphone is used, with R1 dropping the voltage from the supply. The 200-ohm resistor, R2, across the closed-circuit jack replaces the nominal resistance of the microphone when the latter is removed from the circuit. This protects the 2N2222 from current surges when the microphone is plugged in or out.

At first the circuit was tried with a grounded-base arrangement, with the microphone in place of the 200-ohm emitter resistor, R7. This worked satisfactorily, except that the gain was low. Also, the balance in clipping levels would be dependent on the unmodulated residual dc resistance of the

microphone, which can vary with movement of the mike. The microphone was also tried in place of R4, with the value of R3 reduced until the bias on the 2N2222 base was correct. This also made the balance of the clipping level dependent on the position of the microphone. There was also a defect that reminded me of a station active in the Arlington CD Mobile Net, years ago. When the operator finished a transmission, he would drop the carbon microphone before reaching for the send-receive switch, creating the impression among listeners that he had just crashed into a tree at high speed!

The final circuit cures all these weaknesses. The value of C1 should be made as small as possible, for two reasons. First, a large value tends to cause the base bias to charge up and change with modulation, upsetting the balance of limiting. Second, the audio response *before* clipping should cut lows, as clipping tends to make speech sound bassy. *After* clipping the response to lows should be good. C1 should be made as small as possible, without the response sounding tinny and the gain becoming low.

To make the audio stage function as a double-ended balanced clipper, the bias is set so that the collector voltage is halfway between the supply voltage (13) and its saturation value (about 1 volt). This means a collector voltage of 7. Now, a peak voltage swing of plus or minus 6 volts will just cause limiting to occur at both ends of the audio swing. This peak voltage is also just about the swing required to give a deviation of plus or minus 15 kHz at 50 MHz. The collector load resistors are chosen to provide a load resistance of about 1000 ohms at the input to the low-pass filter, for a reasonable range of R6, for deviations of less than 15 kHz. Adjustment for proper operating voltage at the 2N2222 collector can be accomplished by varying the value of R4 slightly.

Low-Pass Filter

Instead of the passive filter seen at the right side of Fig. 5, an active filter of two stages, using 2N2222 transistors was tried. This is the left-side part of the large unit shown in the first photograph. It had an insertion loss of 3 dB, which was considered excessive, and the active components limited the dynamic range. Further, one of the minor objectives of this work was to achieve the desired results with as few transistors and parts as possible.

(Continued on page 44)

Build a Dual-Differential Capacitor for Your Antenna-Tuning Network

BY MERL BOYER,* W9ZSI

MANY AMATEURS have decided that the most versatile antenna is a resonant dipole. It can be designed for operation on several bands and tuned by means of a matching network. Ed Marriner, W6BLZ,¹ wrote about such a tuner which is similar in design to the E. F. Johnson Matchbox. However, he employed a Johnson dual-differential capacitor No. 169-25 which the

* 3444 Kenilworth Ave., Berwyn, IL 60402.
¹Marriner, Match Box Tuner, 73 September 1966.

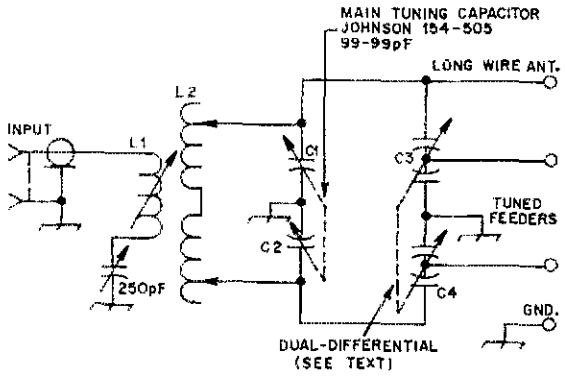


Fig. 1. - Schematic of the W6BLZ modified tuner with the 40- through 10-meter coil in place.

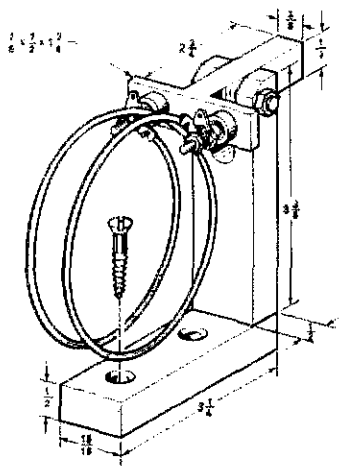


Fig. 2 - The variable link with dimensions for construction of the coil assembly. The two-turn 80-meter link is shown installed.

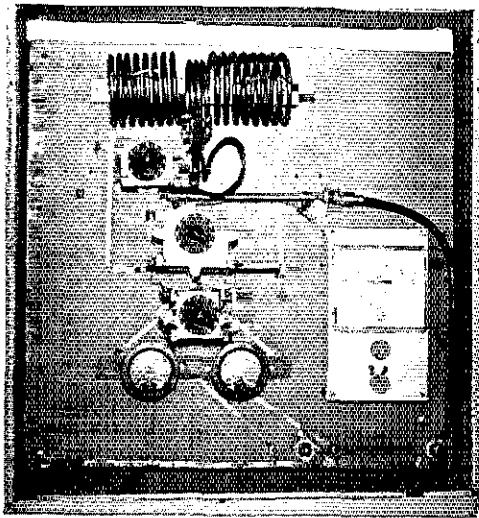


Fig. 3. - Photograph of the completed tuner with an SWR bridge included to aid tune-up. Two rf ammeters are used to observe current in the feed line.

company no longer sells to amateurs. W6BLZ's tuner uses an Air Dux coil instead of the special-wound Johnson coil which has a variable pitch in the center for the higher frequency bands.

My version of the tuner varies from Marriner's in that I use two sets of plug-in coils. One covers 40, 20, 15 and 10 meters. The 80-meter coil is made from 1/8-inch copper tubing or No. 12 soft-drawn copper wire. A coil of 32 turns is spaced over 8-1/4 inches with an 1-3/4 inch opening in the center, and an outside diameter of 3 inches. The 40- through 10-meter coil is similar in construction to the 80-meter coil except it is made of 1/4-inch copper tubing, with 16 turns spaced over 8-1/4 inches. The outside diameter is 3 inches, with an 1-3/4 inch opening in the middle (see Fig. 3). The 1-3/4-inch space allows a variable link to be positioned for maximum coupling, as shown in Fig. 2. The variable link is a 2- or 6-turn coil made similar to L2, and is also a plug-in type to facilitate easy band changing. Bronze or copper clips are soldered to one end of a flexible strap; the other end of the strap is soldered to the first turn on each outside end of the 40-through 10-meter coil. This permits tapping down to achieve four-band operation. A 250-pF variable capacitor has been placed in series with the ground side of the variable

link to increase the impedance range that the tuner can handle.

Capacitor Modification and Construction

The difficult area of construction is in the building of the dual-differential capacitor. I used two surplus split-stator capacitors with a total of 75 pF in each section. One of the split stators is disassembled and the rotor removed. The second is also dismantled in order to cut the 1/4-inch tuning shaft. Additional stock is removed from both ends of the shaft at this point so that there is a 1/8-inch separation between capacitor bodies. The rotor is reassembled and connected together using a piece of 1/2-inch diameter fiber stock 1/2-inch long, and a 1/4-inch hole is drilled in the center to accept the modified capacitors. Epoxy is applied to the two ends of the stator shafts connected by the fiber coupling. The glued assembly is allowed to dry for 24 hours. The rotor is reassembled to its original state and thus provides a split-stator capacitor with an insulated split rotor. The first split-stator capacitor (with rotor removed) is positioned above the second as illustrated in Fig. 4. With a main-tuning capacitor of 99-99 pF and the constructed dual-differential capacitor, you are ready to assemble a tuner that will match a random-length wire antenna or a dipole with tuned feeders. You will find that through the use of plug-in link inductances and the ability to adjust the link into the center of the plug-in coils, you will have a versatile tuner, which, when properly adjusted, will assure an acceptable SWR on any frequency in the 10- through 80-meter bands.

Rf ammeters (0-5 A) are included and may be a feature you will want to add. The meters will aid the tune-up for proper balance of current in each leg of the feed line.

QST

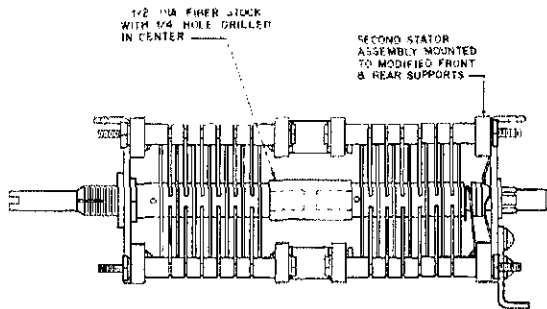


Fig. 4. — The modified dual-differential (C3, C4) capacitors, which are 75-75 pF each. E.F. Johnson split-stator capacitors (No. 155-502) are used. This drawing shows the capacitors joined by the fiber coupler and epoxy glue.

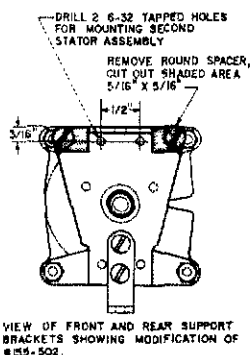


Fig. 5. — A front view of the support brackets, which shows the necessary modifications. Notice that one capacitor stator has been placed over the other. The two are controlled by a common stator.

Solid-State Receiver

(Continued from page 16)

Performance

The receiver is simple to operate as there are only two controls to adjust. The BFO is always on for both cw and ssb reception. High-impedance headphones should be used. Loudspeaker operation is possible if a suitable matching transformer is used. Its primary winding should be about 10,000 ohms and should be connected to the headphone jack connected to the speaker, should match the speaker impedance. The audio level from the loudspeaker is adequate for listening in a small, quiet room.

To receive cw signals, one may tune to either side of zero beat of the desired cw signal, depending on which side is more QRM-free. Ssb reception may be accomplished by tuning to the proper sideband of the received signal and adjusting for the desired voice pitch. A-m may be received by zero-beating the station and thereby eliminating the beat note. Observe, however, that the audio filter is designed primarily for cw reception and

attenuates audio frequencies above 1000 Hz. Hence a-m or ssb signals will have somewhat impaired audio quality, since effective voice frequencies extend to 2500 Hz or so.

Performance of this receiver compares favorably with that of many modern superheterodyne receivers. Measured sensitivity on 80 and 40 meters is 0.3 μ V for a 10 dB signal-plus-noise to noise ratio. Electrical stability is good and circuit-board construction enhances mechanical stability so that drift and instability are insignificant even in the presence of mechanical vibrations. If desired, cw selectivity may be improved by addition of an outboard peak audio filter.

This unit should appeal not only to the beginner and Novice looking for a first receiver with good performance, but to the old timer interested in a modern, economical, portable receiver for use at home or in the field. This equipment should be ideal as a standby receiver for the home station or as a companion to a QRP transmitter. The unit will serve admirably, too, as a battery-operated emergency receiver. When considering cost versus performance, this receiver should have plenty of appeal.

QST

RF Matching Techniques,

Design and Example

BY DONALD K. BELCHER,* WA4JVE

THE FUNDAMENTAL REASON for all of the concern over impedance matching stems from an elemental electrical law which can be explained as follows: All sources of electrical energy can be viewed as ideal current generators in parallel with some "internal" impedance. This is true whether the device in question is a battery to provide dc, a 60-Hz wall outlet, or a high-frequency transmitter. The only difference is the nature of the generator and impedances. Fig. 1 shows a mathematical model of such a generator.

As an example, consider the automobile battery. Without any load or external current, the terminal voltage is 12 V dc, but with a short circuit of heavy wire, the terminal voltage is practically zero. We all have experienced or noticed this effect at some time or other. The same performance can be reproduced with the circuit mentioned above,

*Signa-Signer, Inc., 10560 Main St., A-505, Fairfax, VA 22030.

Probably the most mysterious aspect of electronic circuits is impedance matching at rf. There are many "canned" formulas available but the average electronic enthusiast or ham rarely understands which type of circuit to use and which formula to use. This article is written to bridge the gap between textbook network theory (which is highly mathematical and generally beyond the grasp of the average electronic experimenter) and "canned" equations. Sufficient simplified theory is presented to sprinkle a degree of understanding around the various equations, thereby giving the reader a "feel" for the networks involved. Regretfully for some, all electronics must involve a certain amount of mathematics, but in this writing the math has been reduced to algebra of a rather simple nature.

namely a dc current generator and an internal resistance. As shown in Fig. 2A for this example, the current generated is 500 amperes and the internal resistance is .024 ohm. Examining the circuit at the two extreme conditions, namely open-circuit and short-circuit conditions, we see that at open circuit, the terminal voltage is given by $E = IR$, in this case $500 \times .024 = 12$ V dc, if a zero-impedance short is placed across the output terminals, all of the current will be in the external loop. The short-circuit current will be 500 amperes with the short-circuit voltage equal to zero. So, indeed, the performance of the real automobile battery can be modeled mathematically with the ideal current generator and an internal impedance. Of course there is no real device in the world that is like the ideal current generator just described, but it is an excellent mathematical artifice for understanding the techniques which follow.

The next question is how much power can be derived from our mathematical source or battery. Examining the limiting cases, with a very high impedance voltmeter as the load (practically open circuit), the power delivered would be near zero since the current in the meter is practically zero. If the short circuit was applied, the power delivered would again be zero because the load voltage is zero. Since we know that in a practical case we can indeed obtain power from a battery, we might suspect that somewhere between these two extremes lies an operating condition that delivers power to the load. It is true that at all conditions other than the two extreme conditions discussed, power is being delivered to the load. The most important case is where maximum power is being supplied to the load, the case of maximum power transfer. This condition comes about when the load resistance just equals the internal resistance of the generator or device. In the case of Fig. 2, when the load resistance equals the internal resistance,

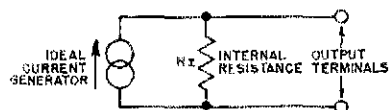


Fig. 1 — Mathematical model of an electrical source.

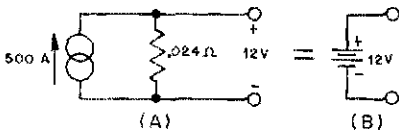


Fig. 2 - At A, mathematical model of an automobile battery, and at B, the electrical symbol for the battery. The arrow at A shows the direction of conventional current flow, being in the opposite direction from that of electron flow.

half the maximum current is flowing in the external resistance. Since $P = I^2R$, the maximum available power is 1,500 watts. This condition is referred to as a matched condition.

Expanding the dc results, we see that the high-frequency case or ac circuit has an analogous mode of operation for maximum power transfer. The fundamental difference is that the internal impedance of the device in question may contain significant reactances, and these reactances must be "tuned out." As an example, consider a 1-MHz generator with an internal impedance of 1,000 ohms in parallel with 500 ohms of capacitive reactance. For maximum power transfer, the load impedance must be equal to a 1,000-ohm resistance in parallel with a 500-ohm inductive reactance. The resistance is the same, but the reactance is of the opposite type. So the same rule holds, but in a slightly modified form. When the generator or source is matched in this manner at ac, it is said to be conjugately matched. This is really the most general case; the dc case is just a more specific case of the ac example. In summary, at high frequencies or whenever reactances are present, the resistances must be matched and the reactances tuned out. In small-signal rf circuitry, conjugate matching is employed almost exclusively. With large-signal devices or power amplifiers a somewhat different technique is employed, and it will be discussed later.

So far, we have seen that to obtain maximum power transfer, particular impedances must be presented to the sources. Such sources may be either tubes or transistors. For these cases of conjugate matching, the method of actually providing these load impedances is the real crux of the problem. There are four basic equations relating the equivalence of series and parallel circuits, and these can enable even the beginner to analyze relatively complex circuits. The equations relate a series resistance and reactance (R_s and X_s , respectively) to a parallel resistance and reactance (R_p and X_p , respectively). These four defining equations follow:

$$1) \quad R_s = \frac{R_p}{1 + \left(\frac{R_p}{X_p}\right)^2}$$

$$2) \quad X_s = \frac{R_s R_p}{X_p}$$

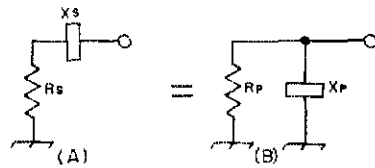


Fig. 3 - Series- and parallel-equivalent circuits. If the values of R_s , X_s , R_p , and X_p are related as given in the four basic equations presented in the text, the impedances of the two networks will be identical even though there may be differences in the component values of the networks.

$$3) \quad R_p = R_s \left[1 + \left(\frac{X_s}{R_s}\right)^2 \right]$$

$$4) \quad X_p = \frac{R_p R_s}{X_s}$$

The two equivalent circuits for these defining equations are given in Fig. 3. By equivalent, it is meant that if the two networks were measured at some particular frequency on an rf bridge, the two networks would exhibit the same impedance, even though they contain noticeably different elements in different configurations.

Conjugate Matching with an L Network

Suppose that it is desired to match 50 ohms conjugately to 250 ohms with no reactances in either impedance. In other words, a network is to be connected between a 250-ohm generator and a 50-ohm load (like a transmission line) such that the 250-ohm generator "sees" a 250-ohm load and the transmission line "sees" a 50-ohm generator. From the equations it may be observed that R_p will always be greater than or equal to R_s , or, if any significant series reactance is added, R_p will be "transformed" to some value higher than R_s . Since it is desired to transform 50 ohms to some higher value, a series element will be used along with the 50-ohm load to transform it. Equation 3 relates the magnitude of this series reactance to the two desired (known) values of terminating resistance. Solving this equation for X_s yields:

$$5) \quad X_s = R_s \sqrt{\frac{R_p}{R_s} - 1}$$

With the known values of R_p and R_s , this equation yields $X_s = 100$ ohms of reactance. Notice that

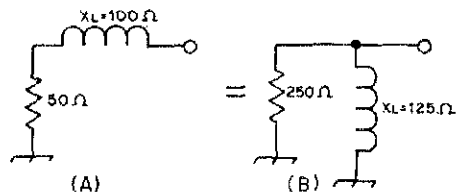


Fig. 4 - Equivalent series and parallel circuits.

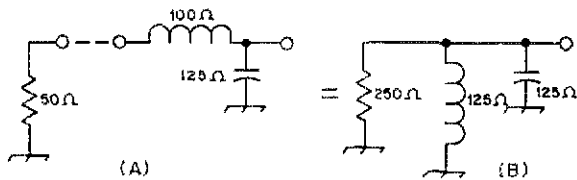


Fig. 5 — At A, the 50-ohm load and matching L network; at B, the parallel-equivalent network.

nothing has been mentioned defining the type of reactance to be used; it can be either capacitive or inductive. For this example, an inductive reactance will be used. So X_s is equal to 100 ohms of inductive reactance. This circuit is shown at A of Fig. 4. It is now necessary to calculate the rest of the parallel-equivalent circuit, since it has already been defined that the resistance part is 250 ohms. In equation 4, notice that everything is known except X_p . Substituting numbers of the known values and solving for X_p yields a value of 125 ohms reactance for the equivalent parallel circuit. This circuit is shown at B in Fig. 4. Thus, the circuits shown at A and B in Fig. 4 are equivalent.

In order to complete the matching network, it is simply necessary to tune out the reactance associated with the parallel circuit. For this example, connect in shunt with the parallel network a capacitive reactance of 125 ohms and the network will be nonreactive. The same is true of the series equivalent circuit. The final "real" network is shown in Fig. 5A, along with the equivalent parallel network at B of Fig. 5. The parallel-equivalent circuit is not needed in the actual matching circuit, being only a means to determining the values required in the series-equivalent network of Fig. 5A.

Of course, in order to actually build the matching circuit, it is necessary to define the operating frequency and compute the parts values from the standard reactance formulas. In this example, the series inductor will be $L = X_L / 2\pi f$, which calculates to be approximately 4.2 microhenries at

3.8 MHz. The shunt capacitor is $C = 1/2\pi f X_C$, and is approximately 335 picofarads at this frequency. The final network which matches 50 ohms to 250 ohms at 3.8 MHz is shown in Fig. 6A.

As mentioned earlier, there are two possible simple networks of this type which will do the same job. If the series element had been chosen as a capacitor, its proper reactance would be X_s , 100 ohms. And in this case the parallel element would be an inductor of reactance X_p , 125 ohms. The second network is shown in Fig. 6B. Again, the standard reactance equations are used to calculate the parts values.

Either circuit of Fig. 6 will provide the proper match. Notice that the network at A is low pass in nature and the one at B is high pass in nature. These characteristics usually help decide which network to use. Another practical consideration is that variable shunt capacitors are mechanically easier to use than variable series capacitors.

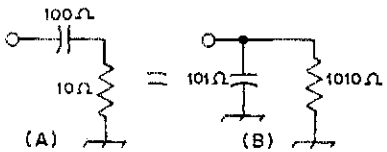


Fig. 7 — The series- and parallel-equivalent circuits representing a short vertical antenna.

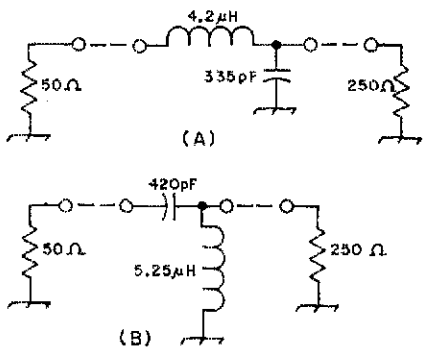


Fig. 6 — Networks to match 50 ohms to 250 ohms at 3.8 MHz. The low-pass nature of the circuit at A versus the high-pass nature of the network of B and mechanical considerations usually help in determining which of the two circuits to use.

As a second example, consider matching a low-value impedance such as might be encountered with a small whip or short vertical antenna. Assume that the impedance of the antenna at 3.8 MHz can be represented by a 10-ohm resistance in series with a 100-ohm capacitive reactance. First, examine the parallel equivalent circuit. From equation 3 the parallel-equivalent resistance is $10[1+(100/10)^2]$ or 1010 ohms, and from equation 4 the parallel-equivalent reactance (capacitive) is $1010 \cdot 10 / 100$ or 101 ohms. See Fig. 7.

Neither the series nor parallel circuit offers a good match to 50 ohms by itself, so a matching network will have to be used. Since the reactance associated with the series circuit is responsible for the high transformation ratio (10 ohms to 1010 ohms), the transformation ratio could be reduced to any desired level if the series reactance could be reduced first. Since it is known beforehand that it is desired to match to 50 ohms, then forget Fig. 7B and assign R_p a value of 50 ohms. Solving equation 5 for the necessary value of X_s with $R_p = 50$ yields

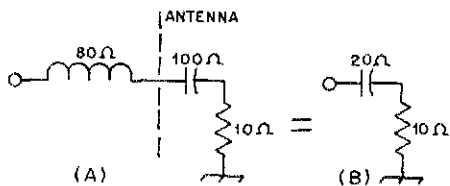


Fig. 8 — Equivalent circuits resulting from the placement of an 80-ohm inductance in series with the antenna represented by Fig. 7A.

a value of 20 ohms reactance. Note that this value is considerably less than the actual value present in the series-equivalent circuit, Fig. 7A. Since series reactances of opposite types (capacitive or inductive) add algebraically, putting an inductive reactance of 80 ohms in series with the 100-ohm capacitive reactance of the series-equivalent circuit will cause the total reactance to become 20 ohms capacitive. This is the desired value mentioned above. The electrical equivalent of the antenna after the addition of the series inductance is shown in Fig. 8.

After adding the series inductor, the new parallel-equivalent circuit can be calculated by assuming that X_s has been modified to its new value of 20 ohms capacitive. R_p has been assigned a value of 50 ohms and from equation 4, X_p is now found to be 25 ohms capacitive. The remaining task is to resonate or "tune out" the X_p with an equivalent X_p of opposite type, by adding a shunt inductor of 25 ohms reactance. The final configuration required to match the antenna to 50 ohms is shown in Fig. 9A. This circuit will be recognized as a shunt-fed system using a base-loading coil.

Since some degree of tuning might be required and variable inductors are rather rare, there may be times when it would be advantageous to use variable capacitors. If the 80-ohm inductor is replaced with a 120-ohm inductor (note that the total effective X_s is still 20 ohms but now inductive), then the 25-ohm shunt inductor can be replaced with a 25-ohm shunt capacitor. The capacitor could then be made variable to provide the tuning. This circuit is shown in Fig. 9B. Of course, to calculate component values for any of the above circuits, the standard reactance formulas given earlier are used.

Transistor-Output Matching

As another example, consider the matching of an rf transistor having specifications at 21 MHz which include an output impedance of 3000 ohms in parallel with a 1000-ohm capacitance reactance. The equivalent parallel-output circuit of this transistor is shown in Fig. 10A. The problem is to match the transistor to a 50-ohm load, since the transistor is going to serve as an antenna-mounted preamplifier and therefore must operate effectively into a 50-ohm line. The first step is to determine

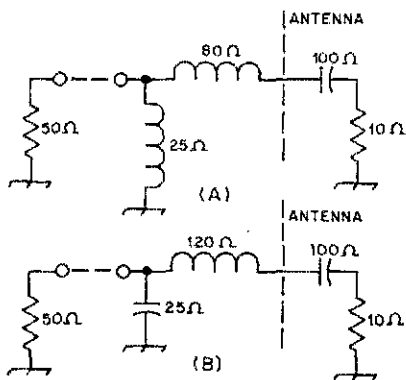


Fig. 9 — Two methods of matching the antenna represented by Fig. 7A to a 50-ohm line.

what the effective X_p must be in order to transform the 3000-ohm R_p into a 50-ohm resistance, R_s . From equation 1, solving for X_p :

$$6) \quad X_p = \frac{R_p}{\sqrt{\frac{R_p}{R_s} - 1}}$$

Substituting the known values of R_p and R_s yields a desired X_p of 391 ohms, and since there already exists a parallel capacitance reactance, capacitive X_p will be used. Remember that reactances in parallel combine like resistances in parallel if both reactances are of the same type. The equivalent of two parallel reactances can be calculated from $X_{total} = X_a X_b / (X_a + X_b)$. Since X_{total} is already known (391 ohms, the desired value of X_p) and X_a is known (the amount of reactance inherent in the device, 1000 ohms), then solving for X_b yields a capacitive reactance of 642 ohms which actually must be placed in shunt with the device to yield 391 ohms overall capacitive reactance. This is shown in Fig. 10 at B and C. The series resistance will now be 50 ohms, but there is still a large reactive component present. This reactance, X_s , can be calculated from equation 2 and is 384 ohms capacitive in this example. This series equivalent of the entire circuit is shown at Fig. 10D.

To complete the match to 50 ohms the equivalent series reactance is tuned out by adding a series reactance of opposite type, which in this example is an inductor. The final circuit is shown in Fig. 10E along with the component values calculated from the standard reactance formulas. The circuit is matched at 21 MHz. Note that since a conjugate match was performed, the line is matched to the device and the device is matched to the line.

Matching by Reactive Transformation

The previous examples have illustrated how small-signal devices can be matched to some desired impedance. As mentioned earlier, when

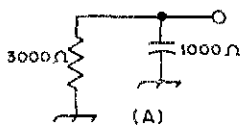
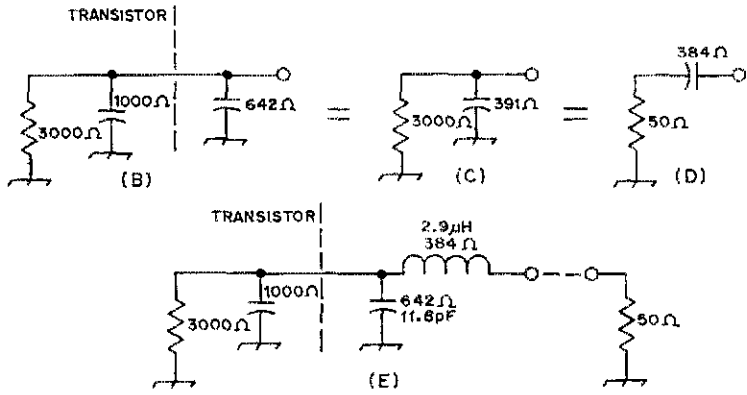


Fig. 10 - Matching of a transistor-output impedance, represented at A, to a 50-ohm line at 21 MHz. Intermediate equivalent networks are shown at B, C, and D, with the final matching network shown at E.



large-signal devices (such as Class C power amplifiers) are concerned, conjugate matching is not employed. The intuitive reason is that conjugate matching requires that an amount of power equal to the total output power be dissipated in the internal impedance of the source or device. This condition would limit the maximum efficiency of any power amplifier to 50 percent, which is an unacceptable situation in most cases.

In the case of a Class C amplifier, some load impedance is desired which will allow the output device voltage to swing over the entire supply-voltage range and just deliver the required output power. This impedance can be obtained in several ways: reactive networks, tuned transformers, or the judicious choice of power levels and operating voltages. In this paper, we are concerned with the application of reactive transformation as just discussed in the small-signal case.

The equation relating the impedance level at the output of a Class C amplifier, whether transistor or tube, to the output power and supply voltage is

$$7) \quad R_o = \frac{V_{cc}^2}{2P_{out}}$$

If an output power of 1 watt is required and the supply potential is 28 volts, as an example, then the load resistance would be 392 ohms. In contrast to small-signal design, the line impedance (usually 50 ohms) is matched to some desired R_o , and a conjugate match does not exist. This means that if one could look into the output of an operating transmitter and measure the impedance, it would generally not be 50 ohms, whereas, if one could look into the total impedance connected to the power device, it would be R_o .

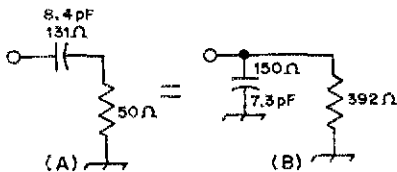
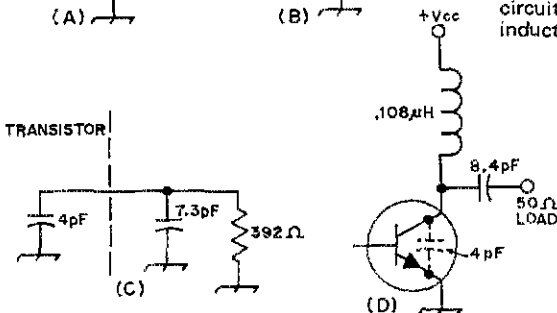


Fig. 11 - Matching of a Class C amplifier transistor by reactive transformation. At A and B, respectively, the series- and parallel-equivalent circuits for the load are shown. At C the internal capacitance at the output of the transistor has been added, and at D the total capacitance of the parallel-equivalent circuit has been resonated at 144 MHz with a shunt inductor.



In the example above, a load resistance of 392 ohms is required. Further assume the transistor has an effective output capacitance of 4 pF, a realistic value for large-signal rf devices. Also assume the 1 watt output is desired at 144 MHz. The problem is to provide the proper load impedance to the device by making a true 50-ohm load look like 392 ohms. Using the simple networks of Fig. 3 discussed previously and equation 5, and knowing R_p and R_s , 392 and 50 ohms respectively, X_s can be found. This yields a value of 131 ohms of reactance for the element to be connected in series with the 50 ohms. In this example, for reasons that will become evident later, the series element will be a capacitor. At 144 MHz an 8.4-pF capacitor would have a capacitive reactance of 131 ohms. The parallel equivalent of the 50 ohm load in series with the 8.4-pF capacitor would be represented as shown in Fig. 11B, calculated from equations 5 and 4.

Since the transistor has some inherent output capacitance, usually a few picofarads, it must be added to the circuit parallel equivalent. This capacitance is approximately equal to the COB of the device, or the collector-emitter capacitance with the base open. For this example it is 4 picofarads. The total parallel-equivalent network is now a 392-ohm resistor in parallel with a 7.3-picofarad and a 4-picofarad capacitor, as shown at C of Fig. 11.

To complete the design, it is simply necessary to resonate the effective total capacitance at the desired operating frequency. Using the resonance formula, $f = 1/2\pi\sqrt{LC}$, and solving for L with C equal to 11.3 pF yields a value of 0.108 μ H for the shunt inductor at 144 MHz. This final circuit is shown in Fig. 11D. Practically, the shunt inductor would be used to supply dc to the device and would be bypassed at the +Vcc end.

Even though illustrative, this example is not very practical because of harmonic content in the rf output. Since Class C amplifiers typically generate relatively large amounts of harmonic energy

in the collector or plate circuits, a matching structure of this type would not be very suitable from a harmonic-rejection standpoint because of its high-pass nature. A more suitable example would be the use of series inductors and shunt capacitors in the same configuration. Of course, the inductor must now be "dc-blocked" and dc must be brought to the collector through an rf choke. The approach would be the same:

- 1) Determine the magnitude of the series reactance element from knowledge of the two resistances - the output impedance, R_o , and the line impedance.
- 2) Compute the equivalent parallel network of the series element and the line impedance. (In combination with this include the output capacitance of the device.)
- 3) Add the necessary shunt components at the collector (which could be either inductive or capacitive) to tune out whatever reactance is present in the parallel-equivalent circuit.
- 4) Add the necessary dc blocking and bypassing circuitry.

Interstage Matching

Next consider the situation involved with interstage matching of a two-stage transistor power amplifier. Assume that from the device specifications the input impedance to the final PA transistor is a 10-ohm resistance in series with a 20-ohm capacitive reactance when operating at nominal output power with nominal supply voltage and drive. The operating frequency is to be 14 MHz and the required drive power for the last stage is given as 1 watt. The supply potential is 28 volts, and the first stage is operating at or near Class C. Since an interstage network is being designed the harmonic suppression is of little concern at this point, so a simple L network is in order.

First compute from equation 7 the required output load impedance for the first stage. Since 1 watt is required from the first stage, $R_o = 392$ ohms. Because the input resistance to the second

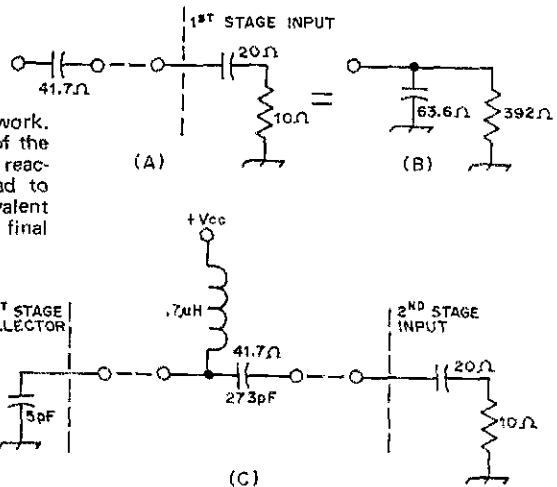


Fig. 12 - Interstage matching with an L network. Shown at A is the equivalent input circuit of the second stage and the additional capacitive reactance to transform the resistive-portion load to that required the first stage. The parallel equivalent of this circuit is shown at B, and at C, the final matching network for operation at 14 MHz.

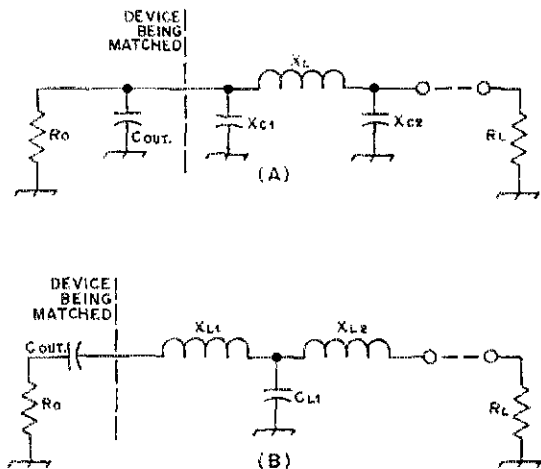


Fig. 13 — A pi-section matching network at A, and a T-section at B.

stage is given as 10 ohms, the 10 ohms must be transformed to 392 ohms as seen by the first stage. Using equation 5 and solving for X_s yields a value of $10\sqrt{392/10-1}$ or 61.7 ohms. Considering that 20 ohms of capacitive reactance already exist in series with the 10-ohm resistance at the PA-stage input, it is only necessary to add an additional 41.7 ohms of capacitive reactance in series to accomplish the desired transformation. See Fig. 12A.

The parallel equivalent of the total input circuit, including the additional capacitor, must now be computed. The parallel resistance has already been defined as 392 ohms, and the parallel reactance is computed from equation 4 as 63.6 ohms. The equivalent parallel circuit of the input is shown in Fig. 12B.

The remaining task is to tune out the capacitance of the equivalent input circuit of the second stage in parallel with the output capacitance of the first stage output. At 14 MHz, 63.6 ohms of capacitive reactance is equivalent to approximately 179 pF. The output capacitance of the first stage is on the order of 5 pF, so the total shunt capacitance is 184 pF. To resonate or tune out this capacitance at 14 MHz a shunt 0.7- μ H inductor is required. This inductor can also provide dc to the first stage. The final interstage network is shown in Fig. 12C. The output circuit can be designed as described in the following paragraphs.

Pi and T Networks

The networks discussed so far are generally called two-section networks. Because of the harmonic-suppression requirements of practically every transmitter or power-amplifier application, a three-section network has been found to be necessary and generally sufficient. This accounts for the popularity of the pi network which is used in most modern transmitters. A pi network is just a

three-section extension of the type of circuits just discussed, as shown in Fig. 13A.

Rather than to repeat work already done, a publication of Motorola Semiconductors will be mentioned regarding the matching and design of power amplifiers. The publication is AN-267, an application note.¹ The note gives a design chart of precomputed values for pi networks and several other circuits. The values of the various components are given in terms of their reactances so that the designer can use them for any desired frequency. In the case of small-signal conjugate matching, the circuits may be applied directly, but for power amplifiers a small amount of interpreting is required.

In most power amplifiers, maximum efficiency is desired, but at the same time maximum harmonic suppression is desired. In practical circuits with real inductors, these two requirements are somewhat contradictory. Increasing the harmonic suppression of transmitters by increasing the loaded Q of the output tank always increases the tank losses. Q is defined as R_0/X_{C1} (Fig. 13A). It has been found that a good compromise of these conditions is a loaded tank Q of 10. It can be seen from the definition of Q that for a load resistance (R_0) lower than approximately 300 ohms, impractical low values of capacitive reactance are required. As may be seen from equation 7, it is also true that large power requirements tend to preclude the use of the pi network in transistor amplifiers, although the pi network is probably the best choice for tube power amplifiers where higher impedances are required.

In higher power transistor amplifiers where the required load resistance is less than 100 ohms, the T network of Fig. 13B is more desirable because of its more suitable component values. The loaded Q of this circuit is defined as the ratio R_0/X_{L1} , and again, a value of 10 is a good design compromise. For power amplifiers, a minor modification must be made to the circuit shown. An inductive shunt component is necessary at the junction of C_{OUT} and X_{L1} simply to resonate or tune out the effective parallel output capacitance of the device (C_{OB} of a transistor).

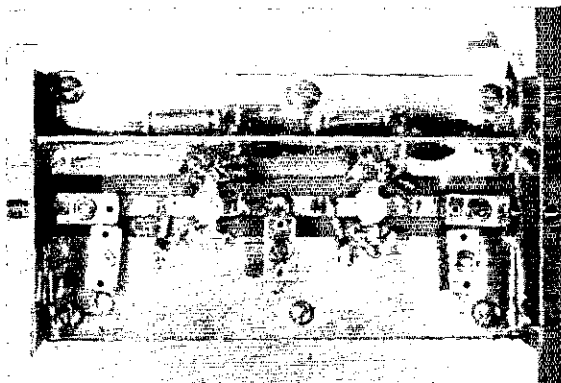
It has been shown that a few relatively simple design formulas and charts will give the average electronic enthusiast sufficient tools to handle most matching problems. The application note referenced may be available from your local Motorola distributor. It gives many more tables and circuit types than can be presented here. QST

¹ See bibliography at the end of this article.

Bibliography

- Davis, *Matching Network Designs with Computer Solutions*, Motorola Semiconductor Products Inc. Application Note AN-267.
- Reference Data for Radio Engineers*, International Telephone and Telegraph Corp., Fourth Edition, pp. 122-123.
- Power Circuits*, Radio Corp. of America, 1969, pp. 267-276.

A two-transistor amplifier that can provide up to 40 watts output on 432 MHz. In this top view, the input is at the left. A shield partition and the two end pieces are fabricated from double-sided pc-board material, as are the strip-line circuit components. The assembly is bolted to a large heat sink with the six screws along the top and bottom edge of the amplifier.



A 75-Watt, Solid-State, UHF Amplifier

40 Watts Output on 432 MHz – Quietly

BY J. BUSCEMI,* K2OVS

AFTER FIGHTING for tropospheric contacts on 432 MHz with 3 watts output for several years, I decided that the time had come for a power increase at my station. The faithful varactor rig¹ had managed 14 states but proved ineffective during weak tropospheric conditions. My requirements for a new amplifier were outlined as follows:

- 1) At least 10 dB gain over the present transmitter.
- 2) Solid-state, small and portable.
- 3) Capable of being driven with the existing varactor rig.
- 4) Sufficient output to drive a future kilowatt amplifier.

Previously, solid-state power devices at 432 MHz have suffered from a number of shortcomings: low power (5-10 watts output), low gain (3-5 dB), instability and intolerance for mismatched loads. However, after a search through some of the existing literature, the Motorola 2N6136 seemed to fill most of the desired requirements. A single-ended output stage could produce 40 watts with approximately 5-6 dB of gain. This stage, together with a similar cascaded driver stage, would provide the 10-12 dB overall gain needed. Motorola developed this device to be used in the 400-500 MHz military band in a strip-line configuration, so I chose a similar design.² The actual techniques used to calculate the strip-line dimensions are covered elsewhere.^{3,4}

Circuit Description

The basic amplifier, shown in Fig. 1, is a two-stage design with capacitive interstage cou-

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¹This and all other footnotes appear in the appendix at the end of this article.

pling. L1, L2 and L3 are strip-line components which are etched or cut into the main printed wiring board. Capacitors C1 thru C5 are ARCO type-420 compression trimmers. Substitution of these capacitors with piston or air-variable types can be made, but keep in mind that these capacitors also contribute some inductance to the circuit and substitutions may require adjusting the length of the strip-line inductors. The interstage capacitor, C6, is a high-Q porcelain or leadless ceramic type and substitution with a disc or mica unit will significantly degrade the performance of the amplifier. The input and output connectors are miniature types, chosen to fit in the small package. BNC connectors can be used if sufficient mounting space is provided.

The transistors are biased for Class C, allowing the collector supply voltage to remain connected at all times. Removing the drive causes the collector current to decrease to nearly zero and no heat is produced during key-up conditions.

Both dc and rf decoupling are provided; use good-quality capacitors and chokes to prevent

Obtaining a few watts of power at 432 MHz is not very difficult as long as the "few" is taken to mean 1 to 5. Amplifying those few watts to a level that will increase the range over which you can work has heretofore required a rugged tube and its associated cooling-fan noise. Here is an amplifier that will provide a considerable boost in output – quietly and efficiently.

EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF OR μMFD); RESISTANCES ARE IN OHMS, $k=1000$, $M=1000000$

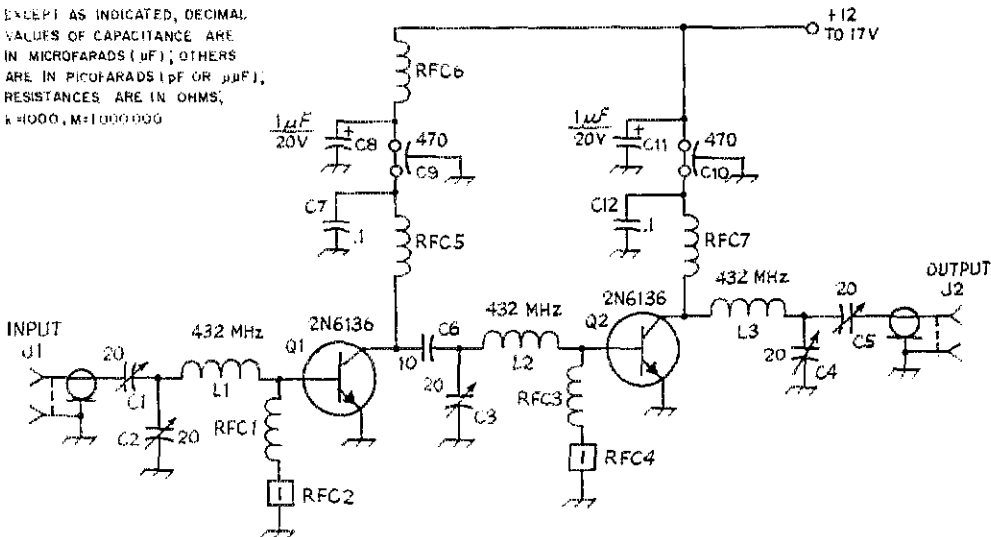


Fig. 1 — Circuit diagram of the two-stage amplifier. C1-C5, incl. — 1- to 20-pF compression trimmer (Arco 420 or equiv.).

C6 — 10-pF microwave ceramic capacitor (ATC-100-B100MC, available from American Technical Ceramics, Inc., 1 Norden Lane, Huntington Station, NY 11746).

C7, C12 — 0.1- μF , 20-volt disk ceramic.

C8, C11 — 1- μF , 20-volt tantalum electrolytic.

C9, C10 — 470-pF feedthrough.

J1, J2 — Coaxial connector, miniature type JCM, SMA, or BNC.

L1, L2, L3 — Strip-line inductor (see text and drawing).

Q1, Q2 — Motorola 2N6136 transistor.

RFC1, RFC3 — 0.15- μH molded miniature choke. RFC2, RFC4 — Ferrite bead slipped over lead at cold end of RFC1 and RFC3.

RFC5, RFC7 — 5 turns No. 20 enam. wire, close wound, 3/16-inch ID.

RFC6 — 0.2- μH molded choke (Ferroxcube VK200 or equiv.).

instability. Working with semiconductors that exhibit high gain at uhf requires some care in choosing decoupling component values which will prevent the amplifier stage from oscillating at hf or vhf, where the transistors usually have extremely high gain.

Pc-Board Construction

The amplifier is constructed on a single piece of Teflon dielectric, 1/16-inch thick pc board. The board has one-ounce copper foil on both sides. Do not try to use the usual glass-epoxy or paper-base pc board material; anything but Teflon or ceramic is much too lossy at uhf.⁶ Try to hold the accuracy to $\pm 1/64$ of an inch, especially the width of the base and collector circuit lines. The layout is so simple that the board can be constructed without etching at all; transfer the pattern to the board in pencil and carefully cut through the top copper layer with a sharp knife. The copper can then be peeled off the Teflon base material in two strips by carefully lifting the end of a strip and pulling it at right angles to the board. The amplifier could also be constructed on a single-sided Teflon board with the circuit lines cut from adhesive-backed copper foil.⁷

Do not substitute a different thickness board; the thickness and the line widths determine the impedance and resonant frequency of the strip line. The width of the board can be changed to suit your heat sink but it should not be less than 3

inches wide to provide an adequate ground area. After the board is constructed, all holes are drilled and the heat sink is then prepared.

Heat Sink

The heat sink is constructed from a section of finned aluminum material approximately 8-11/32 \times 5 inches. The fins are 2 inches high and .090 inch thick.⁸ This represents an approximate heat radiating surface area of 300 square inches. A single flat plate of aluminum, bent into a U shape, could be used but its overall size would be considerably larger to provide the same surface area.

After the heat sink is cut to size, the strip line mounting holes can be drilled and tapped into the aluminum. Holes for the transistor mounting studs should be drilled and any fin material cut away where it might interfere with the mounting nuts on these studs. Adequate heat sinking is extremely important; most uhf power transistors will rapidly destroy themselves if their junction temperatures are allowed to exceed about 125°C. Also keep in mind that heat sinks are only effective if the heat generated by the transistor is efficiently conducted to the sink. Poor mechanical connections between the transistor cases and the heat sink will do no good, no matter how large the heat sink is. For this reason, a thermal grease⁹ must be applied to the transistor studs before they are installed in the heat sink.

Shielding and Final Assembly

Three pieces of a double-sided copper pc-board material are soldered in place to provide a convenient place to mount the input and output connectors and dc filtering components. The rf connectors should be mounted on the end shields before the shields are assembled to the strip-line board.

All components, with the exception of the transistors, may now be mounted to the strip-line board and shields. Keep all component lead lengths as short as possible.

Use a minimum amount of heat when soldering to the base and collector lines to prevent them from lifting off the board; a small 25-watt soldering iron is best here. Next, install the emitter grounding ribbons (Fig. 3) to connect the two sides of the pc board together.

Place the strip line board assembly on the heat sink and check the alignment of all mounting holes and the transistor studs. This is extremely important; misalignment of the board may overstress the leads on the transistors and crack their top caps. The flat bottom portion of the transistor stud should lie flat against the heat sink without placing any strain on the transistor leads. When the alignment seems correct, apply thermal grease to the transistor studs and fasten the transistor to the heat sink. A torque of 5 inch-pounds ** should be applied to provide the proper thermal contact to the heat sink. Finally, tighten the board mounting screws and carefully solder the transistor leads to the board using a minimum of heat.

It is important that the above sequence of assembly is followed exactly; these transistors can be easily damaged if their leads or caps are overstressed. To replace a transistor, reverse the above sequence.

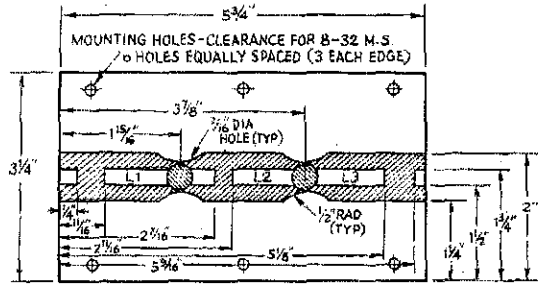
Power Supply Requirements

A power supply providing between 12 and 17 volts dc at 5 amperes is required for operation. A regulated supply is preferred to minimize transients during keying, although it is not necessary as long as the voltage never exceeds 17. The amplifier may be run on 12 to 13 volts for mobile use and will provide 25 to 30 watts output at this level.

A suitable regulated power supply with short-circuit protection is shown in Fig. 4. The entire regulator, with the exception of the transformer and transistors, may be assembled on a single small pc board. If desired, the regulator transistors could be mounted on the heat sink with the amplifier transistors if the heat sink is suitably enlarged.

Temperature Data and Cooling Requirements

The heat sink described above will provide adequate cooling with no fan or blower if it is ** [EDITORS NOTE: Those who may not have a torque wrench can obtain the correct degree of tightness by hanging a weight on a wrench until the weight is supported without further movement. As an example, a one pound weight supported 5-inches away from the stud will meet the requirement given by the author.]



SHADED AREA INDICATES COPPER REMOVED
-BACKSIDE IS ALL COPPER-
MATERIAL: TEFLON, DOUBLE-SIDED
1 OUNCE COPPER, 1/16" THICK

PRINTED CIRCUIT BOARD
LAYOUT

Fig. 2 — Layout for the pc board. The dielectric material is Teflon, 1/16-inch thick. Dimensions should be followed within 1/64 inch.

mounted where air can circulate freely. If you want to enclose the entire amplifier in a cabinet, use the heat sink as the back or top panel with the fins outside the box. If the heat sink is mounted in a closed area (behind a rack panel or under a car hood) some air flow from a small fan will be required to keep the transistor case temperature down.

At the full dc input of 75 watts, the case temperature of the final transistor (the hottest one) should not exceed 200°F. My unit never exceeded 160°F with no blower or fan. However, keep in mind that extra power will be dissipated as heat in the final transistor if they are operated into a mismatched load. Always provide extra cooling capability just in case; it is much better than replacing final transistors.

Tune-Up and Performance

Initial tune-up is performed with the full collector voltage applied and between 1/2 and 1 watt of rf input. Changing the supply voltage will drastically affect tuning by causing the junction capacitances of the transistors to vary.

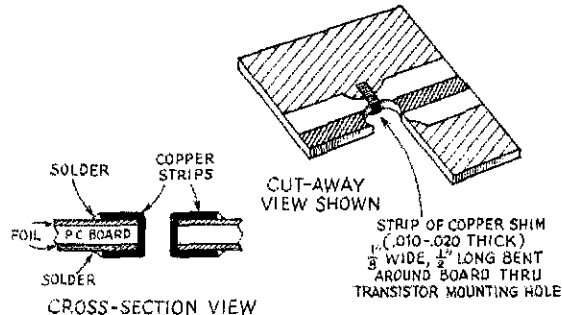
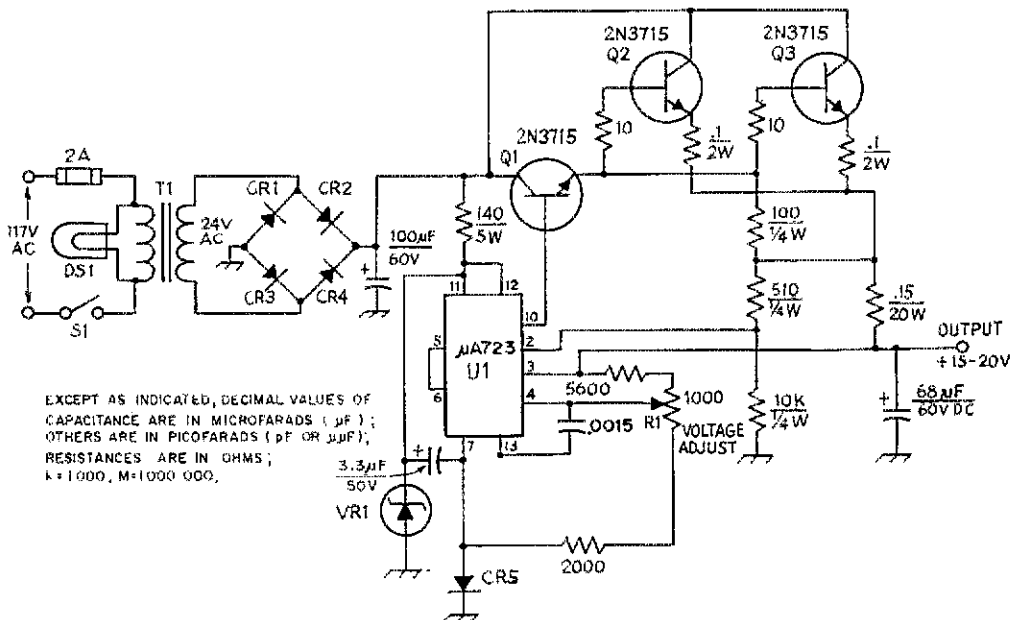


Fig. 3 — The copper foil on both sides of the board is bonded together by means of copper strips through the transistor mounting holes.



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (PF OR μMUF); RESISTANCES ARE IN OHMS; K=1000, M=1000 000.

Fig. 4 - A regulated power supply suitable for use with the amplifier. The output is in the range of 15 to 20 volts at 5 A. Resistances are 1/2-watt unless otherwise specified.

CR1-CR4, incl. - 50 PRV, 5-A silicon diodes.
CR5 - 1N5614.

R1 - 1000-ohm linear-taper composition control.
T1 - 117-V primary; secondary 24 volts at 5 A (Stancor P-6378 or equiv.).

U1 - $\mu\text{A}723$ voltage regulator.

VR1 - 36-volt, 10-watt Zener diode (1N2991B or equiv.).

Connect a VSWR indicator in the input line and adjust C1 and C2 for minimum input VSWR. Next, adjust C3, C4 and C5 for maximum output. Gradually increase the rf input power and repeat these adjustments, monitoring the power supply current at all times. A sudden jump or oscillation of the collector current indicates instability and all bypassing and decoupling components should be checked before proceeding. My amplifier exhibited no instability at all; the collector current climbed smoothly as the input drive was increased.

Despite the fact that this amplifier operates in Class C, the output power is a fairly linear function of the rf input power level. As little as 1 watt of rf input will produce about 10 watts of output power; the gain falls off quickly below this level. The efficiency at full dc input (75 watts) was measured as 52 percent; this produces almost 40 watts of rf output. An a-m or ssb 432-MHz signal may be amplified since the unit is fairly linear. Do not try to modulate the collector of the final transistor directly unless the collector supply voltage is reduced considerably; the voltage peaks may puncture the collector-base junction. Video modulation is also possible using the same precaution as with voice.

Spurious outputs were checked on an AIL 707 spectrum analyzer and all were at least 34 dB down. The highest output observed was at 864 MHz (-34 dB). The 144-MHz output (only 12 dB down out of my varactor) was at least 60 dB below the 432-MHz energy.

Operation

On-the-air tests were most gratifying. My normal local coverage has increased considerably and several new states were added during a few weeks of operation. The amplifier provides sufficient output to drive the K2RIW kilowatt¹⁰ and will be used here as a high-level driver for a tripler to 1296 MHz as soon as I can find a 75-watt transistor for 1296!

APPENDIX

- 1) Blakeslee, "Practical Tripler Circuits", *QST*, March 1966, p. 14, Fig. 1(C).
- 2) Motorola Semiconductors, 2N6136 Data Sheet, DS5744, July 1971.
- 3) Saad, "Microwave Engineer's Handbook", Volume I, Artech House, Dedham, Mass., 1971, p. 115.
- 4) ITT, "Reference Data for Radio Engineers", Howard Sams and Co., Inc., New York, 1969, Section 22.
- 5) A full-size layout is available from the author for a SASE.
- 6) Teflon Board material available from Minnesota Mining and Manufacturing Co., Type "CU-CLAD" K-6098; Military Type FLGT062 G1/1 (double sided).
- 7) Adhesive-backed copper foil available from CIR-KIT, North Adams, Mass.
- 8) Heat-sink material available from Thermalloy, Inc., Dallas, Texas, Type 6153, length 5 inches.
- 9) Thermal Grease available from Wakefield Engineering, Inc., Wakefield, Mass., Type 120.
- 10) Knadle, "A Strip-Line Kilowatt Amplifier for 432 MHz", *QST*, April and May 1972.

ARRL QSL Bureau

The function of the ARRL QSL Bureau is to facilitate delivery to amateurs in the United States, its possessions and Canada, of those QSL cards which arrive from amateur stations in other parts of the world. All you have to do is send your QSL manager (see list below) a stamped, self-addressed envelope, about 4 1/4 by 9 1/2 inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

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

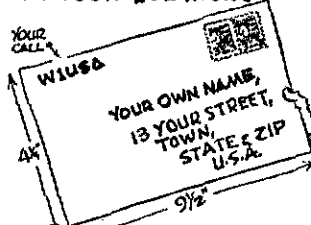
- W1, K1, WA1, WN1¹ - Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.
 W2, K2, WA2, WB2, WN2 - North Jersey DX Assn., P.O. Box 805, Ridgewood, NJ 07451.
 W3, K3, WA3, WN3 - Jesse Bieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355.
 W4, K4 - North Alabama DX Club, P.O. Box 2035, Huntsville, AL 35804.
 WA4, WB4, WN4¹ - J. R. Baker, W4LR, P.O. Box 1989, Melbourne, FL 32901.
 W5, K5, WA5, WB5, WN5 - Kenneth F. Isbell, W5QMJ, 306 Kesterfield Blvd., Enid, OK 73701.
 W6, K6, WA6, WB6, WN6¹ - No. California DX Club, Box 11, Los Altos, CA 94022.
 W7, K7, WA7, WN7 - Willamette Valley DX Club, Inc., P.O. Box 555, Portland, OR 97207.
 W8, K8, WA8, WB8, WN8¹ - Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.
 W9, K9, WA9, WB9, WN9 - Northern Illinois DX Assn., Box 519, Elmhurst, IL 60126.
 W0¹ - Reggie Hoare, W0OYP, P.O. Box 115, Mitchellville, IA 50169.
 K0, WA0, WB0, WN0¹ - Dr. Phillip D. Rowley, K0ZEL, Route 1, Box 455, Alamosa, CO 81101.
 KP4 - Alicia Rodriguez, KP4CL, P.O. Box 1061, San Juan, PR 00902.
 KZ5 - Lee DuPre, KZ5OD, Box 407, Balboa, CZ. Box 407, Balboa, CZ.
 KH6, WH6 - John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, HI 96701.
 KL7, WL7 - Alaska QSL Bureau, Star Route Box 65, Wasilla, AK 99687.
 VE1 - L. J. Fader, VE1PQ, P.O. Box 663, Halifax, NS.
 VE2 - A. G. Daemen, VE2J3, 2960 Douglas Avenue, Montreal 301, PQ.
 VE3 - R. H. Buckley, VE3UW, 20 Almont Road, Downview, ON.
 VE4 - D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg R3N 0E8, MB.
 VE5 - A. Lloyd Jones, VF5J1, 2328 Grant Road, Regina, SK, S4S 5E5.
 VE6 - D. C. Davidson, VE6TK, 1108 Stratford Dr. NW, Calgary 47, AB.
 VE7 - H. R. Hough, VE7HR, 1291 McKenzie Rd., Victoria, BC
 VE8 - Yellowknife Centennial Radio Club, P.O. Box 1944, Yellowknife, NWT, Canada.
 VO1 - Ernest Ash, VO1AA, P.O. Box 6, St. John's, NF.
 VO2 - Goose Bay Amateur Radio Club, P.O. Box 232, Goose Bay, LB.
 SWL - Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.

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

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

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

IS YOURS ON FILE WITH YOUR QSL MGR?



October 1922

... Electric wave filters were generally unknown to the amateur fraternity in 1922, although they had been invented some years earlier. A non-mathematical description of low-, high- and band-pass filters, by Dr. Jewett of the Western Electric Company, marks the first appearance of the circuits in *QST*. Another new development, of more immediate concern to the amateur, is described by P. D. Lowell of the Bureau of Standards in a paper on operating vacuum-tube amplifiers from ac supply. The method used a resistor connected across each tube filament, each having an adjustable center-tap returned to the common plate and grid connections for minimizing hum. The plate supply had a tube rectifier with a 10- μ F capacitor filter. Both radio and audio amplifier stages were operated on ac, but the detector was a crystal because tube detectors were too sensitive to hum.

... On the operating front, a third series of transatlantic tests were announced for the coming December - this time with separate transmitting periods for each district and Canada, together with silent periods in which to listen for European amateurs. And to emphasize the growing problems in international communication, the Traffic Manager pleads editorially for the use of GMT, while the adoption of Esperanto as a common language is urged in the "International Amateur Radio" column.



October 1947

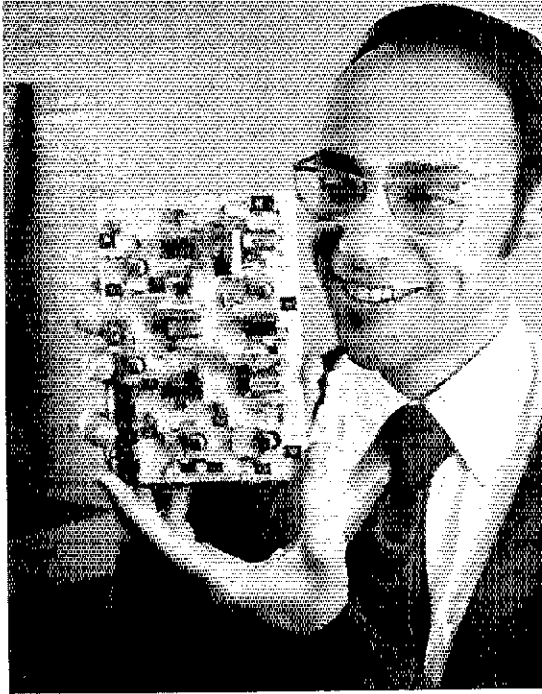
... In a period when standing-wave indicators were very much the subject, the various developments in that line were capped by the ultimate in simplicity - the Twin-Lamp. Designed by W4HVV, it was described by him in the lead article. This was the day when 300-ohm TV lead-in was a popular type of transmission line for amateur antennas, and the Twin-Lamp could be made from nothing more than a few inches of line and a couple of flashlight bulbs. A useful tool for antenna adjustment, it was later instrumental in uncovering the existence of unsuspected "parallel" line currents when inconsistent readings were obtained with it.

... This issue is also notable in being the one in which the 6-meter "Halo" was introduced in an article by W1MUX. Offering horizontal polarization together with lack of azimuthal directivity, it enabled better communication between 6-meter mobiles and fixed stations, horizontal polarization being prevalent among the latter.

... Upgrading 2-meter mobile gear is the theme of two articles: one, by W5FJ, on a mobile superhet receiver and the other, by W3HWN, on simplified crystal control using the new vhf crystals.

... "Happenings" announces that FCC has formed a new division on amateur affairs, headed by W3GA under the supervision of FCC Chief Engineer W3DF. - *W1DF*

Though the author's theme may seem somewhat ahead of its time, at least with respect to amateur radio work, it may not be. WB2EZG has been working with voice-recognition circuitry for commercial applications for quite some time. It is hoped that this presentation will be sufficiently thought provoking to encourage some readers to develop control circuits along the lines suggested here. A number of practical applications for voice-recognition control systems exist — aids for the handicapped operator, and convenience and increased safety of operation for the mobile-unit amateur. Certainly there should be some value to this concept if applied by contest operators! The fundamentals for development of a working circuit are presented in this article. Who will be the first to develop his own voice-recognition control system?



Author shown holding the parameter-extractor circuit board he built.

Limited Speech Recognition

BY VINCENT BIANCOMANO,* WB2EZG

VOICE CONTROL of machines has long been under study at many places throughout the country. Unfortunately, success has been obtained only by using sophisticated equipment that the average amateur has no access to. It is difficult enough for circuitry to recognize speech patterns, but in addition, the human-factors problem enters. Simply, people pronounce words somewhat the

*1569 Richmond Rd., Staten Island, NY 10304.

same, but not nearly so alike as to have simple circuits respond to everyone's command.

It would be desirable, however, to utilize the voice as a means for accomplishing certain functions despite the initial drawbacks of the method. Some applications exist for the amateur, which will be discussed at length. The following describes a method for achieving a limited speech-recognition scheme for any words desired, using operational amplifiers and integrated-circuit logic, or transistorized circuitry.

Fig. 1 -- Block diagram of the parameter extractor.

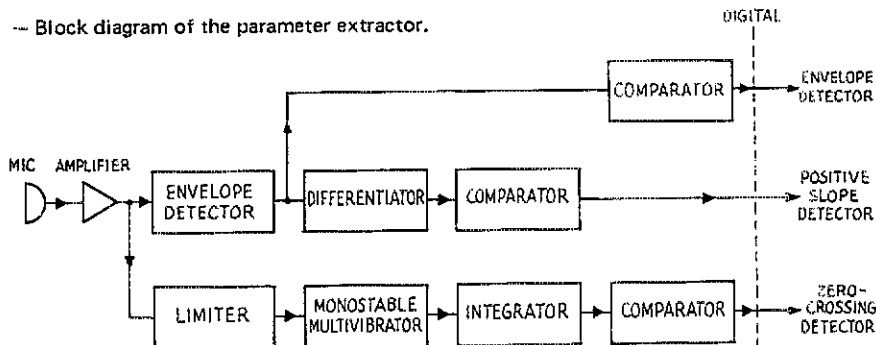
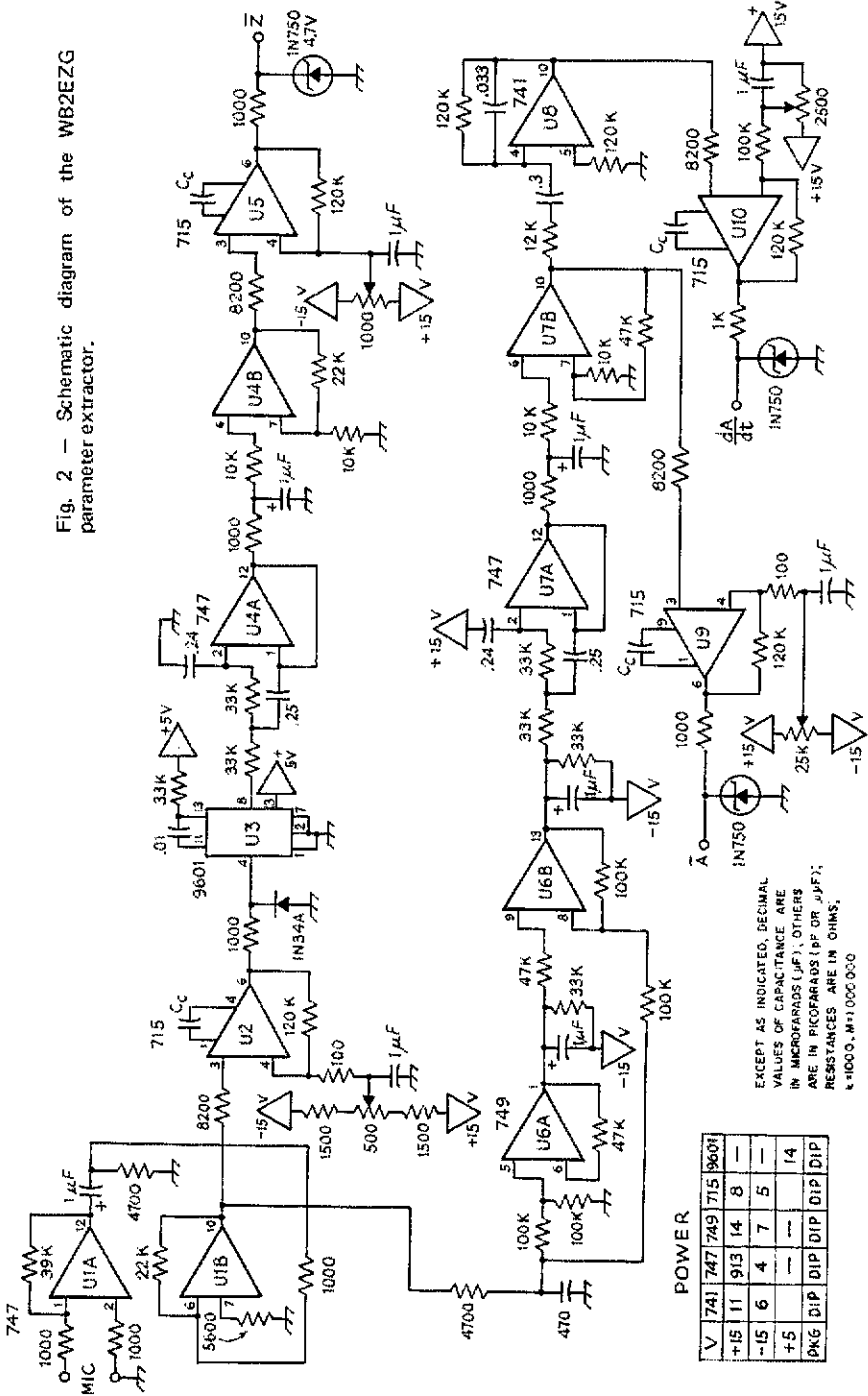


Fig. 2 - Schematic diagram of the WB2EZG parameter extractor.



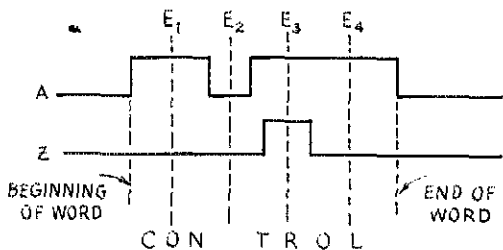


Fig. 3 — Extractor response for a simple-structured word. Slope detector output is not shown.

Basically, the system consists of a parameter extractor, which is essentially an analog-to-digital converter. The logic which follows recognizes the passage of certain speech patterns, called "events." This will be clarified shortly.

The Parameter Extractor

One would desire to use the most reliable characteristics of speech to have the ultimate in a system of this type. By "reliable characteristics," one refers to components of speech that are likely to undergo minimum speaker-to-speaker variation. It is anyone's guess as to what parameters are optimal. The particular extractor constructed had amplitude, zero-crossing (for high-frequency content), and positive derivative (rise in energy of spoken word) detectors. A block diagram is shown in Fig. 1, with the schematic in Fig. 2.

Consider the digital-output wave forms. Note that if each output state is independent of another, at any time, eight events are possible; that is, for a given instant of time, all may be high or low, one of three may be high or low, or two of three may be high or low. Recognition of a word is determined by the occurrence and sequence of events. We are thus faced with the problem of obtaining logic circuits for detecting these sequential events. An example is shown, using two parameters for simplicity.

Logic Design

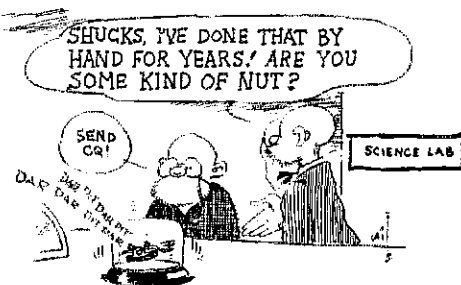
Observe the two digital outputs for the spoken word "control" which emanates from the parameter extractor (Fig. 3). The word is broken up into four events, designated E1 to E4. The choice is not exactly arbitrary, as one can see. When a

change of one or more parameters occurs, an event point can be chosen.¹ We need logic to detect the four events.

The occurrence of event E1 can set a flip-flop. The amplitude wave form (A) would be taken to an AND gate along with the negation output of the zero-crossing wave form, Z, so a flip-flop F1 would be set by AZ . F1 now acts as a memory, recording the fact that E1 has occurred. This output, "anded" with the next event E2, can now be used to set another flip-flop. E2 is thus set by $F1AZ$. Similarly, event three would be recorded by F3, being set by $F2AZ$. Event four would need a set input of $F3AZ$ to F4. The output of the final flip-flop can be taken to some relay through suitable current drivers to control anything imaginable. The same word can also be used to turn off appliances with some ingenuity in design at the final flip-flop.

Results

One can expect success of the order of better than nine times out of ten if certain precautions are taken and one realizes the system limitations. The circuit is not foolproof. When proper thresholds are set at the comparators in the parameter

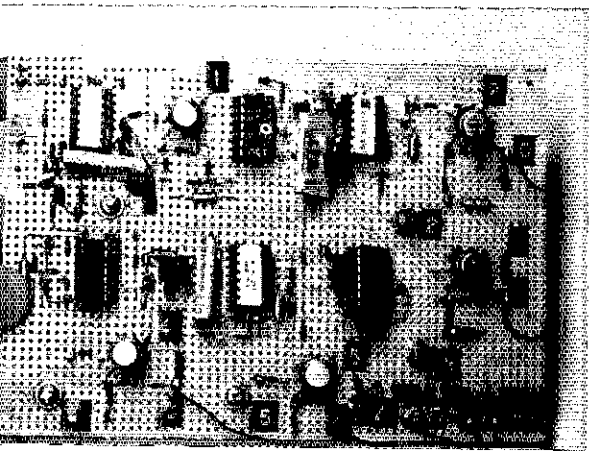


extractor, the circuit will respond to a wide range of voices. No age is present at the input circuit, but might be added if needed. One must first be aware that "hollering" the circuit off, or rushing the speed at which the word is pronounced, only decreases the probability of successful execution. Secondly, words whose binary wave forms approximate closely the chosen word will trip the circuit, even though other events may have occurred in between. The latter may be cured if one is willing to redesign the logic for this effect, using more gates and increasing the cost. Third, one may find that thresholds work adequately for the male population, but not for any but deep-voiced females. Fortunately, such a device would not be used by the whole world, but rather for a few people at most, so there is no problem.

The circuit has the advantage that it is largely invariant to the speed with which the word is pronounced; it is recommended, however, that a timing circuit (monostable) be added in the logic, giving the user a maximum time to pronounce a

¹ Strictly speaking, five events should be chosen for this word, although four are picked.

Close-up view of the parameter-extractor module.



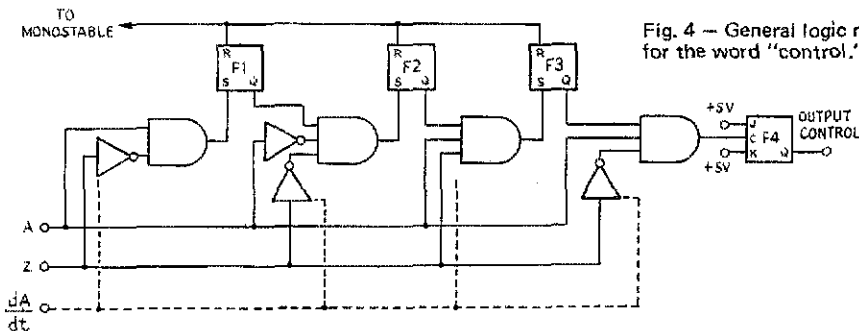


Fig. 4 - General logic needed for the word "control."

given word. This is desirable for two reasons. First, it decreases the chances for accidental talk off on two counts. The first is strictly timewise, the second advantage is that a word must be said in isolation of context to effect an output change. This means that if one uses the circuit to turn on his rig while using the same microphone he ragchews with, then the word he uses will not accidentally turn off the rig (if the key word is accidentally spoken) unless said in isolation.

To continue, the monostable is also used to reset the flip-flops should a person miss execution with his first try and want to try again. Lastly, one must resign himself to the fact that on some days he will not pronounce the key word or words as he did the day before, and will have to settle for a decrease in the percentage of "hits" versus tries. This is a human error and one cannot expect non thinking logic to decipher a babbling human using simple systems. To conclude, these are the steps that should be followed to obtain a working system:

1) Choose a word or words, meaningful or not, with a reasonable number of events. The longer the word, the more significant the number of events. (Perhaps 8 or 9 events is a reasonable number.)

2) Adjust parameter extractor for near-consistent digital outputs when the phrase is spoken by a small population.

3) Design logic for detection of events.

Applications

Uses for the scheme discussed, as far as amateurs are concerned, may be broken into three categories: entirely practical; semipractical, because present activity in a phase of amateur radio is limited; and future, because of present technology, limited or nonexistent amateur activity, or because it is a disadvantage to have this method of control for other reasons.

USING
SPEECH-RECOGNITION
CONTROL HERE, OM!



A) Practical: Probably this system would be most advantageous to handicapped amateurs. A rig could be turned on, and antenna could be rotated, or a voice command could transmit a standard SSTV or cw message. The second use would be in repeaters, where the control decoder would be designed to respond to a voice command instead of audio tones. The third use would possibly be that of remote band switching in mobile communications. The operator would not have to use his hands to adjust antenna matching networks, etc., an important consideration. Also consider that some day, all rigs will probably have instant band switching, which will make it even easier on the mobile operator.

B) Semipractical: A reasonable percentage of amateurs engage in radio control of model airplanes. It has been expressed by the modelers² that their constant goal is realism in model flying. Talking the plane up or down is equivalent to talking to the co pilot of the ship. Such commands given to the co pilot would be "gear-up" or "ten-degree flaps." The last command, incidentally, would appear to be a good choice for a word. Most modelers are not hams, but there is no reason to believe that the aims of both groups differ significantly when it comes to model flying (or model boats).

C) Future: Applications for voice gadgets such as these might be found in amateur satellite control, or in voice-to-Morse, or voice-to-RTTY converters. Admittedly, these are future prospects, but certainly one is not reaching for the moon(!) when the suggestion is made.

Cost

The system described is not a computer, nor could it be if amateurs were to build it. Hence, the system is not nearly as perfect as one would like. This is reflected in the cost, perhaps \$25 for the extractor for those with some kind of junk box. The price of the logic circuitry depends on the words chosen and might approach \$15 for some words. The price of the power supply is not included. Plus-and minus-voltage supplies are used in the original circuit, but certain low-cost operational amplifiers can be made to work as linear elements using only a single 5-volt supply. Ninety-percent or better accuracy is not bad for \$40 or so. Perhaps this method of machine control merits consideration by radio amateurs.

² Interview with Al Lobaito, President, Richmond Model Flying Club, Inc.

OAKEY—

An Op-Amp Electronic Keyer

BY L. H. VALE,* VK5NO

THE KEYER described here is probably one of the simplest and most economical to build of all the TO keyers.¹ A dual operational-amplifier (op amp) integrated circuit is the only active element used, except that, in most cases, it is necessary to use an output transistor.

Two op amps contained in one IC package perform the necessary functions in a most efficient manner, and the circuit offers several advantages other than simplicity. The speed is independent of supply voltage variations over a wide range, the mark-space ratio is independent of the speed setting, the output wave form is a square wave with fast rise and fall times, and the characters are self-completing following an extremely brief operation of the appropriate paddle contact. The power consumption is very low and the circuit is most flexible in that it is simple to change the output polarity from negative- to positive-going dots. Sufficient power is available at the output to drive a relay or transistor; but the basic keyer will key some transmitters directly.

Before describing the circuit it would probably be advisable to describe the operational amplifiers,

*29 Calton Rd., Gawler, South Australia 5118.

EDITOR'S NOTE: The author is referring to the basic design of W9TO. Ricks never published his design, although copies of the original circuit using vacuum tubes have been circulating since the early 1950s, and a commercial version has been marketed. The first reference in *QST* to the TO keyer was by Old, "Transistorized Electronic Key and Keyer," in the May 1959 issue. Various later semiconductor circuits based on the original TO design have appeared; the one enjoying current popularity, "The Micro-TO Keyer," by Opal, originally appeared in the August 1967 issue of *QST* and has been included in recent editions of the *Handbook*.

particularly their method of operation in this keyer. In the Motorola MC1437 IC or its equivalent, there are two separate identical amplifiers in one package; each is a dc amplifier with a very high voltage gain (about 45,000) and differential inputs. As used here the IC requires a dual power supply, that is, one with a positive voltage output and with a second output of equal voltage but negative polarity with respect to ground. In this circuit the op amps are used as differential switches; i.e., if the noninverting input is more positive than the inverting input, the op amp is positive (almost to the value of the positive supply bus) and if the inverting input is the more positive of the two, the output is negative to the same degree. In the condition when both inputs are about equal the output voltage is between the two extremes, but this condition does not occur in this keyer except during the fast transitional periods. Because of the high gain of an op amp, the difference between the inputs needs to be no more than a millivolt to swing the output to either positive or negative extreme.

In the first of a number of keyers built using op amps, the positive output state was the key-up condition, and the negative state was equivalent to key down. In this latter state the pnp output transistor which was used to key a blocked-grid transmitter was in the conductive state. However, the keying polarity can be reversed quite simply, so that the output is positive on key down, to operate the transmitter directly without using a keying transistor. The choice of output circuits is discussed later.

Dot Generator

The simplified circuit of the dot generator is given in Fig. 1A. The output of the op amp, U1A, is fed to the noninverting input (marked "+") via the voltage divider R1 and R2 and is also fed via R3 to the inverting input (marked "-") which is connected via C1 to ground.

The operation of the dot generator can be described by commencing at a time when the output has just become positive. At this time the noninverting input (+) is positive and the inverting input (-) is negative because of a negative charge on C1. Therefore the output remains positive. The capacitor charges positively via R3 until the inverting input becomes more positive than the noninverting input; when this occurs the output swings negative, putting a fixed negative voltage on the noninverting input via R1 and R2, and charging C

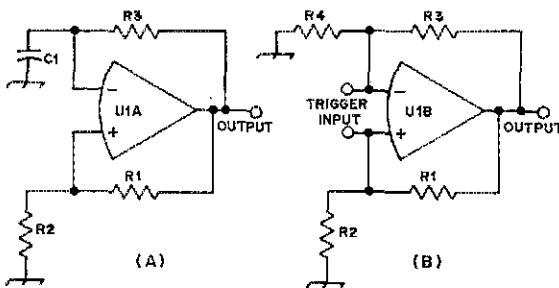


Fig. 1 — At A, a simplified circuit of the dot generator, and at B, the dash bistable circuit.

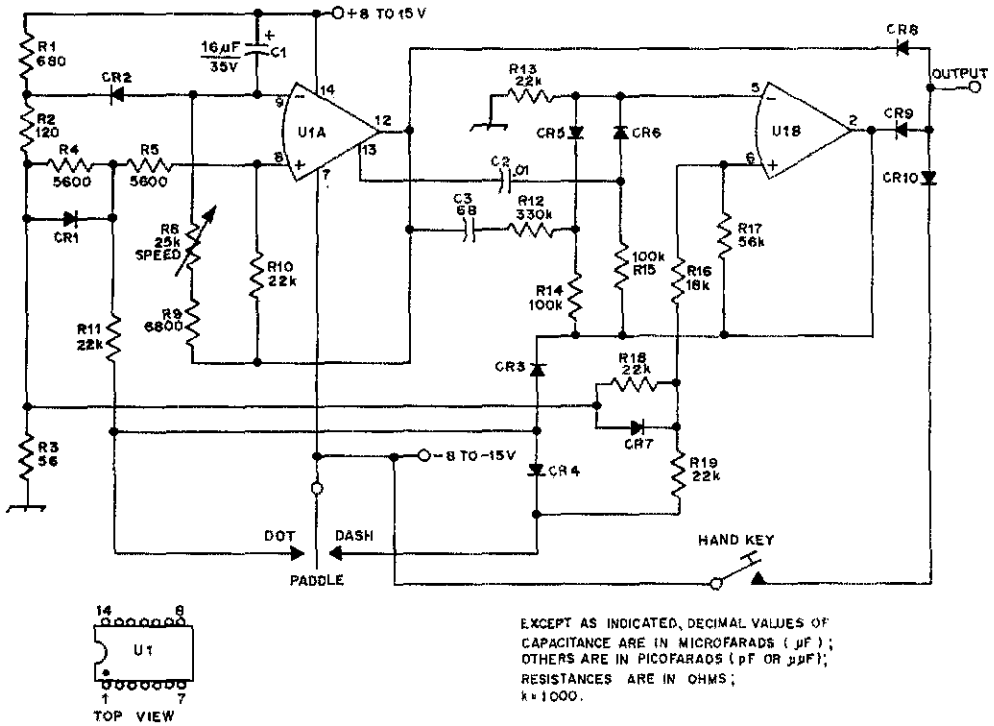


Fig. 2 — Keyer circuit for negative-going keyed output. No connections are made to IC pin numbers not shown. All fixed resistors may be 1/8 W except R1, which must be 1/4 W or higher. Parts not listed below are for text reference.

- CR1-CR10, incl. — Small-signal silicon diode, 50 V.
- R8 — Linear taper, low wattage.
- U1 — Dual operational amplifier, Motorola MC1437L or equiv.

negatively until the inverting input becomes more negative than the noninverting input. At this time the output swings positive and the cycle repeats itself, with the circuit behaving as a free-running multivibrator.² The period of oscillation is governed by the time constant of R3 and C1; speed ranges of greater than 10 to 1 can be obtained with a single value of capacitance, if desired.

Dash Bistable

If an op amp is connected as shown in Fig. 1B with resistive feedback from the output to both input terminals, and if the dc voltage fed to the inverting input is a smaller portion of the output than that fed to the noninverting input, the circuit becomes bistable and the output will maintain itself either positive or negative, according to how it has been set. If this circuit can be triggered by the dot generator to change from one state to the other at the beginning of each dot, its output can be used to fill in the space between each second pair of dots to form dashes.

The triggering circuit for the dash bistable can be seen in the basic circuit of the keyer (Fig. 2). Pulses are capacitively coupled from two output terminals in U1A, the dot generator op amp. The

normal output of U1A (terminal 12) is coupled via C3, R12 and CR5 to the inverting input of U1B, and an auxiliary output (terminal 13) via C2 and CR6. This auxiliary output terminal is normally used for frequency compensation and gives a signal which is much lower in amplitude than the normal output, but of opposite phase. When the output of U1B is positive, CR6 is conductive, allowing the positive pulse from C2, at the start of a dot, to pass to the inverting input of U1B; this causes the output of U1B to swing negative, making CR5 conduct instead of CR6. The positive pulse via C3 at the end of the dot does not affect that state of U1B, but the negative pulse at the start of the next dot turns the output of U1B positive again.

Gating Circuits

When the dot paddle contact is open and the output of U1A is positive (off) the circuit values are such that the noninverting input of U1A is more positive than the inverting input, which is held down by CR2. The output of U1A therefore remains positive until the dot contact is closed. This brings the junction point of R4 and R5 to about ground potential and the noninverting input more negative than the inverting input. The output of U1A swings negative (on) the holds itself in that condition until C1 becomes charged as described earlier. Once the U1A output has swung negative,

²Widlar, "Monolithic Operational Amplifiers — the Universal Linear Component," *National Semiconductor Note AM4*, April, 1968.

R10 effectively replaces R11 and the dot will complete itself correctly if the paddle contact is opened. Closing the dot contact for a microsecond is ample to form a full dot.

CR4 assures that the dash contact activates the dot generator and CR3 commences the second dot necessary to form a dash. When the dash contact is open and the output of U1B is positive (off), the noninverting input is sufficiently more positive than the inverting input and pulses from the dot generator are not able to cause U1B to change state. However, when the dash contact is closed, the junction of R18 and R19 assumes ground potential so that the leading edge of the first dot turns U1B on until the beginning of the next dot, which turns U1B off; the second dot completes itself and finishes the dash.

The function of other components in the circuit is as follows: R1, R2 and R3 form a voltage divider to set the voltage at which CR2 holds the inverting input of U1A when the dot contact is not closed, and the voltage drop across R3 offsets the forward drops across CR1 and CR7. R12 reduces the amplitude of the pulses from U1A to a safe value for the input of U1B.

CR8, CR9, and CR10 form an OR gate to combine the outputs of U1A, U1B, and a hand key, which will be found invaluable when tuning up the transmitter. It is suggested that a single-pole double-throw switch be used so that the dash contact on the paddle can be switched in instead of a separate hand key. This feature would then serve for tuning up, and would also convert the keyer to operate like a normal bug for visitors.

When the basic circuit given as Fig. 2 is used, the output voltage is positive for key up and negative during the dots and dashes. It is more convenient for some applications to have the output voltage negative for key up and positive for key down. This is accomplished simply by reversing the polarity of the supply lines, IC supply terminals, diodes, and the electrolytic capacitor. The circuit for a positive-going output is shown in Fig. 3.

Output Connections

The simplest method of connecting the keyer to a blocked-grid transmitter is shown in Fig. 4A. With this connection it is necessary to use the positive-going keyer circuit (Fig. 3). The possibility of being able to use this method of keying with your transmitter can be ascertained as follows. Connect a variable resistance of, say, 10,000 ohms across the key terminals of your transmitter and increase the value of this resistance until the transmitter ceases to transmit (this point can best be determined by listening on frequency with a receiver — how one does this with a transceiver is a problem we have not had to face). Measure the voltage across the resistance and the current through it. If the potential is less than 25 volts and the current less than about 10 mA, direct keying of the transmitter by the basic positive-going-output keyer is possible.

The power supply voltages will each need to be at least 60 percent of the voltage found from measurements described in the previous paragraph. Before connecting point A (Fig. 4A) to your keyer,

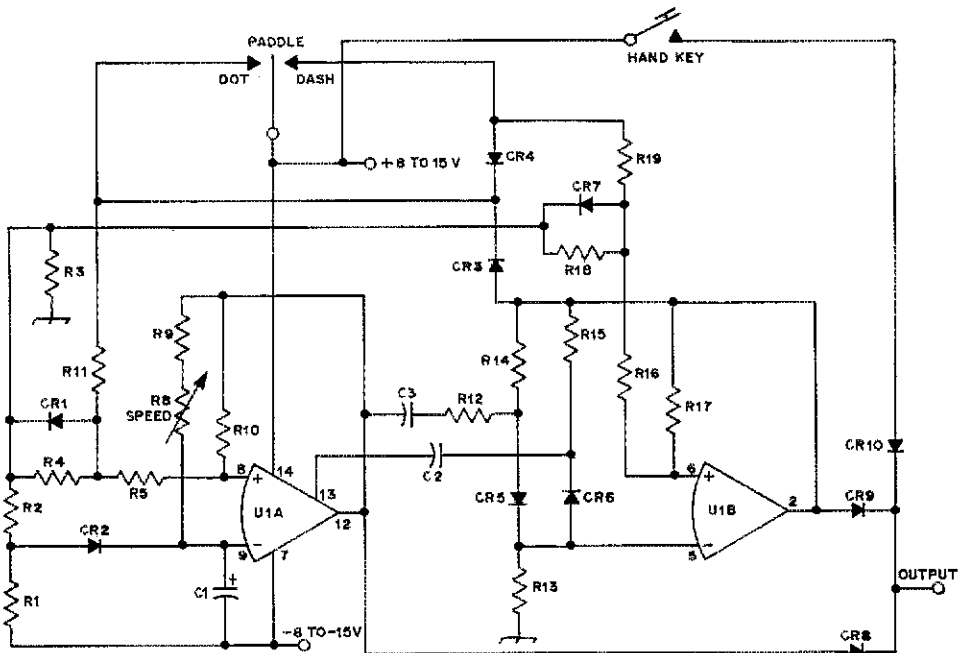


Fig. 3 — Keyer circuit for positive-going keyed output. Values of components are the same as in Fig. 2.

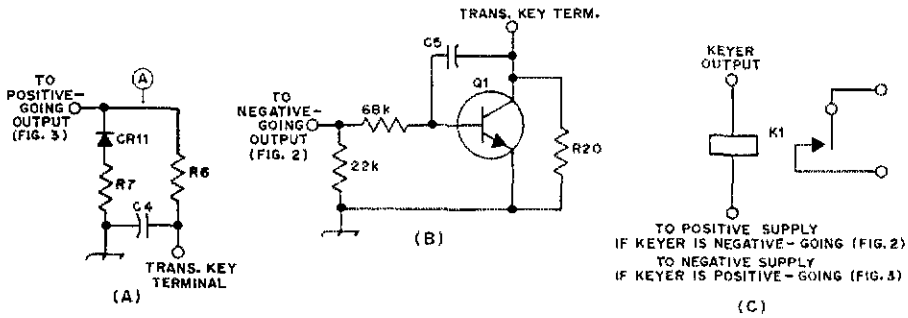


Fig. 4 — Output connections which may be used with OAKKEY. At A, simple circuit for direct keying of blocked-grid transmitter, at B, a transistor driver for keying blocked-grid transmitter,

and at C, relay keying. See text regarding values or types of components not listed below.

CR11 — Small-signal silicon diode, 50 V.
Q1 — Silicon transistor; see text.

connect it to the keyer positive supply voltage. Select a value for R6 such that the transmitter key terminal is approximately one volt positive. Disconnect point A from the keyer positive supply and select a value of R7 that maintains point A under this condition to a volt or so more positive than the negative supply voltage. R7 should be found to have a slightly lower value than R6. After determining the value of the resistors, connect the keyer. C4 is for key-click and transient suppression; its value must be found by experiment.

If a transistor is needed to couple the keyer to a blocked-grid transmitter the circuit shown in Fig. 4B may be used. Determine the minimum value of resistance which can be placed across the transmitter key terminals without causing the transmitter to come on. Choose a value slightly greater than this and measure the voltage across it. This resistor value should be chosen for R20 in Fig. 4B, and the collector-emitter voltage rating of Q1 should be comfortably greater than the voltage across the resistor. C1 is for key-click protection and should be chosen to be as large a value as possible before the keying becomes too soft. Your transmitter may not require the use of a capacitor at all.

The use of a relay in a keyer affords complete dc isolation between the keyer and the transmitter, but introduces time delays which may affect the mark-space ratio of the keying. The circuit used with a relay is shown in Fig. 4C; the total supply voltage should be a little higher than the relay coil requires. The resistance of the relay coil should be at least 500 ohms. If necessary, the mark-space ratio of the keyer can be adjusted to compensate somewhat for relay delays by varying the ratio of positive to negative power supply voltages.

Power Supplies

The power supply requirements of the keyer are quite low and the voltages are not critical. It has been found possible to vary the supply voltages between ± 6 volts and ± 15 volts (which was the maximum voltage available at the time) without varying the performance. At less than ± 6 volts one

keyer showed a tendency to oscillate at a higher frequency during the transition periods, although another worked at ± 4 volts. During development of the unit, voltages of ± 8 volts were used. The maximum voltage rating of the MC1437 is ± 18 volts, but there seems to be little point in using this voltage unless a large output swing is required. The voltage rating of C1 must be at least 20 percent greater than each supply voltage.

Fig. 5A shows how the positive and negative power supply voltages can be easily developed from the transmitter filament supply if one side of the supply is grounded, as it normally is. If the filament supply is 6.3 V ac, the dc voltages will be ± 8 volts.

Another method of obtaining the power supply voltages would be to use two 1-watt Zener diodes of the desired voltage and feed these via resistors from the transmitter supplies as shown in Fig. 5B. It must be remembered that the output current of the keyer when used in the direct output con-

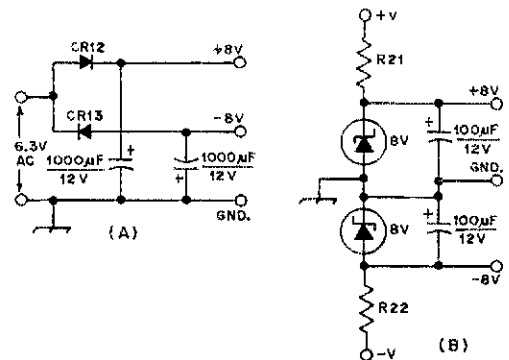


Fig. 5 — At A, a keyer power supply operated from 6.3 V ac, and at B, keyer operating voltages obtained from higher voltage supplies. See text regarding values or types of components not listed below.

CR12, CR13 — Silicon rectifier, 25 V or higher, 1 A.

Table 1. Table of Substitution Pin Numbers

MC1437L PIN No.	709 No. 1 PIN No.	709 No. 2 PIN No.
2		6
5		2
6		3
7	4	4
8	3	
9	2	
12	6	
13	5	
14	7	7

nection (Fig. 4A), or to drive a relay (Fig. 4C), is supplied by the power supply and allowance should be made for this in the choice of the dropping resistors, R21 and R22. If this method is used and the transmitter supply voltages are switched on and off, an extra dot may be developed on switching. The power requirements of the keyer when used with an output transistor are very small. This enables small batteries to be used if required.

Wide-Band Fm

(Continued from page 21)

The passive filter (C3, C4, C5 and L1 in Fig. 5) has an insertion loss of only 1 dB, uses no transistors, and has a large dynamic range. The filter has a cutoff frequency of 3.3 kHz, and its response is down 24 dB at 12 kHz. It is also an impedance transformer, 1000 to 22,000 ohms. Values were worked out by making the input and output capacitive reactances equal to the input and output resistances at the cut-off frequency. The resonant frequency of L1 and the two capacitors, C4 and C5, is about 3.8 kHz. The 0.7 H μ required for L1 was obtained by using the primary of an Argonne AR-154 audio transformer. The output of the filter is fed to the audio input of the varactor modulator, Fig. 4.

The transmitter has been checked on a frequency modulation monitor, giving a deviation of \pm 15 kHz, with a linearity better than 3 percent. It has also been monitored at 222 MHz, the fourth harmonic of a 55.5-MHz output frequency, with 60 kHz deviation, using a receiver having entertainment-type bandwidth.

Construction

The first photograph shows two versions of the exciter. The larger was tacked together on large pieces of copper-clad board. This has the active filter referred to above, but is otherwise similar in circuit to the smaller version in front of it, also seen in better detail in the second picture. The second model is on double-sided circuit board,

Variations and Performance

It is possible to use two 709 type ICs instead of the MC1437, and, in fact, the development work on the keyer was done with 709s, which were more readily available. Pin connections, if the TO-5 type of 709 is used, should be changed according to Table 1. No other changes are necessary. Other types of op amps could also be used, probably with some circuit changes, but the output capabilities may not be as great. The 741 has not been found successful in this circuit.

Various aspects of the performance of the keyer have been mentioned above. The writer has used a keyer containing a pair of 709s and a 2N404 output transistor to key an FL100B transmitter (the value of R1 in Fig. 4B is 3900 ohms and C1 is .01 μ F), using the power supply shown in Fig. 5A. Another unit using an MC1437 and a 16- μ F capacitor for C1, Fig. 2, has a speed range of less than 4 wpm to 44 wpm and keys the FL100B through a 2N3638. The current method is to key the FL100B directly from a positive-going keyer (Fig. 3) using two 709s. The fast rise and fall time of the characters should be an advantage in the development of full break-in circuitry, which is a future project.

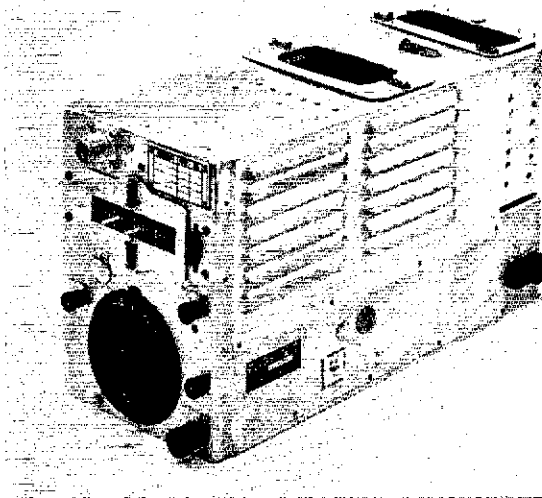
with the rf circuitry on one side and the audio components on the other. All components are mounted on glass standoffs. The board is 4-3/4 by 2-3/4 inches in size, for mounting on studs inside a 2 by 4 by 6-inch chassis, with the microphone jack, deviation control and output connector mounted on the side of the box.



SOME ADDITIONAL QUESTIONS FOR THE GENERAL LICENSE EXAMINATION

1. Can an AM transmitter be operated only till noon of each day?
2. Are "Henry" and "Gilbert" related? In Watt way?
3. Is "OHM" an abbreviation for OLD MAN?
4. If you touched the primary terminals of a high voltage transformer would it make you feel secondary?
5. Are matches really kept in a match box? How about a lunch box?
6. Can a person drown in a sine wave?
7. If you touch the two wire leads of a charged condenser, will it give you a skin effect?
8. What is QTH? (Cutey H) (check one) (a) a transmitter location or (b) a pretty YL named Harriet?
9. What is a Joule? (check one) (a) a unit of energy. (b) the efficient house maid next door (c) or a three carat diamond?
10. A sine (sign) wave is used mostly by whom? (check one) (a) A laboratory technician (b) A catcher making motions behind the batter's back (c) or a striker picketing in front of a factory? - WB4OHH, in Florida Skip.

100 Watts on 160 Meters, Using a BC-458



The converted BC-458-A, 5.3- to 7-MHz surplus transmitter. The dial markings on the front have no relation to the frequency of the 160-meter output but can be used as a means of log settings of the PA tank capacitor, C65.

BY PHILIP H. BARNES,* W3MTK

I WAS INTERESTED in joining the group on 160 meters but was faced with the problem of not having a transmitter for the band. As is generally known, few of the transmitters manufactured these days have the capability to be used on 160. I wanted to be able to use the maximum legal power, 100 watts (after sundown) in my state of Maryland, but did not have the desire to construct an entire ssb/cw transmitter. Faced with the possible expense involved for a new transmitter, it appeared that the most economical way for me was to construct some sort of mixing circuit that would accept the output from a low-power 80-meter transmitter to produce the 160-meter signal and then go on to amplify it to the desired 100 watts.

A BC-458 Command transmitter appeared to be my best choice. It had a very stable oscillator that, when tuned to 5.8 MHz and mixed with the 3.975- to 4-MHz signal, could be used in the 1.8- to 1.825-MHz range. Of course extensive modification to the Command transmitter would have to be made, but it would be nothing that couldn't be done with parts from the junk box. Also I think that it's nice to say that a part of the equipment I'm using was constructed by me.

The block diagram in Fig. 1 shows what is necessary to get the 160-meter signal generated. One note of interest should be mentioned here, though it has been treated adequately in the *Handbook*, when the oscillator frequency is above the modulated signal, the resulting signal will be inverted. This is not important when using cw but if a lsb 160-meter is desired, then usb must be generated in the exciter transmitter. With a-m of course, it would make no difference.

Modification of the BC-458

It is helpful, though not essential, to refer to the original schematic and parts list of the transmitter. These may be found in some of the older surplus-radio conversion manuals published a few years ago. Many of the parts will be reused but quite a few will be of no use because of the change in frequency.

I started the job by stripping the transmitter of all parts that would not be required. This left me with capacitors C58 to C63 and C65 to C68, inclusive, and R68 and R72. I did not change anything in the 1626 oscillator area. The antenna-tuning coil, L52, and its roller contact were removed and were used in the final amplifier plate-tank circuit. The flexible gang-tuning shaft was disconnected and removed by driving out the 1/16-inch steel pins from the mechanical couplings. The original antenna-coupling circuit (T54) is not needed, so it was discarded, as was the variable-link shaft. The knob from the variable-link shaft was

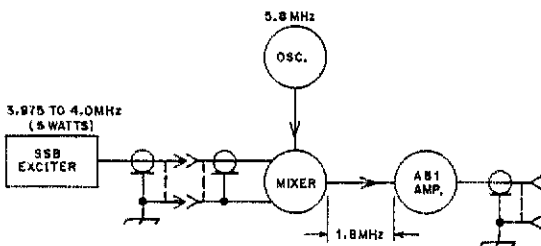
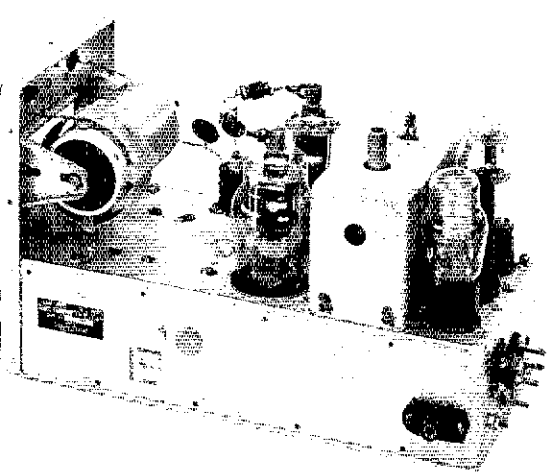


Fig. 1 -- Block diagram of the method used to generate the 160-meter signal.

* 329 Winter Quarters Drive, Pocomoke City, MD 21851.



used to turn C63, the oscillator-tuning capacitor. Drill out the rivets holding the bracket support for R71, connected to pins 2 and 7 of the resonance-indicator tube, V53. Then use one hole for the mounting of an added variable inductance in the grids of the amplifiers. The other hole is used for the mounting of a ground post.

Construction and Wiring

The 1626 oscillator-tube socket is not disturbed and the remaining two sockets are wired for the 6AG7 mixer and a 0C3 voltage regulator, as shown in Fig. 2. The original power socket on the rear chassis wall was replaced with a 5-pin plug which provides connections for the 12-V filament, 250 V dc, 300 V dc regulated, ground, and the grid-bias voltage. The high voltage is supplied through a Millen high-voltage connector. The original antenna connector was removed from the front panel and replaced with an SO-239 chassis-type receptacle. Another SO-239 was installed at the rear of the chassis for the low-level 75-meter ssb signal input to the mixer stage.

The 1626 oscillator stage is supplied with approximately 105 volts B+, which is regulated by a 0C3. An added 6AG7 mixer stage was located in the remaining socket at the rear of the transmitter, and a tuned circuit made of L1 and a 330-pF capacitor is located just below the socket.

Fig. 3 — The oscillator components in the metal compartment, and the 1626 tube are unchanged from the original state after setting to a fixed frequency of 5.8-MHz. The voltage regulator (0C3) and a mixer circuit (6AG7) have been added across the rear of the transmitter. The disabled roller coil that served to tune the transmitter is used again with an added coupling coil made of B&W type 3906-1 stock. The high-voltage connector accepts the B+ while the 5-prong plug at the rear receives all other voltages necessary for operation.

The original roller coil, in the amplifier stage L52, is connected across the plate-tuning capacitor but does not have enough inductance (15- μ H) to reach the desired range. A 200-pF mica capacitor was added to obtain resonance at 1.8 MHz. The padding capacitor, C67, was reset and relocated with the plates at full mesh. With this change the amplifier will tune 1.8 MHz.

The output coil, L3, consists of a 1-inch section of a B&W Type 3906-1 inductor that is 2-1/2 inches in diameter, 8 turns per inch. This coil has an inductance of about 4.5 μ H, which appears to be correct for matching a 50-ohm antenna system. This coil is mounted at the cold end of the roller coil, now designated L2, and is supported by strips of 1-inch-long polystyrene glued to the inside of the four coil ribs. Depending upon your particular antenna system and the impedance presented to the transmitter, you may need a different coil value for L3. One amateur I know uses four turns of No. 12 wire in this same circuit.

Tuning and Adjustment

The oscillator runs continuously and is set to operate at 5.8 MHz. The ssb exciter is tuned from 4 to 3.975 MHz to obtain an output between 1.8 and 1.825 MHz. The amplifier grid circuit coil, L1, is adjusted for maximum output midway between these two 160-meter frequencies.

The 75-meter signal should be limited to about 5 to 10 watts. Overdriving the cathode of the 6AG7 may result in damage to the mixer or cause a loss of output because of improper mixing levels.

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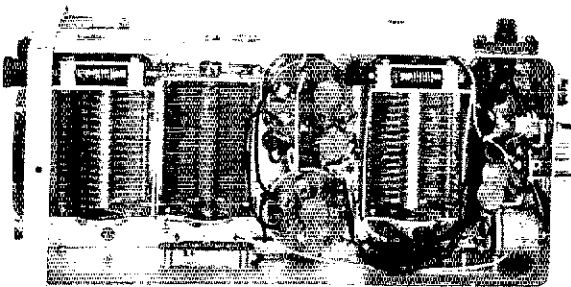


Fig. 4 — The underside of the BC-458-A shows that only a small amount of work is required to convert the transmitter for 160-meter operation. C65 is tuned from the front, while C67, a padder, is tuned from a hole in the right side of the transmitter. C63, the large capacitor at the rear, is tuned for a frequency of 5.8 MHz by means of the relocated knob, then left alone. The operating frequency is varied by tuning the ssb exciter.

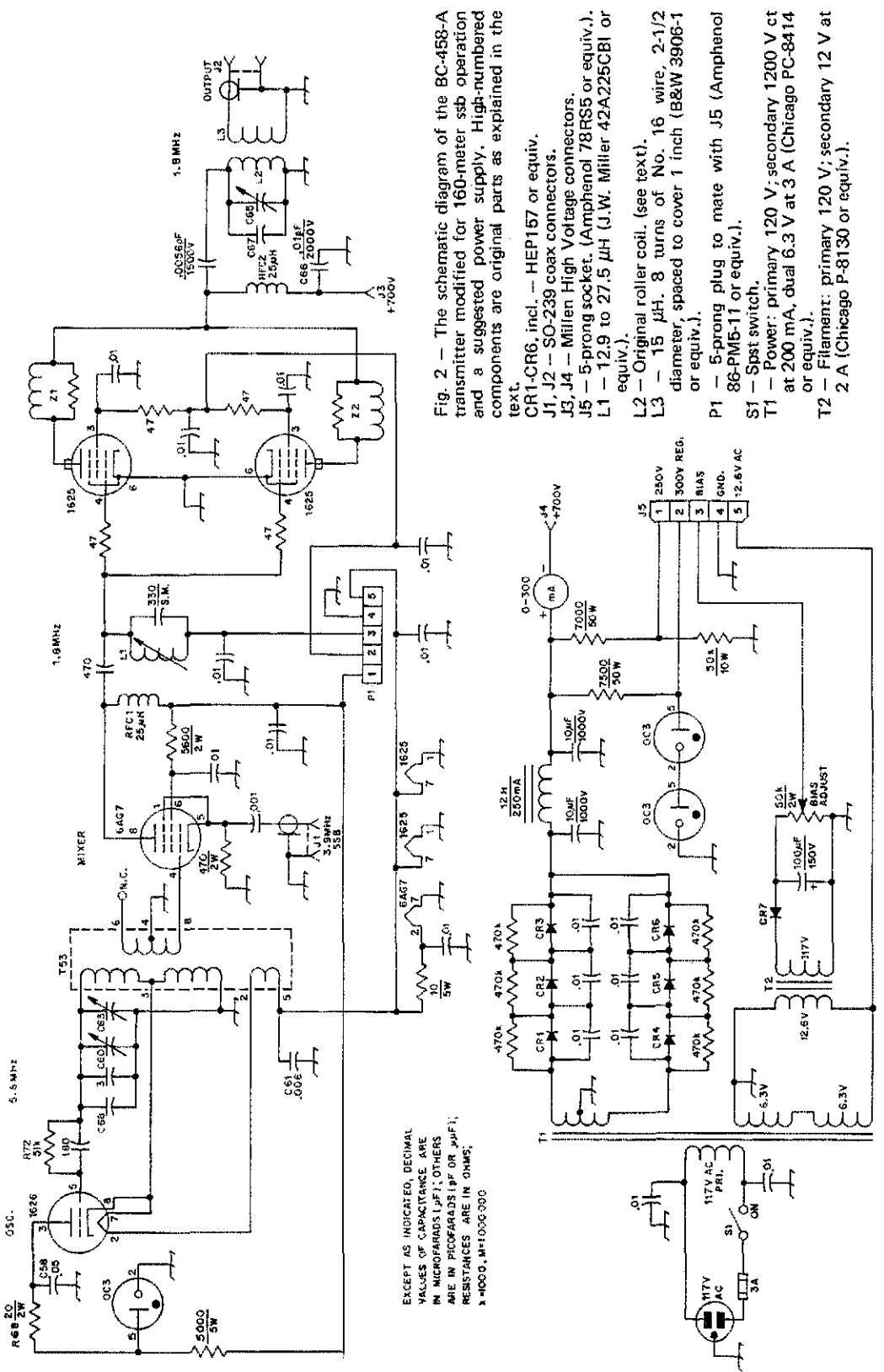


Fig. 2 - The schematic diagram of the BC-458-A transmitter modified for 160-meter ssb operation and a suggested power supply. High-numbered components are original parts as explained in the text.

CRI-CR6, incl. - HEP157 or equiv.
 J1, J2 - SO-239 coax connectors.
 J3, J4 - Mililen High Voltage connectors.
 J5 - 5-prong socket. (Amphenol 78RS5 or equiv.).
 L1 - 12.9 to 27.5 μ H (J.W. Miller 42A225CBI or equiv.).
 L2 - Original roller coil. (see text).
 L3 - 15 μ H, 8 turns of No. 16 wire, 2-1/2 diameter, spaced to cover 1 inch (B&W 3906-1 or equiv.).
 P1 - 5-prong plug to mate with J5 (Amphenol 86-PM5-11 or equiv.).
 S1 - 5-spst switch.
 T1 - Power: primary 120 V; secondary 1200 V ct at 200 mA, dual 6.3 V at 3 A (Chicago PC-8414 or equiv.).
 T2 - Filament: primary 120 V; secondary 12 V at 2 A (Chicago P-8130 or equiv.).

EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μ F); OTHERS ARE IN PICOFARADS (pF OR μ pF); RESISTANCES ARE IN OHMS; 1 = 1000, M=1000-300

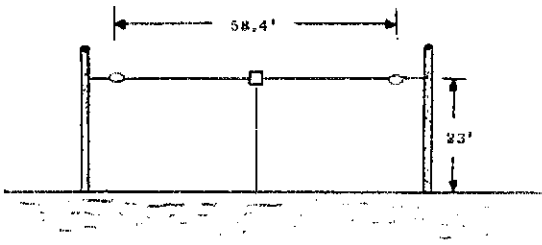


Fig. 1 — Dimensions of the test dipole.

A Closer Look at the HF Resonant Dipole

BY W. R. VINCENT,* WA6CBX

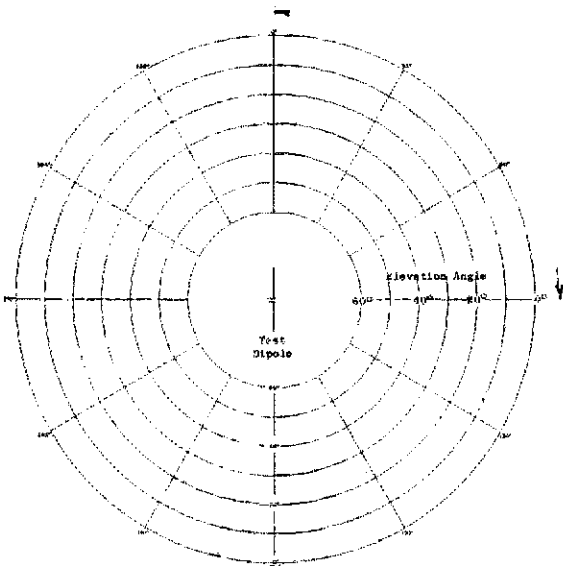


Fig. 2 — Identification of axes of radiation-pattern contour plots.

THE RESONANT DIPOLE ANTENNA has been successfully used by radio amateurs and communicators the world over. Yet, some aspects of its radiation of radio energy are poorly presented in antenna manuals and often misunderstood by the user. To better understand the radiation of energy from a resonant hf dipole, a series of airborne measurements were made on a full-scale hf dipole installed in a typical field situation. The dipole configuration shown in Fig. 1 is typical of those under test and represents many amateur antenna installations. The dipole is mounted between non-conducting wooden poles less than 1/4 wavelength above smooth ground and is trimmed to resonate at a test frequency near 8 MHz.

The test dipole received signals emanating from a linearly polarized antenna and transmitter towed behind (and isolated from) an aircraft by plastic rope.¹ The position of the aircraft was accurately controlled to fly in circles of constant radius and constant elevation around the test dipole. The signal level received by the test dipole was measured to determine its response to the constant field radiated by the aircraft transmitter.

Pattern Display

The conventional azimuth and elevation pattern displays do not allow for convenient display of an antenna's radiation at all azimuth and elevation angles. Consequently, a different format was employed which can be visualized by placing a plastic hemisphere over the test antenna. The radius of the hemisphere must be sufficiently large so that its perimeter is in the far field of the test antenna. Lines can be drawn on the surface of the hemisphere representing the magnitude of the received signals. When viewed from directly above, these contour lines represent the radiation pattern of the antenna at any azimuth or elevation angle. When projected vertically downward onto a flat plane and adjusted to show a linear elevation-angle scale, the plot is called a stereographic projection. Fig. 2 illustrates this type of projection and provides convenient axis identification for later plots.

Horizontally Polarized or E_{ϕ} Response

The aircraft towed the source transmitter in a horizontally polarized configuration around the test antenna at a radius of three miles starting at a low elevation and progressing, in stages, to higher elevations. Each orbit was at a constant radius and constant elevation. This process was repeated in steps of 5 or 6 degrees in elevation angle until the orbit became too small (at high elevation angles) for safe aircraft turning.

Signal levels received by the dipole antenna then were drawn on the surface of the hemisphere (or perhaps more accurately on its flat stereographic projection) in contours of equal signal strength. The contours of signal strength are provided in 3

* 26070 Kriste Lane, Los Altos Hills, CA 94022.

¹ Barnes, "Transmitters Towed Through Air Test Antenna's Radiation Pattern," *Electronics*, October 18, 1965.

dB steps. The resultant pattern is shown in Fig. 3. The maximum response occurred broadside to the dipole at an elevation angle of about 50 degrees. Deep nulls occurred off the ends of the dipole. The response decreased considerably at low elevation angles.

E_θ Response

The process was repeated with the source transmitter towed in a vertically oriented configuration. At low elevation angles the vertical orientation of the source transmitter provided an adequate source of vertically polarized signals; however, at higher elevation angles the polarization of the source should be normal to a line between the test antenna and the source transmitter to simulate the signals arriving from the distant ionosphere. The pattern of the source transmitter was known and a correction factor varying with elevation angle

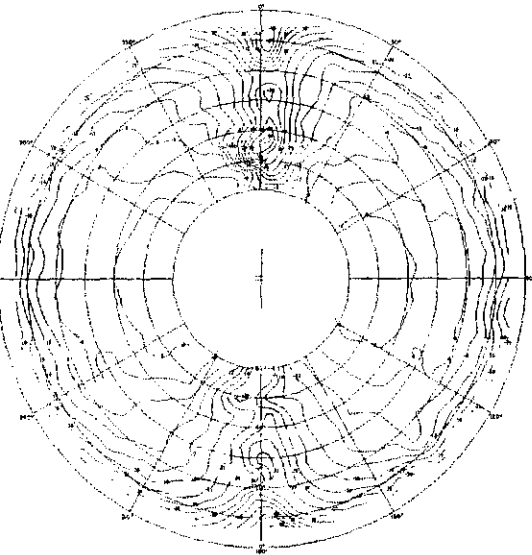


Fig. 3 - E_{ϕ} or horizontally polarized radiation pattern of the test dipole.

was used to compensate for the inability to tow the test source at the ideal orientation. Waves with a vertical-polarization component normal to the line between the test antenna and the source are referred to as the E_{θ} polarization.

Again, contours of signal level were drawn on the stereographic projection and the resultant E_{θ} pattern is shown in Fig. 4. Maximum response occurred from the ends of the dipole at about 50 degrees in elevation. Deep nulls occurred broadside to the dipole.

Discussion

The E_{ϕ} and E_{θ} patterns shown in Figs. 3 and 4, respectively, have been calibrated so that similar signal magnitudes are equal in each plot. These two plots show that a dipole receives E_{ϕ} signals well off

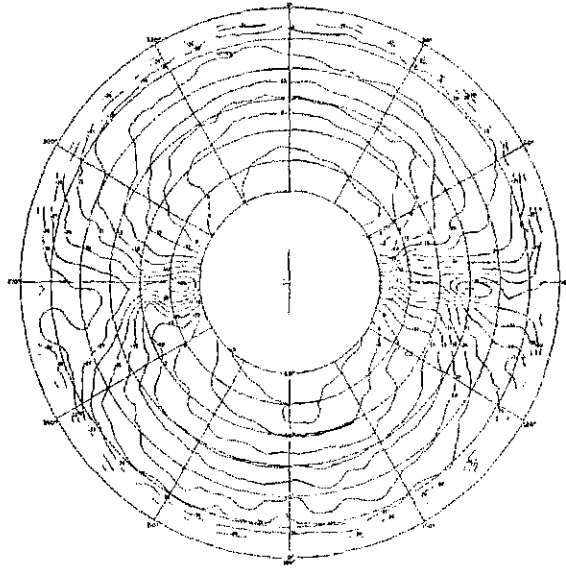


Fig. 4 - E_{θ} or vertically polarized radiation pattern of the dipole.

its sides and E_{θ} signals almost equally well off its ends. To better illustrate the true response of an hf dipole to randomly or rapidly changing polarization of ionospherically propagated signals, the data used to make the E_{ϕ} and E_{θ} plots of Fig. 3 and 4 were combined. At uniform increments of azimuth and elevation angle, the power response (E_p) of the test dipole was determined by inserting the appropriate values of E_{ϕ} and E_{θ} in the formula $E_p = E_{\phi}^2 + E_{\theta}^2$ and the values of E_p obtained were used to generate a power-response of a dipole antenna to sky-wave signals which are randomly or

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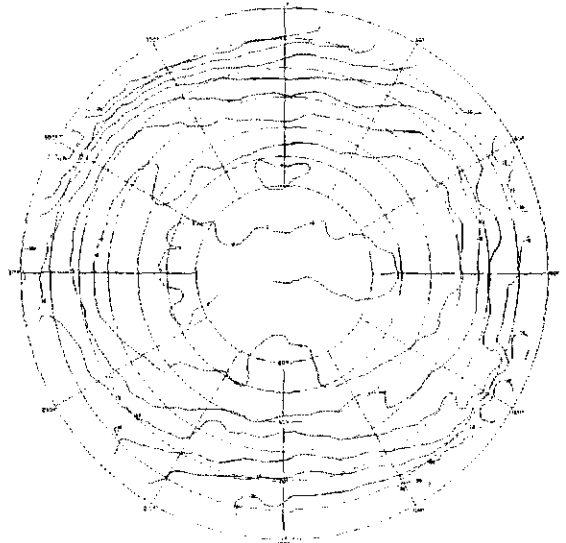


Fig. 5 - Power-radiation pattern of the dipole.

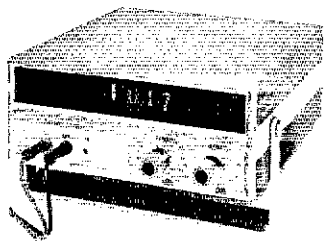


Recent Equipment



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

The Heath IM-102 Digital Multimeter



BECAUSE INTEGRATED CIRCUITS have voltage and current requirements that are quite different from vacuum tubes, the values of resistance and magnitude of voltage in IC circuits are often of critical importance if proper operation is to be assured. Analog multimeters designed to test tube circuits often do not have the sensitivity and accuracy needed for testing solid-state projects. However, ICs have, in effect, come to their own rescue. Low-cost integrated circuits can be combined in an instrument which can measure voltage, current, and resistance with an accuracy 10 to 100 times better than that of the popular VOMs and VTVMs. Heath's new IM-102 multimeter is a good example of such an instrument.

The IM-102 has digital readout. A test instrument with digital display has an important advan-

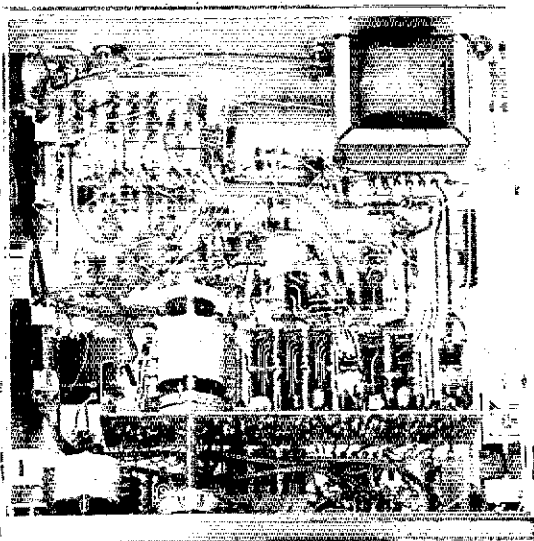
tage not found in units with moving-vane meters. A meter must be read by an operator who can be confused by multiple scales and who must estimate the position of the meter needle relative to the scale behind it. If a digital display shows 1.675 V, there isn't much chance for misinterpretation. The digital readout of the IM-102 can be read easily from ten feet away.

Heath's digital multimeter (DMM) is designed to measure ac and dc voltage, ac and dc current, and resistance. Full-scale voltage ranges are 200 millivolts to 1000 volts (500 volts maximum for ac), and the current ranges cover 200 microamperes to 2 amperes. Six resistance ranges from 200 ohms full scale to 200 megohms are also provided. The polarity of dc voltage and current is automatically sensed and displayed. The unit may be operated from either 120 or 240 volts ac.

Accuracy of measurements made with the Heath unit varies from range to range and depends on the tolerances of the calibration standards used to align the instrument. With laboratory equipment the dc voltage ranges can be set to have an accuracy of ± 0.1 percent, plus or minus one count; input impedance is 10 megohms or more for all voltage ranges. Accuracy of the resistance calibration can be ± 0.25 percent to ± 1.5 percent, depending on the range selected and the accuracy of the calibrator used. Ac readings are average-responding, but calibrated to read rms with accuracies from ± 0.5 percent to ± 1.5 percent. Ac-input impedance of the IM-102 is 1 megohm shunted by 150 picofarads. The meter takes up to 2 seconds to complete and display a dc measurement; the 10-megohm resistance scale requires 10 seconds, and ac checks take 5 seconds.

Circuits

A complete explanation of the circuit would take far more space than is available here. We will describe details of some of the more unusual aspects of the design. A complete description of the unit can be found in the instruction manual (Heath part number 595-1346) which is available for \$2. A block diagram of the IM-102 is shown in Fig. 1. If the RANGE switch is set for ac voltage, an ac-to-dc converter is activated. Dc inputs are passed directly to an analog-to-digital converter, which is a dual-slope integrator operating from a



The ac-to-dc converter is constructed on the pc board mounted parallel to the front panel. This board is supported by the RANGE switch. The fuse holders to the left contain fuses used to protect the input circuits of the digital multimeter.

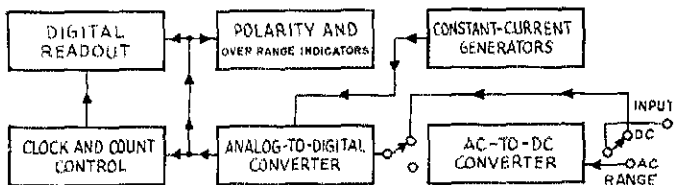


Fig. 1 — Block diagram of the IM-102

constant-current generator (more about this circuit later).

The output of the analog-to-digital (A/D) converter is a string of pulses which are counted, stored momentarily, and decoded by digital-logic ICs. The operation of such counters has been covered in detail recently in *QST*^{1,2,3} and will not be repeated here. Three Nixie cold-cathode tubes and one neon lamp are employed for numerical display. Each Nixie can display numerals from zero to nine. If the count goes above 999, the neon bar lamp is activated. Thus, the maximum count that can be displayed is 1999. Engineers usually refer to this type of readout as a 3-1/2 digit display. If the count goes above 1999, an over-range indicator (a neon lamp which back lights a printed section of the front panel) is activated.

The "heart" of any digital multimeter is its analog-to-digital converter. In the IM-102 the A/D section has two basic ranges, 0 to 200 millivolts and 0 to 2 volts. All of the multimeter functions are adapted to provide dc output in one or the other of these ranges. A 40-kHz oscillator (called a clock by digital designers) establishes the time base for the instrument. During each measurement period, 8000 clock pulses are produced. The digital-to-analog converter determines the number of these pulses that enter the counter section using a patented technique called dual-slope integration.

¹Macleish, "A Frequency Counter for the Amateur Station," *QST*, October, 1970.

²Recent Equipment, "Eldorado Electrodata Model 225 Frequency Meter," *QST*, February, 1971.

³Recent Equipment, "Heath Model 1B-101 Frequency Counter," *QST*, May, 1971.

The integrator uses an SL11862 high-performance operational amplifier, IC1 of Fig. 2A. Integrating action, averaging the level of voltage over a period of time, is accomplished by R118, C108 and IC1. The input potential to IC1 determines how long it takes to charge C108, time period T_1 of Fig. 2B. For the remainder of the count period, T_2 , C108 is discharged and clock pulses pass to the counter circuit. The higher the input potential, the faster C108 will charge, increasing the number of clock pulses passed to the counter during time period T_2 . When a total of 8000 clock pulses have been produced, a reset function is generated by the count-control section and a new count period begins. The discharge of C108 is controlled by a constant-current source. An appropriate constant-current generator for the polarity of the input voltage is selected automatically by the digital circuitry.

Output from IC1 is fed to a voltage comparator, IC3 of Fig. 3. A comparator is a special form of operational amplifier used to sense the level of analog or digital energy. Output from the comparator will be either logic high or logic low, depending on the input potential and any offset voltage applied. When the input signal is positive, the output from IC3 will be low. This low stage is inverted by IC9C, and the resulting high activates Q12 that the transistor turns on. The neon lamp in the collector circuit of Q12 will then be on, providing a visual indication that positive input voltage is being applied to the multimeter. A high output from IC4 will cause the Q output of IC4 to be high, enabling the negative-polarity neon indicator.

Output from IC3 also activates the appropriate constant-current generator in the analog-to-digital converter. IC7A and Q6 turn on the positive-

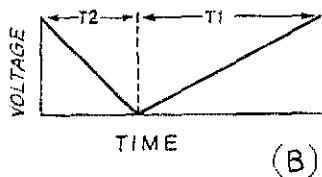
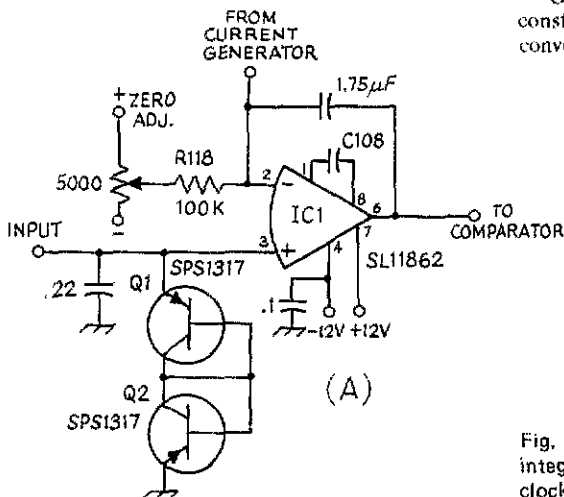
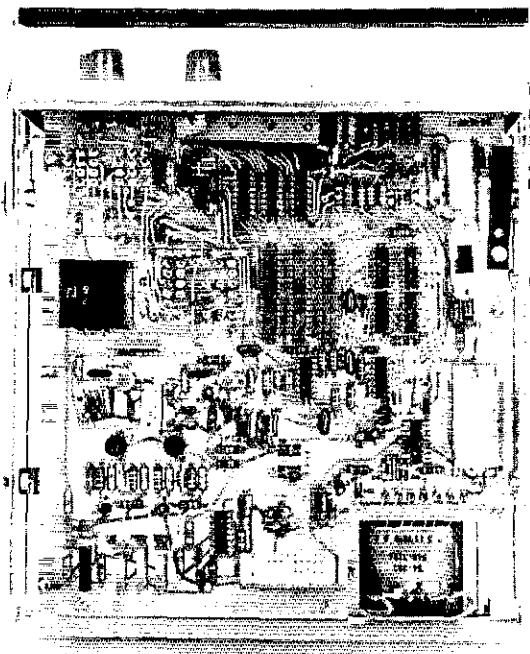


Fig. 2 — (A) Simplified diagram of the dual slope integrator. (B) Typical integrator cycle for 8000 clock pulses.



The digital-counter ICs and readout tubes are located on the upper half of the circuit board. The controls at the lower left are calibration adjustments reached via holes in the rear deck. The slide switch at the upper right is used only during the calibration procedure.

Other Notes

Assembly of the IM-102 is an exacting, but not difficult, task. One large circuit board holds most of the components. The ac-to-dc converter is constructed on a small pc board which mounts below the main board. The RANGE and FUNCTION switches mount into the pc board, eliminating tedious point-to-point wiring of switch contacts. This writer required 10 hours to complete the assembly of the digital multimeter.

Calibration of the IM-102 takes time and patience. Heath provides a calibrator which delivers 200 millivolts to set one basic range of the A/D converter and which contains a resistive network that, using a 3.5-volt source from within the instrument, provides the 2.00 volts needed to set the other basic range. Calibration instructions written for the Heath calibrator and for laboratory standards are given in the IM-102 manual. One very expensive ac standard is needed for alignment of the frequency-compensation capacitors in the ac-to-dc converter. The ARRL lab does not have such a standard, so we cannot report about the error, if any, when using the preset position given for the trimmers as an alternative alignment procedure.

current generator, while IC7B, IC7C and Q4 enable the negative generator, as shown in Fig. 3.

The circuit of the positive constant-current generator is given in Fig. 4. Q7, a dual npn transistor, controls the current source. The level of output current is set by R139, R141 and ZD3. As voltage drops across the two emitter-base junctions equalize, the emitter current will be set by the Zener-diode voltage divided by the sum of R141 and R142. The control, R141, is calibrated so that the output current is exactly 400 μ A.

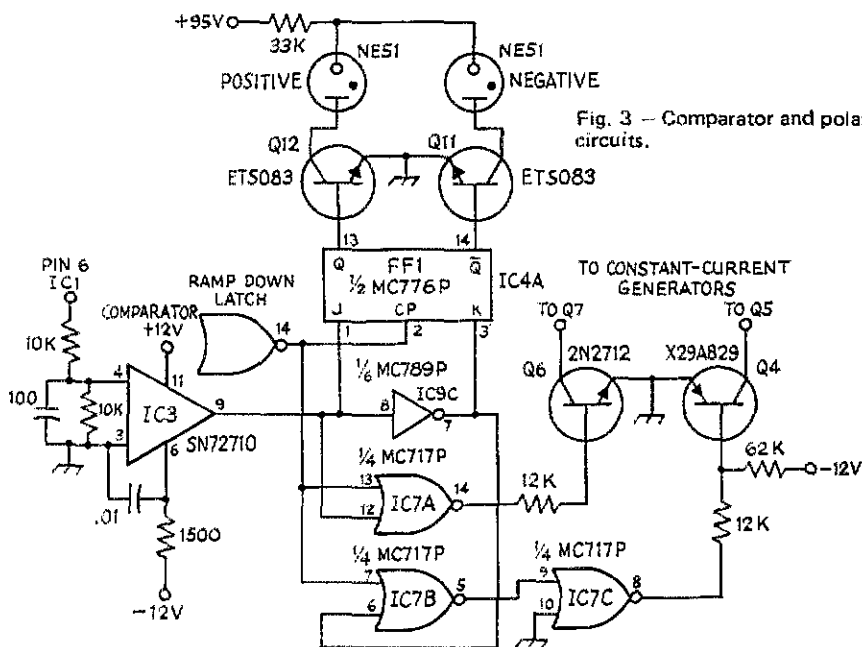


Fig. 3 — Comparator and polarity-indicating circuits.

There are difficulties in using every test instrument, and the IM-102 is no exception. Two problems are common to all digital multimeters when they are used in the ham shack. A digital voltmeter is difficult to use for an alignment task because the reading changes with each count period. Any tune-for-maximum (or minimum) adjustment presents a problem because the flashing numbers cannot be easily interpreted as an indication of relative direction as can a moving-vane indicator. The delay in a DMM from the time a measurement is made until the reading is displayed compounds the problem. Perhaps this is why at least one manufacturer has included a moving-vane meter in their DMM.

Digital multimeters do not have sufficient shielding and filtering to allow operation in a strong rf field. In the lingo of designers, they are not rf "hardened." Even a QRP rig will usually induce enough rf into the DMM low-level stages to cause a random count or lock up of the counting ICs.

The IM-102 uses the same cabinet design as employed for Heath's counters and prescaler. The cabinet has a mechanical problem in the design of the combination handle/tilt bracket. The spring used isn't strong enough to support the instrument in the tilt position, and the angles that have been set by the design of the tilt mechanism are an odd choice. One can only hope that Heath will find a way to improve the handle design, and will make a modification kit available for those who suffer with the current design.

When compared to its level of performance, the problems with the IM-102 are minor. Using a DMM opens a new world for the experimenter. For the

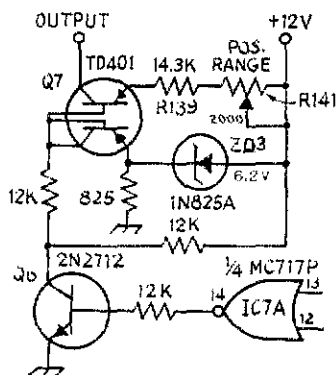


Fig. 4 — Constant-current generator for positive output.

first time he is able to check voltage changes in an IC regulator and to set the filament voltage for a 4X250B at 6.0. Heath pioneered the first low-cost oscilloscopes and VTVM kits; it is fitting that the same firm has the first DMM kit priced within the budget of many amateurs. — WIKLK

Heath IM-102 Digital Multimeter

Dimensions (HWD) and Weight:
 3 × 7 × 8 inches, 9 pounds.
 Power Requirements: 120 or 240 V ac, 8W.
 Price Class: \$230.
 Manufacturer: Heath Company, Benton Harbor, MI 49022.

QST ————— QST ————— QST

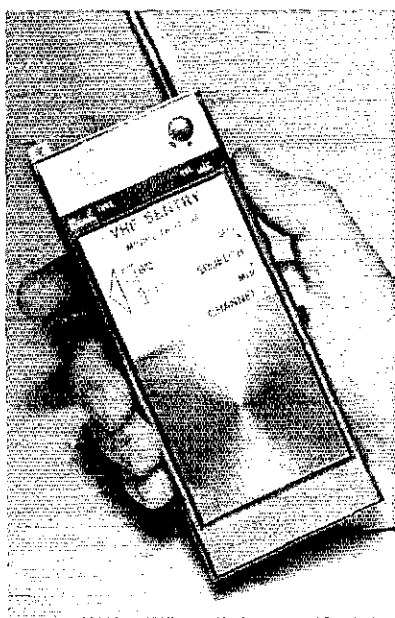
Sonar Sentry

Fm/A-m Monitor Receiver,

Model FR-103SA

HOW MANY TIMES have you wanted to carry an a-m broadcast receiver with you on a club picnic, to a hamfest, or to a convention? Probably not very often! But how about taking along an a-m receiver that can be used to monitor your favorite 2-meter fm frequency as well as the bc band? The ham-band feature certainly does tend to sweeten the pudding, in this writer's view.

Well, Sonar Radio Corporation has made it possible to keep up to date on the news, weather, and amateur-band fm by offering their Sentry monitor receiver. Three crystal-controlled 2-meter channels are selectable by means of a three-position slide switch on the side of the case. A telescoping whip antenna comes as a built-in "radio-wave sampler" for vhf reception. A ferrite-bar antenna is contained within the receiver for use during a-m reception.



is good: there is audio gain to spare, even on the weaker signals. Battery life appears to be typical of that for most imported receivers using a similar number of transistors (10 in this instance, including vhf converter). A miniature dc voltmeter is included on the front panel of the unit to show relative battery voltage during operation.

No i-f filter is used in the Sentry. Selectivity is dependent upon the characteristics of the 455-kHz i-f section in the a-m receiver. No evidence of spillover from nearby adjacent-channel repeaters could be noted, an indication that the selectivity is suitable for more casual use. No spurious responses from commercial services were observed during the two-month period the receiver was used in the Hartford area.

Though the receiver employs crystal control for vhf use, one can tune above and below the selected channel and pick up signals from other amateur stations. For example, when the crystal selector is set for reception on 146.76 MHz, slight adjustment of the a-m tuning dial will permit 146.79-MHz signals to be received. The sensitivity decreases markedly as the set is tuned farther above or below the crystal-controlled channel it is set to receive.

Amateurs who enjoy listening to music, weather, and news, but wish also to keep up to date on what their friends are saying on fm, should find the Sonar Sentry to their liking. — *WICER*

Sonar Sentry Receiver

Dimensions (HWD) and Weight:
5-7/8 × 2-1/2 × 1-5/16, 11 ounces.
Power Requirements: 9 volts dc.
Price Class: \$50.
Manufacturer: Sonar Radio Corp., 73 Wort-
man Ave., Brooklyn, NY 11207.

100 Watts on 160 Meters

(Continued from page 47)

For Class AB1 operation of the amplifier the idling current is adjusted for about 40 mA with the 700 volts of B+ applied. This is accomplished with between -30 and -35 volts on the PA grids and will result in approximately 28 watts of plate dissipation.

Initial adjustments on the PA tank circuit were made by using various settings of C65 and observing the indication of resonance on a grid-dip meter which was tuned to a frequency between 1.8 and 1.825 MHz. The tuning of C65 is slow because of the worm gear used, but does not appear to be critical. Though the tuning is broad, I find there are a few more watts of output when set for the frequency in use.

Power Supply

The power-supply wiring is straightforward. In this case the B+ is 700 volts, but up to 1000 volts

can be used. The screens should receive a regulated 300 volts.

A voltage of 250 is made available and is regulated by the OC3 within the transmitter. This voltage feeds the oscillator. Filament power (12 V) is supplied to all but the mixer circuit which receives its required 6 volts through a 10-ohm 5-watt dropping resistor from the 12-V source.

General

The BC-458 command transmitters, 5.3 to 7 MHz, are still available on the surplus market at a reasonable price. If you already have one, along with the power supply components, this 160-meter transverter and 100-watt linear amplifier is just a few hours away. Performance at this 100-watt level on 160 has been a lot of fun and very rewarding in use.

QST

HF Resonant Dipole

(Continued from page 49)

rapidly varying in polarization. In Fig. 5 some data vertically over the antenna were also incorporated into the power plot from flights which flew in straight lines directly over the test antenna thus enabling the plot to cover the entire hemisphere.

The power plot can be used to determine the gain of the dipole in the direction of a distant station compared to its maximum gain. Values of azimuth angle to the distant station and of elevation angle of the ionospheric path to the distant station can be entered into the power plot to determine the gain for that particular path. The power plot is especially useful for short- and medium-length paths where the ionospheric path take-off angle exceeds 5 degrees in elevation. This range of take-off angles covers most QSOs on 40, 80, and 160 meters. At longer distances (take-off angles below 5 degrees) the performance of dipoles at heights of less than $\lambda/4$ is quite poor and other types of antennas may provide better low-angle performance.

The power pattern shows only a small advantage to the broadside orientation of dipoles and that reasonable performance can be obtained at any azimuth orientation. The dipole antenna, installed over flat terrain and at heights of $\lambda/4$ or less, has been shown to be an excellent antenna for use at short and medium distances without regard to azimuth orientation for sky-wave paths on 160, 80, and 40 meters. Similar measurements on dipoles at other heights have shown very little degradation in performance at heights as low as $\lambda/10$. At heights above $\lambda/4$ a pattern null occurs vertically over the antenna and reduces performance on short paths.

The horizontally polarized (E_{ϕ}) maximum response broadside to the dipole and the E_{θ} maximum response off the ends of the dipole suggest that crossed dipoles would perform well in polarization-diversity installations on short and medium paths.

QST



Hints and Kinks

For the Experimenter



MARKERS FOR THE 160-METER BAND

Many communications receivers fall a little short when it comes to accurate tuning of the 160-meter band. With index marks being mostly at the 10-kHz division, it is very difficult to obtain accurate tracking throughout the entire 200-kHz range.

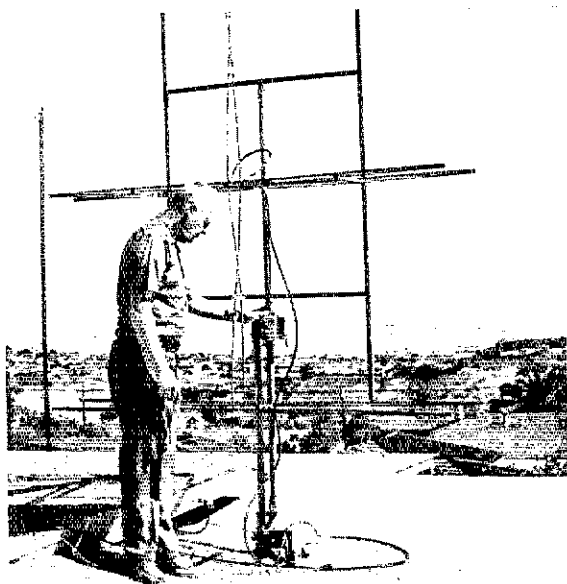
I have found that most neighborhood television sets radiate powerful harmonics of their horizontal oscillators. These signals are heard in the broadcast-band spectrum, and can be used as accurate markers in the 160-meter band.

The color TV horizontal scanning frequency is rigidly maintained at 15,734,264 Hz \pm .044 Hz. Therefore, the first usable amateur harmonic is the 115th providing a marker at 1,809,439.90 Hz, the 116th is at 1,825,174.16 Hz, and so on through the band.

If you aren't able to hear these harmonics, try loosely coupling your receiver into the antenna system of your TV set with a short piece of insulated wire . . . It really works. — *Robert K. Dye, W8YLN*

A \$3 PUSH-UP MAST FOR VHF

Most vhf/uhf antenna experimenters have the lower half of a simple push-up-type antenna mast built into their home without realizing it. Building codes require that all plumbing fixtures be vented



to the outside. These vent pipes usually protrude a few inches above the roof surface, measure 1-1/2 or more inches inside diameter, and are 14 or more feet deep.

The first step is to survey the roof. Measure the inside diameter of the various vents. Measure their vertical clearance depth with a long stick or a weighted string. Select one whose location, size, and depth suits your needs. Suitable nearby points for installing screw eyes or other guy-wire attachments may affect the choice of vent pipe.

Next, select a mast. Its outside diameter should be about 1/8 inch less than the vent pipe inside diameter to insure a free-sliding fit in the vent pipe. The mast length should be about 3 to 6 feet longer than the vent pipe depth to allow a suitable length to remain above when the mast is seated. Galvanized water pipe might be a good choice since it is available in 20-foot lengths and is sturdy, though a bit heavy. Thin-wall electrical conduit is a lighter and a better choice if suitable lengths are available. The W6CMQ installation uses a 14-foot length of 1-3/8-inch diameter wooden clothes-closet hanger rod and is well saturated with REZ, a varnish-like waterproofing compound.

A block of wood, shaped to fit the slope of the roof, is attached beside the vent pipe. The top surface should be level with or slightly above the top of the vent pipe. A split clamp is made to fit the base of the mast. Half of the clamp should be fastened to the wood block. The loose half will be attached when the mast base is resting on the block. The clamp insures against rotation of the mast caused by wind pressure.

Install the guy wire anchors. Make an "educated guess" at the length of each guy wire. Allow enough wire for end fastenings plus a bit of slack. Lower the mast into the vent pipe. Mount the antenna rotor. Attach the guy wires permanently to the top of the mast and temporarily to the guy anchors. Raise the mast out of the vent pipe and place the base on the wood block. The mast will lean because of the slack in the guys, but will be held in place by at least two of them. Adjust the guys until they are taut and the mast is vertical. Fasten the guys permanently to their anchors. The mast now can be lifted slightly above the wood block in spite of the tension of the wires, moved to the vent pipe and lowered.

This completes the mast installation. Attach the antenna, feeder and rotor control cable. Raise the mast and secure the base clamp. This type of installation may leave something to be desired so far as mast height is concerned, but it is ideal for the man who likes to experiment with antennas. Its low cost is also attractive. — *Ted Swift, W6CMQ*

STANDING-WAVE RATIOS AND DIRECTIONAL WATTMETER READINGS

With low-cost directional rf wattmeters now available commercially¹ as well as in kit form,² and with these devices also being made by several home builders,³ more and more amateurs are learning the degree of their antenna-to-feed-line match in terms of forward and reflected "power" or, more properly, volt-amperes. For most amateurs, these numbers alone don't convey the information as vividly as the value of standing-wave ratio or SWR. We may not be any more accustomed to thinking in terms of forward and reflected volt-amperes than we are to thinking of the speed of radio-wave travel in furlongs per fortnight.

There is an exact relationship between the values of forward and reflected volt-amperes and the standing-wave ratio. The equation is:

$$SWR = \frac{1 + \frac{P_R}{P_F}}{1 - \frac{P_R}{P_F}}$$

P_R = reflected volt-amperes
 P_F = forward volt-amperes

But who needs it! You almost require an electronic calculator, or at least a slide rule to use the above equation. A nomograph can be helpful, but that requires a straightedge. (You'd be amazed at the number of items that have been substituted for a good straightedge!) Some months ago *QST* carried another handy graph for making the conversion between forward and reflected values and the ratio of voltage (or current) maxima and minima along the length of the transmission line.⁴ That one has the disadvantage that you still need to make a calculation before the graph can be used.

The graph shown at Fig. 1 is very convenient to use for determining the SWR. All you need do is look along the bottom edge for the forward volt-ampere reading, and locate the intersection of this value with that for the reflected volt-ampere reading from the left edge. At this intersection the SWR may be read directly, with no calculations or straightedge required. As shown, the graph covers forward "power" in the range between 1 and 1000 watts, and reflected "power" between 0.1 and 500 watts. For the QRP man, the two scales may be read directly in milliwatts. — *K1PLP*

¹ See Recent Equipment, "Bird Ham-Mate Directional Wattmeter," *QST*, May, 1972.

² See Recent Equipment, "Heath HM-102 Rf Power Meter," *QST*, December, 1971.

³ See DeMaw, "In-Line Rf Power Metering," *QST*, December, 1969.

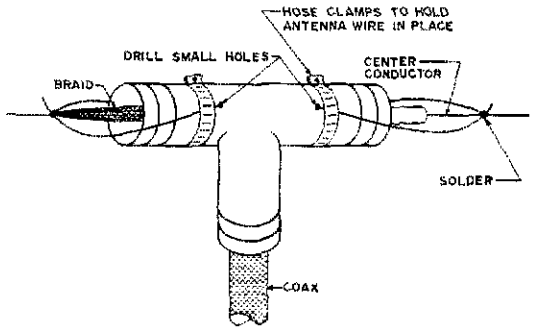
⁴ McCoy, "A Power Bridge and SWR Indicator for 2 Meters," *QST*, July, 1971.

⁵ McMullen, "The Line Sampler," *QST*, April 1972.

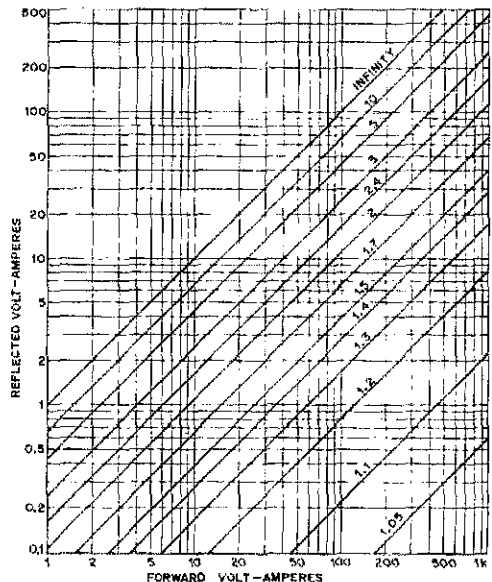
Fig. 1 — Standing-wave ratio as a function of forward and reflected volt-amperes. Locate the forward volt-ampere reading from the calibration along the bottom edge, and the reflected volt-ampere reading from that along the left edge. At the intersection of these values in the body of the graph, read the SWR directly.

CENTER INSULATORS FROM PLASTIC PLUMBING TEES

Another of the many ways that a plastic plumbing T might be used in the construction of antennas is as the center insulator for a wire dipole. I use one of 1/2-inch diameter size so that the coax can be passed through the vertical portion and the braid and center conductor extend outward through each of the two ports where connection is made to each half of the dipole.



As shown in the drawing, I have drilled a pair of holes for the dipole halves to pass through to make a loop and then is soldered to the coax center conductor and braid that is passed through the center of the T. Some may want to add a hose clamps as I have done, which helps to hold the antenna wire in place, though the material seems strong enough to do the job without help. A further refinement might be to seal the ends of the T with a bathtub sealing compound to make the installation more watertight. — *J. Ingram, Jr., WB4BKX*



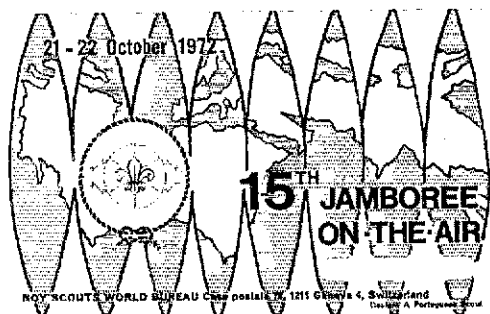


Left: 8J1WJ, 13th World Scout Jamboree, Japan, July 1971. Right: Francis S. G. Rose, G2DRT entertains the Chiltern Venture Scouts during JOTA at his station in High Wycombe, England.

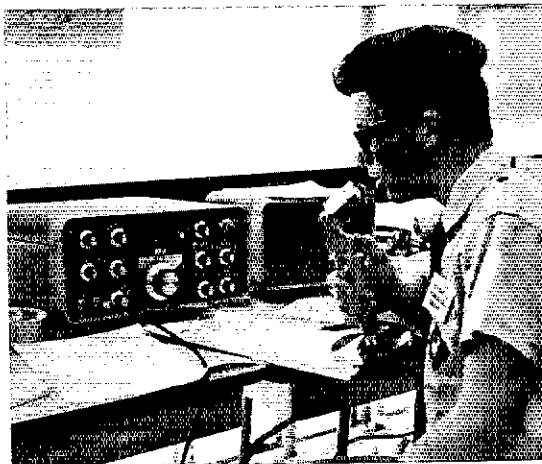
Ham Radio -- Scout Style

ONE OF THE MOST fertile recruiting grounds for amateur radio around the world is through the Scouting movement. Through displays at Jamborees (national and international encampments of Scouts held every few years), merit badge work, locally-organized exhibits at Scout-O-Ramas, and the annual Jamboree-On-The-Air, youngsters are introduced to the wonderful world of hamming. Here is an album of pictures, Ham Radio - Scout Style.

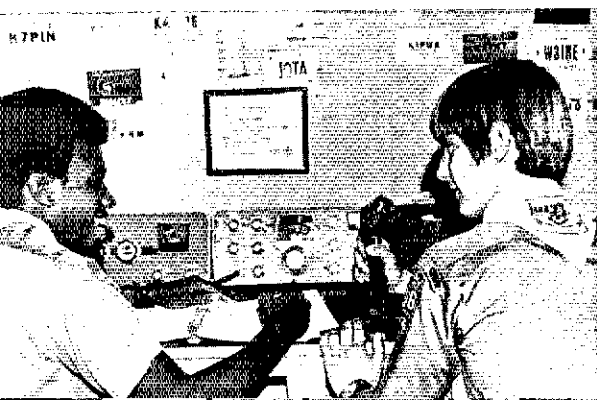
Advance word - there will be ham radio stations as part of the "Merit Badge Midway" at Jamboree East, Moraine State Park, Pennsylvania and Jamboree West, Farragut State Park, Idaho the first week in August, 1973. The National Jamboree Coordinator for Radio is Perry F. Williams, W1UED, 12 West District Road, Unionville, Connecticut 06085.



This year's QSL card issued by the World Scout Bureau, CP 78, 1211 Geneva 4, Switzerland.



VE3SHQ, the station of the National Headquarters Venturer Company, Boy Scouts of Canada.



◀ K2BSA, National Headquarters BSA Amateur Radio Club, North Brunswick, New Jersey.

Harry Harchar, W2GND, former editor of *Boys' Life* magazine, offers the mike to a grinning Cub.



**Boy Scouts of America
WORLD-WIDE JAMBOREE
ON THE AIR
NORTH ORANGE COUNCIL
PLACENTA, CALIFORNIA
ORANGE COUNTY**

WO6BSA

GSO WITH	DATE	TIME	MHZ	RST	2-WAY

W6ANN
QSL MGR

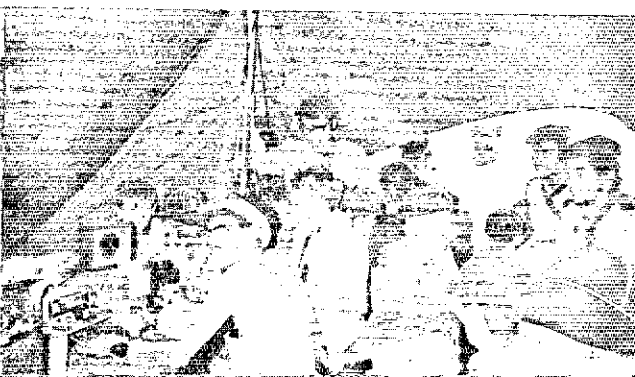
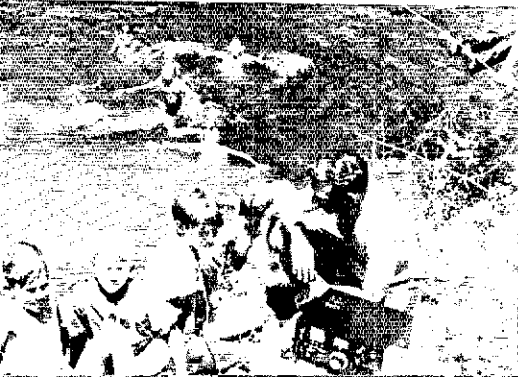
W6EIF
W6AGLD
Operators

QSL card of WO6BSA, a special events station for the Jamboree-On-The-Air at Placenta, California.



Left: Lloyd Alberga, 6Y5LA (right) introduces members of the Polio Rehabilitation Troop in Jamaica to amateur radio at 6Y5RA. Right: K3BSA, the Jamboree station at Valley Forge a few years ago.

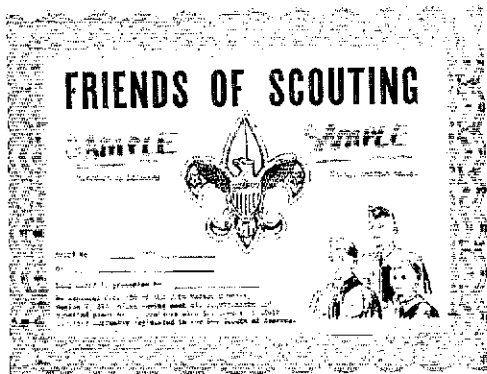
Left: "Down Under" in Australia, there was fun and sun to go with JOTA activities. These are the Taraubal Scouts. Right: Even in the Persian Gulf, Cubs and hams get together for JOTA at MP4BS.





▲ Atop a ten-story building, Scouts string up antennas for CR71A in Mozambique.

When did it all start? Len Jarrett, HB9AMS, at the World Scout Bureau (itself licensed as HB9S) sends record of XBS, issued to H. R. Phillips for the 1st Arundel Troop Boy Scouts in October 1912 — just sixty years ago this month! The pioneer English station used "accumulators" (batteries, to you W/Ks); maximum power was 50 watts on 200 meters; range 5 miles on transmit, 800 on receive; operating hours most Wednesday and Saturday afternoons; also licensed for portable apparatus to work to the main station within five miles!



Explorer Post 160, Box 22, Mankato, Minnesota 56001 offers this award for working 25 amateurs in Scouting. Gary G. Hanson, WA0IEF is the advisor.



WI9BSA, Fort Wayne, Indiana, with Paul De Mond, WA9WUC at the mike.

The 1972 Jamboree-On-The-Air will be October 21 and 22, midnight Friday to midnight Sunday, local time. Best chance of the year to interest youngsters in ham radio — get in touch with the Boy Scouts, either some you know or through the Boy Scout office listed in the telephone book, and invite the boys to visit your station during the time. It's a "conversation party" rather than a contest; no formal report is needed, but BSA Hq. would like to know who participated; address is National Headquarters ARC, BSA, North Brunswick New Jersey 08902. Gathering points on the air include: 3590, 3940, 7030, 7290, 14070, 14290, 21140, 21360, 28190, and 28990 kHz.



◀ Some Scouts at the Racal Amateur Radio Club, GB3RAC.

How to Predict Oscar DX

BY WILLIAM I. DUNKERLEY, Jr.* WA2INB

SOON AN AMATEUR communications satellite will be functioning to provide improved DX possibilities. When will this "new kind of band opening" occur? When will the satellite be within range of *your* station?

A useful feature of Oscar's expected orbit is that it will bring the satellite near your location about the same time every day. These near-overhead passes might occur at, say, 9 A.M. and 9 P.M. Thus, once Oscar 6 (Amsat-Oscar C) is in orbit, and we determine the *actual* near-overhead crossing times, you'll know the general times of day during which the satellite will be useful to you.

Next, with the help of some information from WIAW, you can determine exactly when the band will become alive! Beginning with the launch of Oscar 6, WIAW will carry on its normal bulletin schedule (see page 130), the times at which the satellite will be over selected cities, plus equator crossing times and longitudes. To approximate when Oscar will be within range, simply listen at about the time given for the city nearest you. The equator crossing times and longitudes given, enable you to determine more precisely when the satellite will be within range.

To make use of this data, the reader should consult "Australis-Oscar 5 -- Where Its At," by William Danielson and Sheldon Glick, WA11UO, *QST* for October 1969, page 54, and "An Aid for Plotting Satellite Orbits," by L. Edler, WB6MVK, *QST* for March, 1970, page 50. Oscar 6 is expected to be launched with a meteorological satellite (Itos or Nimbus). The information in these articles therefore applies. Further useful information appears in the 1972 *Handbook*, page 475.

WIAW will transmit complete equator crossing data for about the first month of operation. Thereafter, a reference orbit per day will be given in addition to the "cities data." The "codestore" feature on Oscar's 29.45 MHz beacon is also expected to carry reference equator crossings.

Other Info

The chart on this page will enable you to see where in the satellite's output bandpass your 2-meter transmitter frequency will appear. When listening for your own signal, look several kHz on either side of the expected spot to allow for

* Managing Editor, *QST*.

INPUT		OUTPUT
145.83	HIGH POWER	29.38
145.90	USE LOW POWER	29.45
146.00	HIGH POWER	29.55
146.07		29.62

Oscar 6 input vs. output frequencies.

differences caused by Doppler shift. *Caution:* The chart shows areas for low and high power. In the low power area, signals in excess of 100 watts effective radiated power (erp) will disrupt the normal functioning of the repeater. Thus, Amsat, the licensee of the repeater, requests all amateurs to observe this power limitation. If you can not sufficiently reduce your erp, the "slopes" of the passband (i.e. the high power area where the repeater is less sensitive) can then be used cautiously. Adjust your frequency, power, and antenna so that at no time, your repeated signal exceeds the strength of Oscar's 29.45 MHz beacon.

The launch of Oscar 6 is now imminent. It could occur as early as October 16. WIAW will carry further news on launch possibilities as it becomes available. On the launch day, WIAW will transmit on its normal voice bulletin frequencies, an up-to-the-minute account of the satellite's launch events. *QST*

Oscar 6 Bibliography

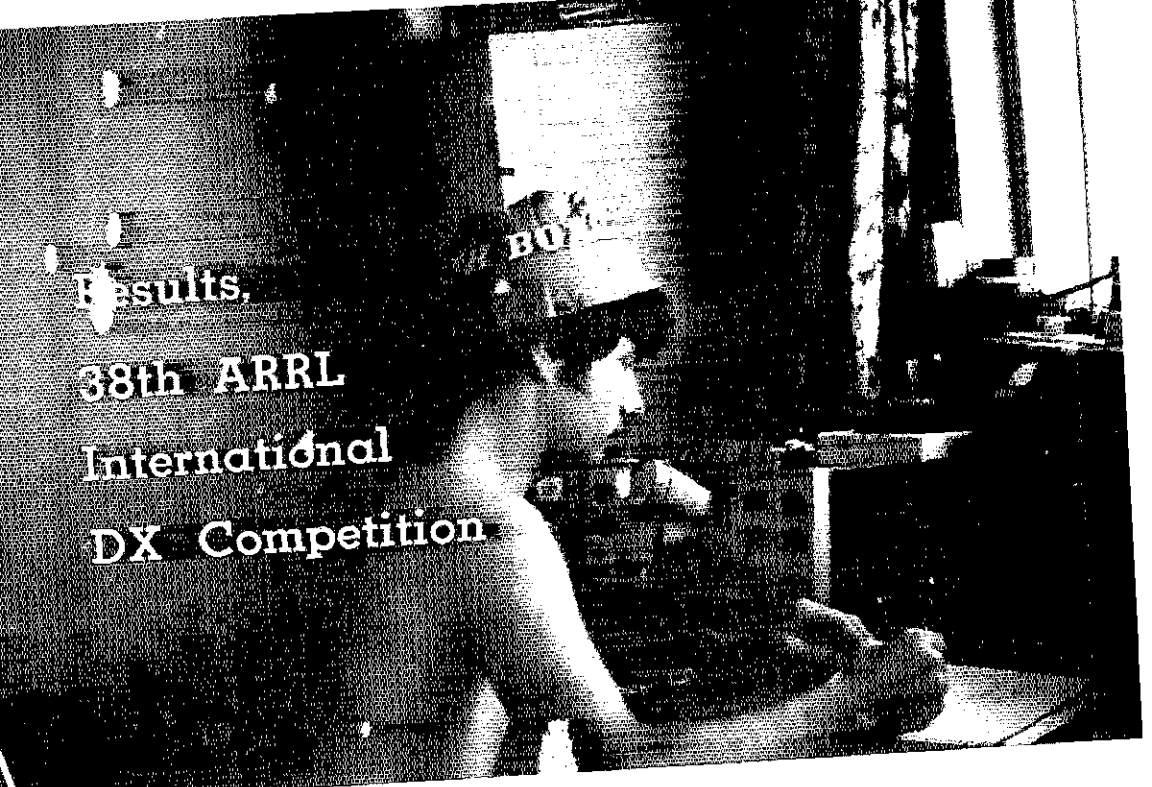
- Dunkerley, "Are You Ready for the Coming DX Openings?" *QST*, March, 1972.
- Dunkerley, "How to Get Ready for Oscar DX," *QST*, May, 1972.
- "Oscar Gets FCC Okays," Happenings of the Month, *QST*, May, 1972.
- Hart, "QSP Via Satellite?" *QST*, June, 1972.

Results,

38th ARRL

International

DX Competition



VP2LAT

REPORTED BY RICK SWANDER, *WA1PID/WA8VRB

LIKE OLD SOLDIERS, ten meters never dies, it just fades away. This year's session of the DX Test, held the first and third weekends in February and March, was blessed with good openings on the highest of our hf bands. Granted, signals were not as strong as a few years ago, but when Old Sol decides to shake up a few ions to our advantage, who are we to complain? Openings on 10 were experienced throughout the US to all parts of the world with the best conditions falling during the phone weekends. The West Coast managed to work into the multiplier-rich European continent and those east of the Mississippi snagged a few JAs. The difficult polar route was best in March and offered a few UAs and Qs and VU2AAA on both modes

*Communications Asst., ARRL

to those willing to turn their beams north. DUIFH placed a passel of lucky W/VE participants (274 to be exact) in his 10 meter phone log, an excellent accomplishment from that long-haul QTH even with superb conditions. And as the soap opera music grows louder in the background we ask the inevitable question: Will ten hold up for next year's onslaught of it? Tune in next February and March, same time, same channel, for the answer to that perennial mystery.

This year log returns were down again for the second year in a row but, as 38 years of log totals have shown, as sunspots go down, log returns are never far behind. Don't start feeling sorry for us because the 2470 logs we did get kept us mighty busy (just opening the envelopes!). CW outnumbered phone 1265 to 1084 thanks to about 500 foreign cw logs. Check logs numbered 121.

This year the "Log-checkers Friend" award, commonly known as "The Golden Pencil" goes to John Beck, VP2A of ZDSJ fame. John typed all 5254 contacts (before dupes) on his own special log sheets and removed all dupes. Totals on each of the 139 log pages were then compiled on a 3 foot long sheet of page-by-page totals that listed Total QSOs, dupes, Valid QSOs, Points and Multipliers. On the same sheet, the totals per band were also listed. On a separate sheet John listed the first person worked in each state or province and gave a cross reference to the log sheet and QSO number on that sheet. Unless John is a very fast typist, he probably spent more time on his log than he did in the contest. A superb submission by the Reinbrandt of the DX Contest.

Ionization of the atmosphere may be attributed to the great volumes of r.f. generated by amateurs in the ARRL DX competition... etc., etc., etc.



Back in the listings on both modes after an absence of 34 years is KH6FF. Last time David entered he took top phone honors in Hawaii using the call K6LKN. You won't have to wait as long to work him again in the DX Test, David says he will be back next year.



A new foreign box is introduced this year that lists QSOs per band for the top 10 single-op stations in each continent on each mode. We will try to come up with a different box every year or two and any suggestions you may have will be appreciated. In fact, while you have pencil and paper in hand drop a note to the Contest Advisory Committee (W1BGD, W2EIF, W3GRF chairman, W4UQ, KSTSR, W6DQX, WA9UCE, WØHP, VE2NV and KH6JJ) and let them know how you feel about the DX Competition rules. Their purpose is to advise us of what you want but they have a hard time doing their job if you don't advise them.

For completeness, be sure to check the extra section at the end of the scores.

Before we sign off we will take a pause that refreshes and make a plea that your New Year's resolutions include: listening before transmitting; more frequent signing (if you are DX); giving both your call and that of the DX on your last transmission (if you are W/VE); and being courteous throughout the fray. And last, but not least, remember the famous saying of esteemed philosopher V.Y. Senny Tree, who said, "Before and during the battle make sure your house is in order."

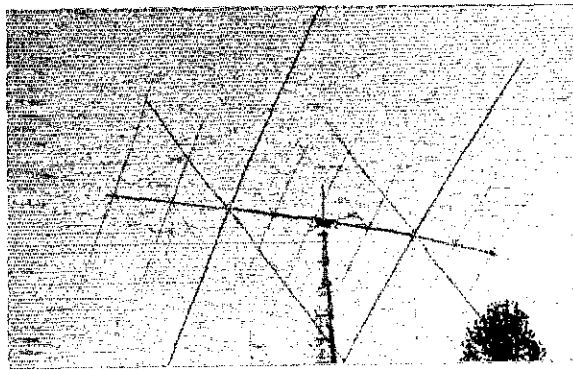
SOAPBOX

Melody of Voices

I really must give a lot of credit to my wife who brings me meals and coffee and an occasional toddy and never complains when I'm lost for 4 weekends. - (KL7BCH) Recopying the log seemed to take more time than was spent actually operating. - (G3ZBA, G8ESI opr.) Here's my contribution to your eyestrain and headaches for this year. - (9G1WW) If people used a little more sense and listened before they transmitted, the contest would be much more enjoyable for

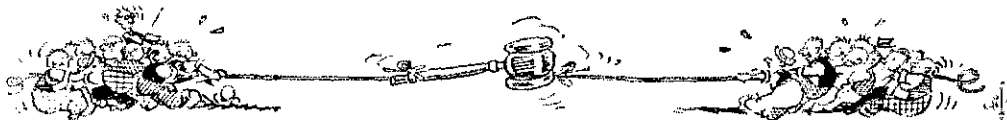
everyone. - (WB8IJW) Murphy strikes again for the third consecutive year. - (K6SVL) This island was suffering from sporadic power failures. - (KS6DY) Managed a quick 75 meter SSB WAC with my SB-101 barefoot. - (W1ECH) It was great to hear those pile ups. - (YB3AAY) Great Contest! Got two new ones and that is a lot when you already have 314. - (W6FJ) Other than rotor sticking, final blowing up and me sleeping too much I guess the contest was ok. - (W9LKJ) Worked half a dozen zeros on 10 with the quad a ruined pile of rubbish on the ground. - (G4ALE) A very enjoyable couple of weekends. Roll on next year. - (VE3VX) It takes lots of valuable time having to call through the pile ups with 50 watts. Only got 3 new countries but worked enough unconfirmed countries to make my mailman weary. - (WB4SXX) I think it is important to note that band conditions *appear* to improve during contests because of people just being there. Let's not write off 10 meters as a DX band just yet. - (K6GKU) Weekend of March 4th and 5th Mother Nature and Murphy teamed up to ice up my beam and I wound up with a SWR of 5 to 1 on 10 and 15 meters. - (W1KSN) The SB-200 I ordered arrived at 0005 on Feb. 5. Do I get a special multiplier for trying to build the kit with one hand and operate with the other? - (K9GSG) One guy said, "I've blown enough air into this mike calling you to blow up the Graf Zeppelin." - (VP2MY) I noticed that W/VE stations were, in most cases, courteous and operated with good procedures. - (KZ5JF) Long live 10 meters. - (K1VTM) Biggest coup of the contest was finding YA10S on upper part of 10 meters all alone. - (WA2AUB) This year was a disaster. Only my receiver worked 100% thru it all. - (W2DKM) Who would have thought VO's

This mass of wires belongs to W5WMU, who took the top Delta Division spot along with nabbing 10th place among W/VE entries on phone. Pat's antenna sports 2 full sized ele on 40, 5 on 20, and 9 on 15 and 10, all on a 52 foot boom. The antenna sits on a 90 foot crank-up tower that was fully retracted when this shot was taken.



harder than VEs? Got VE8 on 3 bands and VO on only one. - (KG4CS) It was fun being DX for a change. The pile ups were a great experience. - (W0YVA/YV5) Ten meters was a-jumpin. - (WB2ZIN) Had lots of fun and lost plenty of sleep. - (W2RAD) Thanks to WA3LNM who checked out the logs while I was on my honeymoon. - (K3HTZ) Old Sol was kind on 10 meters this year, but I fear conditions just can't hold up for next

year's bash . . . but then, I said that last year. - (WB4YOJ) First weekend balanced modulator kept me out for half the time. Second weekend ice storm froze rotator and antenna to the NW. Had frequent power blackouts of up to 4 hours throughout the March weekend. Just not my year. - (VE3GCO) It's an Excedrin contest all the way. - (VE4XJ) I broke up when the JA gave me "59-California." - (W7YTN) It was fun to be in



The Clubs

If the club box looks a little small this year that's because it is. The drop of 20 affiliated clubs, from 50 to 30, was caused by a lack of secretary letters. To be listed, two points must be satisfied: 1) The club secretary must submit a listing of the club entrants or all the club logs must be submitted in a group, 2) A minimum of 3 logs must be listed by the secretary.

Two new clubs appear near the top of the list, the Western Washington DX Club with a 13 million point 5th place showing, and the Central Virginia Contest Club taking 11th with 3 million points: The Northern California Contest Club jumped from 12th to 6th and the Northern Illinois DX Association got into the Top 10 after placing 15th last year. Both clubs just about doubled their scores and should be groups to look for in the

future. Minnesota Wireless Assn., dedicates its club score to the memory of Ernst Krenkel, RAEM.

Dividing the club totals by number of participants yields some interesting facts. Here's how they rate on points per entry.

1.	Frankford Radio Club	835,713
2.	Potomac Valley Radio Club	809,701
3.	Northern California Contest Club	598,415
4.	Murphy's Marauders	576,038
5.	Golden Triangle DX Club	556,618
6.	Western Washington DX Club	392,725
7.	Northern Illinois DX Association	368,452
8.	Richardson Wireless Klub	363,719
9.	Order of Boiled Owls	320,566
10.	Northern California DX Club	296,522

AFFILIATED CLUB SCORES

Club Scores	Entries	CW Winner	Phone Winner
Potomac Valley Radio Club(Md.)	64,776,111	80	K1LPL/3 W3CRE
Frankford Radio Club(Pa.)	63,514,192	76	W3GLY W2EHB
Murphy's Marauders(Ct.)	42,050,748	73	K1ZND K1VTM
Northern California DX Club	16,901,769	57	K6SSJ W6KG
Western Washington DX Club	13,352,667	34	W7RM W7RM
Northern California Contest Club	8,377,809	14	WA6DKF
Golden Triangle DX Club(Fla.)	8,349,273	15	K4THA W4QBK
Richardson Wireless Klub(Tex.)	7,638,104	21	WA5RXT W5OBM
Northern Illinois DX Association	6,263,691	17	W9LKJ W9LKJ
South Jersey Radio Association	5,517,749	21	W2FYS K2AA/2
Central Virginia Contest Club	3,346,875	12	W4ZSH W4QCW
Order of Boiled Owls(N.Y.)	2,564,532	8	W2GGE
North Alabama DX Club	1,487,436	8	K4MG
Laurentian DX Club(Que.)	1,465,383	8	VE2NV VE2NV
Niagara Frontier DX Association	1,357,488	7	K2KNV K2LWR
Winnipeg DX Club(Man.)	1,166,964	10	VE4XJ VE4RP
Gloucester County ARC(N.J.)	898,185	9	W2FBF W2FBF
Steel City Amateur Radio Club(Pa.)	798,510	5	W3KPI W3KPI
ARINC Amateur Radio Club(Md.)	758,274	11	WA3JYV W3PWO
Columbus AR Association(Ohio)	633,325	5	W8ZCQ
LEA Amateur Radio Club(Ca.)	592,860	8	W6HIP/6 K6CN
Saint Louis Amateur Radio Club(Mo.)	592,005	11	W0TDR K0SGJ
West Park Radiops(Ohio)	548,739	7	WB8FNE WB8FNE
South Eastern Virginia Wireless Assoc.	456,261	6	W4OXX W4OXX
New Providence Amateur Radio Club(N.J.)	389,061	5	
Molalla Union HS Amateur Radio Club(Ore.)	342,513	3	WA7OVU
Calgary Amateur Radio Association(Alta.)	299,277	8	VE6AGV
Dallas Amateur Radio Club(Tex.)	122,601	6	W5QZJ
Spokane Radio Amateurs(Wash.)	80,133	6	W7FSF WA7ROS
Parma Radio Club(Ohio)	73,398	9	WB1RG WB1RG
Chicago Radio Traffic Association(III.)	24,750	5	W9REC
Parkway West Amateur Radio Club(Mo.)	681	3	WN0DYV

DX CONTINENTAL CHAMPIONS

CW		Phone		
Single Op.	Multip.	Single Op.	Multip.	
5T5CJ	ET3JH	Africa	ZS6DW	9G1WWW
KR6AY	JA9YBA	Asia	JA2JW	WA2BVU/4X
OZ1LO	YU3CV	Europe	CT1BH	G4ANT
XE11IJ	VP2GVW	N.America	XE11HJ	K25ZZ
KH6RS	KG6ALV	Oceania	KH6RS	KH6HCM/KH6
4M5KL	LU2DKG	S.America	HC1RF	

the great battle with my Marauder. - (CF5GO) I'm afraid at 66 I am beginning to realize it is time for someone younger to take over. - (ZS6DW) I will enjoy the contest of ARRL every year. - (JA1CG) It is a very good contest. - (UAØTO) Hope to be on 40 next time. Vertical did not work out to the States. Back to the drawing board. - (VK4VU) In the best time of 80 meter propagation the electric company cut the electricity. - (EA3NA) Very thanks for the nice contest. - (OHØNI) Altogether quite an experience, and that goes for the typing of this entry too. Next time I'll get some proper log sheets before I completely wear out my index finger. - (9H1CV)

Flying Fingers

I fell asleep at the key right in the middle of a QSO with WB2OFS at 2155 GMT. - (DL5BR) 500 watt cw rig blew up on the 12th contact. - (W1ECH) The second leg, starting on 18 March, coincided with my 70th birthday. - (G2DC) Regular transmitter on the blink. Searched the attic for old

Viking I, removed 7 years of dust, and got it going again. - (W5QF) Biggest thrill of test was working KS6DH and G4ALE on 40 with my indoor dipole and exciter. - (WA3GBU/5) 1516 contacts may not sound like a lot, but with 75 watts and an antenna nailed on top of a packing case leaning against the side of the house, it was tough. - (TI2WX) I can tell you that the ARRL DX Competition is like a great battle. But, what a beautiful battle! - (15YZ) Missed the first weekend of the cw contest. Can't work much DX from the business end of a paint roller. - (W1CNU) Lost 4 element quad just before the second weekend in worst ice storm since 1947. - (WB8EUN) My chirp was so bad I had very few dupes, everyone knew my signal the second they heard me. - (VP2LAT, WA9UCE opr.) This is my 26th consecutive DX contest entry, and I find each as enjoyable as the ones before it. - (W8DB) Sharpest operating ever. A great contest. - (W9JA) Operated home station first weekend and 4U1TU the second. - (WØHP) Ten meters here was like

Minimums Band	80					40					20					15					10				
	80	50	30	20	15	80	50	30	20	15	80	50	30	20	15	80	50	30	20	15	80	50	30	20	15
VI1ANZ/1*	28	42	80	76	60	K31GM/J3*	25	27	83	116	73	W4SVL	17	8	59	54	68	W7AYY	8	11	44	60	61		
VT1JAYU	3	11	69	72	46	K3UZY*	5	25	88	66	57	W4TMR	7	23	42	59	60	W7RM	49	52	82	94	50		
W13RIT	18	13	65	75	41	K10PJ/3	24	48	81	97	68	W4VSV*	16	26	50	61	62	W7SN*	48	44	87	95	67		
W1VWX*	27	30	71	57	70	W1A1B	6	48	77	59	59	W4WRY	14	30	45	68	60	W7NGN	57	40	30	67	56		
W1XQJ	11	2	82	4		W23CB	24	24	72	87	62	W4WY	40	43	87	93	90	W8ZMN	24	26	85	69	27		
W1AGB	41					W3CRI	45	40	123	107	100	W4ZSH	15	22	40	82	62	K8AXG	27	28	76	71	68		
K1DHP	24	57	73	85		W3DPI	1	35	78	75	87	W4ZV	1	52	70	64	64	W8YU	47	47	105	112	75		
K1OHX	42	4	21	20		W3DPM*	1	4	43	51	63	W3ZRW/4*	24	13	77	77	64	K8YV	5	24	87	91	76		
K1OHM	35	42	82	95	97	W3DT	33	28	87	75	85	W44TFW	6	19	27	73	54	W8ZA	13	12	64	70	78		
K1THO	34					W3DT*	66	64	133	128	110	W44YV	20	34	71	84	65	W8ZC	13	12	64	70	78		
K1VYM	44	41	103	100	100	W3G6W*	66	64	133	128	110	W44ZG	9	3	63	96	90	W8ZDN							
W1BHH	14	13	59	60	62	W40PI*	66	64	133	128	110	W44NR1	17	48	95	109	98	W8NGO*	16	47	102	89	79		
W1DO	81	98	88	71		W40RT	12	50	67	74	74	W44OND	1	14	59	75	63	W8UJ	8	5	90	59	88		
W1BY*	62	52	103	109	100	W40RS	9	72	76	85	102	W44OWM	17	40	74	96	96	W8WH	37	38	67	58	69		
W1EG*	75	88	99	52		W40T10	102					W44S41	12	66	76	90	86	W8TBA	29	33	78	66	76		
W1G1	42	19	67	63	60	W40P	69	69	82	8	44	W44QND*	75	19	68	68	68	W8TOM*	44	39	88	65	86		
W1L1M*	19	62	84	72		W40T*	6	18	73	78	21	W44UKA	14	9	52	45	63	W8ZCO	9	80	46	76	75		
W1L1X	28	10	14	47	69	W40MWC*	36	47	91	117	86	W44UJ	7	12	38	100	81	W8JDM*	39	70	106	109	84		
W1HP*	33	23	64	85	46	W40NK*	34	29	83	79	65	W44YUJ	48	49	103	98	97	W8MCR	16	26	80	90	73		
W1M*	43	43	73	73	57	W40OR	59	43	75	8	72	W44YV	16	26	48	75	86	W8MBW	21	36	58	74	68		
W1XPM/W1	12	4	77	80		W40SN*	26	24	89	89	86	W44YV*	16	52	63	80	80	W8T1Y	4	10	39	58	64		
W1A1LD	3	34	82	78		W40T	39	48	97	86	90	W44YV*	38	49	99	91	94	W8YWA	11	25	85	73	51		
W1A1UW*	36	38	104	96	50	W40T*	75	62	131	128	111	W44YV*	26	45	77	84	82	W8ZCCG	7	79	75	26	66		
W1A1KBG	17	13	88	70	57	W40ZP*	13	17	42	42	21	W44YV*	30	30	50	71	71	W8T1U	76	24	65	80	64		
W1A1KZ*	37	43	94	94	79	W40ZP*	9	52	87	119	103	W44YV*	9	14	37	65	70	K8V1Y	32	46	22	82	73		
W1A1LX	18	21	65	81	71	W40ZP*	43	41	118	108	125	W44YV*	30	39	21	90	83	K8JVD	4	8	61	73	54		
W1A1LI	16	16	52	82	81	W40ZP*	50	58	122	114	69	W44YV*	25	26	66	79	75	W9AXD*	19	12	103	67	44		
W1A1PDA	7	10	51	72	59	W40ZP*	5	4	29	64	64	W44YV*/5	42	46	78	91	86	W91WQ	14	17	25	90	83		
K2BK*	24	44	76	84	69	W40ZP*	18	19	80	96	77	W44YV*/5	5	8	18	54	66	W91WQ	14	18	25	73	35		
K2BM	46	65	99	51		W40ZP*	6	10	40	82	49	W44YV*/5	1	15	19	65	65	W91WQ	14	18	25	73	35		
K2C1*	46	46	104	101	89	K40B	34	31	101	13	38	W44YV*/5	34	40	59	78	71	W91RKA	16	28	86	80	68		
K2FT*	2	14	63	63	68	K40NC	21	19	70	71	75	K40C	40	5	33	56	22	W91M	26	26	72	9	34		
K2LWR	12	8	67	78	81	K40C	48	18	55	63	64	Z40B	25	45	89	93	64	W91RH	14	23	75	80	67		
K40L	48	55	87	89		K40T	34	14	38	73	58	W40ZP*/5	15	28	4	13	29	W91ST	11	7	80	71	64		
W20KA	46	57	89	89		K40C	12	19	80	67	48	W40ZP*/5	31	40	69	74	78	W91L	11	25	58	44	63		
W20KA	46	46	104	101	89	K40C	14	14	38	44	48	W40ZP*/5	11	21	64	58	57	W91YB	26	16	5	2	75		
W20DKM	14	32	59	79	53	K41DR	4	2	8	64	64	W40ZP*/5	15	28	67	54	37	W91Y*	48	57	133	111	94		
W20LFB	20	26	87	89	84	K40G	31	17	61	87	72	W40ZP*/5	11	24	46	61	52	W91ZT	41	60	109	106	93		
W20H	4	4	44	52	62	K40D	26	13	35	58	79	W40ZP*/5	37	28	84	73	66	W91BRO	41	20	73	69	61		
W21NA	38	41	90	89	85	K40T*	27	19	64	84	65	W40ZP*/5	25	32	36	81	34	W91BPG	1	56	101	94	63		
W20AD	16	20	75	85	69	K40CW	14	18	68	79	63	W40ZP*/5	32	43	80	67	66	KØZL	4	5	21	67	63		
W20L	15	10	64	65	61	W40VY*	57	50	92	117	87	W40ZP*/5	4	8	1	60	60	K5FNW/Ø	3	20	77	86	61		
W20T	39	38	75	85	91	W40W	56	42	61	34	86	W40ZP*/5	14	2	17	63	63	W91LA	4	5	21	67	63		
W20AUB	43	51	114	98	64	W40W	11	23	63	74	49	W40ZP*/5	26	36	66	75	93	W91W	14	22	34	44	43		
W20LNX*	60	57	127	131	65	W40X1	27	19	64	84	65	W40ZP*/5	33	51	98	105	83	W91P*	21	44	82	84	65		
W20VVA	8	1	22	74		W40X2	4	4	42	48	70	W40ZP*/5	5	106	27	11	61	W91Y*	12	14	91	98	77		
W20ZU	14	24	59	57	72	W40X3	42	42	112	104	86	W40ZP*/5	19	42	86	65	61	W91Y*	6	5	48	72	67		
W20ZOW/2*	19	24	71	76	34	W40X4	35	31	94	88	83	W40ZP*/5	33	33	59	82	66	W91Y*	17	28	68	81	67		
K3HTZ*	43	51	114	98		W40X5	34	23	58	69	67	W40ZP*/5	6	14	52	70	59	W91Y*	16	44	89	71	73		
K3HZL*	25	38	87	89	82	W40X6	17	24	62	73	55	W40ZP*/5	6	14	52	70	59	W91Y*	16	44	89	71	73		
K3MRF*	34	30	82	73	71	W40X7	27	24	116	97	83	W40ZP*/5	13	17	51	76	24	W91Y*	16	44	89	71	73		
K3MFK*	34	30	82	73	71	W40X8	61	65	93	83	81	W40ZP*/5	13	17	51	76	24	W91Y*	16	44	89	71	73		

*Multioperator Station

TOP TEN

Single Operator CW			Single-Operator Phone				
W/VE		DX	W/VE		DX		
K1ZND	2,509,359	XE1IJ	4,970,568	W7RM	2,992,770	XE1IJ	6,903,117
W7RM	2,216,604	VP2A	4,456,782	W3CRE	2,183,730	KH6RS	6,587,672
K1LPL/3	2,101,248	KH6RS	4,396,644	K1VTM	2,038,575	KG4CS	4,574,490
K1NOL	2,024,565	KH6IJ	3,477,474	K8YBU	1,764,792	VP2LAT	4,387,350
K4GSU	1,983,888	4M5KL	3,420,315	W6MAR	1,755,810	HC1RF	4,180,800
W1BPW	1,887,840	CP6FG	2,315,088	K1THO	1,706,928	KP4DLW	4,069,392
W6MAR	1,839,672	OZ1LO	1,900,242	WB4YOJ	1,633,170	KH6IJ	3,979,008
WB4YOJ	1,773,252	16BQI	1,659,585	W9ZRX	1,603,689	KZ5JJ	3,833,730
W6RR	1,767,606	OH8RC	1,520,544	W2YT	1,410,750	XE1LLS	3,109,932
W5WZO	1,595,751	RP6DR	1,474,980	W5WU/5	1,335,150	YV5CVE	2,853,552



Tops in Poland on phone is SP3DOI who has worked 13,500 stations, 70% of them stateside, since getting his licence in 1969.

1973 ARRL DX COMPETITION

Phone: Feb. 3-4, Mar. 3-4

CW: Feb. 17-18, Mar. 17-18

Minimums Band	30					40					80					15					50								
	30	40	80	15	50	30	40	80	15	50	30	40	80	15	50	30	40	80	15	50	30	40	80	15	50				
VE1AH	34	24	32	41	32	VI2MW/W2	54	58	81	66	50	W4BJ	18	40	53	56	W4BDKI	28	51	80	75	61	W4BYD	79	21	56	58	59	
VE1NY	27	60	77	58	47	W4ZJNN*	30	34	25	39	12	W4BVV*	70	87	170	106	77	W4BYD	79	21	56	58	59	W4G6G	11	34	68	55	53
VE1FOJ	23	35	29	62	46	K1JZ7	62	80	78	80	12	W4BDM	5	24	57	63	54	W7IR	15	68	97	88	72	W7RM	26	68	89	89	65
VE4XJ	7	27	32	51		K1KPV*	23	45	62	60	61	W4K1C	32	46	77	55	65	W7RM	26	68	89	89	65	VP2LAT	5	20	80	72	25
K1AFC	47					K1MBI*			83	1	76	W4KAV*	42	58	76	64	60	W7YIN	32	51	74	68	50	VT7Z/W7	32	61	68	50	22
K1DIF	39	24	77	88	34	K1LPL/3	50	79	81	76	56	W4KQA	44	66	64	53	62	W8BI	38	61	76	64	50	W8DB	31	55	79	63	69
K1DPB	18	41	76	58	53	W4AM			83	63	46	W4JUH	8	31	35	44	70	W8RYF*	7	32	63	63	68	W8DB	31	55	79	63	69
K1NOL	52	68	95	77	63	W4AXE	26	34	76	75	46	W4QZE	9	19	47	53	64	W8RYF*	7	32	63	63	68	W8DB	31	55	79	63	69
K1OMI	63	23	53	5	7	W4DBI						W4QCV	38	60	67	57	49	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
K1VTM*	47	73	98	87	58	W4ELY	25	45	85	57	47	W4UJ	58	60	73	50	44	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
K1ZND	39	66	104	82	73	W4ELY	31	50	69	50	44	W4UJ	58	60	73	50	44	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
W1AJQ	59	68	70	36	54	W4GM*	68	89	113	88	68	W4VHK	17	33	49	47	60	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
W1BPW	54	68	90	76	73	W4GN	30	42	67	68	60	W4VSI	30	45	74	69	56	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
W1DAI	32	57	62	74	52	W4GRI	36	54	74	68	53	W4WHI*	10	45	75	65	20	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
W1LDZ	14	63	52	53		W4GRN			88	70	62	W4WNR	2	51	75	46		W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
W1BYB	37	55	67	76	63	W4K1*	20	43	72	51	59	W4WOCW	2	24	58	34	55	K8CUY	46	56	68	66	60	W8DB	31	55	79	63	69
W1HJL	44	38	60	58	46	W4M1J	10	17	75	66	59	W4WYJ	24	71	85	78	64	K8CUY	46	56	68	66	60	W8DB	31	55	79	63	69
W1LLM*	73	53	67	66	60	W4M2W	79					K8AHV	33	49	47	53	55	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
W1LKW	15	50	59	70	35	W4MNL*	46	68	87	66	57	K8FNR	15	28	61	51	56	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
W1LX	50	28	10	46	46	W4NKS*	36	62	61	68	55	W5AO			62			W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
W1ICP	22	57	74	63	42	W4NZ	29	48	66	59	50	W5K1*	70	63	90	75	67	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
W1MX*	72	88	101	83	60	W4OY	12	37	34	37	28	W5ROU	67	40	51	52	50	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
W1OR	43	24	82	83	38	W4PZ	27	90	123	102	84	W5VZD	14	71	83	80	70	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
W1PL	49	49	58	47	59	W4ROR	33					W5DOKA	2	16	43	51	53	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
W1VY*	33	44	66	63	50	W4SS*	28	42	98	82	62	W5DRA*	60	55	78	72	62	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
W1VYK	41	59	85	68	57	W4STV*	22	27	57	49	49	W5ZNY	12	40	57	61	65	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
W4JUN*	32	58	66	65	54	W4VPI	46	76	88	77	68	W5BLY	10	26	77	75	77	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
W4LMB*	26	58	80	76	54	W4WJ*	27	37	90	123	102	W5BLY	10	26	77	75	77	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
K8BA*	39	46	72	56	56	W4ZNR	8	22	27	23	23	W5DNI	24	26	64	75	51	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
K2J1*	50	70	89	80	70	W4JAX*	45	53	83	80	82	K8OZ			97			W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
K2J1*	14	33	60	58	57	W4BYN*	24	43	68	61	52	K8SDR	19	60	85	70	59	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
K2JNV	98	60	78	69	60	W4JHV*	42	56	105	96	72	K8SJA	10	34	71	58	50	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
K2JLR	80	72	81	77	68	K4LE	17	44	41	56	61	W6A1	27	58	109	82	68	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
K2MKE*	38	63	73	66	48	K41WG	44	26	95	71	48	W6AN*	13	27	68	60	51	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
K2OIL	12	27	52	62	50	K4HZ	43	79	95	81	68	W6BP*	13	27	68	60	51	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
W2C1W	37	36	57	43	41	K4RAN*	42	79	95	81	68	W6DLI	22	50	81	73	59	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
W2DXL	45	53	81	72	60	K4H	18	42	82	71	73	W6DPA	18	32	59	56	62	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
W2IR	53	21	30	17	18	K4D	35	67	65	61	41	W6DQ	10	47	64	58	36	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
W2YS	15	43	81	64	40	K4KO	34	26	67	65	41	W6FON	14	52	65	63	52	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
W2G6G	46	65	75	76	53	K4OD	20	42	82	71	66	W6LY*	11	43	53	66	50	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
W2HR	32	33	66	57	58	K4OV	18	35	59	56	64	W6MAR	32	58	95	83	63	W8DB	31	55	79	63	69	W8DB	31	55	79	63	69
W2HIG	47	41	67	65	70	K4RI	11	17	59	55	53	W6RR	26	49	88	76	63	W8DB	31	55	79	63	69</						

DIVISION LEADERS

CW		Phone	
<i>Single Op.</i>	<i>Multiop.</i>	<i>Single Op.</i>	<i>Multiop.</i>
K1LPL/3	W3WJD	Atlantic	W3CRE
W9LKJ	WA9LGQ	Central	W9ZRZ
W2TA/0	WA0BWM/0	Dakota	W0IYP
W5RUB	WA4HHW	Delta	W5WMMU/5
K4GSU	WA8JUN	Great Lakes	K8IDE
W2GGE	K2MME	Hudson	W2YT
K5FNV/0	K0MKD	Midwest	K5FNV/0
K1ZND	W1MX	New England	K1VTM
W7RM	W7YBX	Northwestern	W7RM
WA6DKF	K6EBB	Pacific	W6KG
WB4YOJ	W4BVV	Roanoke	K8YBU
W0NQQ	K5WSP	Rocky Mt.	W5RSZ
K4THA	K4PY	Southeastern	W4LBP
W6MAR	W6ANN	Southwestern	W6MAR
W5WZQ	W5KFL	West Gulf	W5QBM
VE3UOT	VE2ARO	Canadian	VE2AYU
			VE1ANZ/1

looking in the candy store with a pocket full of change but the door was locked. - (VE2NV) Great contest again and I have participated in every single one of ARRL DX contest. - (W1AJQ) The wind and water gods plus a lot of uncooperative electrons caused mucho problems here. - (WA1LXX) This was a contest DX-pedition vacation with wives. It was most successful from every standpoint. We learned what it is like to be the "hunted" and not the "hunter." Although we didn't shatter any records, we all had a ball and that's what it's all about. - (VP2GVW) Had a high hour of 80 QSOs into Europe from 12-13Z the first morning. - (K1ZND) Used higher power than 75 watts the second weekend. Big difference, but I'm not going to junk my giant killing Ranger just yet. - (K9UIY) Murphy strikes in many ways. - (WA3RDU) All things considered it was loads of fun. - (VE7ZZ/W7) The conditions on higher bands are going down with the sunspot cycles and here so north we see it very clearly. - (OH8RC) Learning logistics of care and feeding of guest operators. - (K2BK) Dipoles still get you places. - (W2HIU) It's amazing what you can do with 75 watts in this mess. - (W3ARK) Perhaps I've mellowed, but it seems to me that ops are getting more polite. - (W4WHK) It seems that there is not enough stateside activity to justify two weekends. - (CP6FG) Greatly enjoyed my first contest, but it

sure can be frustrating trying to blast through the European QRM from this location. - (EP2PR) I enjoyed this competition and happy to catch new states. - (JR1BRV) Had a lot of fun. - (OD5EJ) As usual great fun, but oh how I hate doing these contest logs after the event. - (G3TFX) Fine contest indeed. - (HA3KMA) I couldn't be in the competition all the time because of my written examinations for graduation from high school. - (OH7SX) Good conditions on the ten meters band. - (OK1TA) Good procedure from the majority of stations. - (8P6DR) It was great fun and most DX contacts were courteous and cooperative. - (WNSHEY) Participation was terrific and the pile ups were out of this world on some of the choice DX. - (W0LP) Harder from here than last year from HS land. - (K4SE, ex-HS1ADX)

Thirty-Eighth 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. There will not be separate certificates for multi-single and multi-multi entries. Awards are scheduled for an October 15th 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: CR7GJ 546,630-133-1370-B-22 indicates final score of 546,630, multiplier of 133, contacts 1370, power over 150 and up to and including 500 watts, operating time 22 hours.

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

QRP CHAMPS

(150 Watts or Less at All Times)

CW		Phone	
WA1ABW	595,593	W8ECA	369,720
WA8DXA	550,935	W4WRY	271,998
K2MFY	394,362	WA1NH	257,535
WA2HLH	374,319	WB2JSJ	252,648
W1FNV	348,309	K0ZFL	231,660
K5ABV	324,720	WA1KBG	226,395
W3ARK	298,644	WA5WQF	187,089
W7DYQ	258,876	WA1IED	182,091
W4WHK	242,112	WB4LHO	144,045
WA3JYV	203,832	VE6AGV	124,509

DX PHONE	Kilohz	Guernsey	OZ3SK
AFRICA			5832-34-20-B-3
Mozambique	UM8EZ 3843-21-61-B	GA ZDP 76-272-56-454-B-16	OZ61D 5100-24-30-B
		GA 3YLZ 28,860-40-338-A-14	OZ4HW 2394-21-38-B-6
CR7G1 546,630-133-130-B-22	India	Scotland	OZ3PO 2160-15-48-B-1
CR7R 226,080-96-785-B-27	VU2AAA 188,604-93-676-A-17	GM5AXO 1,640-20-28-A-3	OZ1LX 1053-13-27-A
			OZ6BI 690-10-25-A
			<i>Multi-Single</i>
E13US1 13,920-40-116-A-3	ZC4RS 16,029-39-157-B-10	GB 8NW 899,406-14-175-B	OZ7RD (OZ15) OZ2C3 OZ3S
French Somaliland		Hungary	LR VD OZ5JK
ET8MM 261,390-134-1895-A-56		H3 3MB 5046-29-38-A	487,444-142-1144-B
			<i>Overland</i>
Southwest Africa	W32BVU4X (+WBZ2AB W838)	<i>Multi-Single</i>	PA6IMH 184,832-98-628-B-13
ZS3C1 362,100-100-1207-A	4X45 NJ 1011	HA5SKDO (HA55) 10,1 M HO HP 11)	PA6LOU 148,072-88-523-B-7
	1,431,1431,540-198-2410-C	HA3KNA (HA33NS Judit Mona)	PA6LYK 10,340-60-168-B
South Africa		10,434-37-94-B	PA6NMH 10,310-40-119-A
Z56DW 2,128,595-252-3018-B-60	9M2WM 24,384-32-254-B-17	HA/KLF (tintre, Sultan)	PA6VVV 6,732-22-102-B
		162-16-9-B	PA6WJG (PA6HTL, opt)
			5,760-24-80-B
Ghana		Switzerland	PA6TQ 3,762-22-57-A-4
<i>Multi-Single</i>	9V10J 9,342-27-114-A-11	HB9KC 66,105-60-239-D-7	PA6VST 147-7-25-A-2
9G1WW (+9G1YA)		HB9DX 63,717-67-317-B	<i>Multi-Single</i>
2,234,400-196-8800-A-58	EUROPE		PA6GN (PA6S GIN GINI HJK NRA
<i>Rep. of Zaire</i>		Italy	SPA TAW TUK UCU
9Q5IA 189,930-98-680-B-11		IP1MUL 2,001,492-212-3147-B-65	700,398-167-1398-A
		IP1LD 1,206,922-217-2622-B-78	<i>Sweden</i>
ASIA		IP1AYP 1,349,775-205-2585-B-12	SM5RS 288,900-107-900-B-19
Korea		(19J) 1,554,390-190-2777-B-40	SM6ADW 154,548-81-636-B
HI910 60,060-65-308-B-20		IP1WXY 29,859-37-269-B-4	SM4ATA 108,216-54-688-B
			SM5CAK 47,376-47-346-B-6
Thailand			SM7AIL 12,513-43-97-B
HS5A13 146,043-81-601-C-32			SM7YK 8073-39-69-B
			SM6ATP 5832-27-72-B
Japan			SM3RUS 3608-25-48-B
IA2JW 381,190-187-1615-C-48			SM6BDS 3463-21-55-A
IA1CG 640,848-158-152-D-10			SM7RS 1200-16-25-A
IA2YJ 595,404-148-1341-B			SM6HSM 5,90-10-11-B
IA3AG 413,040-130-1059-C			SM5BXX 310-3-10-B
IA4GX 300,048-112-89-C-19			<i>Multi-Single</i>
IA5G 258,687-117-737-A			SK6AW (SM6S JK CNX CVT)
IA6GH 49,983-59-279-D			5,730,323-127-1393-B
IA7I 36,168-44-274-A			SI6ZK (SM6S AYS LGU)
IA8UR 53,720-40-281-A-16			35,532-63-188-B
IA9BBB 31,739-33-321-C			Poland
IA9MTR 29,436-44-223-D-10			SP500L 734,800-132-1855-A-27
IA9YYS 26,530-59-180-A			SP6A01 4,290-22-85-A
IA7KYD 17,820-45-133-D-12			SP9A1U 190-10-13-A
IA5U 14,355-33-145-C			<i>Multi-Single</i>
IA7NBV 14,027-38-125-B			SP5PWK (SP5107 J Henryk)
IA81BM 11,808-33-123-B			413,300-140-985-C
IA7YD (IA7GQR, opt.)			SP6PZB (SP6S FAF UH)
8501-26-109-A			14,880-40-124-A
IA1AA1 6,998-33-103-B			<i>Overland</i>
IA8CG1 5886-18-109-A			<i>Multi-Single</i>
IA8LU 5658-23-82-A			SV6WOO (PARRY)
IA5LI 4158-18-77-A			96,075-37-325-D-6
IA8SW 5276-21-52-A			<i>European R.S.F.S.R.</i>
IA6ABG 2678-12-73-A			UA6Ps 2940-14-20-B
IA2JA 2304-16-48-B-5			UW3UH 180-6-10-A
IA81YW 576-6-24-A-7			UA1IA 60-4-5-A
IA6KHJ 255-5-17-A-4			<i>Multi-Single</i>
IA7NH 216-4-18-A			UK3LAD (Val Kabakov, Vtc
IA81U 132-4-11-A			Kabakov, A. Pavshenko)
IA3BBG 98-3-11-A-2			2,560-43-183-A
IA3LZ 22-4-6-A			UK4WAB (B. Baranov, V. Kiylov,
IA8IDA 22-4-6-A			G. Sukerin)
IA8LR 30-2-5-A-1			16,779-47-119-B
<i>Multi-Single</i>			<i>Lithuania</i>
IA9YBA (IA9S BAO BUL BEN			UP2OX 1,209,996-183-2204-B-72
GLL)			<i>Rumania</i>
445,656-124-1198-F-30			YO2AB 7400-20-40-A
IA1YBO (Kashumi, Kazuo)			<i>Multi-Single</i>
134,316-84-533-B			YO9KAC (YO9S HT VT)
KA2DX (WA3KHR WA5JIS)			199,920-119-560-A
11,124-36-103-A-B			YO2KAB (YO2S ABW BN)
			110,160-90-408-A
Ngoswazi Island			YO2KAR (Eugen, Gheorghe)
3D1ACH 43,674-38-251-A			1080-12-30-A
			<i>Yugoslavia</i>
Asiatic R.S.F.S.R.			<i>Multi-Single</i>
UAØTC 8712-33-80-B			YU1BCD (YU1S NZV PCF OBC
			RS-458)
<i>Multi-Single</i>			1,717,374-226-2533-B-62
UK9CA (UA9CBO UV9ZD)			
227,070-90-841-D-20			
UK9HAB (S. Anatoliyevich, S. Va-			
silyevich, T. Alexandrovich)			
11,310-26-145-B			
UK9OB (2 ops.)			
11,040-32-115-A			
Azerbaijan			
UD6HB 4071-23-59-A			

YU3CNO (YU3c TAA TBG TCN Mikac)
933,912-168-183-A-13

Malta
9HICV 71,059-49-497-B

NORTH AMERICA

Honduras
HR1PJB 51,030-45-378-B-6

Guantanamo Bay
KG4LS 4,574,490-278-5485-A-64

Alaska
KL7BCN 314,901-109-963-C-32
KL7BHV 131,586-91-452-C-8
KL7HIA 62,769-49-427-B-10
KL7EGS (WA8JWP, opr.)
25,428-52-163-C-7

Puerto Rico
KP4DLW 4,069,382-172-4987-E-58
KP4DHI 622,746-174-1193-A-28
KP4DMR 445,302-143-1038-A-13

Canal Zone
KZ33I 3,833,130-270-4733-B-75

Multi-Single
KZ5ZZ (+KZ5s BR YYI)
5,340,115-295-6599-C-96

Greenland
OX3JW 40,896-48-284-B
OX3RC 684-12-19-A

Multi-Single
OX3WQ (+OX3FL)
211,104-96-733-B-15

Guatemala
TG0AA (TG9G1, opr.)
1,570,125-195-2685-B

Aringua
VP2AAC (WB4KG, opr.)
2,101,533-229-3059-E-29
VP2AAP 2,100,993-219-2979-E-40
VP2AC 4,100,220-129-1060-B-17

Greenland
Multi-Single
VP2GVW (+W3s AOH TV W4GIV)
1,279,692-204-2091-B-45

St. Lucia
VP2LAT 4,387,350-275-5318-B-88

Montserrat
VP2MY 1,219,950-210-1935-B-26

St. Vincent
VP2SU 923-11-39-B-2

Bahama Islands
K6LZQ/VP7
252,144-102-824-A-17

Bermuda Islands
W4EV/VP9 727,272-168-1443-A-36

Mexico
X1111 6,590,317-277-9301-C-72
X1113 3,109,932-258-4018-B
X12LL 1,186,770-221-1790-B

Cayman Islands
Z11BR 4032-24-56-B-8

Barbados
8P6DR 1,756,548-246-2481-B-46

OCEANIA

Philippine Islands
D011H (Carl Hornbostel, opr.)
900,294-181-1658-C

Taan
KG6JRO 914,352-172-1772-C-38
KG6JAR 8136-28-104-C

Multi-Single
KG6AV (+K1MTJ WA9HHJ)
1,125,528-184-3039-1-41

Mariane Islands
KG6SL 1,240,029-189-2187-B

Hawaian Islands
KH6RS (K2SH, opr.)
6,587,673-283-7652-C-69
3,979,088-264-5024-C-64

KH6HJ 702,954-147-1594-C-26
KH6HPJ 345,567-127-907-B
KB6GLU 12,137-33-123-A-5

Multi-Multi
KH6HGM/KH6 (+K7VEH KH6s
BZ1 GMP GOW HLK)
5,469,372-278-6558-C-96

American Samoa
KS6DY 1,128,000-160-2350-C-37

Australia
VK4VU 31,296-122-856-A-46
VK3WD 27,000-40-225-B

Indonesia
YR3AAV 274,590-113-810-B-24
YB5AAQ 58,986-58-339-B-18

New Zealand
ZL2ACQ 501,714-163-1026-A-50
ZL1AGO 402,912-156-859-A
ZL2GJ 47,601-43-369-A-24

SOUTH AMERICA

Chile
CF5GO 76,176-48-529-A-14
CF8AD 40,704-53-256-A

Bolivia
CP1LU 354,170-94-1185-C-21

Ecuador
HC1RI 4,180,800-268-5200-C

St. Eustatius
PI8DX 210,519-113-621-B-11

Brazil
PY2YC 75,828-71-356-B-9
PY60A 30,388-68-247-B-11
PY2RE 43,920-61-240-C-5
PY2GJ 42,822-61-234-B-5
PY1BE 27,924-52-129-B
PY2EVO 2566-26-97-B

Venezuela
YV3CVL 2,855,452-272-3497-A-70
W0YVA/YV5 1,832,454-191-3198-C-48
DL3ZM/YV5 961,554-187-1714-C-29
YV1TO 526,812-143-1238-B-28
ZP5AQ 847,602-147-1922-C

Guyana
8R1G 395,694-78-1691-A-68

Trinidad & Tobago
9Y4VU 2,538,270-238-3555-B-45

WEVE PHONE

CANADIAN

Maritimes
VE1ANT 90,987-121-249-B-30
VE1AW 53,460-90-198-C-17
VE1EK 14,100-50-94-A

Multi-Single
VE1ANZ (+VE1AS1)
758,529-271-933-C-53

Quebec
VE1ASU 432,954-201-718-C-65
VE1ZNV 252,575-185-455-1-28
VE1ZWA 88,500-125-236-1-22
VE1ZU 27,972-63-148-B

Ontario
VE1RHI (Neil Stipes, opr.)
374,286-214-283-C-70
VE1GCO 58,800-110-176-A-20

VE3FRK 3645-27-45-B-14

Multi-Single
VE3VX (VE3s BOH BPO C1O
EZW Doug Jim Steve)
460,110-243-626-A-90

Manitoba
VE4RP 261,468-162-538-B-68
VE4XJ 66,738-96-227-C-38
VE4SD 57,378-73-262-C-30
VE4JK 54,237-101-179-B-26
VE48W 21,306-67-106-D-15
VE4BI 507-13-13-B-3

Saskatchewan
VE5RA 68,985-105-219-A

Alberta
VE6AGV 124,509-121-343-A-33
VE5RC76 89,145-105-283-C
VE6AP 52,866-99-178-B-32
VE6APJ 15,984-37-144-C-18
VE6AYU 15,552-54-96-E-11
VE6TK 31,484-44-87-C-14
VE6ANS 3975-25-53-B-11
VE6CN 1701-21-27-A-3
VE6AYO 45-3-5-B-1

British Columbia
VE7VP 61,248-88-232-1-49
VE7AZG 6120-30-68-D-18
VE7BBI 72-4-6-A-2

Yukon-NWT
VE7G/B 242,880-160-506-C-38

U.S.A.
K1VIM 2,038,575-385-1765-C-80
K1THO 1,706,928-344-1654-C-75
K1DPB 532,014-239-742-C-41
G3XPM/W1 492,576-224-733-B-45
WA1LD 478,668-226-706-C-40
WA1POA 389,244-199-652-G-53
K1GOD 324,885-179-605-C-37
WA1QD1 240,210-170-471-C-25
W1BII 285,246-108-377-C-20
W1DO 187,500-250-250-C-34
WA1PID* 121,401-141-287-C-14
W1FTX 110,376-168-219-C-26
W1DEP 61,110-97-210-B-24
W1CNU 54,468-89-204-B-23
W1CVR 46,656-108-144-A-9
K1JHX 42,330-85-106-C
W1FRD 37,101-83-149-C-27
WA1PAX 36,738-78-157-B-37
K1GTK 28,566-69-128-C-14
WA1NRG 22,814-63-126-B-23
W1RML 15,594-46-113-B-8
WA1MAO 12,694-51-83-A-10
WA1KOC 7434-42-59-C-8
K1PNS 7242-34-71-1-11
W0DRF1* 6120-40-51-C-7
W1QV 5841-33-54-C-8
K1K1B 4752-36-44-C-6
W1ARR1 2772-28-33-C-4
K1WVX 2440-27-30-C-15
K1YXG 1479-17-29-G-25
W1D1 189-7-9-A-1
W1AB 12-2-2-C-1

Multi-Single
W1BY (+K1ZND)
2,371,968-426-1856-C-96
W1FPG (+K1s ASJ LLI)
1,153,110-289-1330-C-49
W1EUM (+WA1NES)
872,025-275-1057-C-80
W1CP (+WA1PID*)
549,690-251-730-E-47
K1RLU (+WA1KOD)
21,063-59-119-B-13
WA1PH (+W1C1O WA0ZV1)
10,488-46-76-B-12

Eastern Massachusetts
WA1LKA 616,704-256-803-F-68
WA1LXL 567,000-250-756-B-50
W11J 433,755-255-567-C-36
WA1LKO 309,672-187-552-B-68
WA1NH 257,535-177-485-A-53
WA1ANR 247,800-175-472-C-46

WA1KBG 226,395-195-387-A-50
WA1ED 182,091-161-377-A-32
WA1NLX 160,860-140-383-B-46
W1KSN 154,584-152-339-E-28
K1DCB 79,818-106-251-C-29
WA1MMJ 61,776-99-208-A-60
K1DUR 49,725-85-195-C-9
K1OME 43,920-80-183-B-25
W1ESN 41,031-97-141-C
WA1KSF 18,241-59-105-B-15
K1AGB 6519-41-53-B-13
W1LHY 4485-73-65-B-6
W1PLJ 3726-27-46-B-11
WA1MYK 1458-18-27-A

Multi-Single
WA1KZ1 (+WA1NRV)
1,451,124-346-1398-C-88
W1MX (+WA1s COW J2C KKM
K3QDD WA08 of G WNU)
1,104,111-317-1161-E-96

Multi-Multi
WA1JUY (+WA1s BOD JYV IZC
WA2APG WB2YEW)
1,488,405-535-1481-G-88

Maine
W1MN 69,156-102-226-C-19
WA4UTP1 9984-52-64-B-32

New Hampshire
W1FHT 276,276-182-506-B-47
K1CSH1 129,444-134-372-C-25
K1A1L 17,595-69-85-B-19
W1FIC 5108-28-37-C

Rhode Island
WA1JLV 83,505-95-293-C-18
W1VOP 27,300-55-166-C-14
W1AW 7236-36-67
W1YNE 1953-21-31-C-3

Multi-Single
W1VVPY (+WA1K1
WA2LBT)
343,785-205-559-C-58

Vermont
W1HGA 25,578-58-147-B-19
W1SPK 18,522-63-98-B-20
K11D 11,328-59-64-B-14

Western Massachusetts
K1FAR (W1MQK, opr.)
177,633-153-387-C-38
W11RV 29,172-68-143-A-14
K1KNO 24,708-71-116-C
WA1ABW 15,510-47-110-A-4

2
Eastern New York
K2BM 277,386-166-557-C-37
WA2AUB 195,195-169-385-B-48
WA2HLH 27,456-64-143-A-20
WB2LO 26,937-73-123-A-11
WA2UDW 8184-44-62-B-18
WA2ROH 8100-36-75-C-9
WA21DM 5292-28-63-B-20
WA2MDY 2277-23-33-F-5

Multi-Single
K2BK (+W2DXL WA2SVH
WB2BXL)
831,303-197-933-C-89

Multi-Multi
WA2UNX (+WA2s IAH RAL SPL)
WB2s OEU SON)
4,247,760-440-3218-C-96
K2UOT2 (+K2s BOO OYC
WA2MCR)
1,428,108-349-1364-C-95
N.Y.C./I.L.

W2DKM 435,843-237-613-F-54
W2BUZU 324,210-202-535-C-21
W2R1S1 252,648-174-484-A-52
K2DW 153,720-140-366-B-52
W21RV 109,278-127-288-C-21
W2CKR 74,575-109-225-A-31
WA2VDA 38,304-76-168-B-16
WB21NS 32,175-75-143-B-15
K2M1Y 25,137-63-137-A-10
W2M1O 21,940-65-112-C-15

WBZLN 18,468-54-114-A-13
 K25YJ 17,577-63-94-A-11
 W3YCW 16,638-59-94-C-10
 WA2LXP 16,216-66-82-B-14
 WA2JRD 13,158-51-86-B-9
 K2OVS 12,600-42-100-A-23
 WA2JRC 2808-26-36-B-20
 W6ZOVY 2,277-23-13-A-18
 WB2NKF 504-12-14-C-17
 W2TUK 216-8-9-C
 WA2YHK 3-1-1-B

Multi-Single

WA2RAZ (+WA2RZA) 309,781-163-429-D-50
 WB2QBP (WA2KBB WB2s YKL Z1H) 135,042-142-117-F-50
 WR2ZVY (WA2s MHB M2A) 74,860-124-255-F-72

Northern New Jersey

W2YF 1,410,750-110-1425-C-72
 W2MB 1,134,613-34-51-297-C-78
 W2RAD 525,495-265-621-C-62
 W1PCR 236,592-186-424-F-38
 WR2VTF 225,720-171-440-D-75
 WA2JNY 74,100-1-10-10-C
 WB2PWS 34,200-76-150-A-15
 W2CHA 16,836-61-92-B-30
 WA2CWX 9240-44-70-B-11
 F3VN/W2 3612-76-43-B-6
 WA2CAK 2262-26-29-B-11
 WB2HFX 54-3-6-A-3

Multi-Single

W2KXD (+WB2LRL) 29,184-76-128-B-3

Southern New Jersey

W2FHB 835,608-296-941-F-64
 K2OH 524,738-246-711-C-60
 W2UL 432,795-215-671-B-36
 K2AA/2 (W2FYs, opr.) 341,740-170-474-F-58
 W2PAU 302,753-176-384-C-46
 K2PZJ 300,112-176-379-C-43
 W2FBI 188,568-162-388-G-31
 W2PDI 119,808-128-312-C-25
 W2PLD 71,368-108-282-B
 WA2VYA 89,460-105-284-C-25
 W2SDR 84,942-121-234-C-30
 WA2NPD 79,929-107-249-C-23
 W2FHY 67,734-106-213-B-41
 W2TTC 51,524-74-142-C-12
 WB2WVY 23,808-64-124-A-30
 K2JUV 22,578-71-106-B-29
 W2PFI 10,560-44-80-B-27
 WB2HFX 8708-48-57-C-13
 W2LPA 7623-33-77-C
 WB2VMD 5148-33-52-A-6
 W2OWA 3864-22-54-C-20
 WA2HOB 2520-21-40-A-6
 WA2YVW 2046-22-31-C-6
 WB2NRU 936-13-24-B-10
 WB2GPH 432-12-17-C-2

Multi-Single

K2IT (+W2ORA) 441,630-210-701-C-57

Multi-Multi

K2FL (+K2OJ) (K2KH) 1,141,788-386-986-C-93

Western New York

W2UJP 215,475-169-425-C-32
 K2LWR 62,238-82-255-C-40
 WA2DHS 42,897-79-181-C-11
 K2KNV 25,704-68-126-C-8
 W2FHO 23,625-63-125-C-32
 WB2AZO 22,365-71-105-C-9
 W2LXA 17,760-74-80-C
 W2WZO 10,680-40-89-B-14

Multi-Single

WB2ZOW/2 (+WA2LDC) 377,664-224-562-C-90
 WA2OJC (+WB2NKR) 21,780-66-110-B-40
 3
 Delaware
 K3NLZ 28,914-79-122-B-21
 K3MYR 14,952-56-89-B-10

Multi-Single
 WA3HGV (+WA3s KFR KZO) 11,178-54-69-C-15
 OVC RAP WA9SVZ) 1,810,098-443-1362-C-96
 W3DRD (multiop) 123,984-164-252-C-30

Multi-Multi

W3JNX (multiop) 528,890-290-607-C-60

Pennsylvania

WA3NNA 786,240-280-936-C-65
 W3GRS 323,796-242-446-C
 W3A1B 300,390-190-527-C-42
 W3K1Q 211,134-154-457-C-38
 W3OOR 164,829-167-139-C-43
 W3OLW 138,510-135-342-C-51
 W3GHD 104,401-123-239-B
 WA3JLC 50,778-78-217-D-34
 W3ZJ 40,035-85-157-B-20
 B3DNI 39,615-85-139-C-14
 K3ZOL 38,631-79-163-B
 W3N3M 26,820-60-149-C-18
 W4OIA 25,185-73-115-C-16
 WA3MOF 24,570-78-105-F-14
 K3FRR 19,116-54-118-B-13
 W3CYS 17,298-62-93-C-11
 W3E1G 17,202-58-73-B-18
 W3CUP 10,332-42-82-B-5
 W3OVS 7956-39-88-C-6
 E3C7S 2961-23-39-C
 W3CBI 672-14-16-A-3

Multi-Single

K3MTK (+WA2QWK E3s KPV) 742,980-290-854-C
 IWR WA3s KPP PGR) 742,980-290-854-C
 W3DHM (multiop) 540,684-276-653-C-48
 W3KF (multiop) 458,372-246-594-C
 K3MBE (+K3JLJ) 102,339-83-411-F-36

Multi-Multi

W3WJD (+K3YUA W3s PSM YIK G3H1UW) 4,356,144-507-2864-C-96
 W3GCM (+W3s BGN GIM JSX KY LUTU NOH WA3JYB) 4,264,608-496-2866-F-96
 W3GPI (+K3WJV WA3s IHR IJZ) 3,251,971-479-2263-C-96
 K3HTZ (+W3WPG WA3s LNM NOX VF3BAW) 2,599,476-419-2068-C-96
 WA3ATP (+WA3s LRN LR) 1,959,804-404-1612-C-93
 WA3A1X (+WA3s COT G1Z KNB MME MPLI) 1,855,635-383-1615-C-96
 W3MWC (+K3s ILL JLK) 1,483,872-377-1312-C-86
 K3TGM/J (+K3PPI W3s BYX IHR WA3KRDI, opr.) 1,341,678-334-1339-C-9
 W3SS (+K3JLK WA3OAY) 1,083,780-324-1115-C-84
 K3UZY (+WA3KMD) 496,208-236-701-B

Maryland-D.C.

W3CRF 2,183,730-415-1754-C-66
 K1LLP/3 (WA3HTO, opr.) 1,273,590-318-1335-C-85
 W3E2I 1,094,184-334-1092-C-65
 W3GRF (W3GRM, opr.) 751,104-256-978-C-70
 W3AXW 550,374-269-682-C-68
 W3DBT 356,085-193-615-F-50
 W3ZSR 235,875-185-425-D-31
 W3PWO 200,856-169-408-C-54
 W3GN 196,866-147-446-C-35
 W3KDD 184,212-107-602-F-35
 W3HVM 135,942-139-326-C-30
 WA3GZT 125,715-145-289-C-40
 W3YHR 108,900-125-288-C-25
 WA3RCE 74,358-102-243-B-20
 WA3JVY 69,216-103-224-A-13
 W3HH 30,240-70-144-C-13
 WA3ENM 25,134-71-118-C-21
 WA3RDU 23,976-74-108-B-15
 W3EBX 16,008-58-92-C-9

WA1FBX/3 14,337-59-81-A-14
 W3AWM 11,907-49-81-F-16
 K3KMO 11,178-54-69-C-15
 W3FA 10,152-47-72-F
 W3PT 7503-41-61-B-7
 W3BVO 6552-39-56-A-25
 W2DWJ/3 3690-30-41-B-4
 W3WD 3162-31-34-B-15
 WA3RUC 1653-19-29-A-6
 W3QIC 1197-19-21-B-3

Multi-Multi

WB98XX/3 (+WA3RTD) 213,344-176-423-F-26

Western Pennsylvania

W3VT 1,142,640-360-1038-C-75
 W3KPI 274,950-195-470-C-40
 W3ZDW 167,994-153-366-A-44
 K3YVN 99,375-126-265-F-26
 W3YX 97,146-226-257-C-39
 W3PIX 77,559-103-251-B-15
 W3SOV 63,963-103-207-C-28
 W3KVS 59,607-111-179-C-35
 W3YZR 53,406-86-307-C-20
 W3PCZ 25,200-70-120-C-30
 WA3WAL 23,675-75-108-C-19
 W3SMX 4050-27-50-B-9
 W3VK 1680-20-28-C

Multi-Single

K3HLZ (+WA3s GJU NPX) 996,705-471-1035-C-72

4

Alabama

K4MG 578,880-268-720-C-66
 K4VKW 365,958-243-502-C-77
 W4CYC 306,432-192-532-C-63
 K4AEB 201,609-171-393-C
 K4BBE 189,561-177-357-C-46
 K4UWS 33,726-77-146-A-46
 K4IKR 24,300-60-135-C
 K4BYM 9300-50-62-C-3

Eastern Florida

W4LBP 1,154,859-331-1163-C-72
 W4PWC 425,502-231-614-C-68
 K4BKV 287,846-236-505-A-45
 E4CI 202,148-218-462-C-57
 W4Z1W 261,987-187-467-B-45
 K4KQ 182,175-125-347-C
 W4HOS 174,240-176-370-F-40
 W4CZS 156,240-186-280-C-43
 K4NE 123,576-152-271-A-32
 W4OZI 70,596-111-212-C-20
 W4RUN 48,300-94-175-C-42
 W4BI 38,448-73-138-C-24
 W4DXI 35,604-86-178-B-27
 W4WS 22,890-70-109-C-17
 W4QCGW 22,509-61-123-F-16
 WB4WLD 16,992-48-118-A-23
 W4YK 12,600-42-100-C-5
 W4KJV 12,324-52-79-A-4
 W4GOUZ 11,760-49-80-C-22
 W4WKC/4 6960-40-58-C-11
 K4UA 6270-38-55-A-6
 W4FEO 2430-27-30-A-20
 W4NTT 210-7-10-A

Multi-Single

W4FDA (+WB4s YX IAE) 2,146,416-388-1644-C-94
 W4KKD (+WB4WZR) 1,501,263-147-343-C-60
 WR41ON/4 (W4OZ1 WA4RLS W4N4UN) 97,020-110-294-C-24

Georgia

W4DOD 491,490-254-645-C-60
 K41Z 415,152-248-558-C
 W4WRV 217,998-207-438-A-57
 W4DXI 206,856-169-408-C-54
 W4KNW 68,199-127-179-C-20
 K4OV 63,504-112-189-F-31
 K4APL 32,472-88-123-C-74
 W4BHG 17,922-58-103-F-22
 W4GKI 10,368-48-72-D-33
 WB4RUA 8978-48-62-F-4

Kentucky

WB4SD 434,076-244-593-C-64
 WB4TPI 341,124-217-524-C-60
 K4VCB 15,292-47-112-C-9

S4FJK 2625-25-35-B-2
North Carolina
 WB4YUJ 1,633,170-385-1414-C-74
 WA4FTW 591,357-257-767-C-60
 W4TMR 282,807-201-469-B-45
 WB4YB 274,472-188-398-C-32
 WB4KZG 139,500-186-250-B-26
 W4VCN 32,832-72-152-F-23
 WB4SXX 29,314-78-121-A-15
 K4GHS 28,251-73-129-B-12
 WB4TBL 7830-45-58-B-14

South Carolina

E4II 503,496-252-666-C-52
 WB4NRJ 544,589-269-427-F-10

Tennessee

WB4LHO 444,045-165-291-A-65
 WB4COL 7980-38-70-B-12
 WB4RUX 4794-34-47-B-24
 W4OGG 96-4-8-A-2

Multi-Single

K4TTA (+K4WJZ WB4PRX W4N4PJE) 3016,316-331-812-F-75
 W4VSV (WB4s AUJ ILW IYO) 295,400-205-480-C-65

Virginia

W4QCV 1,149,000-383-1000-C-84
 W4WSF 1,139,484-353-1076-C-65
 WB4UYD 1,116,192-308-1208-C-74
 W4CWR 981,720-324-1010-C-82
 K4OD 687,486-298-769-C-60
 WA4YBV 606,066-274-803-C-65
 W4ZSH 460,836-251-617-C-51
 W4NOA 402,984-232-579-C-42
 W4DM 187,996-217-596-C-35
 K4PCL 368,253-207-593-C-39
 WB4OXD 328,704-214-512-C-51
 WB4QWJ 283,977-227-417-C-52
 W4TZ 257,850-191-450-C-26
 W4SYL 251,526-206-407-C-17
 WB4UKA 220,149-183-401-C-41
 W4JVN 188,877-167-377-C-34
 W4UPI 157,734-138-381-C-26
 E4ZA 118,440-140-282-C
 K4DXO 117,045-135-289-B-27
 W4PHL 114,840-132-290-F-43
 WB4TBO 72,077-104-231-C-33
 W4WBC 66,370-106-215-C-20
 W4DSW 61,486-98-209-C-24
 K4LDR 43,290-78-183-C-24
 K4JYM 40,290-85-158-A-21
 W4RQDY 38,544-88-146-C-25
 WB4GJV 31,317-73-143-C-13
 E4EHI/4 (+W4s RLS) 38,980-70-138-F
 W4KFC 31,000-70-100-C-6
 W4KMS 18,900-75-84-C-14
 WB4QV 13,748-44-89-B-11
 W4GFG 10,350-46-75-C-6
 W4BPMG 7326-17-66-C-22
 W4HUV 2958-29-74-C-10
 WB4M2T/4 (WB4OXD, opr.) 1500-20-25-B-4
 K4KA 1330-20-22-B-2
 K4YRN 160-10-12-A-2
 WB4SOK 297-9-11-B-3

Multi-Single

W4QAW (multiop) 1,013,934-347-974-C-70
 K3YGU/4 (+WA1JK W4MZN) 112,068-132-283-C-66

Multi-Multi

W4BYY (+K3NPV W3BOV K4s) (KLD VDL WB4EAL WA6QAE) 3,091,413-403-2557-C-90

Western Florida

Multi-Single

W3ZBW/4 (+WB4VUP) 512,865-261-655-B-70

5

Arkansas

WA5VDH 147,798-161-306-D-38
 WB5CKR 33,741-69-163-B-24

Multi-Single

W5PRZ (multiop) 283,866-187-506-C-57

CONTINENTAL LEADERS, QSO/BAND

CW						PHONE					
AFRICA						AFRICA					
	80	40	20	15	10		80	40	20	15	10
ST5CJ	64	225	349	260	320	ZS6DW	67	218	778	870	1086
ZD8MG	0	15	215	318	536	FL8MM	1	6	1040	528	320
CR6AI	23	72	232	120	277	CR7GJ	0	0	426	421	523
EA9EO	114	71	391	153	0	ZS3CJ	0	0	36	181	990
FL8HM	0	0	258	401	3	CR7FR	0	0	20	293	487
ZS2CW	0	0	80	0	65	9Q5IA	0	0	24	272	387
						FF3USL	0	0	75	41	0
ASIA						ASIA					
KR6AY	63	213	731	773	575	JA2JW	31	85	413	658	428
JA2JW	65	172	630	832	437	JA1CG	3	41	415	561	332
JA2IYJ	13	163	287	416	309	JA2IYJ	0	107	403	501	330
JA1JG	80	108	187	460	305	JA9AG	3	29	371	340	329
JA1CG	2	22	470	411	279	JA3MGX	6	20	156	243	468
VU2AAA	0	0	635	242	29	JA3AZD	0	52	277	250	165
OD5FJ	0	31	467	65	148	VU2AAA	0	0	417	224	35
JH1CBI	0	20	201	285	143	HS5AFJ	34	4	348	124	91
JH1WIX	0	4	0	490	248	HL9TO	0	31	99	155	23
JA1SR	6	39	107	220	216	JARGHT	0	19	1	50	209
EUROPE						EUROPE					
OZ1LO	184	326	859	897	500	CT1BH	186	224	963	1140	1507
I6BQI	136	285	761	852	539	IP1MOL	273	236	1139	1168	464
OH8RC	7	257	1191	1031	210	DL6WD	79	193	911	1042	1016
DL5BR	178	258	656	733	416	I6F1D	200	268	861	684	611
I3ASF	36	379	635	812	477	HA1YP	107	301	742	861	580
PA0LOU	152	208	578	391	551	IT9JT	76	92	1137	873	549
OZ5DX	73	68	476	763	500	CT2BG	175	365	689	872	301
F5IN	0	228	713	453	411	FA11D	147	237	617	454	776
EI9J	158	181	545	294	255	EA3NA	77	2	845	919	713
GW3JI	216	250	249	230	321	G3TJW	477	178	173	641	711
NORTH AMERICA						NORTH AMERICA					
XE1HJ	598	811	1503	1575	1347	XE1HJ	650	789	1575	2213	3080
VP2A	531	857	1227	1246	1073	KG4CS	433	587	1383	1133	1943
8P6DR	281	361	514	393	438	VP2LAT	510	435	1220	899	2254
OX3YY	168	314	797	615	146	KP4DLW	380	453	1420	1178	1554
KL7BCI	0	283	753	1228	0	KZ5JF	638	653	707	1046	1738
KP4DH	137	196	359	467	460	NE1LLS	407	678	927	683	1349
H2WX	0	34	512	527	443	VP2AAC	155	173	653	908	1170
OX3WQ	54	93	453	332	160	VP2AAP	268	427	505	574	1155
K4BZH/VP7	29	27	55	73	168	8P6DR	251	301	589	553	787
WA7SUN/VP9	128	59	51	40	0	TG0AA	0	258	626	1092	709
OCEANIA						OCEANIA					
KH6RS	500	817	1224	1182	1266	KH6RS	565	1217	1781	1810	2265
KH6J	277	704	1089	1180	990	KH6J	373	572	1009	1410	1660
ZL1AMO	58	247	743	442	386	KG6SL	62	151	611	571	792
VK6HD	102	355	525	183	297	KS6DY	2	0	546	562	1242
KH6GJY	147	236	319	446	166	KG6JBO	114	0	420	509	729
VK3KX	1	397	392	295	360	DU1FH	68	231	655	430	274
ZL1AFW	31	145	446	206	548	KH6FF	17	49	267	564	697
VK2GW	0	399	569	132	250	ZL2ACP	2	116	355	172	381
KH6FF	72	207	246	646	3	ZL1AGO	24	137	296	151	251
VRTAA	70	121	149	215	187	KH6HPF	0	4	327	395	181
SOUTH AMERICA						SOUTH AMERICA					
4M5KL	399	648	1204	1160	924	HC1RF	357	597	1182	1334	1730
CP6FG	78	209	1017	1131	877	VV5CVE	249	652	671	874	1051
9Y4VU	284	292	391	442	506	9Y4VU	240	161	634	986	1534
PJ9JT	0	230	721	607	837	W0YVA/YV5	0	163	1311	841	883
PY2FCJ	63	176	372	489	698	DL3ZM/YV5	371	0	410	312	621
CPIFU	0	33	87	94	0	ZPSAQ	0	0	621	428	873
OAN4AHA	0	0	0	285	0	YV1TO	0	143	614	443	28
PY2YC	0	0	50	0	0	8R1G	248	36	143	476	788
						CPIEU	0	2	2	127	1054
						CE5GO	0	13	0	0	516

Louisiana		W6APW 318,594-178- 591-C-60	K6GKU 31,980- 65- 164-B-40	Multi-Multi
WSWMLJ5	1,335,150-345-1290-C-84	W6JPH 171,387-137- 417-C-23	Multi-Single	W7ST A (+W7DL VU7- 421-ZZ)
WSOJ	73,710-117- 710-C-78	W6AM 164,250-150- 365-A-24	K6SDR (+W6QW)	2,776,472-341-2714-C-85
WSWG	66,402-102- 217A-60	W6KNC 97,236-111- 292-A-34	K8ZL 121-233- (179-C-80)	
K5RSH	16,512- 44- 86-D-20	W6AKZI 77,890- 88- 295-B	San Francisco	W7INH 17,577- 63- 93A-28
K3LVZ	11,550- 50- 77A-30	K6SSN 58,325-113- 175-C-20	W6YII 1940- 20- 49-A- 8	8
Mississippi		W6RCV 52,899- 11- 229-B-30	Multi-Single	Michigan
WSMUG	146,772-162- 302-B-25	K6MP 44,073- 83- 177-C-18	K6UJ (+W68KA)	K8DI 1 069,835-441-1045-C-80
New Mexico		K6OVI 41,169- 98- 140-C-10	W6RIP (+W60JH)	K8FH A 633,087-273- 723-C-81
W8RSZ	748,272-272- 917-C-62	W6LHA 40,550- 78- 175-L-55	361,188-158- 762A-32	W8BLU 451,437-259- 581-G-47
W4GHV/5	7812- 42- 62-C-10	W6CS 37,504- 94- 133-C-15	Sacramento Valley	W8SH (WABTBO, opr)
W5QO	388X- 27- 48A- 7	W6JKR 54,800-100- 116-C-18	W66NYV 184,824-136- 453-C-45	43,976-264- 553-C-45
K3WSP	16X- 7- 8	W6AAW 26,445- 41- 215-C-15	W66BK6	W8JW 259,740-195- 444-B-60
Multi-Single		K6ELX 12,810- 45- 132-C-18	K6RN 102,231-111- 307-B-12	W8TDT 170,982-161- 354-B-74
W5AXC (WA55 GD5 MHR VAL		W6DPO 11,610- 43- 90-D-5	K6KYA 56,604- 89- 212-B-13	W8KJ 142,623-159- 299-C-25
W5AYD WNS1AC WA6M8		W6LPX 35,64- 27- 44-A-24	W6GVM 25,773- 21- 121-C-25	W8QOH 72,913-112- 217-C-23
M. Robinson)	9990- 37- 90-F-18	K6KKP 78- 2- 3A- 1	W6NKR 17,169- 59- 97-C-14	W8VVP 55,212-107- 172-C-44
Northern Texas		Multi-Single	K6DR 12,240- 51- 80-C-22	W8WGG 51,376- 93- 184-B-20
WSQBM	1,071,996-314-1138-C-84	W6HJ (multipt)	W6BL 1242- 18- 23-B- 9	W8WHH 42,828- 86- 166-B-32
WA3BZA/5	253,581-181- 467-C-69	W6HJ 1,234,530-258-1595-C-70	7	W8WHY 35,607- 83- 143-F-32
WSQNZ	167,832-168- 33A-C-58	W6VPZ (6.6s HRT KH YPT Was	Arizona	W8WAA 7788- 44- 59-C- 8
W5PQA	149,490-151- 330-B-38	(FM YD)) 58,464-84-732-42	W7AYY 358,592-184- 646-C-41	W8WKS 4770- 30- 53-B- 8
WSQOZ	68,058-114- 199-D-31	Orange	W7E F 101,727-127- 267-F-36	W8WXL 2349- 27- 29-B-16
K5LZA	52,632-102- 172-C-40	W6MYV 243,540-180- 451-F-40	K3VXF/7 12,450- 50- 83-B-19	Multi-Single
W5WMM	2268- 21- 36-C-10	W66TQ 92,340- 95- 434-C-26	W71CD 11,070- 41- 90-A- 7	W8JUN (+K8HLR W8S OBG
W5SD	2160- 20- 36-A-17	W6ZOL 65,025- 75- 289-F-31	Idaho	VMO)
WASPL	216- 8- 9-B- 3	Multi-Single	K7J1 40,401- 67- 201-C	2,144,448-408-1752-C-95
Multi-Single		W6NSI (+W6LFL)	Montana	W8NGO (+W8S ONA SRK)
W5EUT (+W5E QWF YR WAsS		K6OW 156,591-127- 411-C-48	W7GKI 360,552-166- 724-F-58	1,082,916-133-1084-C-90
QXD UCT)	1,635,600-376-1450-C-96	W6DKO 74,175-115- 215-C-10	K7LTV/7 128,304-132- 324-C	W8UM (W8LA WAsS 17H
WSHA (+WASOCC)	789,192-291- 904-C-90	W6GLB 7770- 35- 74-C- 4	47,286- 71- 222-C-25	YVR)
WSGXX (+W85CRG Randy)	70,596-106- 222-A-53	Multi-Multi	W71IN 11,088- 44- 84-A	633,348-292- 723-B-60
W5FC/5 (W5QZC WAsS VOI		W6UA (+W6OH)	Nevada	Ohio
YKQ)	147- 7- 3-C- 1	241,380-149- 555-C-64	W79NIN 709,632-231-1024-C-82	W8MCR 612,943-265- 771-G-41
Oklahoma		Santa Clara Valley	W7YKN 29,415- 53- 185-F-17	W8YWX 358,714-247- 354-C-72
W5ZWO	1932- 23- 28-B- 6	W6DKF 946,122-274-1151-F-66	W7SGN 421,500-250- 562-F-47	K8AXG 476,205-265- 599-C-74
K5DLC	90- 5- 6-B- 6	K61P 250,752-128- 653-C-18	W7PIK 277,332-121- 704-C-54	W8MHW 392,400-218- 600-C-70
Southern Texas		K6CQF 200,772-156- 429-F- 1	W7JUC 53,406- 86- 207-B-60	W8EL A 369,720-237- 520-A-63
WSNMA	891,072-312- 952-C-86	K6PDI 172,692-123- 468-C-30	W7ATH 52,234- 68- 256-A-51	W8OKI 339,000-201- 560-C-66
K5TR	686,691-261- 877-C-48	W6YVK 99,198- 99- 334-B-29	W7GK 34,977- 89- 131-C-40	W8PRR 299,691-201- 497-C-64
WASWOF	187,089-151- 413-A-55	W6LJ 90,402-122- 247-C-53	W7GUR 23,760- 55- 144-F-25	W8ZCO 230,280-190- 404-C-37
W5JWM	182,214-191- 318-C-47	W6OKJ 87,318- 98- 297-F-45	Utah	W8BIA Y 213,840-162- 440-C-15
W5AED	159,495-155- 343-C-54	K6CN 73,663-113- 217-F-32	Multi-Single	W8I NF 197,067-164- 403-C-60
WASZWC	70,902-101- 234-B-23	K6OZ 58,680-120- 163-C	W7HS (+K7SD)	9870Z 172,368-171- 336-C-28
W5SHU	41,238- 87- 158-B-44	W6KJ 54,978- 98- 187-C	313,038-187- 558-C-65	W8MBD 169,875-151- 475-C-52
W5LDX	28,572- 88- 108-B	W6KLF 42,120- 72- 195-F-21	Washington	W8LBN 97,902- 98- 333-B-29
YV5AMH/WS	23,760- 80- 99-F	W6ISQ 22,995- 74- 105-C-10	W7RM (+K7PE, opt 1	W8NPF 68,622-118- 243-C-41
WASYSY	96,36- 44- 73-A- 7	K6WD 18,126- 55- 114-C	2,992,770-330-3024-F-82	W8M1 57,681- 82- 221-C-33
W5TFZ	88,32- 46- 64-F-21	W6GXF 16,104- 44- 122-B	W7BJ 431,538-142-1013-C-58	W8NCV 51,042- 94- 181-C-33
K5RVE	8775- 45- 65-C-14	W6HXS/6 14,322- 31- 154-A-18	K7GEX 325,035-155- 699-C-55	W8KZH 49,215- 85- 131-C-16
W5BIB	4320- 32- 45-A- 4	K6CXV 14,214- 46- 103-C-32	K7IRU 214,338-139- 514-F-50	W8WJG 22,578- 53- 142-A- 8
W5ELN	3096- 24- 43-F-15	W6CLM 6,789- 31- 73-F-14	W7YTB 179,928-153- 492-C-55	W8WZC 18,432- 64- 96-C-33
Fast Bay		W6MUI 819- 7- 94-B	W7YBK 141,576-136- 347-C-37	W8R1G 16,979- 57- 99-B
W6KG	1,214,451-259-1563-C	K61ZX 663- 14- 17-C- 4	W7OI 114,048-144- 264-C-32	W8BOV Y 15,390- 57- 90-C-19
K6DYO	380,685-205- 619-C-32	W661XW 300- 10- 06-F	W7JCB 93,912-104- 301-F-23	W8DI L 14,706- 57- 86-C-20
W6ITD	194,688- 96- 678-C-35	Multi-Single	W7NP 86,490- 93- 110-C-36	K8KXV 11,970- 42- 95-A-18
W6A6HF	124,200-138- 300-C-60	W6GGF (+W66DII)	W7UMX (K4ZDK, opt.)	W88KP N 3465- 13- 35-B-13
W6A6OM	102,897-111- 309-C-39	437,112-176- 679-C	41,340- 65- 212-C	W8D8 2540- 26- 30-A- 2
K6MHD	29,760- 62- 160-C-14	W6GLY (W6LH W661 XW)	W7LZL 41,160- 70- 126-C-23	K8BFX 208R- 24- 29-B- 2
W6ROZ	28,086- 54- 173-C	233,874-142- 549-C-55	W7R05 36,261- 79- 153-B-33	W8JAW 1200- 20- 20-A
Multi-Single		W6ZBS (+W6ZTJ)	K4ZDK/7 35,442- 66- 174-C-13	K8P Y D 1140- 19- 20-C-6
K6AN (+K6AUC W6PM)	1,195,026-259-1538-C-95	W6CUP (multipt)	W7ON 33,891- 79- 143-C-30	W8E V Y 1688- 16- 24-B- 7
W6NCG (+K6PJY)	971,106-277-1426-C-94	40,764- 86- 158-C-10	K7RSC 32,436- 51- 212-C-20	W8SUS 780- 13- 30-C- 9
K6H1H (+K61LG)	669,324-193-1156-C-65	W6GBY (+W66ZLU)	W7OHO 18,309- 17- 359-C- 9	W8JRN 160- 10- 12-B- 8
Los Angeles		W6GJY (+W66ZLU)	K7L B 12,060- 48- 90-C-30	W8EPL 216- 8- 9-A- 2
W6RR	1,294,419-371-1163-C-72	W6G6V (+K6L BB W6OAT	W7APN 3918- 18- 87-C- 6	Multi-Single
K6VLU	870,200-232-1450-L-72	W661 XW 1,986,600-301-1554-C-72	W71B M 7128- 44- 54-F-12	W8HVI (+K8TVO)
W6DSQ	809,732-268-1083-C-77	W661 XW 1,986,600-301-1554-C-72	W7UBA 4860- 30- 54-C-15	(026,300-311-1100-C-65)
W6NLU	448,029-201- 743-C-24	W6HJQ (+W6RGG W661RS)	K7UVT 4680- 30- 52-A- 7	West Virginia
W6DOX	438,600-215- 680-L-57	652,536-228- 954-L-78	K7UW T 26,22- 23- 38-C-4	K8YBU 1,764,794-386-1524-C-91
W6DGH	431,568-222- 648-F-47	W661 XW 1,986,600-301-1554-C-72	W7GYS 1755- 15- 39-A- 3	W8R1X 267,723-197- 453-F-62
W6BHDG	406,422-201- 674-B-52	W661 XW 1,986,600-301-1554-C-72	K7B1-L 156- 4- 13-A- 1	W8BJW 12,276- 44- 93-A-23
W66CMX	570,899-171- 721-F-70	W661 XW 1,986,600-301-1554-C-72	W7F5F 135- 5- 9-F- 1	W8VVA 5670- 35- 54-B- 8
		Multi-Single	Multi-Single	W8BK 1728- 16- 36-B- 8
		W6A6UZA/6 (+K6L BB W6OAT	W7VRO (+W7LKM)	K8YQC 79R- 14- 19-A- 2
		W661 XW 1,986,600-301-1554-C-72	689,688-206-1116-C-90	
		W661 XW 1,986,600-301-1554-C-72	W7MJJ (+W7MJC)	Illinois
		W661 XW 1,986,600-301-1554-C-72	135,516- 92- 491-C-20	W9LKJ 175,248-748-1042-C-46
		San Diego	W7MFO (+W7MJJ)	W9DWO 555,537-281- 659-C-28
		W6MAR 1,755,810-345-1858-F-88	36,352- 68- 188- 1	

WOMKA 529.137-259. 681-C-59
 W00III 4no.977-259- 601-C
 W0MIG 344,352-211- 544-C-71
 K9IIV 310,764-188- 551-C-61
 W9BZV 237,250-202- 375-C-28
 W9KDX 180,930-163- 370-C-54
 W9TII 180,297-301- 299-C-56
 W9IVB 113,577-131- 289-C-43
 W9WYB 100,650-122- 275-C-25
 K9CNG 78,624-112- 234-C
 W9YYG 59,427-93- 213-C-19
 K9MNI 58,752-96- 204-B-33
 W9EHP 51,264-89- 192-C-22
 W9IFU 46,992-89- 176-B-30
 W9IT 46,620-84- 185-C-20
 W9NNE 45,666-86- 177-C-26
 W9ALS 44,400-100- 148-B-30
 W9EFO 33,012-84- 131-C-25
 W9AG 21,420-68- 105-C-7
 W9MAI 21,243-73- 97-C
 K9R0I 20,520-57- 120-C-18
 W9VGV 18,471-47- 131-B-29
 W9IJI 16,362-54- 101-C-13
 W9AZRP 14,994-51- 98-A-22
 W9GKH 12,654-57- 74-B-8
 W9IETH 10,293-47- 73-C
 W9AVGN 76,11-43- 59-A-13
 W9BDDR 75,24-38- 66-B-20
 W9A9IH 45,12-32- 47-A-16
 W9R1C 1,242-18- 23-B-18
 W9KWA 1,026-18- 19-C-11
 K9DVK 540-10- 18-C-3
 W9HPG 108-6- 6-A-3

Multi-Single

WB9LUV (+WB9L DZ) 87,480-120- 243-D-96

Multi-Multi

W9AXD (K6YRA K9S CIV WT8) 782,280-265- 984-C-65

Indiana

W9ZRY 1,603,689-409-1307-C-96
 K9C9Y 1,140,156-324-1173-C-82
 WB9BPG 471,678-254- 619-C-34
 W9S1R 416,760-230- 604-C-52
 W9ARQY 406,752-223- 608-C-72
 W9ANPM 248,523-187- 443-B-68
 K9ODI 210,396-178- 394-E-59
 W9K1P 168,858-159- 354-C-76
 WB9DMC 89,880-107- 280-A-26
 K9RC9Y 69,264-104- 222-C-32
 W9AVGQ 66,930-115- 194-C-24
 K9VJK 60,822-109- 186-C-39
 W9ZTD 60,669-107- 189-C-20
 W9B1X 47,478-82- 193-B-38
 WB9EAO 38,116-71- 132-B-16
 K9C1U 27,495-65- 141-C-23
 W9HZ 23,976-72- 111-45-20
 K9MMH 21,204-76- 93-C-20
 W9AUM 18,300-61- 100-C
 W9IYI 4650-31- 50-C-3

Wisconsin

W9LWC 493,476-236- 697-C-32
 W9KYZ 298,350-195- 510-V-50
 WB9BPN 149,058-147- 338-1-84
 W9KXK 109,326-133- 274-B-43
 K9DXO 76,972-79- 156-B-16
 W9AVCK 29,601-69- 143-B-22
 K9I9N 24,705-61- 135-B-22
 W9RDK 23,256-57- 116-D-28
 WB9K1P 22,446-58- 129-C-22
 W9K6 21,660-76- 95-B-22
 W9QZWI 18,126-57- 106-B-9
 WB9BIO 9990-45- 74-B
 K9GMI 7011-41- 57-C-15
 W9QW 756-12- 21-C-3
 W9C1S 189-7- 9-B-6

Multi-Multi

W9YF (K9S KGA LBO OXY W9S GMK SOU TPV W9S BJR 11B) 3,945,363-449-2929-C-96

WB9LUI (+WA9PUN) 60,342-89- 226-C

Colorado

W9NOU 634,524-253- 836-C-63
 K9ZFL 231,660-156- 495-A-54
 W9GAA 229,320-168- 455-C-26
 W4UDS/Q 7592-24- 36-C-3

Multi-Single
 W9MYN (+WA9UGZ WB9S AIN AMJ CMM D11) 959,424-263-1216-C-96
 K9WAR (K9S DWZ ISD J11 TOG W9YCD WA9VQG WB9DID) 6356-32- 66-B-30

Iowa

WA9AIY 81,432-116- 254-B-35
 W9I2O 22,848-56- 136-B-11
 W9I6I 19,116-59- 108-B-26
 W9N1L 17,199-63- 91-D-17
 WA9VBW 4557-31- 49-B-30
 WA9VIX 4104-36- 38-C-3
 W9JKT 8-1- 2-A-3

Multi-Single

WA9TAP/Q (+WA9MMWW) 19,152-56- 114-A-15

Kansas

K9I9NV/Q 579,462-247- 782-F-66
 WA9MYK 89,262-103- 318-B-47
 K9CMI 88,425-131- 225-C-40
 W9IUB 52,359-85- 211-B-23
 WA9TKJ/Q 41,310-81- 170-B-26
 WA9IOZ 30,861-81- 127-A-37
 WA9VJE 27,951-77- 121-C-17
 W9RCS 288-14- 14-C-9
 WA9HZL 504-12- 14-C-1
 WA9SVQ 243-9- 9-C-6

Multi-Single

WB9GPE/Q (multiop) 18,564-68- 91-C-35

Minnesota

W9IYP 381,348-198- 642-C-37
 W9IYH 200,070-171- 390-C
 W9NG 153,075-157- 325-C
 WA9VBV 131,152-152- 292-B-38
 K9Z8I 87,480-108- 270-C
 K9ZKI 46,851-97- 161-C-16
 W9IWN 36,936-76- 162-C
 W9E1A 25,833-79- 109-C-14
 W9YDR 20,196-66- 102-C-13
 W9TRI 18,648-56- 111-B
 W9FAN 4368-28- 52-C-2
 W9LPL 1848-22- 38-B-9
 K9CNC 198-6- 11-C-1

Multi-Single

W9HZ (+W2TA K9VWX W9S NAR NUH) 1,38,800-292-1300-C
 W9HP (+WA9WELZ) 849,816-296- 957-C
 K9JLL (+K9ZKI WA9WELZ) 268,737-191- 469-C-40

Missouri

WA9ILF 314,184-212- 494-C-70
 K9S6J 224,064-192- 389-C-57
 W9UCK 34,560-90- 128-C-37
 W9B1B 31,488-82- 128-C-19
 W9RUR 21,594-59- 122-C-14
 K9TOV 14,625-65- 75-B-19
 W9TDR 13,167-57- 77-C-10
 WA9VSS 12,792-52- 82-C-26
 W9DLM 1848-22- 38-B-12
 K9DYM 1104-16- 23-C-4

Nebraska

W9NGJ 339,360-224- 505-C-56
 W9WLO 224,451-163- 459-C-42
 WA9ZPM 47,658-94- 169-C-30
 WA9LRQ 34,992-81- 144-B-32
 WA9WGO 30,450-58- 175-B-31
 WA9VYV 5346-33- 54-C-8

Multi-Single

WA9GHZ (+WA9E1U) 8888-40- 14-B-14

North Dakota

K9AIL 43,659-99- 147-C-26
 W9CAQ 25,137-63- 133-B-21

South Dakota

W9WUI 5940-33- 60-B
 WA9OML 4092-31- 44-C-19

DX CW
AFRICA
 Angola
 CR6AI 308,424-142- 734-B-16
 Cota
 CA91Q 282,123-129- 129-A-39

Ethiopia

Multi-Single
 IT7TH (+K1LJ1 IT7GK) 402,615-115-1167-A-26

French Somaliland

F180HM 192,642-97- 662-B-17

Ascension Island

ZD8MG 455,368-134-1084-B-36

South Africa

ZS2UW 10,440-24- 145-A-18

Mauritania

5T5CI 672,336-184-1218-A

ASIA

Iran
 F9P2P 46,800-60- 260-B-28
 F9PC2 3432-22- 52-A
Korea
 HL9VK 117,855-81- 485-F-27

Japan

JA2JW 1,300,824-203-2136-C-62
 JA2IYJ 613,008-172-1188-B
 JA1JGK 584,820-171-1140-D
 JA1CG 532,800-150-1182-C
 JH1CB 239,481-123- 649-B-24
 JH1WU 218,148-98- 742-A-21
 JA3SR 204,824-116- 588-F-45
 JA4BNT 204,120-108- 630-A
 JA8FB 140,112-84- 556-B
 JA7IA 110,454-82- 449-D
 JA2IU 104,874-77- 454-A
 JR1BRV 84,825-75- 377-B
 JA3MGY 77,688-78- 352-D-17
 JA4AEZ 77,526-73- 354-A
 JA1SJV 68,208-49- 604-B-18
 JA5BLE 41,340-53- 260-B
 JA2DNA 36,300-50- 242-D
 JA9LZ 31,455-45- 233-A-32
 JA7YOJ (JA7GQB, opt.) 27,945-45- 207-A
 JA2JA 21,930-43- 170-B-10
 JA7BP 15,129-41- 123-A-33
 JH1MT 12,864-32- 134-D-70
 JE1CUA 12,078-31- 366-A
 JA8AAC/I 9696-32- 101-A
 JA9MT 7920-30- 38-A
 JA1BNW 7614-27- 94-B
 JA2HI-B 5676-22- 86-A
 JA5IU 4920-20- 82-A
 JA1DFQ 4875-25- 65-A
 JA5TX 2013-11- 61-A
 JA7IKH 1230-10- 41-A-10
 JARGR 960-8- 40-A-5
 JH1HK 588-7- 38-A
 JA9JOP 468-13- 12-A
 JA1KKA 432-8- 18-B-3
 JA3BK 324-4- 27-A
 JH3BJN 60-4- 5-A-2
 JH2BSE 36-2- 6-A

Multi-Single

JA9YBA (JA9S BAU BEX EXI PAN F11N GLE) 1,026,840-199-1720-G-40
 JA7YAA (multiop) 143,520-92- 520-B
 KA2DX (WA3RHR WA5HS) 84960-80- 354-A

Mongolia

JT9AE 3384-24- 47-A

Rouk u Islands

KR6AY 1,462,455-207-2355-C

Lebanon

OD5EJ 255,960-120- 711-A
 OD5LX 27,060-55- 164-B

Asiatic, R.S.F.S.B.
 HW9AL 192,648-92- 698-B
 U99WL 192,390-106- 605-B
 UA9MAR 102,060-54- 630-A
 UA9MX 77,760-72- 360-A
 UA9NN 54,150-50- 361-B
 UA90N 49,077-57- 287-B
 UA9LI 48,516-52- 311-B
 UA9TD 34,701-43- 269-A
 UA9BAC 27,429-41- 223-A
 UK9CAI 20,304-36- 188-B
 UA9LAC 16,884-28- 201-A
 UK9SAA 12,600-40- 105-B
 UK9CAI 11,682-22- 177-A
 UA90N 11,532-31- 124-B
 UA9OAS 8424-26- 108-A
 UA9ZF 3960-15- 88-A
 UA9JAD 2520-21- 40-A
 UA9AAK 2508-19- 44-A
 UA9KAL 1296-16- 27-A
 UK9MAA 264-8- 11-B

Multi-Single

UK9ZAB (+V.Crymsky,I.Demov,H.Garvin) 383,616-128- 999-B

UK9CAB (3 ops.)

336,000-112-1000-B
 UK9HAD (+I.Alfanassev,V.Munarov,G.Piatkov) 264,600-98- 900-B

UK9JTB (S.Anatolyevich,S.Vasiljevitch,A.Alexandrovitch)

84,315-73- 385-B
 UK9SAY (+J.Donskih,J.Koternikow,W.Krawiec) 72,171-81- 891-B

UK9FAD (2 ops.)

41,796-43- 324-A
 UK9CCC (+Y.Kalturnov,A.Solovjev,G.Slotin) 21,600-40- 180-A

UK9KAG (UA9KAF UA9L-138-B)

61,200-17- 122-A

Azerbaijan

UD6AM 2064-16- 43-B

Georgia

UF6AS 7350-35- 70-B

Turkoman

UH8BO 165-5- 11-B

Kazakh

UL7GW 23,256-57- 136-B
 UL7TA 8160-32- 85-A
 UL7CT 3888-24- 54-A

Kirghiz

UM8MAL 26,814-41- 218-B
 UM8FM 6174-21- 98-B

Multi-Single

UK8MAA (+S.Pasko,S.Pavlov) 38,854-42- 279-B

India

VU2AAA 293,544-108- 906-A-28
 VU2JN 8094-38- 71-A

Afghanistan

YA1OS 14,112-32- 147-B

Israel

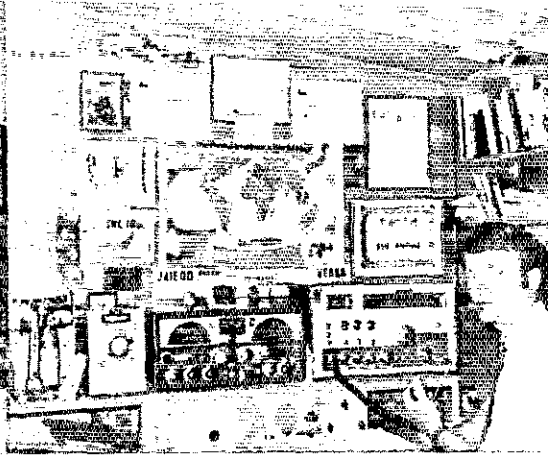
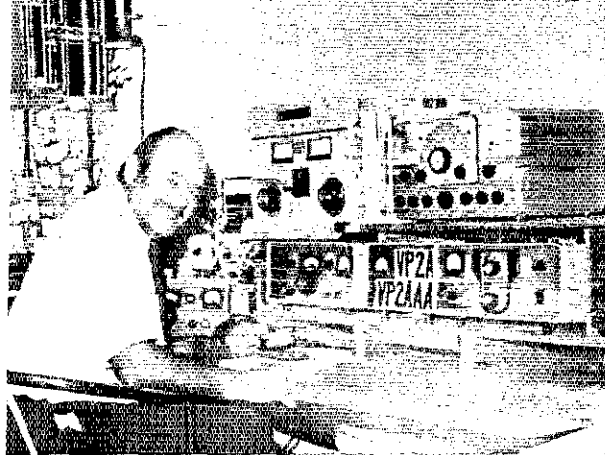
Multi-Single
 4X4U (+Z4ZG) 608,958-162-1253-C-55

EUROPE

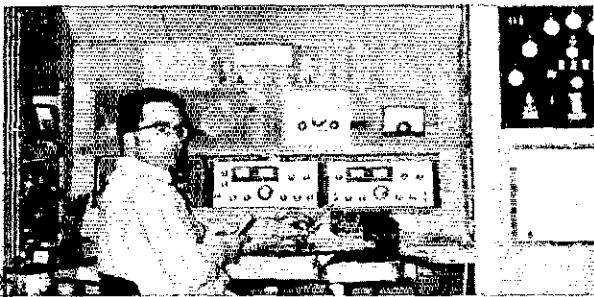
Portugal
 CT1ZO 71,736-61- 392-A

Germany

DL5BR 1,405,107-209-2741-B-94
 DL2PH 676,500-164-1375-C
 DL7NS 623,159-169-1237-B
 DL6BW 244,422-111-734-B
 DL0CP 236,691-119- 663-B
 DL5CG 210,168-126- 586-C
 DL6W 185,760-120- 516-F
 DL1GN 160,425-115- 465-D



Left: The proud holder of "The Golden Pencil," VP2A, John's Collins-line and beam antennas helped him rack up just over 5000 QSOs in the cw event. A fine station and a fine operator. Right: From the mountains of Chile, the Marauder of CE5GO stirred the airwaves for 14 hours. Outside, Ulrich has a 14-AVQ and dipoles.



Here's one you shouldn't have missed on cw. PAØLQU keyed his way to a million-points-plus showing using a TH3 and random wire radiators. Lou remarks that his operating time was limited due to interference to transistorized entertainment equipment. Eliminating that problem is a tough nut to crack.

Right: One of many German phone entries is DL4DL who gave a QSO to 923 W/VE participants. Bob worked all states except Arizona during the two weekends. Below: Coming in with over 4 million points from Ecuador is HC1RF who used 600 watts to a two ele quad and inverted vee's. Richard made a "clean sweep" on 10 by grabbing all states and VE call areas while making 1730 5BDXCCers happy. Below right: With the highest scores ever from North Carolina WB4YOJ grabbed 7th and 8th spots in the top 10 on phone and cw respectively. Dean is no newcomer to this game having entered the fracas as WA1IRG in years past.



DI9RT 155,995-104 500- B
 DI43S 123,795-105 393-B-26
 DM2AOL 77,640 49 120-A
 DJ1RE 65,808 48 457-C
 DK5HU 45,864 42 364-B
 DL2JX 43,890 45 266-A
 DJ4RX 35,156 36 301-B
 DM2HUN 22,680 36 210-B
 DM2CYO 18,054 59 102-A
 DM3BE 17,787 49 123-A
 DM4ZWL 15,435 49 105-A
 DM3VUH 13,806 39 118-A
 DL1TH 11,997 31 129-B
 DM21DI 7,650 30 85-A
 DM4XI 6,622 23 98-A
 DM2CLM 4623 23 67-A
 DM1LMM (DM4ZOM, opt.)
 4056- 26 52-A
 DM2FBN 2940 20 49-A
 DM4XKL 1800 20 38-A
 DM2AVD 891 11 27-A
 DM2ZAC 120 12 20-A
 DM2CHM 720 10 24-B
 DM2CUU 480 10 16-A
 DJ2YE 264 8 11-B
 DM4WFF 198 6 11-A
 DM2DEN 27 3 3-B
 DM2FBL 18 2 3-A

Multi-Single

DI9FF (+DKNOI) 1,204,794-201-1998-C
 DMSOI (DMS5 SDL VDL) 98,940 85 388-B
 FA5HS 230,418-102 753-A-2U
 LA2HR 52,896 76 232-A 3R
 FA2CR 25,821 19 63-A

Spain

FA5HS 230,418-102 753-A-2U
 LA2HR 52,896 76 232-A 3R
 FA2CR 25,821 19 63-A

Rep. of Ireland

F19J 917,748-212-144-A-3R
 E15F 7830 29 90-A

France

F51N 942 210-174-180S-R85
 F8VJ 599,400-180-1110-A-48
 F81C 534,600-135-1320-B-46
 F8TQ 429,429-169 847-A-30
 F8ZF 319,839-139 767-B-25
 F6BBJ 137,058-106 431-B
 F2PO 59,007 89 221-A
 F8VQ 3132 18 58-A
 F2CG 702 13 18-A-2

England

G2OT 785,400-200-1309-A-56
 G3KMA 658,368-192-1143-A
 G2DC 521,136-168-1034-A-69
 G3TFF 177,708-118 502-A-22
 G3APN 170,847-123 461-A
 G2AJB 49,350 70 235-A-24
 G3CWL 3645 27 45-A-5

Multi-Single

G4ALE (G3s SIX UP Y VY) WRR
 G8s COA (CSK) 1,247 256-204-2038-A-96
 G3YCT (+G3FBK) 508,458-166-1021-A-62

Scotland

GMSAXO 35,532 63 188-A-6

Wales

GW3JI 808,974-213-2266-A-80
 GW3SYL (25,820 90 466-A-19)

Multi-Single

GW3UCB (G3s WKH WXS) 45 3 5-A

Hungary

HA5JU 198,450-105 630-A
 HA3GA 114,037 87 437-B
 HA5HM 63,114 67 314-A
 HA1ZG 10,989 53 111-A
 HA9GQ 4860 27 60-A
 HA1YA 4752 22 72-A
 HA9PP 384 8 16-A-6

Multi-Single

HA5KIDQ (HA5s DF FM HO HP H) KCH 1,611,456-218-2464-B

HA5KBM (HA5HW, E. Schneid-
 hoffer) 402,570-142-945-A
 HA3KMA (5 ops.) 90,816 88 344-A
 HA3KNA (HA3JNG, J. Csepel-
 la, I. Csoti) 61,248 64 319-B
 HA5KKK (György Jozsef, Karo-
 ly Miklos) 26,708 48 182-B

HA9KOB (B. Mihaly, P. Pataki) 8352 32 87-B-6
 HA8KQX (H. Reiz, Gabur, Istvan) 5306 19 58-A
 HA5K1N (HA5s 131 093) 1092 14 26-B

Switzerland

HB9KC 503,496-162-1036-D-23
 HB9DX 217,404-132 549-B
 HB9AGH 31,860 59 180-D

Liechtenstein

HR0XHW 111,000-100 370-A

Italy

I6BDJ 1,659,585-215-2573-B
 I3ASL 1,386,396-198-2334-B-66
 I1DOZ 807,312-176-1529-B-57
 ISYZ 126,360-104 405-A-25
 IZVYZ 67,584 88 286-A-27
 I3MGN 41,616 68 204-B-30
 I4RGZ 6442 32 67-A-15
 IPIWXY 12 2 2-B

Norway

I49JM 542,880-160-1131-A-42
 I46U 57,117 79 241-A
 I49OI 51,480 66 269-A
 I471J 22,737 53 143-A-8
 I48C1 20,160 56 120-A-13
 I41P 16,512 43 128-A-31
 I411C 12,972 47 92-A
 I42Q 12,642 49 86-B

Bulgaria

LZ2LE 150,450 85 590-B
 LZ1KBG 27 1 3-A

Multi-Single

LZ1KDP (LZ1s GX NZ A-42) A-510 1-38Y
 618,408-168-1222-B
 LZ1KDF 26,612 54 226-C

Austria

OE1ZGA 681,408-168-1352-B-43

Finland

OH8RC 1,528,544-188-2696-B-82
 OH1W 223,215-115 647-A
 OH2IS 136,452 83 548-B
 OH8OB 97,440 70 484-B
 OH2BMG 74,679 73 341-B
 OH7NW 73,185 85 287-A
 OH8SN 34,182 54 211-B
 OH1QB 25,740 44 195-B
 OH2YT 23,667 49 161-B
 OH9PI 20,988 53 132-R
 OH8SI 20,550 50 137-B
 OH2BCD 14,553 33 147-B
 OH7SQ 12,834 46 93-B
 OH7RC 12,519 39 107-B
 OH6YO 9000 30 100-A
 OH2LG 8160 34 80-A
 OH6YP 5394 29 62-A
 OH2BFX 4032 24 56-B
 OH7SX 2588 26 46-B
 OH2JS 2622 23 38-A
 OH2VZ 2457 21 39-B
 OH8UX 2376 24 33-B
 OH6RC 1932 14 46-B
 OH1PG 864 16 18-B
 OH2DN 594 11 18-A
 OH2LU 390 10 13-A
 OH2RD 168 7 8-A
 OH5YU 168 7 8-A
 OH7AC 90 5 6-B
 OH9TD 90 5 6-A

Multi-Multi

OH1AD (OH1s MA PS OP SH UK VQ VT WD XX OH2BO) 1,921,992-212-3022-B

Czechoslovakia

OK3CIR 608,880-172-1180-B-66
 OK1WC 468,504-162 964-A-96
 OK1TA 447,984-153 976-U
 OK1QX 411,228-144 954-C-13
 OK1APJ 377,568-152 828-B-64
 OK1MIN 144,780 95 508-A-49
 OK1ND 49,980 70 238-A
 OK2BDM 39,672 57 233-A-27
 OK2BKJ 26,814 41 218-A
 OK1KZ 18,600 31 300-B-24
 OK2BP 14,820 38 130-B
 OK1DWK 14,385 35 137-A
 OK1MMK 14,136 38 124-A
 OK1RAQ 12,636 27 156-A
 OK1DM 11,514 38 101-A
 OK2BIR 11,067 31 119-A
 OK1ATZ 10,080 32 105-A
 OK1KCF 9600 32 100-B
 OK2PAW 5568 29 64-A
 OK2RO 5346 22 81-A
 OK1AM 5040 28 60-B
 OK1DAV 4992 26 64-A-5
 OK1EJS 4872 28 58-A
 OK11ON 4758 26 61-A-12
 OK3ZBU 4725 25 63-A
 OK1FO 3709 21 43-A
 OK2PDL 2280 19 40-A
 OK1ATJ 2244 22 34-A
 OK1DBM 2052 19 36-A
 OK1APS 1248 13 32-A
 OK1ATA 897 13 23-A
 OK11AR 792 11 24-A
 OK1CJ 551 9 13-B
 OK1HM 336 7 16-A
 OK1AVI 324 9 12-B
 OK1URJ 192 8 8-A
 OK2KYJ 60 4 5-A
 OK1ATP 3 1 1-A

Multi-Single

OK1KTI (multipt) 986,133-191-1721-C
 OK1KSOP (OK1s AAU ADH ALZ
 AH JJB TS WT) 646,458-163-1322-B-84
 OK1KWR (multipt) 702 9 26-A

Belgium

ON4XG 487,971-159-1023-B-31
 ON8UL 792 12 22-A-1

Faro Islands

OY4M 13,884 26 178-C-14

Denmark

OZ1LO 1,800,242-229 3766-B-86
 OZ5DX 1,049,040-186-1880-B
 OZ1W 277,620-140 661-A
 OZ1W 129,712-112 512-A
 OZ3PO 94,815-105 301-B-17
 OZ4HW 44,250 59 250-B-19
 OZ7HC 40,803 67 203-A-25
 OZ8BN 17,286 43 134-A
 OZ1TH 13,230 35 126-A

Netherlands

PA01OU 1,154,958-214-1799-A-43
 PA0JMH 302,976-128 789-A-35
 PA9GP 21,496 84 248-A-15
 PA0JR 18,975 55 175-A
 PA0NMH 17,940 46 130-A
 PA0VB 14,985 45 111-A-10
 PA0TA 8892 39 76-A-9

Multi-Single

PA0GN (PA0s GIN HJK NRA SPA TUM) 966,078-191-1686-A-96

Sweden

SMSBNZ 716 352-164-1456-B-52
 SM7FA 625,968-168-1242-A
 SM6BTZ 297,882-134 741-B
 PA9GP 21,496 84 248-A-15
 PA0JR 18,975 55 175-A
 PA0NMH 17,940 46 130-A
 PA0VB 14,985 45 111-A-10
 PA0TA 8892 39 76-A-9

SM6HDW 46,272 64 241-B
 SM0CGG 43,848 72 203-B
 SM7AL 34,362 69 166-B
 SM4CM 29,580 58 170-B-4
 SM4AZD 27,360 60 152-A
 SM0BBS 27,360 60 152-A
 SM6PI 25,740 55 136-B-20
 SM0BTS 21,318 38 187-B
 SM1BDA 20,988 53 132-A-12
 SM7CYP 17,976 56 107-B
 SM5AUN 17,952 44 136-B
 SM7CTJ 16,896 44 178-A
 SM0OY 10,800 45 80-B
 SM6AVD 10,206 42 81-A
 SM7DMT 5625 25 75-A
 SM7LXC 5460 26 70-A
 SM6JY 3111 17 61-B
 SM3EAP 2850 25 38-A
 SM5DEN 2448 24 34-A
 SM6DH 1785 17 35-A
 SM5XX 1125 15 25-A-10
 SM3DXC 1008 12 38-A
 SM6BSM 273 7 13-D

Multi-Multi

SK3BP (SM2s L1 L1 KM SM3s BUS
 EVG IWR VF SM5s CRV DFM
 DEW DNI ERP 1 U1) 1,333,497-187-2377-B

Poland

SP6ASD 323,895-151 715-B-88
 SP2DVT 204,960-122 560-A
 SP6DMJ 96,726 94 343-A
 SP8AON 93,852 99 316-A-26
 SP8FDQ 64,368 48 447-A
 SP2AIO 57,840 80 241-B
 SP8RH 45,360 70 216-A
 SP8FM 37,866 67 186-A
 SP9KZ 26,373 59 149-B
 SP9AG 20,586 47 146-B
 SP7BC 17,917 47 127-A-23
 SP9AV 17,039 31 83-A
 SP4KKG 11,530 35 110-A-20
 SP2BHZ 10,044 31 108-A
 SP3AHZ 6018 34 59-A
 SP3CDO 5368 32 58-A
 SP6WQ 3960 22 60-
 SP7CKJ 1764 21 78-A
 SP9HJ 1581 17 31-A
 SP2BHZ 1260 12 35-A-5
 SP6IK 1008 16 21-A
 SP2BRZ 816 16 17-A
 SP2RMX 660 11 20-A
 SP1DBD 231 7 11-A
 SP5GJ 198 6 11-C
 SP6GC 75 5 5-A
 SP9DH 5 1 1-B

Multi-Single

SP3PT (multipt) 7104 32 74-A
 SP5PTR (SP5s HIR 1 NM 1433) 3480 20 58-B
 SP5PBE (multipt) 1008 14 24-A

Greece

SV0WO 373,320-122 1020-E-32
 SV0WII 106,272 82 432-1-55

European R.S.F.S.R.

UW1C 196,647-101 649-B
 UW3IV 76,032 72 352-B
 UA1IA 51,750 56 345-B
 UV3TA 40,800 50 272-B
 UW3VV 33,075 45 245-A
 UW3UH 16,008 46 116-A
 UK4HBB 14,934 38 31-A
 UA3TA 14,352 46 104-B-12
 UA1WAR 12,915 41 105-B
 UA3BAK 12,726 42 101-B
 UA3HH 11,655 35 111-A
 UA3RO 6,448 29 74-A
 UA1AJ 3098 24 43-A
 UA3QY 2800 19 50-A
 UA6LU 2064 16 43-B
 UA4BB 1386 14 43-A

UK3DBD 1326-13-14-B
 UA4AAA 120-5-8-A
 UA300 75-5-5-B
 UK3MAA 48-4-4-B

Multi-Single

UK1AAG (Elnsky,Karpenko,Kir-
 juk,Myrmin) 364,320-132-920-B
 UK3LAD (V.Kabanov,B.Ovstinn-
 kov,A.Pastchenko) 149,885-85-587-B
 (UK4WAB (B.Baranov,A.Kapachin-
 sky,V.Kislyakov,V.Krylov) 75,613-71-355-B
 UK3AAG (V.Babkov,V.Kry-
 yuk,E.Mikhailenko) 64,872-68-318-B
 UK3YAA (RAJB3YBO (UA3YR
 UA3J-11884) 25,854-62-139-B
 UK3DAA (multiop) 18,480-40-154-B
 UK4AAJ (multiop) 627-11-19-A

Ukraine

UY500 90,153-81-371-B
 UBSTO 60,975-75-271-B-27
 UY5TF 50,800-80-212-B
 UB50AL 32,706-46-237-A
 UT5SY 30,456-54-186-A
 UB5RS 12,348-42-98-A
 UT5HZ 4416-32-46-D
 UB5EF 4158-22-63-B

Multi-Single

UK5LAA (UTSYC UB5S 073-202
 073-3 073-446 073-474) 465,594-146-106-B
 UK51AJ (A.Khodolov,V.Urban-
 sky,L.Shvied) 209,664-112-624-B
 UK5LAA (N.Owod,Y.C.Chu-
 pona,L.Zubchenko) 167,165-95-569-B
 UB5NS (+UB5NQ UT5ZC) 8904-28-106-B

White R.S.S.R.

UC2CK 2058-14-49-B

Moldavia

UQ5OAY 6162-26-79-A

Lithuania

UP2BV 45,864-49-312-A
 UP2BAW 32,445-35-309-A
 UP2BAS 9801-27-121-A-6

Multi-Single

UK2BAV (UP2MB UP2O3R-211 Jo-
 nns) 48,708-66-246-A

Latvia

UQ2OC 80,166-62-431-A
 UK2GBY 60,705-71-285-B
 UQ2HO 9828-42-78-B

Multi-Single

UK2GAA (UQ2A GCN ON) 394,800-140-940-B-41
 UK2GAT (Ankovich,Malaty,Pawlow-
 sky) 63,960-65-328-B

Romania

Y07DO 171,360-105-544-B
 Y08EZ 168,480-104-540-A
 Y02BP 60,192-48-418-A
 Y06KAF 21,168-49-144-A
 Y06AW 15,732-46-114-B
 Y06ADM 12,864-32-134-A
 Y04KAK (YO4AH, opr.) 12,600-40-105-A
 Y03JA 4860-30-54-A
 Y091O 4680-30-52-A
 Y07APA 3213-17-63-A
 Y02AV 1634-16-34-A
 Y09AFM 570-10-19-A
 Y06LG 480-10-16-A
 Y09KPI 394-7-19-A
 Y09ABX 252-7-12-A
 Y06LV 12-2-3-A

Multi-Single

YO2KAB (YO2S ABW BM) 500,544-191-869-A
 Y05KAU (YO5A DH TO) 180,260-105-604-A
 YO6KAL (YO6S EX XI) 104,052-92-377-A
 YO7KAJ (YO7S AHD ARZ DF NA) 82,110-85-372-A
 YO8KGA (YO8S DD OP) 68,904-88-261-B
 YO5KAD (E.Dialog,A.Kotimon) 50,778-27-217-A
 YO8KAN (YO8S ML MD) 42,435-69-205-A
 YO2KAR (YO2GL E,Badca) 31,725-75-141-A
 YO4KBJ (YO4S CT YG) 19,668-44-149-B
 YO9KH1 (Badoni,Gujj) 12,130-45-90-A
 YO6KBM (YO6S DB XB) 2430-18-45-B

Yugoslavia

YU2CDS (YU2RKK, opr.) 122,106-94-433-A
 YU1SF 40,755-65-209-A-43
 YU3WD 15,120-24-210-B-13
Multi-Single
 YU3CV (+YU3S HD E LFO F Y TFO
 TVP) 2,288,703-230-3317-B-94
 YU1BCD (YU1S NQW PCT QBC
 RS-458) 1,726,188-226-2546-B-83
 YU2CBM (Andrija,Jo.Juro,Marin-
 Rade,Srecko,Vojo) 115,940-115-452-B-52
 YU5CEF (K.Mirceski,V.Naumov-
 ski,T.Tnokovski,T.Iodorov) 57,645-45-427-A-18

Malta

9H3C 553,104-167-1104-A

NORTH AMERICA

Cuba

CU2LD/7 2400-20-40-A

Dominican Republic

HI3MEI 57,477-49-391-B

Panama

HP1AC VI 707-39-271-B

Honduras

K0YVVR/HR2 9702-42-77-B-4

Alaska

KI7RCH (O1230R-149-2264-1-70
 KL7HGA 55,428-62-298-A-21
 KL7EWA 22,632-41-184-A-4

Puerto Rico

KP4DJ1 990,828-204-1619-B-33

Greenland

OX3YY 1,383,120-226-2040-D-65
 O83WQ 484,848-148-1092-B

Costa Rica

TI2WX 759,516-167-1516-A-37

Anguilla

VP2A 4,456,782-297-5002-C-80

Grenada & Dependencies

Multi-Single
 VP2GVW (+W3s AOH TV W4GIV
 VP2GUF) 1,728,222-226-2549-B-48

St. Lucia

Multi-Single
 VP2LAT (+VP2LAW) 1,395,360-255-1824-B-46

Bahama Islands

K4BZH/VP7 90,096-91-353-A-10

Bermuda Islands

WATSON/VP9 79,230-95-278A-42

Mexico

XE1HJ 4,970,568-284-5834-C-72
 XE1HJ 1,474,980-244-2015-B-55

Ontario

Multi-Single
 KG6JAR 230,317-113-703-C
 KG6JBO 58,368-64-304-B-7

Multi-Single

KG6ALV (K1MT WA9HHL) 1,995,774-242-2749-C-86

Hawanna Islands

KH6RS (K2SIL, opr.) 4,396,644-292-5019-C-73
 KH6II 3,477,474-273-4246-C-73
 KH6GJY 796,284-202-1314-A-52
 KH6IF 574,086-163-1174-C-30

Australia

VK6HD 90,1516-206-1462-A-27
 VK7KX 793,305-183-1445-A-53
 VK2GW 652,050-161-350-A
 VK3APN 9600-32-100-A

Gilbert Islands

VR1AA 385,098-173-742-A-16

New Zealand

ZL1AMO 1,148,112-204-1876-A-50
 ZL1AW 763,680-185-1376-A-47

SOUTH AMERICA

Bolivia

CP6FG 2,315,086-233-3372-C-64
 CP1F 46,224-72-214-C-5

Argentina

Multi-Single

LU2DKG (+LUIDAY LU6DKX
 LU8S DLK HQ) 1,865,019-221-2813-B-89

Peru

OAN4AHA 32,490-48-985-B

Netherlands Antilles

PJ9JT 1,337,850-190-2147-C-74

Brazil

PY2FCJ 1,099,152-204-1796-B
 PY2YC 3600-24-50-B-2

Venezuela

4M5L 3,420,315-263-4335-B-76

Tenidid

9Y4VU 1,361,565-237-1915-C

WVVE CW

CANADIAN

Maritimes

VO1HH 395,241-203-649-B-44
 VF1AIH 174,084-163-356-B-56
 WIZI/VF1 44,121-77-191-B-40
 VF1AI 22,350-50-149-A
 VO1AW 9804-38-86-C-4

Quebec

VE2NV 708,546-269-878-F-60
 VE2AYU 508,440-190-892-F-83
 VE2WA 201,430-170-995-F-24
 VE2ZU 96,048-138-232-B
 VE2AH 68,310-90-353-A
 VE23S 22,032-54-136-B-22

Multi-Single

VE2ARO (+VE2S AIL BC'B) 63,667-99-211-A-26

Ontario

VE3UOT (V1 3A1A, opr.) 732,450-257-9504-G-71

VE3CSZ 95,853-89-359-C-96
 VE3AWE 85,905-116-249-C-19
 VE3WV 33,718-59-134-B-55
 VE3AOT 2400-25-32-B-14

Manitoba

VE4X1 394,568-167-588-C-49
 VE4B0 216-9-9-B-3

Saskatchewan

VE5RA 116,886-171-372-B
 VE5PM 15,091-101-193-B
 VE5IT 53,809-40-113-A-26
 VE5NU 9114-49-62-B-10

Alberta

VE6AP1 5,718-86-371-C-72
 VE7BY 19,344-52-124-B-16

British Columbia

VE7HO 142,779-91-523-B-58
 VE7BBL 4680-26-60-A-13
 VE7BBD 1796-16-27-A-4
 VE7AKJ 315-7-15-A-8

U.S.A.

Connecticut

K1ZND 2,509,359-479-2207-F-86
 W1HBY* 1,206,792-302-1327-C-69
 K1DPB 735,712-246-1024-C-50
 W1ICP (WA1PID, opr.) 312,404-257-924-C-45

Delaware

W1BHH 290,601-229-423-C-20
 W1TS 279,864-169-852-C-30
 WA1AO 253,800-180-470-B
 W1QR 232,800-194-396-C-60
 W1RML 191,976-152-421-B-52
 K1TZO (WA1OI, opr.) 184,032-142-432-C-25

Florida

G3XPM/W1 141,570-121-3001-72
 W1FTX 127,980-180-237-C-32
 W0DR1/* 118,293-131-301-C-28
 K1THQ 86,300-100-221-C-8
 W1CNU 61,845-95-217-B-20
 W1VO 37,668-86-146-C-12
 VE6ATW/W1 26,625-71-125-A-27

Georgia

W1TX 26,335-61-145-C-10
 W1ECH 20,100-67-100-D-6
 WA1MAO 18,130-55-110-A-13
 WA1CYT 13,530-55-82-B-6
 W1AB 5499-39-47-C-8
 WA1KOC 5292-28-63-C-6
 W1O7J1 3240-27-40-A-8
 WA1NRG 360-10-12-B-3

Multi-Single

W1LW (+WA1NES) 1,067,661-269-1323-C-80
 K1GUD (+W1ARR WA7GW) 235,053-147-513-C-35
 WA1NNC (+W1CW) 151,200-200-252-C-55

Kentucky

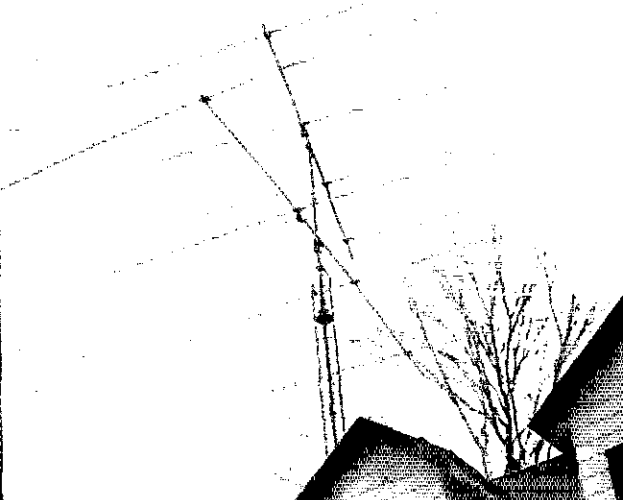
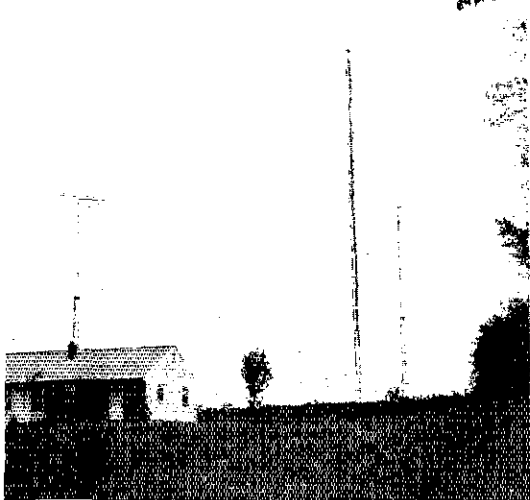
K1RLU (+WA1KOH) 144-6-8-B-1

Multi-Multi

K1VTM (+K1THX W1EG) 2,566,972-363-2348-F-75

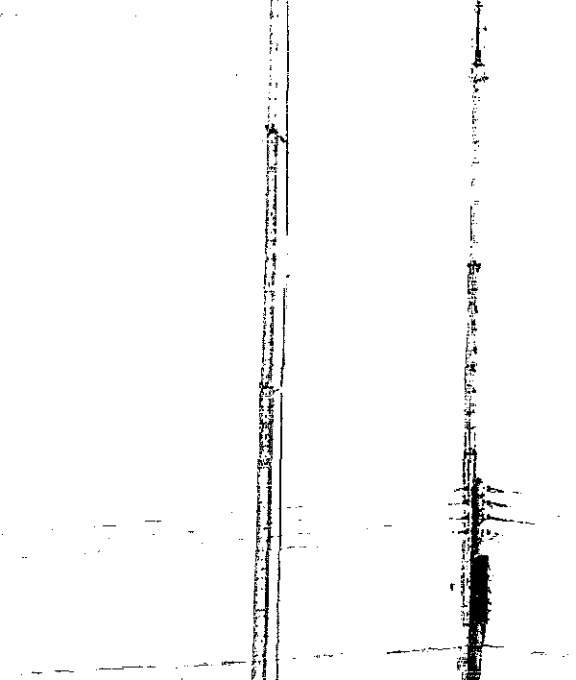
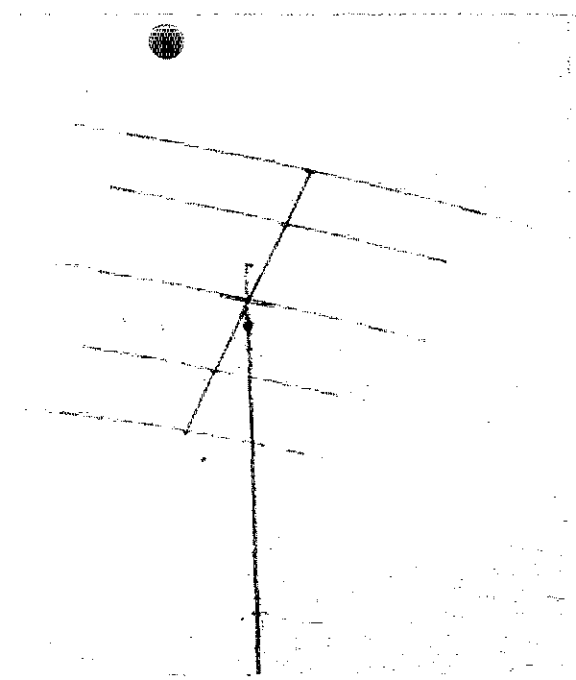
Eastern Massachusetts

K1NOL 2,024,563-355-1901-F-82
 W1DAI 1,334,312-302-1252-C-73
 K1DIR 938,484-267-1194-C-54
 WA1LXX 843,045-245-1147-C-76
 W1PL 541,692-246-734-F-57
 WA1LJU 444,276-246-692-C
 W1LJK 385,632-206-624-B-60
 W1FNV 348,309-229-507-A-66
 WA1ANR 168,780-145-388-C-55
 K1OML 110,715-121-305-B-27
 WA1ED 71,505-105-227-A-22
 W1AX 56,994-118-161-C-10
 W1FJV 10,090-85-118-B-10
 WA1KJ1 89,784-68-146-A-23
 WA1NLX 11,776-41-112-C-19
 W1ESN 13,122-54-81-C
 WA1MYS 11,070-45-82-A-12
 WA1KSE 10,998-47-78-B-8
 W1PLJ 6954-38-61-B-13
 K1AGB 6030-42-55-F-10



On the left are the towers of W3WJD, top phone multi-multi and second in line for US honors on cw. The sky-hooks, from left to right, support a 2 ele 40 meter beam at 85 feet with 4 elements on 10 above it; 4 ele on 15 at 80 feet; and 4 ele on 20 at 75 feet. On the right are the stacked 4 ele 15 and 10 meter beams of W1BGD/2 at 50 and 55 feet respectively. Pete also used a 4 ele rotary at 80 feet for 20 meters during his cw effort.

Below is the 5 element tri-band beam of FL8MM. The round object near the top of the picture is a hydrogen filled balloon used to support the vertical element of a full-sized 75 meter ground plane. Mada believes that his only 75 meter QSO (with W3AU) marks the first time a phone QSO has been made from FL8 on that band during a contest. On the right the beams of G3ANT, the East Anglian Contest Club, tower above Rackheath Airfield. The tower on the left holds a 3 ele 20 meter mono-bander with a 10 and 15 duo-bander perched above it. The righthand tower sports a 3 ele 15 meter beam and above it a 9 ele 2 meter unit. On 40 a 2 ele quad was used and their strong 75 meter signal was due to two phased verticals. Their 3 million point effort placed them first in Europe, multi-op.



W4VSV (WB4s AUJ H.W.1YO) 52,539-83-211-C-96	W5KYD 13,944-56-83-C-6	Multi-Multi	W7OHR (K7HOT, opr.) 56,745-65-291-C-30
Virginia	W5QF 12,240-48-85-A-8	W61A (+W6HOH) 401,034-178-759-C-70	W7RO 53,265-67-265-B-24
W4NOA 1,064,187-291-J-219-C-67	W5AUC1 4500-25-60-A-8	Santa Clara Valley	Washington
W4CRW 942,168-296-1061-C-66	W5YR 1881-19-33-C-1	W6BDK1 1,248,528-296-1406-F-81	W7RM (K7VFF, opr.) 2,216,604-338-2186-F-84
K4OD 879,249-281-1043-C-66	W5SOD 684-12-19-A-14	W6HON 725,355-243-995-C-80	VE7ZZ/W7
W4KFC 792,000-275-960-C-37	W5WMM 596-11-12-C-3	E65S1 (W6HHV, opr.) 563,967-223-843-C-80	1,177,428-262-1498-C-75
W4W5F 752,130-274-915-C-60	Multi-Single	W6HOC 535,800-255-760-F-57	W7NP 376,320-160-784-F-69
W4UQ 480,600-267-600-C-51	W4SRXT (+K5YAA W4Ss F1P QXD SGD UCT) 1,163,646-297-1306-F-96	W6HJP6 218,091-139-523-F-48	W7YTN 306,852-182-562-B-72
W4NH 432,630-190-759-C-44	Oklahoma	W6OKK 174,420-114-510-F-53	W7DYO 258,876-153-564-A-55
W4DM 426,930-214-665-C-37	W5QJZ 29,574-62-159-C-16	W6GVJ 162,138-122-443-C-37	W7LZE 172,221-139-413-C-52
W4FZ 416,070-230-601-C-40	Southern Texas	K6YGS 156,375-139-375-C-65	W47JC B 150,156-130-385-F-80
W4ZSH 359,365-215-357-C-42	K5TSR 510,831-211-807-C-35	K6CTV 147,060-114-430-C-70	W7QF 148,356-156-317-C-30
K4SF 269,100-195-460-C-48	W4SOK1 215,820-165-436-C-54	W6LJ 127,821-137-311-C-32	W7GYF 57,672-89-216-A-12
K4JM 256,041-167-511-B-40	W5SLT 182,700-150-406-C-25	W6ATO 93,465-9-335-C-49	W7APN 52,185-71-245-F-17
W4WBC 189,840-140-452-C-29	W5RRB 13,509-57-79-B-6	K6QZ 91,374-97-314-C-8	W7E5F 42,021-69-203-F-24
W4JHK 179,550-150-399-C-32	W5SHR 860-48-60-A-7	W6CLM 90,306-87-346-E-48	W7IEU 21,945-61-115-A-45
K4LDR 178,782-166-359-C	W4SRI 85,049-47-79-B-6	K6WD 80,631-9-289-C	W7JME 8178-29-94-A-10
W4PHL 168,420-140-401-C-49	W5BWW 1995-19-35-B-5	W6GBY 75,600-100-252-C	W7CBA 8085-35-75-C-15
W4TKR 157,248-156-336-A-3	W4SRI 85,049-47-79-B-6	W6RRF 61,752-83-248-E	W47NOH 3844-18-31-A-8
K4KA 122,925-149-275-B-29	W4SRI 85,049-47-79-B-6	E6CN 48,204-78-206-C-24	W7GYN 19,081-57-111-C-27
K4IYM 121,068-118-342-B-45	W5QAM 1440-20-24-B-8	W6KHS 40,836-83-164-C	K7IEFB 1128-8-47-A-7
W4RDV 67,512-116-194-F-33	W5TLZ 36-11-11-C-17	W6KJ 37,440-64-195-C	K7BFL 432-9-16-A-3
K4JD 58,650-85-230-C-43	Multi-Multi	W6MUF 23,552-56-139-C-27	W47IOF 156-4-13-A-8
W4UYD 52,221-103-169-C-23	W5K1L (+W5s 1VN VQ W4ss C6N ZWC WBSAAU) 1,423,500-325-1460-C-96	W69KKV16 22,317-43-173-A-20	Multi-Single
W4GF 41,328-84-164-C-7	6	W6GI 21,420-51-140-B-10	W7YXB (+W47OTT) 163,488-F-31-416-C-36
W4KMS 35,424-96-123-C-20	W4NGG 660,858-209-1054-C-79	K6JZX 20,160-56-120-C-10	W47MFO (+W47MJJ) 66,990-70-319-F
K4AUL 23,598-57-138-C-17	W6PM 441,396-201-732-C-46	W6MFD 11,988-37-108-A-18	8
K4GKD 20,988-53-132-A-12	K6HHH 378,870-173-730-C-65	W6CLZ 10,098-33-102-B-13	Michigan
K4QJ 17,484-47-124-B-16	W6E1E 164,574-82-669-C-54	W6TSL 1764-14-42-B	W8ELUN 219,939-167-439-G-38
W4YZC 17,226-58-99-C-8	K6VI 163,578-137-398-C-61	W6BXW 960-16-20-B-12	W8IWN 199,980-165-404-B-60
W4TTRQ 14,994-51-90-C-23	K6AN 96,048-116-276-C-25	W6ISO 330-10-11-C-2	K8VRZ 196,900-156-425-A-62
K4ZA 11,970-57-70-C	K6B 92,106-102-301-C-40	Multi-Single	W8SDO 176,328-124-474-B-63
K4AUN 8505-45-63-C-13	W6TDF 71,364-76-313-C-24	K6LBB (+W6s CUF RCG) 1,652,840-313-1760-C-96	W8CC 153,027-147-347-C-45
W4YHD 7161-31-77-C-3	W6YUS 43,095-85-169-C-15	W6CUIF (multip) 179,928-136-441-C-30	W8EW 89,559-107-279-F-29
W4ZM 6720-40-56-C-2	W6RQZ 41,664-248-56-C	W6B6VY (+W6BODL) 73,680-80-307-C-20	W8DVE 66,126-107-206-B-61
W4NM 5217-37-47-A-7	K6DJYQ 21,120-44-160-C-30	San Diego	W8DA 61,200-102-209-F-20
K6FLM/4 4704-28-56-B-15	W6UZX 17,100-57-100-C-16	W6MAR 1,839,672-334-1836-C-90	W8ROO 61,146-86-237-B-37
W4DSQK 1944-24-27-B-6	W6WJ 17,100-57-100-C-16	K6SDR 1,452,987-293-1653-C-78	W8QOH 56,964-94-202-C-22
W4DSW 1134-18-21-C-3	W6FJA 567-9-21-B-3	W6OVO 76,140-94-270-C-14	K8QWG 10,920-40-91-B-22
Multi-Single	Multi-Single	Multi-Single	K8PTZ 3542-33-58-C-6
W4QCW (+K4GFH) 686,172-271-844-C-63	W6KG (+W6DDD) 863,460-234-1230-C-95	W61LY (+K6VI) 1,002,540-1364-245	W8EEM 5654-29-42-C
Multi-Multi	Lus Angeles	San Francisco	W8BHYL 3360-28-40-B-12
W4BYV (+K3s JGD NPV OAF W3s BOV WZL K4s GKD VDL WB4EAL) 5,673,444-476-3973-F-96	W6RR 1,767,606-302-1951-C-80	San Francisco	W8YKU 1848-22-28-A-35
W4KXV (+W4HR) 1,286,100-300-1429-C-76	W6RDG 1,287,000-286-1500-F-76	W61VM 157,635-113-465-C-30	Multi-Single
Western Florida	K6OVJ 754,314-242-1039-C-64	Multi-Single	W8AJUN (+K8HFL W8ROBG W8BZG) 2,034,564-371-1828-C-92
W1ZBW/4 266,400-185-480-C-50	W6DOX 616,284-228-901-F-65	W6BIP (+K6OSO WA6DJJ) 659,628-219-1004-C-82	W8UM (K8OKY W8FAW W4Ss CZH TBO YVR ZAV) 1,854,780-380-1627-F-96
K4NS 42,840-85-168-C-15	W6HX (WB6VU, opr.) 561,180-199-940-C-73	San Joaquin Valley	Ohio
5	W4KZI 223,245-123-605-C	W6CTP 17,082-39-146-B-50	W8DB 783,081-299-873-C-57
Arkansas	W6RCV 196,812-132-497-C-45	Sacramento Valley	W8ZCO 270,111-179-503-C-46
W5RUH 57,834-102-189-A-43	W6JPH 129,564-122-354-F-20	W46NYV 394,200-180-730-C-70	W8FNE 264,195-171-515-C-60
W5CKR 720-15-16-A-6	W6CS 117,624-116-338-C-15	W46JVD 338,142-194-581-C-62	W8ZCK 239,913-181-437-C-54
Louisiana	K6MP 89,397-99-301-C-18	K6SK 39,312-56-234-A-40	W8UDM (W8ATGX, opr.) 194,649-161-403-A-38
W5QH 124,200-138-200-C-82	K6OC 88,296-104-283-C-25	W6KYA 37,800-72-175-B-16	171,873-169-339-G-29
W5WG 38,760-76-170-A-48	K6LEB 52,899-77-239-C	K6DR 17,685-45-131-C-13	W8JAU 160,776-132-406-C-40
W5SCMX 1188-18-22-A-4	W4AAW 45,225-75-201-C-23	W6MDDP 528-8-22-B-4	W8CMX 122,400-136-300-F-46
Mississippi	W6APW 29,520-60-164-C-12	K6TWE 483-7-23-B-5	W8EF 99,294-134-247-C-50
W5RUB 386,400-230-560-C-47	W4AZK1 15,930-45-118-B-41	7	W8FDN 71,490-85-280-B-23
W5AO 22,386-82-91-C-23	W6NJU 10,152-36-94-C-4	Arizona	W8GCO 57,474-93-204-A
W5MUG 15,300-50-102-B-10	W4JKR 9408-56-56-C-9	W7IR 1,387,905-335-1381-C-75	W8HPE 50,232-104-161-C-26
New Mexico	W4DPO 2904-22-44-F-3	W7AYY 384,120-165-776-C-45	K8YOW 49,404-92-179-B-17
W5DYV 520,515-215-807-F-46	K6MV 1674-18-31-A	W7MNM 19,968-64-104-B-42	W48GRR 36,432-92-132-F-23
W5BRHN 91,770-115-266-C	Multi-Multi	K3VXE/7 6975-31-75-B-20	W8KZH 34,854-74-157-C-15
K5MAT 21,600-75-96-A	W4ABP (+K6s CFO FLX W46BNZ) 264,132-132-667-C-78	Idaho	W8YRP 21,762-78-93-B-10
Multi-Single	Orange	W7GHT 69,168-88-262-D	W8VZF 21,582-66-109-B-13
K5WSP (multip) 9504-36-88-B-12	G3DPX/W6 83,025-75-369-B-30	Montana	W8WB 18,666-51-122-F-18
W5AXC (W4Ss DUH MHR W5CKJ W46MBZ) 2829-23-41-F-8	W6HDY 35,185-67-185-B-33	W7GKF 476,319-179-887-E-61	K8HBN 14,823-67-81-C-14
Northern Texas	W4G1QO 5400-30-60-A-10	K7ABV 374,796-174-718-C-44	W8PFX 9384-46-68-B-4
W5WZQ 1,595,751-331-1607-C-89	W6GTX 5184-32-54-B-10	K7LTV 41,580-66-210-C	W8RQ 5104-34-52-B-14
W5EOT 401,907-209-641-C-32	W6BKTJ 2280-19-40-A-8	Oregon	W8PCS 4563-39-39-C-5
K5ABV 324,720-246-440-A-78	Multi-Multi	W7QK 37,062-87-142-C-12	W8ROO 3780-28-45-F-8
K5HTM 257,400-143-600-C-57	W6ANN (+K6SXA W46s EPO GLD LPY W6PKA) 2,494,344-344-2417-C	W7LT 3646-19-64-F-22	W8RDR 3444-28-41-B-3
W5PAQ 224,595-161-465-F-46	Santa Barbara	W7GUR 3150-25-42-B-9	K8AOM 1311-19-23-C-8
W5QJZ 51,516-106-162-D-28	K6OW 399,672-184-561-C-54	Utah	W8AJW 1200-20-20-A
W5QBM 44,226-78-189-C-22	W6GEB 49,410-90-183-C-14	W7HS 279,072-153-608-C-53	W8BIMG 507-13-13-B-5
	W4DEI 7047-29-81-A-5		K8NXX 189-7-9-B-4
			K8BBH 108-6-6-B-5

Multi-Single

W8HVF (+K8s BPX TVO) 694.440-230- 876-F-50
 WA8MHW (+W8BHNX) 12,705- 55- 77-C-14
 W8SPRR (+W8CRD) 7110- 30- 79-C- 9

West Virginia

W8HT 621.432-252- 822-F-21
 W8BJW 6,263-1- 73- 149-B-27
 W8NHFV 25,200- 40- 210-A-19
 W8BJ 14,400- 64- 78-B-25
 W8RKK 12,312- 54- 76-B-12
 W8SVLA 3999- 31- 43-B- 7

Illinois

W9LKL 1,263,222 298-1413-1-60
 W9RFR 1,164,660-295-1316-C-74
 W9DHH 502,665-235- 713-C
 W9RZB 485,280-240- 674-C-43
 W9DWO 231,516-177- 436-C-18
 W9HJ 712,877-217- 327-C-50
 W9YDMD 169,092-154- 306-A-60
 W9IT 159,900-130- 410-C-50
 W9YWB 111,540-110- 338-C-25
 K9DVK 108,927-133- 274-C-36
 W9IVR 84,564-108- 261-C-38
 W9AYVL 64,032- 92- 232-C-42
 W9GB 63,750- 85- 230-C-30
 W9AG 60,900-116- 178-C-20
 K9IHY 59,541- 89- 223-D-28
 W9YYG 57,872- 89- 216-C-14
 K9HWL 43,650- 97- 130-B-33
 W9AFS 35,796- 76- 157-F-27
 W9PNE 23,028- 76- 101-D-26
 K9MNT 22,563- 69- 106-B-15
 W9MAF 18,318- 71- 86-C
 W9BWN 15,600- 52- 100-C-22
 W9REC 14,112- 56- 84-B-26
 K9UCN 11,058- 38- 97-F- 9
 W9WR 6840- 40- 57-B
 W9YDZR 6831- 33- 69-B-20
 W9KBJ 6510- 35- 62-A- 9
 W9TCC 3198- 26- 41-A-17
 W9HPG 2448- 24- 34-A-12
 W9TNZ 1380- 20- 23-A-25

Indiana

K9CUY 1,052,100-300-1169-F-85
 W9BPG 1,024,914-293-1166-F-80
 W9RFR 631,620-242- 870-C-63
 W9ZRX 336,399-193- 581-F-48
 W9ZTD 104,181-121- 287-C-25
 W9AUM 85,860-108- 263-F
 K9CLU 79,182-106- 249-C-43
 W9WCT 49,242- 58- 283-B-34
 K9VOK 40,560- 80- 169-C-33
 K9MMH 338- 10- 11-C- 4

Multi-Single

W9ALGO (WA9A1M WB9BJV) 70,221- 89- 263-F-17

Wisconsin

W9EWC (WB9BJR, opr.) 998,568-276-1206-C-69
 W9KYZ 671,541-257- 871-F-66
 W9PPT 219,240-145- 504-G
 W9IA 181,548-246- 246-C-50
 W9HL 165,432-122 452-C-32
 W9KXK 160,800-160- 335-C-50
 WB9BD 136,530-123- 370-R-40
 K9GSC 91,686-118- 279-F-50
 W9WV 99,042- 86- 349-C-40
 W9RKP 23,010- 59- 130-C-23
 W9RG 19,899- 67- 99-B-19
 WB9BPN 17,169- 59- 97-C-40
 WA9VCK 13,095- 45- 97-R-14
 W9AEM 2880- 30- 52-A
 W9TKE 2440- 26- 30-B- 7
 WB9DRE 1827- 21- 29-A- 7

Colorado

W9NOO 1,160,640-310-1248-C-84
 K9ZL 46,500-100- 155-A-22
 W9LNER 13,200- 44- 100-A-18
 W9MSV 3840- 32- 40-B-12
 WA9ZWA 2691- 23- 39-A- 6

Iowa

W9B3X 420,900-244- 573-G-52
 WA9VDX 237,630-178- 443-C-34
 W9BSY 117,972-113- 348-C-40
 W9I7U 44,844- 74- 202-C-16
 WA9ATY 44,712- 81- 184-C-22
 K9IIR 40,950- 91- 150-C-14
 W9NEC 14,418- 54- 89-B-30
 WA9VBW 9024- 47- 64-B-30
 W9MHK 7560- 45- 56-A-45

Multi-Single

K9MKD (+WA9YCN) 225,150-158- 475-C-96
 WA9IAO/Ø (+WA9MWW) 29,400- 70- 140-D-24

Kansas

K5I-NV/Ø 517,860-210- 822-F-80
 W9ILB 200,406-127- 526-B-32
 WA9YMK 164,970-130- 423-B-46
 WA9IKT/Ø 114,576-112- 341-B-50
 W9WPL 40,500- 90- 150-B-23
 W9RCS 6549- 37- 59-C-13

Minnesota

W2TA/Ø 543,474-218- 831-C
 W9HZ 542,682-219- 826-C-42
 K9HP 386,859-209- 617-C
 W9IYP 329,793-211- 521-C-42
 W9NAR 211,352-166- 424-C
 W9GYH 127,926-138- 309-C
 W9NG 120,324-148- 271-C-35
 WA9KDI 100,926-126- 267-C
 W9ELA 76,626-129- 198-B-24
 WB9CJV 52,222- 87- 202-C-16
 WA9YX 29,160- 81- 120-B-25
 K9BZE 23,652- 54- 146-A-14
 W9LP 20,475- 65- 105-B-23
 W9JS 10,584- 49- 72-C-23
 WA9BVV 7488- 39- 64-C
 K9CNC 3321- 27- 41-C- 3

Multi-Single

WA9BWM/Ø (+WA9ENP) 599,676-236- 847-C-80
 K9JL (+K9ZXE) 201,132-151- 444-C-38
 WA9VPN (+WA9RWB) 170,031-157- 361-C-40

Missouri

WA9RZY/Ø 347,923-169- 489-C-75
 W9TDR 189,618-169- 374-C-25
 WA9YTF 52,890- 82- 215-B-58
 WB9PCM 48,177-101- 159-B-45
 W9HJB 35,478- 81- 146-C-22
 K9DYM 13,515- 53- 85-C- 8
 W9QZY 675- 15- 15-A-10
 WA9ZLU 459- 9- 17-A- 3
 WA9WBJ 3- 1- 1-A- 1
 W9NDYT 3- 1- 1-A

Nebraska

W9WLO 388,476-198- 654-C-54

North Dakota

K9ALL 16,560- 60- 92-C-11
 WA9ELO 4275- 35- 45-C-10
 WA9MLE/Ø 1080- 18- 20-C- 1

South Dakota

W9WUU 390- 10- 13-B

WAØTAS. (DX PHONE) CX1JM, DL4JW, F6BJA, HA4KYB, LA5BE, LA8BN, LA8SJ, LA9OI, LJ2L, LU2FAO, OH3XY, OK1US, OZ8T, PA1GRE, RA1AET, RB5EDU, SM5AQN, SM5BFJ, SM5-FOO, SM5QU, SM6CZU, SM7DER, TG7MI/VP1, UL7YR, VP2SG, VP7CQ, VQ9R, YO2BM, YO2-CJ, YS10, ZS5DS. (DX CW) BV2A, DL6WD, DM2CCM, DM2CGH, DM3TF, DM3XHF, DM5VBN, G3FAS, GI5UR, HA3GJ, HA3KGJ, HA6JNC, LAØLC, LA8SJ, LZ1KBG, LZ1KRB, LZ2GS, LZ2KLU, LZ2KTS, OH5UN, OH5YX, OHØNJ, OK1GS, OK1KYS, OK2BBJ, OK2BKI, OK3TAD, PAØPHK, PAØTO, PAØWAC, SM3NJ, SM5BFJ, SM5QU, SM5TK, SM5UU, SM7BBV, SM7BY, SMØCTU, SP2DVA, SP3AJ, SP5BCT, SP5EXA, UA1-14312, UA3LAC, UA3TAM, UA9OS, UAØDL, UB5EM, UK1ABE, UK3TAG, UK4LX, UK5UB, UK9CAQ, UO5AW, UP2BZ, UV9CX, UVØBB, UW1LW, UW1ZO, UW6CV, UW6CW, UWØBA, UY5SO, VP7CQ, VU2OMR, YO2GL, YO2RA, YO7AWC, 4U1ITU.

Aldenda

Although the following entries arrived past the new received dates, they are being declared eligible for section awards and club aggregate listings because of the considerable confusion in interpretation of the new rules. They were too late, however, to be included in the various detailed breakdowns (high multipliers, high QSOs, etc.). Please note that an asterisk following the call indicates that the scorer is a section winner, superseding the top scored score in the previous section/country listings.

PHONE SCORES

	CANADA	U.S.A.
WA2VJ (+WA2KTO)	27,873- 57- 163-B-24	
WB7FH (+WA2AYU)	8436- 37- 76-B-12	
WA3NKO (+WA3POF)		*4,664-122- 204-A-45
W4ATC (WB4s BGL IOJ)*		331,300-253- 700-F-79
WB4RSV (+WB4VQL)		26,724- 68- 131-A-19
W5LJU (+W5PQA)		402,020-265- 556-C-50
WB5AAR (+WB5AOP)		1539- 19- 27-A- 4
W6HVN (+K6CAZ)		1,91,838-248-1602-C-96
W8EDU (WA3s BGL MSZ WA-RKM)		91,134-122- 249-C-18
WB9DXW (+WB9WUC)		733,590-285- 858-C-92
WAØJBX (+K9ØBX WAØ FHO IEM)*		53,424-106-168-B-34
Multi-Multi		
W3AU (+K3FST W3s AZD IN ZKH WA3s AMH IAQ)*		8,202,736-581-4752-F-96
WA3SCA (+WA3s LHG IJP MLD MXO NYU OIA)		1,260,117-331-2269-F-96
K4CG (K3WJU WA3s HWV QGV K4POL WA4H1R WA4KJR WB4RDV E6ØZL)*		3,544,740-470-2514-F-94
WA6ØVW (+WB6LQJ)		69,720- 83- 280-A-
WAØETC (+KØKUN WBØAAM WNØCXV)*		596,745-267- 745-G-91
CW SCORES		
CANADA		
VE1AS1*	1,279,800-316-1350-C-73	
VE4KE	15,618- 38- 137-F-15	
VE4MP	725,797-168- 448-C-70	
<i>(Continued on page 94)</i>		

Multi-Single

VE4DD (+VE4TK) 165,594-143- 386-B-62

CHECK LOGS: (W/VE PHONE) VE6IN, W1WY, W2FUJ/1, W2EGH, W2IUV, W3CTE, W2DS, K4RU, K4SF, W4DYV, W4EWR, WA4DRU, WA4YNE, W7GLP, W8KUN, W9CP. (W/VE CW) W2FUJ/1, W2EGH, W2LKH, K3NEZ, W3DS, K4RU, W4EWR, W4JUK, WA4DRU, K6KWN, W6FZX, W8KJN,

PACIFIC DIVISION CONVENTION

San Mateo, California

October 14-15

COMING ARRL CONVENTIONS

October 14-15 - Pacific Division, San Mateo, California

October 21-22 - Hudson Division, Tarrytown, New York

October 20-22 - Southwestern Division, Santa Maria, California

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.

HUDSON DIVISION CONVENTION

Tarrytown, New York

October 21-22, 1972

The scenic Hudson River Valley with its panorama of inspiring views that border the broad sweep of the historic river will be the locale of the 1972 ARRL Hudson Division Convention on October 21 and 22, sponsored by the Hudson Amateur Radio Council.

Focal point for the Convention's array of exhibits, demonstrations, lectures, initiations, ham-fests, banquet and just plain "eyeballing" will be the Hilton Inn at Tarrytown, NY, a picturesque hamlet made famous by Washington Irving's Ichabod Crane and the Headless Horseman, and so named three centuries ago by piqued housewives whose men-folk were wont to "tarry" at the inviting taverns and inns.

Spacious exhibit areas will feature displays of amateur equipment and services and manufacturers' technical experts will be on hand to explain the latest gear.

Highlights of the affair will be lectures and meetings on ARPSC, mobile operations, MARS, DX, FM, RTTY, ssb, repeater demonstrations, traffic, antennas and, of course, special events for YLs and XYLs.

ARRL General Manager John Huntoon, W1RW; Deputy Communications Manager Ellen White, W1YL; Novice Editor Lewis G. McCoy, W1ICP, and Doug Blakeslee, W1KLK, Editor of the 1972 *Radio Amateur's Handbook* will headline special-interest forums. A prominent speaker will be featured at the Saturday night banquet.

A short distance from New York City, the convention site is south of exit 9 on the New York Thruway and is close to the famed Tappan Zee Bridge. Multi-laned highways and frequent train schedules make the Hilton Inn quickly accessible from New York City.

Registration is \$3.00, and is required for forum attendance and special events. Banquet tickets are \$10 and, if any remain, \$12 at the door. Checks or money orders to Dave Popkin, WA2CCF, 303 Tenafly Road, Englewood, N.J. 07631. Free gifts to early registrants. Plenty of free parking.

Contact the Hilton Inn, 455 South Broadway, Tarrytown, NY 10591 for room reservations.

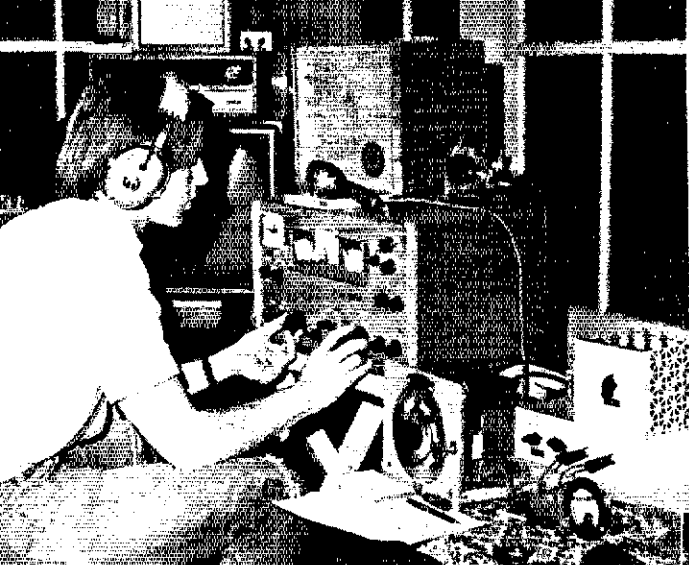
The Royal Coach Inn in San Mateo will be the site of the 1972 ARRL Pacific Division Convention, Saturday and Sunday, October 14-15. Registration beginning at 8 A.M. Saturday morning kicks off a busy two-day program of activities that will include sessions on propagation prediction, rf transistors, linear amplifiers, repeaters, Oscar satellites, phase lock loops and other topics of interest to the technically minded. Hq. staffers Perry Williams, W1UED, and Jerry Hall, K1PLP, will be on hand at the ARRL information booth to answer your questions. Jerry will also present talks on antennas and DXing and on how a technical article gets into *QST*, as a part of Saturday's program. Perry will spotlight the World Administrative Radio Conferences in his talk, "How We Get Our Frequencies," a topic of interest and concern to all amateurs. Both will participate in the ARRL Forum on Sunday morning with President Dannels, W2TUK, Pacific Division Director Gmelin, W6ZRJ, and other League officials. Lloyd and Iris Colvin, W6KG and W6DOD, will host a DX room. There will be a NCDXC forum, a showing of DX slides and several sessions devoted to disaster communications, including a talk on disaster communications and the law by Prose Walker, W4BW, Chief, Amateur and Citizens Radio Division, FCC. Mr. Terrence Meade, White House Office of Emergency Preparedness, will be the speaker at a MARS banquet Saturday evening. A "happy hour" is planned 5 to 6 P.M. Saturday. Those still around at midnight are invited to participate in the Wouff Hong ceremony sponsored by the Oakland Radio Club.

Sunday's activities will kick off with organizational breakfasts at 7:30 A.M. There will also be a hidden transmitter hunt and sessions on SSTV DX and various technical topics. Following the ARRL Forum, Prose Walker will be keynote speaker at the luncheon banquet which concludes formal convention activities. During both days there will be manufacturers' exhibits, continuous showings of "Ham's Wide World" and other films, swap-shop, ATV demonstrations and plenty of other events of interest to all. A Sunday luncheon will highlight a full program of activities for the ladies which will include displays and demonstrations on knitting, spinning, creative stitchery, stamp collecting and silhouette-cutting.

Registration is \$10 before October 8, and includes the Sunday luncheon banquet. After October 8 registration is \$12. The joint MARS luncheon is \$4.50 and the special ladies luncheon is \$3.50. Advance registration is available from ARRL Pacific Division Convention, Box 751, San Mateo, California 94401. Room reservations may be made through the Convention committee or directly to the Royal Coach Motor Hotel, 1770 South Bay Shore Boulevard, San Mateo, California 94401.

NOTE: Southwestern Division Convention info appears on page 68 of September *QST*.

QST



WA11AM/1.

June VHF QSO Party Results

REPORTED BY RICK NISWANDER,* WA1PID

WHILE THE REST of the country basked in the warm glow of sporadic E, the East Coast shivered through poor conditions and unseasonably cold weather. Mountaintoppers in the Northeast found heavy coats and mittens the order of the day as temperatures plummeted as low as zero in some places. The going was rough and only those with above average antennas could cope with the lack of tropo and sporadic E.

Comparing multi-operator scores in an area with past performances is a good way of indicating how good or bad conditions were. In all cases except one, the big multi-op scores in the Northeast were down about 20% from last year. WA1MUG, W1DC/1, K1PXE, WB2GKE/1, and WA2WEB/2 fell prey to the ionosphere although all had excellent scores and finished in the top six. The only exception was the gang at W3CCX/3 who managed to snap their own two-year-old Atlantic Division record by about 2000 points with a score of 76,818. They were helped by an improved antenna system and the utilization of more UHF bands, which resulted in their placing second among multi-ops.

* Communications Asst., ARRL

Northeastern single ops didn't fare too well either. Second and third place K2DEL and K2OWR and tenth place K1GYT were the only ones, twos, or threes in the top 10. A little research shows that this is the only time that these three call areas have had less than 4 entries in the top 10.

But as bad as conditions were in the Northeast, hardy souls in the West and Midwest were supplied with many good openings.

K8LEE took top single-op honors with a fine 26,560 point showing, marking the first time an eight has ever taken the top spot. Wayne also handily broke the Great Lakes Division record of 10,881 set back in 1967. The multi-op division record didn't stand up to conditions this year either as W8CCI added about 5000 points to the year-old mark. One of our two novice entries came from Ohio. WN8ITJ had no intention of entering but he "soon got into the spirit of it all" and gave out a few contacts using A2.

In the Central Division, K9HMB snapped his own three-year-old record with a 18,886 point effort that was also good enough for 6th spot nationwide.

The group at W5UK/5 reached a new Delta Division high with an effort of over 16K and in the West Gulf Division, W5SXD bettered the single-op mark by just under 5000 points with a 19,398 point performance from South Texas.

In the West where the mountains touch the sky, scores scaled peak after peak. W9MHL/0 planted his 4 element 6 meter beam at 7380 feet and came up with the first score from the Rocky Mountain Division to break 10K. During the contest Mike worked WB6BPI who was running 1/2 watt.

A new country for many on 6 meters was VP5RS, here manned by Joe, WB4OSN. The group amassed 230 two-ways in the contest and throughout their 6 day stay at VP5 worked 44 states and 4 countries.



It was COLD at multi-op WB2GKE/1 in Vermont. WA2AOL etched his friendly (or funny) greeting in the frost on the window. The temperature dropped to 15 degrees and for the first time in 10 years it snowed in June. Their comments about the weather were real chillers.

It took K6KLY/6 ten years to break their Pacific Division multi-op record of 14K. We hope their new mark of 24,035 doesn't stand until 1982. Multi-op stations K6TJL/6 and WB6KBZ also broke the 1962 record but had to settle for second and third behind K6KLY/6 in the division leader race.

K6YNB drove his camper truck from sunny Garden Grove to the deserts of Nevada and made 303 VHFers happy. Wayne missed breaking 20K but he just about doubled the old Pacific Division record while nabbing fourth nationwide. This is the first time in many a year that a seven has appeared in the top 10. Excellent, Wayne. Dig out your copy of August 1971 QST for Wayne's story of his camper.

Washington multi-ops W7DZO/7 and W7VE/7 made good use of the sporadic E openings to snap the 1969 Northwestern Division record with W7DZO/7 coming out on top in the final analysis.

For the June 10-12 QSO Party logs were received from 378 participants, 90 in the multi-op category, representing 67 sections and 3 foreign countries. Certificates are scheduled for an October 15 mailing.

Many thanks to 8P6EN; W4GDS, WB4BND and WB4OSN (the gang at VP5RS); XE2XN, K5HVC, K5KYD, and WSQDB who signed XE2XN from Mexico. Your efforts are greatly appreciated.

Comments and suggestions about the VHF QSO Party rules may be addressed to your Contest Advisory Committee representative. (W1BGD, W2EIF, W3GRF chairman, W4UQ, K5TSR, W6DQX, WA9UCE, W0HP, VE2NV and KH6IJ). Let them know what you want.

Depending on your point of view this contest was great, mediocre, or lousy. We hope that next year is better for all of you.

SOAPBOX

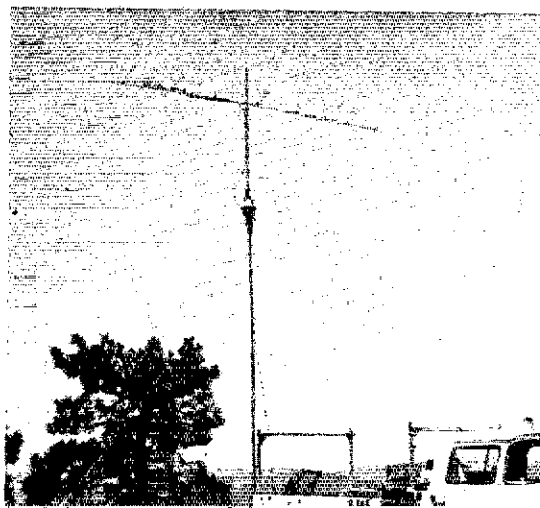
The contest activity from this area was excellent and band conditions were exceptional. — (K7VNU) E skip in this year's contest was poorer than last year. The band was open to the low population west and south. The result was 31 sections but not many contacts. — (WA0VJF) In strict adherence to Murphy's Law the rotor died just before the contest. — (WA3MPO) The most startling part of the contest was the late evening double-hop to Washington that went on for hours. — (WA5YX/5) Conditions here during this contest were very poor. Skip was not of the best and to very limited areas while tropo was almost nonexistent due to the large cold front that went through just prior to the contest. — (WA3DMF)

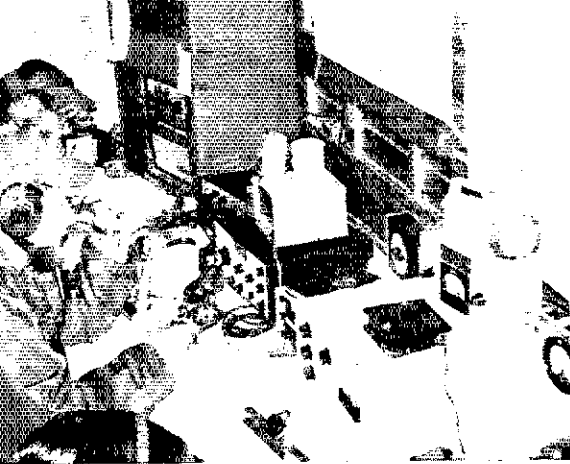
The 2 meter SSB position at K6TJL/6 was a little drafty. Operating from the bed of the truck, 2 meter operator K6DTR garnered 10 sections and probably got a good suntan.



DIVISION LEADERS

Single Op.	Division	Multip.
WA3NZL	Atlantic	W3CCX/3
K9HMB	Central	WB8HUC/9
WB0ELN	Dakota	K9UYK/0
WA5THH	Delta	W5UK/5
K8LEE	Gr. Lakes	W8CCI
K2DEL	Hudson	WB2SIH
WA0ZWF	Midwest	K0TLM
K1GYT	New Eng.	WA1MUG
WA7KYZ	Northwestern	W7DZO/7
K6YNB/7	Pacific	K6KLY/6
K4PCL/4	Roanoke	K4LVV/4
W9MHL/0	Rocky Mt.	W5TDZ/5
W4OJU	Southeastern
W6NLO	Southwestern	K6BPC/6
W5SXD	West Gulf	WB5DSH
VE7XF	Canadian	VE3ONT
8P6EN	Foreign	XE2XN





From the top of 8000 foot Mount Frazier in the Santa Barbara section, K6BPC/6 ran up the highest multi-op score west of Ohio, good enough for 8th place among multi-ops. Shown here are the operating positions for 144 and 432 MHz. When this picture was taken the 432 rack was adequately perking but it spewed out clouds of smoke early Sunday morning when it turned out to be the only equipment plugged in when the generator was restarted. Sounds like Field Day.

Wow! Six meters sounded like 20 meter Phone during Saturday. - (W6SF) Added new states to my 432 list. Actually I doubled my total, now I have four. - (K2UOP/4) Contest activity seemed to be off this year again to continue a trend I seem to have been noticing for the last three years at least. This problem was compounded by some of the worst propagation conditions I can remember for a VHF contest in the last 15 years. - (W1EUJ) It appeared I was on the edge of the openings, 100 miles west did much better and 100 miles east could not hear what I did. Had a lot of fun but lost twice as many contacts as I made. - (WA3ODA/4) Conditions as poor as I ever saw in June, as far as tropo is concerned what with record low temperatures all through the Northeast. Some E's but nothing like what has been almost daily fare since early May. We are having the best 6 meter summer DX season I can recall but it let up for the contest, of course. - (W1HDQ) Sporadic E was everlasting. - (W7VE/7) Band open every day for 43 consecutive days. The contest comes along and zlich. - (WB4MJY) Generally speaking activity on 6 meter SSB and AM was down and 2 meter SSB and AM were almost nonexistent. - (WA2QLK) Band conditions were below average here due to

the combined high winds and extreme cold. How does 32 degrees grab you for a June evening? - (VE3ONT) [That's a chilling prospect. Ed.] Best band opening ever experienced. - (WA5QCP) Four North Carolina operators sure had a ball from a small hill in South Carolina. - (K4LVV/4) Our generator worked exceedingly well, producing a measured output of 200 VAC which blew one fuse before we cranked it down to 120. - (W5KA/5) Conditions poor. Weather 28 degrees. - (WA2JQO) Once again we had beautiful E's to the western states prior to the contest, then rather poor conditions during the contest. - (W3CCX/3) Contest propagation was disappointing considering the past month and a half of excellent E's. - (K0LCB)

SCORES

Scores are listed by W/VE call areas and sections within call areas. The top single-operator scorer in each section receives a certificate award. Multiple-operator scores are shown at the end of each section tabulation; in sections where at least three such entries were received, the top multioperator scorer receives a certificate award. Asterisk following call indicates Headquarters staff member, ineligible for award.

Columns show final score, total number of contacts, section multiplier, and bands used. A represents 50 MHz.; B, 144 MHz.; C, 220 MHz.; D, 432 MHz.; E, 1215 MHz. and above.

Call Area	Score	Contacts	Section Multiplier	Bands Used
Canada				
VE1ANJ	372	49	28-A	
VE2BYG	693	33	21-A	
VE2AIF	244	18	13-AB	
VE3ADI	495	45	11-B	
VE4DNR	14	7	2-B	
VE5ONI	(V) 2YU	VI	(S) ASO	DOI
DSS DXJ	FMS	FIB		
VE3HK	(V) 3	0	HD	
VE4MA	786	108	26-ABD	
VE4AS	84	46	16-ABD	
VE5US1	VE5US2	09L		
1656	69	24-A		
VE6MC	526	40	13-A	
VE7XI	496	157	2-A	
VE7ANP	275	11	25-A	
VE7BIE	252	86	27-AB	
VE1ASM/T	(V) F7s	A1B	ASC	BN
EQ1				
VE1ARM/T	(V) L7s	ADL	AZG	BK X
BUU				
VE1029	145	7	ABD	
USA				
Connecticut				
WA1NGR	7722	198	39-AB	
W1HDQ*	980	55	16-AB	
WA1PHF	(WB2CHO, opt.)			
W1OAX	864	54	16-AB	
W1QHL	656	16	37-BD	
W1QJL	451	41	11-AB	
WA1BK1	384	48	8-B	
WA1UO	190	19	10-B	
K1YON	120	15	8-A	
W1WLE	99	39	3-B	
WA1KES	76	8	2-B	
K1PNT/1	(K1s	DOV	H1V	VD
W1EPI	WA1HD	WA2s	L1M	K0X
WB4YOL	D. Sproule	g		
T. Waterhouse				
K1VYU	(W1s)	LOK	GTP	
3762	90	38	ABD	
W1ARR	(W1s)	COW	TWO	NES
PHD	W1BYE	W1		
2475	99	25-AB		
Eastern Massachusetts				
K1AGB	12,390	179	59-ABCD	
W1UJH	5670	124	42-ABCD	
WA1FD	1360	58	20-ABCD	
WA1FCU	1350	90	15-AB	
K1OJO	1302	50	21-BD	
K9AQP/1	752	23	16-CD	
WA1MKE	592	74	8-A	
WA1NQV	344	43	8-A	
K1PTV	105	15	7-A	
W1UJ	28	7	2-D	
W1MHL/1	(K1MON	WA1s	K1J	
KPX	MYD)			
WA1GZ1	(W1s)	124	139	23-ABC
W1G171	(W1s)	OAM	PBU	
W1N1GNB)				
	1218	87	14-AB	
Maine				
W1Y1W	5360	104	40-ABCD	
K1MFI	530	38	15-AB	
WA1DFG/1	(WA1s	DYU	LYD	MSK
OML)				
	3076	204	19-AB	
New Hampshire				
WA1S2/1	(K0s)	91	19-ABD	
W1USM	198	27	9-B	
W1DPT/1	(K1s)	COX	CRN	K1U
MCC				
NZU	SVE	FW	W1s	BX1
ZAGGM				
DRH	JVI	KSI	NPN	QUP
PVT	0XX			
WA1S	DRO	F1H	CVH	HON
IZO				
LNU	PHR	K4GGD		
	75,584	781	84-ABCD	
Rhode Island				
W1FEO				21, 7, 3-B
K1ABR	(K1s)	1KN	VOB)	
15,622	261	49-ABD		
Vermont				
K1GVT	12,720	340	53-AB	
K1LJG	128	16	6-AB	
WB2GKE/1	(K2s	DLK	QVS	WA2s
AOL	BAT	DHD	FXX	FZW
Z9W	WB2s	UOT	WHC	W1K)
	45,056	471	88-ABCD	
WA1HLA/1	(W1AIM	WA1s	JLX	
LC1	MAG	NBU	NFM	WA2GWV
WA9TWW)				
	7095	213	33-ABD	
Western Massachusetts				
K1U1Z	500	50	10-AB	
W1FMI	196	26	7-AB	
E1ZND/1*	1	1	1-B	
WA1MUG	(K1s)	FXY	JMG	POY
ZND	W1KZs	WA1s	HCO	H50
IOJ	H	DXL	NLT	K2TYB
WA2SPL	WB2s	DUS	MBI	O1U
SON)				
	80,644	836	89-ABCD	
WA1HAM/1	(W1s)	LAN	LIM)	
	542	38	9-A	
Eastern New York				
W2CRS/2	12,354	183	58-ABD	
WA2Y1R	910	41	14-BD	
W2GKR	630	42	15-B	

KZGSF 480-60-8-B
 WA2RIW 403-33-13-AB
 K2ARO 342-19-9-D
 W2HF 32- 5- 4-BD
 WB2VFC/2 24- 8- 3-B
 WB2SH (+WA1GWS WA2s GMT ROD)
 17 R08-318-5-4-ABC
 WA2CAC/2 (+WA2s GMI 15Z
 WB2VUK)
 R056-210-18-ABC
 WB2FKJ2 (WB100 K2s TWY UKF
 W2s AWX KBH YPM WA2HIAQ
 WB2HDS G3MM)
 4110-118-30-ABD
 WA2YJF/2 (+WA2F2)
 3000- 94-30-ABCD
 N.Y.C.-L.I.

WA2OLK 1288-147-24-AB
 K2DDK 2408-86-28-AB
 K2RIW 2040-60-1-D
 W2SEU 1449- 53-23-ABCD
 W2FH 1302- 93-14-B
 WA2MZH 910- 63-14-AB
 WA2SIV 801- 89- 9-B
 WA2RRG 582- 97- 6-B
 W2GF-F/2 352- 44- 8-B
 W2XKG 250- 50- 5-A
 WA2MJK/2 147- 21- 7-A
 W2RAK/2 (W2NXT WB2s CUW
 ZPJ KWC RVG LUY YZK W1X
 ZKT)
 13,524-249-49-ABD
 WB2IGT (+WA2NAS)
 3645-135-27-AB

Northern New Jersey

K2DFI 25,578-382-58-ABCD
 K2OWR 23,919-344-6-ABCD
 WB2NST 5518-160-31-ABCD
 WR2UM 2940-140-21-AB
 W2LK 2775- 51-37-BD
 W2OMS 2185- 44-23-DF
 W2FWM 730- 45-16-F
 WA2FUO 364- 28-13-B
 W2DFA 304- 29- 8-BC
 W2CWW 276- 20-12-ABCD
 WB2CUT 245- 35- 7-AB
 WA2LUI 102- 17- 6-B
 K2RLW 24- 8- 3-B
 W2DDV (+WA2UL opr.)
 18- 6- 3-B
 WA2UBT (+WA2PKZ)
 2808-156-18-B
 WA2IRZ/2 (+WB2YPM)
 1512-126-12-B
 WB2FNJ (+WA2s AIH YYN)
 378- 42- 9-A

Southern New Jersey

WB2GJ 1156- 65-17-ABC
 WA2WLB/2 (9 oprs.)
 67,830-542-102-ABCDM
 K2BWR (+K2ZRJ)
 7830-136-94-ABC
 WA2LNU/2 (+WB2YEH)
 5328-104-32-AB

Western New York

WA2THS 4608-144-32-AB
 K2LDU 1105- 57-17-ABD
 WB2MXX/2 430- 43-10-A
 W2WGL 348- 29-12-B
 WA2TRY 210- 21-10-AB
 WA2BHYK 198- 22- 9-B
 K2HJO 144- 18- 8-B
 W2DMK/2 (+K2RRM WA21KO
 WB2s BSI RRR)
 2808-104-27-AB

WA21OO (W21UQ WA2BPE WB2s
 PMI RKT)
 2700-105-25-ABC
 WA2GJA/2 (+K2LFB)
 360- 36-10-AB

Delaware

WA3QPX 4968-127-36-ABD
 W3CGV 1750- 59-25-ABCD
 WA3OND 1072- 67-16-AB
 W3BHG 928- 58-16-B
 WA3QYA 660- 44-15-B
 WA3ILD 76- 19- 4-B

Eastern Pennsylvania
 WA3IKO 6408-178-36-AB
 K1UDY/3 2970-110-27-A
 WA3ADN 2134- 93-23-AB
 W3JLU 1616-101-16-B
 WA3KY 1240- 62-20-A
 K3ATL 1026- 54-19-AB
 W3FBU 891- 28-11-ABE
 W3GJA 615- 41-15-A
 WA3MPO 272- 37- 6-AB
 WA3OTG 112- 28- 4-A
 WA3K-T 48- 16- 3-A
 WN3QZ/1 12- 4- 3-B
 W3CCX/3 (K1S11 W21E WA2EOI
 WB2KZK K3s BPP GAS 1PM 1UV
 JZ PUS UJD ZKO ZSG W3s CUU
 CL UKZ ZD WA3s ANV RIV DNC
 LNH NEV NGK)
 26,818-692-93-ABCD
 WA2CPQ/3 (+K2YSX WA3s GJD
 VFX)
 27,075-335-25-ABCD
 WA3RZO/3 (K2YSG WA3s DNC
 FVK MIX MKN PIR)
 15,455-261-55-ABCD
 W3ARW (+K3SQO W3G)
 6,578-120-46-ABCD
 K3YFD (+WA3s MCK NNT RLW)
 2210-130-17-AB

Maryland-D.C.

WA3NVL 8160-204-40-AB
 W3KVM 5985-171-35-AB
 W3GN 4988-172-29-AB
 WB4JGG/3 5159-177-27-A
 W3CJL 1332- 64-18-BD
 W3LUL 1200- 60-20-B
 WA3DPM 1005- 67-15-AB
 K3MWT 994- 11-14-AB
 W3DTC 915- 61-15-AB
 W3HF 725- 56-13-B
 W3QU 240- 30- 8-AB
 WA3LJL/3 126- 18- 6-AB
 W3MSN 100- 20- 5-AB
 W3HFH 68- 17- 4-B
 WA3OIB 3- 4- 2-B
 WA3ORD 4- 4- 1-B
 W3PGA/3 (K3s PIH YG VSE YZY
 W3s JDF ROJ RW S3 HV)
 6048-159-36-ABD
 WA3NUI (+WA3s LOP 1OO NDA)
 5577-169-33-AB
 WA3LOS (K2ODI WB2JRS)
 1824- 72-24-ABC

Western Pennsylvania

W3BWT 3080-109-28-ABC
 WA3HUR 2576-112-27-AB
 W3JIM 196- 28- 7-A
 K3YVN (+W3IOH)
 540- 45-12-A
 4

Eastern Florida

W4DIL 17,442-459-38-AB
 K4BNC 9372-213-44-AB
 WA4HMJ 2947-111-27-A
 WB4PE 1948-134-22-AB
 WA8YVW/4 1100- 44-25-AB
 K8FCG/4 9- 3- 3-A

Georgia

WA4NJP 7728-161-48-AB
 K4FRH 3600- 90-40-AB
 WB4WMI 1512- 63-24-A
 W4HSS 464- 29-16-AB
 W4WDH 45- 9- 5-B

Kentucky

WA4CQG 4224-128-33-A
 K4CQ/4 (K4JBV WA4NXD
 WB4HDW)
 8307-209-39-AB
 WB4QO (WB4s 1DK UGI)
 2708-100-27-AB

North Carolina

WB4LDO/4 2944- 92-32-AB
 K4ROM 2268- 81-28-A
 WB41DP 528- 33-16-AB
 WA4WZ/4 (+WA4s IC-F W3P
 WB4UDS)
 2262- 87-26-AB

W4GG/4 (W4s ACY MR WA4s FIM
 MYU WB4s APT DRB DDD)
 1501- 77-19-AB
 K4SAN/4 (+WB4QOI)
 935- 55-17-AB
 K4NHQ/4 (+WA4YBY)
 40- 10- 4-A

South Carolina

WB4MIY 774- 44-18-AB
 K4VAA 272- 29-15-A
 K41VY/4 (+WA4s 1PO VUC
 WB4SPV)
 7995-205-89-AB

Tennessee

WA4WDU 1536- 64-24-A
 WB4VNO 1323- 63-21-A
 WA4SGI (+K4DCC W4s PPR OBB
 ZXB)
 4089-141-29-AB

Virginia

K4PCT/4 8064-172-47-AB
 K3LOR/4 1940-151-11-ABD
 W40UH 1452- 55-22-ABCD
 W41E 462- 18-14-AB
 K4110 348- 31- 8-B
 WB4TWW/4 (+WB4TXX)
 2967-129-23-AB

Western Florida

WA3ODA/4 4102-102-24-A
 W4CNS 344- 33-18-A

West Indies

WIHOY/KP4
 2704-104-26-A
 5

Arkansas

K5BXC/5 (+WB4HLD K5WVX
 B3WAX WA5s CHK RHO DMP
 VDH YHN WBSBHS)
 11,816-211-56-AB

Louisiana

WAS1TH 14,674-253-88-A
 WB5CZV 4248-118-46-A
 WASOBX 2494- 86-19-A

Mississippi

WB4IYO/5 230- 23-10-A
 W5UK/5 (+WASVU WB5s AH
 AM)
 16,017-281-57-A

New Mexico

WR5CAG 3168- 96-33-A
 W5DIO 903- 43-21-A
 W5QND/5 8- 8- 1-B
 WB5BHN 8- 8- 1-B
 W51DZ/5 (+K51JW)
 8888-202-44-A
 W51AS/5 (+W51XR)
 625- 35-15-A

Northern Texas

WAS1UM 9270-206-45-A
 W5SWY 7320-184-40-AB
 WA5ZUC 4658-137-34-A
 K51VR/5 3540-118-30-A

Oklahoma

WA5VHN 8360-209-40-AB
 WB5DSH (+WB5C1S)
 11,904-248-48-A

Southern Texas

W55XD 19,398-310-61-ABCD
 WA51YX/5 4864-128-38-A
 WA5OUP 3168- 88-36-A
 W55VY 2044- 73-28-AB
 WA57XB 1932- 69-28-A
 W5KAS (+WA3GBH K5s FUL FRK
 W5RIA WA5s SPN ZHI ZHK WB5s
 DUE FMA W5Ss FYL GIV)
 5379-163-33-AB
 6

East Bay

WB6NMT 7644-134-49-ABCD
 K6RNO 6380-145-44-A
 W6OMI 792- 33-24-A

WB6KBI 19- 14- 2-B
 K6K1Y/6 (+WA2CJL WA6KAM
 WA6DOD)
 24,035-400-55-ABCD
 Los Angeles

K6SSN 1601-351-41-ABD
 WB6JG 5980-128-46-ABD
 WB6VVO 1822- 73-26-A
 WB6FN 544- 34-16-A
 WA6BIP 448- 03-14-A
 WA6HAM (+K6s KSA PUL SYL
 WA6s BRZ OLL OZC 500 WB6s
 NML GKK WAA)
 23,684-161-62-ABD
 WA6IRP (+WA6MBI)
 130- 26- 5-AB

Orange

K6LBY 2816- 80-12-AC

Santa Barbara

K6BJC/6 (K6OPH WA6s ARC BIU
 DSN AHM ZNP WB6s USI IMV
 MWI RAJ RAJ RIV VPI)
 28,006-409-64-ABCD
 W6OAL/6 (+K6LBY W6s M/C WB6s
 IMV LLI)
 11,424-200-51-ABCD

Santa Clara Valley

W6KCS 9776-208-43-A
 WB6KAP 5076-132-36-ABD
 K6DAX 5410- 90-31-ABC
 WB6JDN 1220- 61-30-AB
 WA6DAP 876- 45-12-BCD
 WB6FTC 600- 60-10-AB
 W6GWO 300- 25- 6-BC
 WA6HAM 120- 40- 2-B
 W6LJ1 192- 16- 6-AB
 WB6LLD 80- 40- 2-B
 W6LPL 30- 15- 2-B
 WB6TJ/6 (K6D1R W6s UP V/P
 WA6s GYD KKK)
 23,450-109-70-ABCD
 WB6KBZ (+K6SSN)
 17,050-276-55-ABD

San Diego

W6NLO 12,546-208-51-ABD
 W6OFD 8191-188-43-ABD

San Francisco

WA6PYN 980- 70-14-AB

San Joaquin Valley

WA6NRV 10,654-128-57-ABD
 W6S1 (W6YK opr.)
 8184-186-44-A
 K6ZMW/6 3940-114-35-A
 W6YCP/6 6984-128-31-AB
 WB6NET 1440- 60-24-AB

Sacramento Valley

WB6NKO 8,089-187-47-A
 W6DOR 819- 92-21-A
 WB6AS1/6 (+WB6s D/B OOL)
 830- 40-14-AB
 7

Arizona

WA71PO 7172-194-38-A
 WA71EM 6200-160-34-AB
 K7N1Q 4514-118-37-ABD
 K7PXI 3434-101-34-A
 WA71LI 1970- 71-27-A
 K7NKH 1848- 66-28-A
 WA7BBM (+K7KHJ)
 8786-174-39-AB

Montana

W7IRG 3861-143-27-A

Nevada

K6YNH/7 19,654-99-36-2-ABD
 K7RWB 7439-171-43-ABD

Oregon

K7IDV 6,210-157-37-ABD
 W71YR 5050-168-34-ABD
 K7AUP (+W7UDM, opr.)
 3689-114-31-ABD
 K7HSD (+W7A11)
 464- 26-16-AB

Mtn. Sections	40	15	4	3	1	WA3QPX	17	11	8	WB6KRZ*	41	6	5	3		
MHz.	30	144	220	452	215	WA3RZQ/3*	10	14	5	WB6NRG	47					
VF3ONE*	36	7	5	6		WA2C7Q/3*	37	20	8	WB6NMT	40	3	5	1		
K1ABR*	25	16		8		K4BNC	43	1		K7GVK	33	2		2		
K1AGB	20	17	10	12		K4CO/4*	34	3	3	K7ICW	38	3	1	1		
K1GYT	37	16				K4IRH	36	4		K7IY/7*	30	3	2			
E1JOJ	14					K4LVV/4*	34	5		K7NLO	34	1		1		
K1PXE/1*	31	17	13	14	10	K4PCL/4	40	7		K7PXI	34					
K1VYU*	20	11	2	5		K2UOP/4	14	13	4	K7VNU	30	2	5	4		
E9AOP/1	30	11	7	8	1	W4EJ	3		11	K6YNH/7	46	7	5	4		
W1DC/1*	23	19	11	15	6	W4GJ	37	1		W7DZG/7*	32	4	2	2		
W1FUJ	23	9	7	3		W4UCH	7	8	3	4	W7EN	32	3			
W1QAX	13			3		WA4COG	33				W7VDZ	34				
W1YTW	11	13	7	9		WA4NIP	45	3			W7VJ/9*	35	3			
WA1FSZ/1	9	6	4	3		WA3ODJ/4	41			W7ZSL/7*	27	2		1		
WA1HEO	7	6	4	3		K5BKX/5*	51	3		W7YTRM*	38	1				
WA1MUG/1*	39	20	16	14		K5IVB/5	30			WA7TFO	48	1				
WB21KJ/1*	40	21	12	15		W5KA/5*	51	2		WA7JIM	38	1				
K2ARO					9	W5SWY	37	3		WA7KYZ	36	1				
K2RWR*	33	13	8			W5SSXO	51	6	1	2	K81JF	60	4			
K2DFL	26	15	8	9		W5TII/5*	44				K8RPL			10		
E2LDU	8	5	4			W5UK/5*	57				K8SUL	30				
K2QWR	32	14	10	6		W5VYX/5	38				K8TQA	14	4	1	5	
K2RIW				17		WASLUM	45				W8CCT*	56	11	6	1	
W2CRS/2	23	15	10	10		WA5QCT	36				W8CVQ	4	4		3	
W2CYW	7	10	4	2		WA5TTH	58				W8KPY	14	14			
W21WM	16					WA5VHN	39	1			W8UCI	22	4	4		
W2GCR	15					WASZUC	54				W8VA/R*	31				
W2QMS				17	6	W8VAG	33				W8PFB	51				
W2RAK/2*	26	15	8			W8VZY	36				WA87HO/8	35				
W2SEU	9	8	4	2		W8VDSH*	48				WA411Z/8*	31	11			
W2UK		21		16		K6BCT/6*	42	9	2	6	5	W8B8QY	69	3		
WA2THS	30	2				K6IBY	26		6			W8HWI/R*	52	16		
WA2UD1*	18					K6KLY/6*	39	7	4	5		E9EKL	41			
WA2VTR	5		5	4		K6QAX	25	2	4			K6HMB	50	10	6	5
WA2WFB/2*	35	19	18	20	10	K6RNO	44				W9HLY	45	10			
WA2YJ/2*	13	12	3	3		K6SSN	29	6	3	3		W9JTY	52			
WB2CST	17	9	2	3		K6TLL/6*	46	10	8	6		W8HUC/9*	55	5		
WB2FKJ/2*	6	17		7		K6TMR/6	35					K6CJL	43			
WB2SIH*	30	14	9			W6EJL	40	4	1	1		K6CJB	31	5		
W3ARW*	14	16	10	6		W6EJZ	4			6		K6SUD	33			
W3BHG	16					W6GWO	4			2		K6TIM*	39	7		2
W3CCX/3*	35	18	17	15	8	W6KQG	47					K6YKQ*	43	9		
W3CUCV	12	5	3	4	1	W6NTD	39	5	3	3	1	W6PEP	16			
W3CJL	12			6		W6OAJ/6*	32	6	3	6	4	W6MHL/9	41			
W3JLD	16					W6QFD	31	7		4		WA6SY8/8	33	1		
W3LUL	20					W6SF	44					WA6VIE	31			
W3PGA/3*	18	11		7		WA6HXM*	43	5	4	6	1	YPSRS*	39			
WA3LOS*	13	7	4			WA6NRV	43	9				XP2KN*	40	1		
WA3LH/3	5				1	WA6HAP	5	5	4							
WA3NZL	32	8				WB6ASU/6*	5	5	4							
WA3OYA	15					WB6KAP	26	4	2	4						

* Multioperator Station

Washington	
WA7KYZ	9107-246-37-AR
W71-N	8820-252-35-AR
K7DBR	6815-235-39-AB
W7DVB	5510-190-79-A
K7VNU	4992-156-32-AB
K7WIA	4592-164-28-A
K7QJW	3000-120-25-AB
WA7PVT	1350-90-15-A
W7QXV	490-49-10-AB
W7DZG/7	(+K7s BBO IFTZ IOX)
WA7s BBI IRTG)	
	15,876-364-42-AB/CD/E
W7VE/7	(WB6HLL K7s GWT TUD)
WA7s PRG ORS)	
	15,656-412-38-AB
W7ZSL/7	(+K7WIG WA7s EBH ILO)
	5835-280-31-AB/DE
K7H Y/7	(+K7MQF WATEHL)
	6550-187-35-ABC
W7J/7	(W7UGA WA7s LZL IOX)
	3520-160-22-AR
W7HML/1	(+K7IKC W7s IBY JHK)
	1407-67-21-A
Wyoming	
W7VDZ	8296-244-34-A
	8
Michigan	
W8BRGY	8030-215-43-AB

WKUCI	3990-127-30-4-BC
W8NOH	1990-90-21-AB
WKDRI	1691-89-19-AR
WRRLY	1580-79-20-AB
K8IHW	1512-79-18-ABC
W8NPI	1400-148-10-B
W8LBIH	1330-93-14-ABC
W8LLY	296-87-8-B
W8KXF	690-68-10-AB
W8CVQ	385-30-11-ABD
K8NNU	300-51-6-B
W8CKW	270-54-5-B
W8BATZ	201-67-3-B
W8AZCO	148-32-4-B
W8NRTJ	26-13-2-B
W8RDD	21-7-3-AB
W8L LK	12-12-1-A
W8BJXL/8	(+W8KDP WB8HJ)
	1092-78-14-AB
Ohio	
K8L LK	26,500-413-64-AH
W8RPLB	14,076-276-51-A
W8KPY	9456-197-48-AR
W8BZG	5348-164-32-AB
W8AZU/8	4760-136-35-A
K8SUD	3420-114-30-A
K8HUA	2016-70-24-AB/CD
K8MFR	896-64-14-A
K8ZFS	159-61-11-BCD
W8MFM	453-35-13-A
K8RPL	300-13-10-D

W8K1YF	184-23-8-AB
W8H1Z/8	74-37-2-B
W8L LK	70-5-4-BCD
W8VY	57-16-3-ABC
K8ROV	56-16-4-BCD
W8NPI	15-3-5-AB
W8CCL	(K8s ICR NTR WBULC)
W8S4	IUI LZII NJT PAM IYF
W8H WXT	ZXF WB8s EFX FAG
(GMZ)	
	36,778-486-74-AB/CD
W8HWI/R	(+K8MMM W8S LCM
(LRL)	
	24,616-362-68-AB
W8H2K	(+W8S JRX TGX)
	3780-126-30-AR
W8RI	(W8DPW W8UUC W8RS
(+RO I1W IMY IOR JKY)	
	2268-108-21-AB
W8KEL	(+W8RWR)
	1491-71-21-A
West Virginia	
WA4LE/ZR	(K3MBO K4RKA WB3s
NNO RBW)	
	7812-186-42-AB
W8RNF/R	(+K8KML W8ALC
W8SYH	WB8s LKG IJW)
	7783-181-43-AB
W8VA/B	(W8Ss CTR BVM KCJ
W8RAUL)	4867-157-31-A

9	
Illinois	
K8HMB	18,886-252-71-AB/CD
K8VY	1140-76-15-AB
W8WA	845-63-11-AB
K8GVW	462-66-7-B
K8MFB	364-52-7-B
K8LSX	252-28-9-A
W8VLCX	225-45-3-AB
W8VZYG	124-31-4-B
W8VAXH	120-30-4-B
WA9QZ1	(+WA9TCW)
	3293-221-33-AB
W8BXX	(WA9s KIO ULU ZPI
W8VAP)	
	7140-210-34-AB
K8DTB	(+W8VLU)
	4830-161-30-AB
W8HJF	(+W84VLI)
	2304-72-32-A
Indiana	
K8ELK	6888-168-41-A
K8QK R	5372-158-34-AB
K8VY1	2438-104-23-ABC
W8VLY	351-31-9-BC
W8VADU	175-35-5-B
W8HUC/9	(WB8s G1 U L L X GE
(G1A)	(3,670-227-68-AR)

(Continued on page 88)

39th ARRL November Sweepstakes Announcement

IT'S TIME TO GET plenty of sleep, buy lots of coffee company stock, fix antennas and rigs and persuade the XYL to let you stay cooped up in the shack for a few weekends because the SS is upon us.

Two recommendations from the Contest Advisory Committee concerning the SS have been adopted. 1) The shortened exchange, which was used last year on a trial basis, has been formally accepted. 2) The low power classification has been changed to 200 watts dc or less.

So as to minimize QRM to non-contest stations, suggested operating frequencies are as follows:

CW	PHONE
3550-3650	3850-3950
7050-7100	7225-7275
14050-14100	14250-14300
21050-21100	21300-21400
28050-28100	28600-28800

Read the rules thoroughly, then send for our "SS Package": log-sheets, summary-sheet, Op Aid 6. Be sure to specify approximately how many log-sheets you will need and whether you intend to participate on both modes. Unless first-class postage is included with your request, log sheets will be sent by third-class mail.

Your entry (and, for clubs, the Secretary's letter) must be postmarked no later than December 15, 1972 AND must be received on or before December 29, 1972. Both deadlines must be met in order to be eligible for QST listings and awards.

CQ SS CQ SS de — WA1PID

Rules

- Eligibility:** The contest is open to all radio amateurs in (or officially attached to) sections listed on page 6 of this issue of QST.
- Time:** All contacts must be made during the contest period indicated elsewhere in this announcement and between amateurs in (or officially attached to) the 74 sections. Yukon-N.W.T. (VE8) counts as a separate multiplier, for a possible total of 75 multipliers. Time spent in listening counts as operating time. No more than 24 hours of operation are permitted during the 30 hour period.

"Off" periods may not be less than 15 minutes at a time. Times on and off must be entered in your log.

3) **QSO:** Contacts must include certain information sent in the form of a standard message preamble, as shown in the example. CW stations work only CW stations and phone stations only other phones. Valid points can be scored by contacting stations not working in the contest, upon acceptance of your preamble and/or receipt of a preamble.

4) **Scoring:** Each preamble sent and acknowledged counts one point. Each preamble received counts one point. Only two points can be earned by contacting any one station, regardless of the frequency band. The total number of ARRL sections (plus VE8) worked during the contest is the "section multiplier." It is not necessary for preambles to be sent both ways before a contact may count, but one must be received, or send and acknowledge, before credit is claimed for either point(s) or multiplier. If your power is 200 watts or less, send "A" as your precedence; otherwise, send "B."

The final score equals the total "points" X the "sections multiplier."

5) **Reporting:** Contest forms (log sheets, summary-sheets, Operating Aid 6) are available

ARRL November Sweepstakes

ARRL SECTION 19, 6011 BROADWAY, NEW YORK, N.Y. 10022

NAME (PRINT) WA1PID CW PHONE ARRL SECTION 19, 6011 BROADWAY, NEW YORK, N.Y. 10022

NOTE: separate logs must be submitted, with separate preambles, for each mode.

CLASSIFICATION: 200 watts or less X 74 sections = 14828 points (based on 200 watts or less per complete QSO. Times not counted worked on the list below.)

1972	1971	1970	1969	1968	1967	1966	1965	1964	1963	1962	1961	1960	1959	1958	1957	1956	1955	1954	1953	1952	1951	1950	1949	1948	1947	1946	1945	1944	1943	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929	1928	1927	1926	1925	1924	1923	1922	1921	1920	1919	1918	1917	1916	1915	1914	1913	1912	1911	1910	1909	1908	1907	1906	1905	1904	1903	1902	1901	1900	1899	1898	1897	1896	1895	1894	1893	1892	1891	1890	1889	1888	1887	1886	1885	1884	1883	1882	1881	1880	1879	1878	1877	1876	1875	1874	1873	1872	1871	1870	1869	1868	1867	1866	1865	1864	1863	1862	1861	1860	1859	1858	1857	1856	1855	1854	1853	1852	1851	1850	1849	1848	1847	1846	1845	1844	1843	1842	1841	1840	1839	1838	1837	1836	1835	1834	1833	1832	1831	1830	1829	1828	1827	1826	1825	1824	1823	1822	1821	1820	1819	1818	1817	1816	1815	1814	1813	1812	1811	1810	1809	1808	1807	1806	1805	1804	1803	1802	1801	1800	1799	1798	1797	1796	1795	1794	1793	1792	1791	1790	1789	1788	1787	1786	1785	1784	1783	1782	1781	1780	1779	1778	1777	1776	1775	1774	1773	1772	1771	1770	1769	1768	1767	1766	1765	1764	1763	1762	1761	1760	1759	1758	1757	1756	1755	1754	1753	1752	1751	1750	1749	1748	1747	1746	1745	1744	1743	1742	1741	1740	1739	1738	1737	1736	1735	1734	1733	1732	1731	1730	1729	1728	1727	1726	1725	1724	1723	1722	1721	1720	1719	1718	1717	1716	1715	1714	1713	1712	1711	1710	1709	1708	1707	1706	1705	1704	1703	1702	1701	1700	1699	1698	1697	1696	1695	1694	1693	1692	1691	1690	1689	1688	1687	1686	1685	1684	1683	1682	1681	1680	1679	1678	1677	1676	1675	1674	1673	1672	1671	1670	1669	1668	1667	1666	1665	1664	1663	1662	1661	1660	1659	1658	1657	1656	1655	1654	1653	1652	1651	1650	1649	1648	1647	1646	1645	1644	1643	1642	1641	1640	1639	1638	1637	1636	1635	1634	1633	1632	1631	1630	1629	1628	1627	1626	1625	1624	1623	1622	1621	1620	1619	1618	1617	1616	1615	1614	1613	1612	1611	1610	1609	1608	1607	1606	1605	1604	1603	1602	1601	1600	1599	1598	1597	1596	1595	1594	1593	1592	1591	1590	1589	1588	1587	1586	1585	1584	1583	1582	1581	1580	1579	1578	1577	1576	1575	1574	1573	1572	1571	1570	1569	1568	1567	1566	1565	1564	1563	1562	1561	1560	1559	1558	1557	1556	1555	1554	1553	1552	1551	1550	1549	1548	1547	1546	1545	1544	1543	1542	1541	1540	1539	1538	1537	1536	1535	1534	1533	1532	1531	1530	1529	1528	1527	1526	1525	1524	1523	1522	1521	1520	1519	1518	1517	1516	1515	1514	1513	1512	1511	1510	1509	1508	1507	1506	1505	1504	1503	1502	1501	1500	1499	1498	1497	1496	1495	1494	1493	1492	1491	1490	1489	1488	1487	1486	1485	1484	1483	1482	1481	1480	1479	1478	1477	1476	1475	1474	1473	1472	1471	1470	1469	1468	1467	1466	1465	1464	1463	1462	1461	1460	1459	1458	1457	1456	1455	1454	1453	1452	1451	1450	1449	1448	1447	1446	1445	1444	1443	1442	1441	1440	1439	1438	1437	1436	1435	1434	1433	1432	1431	1430	1429	1428	1427	1426	1425	1424	1423	1422	1421	1420	1419	1418	1417	1416	1415	1414	1413	1412	1411	1410	1409	1408	1407	1406	1405	1404	1403	1402	1401	1400	1399	1398	1397	1396	1395	1394	1393	1392	1391	1390	1389	1388	1387	1386	1385	1384	1383	1382	1381	1380	1379	1378	1377	1376	1375	1374	1373	1372	1371	1370	1369	1368	1367	1366	1365	1364	1363	1362	1361	1360	1359	1358	1357	1356	1355	1354	1353	1352	1351	1350	1349	1348	1347	1346	1345	1344	1343	1342	1341	1340	1339	1338	1337	1336	1335	1334	1333	1332	1331	1330	1329	1328	1327	1326	1325	1324	1323	1322	1321	1320	1319	1318	1317	1316	1315	1314	1313	1312	1311	1310	1309	1308	1307	1306	1305	1304	1303	1302	1301	1300	1299	1298	1297	1296	1295	1294	1293	1292	1291	1290	1289	1288	1287	1286	1285	1284	1283	1282	1281	1280	1279	1278	1277	1276	1275	1274	1273	1272	1271	1270	1269	1268	1267	1266	1265	1264	1263	1262	1261	1260	1259	1258	1257	1256	1255	1254	1253	1252	1251	1250	1249	1248	1247	1246	1245	1244	1243	1242	1241	1240	1239	1238	1237	1236	1235	1234	1233	1232	1231	1230	1229	1228	1227	1226	1225	1224	1223	1222	1221	1220	1219	1218	1217	1216	1215	1214	1213	1212	1211	1210	1209	1208	1207	1206	1205	1204	1203	1202	1201	1200	1199	1198	1197	1196	1195	1194	1193	1192	1191	1190	1189	1188	1187	1186	1185	1184	1183	1182	1181	1180	1179	1178	1177	1176	1175	1174	1173	1172	1171	1170	1169	1168	1167	1166	1165	1164	1163	1162	1161	1160	1159	1158	1157	1156	1155	1154	1153	1152	1151	1150	1149	1148	1147	1146	1145	1144	1143	1142	1141	1140	1139	1138	1137	1136	1135	1134	1133	1132	1131	1130	1129	1128	1127	1126	1125	1124	1123	1122	1121	1120	1119	1118	1117	1116	1115	1114	1113	1112	1111	1110	1109	1108	1107	1106	1105	1104	1103	1102	1101	1100	1099	1098	1097	1096	1095	1094	1093	1092	1091	1090	1089	1088	1087	1086	1085	1084	1083	1082	1081	1080	1079	1078	1077	1076	1075	1074	1073	1072	1071	1070	1069	1068	1067	1066	1065	1064	1063	1062	1061	1060	1059	1058	1057	1056	1055	1054	1053	1052	1051	1050	1049	1048	1047	1046	1045	1044	1043	1042	1041	1040	1039	1038	1037	1036	1035	1034	1033	1032	1031	1030	1029	1028	1027	1026	1025	1024	1023	1022	1021	1020	1019	1018	1017	1016	1015	1014	1013	1012	1011	1010	1009	1008	1007	1006	1005	1004	1003	1002	1001	1000	999	998	997	996	995	994	993	992	991	990	989	988	987	986	985	984	983	982	981	980	979	978	977	976	975	974	973	972	971	970	969	968	967	966	965	964	963	962	961	960	959	958	957	956	955	954	953	952	951	950	949	948	947	946	945	944	943	942	941	940	939	938	937	936	935	934	933	932	931	930	929	928	927	926	925	924	923	922	921	920	919	918	917	916	915	914	913	912	911	910	909	908	907	906	905	904	903	902	901	900	899	898	897	896
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EXPLANATION OF "SS" CONTEST EXCHANGE

Exchanges	Nr	Precedence	Call	CK	Place
	Consecutive Serial Number	Power input less than 200 watts dc	Send your station call	CK (Last two digits of year first licensed)	Your ARRL section
<i>Sample</i>	NR 1	A	WA3FHB	65	MDC

free from ARRL Hq., or you may use forms of your own design provided they follow the indicated format. Every competing entry claiming 200 or more QSOs must have cross-check sheets (Op Aid 6 or similar) attached. To aid us in getting these forms to you as fast as possible, please be sure to include with each request a self-addressed and stamped legal-size envelope containing: your full name, call and mailing address complete with zip code. We suggest a minimum of 16c postage attached. This will assure your receiving 1 summary sheet, 1 Op Aid 6, and 4 log sheets, enough for 400 QSOs. Using this as a guide-line you can adjust the postage according to your needs. **ANY LOG OMITTING TIMES ON AND OFF, OR OMITTING CROSS-CHECK SHEETS (WHEN REQUIRED), OR OMITTING A SUMMARY SHEET OR ANY INFORMATION REQUESTED THEREIN (see sample), WILL NOT BE CONSIDERED FOR COMPETITIVE QST LISTINGS OR AWARDS.** Such logs will be classified as "check-logs" and processed accordingly. Entries must be postmarked no later than December 15, 1972 and must be received on or before December 29, 1972. Both deadlines must be met in order to be eligible for QST listings and awards. All entries become the property of ARRL and none can be returned.

There are no objections to one's obtaining assistance from logging, "spotting" or relief operators, but their use places the entrant in the multiple-operator class, and it must be so reported.

A single-operator station is one manned by an individual amateur who receives no assistance from other persons during the contest periods. He may not have assistance in any manner in keeping the station log and records, or in spotting stations during a contest period. The operation of two or more transmitters simultaneously, is not allowed.

A transmitter used to contact one or more stations may not be subsequently used under any

other call during the contest period (with the exception of family stations where more than one call is assigned to one location by FCC/DOC).

6) **Awards:** Certificates will be awarded to the highest-scoring cw entrant and to the highest-scoring phone entrant in each ARRL section, provided that *either* (1) there are at least three single-operator competing entrants from that section, *or* (2) the top single-operator score is 10,000 points or more. Similarly, a certificate will be awarded to the highest-scoring Novice or Technician licensee in a section if (1) there are at least three single-operator competing entrants of that license class in that section, *or* (2) if, in the opinion of the Awards Committee, the entrant displayed exceptional effort. Multiple operator entries, regardless of license class of operator, are not eligible for certificate awards and will be listed separately in the final results in QST.

A gavel will be awarded to the highest affiliated club entry. The aggregate scores of phone and cw provided by club secretaries and confirmed by the receipt at ARRL of contest logs constitute a club entry. Segregate club entries into phone and cw totals. Both single and multiple-operator scores may be counted, but only the score of a bonafide club member, operating a station (his or another club member's) in local club territory, may be included in club entries.

The highest single-operator cw score and the highest single-operator phone score in any club entry will be rewarded with a "club" certificate where at least three single operator phone and/or three single-operator cw scores are submitted.

7) **Disqualification:** Failure to comply with the contest rules on FCC/DOC regulations or the necessity for avoiding interference with channels handling emergency communications shall constitute grounds for disqualification. In all cases of question, the decisions of the ARRL Awards Committee are final.

QST

VHF QSO Party

(Continued from page 86)

	Kansas	
WA0VJH	2852-92-1-A	
	Minnesota	
K0GUV	3168-96-33-A	
W0EVI	648-36-18-A	
W0PHD	592-35-16-ABD	
W0RLI	232-29-8-B	
K9UYK/Ø	(+W0OHU)	
W9DJ	9412-181-52-AB	
	Missouri	
K0LCB	2952-82-36-AB	
W0BABI	2080-80-26-A	
W0BHHB	76846-16-A	
W0KCC	234-26-9-AB	
K0TLM	(+W0YZ5)	
	Iowa	
WA0ZWT	5115-165-31-AB	
W0PFP	3780-105-36-A	
W0BATY	1392-48-29-AB	
W0MOO	247-19-13-AB	
	Nebraska	
K03VD	2727-101-27-AB	
W09OM	1071-50-21-ABD	

South Dakota	Mexico
W0E1LN 3297-157-21-A	XE2XN (+K5) HVC KYD WSODRI
K0WLU 152-19-8-B	11316-276-41-AB
FOREIGN	Barbados
Turks & Caicos Is.	8P6FN 264-24-11-A
VPSRS (+W4GDS WB4s BND OSN)	Check Log
8970-230-39-A	W75NP (K7ICW, opr.)

ARE YOU LICENSED?

• When joining the League or renewing your membership, it is important that you show whether you have an amateur operator license. Please state your call and/or the class of operator license held, that we may verify your classification.

AMATEUR RADIO PUBLIC SERVICE

NTS RACES AREC

In the Public Interest, Convenience, Necessity

CONDUCTED BY GEORGE HART,* W1NJM

NOW IS THE TIME . . .

CRITIQUES RECENTLY attended in Syracuse and Rochester, N.Y., on the Agnes floods, occasioned some research in back files of *QST* on previous similar floods. There have been two of them. One was in 1936, written up in May, 1936, *QST*, and recorded as "the second greatest deluge in history (if you credit your Genesis)." Over 15 pages of factual accounts of amateur participation were presented, with a critique occupying slightly over a page in *Operating News* of the same issue. Reading over it, we find it sounds very familiar in current experience.

Nineteen years later, in August of 1955, came another great deluge and the Diane floods, characterized by many as the greatest ever, even worse than 1936. An 8-page article resulted in December '55 *QST*. This time the critique preceded the article (Nov. '55, p. 58) but was largely in the October '55 CD Bulletin, where more space was available. We have dug out a copy of this bulletin and wish we had room to quote it. Without date references, it could pass as a summary of conclusions reached at the Syracuse and Rochester critiques as to the things we amateurs did wrong, the right things we could have done better, and how we should plan to avoid these mistakes in the future.

Now comes the Agnes disaster of 1972, again characterized as the greatest of all, and again will come the write-up (hopefully, next issue, reports still coming in), and again the critique reaching, generally speaking, the same conclusions reached after the previous Great Eastern Floods and after the Alaska and Los Angeles earthquakes, after Camille, after Rapid City, after numerous tropical hurricanes which battered the Florida and Gulf coasts, after every major emergency. Look them up in your back issues, and learn that history is educational and that it repeats itself in a never-ending cycle.

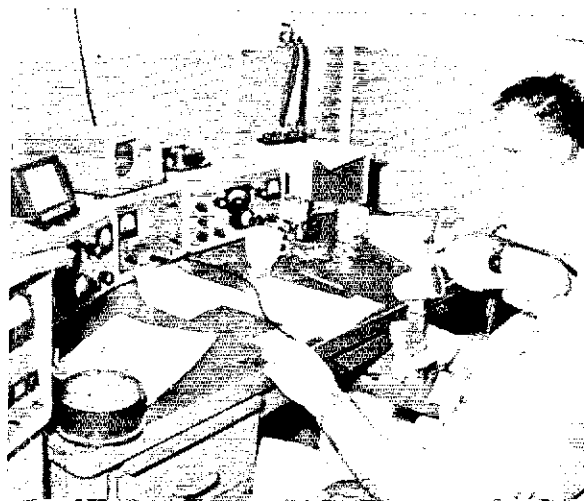
Why do we never learn? The reason is that the same degree of emergency gravity seldom occurs with any frequency in the same locality. When was the last time Alaska had an earthquake before

*Communications Manager, ARRL.

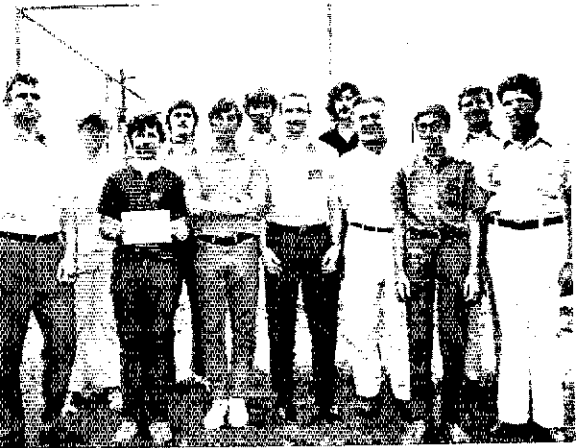
1964? How about the LA area? And how often does "the greatest flood of all time" hit the northeast? Usually, after such an emergency, we are all conscious of what we did wrong and how we would operate to correct such errors if the same thing were to happen again. Plans are made, discussed, modified, rediscussed, brought close to perfection. We can hardly wait for the next flood.

But it doesn't come for about 15 years. By that time the agony of the previous one is all but forgotten, plans made with such enthusiasm and determination have been shelved, or discarded because of obsolescence, a new generation of amateurs has come along who didn't learn these lessons the hard way, apathy has set in. Boom! A new and even greater emergency strikes, amateurs again come out of the woodwork to assist, again "discover" how to conduct emergency communication by flailing around doing it, and, afterward, again discuss the lessons they learned and resolve to benefit from the experience. In every emergency, a small contingent of amateurs are ready, but the great and overwhelming majority are those eager and willing to help who have not been "in" on local preparedness plans. Sometimes they are sufficiently adept and adaptable that they can help; sometimes they are useless; and sometimes obstructive.

The first great northeastern flood was in 1936; the second in 1955, 19 years later; the third in 1972, 17 years later. According to this, we can look forward to the next one, then, in 1990 or thereabouts. By that time the entire northeast will probably be one immense super highway or parking lot and the run-off from heavy downpours



Whidbey Island AREC (WA) handled 1129 messages relating to the South Dakota disaster, via club station W7UMX. Early hours were spent handling food and medical traffic through Red Cross and c.d. Shown here, K7GGZ and WA7SXG in a 20-meter exchange with South Dakota.



The Tennessee TN and TNN gang are pictured during the Crossville, TN Hamfest, July 16. Left to right, RM W4ZJY, WB4MYZ, WB4YCV, WA4-YEM, WB4DGI, W4YAC, WB4NIR, WB4EHD, K4PJ, WB4UUH, W4DMS and WB4DJU.

Field Day and the Real Thing

Just prior to, during and after the recent Field Day exercise there were quite a few amateurs, and even a few non-amateur officials, who were strongly of the opinion that conducting an emergency exercise while a real major emergency was in progress, was the height of folly and asininity. Yet, a conclave of ARRL officials of a stature certainly to cancel the Field Day if the situation demanded, decided not to do so. Why?

should really be something! Will we, that far in the future, still remember and will we have continued to maintain our preparedness? You know that we will not, and those who preach doom will be generally ridiculed as old fuds behind the times. And so in 1990 the whole cycle will repeat itself.

UNLESS . . . we take steps to see that certain axioms of emergency preparedness are kept before us at all times, that they are repeated, that some kind of teeth are applied to *require* amateurs to maintain a certain minimum of preparedness. Now is the time, when the lessons to be learned are fresh in the minds of amateurs in the northeast from Agnes, in the midwest from Rapid City, and on the west coast from Isleton - NOW is the time to put on a drive for AREC or RACES registration, to bring your local organization to a peak of preparedness, to make and establish firmly your official contacts with served agencies.

The above is not intended as an Agnes critique. *QST* space permitting, that will come later, along with or following the factual account of what amateurs in New York and Pennsylvania and elsewhere did during and after the flood - and believe us, they did plenty! Hindsight is always better than foresight. But hindsight can *become* foresight if you'll only bear in mind that the lessons learned in the previous emergency apply in the coming one, despite changes in techniques, personnel, equipment and politics. These are details, trimmings. You have to dig down beneath them to get at the basics. When we do get to the critique, dig, man, dig! Dust off what you dig up and you will find some basic principles of emergency preparedness that are stated clearly in the *Public Service Communications* manual and that should be preserved faithfully and applied regularly as our guidelines.

Several reasons, actually, but the principal one was that by the time it appeared obvious that the emergency was major in extent and seriousness, it was not practical to "cancel" the Field Day. Secondly, the actual necessity was also somewhat in doubt. Most emergency operation would be conducted on 80 or 40 meters, or on the vhf's using repeaters. It seemed that it should be possible to control the situation on 80, and on 40 most of the traffic would be incoming "health & welfare" (we prefer to call it "inquiry," because health & welfare can be either incoming or outgoing), so the need there seemed possibly less critical. There would be virtually no need for clear channels on 20, 15 and 10, the first two at least very widely used on FD, so why cancel them out? In all but the northeast corner of the nation, the need for emergency communication would not exist. The worst potential for serious interference would be on 75 phone, but this potential did not appear serious enough to cancel a nationwide activity. FCC ingeniously designated 3815 kHz as a cleared channel, lifting the licensing restriction implicitly, since FD operation in the "extra" portions of the bands is practically nil. So actually, when you come right down to it, only one segment of one amateur band stood to be in trouble by FD continuation, and this didn't seem sufficient to preemptorily cancel the whole shindig.

Instead, W1AW came on with a special bulletin warning all amateurs, especially those participating in FD, to avoid QRMing emergency nets on pain of disqualification and, when the FCC announcement of cleared channels came out, another bulletin detailing this information.

The result? On the whole very satisfactory, as most groups participating in Agnes seem to agree. Most FDers avoided emergency nets, and when occasionally someone blundered onto one and was



This is the 20th year an amateur radio net has assisted with the All-Women Trans-Continental Air Race (Power Puff Derby). Starting times are reported on 2-meters and checkpoints across the country are tied together on 20 and 40. Pictured is Palo Alto A.R.A. station W6OTX, manned by W6AIN (left) and W6QWF (center). A 2-meter station is in the background.

advised of it, he quickly withdrew with apologies. Considering the potential that existed, QRM from FD was minimal, certainly no worse than it would have been if no contest was going on. Perhaps, because FD consists of a larger percentage of emergency-oriented amateurs than would otherwise have been on the air — perhaps even better.

But more important and impressive was the number of club and non-club FD groups in the affected area and elsewhere who gave up their FD plans entirely in order to assist in emergency communications so badly needed in so many places in New York and Pennsylvania. We are reserving a special place in the Agnes writeup for these groups, and we hope we have the names of all of them. If your group was one and is not listed in the Agnes writeup when it appears, please advise us so it can be included in the inevitable supplement. — WINJM.

SOUTH DAKOTA FLOOD

Supplement

With many reports of South Dakota flood activity (which began June 9) received after the deadline for September QST, a follow-up report seems in order. Most of our reports come from outside the disaster area; amateurs who assisted with communications as far away as Hawaii. Again, resumes of reports by areas:

Ohio. K8ONA reports much monitoring activity by the Ohio crew. EC W8GRG, W8SZU, WA8MHW and W8ELG kept the gang abreast of the activity in South Dakota. Many hams handled traffic into the affected area and some messages from the area. Among the traffic handlers were: WA8MCC, WA8ZUK, WB8JEL, W8UDG, W8FQM, WA8GED and W8SUS. Close contact was maintained with the Red Cross.

Iowa. Another report, this one from EC W0LIJ, relates communications provided by the Cedar Valley ARC of Cedar Rapids/Marion, IA. The club activated W0WSV at county c.d. headquarters and established contact with state c.d. station, WA0CIQ, in Des Moines. W0WSV was on the air continuously for 32 hours, originating and relaying messages for outlying stations and being temporary relief for WA0CIQ. Most traffic was health and welfare.

Minnesota. WA0DCJ and WN0GOY, members of the 3M ARC, manned club station WB0BQG at Tartan Park on June 10. Health and welfare inquiries were forwarded to Rapid City hams who advised as to whether or not the addressees were in safe areas. On Sunday the county c.d. authorized WB0BQG to operate under c.d. and handle emergency messages. Operation continued until Monday, with about 150 messages originated. Others participating were: WA0QFO, W0JIE, W0VUZ, W0CYH, WA0BIX, K0RAB and W9RDQ. W0WVO and K0RAB activated St. Paul Red Cross station on Saturday.

W6LOI reports handling health and welfare traffic from the disaster area via WestCARS, with help from WB6AOO and W6GOJ. Much Hawaiian

Public Service Honor Roll July, 1972

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

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	Totals
Max. Pts.	10	10	12	12	12	20	3	5	5	
WA21ED	10	6	12	12	12			5	5	111
WA3QXZ	10	10	12	12	12	8	3	3	5	75
WA9VYR	10	10	12	12	6	20				70
W3F7T	9	7	12	12	12	9				66
WB8LEZ	10	10	9	12	12	8				66
WB5DLK	10	10	12	12	12	3				64
W8AELX	10	10	12	12	12		3			64
WA2CXY	10	10	12	12	12					61
WA3GSM	10	10	12	12	12					61
WB4PNC	10	10	12	12	12					61
WB4SVH	10	10	12	12	12					61
WB8HNV	10	10	12	12	12					61
W8LRW	10	10	12	12	12					61
K6PJV4	10	10	12	12	12					61
WA3JGM	10	10	12	12	12		3			59
WA8UP1	10	10	9	12	12	1				59
K0BA1J4	10	10	12	9	12	1				59
WB4SON	10	10	12	12	12	2				58
WA0VAS	10		12	12	20	3				57
WB2AEH	10	10	12	12	12					56
WA2FUD	10	10	12	12	12					56
WB2OVV	10	10	12	12	12					56
K3KAJ	10	10	12	12	12					56
WB4SOA	10	10	12	12	12					56
WB8IUP	10	10	12	12	12					56
WB9AJJ	10	10	12	12	12					56
WA2UOO	10	10	12	3	12				5	52
WB4NCH	10	10		12	12		3			52
W7OCX	10	10	3	12	12					52
WB0DVP	10	10	12			20				52
W3ICS	5	10	12	12	6					50
WA61VA	12	12	3	12	6					50
W2OF	10	10	9	12	6		3			49
K3BR	10	10	12	12	12					49
K7OH	10	10	12	12	12					49
K0MR1	10	10	12	12	12					49
VE3JHM	10	10	12	12	12					49
WB3JHM	10	10	3	12	12					47
W4ZY	10	10	8	12	12					47
W4GDL	10	10	12	3	12					47
WA5BCX	9	10	10	12	12	4				47
WB0CNM	10	10	12	3	12					47
WA8NOQ*	10	10	12	12	2					46
WB0CCB	10	10	12	12	2					46

W6MNY	45	WB4IMH	40	WB0HY	36
W7BO	45	WB4IC	40	W5ABQ	35
WB8JEL	45	W2CH	39	K8MLO	35
WB9BAO	45	W2TR	39	VE4EA	35
W2BU	44	W2RO	39	K1SXL	34
WB2CHY	44	W3OS	39	WA3IYS	34
W2TPVJ	44	W3NM	39	W30BN	34
K3DO	44	W6NH	39	W3YA	34
E5KQZ	44	W7GH	39	K4KNP	34
W0HRY	44	WA8VKF	39	W4TES	34
W0BV	44	WB0BAP	39	W6VBV	34
VE3GBR	44	K8ALM	39	W7LBK	34
VE3SB	44	W8H	39	W7WJH5	34
WB4YCV	43	VE3EWD	39	WB1KX	34
K1OXJ	42	WB2NOM	38	W9QLX	34
WB610	42	WB4EDT	38	VE3JAL	34
WA1ICU	41	WB4VZQ	38	VE3JAWF	34
WA3GT	41	W6AUC	38	WB8AYC	34
WA1QUR	41	W6DFI	38	WB8SH	34
WB4SKJ	41	WA0MFF	38	W81M1	33
K8NOV	41	WB8CWD	37	W2MTA	31
W0AXW	41	WB81D	37	WA2CCF	30
WA0QEX	41	VE3DPO	37	WB6KJ1	30
		VE3GT	37		

*Denotes multiplier station.

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



K5SXO (left) and W4QGZ were two of the participants in the July 18 Shriner's parade in Dallas, TX. Dallas area amateurs from the Texas Repeater Society and Dallas ARC provided communications for medical and police aid and general parade coordination.

health and welfare traffic was passed by KH6AX in many long hours of operation. At the other end of the country, K1EIR and K1EIC were aiding in Red Cross communications with Rapid City. WA0GAT handled 175 messages to and from the disaster area, and reported good news to several North Platte, NE families. W2DJY acted as a communications link between South Dakota and a rescue agency in Colorado, and also with Red Cross. K7LDZ represented Red Cross and Civil Defense for the Great Falls, MT, area and relayed information to local broadcast stations. A message from a worried man to his wife in Rapid City was handled by WA1HNM via relay from WB9BXS.

On July 13, K4TOR/mobile approached a car-truck collision in Vestavia, AL. He used the Birmingham Amateur Radio Emergency Service repeater and contacted K4UMD who relayed to police. Ambulance and police arrived within minutes. — (K4AOZ)

While travelling on I-35 near Des Moines, IA, on July 14, K0LKH came upon an accident. His 2-meter fm call was answered by K0OOD who notified authorities. In seven minutes an ambulance and four units of the Iowa Highway Patrol arrived on the scene. — (K0YVU, SCM IA)

During the evening of July 24, VE4RV heard a call from CE6GV on 20-meters requesting a rare drug for a person in Santiago, Chile. VE4RV called EC VE4HR in Winnipeg and a hospital pharmacist. VE4HR completed arrangements and had the drug flown to Santiago the next day. — (VE4FQ, SCM MB)

Well, that concludes our account of amateur operations during the South Dakota disaster. A report on "Agnes" is forthcoming. Let's hope we are not subjected to any more disasters in the near future. However, we cannot sit back and say it can't happen again. It can! Let's be prepared. — WA1HCM.

At 0110Z on July 25, a man swimming in a pool in White Branch, OR, had a heart attack. WA7DIT/mobile assisted in communications and an ambulance was dispatched. W7MDM relayed information to W7SY who made arrangements for admittance to a hospital in Bend. — (W7HLF, SEC OR)

Public Service Diary

On June 6, W8GV received a request for antibiotics from CR7PK via W1FBG. He contacted a pharmacy and the manager notified a pharmaceutical association. The medication was flown to Mozambique the same day. (W8GV)

At 8 AM on August 4, a mountain climber was reported lost on Mt. Jefferson in central Oregon. K7MMK and W7IMP supplied communications from the base camp on the mountain to the Portland Search and Rescue Emergency Coordinator by way of W7PJO in Portland. They handled 24 health and welfare messages and 5 phone patches, one of which was from the father of the lost climber to his wife. Operation was secured at 8:30 PM. — (K7WWR, SCM OR)

The Phoenix (AZ) area was hit by a severe thunderstorm June 28 and 29. A number of homes were demolished and many others were damaged. Amateurs aided Red Cross in communications under the leadership of K7GHS. WA7NXI operated from the county e.d. center and K7WUG and W7CAF operated from the Capitol Building. — (W7CAF, SCM AZ)

On August 14, W9EX spotted two cars over the embankment of I-74 near Bloomington, IL. He contacted K9IKR through WA9GCK repeater, who summoned an ambulance for several injured persons. When a trooper arrived, W9EX was requested to send for more ambulances. He then checked the second car and found no injuries, but relayed a personal well being message to their relatives, again through WA9GCK. — (K9ORP, EC McLean Co.)

During a QSO on July 4, WNSFFH learned that WN7TFI's telephone had been out of order for several days. WN7TFI lives several miles from town in Concho, AZ. WNSFFH called the Albuquerque, NM telephone company and reported the problem. — (WNSFFH)

During June, four severe storm watches took place in the Milwaukee, WI area; one tornado watch and three severe thunderstorm watches. On June 12, sixteen amateurs participated, relaying storm observations to the National Weather Service in Milwaukee. Later, on June 19, fifteen amateurs took part in a similar operation, again advising the weather service. — (W9NGT, SEC WI)

At 0030 on June 18, W7IEU was notified by K7KXN that a climber had broken a leg in Mt. Baker National Forest, WA. W7IEU alerted members of Hams Amateur Mobile Service Club to assist in communications as soon as the rescue crew requested it. The club stood by until 0800 at which time they were informed that the man had been removed from the mountain and was in a local hospital. -- (W7IEU, EC Snohomish Co.)

A severe thunderstorm hit Belchertown, MA, on July 25 at 1400. Since many power lines were down, WA1DNB went to the Town Hall to set up possible communications. W1CSF and K1FUG arrived at the Town Hall soon after and their mobile capabilities were made known to police and fire departments. Power was restored at 1610. -- (WA1DNB, SEC WMass)

We received 38 SEC reports for July. Although that is the same number of reports, it represents 11,932 AREC members, down from 12,068 members represented last year. Is your section represented? Sections reporting: AB, AZ, CO, CT, DE, EFLA, ENY, EMASS, IN, IA, KS, MAR, MDC, MI, MN, MT, NE, NV, NC, NNJ, OH, OK, ON, ORG, OR, SDGO, SK, SD, SNJ, TN, UT, VA, WA, WV, WFLA, WMASS, WNY, WPA.

Traffic Talk

The following is purloined from *The Ground-wave*, publication of the Ottawa (Ont.) Amateur Radio Club, and originally was written by VE3DV, although he may not recognize it.

Traffic handlers aren't born that way. They just tend to look and sound funny because of the hard discipline imposed on them over the years by heartless net control stations. Amateurs were handling traffic back in 1914, so the practice is venerable, if not impeccable. Most amateurs who handle traffic do so only after having gone through one or more other phases of amateur radio operating, such as ragchewing, DX chasing, etc. Some come by it naturally, through government or commercial training.

In any case, there are a number of advantages in turning to traffic handling, and here are a few:

(1) Regular activity. Nets usually meet at the same time, same frequency, same day or days of the week.

(2) Controlled nets. You speak only when spoken to. This mild discipline is like a breath of spring after a heavy session of DX work.

(3) You learn a specialized phase of amateur radio, and with experience become a better all-around amateur.

(4) You can participate by cw, ssb, fm and even RTTY.

(5) You are preparing yourself so you can take on a much more important role in the event an actual disaster hits your area.

(6) With NTS connections, you become part of a complete communications system that covers the whole of North America, the West Indies, Hawaii and the Canal Zone. It's like being a part of the Bell System, except no money involved.

During the 15th Airstream International Rally in Louisville, KY, June 25 to July 5, 1610 messages were handled, mostly by RTTY. WA8ETX is seen sending some of those 1.6k messages. (Photo by W9UUN)

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for July Traffic

Call	Orig.	Recd.	Rel.	Del.	Total
W3CUL	190	1179	1044	41	2404
K9ONK	182	678	667	12	1839
W2ZQ	10	516	500	26	1052
WA3OOZ	34	480	323	68	925
W3VR	269	284	247	17	808
W2GKZ	9	392	396	4	796
WA0VAS	116	287	13	272	690
W3FML	24	346	252	6	622
WA8LX	492	65	53	8	618
W2OF	67	290	224	6	587
WB6BBO	38	377	257	7	579
W4JZLN	23	272	160	78	533
W4BYO	13	258	245	11	527
W3BA	38	247	202	42	523
W4CUL(June)	296	840	769	164	1969
WA3FV(June)	178	294	73	180	925

More-Than-One Operator Station

WB4HS	477	477			954
WB4USA	638				638

BPL for 100 or more originations plus deliveries

K8NOW	153	WB6VTK	123	WB4NCH	101
W2CU	136	W9MFG	117	WB2NOM	100
KP4WT	135	W7ISA	114	WA8WFO(June)	177
WN3RCL	130	WA3GGM	107	WA2CNE(June)	124
W8QCU	125			K9LEY(May)	103

BPL Medallions (see July, 1968 QST, p. 99) have been awarded to the following amateurs since last month's listings: WA3LOV.

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.

What are the disadvantages? Gee, there really are none, except possibly that you can't become adept at traffic handling without working at it regularly -- like any other pursuit, when you think of it. Newcomers to traffic handling are best advised to start on cw, because proper procedure is more required and more basic by that mode. Once you "get the idea," you can check into a phone net with a minimum of difficulty and extra training. Of course you have to bring your code speed up to a minimum of about 15 wpm, but that won't hurt you a bit. Copying WIAW for a few weeks will do it.

National Traffic System. Many are asking "When will the proposed 'daytime NTS' be implemented?" Patience, patience! Your Public Service Branch at ARRL CD is snowed, and with a new man breaking in we have to approach all new functions cautiously. The original target date of October 1 has been moved to January 1. During September and October we hope to take some initial steps toward implementation, but much correspondence and recruiting will be necessary. An article for QST kicking off the new project will be prepared to appear, hopefully, in the December issue. Wish we could promise faster action, but it is necessary to be realistic.



Meanwhile, amateurs interested in assuming leadership roles in the daytime NTS (DNTS) might "register" with headquarters, so we will have a cadre to start with when it is time to make appointments. - WINJAM.

July reports. Assistant CAN manager WA0MLE records second highest rate ever for July and traffic up from last two years. He feels CAN crew is utilizing 40-meters very well. Initial 2RN wallpaper earned by W2CLW, WA2s CXY EUO LXF SRQ. Second annual certificates went to W2ZEP, WB2s LQP OYV, K0BAD/4, acting RN5 manager, expects W5SBM will be assuming manager duties again by the end of August after recuperating from surgery. W7BQ submits his 122nd and last RN7 report. Sez he's been at it about "one sunspot cycle". W7KZ takes over as RN7 manager. Summer conditions are having their effect on TWN. K7NHL reports conditions pretty unstable for early session and static takes its toll.

VNO VZT, WA6DEI, W7s EQ DZX EKB EM GHT KZ PI, W0LO, K0JSP.

Independent Net Reports (July)

Net	Sessions	Traffic	Check-ins
No. American 20M SSB	25	277	514
20 Meter ISSB	19	1106	375
3B Service	5	33	611
Mike Farad	26	237	344
Clearing House	26	286	392
1MRA	47	569	1648
7290 Traffic	40	594	1690
75 Meter ISSB	31	263	979
Early Eighty Free	29	175	156
Ohio Valley Teenage	38	82	247
Hit and Bounce / MW	31	895	362

QST

DX TEST

(Continued from page 80)

WA0WBG 54,735-89-205-A-18

Multi-Single

- VE3RIT (VE3s ABN BMV CDX EXA)*
- 1,080,858-302-1193-C-75
- WA2IVL (+WA2KTO)
- 68,376-74-308-B-40
- WA2IOW (+WA2OJC)*
- 241,449-151-533-A-32
- WB2HIF (+WA2AYU)*
- 75,141-99-253-B-29
- WB4RSV (+WB4VGF)
- 7866-38-69-B-10
- W5LJL (+K5LJLW WBSAAR)
- 1,002,468-278-1702-C-85
- WB1EDU (WA3BGT WARRXM)
- 389,400-200-599-C-76
- WB8LOS (+WN4TDV WBSHUP)
- 87,780-133-220-D-

Multi-Multi

- K3TGM/3 (+W3s BYX DOB EHR WA3KRD)
- 760,500-260-975-C-75
- W3AD (+K3EST W3s GRM JN WA3s AMH ECT HRV IAO IVS)*
- 5,772,195-507-3795-C-96
- W3GPE (+K3JWV WA3s FFR OAT)
- 3,629,652-439-2756-C-96
- W3WPG (+K3HITZ VL3BAW WA3s LNM NQX)
- 2,909,088-416-2331-C-96
- W3YQ/3 (multitop)
- 95,537-107-891-C-
- K4CC (+K2OBW K3WU WA3s HWW W4s YZC ZM WA4KJR WB4RDV K6OZL WABRGJ)
- 3,588,075-431-2775-F-96

DX

- Multi-Single
- SP5PWK (SP5AUY, Henryk)*
- 709,646-178-1329-C-

Net	Sessions	Traffic	Rate	Avg.	%Rep.
EAN	31	1661	1.215	53.6	93.5
CAN	31	1077	0.959	34.7	100.0
PAN	31	952	0.832	30.7	100.0
1KN	62	512	0.341	8.3	88.0
2RN	62	628	0.714	10.1	93.4
3RN	62	434	0.368	7.0	97.3
4RN	51	441	0.302	8.6	76.2
RN5	62	741	0.375	11.9	89.1
RN6	62	691	0.320	11.1	97.8
RN7	61	181	0.201	2.9	53.2
SRN	57	479	0.407	8.4	79.0
9RN	60	381	0.350	6.4	83.5
TEN	62	475	0.423	7.7	71.1
EUN	55	84	0.184	1.5	84.1
TWN	53	277	0.215	5.3	53.9
ICC Eastern	1181	658			
ICC Central	931	519			
TCC Pacific	1241	795			
Sections*	2362	9678			
Summary	3164	20664	EAN	6.5	
Record	2890	26748	7.267	75.2	

*TCC Functions not counted as net sessions.

Section and local nets reporting (71): AENQ, AENR, AEND, AENB (AL); ATEN (AZ); NCN, SCN (CA); ECN (CO); BEN, CN, CPN, NVH (CI); DEPN, DTN (DE); EAST, EMTN, EPTN, GN, QFTN, TPIN, VEN, WEPN (EL); GSN (GA); HLM (HL); KEC, KWN, OKS (KS); LAN (LA); SGN (MD); MDCTN (MD-CO); WMN (MA); QMN, WSB (MI); MJN, MSPN, PAW (MN); MTN (MS); MSN, WFN (MO); NLEPTN, NJN, NSN, PVTEN (NJ); NMRN (NM); NLI, NYS (NY); NCNN (NC); BNR, OSSBN (OH); EPA, EPEPTN, PFTN, WPA (PA); IN, TNN (TN); TTN (TX); BUN (UT); VRN, VSBN (VA); NSN, PSN (WA); WVPN (WV); BEN (WI); APSN (AB); MTN (MB); GBN, OPN, OQN (ON); WQV/UH (PQ).

Transcontinental Corps. A TCC Eastern certificate has been issued to W8IBX, W6RSY, W7BQ and W0LO have received TCC Pacific certificates this month.

Area	Functions%	Out-of-Net		
		Traffic	Traffic	
Eastern	118	90.0	1850	658
Central	93	95.6	1086	519
Pacific	124	92.7	1564	795
Summary	335	92.7	4500	1972

The TCC roster: Eastern Area (W3EML, Dir.) - W1s BJG E1J NJM OYV YNE, W2s FR GKZ, K2ETK, WA2ICU, WB2s LZN RKK, W3EML, W4UO, K4s KNP VDL, W5s IBX PMJ RYP VDA/4, K8KMO, WA8PIM, Central Area (W0LUX, Dir.) - W4OGG, WA4WWT, WB4s KPE YCY, W5s OLI MI SBM, K6KCB/5, W6s CXY DND, W7s HI INH LCX ZHN, W8s ABM DDA, W9s IAW MLE, Pacific Area (W6VNO, Dir.) - W5RE, K5MAT, W6s BGF EOT IPW MLE MNY RSY



STOLEN EQUIPMENT

The following equipment was stolen from a car in San Francisco, California on June 4, 1972: Swan Cygnet, Model 270, serial no. 313022, and Collins microphone model MM2, serial no. 4294. Contact Saul A. Cohen, K4ACJ, 4524 Michigan Ave., Miami Beach, FL 33140.

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

WORKED ALL CONTINENTS AWARD

The IARU Worked All Continents award continues to enjoy high popularity. During 1971, 1846 awards were issued. Of these, 881 were endorsed for ssb, 12 for RTTY, 51 for 3.5 MHz and 4 for 1.8 MHz. Since the announcement of the slow-scan television endorsement, five certificates have been issued endorsed for SSTV.

Applicants from other than the U.S. and Canada are reminded that they should submit their applications to their local IARU society, *not* to IARU/ARRL headquarters. Only if there is no IARU society in their country, should applications be sent to ARRL. There is no charge for the award; however, please enclose a self-addressed envelope and sufficient postage for return of your cards.

In addition to those endorsements listed above, one for 50 MHz work also is available.

AUSTRALIAN NOTES

The Director-General of the Radio Branch, Postmaster-General's Department in Australia, has announced that holders of Limited (vhf) Licenses are now authorized to use satellite transponders which retransmit their two-meter signals in the ten meter band, such as the Amsat-Oscar C package to be launched later this year. This authorization also includes operation through terrestrial repeaters intended to familiarize users with satellite techniques.

The Director-General has also announced a change in the policy of that country regarding reciprocal operating permits. In the future, an amateur from any country on a temporary visit may apply for operating permission in Australia, whether or not the respective governments have concluded reciprocal agreements. Formal agreements are still necessary for the granting of operating permission to amateurs intending to take

up residence in Australia. As with all such operating permits, the regulations of the host country apply to the visiting amateur; for example, a U.S. amateur visiting Australia must observe the Australian power limitation of 150 watts, but he need not observe the U.S. phone subbands.

Amateurs intending to visit Australia may obtain further information on operating in that country from The Manager, *Wireless Institute of Australia*, P.O. Box 150, Toorak, Victoria 3142.

QSL BUREAU CHANGES

Several changes in international QSL bureaus have been made since the comprehensive listing appeared on page 84 of July *QST*. New addresses are:

Barbados: ARSB, Box 814 E, Bridgetown

Cuba: FRC, Apartado 1, Habana

Ethiopia: Telecomms Amateur Radio Club, Box 1047, Addis Ababa

Finland: SRAL, P.O. Box 306, 00101 Helsinki 10

Germany: DARC Amateurfunk-Zentrum, Lindenallee 6, P.O.Box 1155, D3501 Baunatal 1

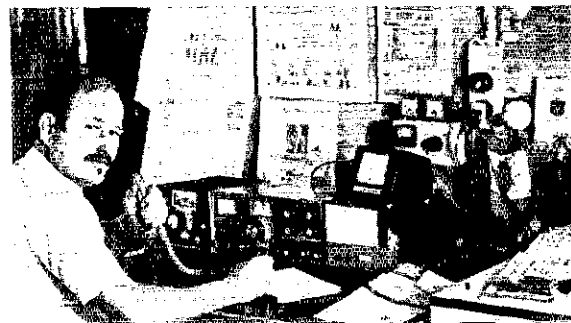
Wake Island: There is no longer a valid address for a Wake Island QSL bureau. QSLs may be sent direct to the stations contacted.

All IARU societies and others are requested to notify ARRL of any changes in the addresses of their QSL bureaus.

RECIPROCAL OPERATION IN VENEZUELA

The Ministry of Communications of Venezuela has announced that it will issue no authorizations to operate from Aves Island (YVØ) to other than Venezuelan citizens. Amateurs from the U.S., Canada, and Costa Rica may obtain permission to operate in other parts of the country. Further information may be obtained from *Radio Club Venezolano*, P.O. Box 2285, Caracas, Venezuela. [QST]

Bottom left: Worked All Continents applications are processed by IARU societies for amateurs in their countries. REF awards manager Marcel, F9MD is responsible for checking cards submitted by applicants in France. Bottom right: The triennial conference of the IARU Region 1 Division was the occasion for this gathering of IARU officials. Shown enjoying the Scheveningen sunshine are Region 2 Chairman XE1CCP; PAØDD, the new Chairman of Region 1; IARU President WØDX; and retiring Region 1 Chairman SM5ZD. August *QST* contained a summary of the events of the conference.



Happenings of the Month

HAM GETS ZONING CHANGED

From time to time, amateurs' penchant for towers to support antennas brings them up against the town fathers. Through patient, polite persistence, it is possible to change unfavorable rules or alter the viewpoints of local officials in many cases.

One recent success story in that respect was in Marilla, Erie County, New York. Kenneth R. Palmer, K2FJ, ran up against a new ordinance adopted in November 1971 which limited "flagpoles, antennae or aerials" to 20 feet above the rooftop, when mounted thereon, and otherwise to the height limits for buildings.

In March, he met with the Zoning-Planning Board and offered some new language, together with some reasons for change and the experiences of other municipalities gleaned from the ARRL "Legal Kit." He was joined by WA2MRZ and WA2GRP, who also supported the amendment.

In July, the following language was adopted:

Section 3-45 Height Exceptions — The height limitations of this ordinance shall not apply to:

- A) Chimneys, spires, belfrys, roof water tanks and farm silos.
- B) Antennas and/or towers used in the following transmitting services and in conformance with the State or County regulations relating thereto:
 - 1) Amateur Radio
 - 2) Business Radio
 - 3) Citizens Radio Class A
 - 4) Civil Defense Radio

- C) Flag poles, fm, TV and Class B, C, and D citizens radio antenna or aerials located on a building and extending not more than 20 feet above the highest point on the roof of such building.

There is, accordingly, no limit on antenna height for amateurs in this community. Our congratulations to K2FJ et al!

FCC WARNS ABOUT PATCHES

Last month *QST* mentioned briefly FCC's warning to amateurs generally about misuse of phone patches, conventional and autopatch. Here is the text of the public notice:

PUBLIC NOTICE Federal Communications Commission

August 4, 1972

AMATEUR LICENSEES ARE WARNED AGAINST IMPROPER USE OF THEIR STATIONS IN HANDLING COMMERCIAL TRAFFIC

The Commission has received recent evidence that a number of amateur licensees are engaged in handling business communications directly and indirectly involved in commercial operations. These communications are conducted on both the High Frequency bands, and in particular, of late, the VHF bands. In the former, manually operated phone-patch equipment usually is utilized. In the latter, repeaters using "auto-patch" equipment have been used on a widespread basis for interconnection with the commercial telephone system. There has been tremendous growth of amateur repeater stations over the past few years. This has enabled amateur VHF communication from automobiles over a large area of the country. An individual in a moving vehicle capable of accessing a repeater equipped for "Auto-patch" operation may easily communicate with practically anyone having a telephone.

Use of interconnection equipment is not prohibited in Part 97 of the Rules. Automatic "auto-patch" equipment is being used increasingly by VHF repeater stations. There is evidence that this type of operation encourages the handling of commercial communications, which are not permissible in the Amateur Service. The Commission is greatly concerned that such operation may seriously jeopardize the evolutionary development of the Amateur Service in accordance with its "charter" contained in Section 97.1 of the Rules. Augmentation of the value of the Amateur Service as a "voluntary non-commercial communication service" must not be brought into question as a result of amateurs' handling commercial traffic.

NEW RULES FOR ALIENS

Formalizing the procedures which have been followed since last year, FCC has adopted a new Subpart H to the amateur rules providing for the issuance of licenses to future citizens. At the same time, FCC adopted a new Form 610-C which is to be used in conjunction with the regular Form 610 in applying to the FCC office in Gettysburg for a license. After the paperwork has been cleared through FCC, the applicant will take the normal examination at an FCC office or before a volunteer examiner as appropriate to the class of license being sought. An application fee of \$9 is required for every class of license except Novice. The text follows:

Dr. Karl Kopetzky, K9AQJ (left), secretary of the Chicago Area Radio Club Council presents two volumes of the ARRL Handbook to Mr. Ted Balcom, Ass't Librarian of the Elmhurst, Ill. public library, in memory of the late Ray P. Birren, W9MSG, past president of the Council. The Council comprises 51 Clubs representing 3500 hams.

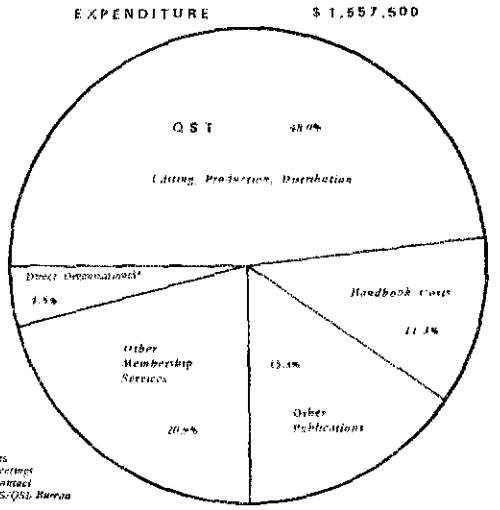
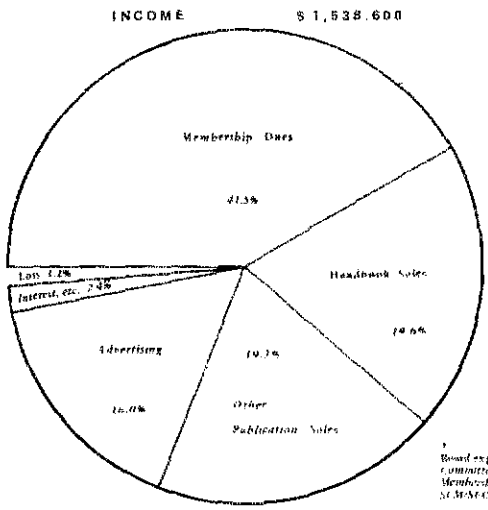




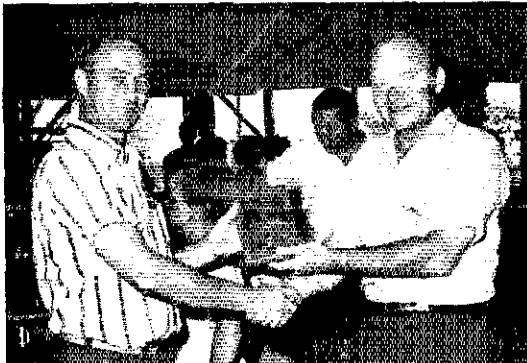
Two amateurs recently were cited by the Minnesota Governor's Commission on Employment of Handicapped Persons. Minnesota Attorney General Warren Spannaus, left, presents certificates to Leon Hoke, WØRQO, personnel management specialist at Duluth Air Force Base and to Felton S. "Doc" Jenkins, KØZZR, who was cited for his work with Viet Nam veterans and with the Handi-Hams of Rochester. (righthand photo).

Section 97.401 Basis, purpose and scope. (a) The rules in this Subpart are based on and are applicable solely to those provisions of Section 303(1) (3) and 310(a) of the Communications Act of 1934, as amended (see Public Law 92-81, 85 Stat. and 78 Stat. 202) whereby certain aliens admitted to the United States for permanent residence should be eligible to operate amateur radio stations and to hold licenses for their stations. (b) The purpose of this Subpart is to implement Public Law 92-81 by prescribing the rules under which an alien, who is a permanent resident of the United States and has filed a Declaration of Intention with a state or federal court may operate an amateur radio station in the United States.

Section 97.403 License required. (a) Before an alien, under Public Law 92-81, may operate an amateur radio station in the United States under the provisions of Sections 303(1) (3) and 310(a) of the Communications Act of 1934, as amended, he must obtain a license for such operation from the Federal Communications Commission. A license for such operation shall be issued only to an alien admitted to the United States for permanent residence who has filed under Section 334(f) of the Immigration and Nationality Act (8 U.S.C. 1445(f)) a Declaration of Intention to become a citizen of the United States and has successfully completed an examination pursuant to Section 97.29 of this Part.



Where the League's money comes from and how it is spent are summarized in this traditional chart form. Copies of the full operating statement and balance sheet are available as always to members and affiliated clubs on request. The Board — with Finance Committee coordination — requested publication of this chart so that the League's financial picture would have wider exposure to the membership.



For conducting theory and code classes, and assisting in numerous tower and antenna installations, Charles Wagner, WA9PSG (left), was named "Amateur of the Year" by the St. Louis Amateur Radio Club. Prexy W0KC here makes the presentation at the Zero-Beaters hamfest in Washington, Mo.

K2FS was K2SXV
W2LF was W2KHK
K4PM was W0MCK

Sorry, gentlemen!

FCC DENIES RULEMAKING REQUESTS

FCC has turned down four requests for rule-making filed by individuals:

RM-1520, by William A. Tynan, W3KMY/W4KM, September 11, 1969. It requested that the restricted portion of 50 MHz be divided, 50.00-50.05 and 50.10-50.15 for Advanced and Extra only; 50.05-50.10 (A-1 only) and 50.15-54 MHz for Technicians and higher. Other actions of FCC in respect to phase 2 of incentive licensing and developments since then render the change unnecessary in the Commission's view.

RM-1830, by George Puzzuole, June 25, 1971. It requested change of the name of the amateur license to "Radioman license." The Commission said the petitioner had not shown that a real problem existed.

RM-1877, by Ray R. Dopmeyer, November 11, 1971. This petition would have prohibited by regulation the delivery of third-party messages by collect telephone call. FCC said this idea was beyond the scope of the amateur rules, and suggested that the simple solution to any problem in this respect would be refusal to accept such calls.

RM-1907, by Paul T. Atkins, WB2OZW, January 19, 1972. Part of this petition claimed that ssb and sstv were incompatible and that the latter should be moved to the high end of the band or at least to the high end of the Advanced/Extra segment. FCC pointed out that there should be no more of a compatibility problem between an ssb station and an sstv station than between two ssb stations or two on sstv. Further, FCC said that frequency planning and coordination by amateur operators themselves can result in the best spectrum utilization appropriate to the service. The second portion of this request suggested that Extra Class licensees not yet eligible for a one-by-two letter call (e.g., W6XX) might receive a two-by-two letter call (e.g., WB6XX). The FCC action did not mention this request; presumably it remains on file for later determination.

FCC PROPOSES RELAXED RC RULES

The Federal Communications Commission has proposed relaxing the rules applying to radio control of models by amateurs, along lines suggested by the Academy of Model Aeronautics in

The November 1971 QST article, "A WWVL Receiver," brought Cover Plaque honors to Eugene Pearson, W3QY, center. Making the presentation are Atlantic Director Harry A. McConaghy, W3SW (right) and Assistant Director Harry Stern, W3CL.

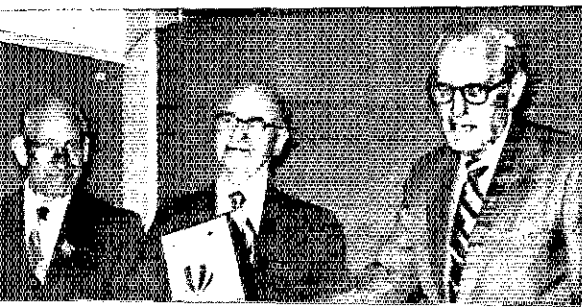
Section 97.405 Application for license. (a) Application for license shall be made on FCC Forms 610 and 610-C. Both forms may be obtained from the Commission's Washington, D.C. office or any of the Commission's field offices. (b) The application forms shall be completed in full in English and signed by the applicant. The Commission may require the applicant to file additional information. Both applications must be filed in accordance with the instructions contained in Sections 97.11 and 97.41 of this Part.

Section 97.407 Issuance, modification or cancellation of license. (a) The Commission may issue a license under such conditions, restrictions and terms as it deems appropriate. (b) At any time the Commission may, in its discretion, modify or cancel any license issued under this Subpart. In this event, the licensee will be notified of the Commission's action by letter.

Section 97.409 Operating conditions. (a) The alien applicant may not under any circumstances begin operation until he has received a license issued by the Commission. (b) Except as stated in any condition the operational rules and procedure contained in Subparts A through E of this part shall be applicable. (c) When the licensee under this Subpart becomes a citizen of the United States it will not be necessary for him to notify the Commission of this fact until such time as the licensee desires to renew or modify his license. At the time the licensee becomes a citizen of the United States all procedural rights shall attach to his license and the Communications Act and Administrative Procedure Act shall be applicable regarding any request or application for, or modification, suspension or cancellation of, any such license.

"WHO THE DEVIL" - OOPS!

Gremlins crept into the editorial rooms when we were working on the August installment of "Who the Devil is Who?" The correct version:



RM-1951. Deadline for comment was set at September 29, 1972 with "reply comments" (answers to the comments of others) due by October 10; it is, however, possible that an extension of time to file comments will have been given, or that late comments will be accepted if justification is presented. The text of the Notice follows:

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

In the Matter of
Amendment of Part 97 of the Rules
insofar as they pertain to the Docket No. 19572
radio control of remote model
craft and vehicles

NOTICE OF PROPOSED RULE MAKING

1. Notice is hereby given in the above captioned matter.

2. The Commission has under consideration a petition (RM-1951) filed by the Academy of Model Aeronautics (AMA). Petitioner requests relief in the rules governing the Amateur Radio Service through amendments insofar as they pertain to the operation of model aircraft by radio remote control, and states a desire for comparability between the rules governing like-type operation in the Amateur Radio Service and the Citizens Radio Service.

3. Section 97.89 of the Rules provides for the radio control of remote objects in the Amateur Radio Service. Additionally, Section 97.61 provides frequency bands and emissions suitable for radio control operation. Petitioner points out how compliance with other rules applicable to all amateur radio stations can be awkward for operating model aircraft by radio remote control. These include logging requirements, station identification requirements, and notification to the Commission when in portable operation for extended periods. A concern is also expressed that transmitted control signals could be interpreted as codes or ciphers prohibited by Section 97.117.

4. The Citizens Radio Service provides for the control of remote objects on six specific frequencies within the 26.995 - 27.255 MHz frequency segment; for the radio remote control of any model used for hobby purposes on three frequencies between 72.16 - 72.96 MHz; and for the radio remote control of aircraft models only, on four frequencies between 72.08 - 75.64 MHz. Licenses granted in the Citizens Radio Service do not authorize certain privileges related to this matter that are available to amateurs. For instance, amateurs may design, construct, and adjust their transmitters, and type acceptance by the Commission is not required as some classes of equipment in the Citizen Radio Service.

5. Petitioner reports "... those aircraft modelers who also hold licenses in the Amateur Radio Service operate model aircraft on frequencies in the 50 MHz and higher bands. AMA encourages the use of the amateur bands by qualified members because it relieves congestion on the heavily used Class C frequencies. However, model aircraft radio control operations on the amateur frequencies are more burdensome to the modelers than in the Citizens Radio Service because, unlike the latter service, the amateur rules are not tailored to accommodate such operations."

6. We are sympathetic to the petitioner's requests, and we propose amendments incorporating special provisions into the rules exempting certain low power amateur radio stations used only for transmitting signals for the control of remote models of all types. Station identification, logging and portable operation would be simplified. An amateur transmitter operating under these special provisions would be required to bear a suitable identifying marker.

7. Petitioner requests relief for operation with transmitters having a final amplifier input power level of less than three watts. Section 95.43 of the Citizens Radio Service Rules and Regulations permit a maximum of 5 watts average input power or 4 watts average output power for similar operation. However, the transmitter power levels actually required in practice should be considerably lower since, presumably, the remote model must be in sight of the control operator at all times. For this reason we are proposing a maximum mean power output of one watt for transmitters qualifying for operation under these special provisions.

8. Petitioner also requests the special provisions equally apply to transmissions used for telemetering purposes, but does not furnish details and rationale for this request. Interested parties having information and suggestions in this area are requested to submit same to the Commission for consideration.

9. The specific rule changes proposed herein are set forth in the attached Appendix. Authority for these proposed amendments is contained in Sections 4(i) and 303 of the Communications Act of 1934, as amended.

10. Pursuant to applicable procedures set forth in Section 1.415 of the Commission's Rules, interested persons may file comments on or before September 29, 1972, and reply comments on or before October 10, 1972. In accordance with the provisions of Section 1.419(b) of the Commission's Rules, an original and fourteen copies of all statements, briefs, and comments filed shall be furnished the Commission. All relevant and timely comments and reply comments will be considered by the Commission before final action is taken. The Commission may also take into account other relevant information before it, in addition to specific comments invited by this notice. Responses will be available for public inspection during regular business hours in the Commission's Broadcast and Docket Reference Room at its Headquarters in Washington, D. C.

FEDERAL COMMUNICATIONS COMMISSION
Ben F. Waple, Secretary

APPENDIX

Part 97 of the Commission's Rules is amended as follows:

1. Section 97.99 and undesignated headnote "SPECIAL PROVISIONS" are added to read as follows:

SPECIAL PROVISIONS

§97.99 Stations used only for radio control of remote model crafts and vehicles.

An amateur transmitter when used for the purpose of transmitting radio signals intended only for the control of a remote model craft or vehicle and having mean output power not exceeding one watt may be operated under the special provisions of this section provided an executed Transmitter Identification Card (FCC Form 452-C) or a plate made of a durable substance indicating the station call sign and licensee's name and address is affixed to the transmitter.

(a) Station identification is not required for transmissions directed only to a remote model craft or vehicle.

(b) Transmissions contain only control signals directed only to a remote model craft or vehicle are not considered to be codes or ciphers in the context of the meaning of §97.117.

(c) Notice of operation away from authorized location is not required where the portable or mobile operation consists entirely of transmissions directed only to a remote model craft or vehicle.

(d) Station logs need not indicate the times of commencing and terminating each transmission or series of transmissions.

2. In §97.101, the headnote is amended to read as follows:

§97.101 Mobile stations aboard ships or aircraft.

New Repeater Rules!

Extensive Amendments Also Affect Amateurs Generally

THE FEDERAL COMMUNICATIONS COMMISSION has adopted extensive changes in the rules governing the Amateur Radio Service, to provide for the licensing of repeater stations and to make a number of other changes, particularly in the area of station identification, portable/mobile operation, and station log-keeping. The effective date is October 17, 1972.

The extensive text changes and additions are somewhat complicated and will require careful study by each FCC licensee, whether or not he is engaged in repeater operation. In general they represent liberalization of restrictions. FCC seems to have abandoned many of the unpopular features of its Notice of Proposed Rulemaking in Docket 18803 dated February 26, 1970. Perhaps as a "trade-off," the Commission will require much more information from applicants for repeaters (and, to an extent, for certain other special stations) in order to verify that the applicant has given careful consideration to the planning and design of his station, addressing particular attention to the geographical area to be covered.

What follows is a summary of the changes in our rules, prepared after the opportunity of only a few hours of study of the 25-page document. There appear to be some grey areas, and even a conflict or two; thus the following is subject to later change or clarification. Future issues of *QST* undoubtedly will have further comment. In what follows, terms in bold face are new and are among the many new definitions in revised Section 97.3.

Changes Affecting All Amateurs

Primary station license for all.

There are several new classifications of station, according to location and use. In the future, every operator must have a **primary station license**, so that every amateur will have a call sign. Normally, the primary station license will be issued for the amateur's home address. However, those amateurs not having a permanent address (or those whose permanent address is outside FCC's jurisdiction) should furnish the address of a relative or friend who will receive and forward mail to the licensee. There are **additional station privileges**, some of which may be combined with a primary station license: Repeater station, Control station, Auxiliary link station and Secondary station. At this point we suggest you have a look at the various definitions in Section 97.3. Repeater stations will have a special call sign beginning with WR, and will

not be combined with another station license. A secondary station is one at a vacation home, place of business, etc., up to now described as an additional station; the latter term now will include all those special uses we mentioned above.

Which call to sign.

In these new rules, the Commission returns (hooray, hooray!) to a tradition in amateur radio it abandoned a few years back. Every permanent collection of radio apparatus constituting an "amateur radio station" must have its own license, and its call sign will be used whenever the station is on the air. In other words, when you visit W1XYZ you sign his call, not your own as portable. Presumably, this also means — as it did in years past — that an amateur can't check out the station of a future ham under the guise of "operating portable."

There's another important change. If the visiting (control) operator holds a higher class of operator license than the station licensee (or trustee), he may if he wishes use the subband privileges to which he personally is entitled, but must then sign a dual call. 'Til now, a visiting amateur could not operate the station beyond its owner's class of privileges. Three examples under the new look:

1) WN6ABC operates W7XC — uses Novice bands, crystal control, telegraph, 75 watts or less input, and signs W7XC.

2) W7XC returns the visit; operates WN6ABC; uses Novice privileges, signs WN6ABC.

3) W7XC visits again; this time wants to use phone on 3820 kHz; now he signs WN6ABC/W7XC.

Both the station licensee and the control operator will be responsible for the proper operation of the station.

Visitors not FCC-licensed

Under the new rules, the licensee may permit any person to participate in amateur radio-communication from his station, provided that a control operator is present and continuously monitors the radiocommunication to ensure compliance with the rules. The specific mention of radioteletype and radiotelephone in this connection has disappeared, along with the words requiring the licensed operator to throw the switches and sign off. Accordingly, it should be possible, for instance, to let a visiting JA, or perhaps a shipboard operator, work cw from your

station, when a U.S. ham is present as control operator. Visiting XEs and VEs, for example, can probably sit in on your club's FD operations, too, if the logging operator meets the qualifications of control operator to supervise these QSOs.

Technicians get more space.

Technician Class licenses will be able to operate in 145.0-148.0 MHz. Obviously, this change is intended mainly to facilitate expanded repeater operation; however, it would also apply to other operations by Techs as well. (So far, this is the only portion of the 1969 League request for expanding Technician Class privileges to the entire band to be granted by FCC.)

Notification of portable and mobile

The burden of notifying district FCC engineers on portable or mobile journeys has been lessened considerably. All amateur stations (except military recreation stations and Auxiliary link stations) may operate as portables or mobiles. Whenever an amateur station is (or is likely to be) in portable operation at a single location for a period exceeding 15 days, the licensee will give advance written notice of such operation to the designated FCC engineer-in-charge. But ordinarily, a mobile station is no longer required to notify FCC in advance of an extended trip! (There is some indication, though it is not spelled out, that a mobile station operating out of a single temporary location more than a hundred miles from home and for more than 15 days without returning home — e.g., a college student at school for a semester — should continue to notify as before.)

The required notice is a bit shorter than before; thus, after the effective date of these changes you should secure revised ARRL Forms S-43s rather than using the ones you've stockpiled.

Logging simplified.

A written log must be maintained for each amateur radio station. The log needs: call sign and signature of the licensee; the signature of the control operator on duty and the call sign of his primary station, if he is other than the station licensee; the location of the station (mobile stations enter "Local" when within 100 miles of home and otherwise, the locations of the first and last QSO each day); the input power; type of emission and frequency or subband in use. These items need be entered only once until there is a change.

Other entries for all stations which may be recorded in a form other than written but which can readily be transcribed by the licensee into written form: dates of operation; names of persons other than the control operator using the station either directly or indirectly, as for instance by phone patch (but repeaters don't need to do this!); a notation of third party messages — apparently again including phone patch traffic — including names of participants and a brief description of the content; the calls of each station actually contacted (mobiles and repeaters are exempt from

this! Control stations enter the call of each station in the control link, and an auxiliary link station enters the call of its associated station); all stations shall enter the times the station is put into or taken out of, service. Stations other than mobiles, repeaters, control stations and auxiliary link stations should also enter the times of commencing and terminating each exchange of radiocommunication.

In other words, a large part of your daily log — even for DX chasing in the hf bands — can simply be talked onto a tape. Mobiles no longer need to record the calls of hams they've worked. And as we see it, repeater operators no longer need their recorders! The requirement for technical maintenance logs, proposed for repeaters back in 1970, was not adopted. Wisely, FCC decided that the licensee is fully responsible for the technical performance of the station; as such, he will perform whatever maintenance and repair is necessary to keep it legal. But all licensees must keep on hand all components of their logs for a year, written or recorded.

Miscellaneous.

Where mechanical devices are used to send the call sign of a station in International Morse Code, the speed will not exceed 20 words per minute. Though this is primarily for repeater operators, it could apply also to RITTY stations and contesters.

For years the Communications Act of 1934 as amended has contained the caution that only the minimum power required for communication should be used. This is now mentioned in Section 97.67 (b) as well. It applies to all of us!

The "banned list" of countries who don't want us communicating with their amateurs is now specifically mentioned in the amateur rules: Section 97.89 (a) (1) permits communication by amateurs "with other amateur stations, excepting those prohibited by Appendix 2." Unfortunately perhaps, an amateur still has the responsibility for keeping up to date with the latest FCC bulletin on the subject of banned countries; no list actually appears in the rules.

Amateurs are again warned that abuses of phone patches, manual or automatic, for transmission of commercial or business traffic, may lead to rules designed to curb abuses. Self-policing is far better in this area, fellows; let's all watch this in transmissions from our own stations. Incidentally, FCC has beefed up its definition of permissible amateur communications thusly: "Amateur radiocommunication. Non-commercial radiocommunication by or among amateur radio stations solely with a personal aim and without pecuniary or business interest."

Changes Applying to Repeaters and Remotes

Repeater frequencies.

Repeaters may operate anywhere in the following segments of the bands:

52.0 — 54.0 MHz
146.0 — 148.0 MHz
222.0 — 225.0 MHz
442.0 — 450.0 MHz

and on any amateur frequency above 1215 MHz. In addition, the frequency band 29.5-29.7 MHz may be authorized upon a special showing of need for repeater station operation in this band for intra-community amateur radio communications. FCC's 1970 proposals for spot frequencies and for total banning of repeaters below 50 MHz were thus greatly modified as a result of amateur comments in the Docket, together with changed views among FCC staff.

Repeater power.

All throughout the Report and Order there is emphasis on repeaters being used for intra-community work. The Commission feels strongly that each repeater should exist primarily to serve mobile and hand-held portables in a local area. Especially, FCC feels that transmission of signals from a repeater station over a distance many times greater than the received-signal coverage would violate Section 324 of the Communications Act of 1934 as amended relative to using only the power required for the communications in progress. For these reasons, FCC has adopted effective radiated power limitations for repeaters which are tied to the antenna height above average terrain at each site. A chart showing these erp limits appears in the text below, as item 9 of the appendix; they range from 25 watts erp on 52 MHz for an antenna more than 1,000 feet above terrain to 800 watts erp on 146 MHz for an antenna less than 50 feet high and on 442 MHz for an antenna between 100 and 1000 feet high. The figures in the chart for 146 also apply to 222 MHz, we understand.

Licensing of repeaters.

Detailed information will be required from applicants for repeater licenses, as set forth specifically in new Section 97.41, particularly subparagraph (f). Present licensees may continue to operate under current authorizations until June 30, 1973 or until the license expires, whichever comes first. After that time, a license specifically for the repeater will be required; its callsign will begin with the letters WR. Applicants must hold Technician or higher operator license. FCC offers to help with filling out a complex application; write the Chief, Amateur and Citizens Radio Division, FCC, Washington, 20054.

Repeater control points.

Licensees of repeaters will be able to include in the application names of other amateurs who can operate control stations, and auxiliary link stations where the terrain dictates it. A system network diagram showing each controlling point must be included with the application. Control stations may be deleted by letter, but the adding of new ones requires modification of the license through formal application on FCC Form 610 or Form 610-B, the latter for club and military recreation stations.

Happily, FCC will allow remote control of a repeater from a portable or mobile, provided that all of the monitoring and control functions can be

satisfactorily performed. The receiver input frequency of the repeater can't be used for primary control, however. FCC was not ready to go to automatic control of repeaters; monitoring will be necessary, with automatic QRT in three minutes if control link fails.

Access tones.

Since primary control is to be on a frequency other than the repeater receiver frequency, coded access won't be required for users; it is, however, permitted where desired.

Linking of repeaters.

Since intra-community work is intended, only two repeaters may be linked together, except for emergencies and brief tests of emergency capability. No crossband or multiband repeater will be permitted, but a repeater may operate on more than one band if the input and output of a particular communication occur on frequencies within the same band.

Repeater ID.

The repeater should identify itself automatically while in use every five minutes by either phone or International Morse Code, with modulation enough to be heard over the conversation in progress.

Remote control in general.

There are new rules governing remote control of stations, both repeaters and others. Section 97.41 describes the application procedures for each.

Only the simplest on-premises remote control systems using wire and mechanical control will be free of licensing. The more complex varieties of wire remote control (as well as radio remote control) will require licensing, after expiration of the current authorization.

Identification of remote components.

A new rule requires that a durable tag be affixed to the antenna or feedline or most of the remotely-controlled transmitter marked with the station call sign, the name of the licensee and other information so that the control operator can be contacted by Commission personnel in event of interference to other radio services.

The FCC text follows:

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	Docket No. 18803
Amendment of Part 97 of the Commission's Rules concerning the licensing and operation of Repeater stations in the Amateur Radio Service	RM-388, RM-1087 RM-1209, RM-1542 RM-1725

REPORT AND ORDER

Adopted: August 29, 1972. Released: Sept. 8, 1972

1. The Commission adopted a Notice of Proposed Rule Making in the above entitled matter on February 26, 1970, which was published in the Federal Register on March 5, 1970, (35 FR 4138). Interested parties were invited to file comments on or before May 15, 1970, and reply comments on or before June 1, 1970. The time for filing comments and reply comments was subsequently extended to June 15, 1970, and July 7, 1970, respectively.

2. The Notice proposed to specifically provide rules for the operation of amateur stations which receive and automatically repeat the radio signals of other amateur stations. Although the rules have not specifically referred to amateur repeater stations, per se, the Commission has licensed hundreds of repeater stations to operate under the rules applicable to amateur radio stations in general. We are of the opinion that this activity is in keeping with the fundamental purpose of the Amateur Radio Service expressed in the principles set forth in Section 97.1 of the Rules, particularly with respect to paragraphs 97.1(b) and (c):

"(b) Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art.

(c) Encouragement and improvement of the amateur radio service through rules which provide for advancing skills in both the communication and technical phases of the art."

The high quality of the technical content of the comments received is evidence that the basis and purpose of this Service are being served by this amateur repeater activity.

3. Both formal and informal comments were received from numerous individuals and amateur radio organizations. Since the comments received were so numerous, it is not practicable to discuss each herein. However, every comment has been given careful consideration by the Commission. Many include statements describing the value of repeater stations to the Service and predict further technological developments and increasing benefits if their usage is permitted to continue unhampered by the imposition of unnecessary restrictions. Generally, they heavily favor the adoption of specific rules governing the licensing and operation of repeater stations, but not necessarily in the manner proposed in the Notice.

4. The Commission finds that amateur terrestrial repeater stations are useful for increasing the reliable range of VHF and UHF¹ vehicular and hand-held mobile stations in conducting intra-community amateur radio communication, and for effecting emergency radio communication which possibly could not otherwise be conducted on the amateur bands. Again, this is in keeping with Section 97.1 of the Rules:

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

Accordingly, we believe that rules to provide for the operation of repeater stations are desirable. It is apparent that repeater stations have become a significant part of the Service. There is no reason to expect their growing popularity to quickly diminish, nor is there reason to anticipate the innovative skills that amateur operators have

demonstrated in designing and planning repeater systems to suddenly dissipate. We would prefer to have this activity continue in an orderly fashion, in a spirit of cooperation among amateur operators. Just as it was not possible to foresee the interest in repeater stations, it is similarly impossible to fully predict the eventual products of the amateurs' imaginative application of the electronic and radio arts. For this reason, the rules adopted herein are intended to introduce provisions into the rules which permit the flexibility needed in the Service, and to provide the licensing framework for accommodating future technical and operational advancements in amateur radio communication. Despite our efforts to forecast future needs and provide appropriate rules, we recognize that in all probability further advancements in remote control and automatic control technology will necessitate additional amendments. We urge interested parties having information and suggestions in these areas to submit them to the Commission for consideration.

5. Beginning July 1, 1973, a separate station license will be required for every amateur repeater station regardless of when it was first licensed. Applications for new, modified or renewed repeater station licenses must meet the new requirements upon the effective date of the new rules. These stations will be identified by a call sign having the distinctive prefix WR. In order to qualify for a repeater station license, the applicant must be at least a Technician Class licensee and must submit certain data regarding the technical and operational provisions included in his proposed station. The requirements for this showing are intended to verify that the applicant has given careful consideration to the planning and design of his repeater station, addressing particular attention to the geographical area to be covered. We desire that the applicant for a repeater station license predict by analysis the approximate coverage area needed for intra-community amateur radio communication, using the desired mode of emission. After the repeater is licensed and in operation, the licensee should verify his assumptions of community radio communication requirements and his prediction of the station coverage through testing and operating experience, and make appropriate adjustments based thereon. The foregoing approach should be accomplished giving due consideration to minimizing harmful interference to other amateur radio operators in the same or nearby communities desiring to use the same frequency, or frequency bands.

6. Upon reviewing the comments, and in consideration of the increasing complexity of systems described in applications received by the Commission for remotely controlled repeater stations, we recognize the need emerging in the Service for a licensing structure that facilitates combining several amateur radio stations into a radio communication system. It has not been uncommon to receive an application for a proposed "station" having fifty or more remote control points and a half-dozen remote receiving sites which involve a multiplicity of transmitters and frequencies. This is clearly a complex system comprised of special purpose stations, each performing one or more functions in a network. A thorough review of this matter has been undertaken, and the resulting Commission determination is reflected in the amended rules. The review indicated the difficulty in providing operating and licensing rules for the Service without taking into account the functions

¹ Article 2, Section III of the I.T.U. Radio Regulations defines VHF as Band 8, 30-300 MHz (Metric waves) and UHF as Band 9, 300-3000 MHz (Decimetric waves).

performed by various types of specialized amateur radio stations. Accordingly, we are adopting a structure of definitions and station privileges related to the major functions performed by such specialized stations. Under this concept, and with the one exception of repeater stations, a single station may be licensed for one or more special purpose privileges according to the functions to be performed by that station. This permits a licensee to combine several stations into a system. We feel this "building block" approach is consistent with the increasing complexity of amateur system networks, will provide the necessary flexibility, and at the same time, retain the means for the Commission to exercise its requisite obligations.

7. Every amateur radio operator is affected by the adoption of this licensing structure to some degree. For example, an amateur's license which now specifies the location of his station and indicates his operator privileges, i.e., Technician, General, etc., will also include the privileges authorized for his station. As a minimum, the station privilege would be "primary station." Every operator must have a primary station. This is necessary so that every amateur will have a call sign with which he may identify his radio communication, if required. Normally, the primary station license will be issued for the amateur's home address. However, those amateurs not having a permanent address within the United States, its territories and possessions should furnish the address of a relative or friend who will receive and forward mail to the licensee. Every licensee will be accountable for mail sent to the address of record given for a station license. Therefore, every amateur must have a license for a primary station, and this license will also authorize his operating privileges. The license may also contain additional station privileges for the same station. Licensees other than those desiring remote control or repeater station privileges will have their licenses updated upon renewal.

8. The various kinds of additional station privileges, some of which may be combined with a primary station license, are: repeater station, control station, auxiliary link station and secondary station. Repeater station privileges may not be combined with another station license because of their distinctive call sign assignment. A control station privilege authorizes the station to exercise control over a remotely controlled station. An auxiliary link station authorizes a station to relay a radio signal point-to-point within the same system network. Either or both may be combined with a primary station for the same location. A secondary station license is for a station at a different location, such as a vacation home, and is obviously a license issued in addition to the primary license. These various privileges may be added to an existing license by modification, or at renewal, upon submittal of the appropriate information.

9. The rules for remote control proposed in the Notice have been relaxed in three major areas. First, the control operator may be any qualified amateur designated by the licensee. Secondly, provisions are adopted for any repeater station authorized to be operated by radio remote control to also be so operated from a portable or mobile station, provided all of the required monitoring and control functions can be satisfactorily performed, from either the authorized control point or from the mobile or portable control station. This will enable a licensee to make use of his own repeater station while he is operating mobile or

portable. Thirdly, since the comments frequently and persuasively mention terrain and other considerations which make necessary "multiple-hop" control links, we are deleting the proposed limit to a direct (single-hop) control link and providing for auxiliary link stations, which may be authorized for this and also for other point-to-point intermediate relay applications, such as a relay between a remote receiving site and a repeater station.

10. We have considered the advisability of adopting rules for control links based upon current amateur control link techniques, versus rules which would allow greater latitude. We find the latter approach to be more flexible and appropriate to the amateur service, but it requires a showing of the design and operational features of an applicant's proposed control system network. The applicant must submit a diagram showing the inter-relationship of all of the stations and control points in the system network configuration. The station license will list the control points and the control stations authorized to operate the remotely controlled station.

11. In the past, we have permitted a very broad interpretation of the term "wire" remote control as applied to Part 97 of the rules, including the use of commercial telephone lines and command signal techniques. This has exempted stations employing relatively sophisticated and sometimes questionable approaches in the design and operation of wire remote control links, from submitting information on their proposed station with their applications. Upon the effective date of this Report and Order, only stations having the most elementary form of interconnection comprised of electrical conductors directly between the transmitter and the control devices, and having all of the elements of the station located on the same premises, will be considered as not constituting remote control. Applicants proposing to use any other form of remote control must submit the information required by Section 97.41. Stations other than repeater stations now authorized to be operated by wire remote control and not in compliance with the licensing requirements of the amended rules may continue to operate under their present authorization until the expiration date of their current station license.

12. Restriction of repeater operation to specific portions of the amateur bands above 50 MHz has not been adopted as proposed in the Notice. Approximately one-half of the Amateur VHF bands and 8 MHz of the 420 MHz band is being authorized for repeater usage. The Commission is persuaded by the comments and by observation that regional and national frequency planning and coordination by amateur radio operators themselves can result in the best spectrum utilization appropriate to the service. However, we are prepared to reverse this decision should plans and their implementation not occur within a reasonable period. To solve the problem presented by Technician Class privileges in only one-half of the 146-148 MHz sub-band authorized for repeater operation, the Rules are amended to permit Technician Class licensees to also operate in the entire 145 to 148 MHz segment.

13. We are of the opinion that terrestrial repeater stations should be utilized only for intra-community radio communication and should not be used, directly or indirectly, as a means to circumvent the rules regarding authorized amateur operator privileges for the different classes. Repeating a lower class operator's radio signal from

one frequency band into another band having higher operator privilege requirements is unfair to those operators who have properly qualified for the higher requirements. For these reasons, we are persuaded to adopt the provisions of the Notice prohibiting multiband, crossband and linked repeater operation even where operator privileges would permit it. Similarly it is not in the interest of spectrum conservation to utilize crossband and multiband operation. Many comments argued against the proposed rule to prohibit linking repeaters. In weighing these arguments against the desire to conserve spectrum and to encourage the use of amateur terrestrial repeaters for intra-community coverage, we find that a majority of situations can be accommodated with a maximum of two linked repeaters. Therefore, two repeaters may be linked together, and under certain circumstances as provided for in Section 97.89(c), more than two.

14. As pointed out by a large number of respondents the changes proposed by the Notice for defining the maximum authorized transmitter power for an amateur station would affect a much broader segment of the Service than those pursuing an interest in repeaters. For that reason, action on this topic is postponed with the intention of making it the subject of a future rule-making proceeding as recommended in the comments submitted by the American Radio Relay League and others.

15. The proposed 600 watt input power limit on repeater transmitters is not being adopted herein as a means of regulating a reasonably balanced receive-to-transmit repeater coverage. A decision is made to incorporate into Section 97.67 the provisions of Section 324 of the Communications Act of 1934, as amended, to emphasize its particular applicability to amateur terrestrial repeater stations. We conclude that a repeater station which transmits a signal at many times the range over which it is capable of receiving would be in violation of the Act. In reviewing several frequency plans proposed for the VHF bands, we observe that a typical plan would allocate about one to two dozen frequency channel pairs per megahertz. With limited channels available, the possibility of interference between repeater stations in adjacent communities desiring to use the same frequencies must be considered. For this reason, limits are established for effective radiated power from a repeater station antenna, based upon the power normally required for reception by a typical vehicular mobile station over a nominal community coverage area. A major consideration in establishing these limits is the encouragement of the practice of achieving the desired coverage through the use of a low power transmitter in conjunction with an antenna located at an optimum height above average terrain. The operation of a control station or an auxiliary link station which does not use directional antennas in conjunction with low transmitter power to minimize the possibility of harmful interference is not considered good amateur practice, and will be carefully evaluated by the Commission if proposed.

16. As stated in the Notice, Section 310(b) of the Communications Act requires, in effect, that the licensee of a repeater station maintain supervision and control of both the technical and operational performance of his station. Although several of the comments addressed this topic, as do RM-1542 and RM-1725 filed by Mr. Ken W. Sessions, the Commission is not ready to make a

determination of rules for automatically controlled stations in the Service. We do not consider access to a repeater station controlled by the users via coded signals alone on the receiving frequency to be active supervisory control by the control operator. Such coded signals are permissible for secondary control but are not required.

17. Comments were received in response to the additions to Section 97.87 proposed in the Notice, correctly noting that the implications extend beyond that of properly identifying a repeater station. All stations would be affected. However, the proposal reflected the policy position then held by the Commission, and the comments prompt a review of the matter. The amended section is a means to accomplish two partially conflicting purposes: rapid identification of a station causing interference to another service, and identification of the operator in order to determine his class of license for verification of his privilege to operate within a restricted sub-band. Under the amended rules, a visiting operator must use the call sign of the station he is operating. Should his class of operator privilege exceed that of the station licensee, and should he desire to operate the section within the sub-bands available to him but not to the station licensee, he must identify with both the station call sign and his own. Provision for automatic identification of a repeater station by telephony as well as telegraphy is adopted. The requirement for repeater identification is designed to provide assurance that a short single transmission or a short exchange of transmissions will include at least one repeater station call sign transmission.

18. Received comments highly favor simplified logging. The section has been restructured and requires only a minimum of information to be recorded in written form. The proposed requirement for recording all installation, service or maintenance work in the station log is deleted. Although the use of such a routine is encouraged, we find that since the station licensee is responsible for the technical performance of the station, the procedure to be employed to meet this obligation is a matter of personal choice.

19. A new requirement is added for the identification of the antenna and/or transmission line associated with a remotely controlled transmitter in order to facilitate contacting the station licensee should the need arise -- a process which has been time consuming in some instances where the radiating antenna of a station in violation has been identified by radio location techniques. To minimize the prospect of interference to radio communication already in progress on a given frequency, the rules to require continuous monitoring of a remotely controlled transmitter are expanded to require continuous monitoring of the frequencies while in operation, which is good operating practice. Frequencies above 225 MHz used for remotely controlling a transmitter are exempted from the continuous monitoring requirement since the interference potential with UHF is much less than with VHF.

20. Section 97.89 has been reorganized editorially and the invitation to incorporate into the text a reference to Appendix 2 is taken. Numerous comments were concerned with the omission in the Notice of provisions for various test, control and experimental transmissions. The amended rule includes these provisions.

21. The Section containing definitions, †97.3, has been expanded to include those terms fre-

quently used in the amendments. They are defined in order to minimize possible ambiguities in the statement of the rules.

22. The rules adopted herein do not proscribe amateur radio stations, including repeaters, from being automatically interconnected to a telephone exchange system. Amateur licensees should be aware that rules governing that type of facility will be considered for other of the Commission's radio services in a separate proceeding. It has been brought to the Commission's attention that numerous violations of the Sub Part E of Part 97 of the Rules have taken place through the use of such interconnection, which facilitates communication from moving vehicles. Therefore, it may be necessary at some future date to examine in detail the current usage of "autopatch" facilities; and possibly restrict the use of such devices in the Amateur Radio Service. Pending the adoption of any such regulations, amateurs are warned that usage of such interconnecting devices must be limited to amateur radio communication and may not be used for any type of business communication.

23. These amendments shall become effective upon the date stated in Paragraph 25. Existing remotely controlled stations may continue to operate under their current authorizations until midnight local time June 30, 1973, or until the expiration date of their license, whichever occurs first. All new and renewed stations must comply with the rules as amended. Applications for all stations will continue to be filed on Forms 610 and 610-B, as appropriate. Parties desiring instructions for completing applications requiring additional showing may obtain same upon written request addressed to the Chief, Amateur and Citizens Division, Federal Communications Commission, Washington, D.C. 20554.

24. We find the attached amendments to the rules are necessary and desirable for the execution of the Commission's duties. Authority for adoption of these amendments is contained in Sections 4(i) and 303 of the Communications Act of 1934 as amended.

25. Accordingly, IT IS ORDERED, that effective October 17, 1972, Part 97 of the Commission's Rules IS AMENDED as set forth in the attached Appendix. IT IS FURTHER ORDERED, that in addition to RM-388, RM-1087 and RM-1209, the pending petitions of Mr. Ken W. Sessions, Jr., RM-1542, filed December 8, 1969, and RM-1725 filed December 7, 1970, have been fully considered and, to the extent that they are at variance with the rule changes adopted herein, they are DENIED.

26. IT IS FURTHER ORDERED that this proceeding IS TERMINATED.

FEDERAL COMMUNICATIONS COMMISSION

Ben F. Waple
Secretary

A P P E N D I X

1. Section 97.3 is revised to read as follows:

§97.3 Definitions

The following definitions are used in this part:

(a) *Amateur Radio Service.* A radiocommunication service of self-training, intercommunication and technical investigation carried on by amateur radio operators.

(b) *Amateur radiocommunication.* Non-commercial radiocommunication by or among

amateur radio stations solely with a personal aim and without pecuniary or business interest.

(c) *Amateur radio operator.* A person interested in radio technique solely with a personal aim and without pecuniary interest, holding a valid Federal Communications Commission license to operate amateur radio stations.

(d) *Amateur radio license.* The instrument of authorization issued by the Federal Communications Commission comprised of a station license, and in the case of the primary station, also incorporating an operator license.

Operator license. The instrument of operator authorization including the class of operator privileges.

Station license. The instrument of authorization for a radio station in the Amateur Radio Service.

(e) *Amateur radio station.* A station licensed in the Amateur Radio Service embracing necessary apparatus at a particular location used for amateur radiocommunication.

(f) *Primary station.* The principal amateur radio station at a specific land location shown on the station license.

(g) *Military recreation station.* An amateur radio station licensed to the person in charge of a station at a land location provided for the recreational use of amateur radio operators, under military auspices of the Armed Forces of the United States.

(h) *Club station.* A separate amateur radio station for use by the members of a bona fide amateur radio society and licensed to an amateur radio operator acting as the station trustee for the society.

(i) *Additional station.* Any amateur radio station licensed to an amateur radio operator normally for a specific land location other than the primary station, may be one or more of the following:

Secondary station. Station licensed for a land location other than the primary station location, i.e., for use at a subordinate location such as an office, vacation home, etc.

Control station. Station licensed to conduct remote control of another amateur radio station.

Auxiliary link station. Station, other than a repeater station, at a specific land location licensed only for the purpose of automatically relaying radio signals from that location to another specific land location.

Repeater station. Station licensed to automatically retransmit the radio signals of other amateur radio stations for the purpose of extending their intra-community radiocommunication range.

(j) *Space radio station.* An amateur radio station located on an object which is beyond, is intended to go beyond, or has been beyond the major portion of the Earth's atmosphere. (Regulations governing this type of station have not yet been adopted and all applications will be considered on an individual basis.)

(k) *Terrestrial location.* Any point within the major portion of the Earth's atmosphere, including aeronautical, land and maritime locations.

(l) *Space location.* (reserved)

(m) *Amateur radio operation.* Amateur radiocommunication conducted by an amateur radio operator from an amateur radio station. May include one or more of the following:

Fixed operation. Radiocommunication conducted from the specific geographical land location shown on the station license.

Portable operation. Radiocommunication conducted from a specific geographical location other than that shown on the station license.

Mobile operation. Radiocommunication conducted while in motion or during halts at unspecified locations.

(n) *Remote control.* Control of transmitting apparatus of an amateur radio station from a position other than one at which the transmitter is located and immediately accessible, except that direct mechanical control, or direct electrical control by wired connections, of an amateur radio transmitter from a point located on board any aircraft, vessel, vehicle, or on the same premises on which the transmitter is located, shall not be considered remote control within the meaning of this definition.

(o) *Control link.* Apparatus for effecting remote control between a control point and a remotely controlled station.

(p) *Control operator.* An amateur radio operator designated by the licensee of an amateur radio station to also be responsible for the emissions from that station.

(q) *Control point.* The operating position of an amateur radio station where the control operator function is performed.

(r) *Antenna structures.* Antenna structures include the radiating system, its supporting structures and any appurtenances mounted thereon.

(s) *Antenna height above average terrain.* The height of the center of radiation of an antenna above an averaged value of the elevation above sea level for the surrounding terrain.

(t) *Transmitter.* Apparatus for converting electrical energy received from a source into radio-frequency electromagnetic energy capable of being radiated.

(u) *Effective radiated power.* The product of the radio frequency power, expressed in watts, delivered to an antenna, and the relative gain of the antenna over that of a half-wave dipole antenna.

(v) *System Network diagram.* A diagram showing each station and its relationship to the other stations in a network of stations, and to the control point(s).

2. In Section 97.7, paragraph (c) is amended to read as set forth below and the note at the end of the Section is deleted.

†97.7 Privileges of operator licenses.

(c) *Technician Class.* All authorized amateur privileges on the frequencies 50.1-54.0 MHz and 145-148 MHz and in the amateur frequency bands above 220 MHz.

3. Section 97.37 is revised to read as follows:

†97.37 *General eligibility for station license.*

An amateur radio station license will be issued only to a licensed amateur radio operator, except that a military recreation station license may also be issued to an individual not licensed as an amateur radio operator (other than an alien or a representative of an alien or of a foreign government), who is in charge of a proposed military recreation station not operated by the United States Government but which is to be located in approved public quarters.

4. Section 97.40 is added to read as follows:

† 97.40 *Station license required.*

(a) No transmitting station shall be operated in

the Amateur Radio Service without being licensed by the Federal Communications Commission.

(b) Every amateur radio operator must have a primary amateur radio station license.

(c) An amateur radio operator may be issued one or more additional station licenses, each for a different land location, except that repeater station, control station, and auxiliary link station licenses may also be issued to an amateur radio operator for land locations where another station license has been issued to the applicant.

(d) Any transmitter to be operated as part of a control link shall be licensed as a control station or as an auxiliary link station and may be combined with a primary, secondary, or club station license at the same location.

(e) A transmitter may only be operated as a repeater station under the authority of a repeater station license.

5. Section 97.41 is amended by modifying paragraph (a), adding new paragraphs (b), (c), (d), (e) and (f), then redesignating former paragraphs (b) and (c) as (g) and (h).

†97.41 *Application for station license.*

(a) Each application for a club or military recreation station license in the amateur radio service shall be made on the FCC Form 610-B. Each application for any other amateur radio station license shall be made on the FCC Form 610.

(b) Each application shall state whether the proposed station is a primary or additional station. If the latter, the application shall also state whether the proposed station is a secondary, control, auxiliary link or repeater station.

(c) When an application(s) is made for a station having one or more associated stations, i.e., control station and/or auxiliary link station, a system network diagram shall also be submitted.

(d) Each application to license a remotely controlled amateur radio station, whether by wire or by radio control, shall be accompanied by a statement giving the address for each control point. The application shall include a functional block diagram and a technical explanation sufficient to describe the operation of the control link. Additionally, the following shall be provided:

(1) Description of the measures proposed for protection against access to the remote station by unauthorized persons.

(2) Description of the measures proposed for protection against unauthorized station operation, either through activation of the control link or otherwise.

(3) Description of the provisions for shutting down the station in case of control link malfunction.

(4) Description of the means to be provided for monitoring the transmitting frequencies.

(5) Photocopies of control station license(s) and auxiliary link station license(s), or the application(s) for same if such stations are proposed for the system network.

(e) Each application to license a control station or an auxiliary link station in the amateur radio service must be accompanied by the following information:

(1) The station transmitting band(s).

(2) Description of the means to be provided for monitoring the transmitting frequencies.

(3) The transmitter power input and justification that such power is in compliance with

†97.67(b).

(4) If remote control of an auxiliary link station is proposed, all of the information required by paragraph (d) of this section shall also be provided.

(f) Each application to license a repeater station in the amateur radio service must include the following information for each frequency band proposed for operation.

(1) Location of the station transmitting antenna, drawn upon a topographic map having the scale of 1:250,000 and a contour interval of 50 feet.¹

(2) The transmitting antenna height above average terrain.²

(3) The effective radiated power in the horizontal plane for the main lobe of the antenna pattern, calculated for maximum transmitter output power.

(4) The transmitter power output with an explanation of the basis for the measurement or computation.

(5) The loss in the transmission line between the transmitter and the antenna expressed in decibels, and method of determination of the loss.

(6) The horizontal and vertical radiation patterns of the transmitting antenna as installed, with reference to True North (for horizontal pattern only) expressed as relative field strength (voltage) or in decibels, drawn upon polar coordinate graph paper, and method of determination of the patterns.

(7) The relative gain of the transmitting antenna in the horizontal plane and method of determination of the gain.

(8) If remote control of the repeater station is proposed, all of the information required by paragraph (d) of this section also shall be provided.

(9) If auxiliary link station(s) are also proposed, include photocopies of the auxiliary link station license(s), or the application(s) for such licenses.

6. Section 97.43 is revised to read as follows:

†97.43 *Location of Station.*

Every amateur station must have one land location, the address of which is designated on the station license. Every amateur radio station must have at least one control point. If the control point location is not the same as the station location, authority to operate the station by remote control is required.

7. In Section 97.47, the note following paragraph (c) is deleted and paragraphs (d) and (e) are added to read as follows:

†97.47 *Renewal and/or modification of amateur station license.*

(d) When an addition to the control point(s) authorized for a remotely controlled station is desired, an application for modification of the remotely controlled station license shall be submitted. Authorized control points may be deleted by letter notification to the Commission.

¹ Indexes and ordering information are available from U. S. Geological Survey, Washington, D. C. 20242, or Federal Center, Denver, Colorado 80225.

² See Appendix 5.

(e) Should the licensee desire to effect changes to his station which would significantly change the system network diagram or other technical and operational information on file with the Commission, revised showings for the proposed alterations shall be submitted for approval. An application for modification of the station license is not required.

8. In Section 97.61, the introductory text of paragraph (a) is amended, and new paragraph (c) is added to read as follows:

†97.61 *Authorized frequencies and emissions.*

(a) Following are the frequency bands and associated emissions available to amateur radio stations, other than repeater stations, subject to the limitations stated in paragraph (b) of this section, 97.65, 97.109 and 97.110.

(c) The following transmitting frequency bands and the associated emission authorized in paragraph (a) of this section are available for repeater stations, including both input (receiving) and output (transmitting):

FREQUENCY BAND (MHz)

52.0 - 54.0
146.0 - 148.0
222.0 - 225.0
442.0 - 450.0

any amateur frequency above 1215 MHz.

The frequency band 29.5-29.7 MHz may be authorized upon a special showing of need for repeater station operation in this band for intra-community amateur radio communications.

9. Section 97.67 is revised by designating the existing text as paragraph (a) and by adding new paragraphs (b) and (c) to read as follows:

†97.67 *Maximum authorized power.*

(b) Notwithstanding the provisions of paragraph (a) of this section, amateur stations shall use the minimum amount of transmitter power necessary to carry out the desired communications.

(c) Within the limitations of paragraphs (a) and (b) of this section, the effective radiated power of a repeater station shall not exceed that specified for the antenna height above average terrain in the following table: [see next page]

10. In Section 97.79, the headnote and text are revised to read as follows:

†97.79 *Control operator requirements.*

(a) The licensee of an amateur station shall be responsible for its proper operation.

(b) Every station when in operation shall have a control operator at an authorized control point. The control operator may be the station licensee or another amateur radio operator designated by the licensee. Each control operator shall also be responsible for the proper operation of the station.

(c) An amateur station may only be operated in the manner and to the extent permitted by the operator privileges authorized for the class of license held by the control operator, but may exceed those of the station licensee provided proper station identification procedures are performed.

(d) The licensee of an amateur station may permit any person to participate in amateur radio-communication from his station, provided that a control operator is present and continuously monitors the radiocommunication to ensure compliance with the rules.

Antenna height above average terrain	Maximum effective radiated power for frequency bands above:			
	52 MHz	146 MHz	442 MHz	1,215 MHz
below 50 feet	100 watts	800 watts	Paragraphs (a) and (b)	
50 to 99 feet	100 watts	400 watts	Paragraphs (a) and (b)	
100 to 499 feet	50 watts	400 watts	800 watts	Paragraphs (a) and (b)
500 to 999 feet	25 watts	200 watts	800 watts	Paragraphs (a) and (b)
above 1,000 feet	25 watts	100 watts	400 watts	Paragraphs (a) and (b)

11. In Section 97.87, paragraph (d) is amended and redesignated as (h) and new paragraphs (d), (e), (f), and (g) are added as follows:

‡97.87 *Station Identification.*

(d) Under conditions when the control operator is other than the station licensee, the station identification shall be the assigned call sign for that station. However, when a station is operated within the privileges of the operator's class of license but which exceeds those of the station licensee, station identification shall be made by following the station call sign with the operator's primary station call sign (i.e., WN4XYZ/W4XX).

(e) A repeater station shall be identified by radiotelephony or by radiotelegraphy when in service at intervals not to exceed five minutes at a level of modulation sufficient to be intelligible through the repeated transmission.

(f) A control station must be identified by its assigned station call sign unless its emissions contain the call sign identification of the remotely controlled station.

(g) An auxiliary link station must be identified by its assigned station call sign unless its emissions contain the call sign of its associated station.

(h) The identification required by paragraph (a), (b), (c), (d), (e), (f), and (g) of this section shall be given on each frequency being utilized for transmission and shall be transmitted either by telegraphy using the International Morse Code, or by telephony, using the English language. If by an automatic device only used for identification by telegraphy, the code speed shall not exceed 20 words per minute. The use of a national or internationally recognized standard phonetic alphabet as an aid for correct telephone identification is encouraged.

12. Section 97.89 is amended to read as follows: ‡97.89 *Points of Communications.*

(a) Amateur stations may communicate with:

(1) Other amateur stations, excepting those prohibited by Appendix 2.

(2) Stations in other services licensed by the Commission and with United States Government stations for civil defense purposes in accordance with Subpart F of this Part, in emergencies and, on a temporary basis, for test purposes.

(3) Any station which is authorized by the Commission to communicate with amateur stations.

(b) Amateur stations may be used for transmitting signals, or communications, or energy, to receiving apparatus for the measurement of emis-

sions, temporary observation of transmission phenomena, radio control of remote objects, and similar experimental purposes and for the purposes set forth in 97.91.

(c) Notwithstanding the provisions of paragraph (a), no more than two repeater stations may operate in tandem, i.e., one repeating the transmissions of the other, excepting emergency operations provided for in 97.107 or brief periods to conduct emergency preparedness tests.

(d) Control stations and auxiliary link stations may not be used to communicate with any other station than those shown in the system network diagram.

13. Section 97.95 paragraph (a)(1) is amended as follows:

‡97.95 *Operation away from the authorized permanent station location.*

(a) * * *

(1) When there is no change in the authorized and station location, an amateur radio station other than a military recreation or an auxiliary link station may be operated under its station license anywhere in the United States, its territories or possessions as a portable or mobile operation, subject to 97.61.

14. Section 97.97 is revised to read as follows:

‡97.97 *Notice of operation away from authorized location.*

Whenever an amateur station is, or is likely to be, in portable operation at a single location for a period exceeding 15 days, the licensee shall give advanced written notice of such operation to the Commission's office specified in 97.95. A new notice is required whenever there is any change in the particulars of a previous notice or whenever operation away from the authorized station continues for a period in excess of one year. The notice required by this section shall contain the following information:

(a) Name of licensee
 (b) Station call sign
 (c) Authorized station location shown on station license

(d) Specific geographical location of station when in portable operation

(e) Dates of the beginning and end of the portable operation

(f) Address at which, or through which, the licensee can be readily reached.

15. Section 97.103 is revised to read as follows:

†97.103 Station log requirements

An accurate legible account of station operation shall be entered in a log for each amateur radio station. The log shall bear the call sign of the station and the signature of the licensee. The following information shall be recorded as a minimum:

(a) Written entries for all stations which are required only once, or when there is a change thereto.

(1) The signature of the control operator on duty and the call sign of his primary station, if he is other than the station licensee.

(2) The location of the station. Stations in mobile operation may enter the word "local" for amateur radiocommunication conducted within 100 statute miles of the address shown on the station license, otherwise the location of the first and last radiocommunication of each day. Stations in mobile or portable operation shall make an entry showing compliance with 97.97, if required.

(3) The input power to the transmitter final amplifying stage.

(4) The type of emission used.

(5) The frequency or frequency sub-band used for transmitting.

(b) Other entries for all stations which may be recorded in a form other than written but which can readily be transcribed by the licensee into written form:

(1) The dates of operation.

(2) Except for repeater stations, names of persons other than the control operator using the station, either directly or indirectly, for amateur radiocommunication.

(3) A notation of third party messages sent or received, including names of all participants and a brief description of the message content.

(4) The call sign of each station actually contacted, or other purpose of the transmission, i.e., those set forth in 97.89. Stations in mobile operation and repeater stations may omit this entry. Control stations shall enter the call sign(s) of each station in the control link. An auxiliary link station shall enter the call sign of its associated station(s).

(5) All stations shall enter the times the station is put into, or taken out of, service. Stations other than those in mobile operation, control stations, auxiliary link stations, and repeater stations shall enter the times of commencing and terminating each exchange of radiocommunication.

16. Section 97.105 is revised as follows:

†97.105 Retention of logs.

The station log shall be preserved for a period of at least 1 year following the last date of entry and retained in the possession of the licensee. Copies of the log, including the sections required to be transcribed by 97.103, shall be available to the Commission for inspection.

17. Section 97.111 is redesignated as 97.112 and a new undesignated center heading and Sections 97.108 through 97.111 are added to read as follows:

Operation of additional stations

†97.108 Operation of a remotely controlled station.

(a) An amateur radio station may be operated by remote control only from an authorized control

point, and only where there is compliance with the following:

(1) The license for the remotely controlled station must list the authorized remote control point(s). A photocopy of the remotely controlled station license must be posted in a conspicuous place at the authorized control point(s), and at the remotely controlled transmitter location. A copy of the system network diagram on file with the Commission must be retained at each control point. The transmitting antenna, transmission lines, or mast, as appropriate, associated with the remotely controlled transmitter must bear a durable tag marked with the station call sign, the name of the station licensee and other information so the control operator can readily be contacted by Commission personnel.

(2) The control link equipment and the remotely controlled station must be accessible only to persons authorized by the licensee. Protection against both inadvertent and unauthorized deliberate emissions must be provided. In the event unauthorized emissions occur, the station operation must be suspended until such time as adequate protection is incorporated, or there is reasonable assurance that unauthorized emissions will not recur.

(3) A control operator designated by the licensee must be on duty at an authorized control point while the station is being remotely controlled. Immediately prior to, and during the periods the remotely controlled station is in operation, the frequencies used for emission by the remotely controlled transmitter must be continuously monitored by the control operator. The control operator must terminate transmission upon any deviation from the rules.

(4) Provisions must be incorporated to automatically limit transmission to a period of no more than three minutes in the event of malfunction in the control link.

(5) A remotely controlled station may not be operated at any location other than that specified on the license without prior approval of the Commission except in emergencies involving the immediate safety of life or protection of property.

(6) A repeater station may be operated by radio remote control only where the control link utilizes frequencies other than the repeater station receiving frequencies.

†97.109 Operation of a control station.

(a) Amateur frequency bands above 220 MHz, excepting 435 to 438 MHz, may be used for emissions by a control station. Frequencies below 225 MHz used for control links must be monitored by the control operator immediately prior to, and during, periods of operation.

(b) Where a remotely controlled station has been authorized to be operated from one or more remote control stations, those remote control stations may be operated either mobile or portable.

†97.110 Operation of an auxiliary link station.

(a) An auxiliary link station may use amateur frequency bands above 220 MHz excepting 435 to 438 MHz for emissions. Frequencies below 225 MHz used by an auxiliary link station shall be monitored by the control operator immediately prior to, and during, periods of operating.

(b) An auxiliary link station may only be used for fixed operation from the location specified on

the station license, and only when its associated station(s) is operated from its authorized land location.

†97.111 *Operation of a repeater station.*

(a) Emissions from a repeater station shall be discontinued within five seconds after cessation of radiocommunication by the user station. Provisions to automatically limit the access to a repeater station may be incorporated, but are not mandatory.

(b) The transmitting and receiving frequencies utilized by the repeater station shall be continuously monitored by the control operator immediately prior to, and during, periods of operation.

(c) A repeater station may be concurrently operated on more than one frequency band, provided the necessary showings have been approved by the Commission for each frequency band of operation. Crossband operation of repeater stations is prohibited, i.e. both input (receiving) and output (transmitting) frequencies for a particular repeated transmission must be within the same frequency band. Operation on more than one output frequency on a single frequency band is prohibited except when specifically approved by the Commission. Repeater stations authorized to operate in conjunction with one or more auxiliary link stations may utilize an input frequency in a different frequency band provided the input frequency of the auxiliary link station(s) is in the same frequency band as the output frequency of the repeater station.

(d) A repeater station shall be operated in a manner so as to assure that the station is not used for one-way radiocommunication other than provided for in 97.91.

(e) A station licensed as a repeater station may only be operated as a repeater station, excepting for short periods for testing or for emergencies.

18. In Section 97.103, the introductory text of paragraph (a) is amended, and a new paragraph (e) is added to read as follows:

†97.193 *Frequencies available*

(a) Except as provided in paragraph (e) of this section, the following frequency and frequency bands and associated emissions are available on a non-exclusive basis to the individual class of stations or units of such stations in the Radio Amateur Civil Emergency Service.

(e) A repeater station in the Radio Amateur Civil Emergency Service may operate on any frequency, and with any associated emission, above 50 MHz listed in paragraph (a) of this section, except for 220 MHz to 222 MHz.

19. Appendix 2 is amended by adding a footnote to Section I as follows:

Sec. 1. Radiocommunications between amateur stations of different countries¹ shall be forbidden if the administration of one of the countries concerned has notified that it objects to such radiocommunications.

¹ As may appear in public notices issued by the Commission

20. Appendix 5 is added, reading as follows:

APPENDIX 5
DETERMINATION OF ANTENNA
HEIGHT ABOVE AVERAGE TERRAIN

The effective height of the transmitting antenna shall be the height of the antenna's center of

radiation above "average terrain." For this purpose "effective height" shall be established as follows:

(a) On a United States Geological Survey Map having a scale of 1:250,000, lay out eight evenly spaced radials, extending from the transmitter site to a distance of ten miles and beginning at 0° T (0°, 45°, 90°, 135°, 180°, 225°, 270°, 315° T). If preferred, maps of greater scale may be used.

(b) By reference to the map contour lines, establish the ground elevation above mean sea level (AMSL) at 2, 4, 6, 8, and 10 miles from the antenna structure along each radial. If no elevation figure or contour line exists for any particular point, the nearest contour line elevation shall be employed.

(c) Calculate the arithmetic average of these 40 points of elevation (5 points of each of 8 radials).

(d) The height above average terrain of the antenna is thus the height AMSL of the antenna's center of radiation, minus the height of average terrain as calculated above.

Note 1: Where the transmitter is located near a large body of water, certain points of established elevation may fall over water. Where it is expected that service would be provided to land areas beyond the body of water, the points at water level in that direction should be included in the calculation of average elevation. Where it is expected that service would not be provided to land areas beyond the body of water, the points at water level should not be included in the average.

Note 2: In instances in which this procedure might provide unreasonable figures due to the unusual nature of the local terrain, applicant may provide additional data at his own discretion, and such data may be considered if deemed significant.

QST



The Great Hall at the Ontario Science Centre VE3OSC will be the location of this year's Amateur Radio Exhibition — HAM AND HIS WORLD 1972, Wednesday October 18 to Sunday October 22 inclusive. Over ten thousand visitors to the Science Centre will see an automobile completely radio equipped and working; cw low power station; ssb station with linear (operated by the Ontario Trilliums and CLARA); home-brew demonstration; International Morse code demonstration; a station operated by the handicapped; slow-scan TV; message handling; and a well stocked Information and Education exhibit. The Centre is at 770 Don Mills Road, Don Mills, Ontario.

QST congratulates, . . .

David T. Justice, W7UJA, the new mayor of Clarkston, Washington.

Floyd Fellows, WA8FLE, whose pop song "If Only You'd Believe" has been recorded in a new Charlie Vickers album.

Professor Robert L. Pigford, K6QS, on his election to the National Academy of Sciences.

Burnett M. Frazer, WSALL, on his election as mayor-protem of Cloudfcroft, New Mexico.



Correspondence From Members -

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

QST RAPPED

● I wish to protest vehemently the latest move in the League's pro-phone campaign. This is, of course, the laudatory "Recent Equipment" report of one more highly-technical device to give 'phone men an extra and additional advantage over cw men. This report appeared on page 56 of the August, 1972, issue of your official organ.

It was reported that for just under \$200 a radio amateur could buy a kit for a device that would indicate in digital readout form the exact (to Hz) frequency of the signal being received. However, if one carefully follows the complicated (normal *QST* style) technical discussion, he finds no indication that a *cw man* can utilize the instrument! Checking the math through on an available IBM computer, it was proved by this incensed amateur that the statements in the subject article were true only for PHONE! With cw, "It does not compute." The failure to report this fact in the pages of *QST* proves to me that, once again, *QST* and the League are anti-cw.

The computer discloses one interesting fact. The device is indeed useful and accurate if one tunes in the cw signal at "zero beat." Does this mean the League is planning to encourage the reception of cw signals at zero beat? I hope not. The device could also be used if we were permitted tone-modulated cw (F5 signals) but you took that away from us in the late 1920s with your despicable "dc power supply" regulations. Obviously the League has long-range and devious plans to ham-string cw operation and run us out of existence!

I urge every able-bodied and clear-thinking cw man to write his Director and his Congressman and insist that the subject device not be allowed advertising space in *QST* until it can provide as good service for cw as for 'phone! Fair's fair, isn't it? - *Larson E. Rapp, W1OU, Kippering-on-the-Charles, MA*

HQ VISITORS

● Our sincere appreciation for your warm welcome and your guided tour of Headquarters on our recent visit. We congratulate those who are responsible for the prevailing atmosphere at our "ham home."

The displays in the museum are great. They were just as I hoped they would be. Thanks for the picture I took of the "Wouff Hong!" It turned out HB. We hope everyone comes away from their visit to Headquarters all warmed and filled as we did. - *Novis Ousley, W9PO, Rule, TX*

● I just wanted to tell you how much my son Fred, WA2PAT, and I enjoyed our excellent tour and visit of the League Headquarters and Maxim Memorial Station. Please pass along our special thanks to K1ZND, who was our guide - he certainly took us on a splendid tour. I also enjoyed

speaking with him and could see that he was well informed and a good asset to the ARRL.

We also enjoyed visiting and operating W1AW and started a miniature pile up on 75 meters. We enjoyed it and I think more hams should visit during the week when so many interesting people are around to meet. - *Sid Deitz, W2FDE, Fred Deitz, WA2PAT, Trenton, NJ*

● While visiting recently in your vicinity, I dropped in at Headquarters for a short visit. Although first licensed before WW II, this was the first time I had been to hamdom's Mecca. I should like to thank you all for the courtesy offered, the Grand Tour, the opportunity to meet John Huntoon. Last, but hardly least, the Museum is marvelous.

I returned to amateur radio only 14 months ago after a 22-year absence. In order to update myself, I built a collection of *QST*'s beginning at January 1930 (when my acquaintanceship began) to the present. Rereading the old issues is a provocative experience in nostalgia; reviewing those between 1949 (when I went inactive) and 1971 (when I got back in) provides ample historical perspective.

Funny thing but amateurs were crying the blues 40 years ago in much the same way they do today: raise the code speed, lower the code speed, widen the phone bands, the League is dominated by old fogies, *QST* is boring, I'm dropping out, etc., etc. Good Lord! What would the amateur radio movement have done *without* the League? You're doing the same great job you were doing when I first got involved. With regard to *QST*, the current issue strikes me as a most professional job, both in editorial balance and appearance. It's great to be a ham again and a *bona fide* member of the League! If you choose to publish this letter, I hope some of your detractors - whom I know personally - read it. - *Edwin Dallas Kennedy, W3GPI, College Park, MD*

PULLING TOGETHER

● Having recently returned to amateur radio, I've given serious thought to the matter of joining the ARRL; originally deciding against membership. There were too many things I did not like; e.g., that matter about "incentive licensing" following the donations to the Headquarters Building Fund, the current *QST* editorial attitude toward CBERs, as well as some rather childish gibes at Novices, who at least can claim ignorance and inexperience as an excuse for some admittedly poor operating practices (What excuses do the Generals offer?), etc.

However, neither do I like the "We - They" attitude being actively promoted by another publication in amateur radio. After all, we're all in this together (in a way, even the CBER), and if things don't start shaping up soon - well, we stand to lose considerably more than we can gain by hasseling each other.

Therefore, rather than register my discontent in a sulking, negative manner by non-affiliation, I want to join the organization and, together with others of similar dedication, work positively toward the implementation of those ideals which truly represent this most remarkable avocation.

Please accept my application for membership, and expect to hear from me from time to time, as I intend to register both my dissatisfactions and my appreciations. *Victor I. Culver, W9GWE, ex K2QOH, Kansas City, MO*

LEARNING MORSE

● The article on "Learning Morse" (page 58, August *QST*) is likely to provoke a great deal of controversy. Hopefully this will concern speeds below 25 wpm since the current arguments pro and con cw revolve around amateur licensing, rather than higher speed proficiency. The latter is not within the scope of the article.

The ancient jest, "I don't understand everything I know," is forcefully emphasized here, but at least I have found some answers which have been puzzling for many years.

I would take exception only to the remarks about receiving practice on code groups and nonsense material prior to an examination. I feel that the point involved is not properly stated and the conclusion misleading.

The leaded bat to be swung prior to examination is one of speed, rather than context of material. Since one will be under some stress taking the code examination, some margin of anxiety should be expected as a minus factor. Naturally, the Cyrillic alphabet is not recommended for practice in International Morse examinations! Nevertheless, the ability to handle code groups and nonsense at a faster rate than necessary for examination can be a real plus factor. I would suggest copying anything you can find in the way of tape-transmitted cw — heaven knows there is little enough available in the hf spectrum these days.

One other point needs amplification. I believe the claim that some operators can copy dots and dashes on moving tape faster than aural code has "slip reading" as a foundation. This skill, now virtually disappearing with the advent of commercial overseas teletype, was developed by readers of inked tape. These operators in commercial message centers, seldom if ever, learned cw as we know it, but rather learned the visual appearance of words and letters in groups. Since scanning is done by character-groups and may be repeated by the eye rapidly, this is not quite the same as the blinking light or other once-repeated visual signal.

Nowhere in the article do I see any substantiation of inability to learn the code. True, "some got it, some don't," but if you believe yourself to be in the "some don't" category for heaven's sake don't join the "can't-be-done" group — there's too many now and the waiting list seems to be growing, alas. — *W. H. Fishback, W1JE, Chatham, MA*

SIDESWIPE

● I recently had an experience which might give some other old timers a chuckle as it did me.

Upon turning my receiver on I happened to be on frequency of a station whose fist brought back nostalgic memories of bygone days. I continued to read his mail with pleasure and he stood by shortly

for the station he was in contact with. The other station responded with an electronic key adjusted for the dots about four times the speed they should have been in relation to the dashes and he commented "... there's something wrong with your keyer old man, you should check it out ..."

The other station upon returning opened his transmission with "... let me introduce you to the sideswiper key sonny ..."

At this point I had my laugh for the day and hope it does the same for you. — *Norman Gertz, W1KYK, Providence, RI*

PUBLIC SERVICE

● The seemingly dwindling interest of hams in serving the public is bothersome. The recent thing in the Chicago area is the start of a local repeater to communicate with hams who volunteer in transporting eyes between hospitals. Yesterday morning a base station tried to locate a ham to make delivery of eyes for a needed operation. He had to make several calls on the air. What got me is that immediately after one of his one-the-air calls a member of the repeater group came on and called another ham and did not even make reference to the need for eye transportation.

Now, the excuse would be that they were not near the area where the pickup was to be made. But we are supposed to go out of our way to serve the public, aren't we?

Maybe the ARRL is the only group interested in really using ham radio to help a non-ham. — *Larry Cotariu, WA9MZS, Chicago, IL*

● Thank you for the Public Service Certificate. As you have stated, it is a certificate not specifically worked for, not asked for, and not expected. Perhaps for these reasons it is one of the most cherished.

My thanks to you and to whoever had suggested that I might be deserving of this fine recognition. It was indeed a surprise and one of the nicest I have ever had the pleasure to enjoy. — *R.H. Orines, K8MMH/9, Buffalo Grove, IL*

TERMINAL CASE?

● There was a lot of good common sense in your July article "The Ailing Emporium." The chart and footnotes covering supply sources are really helpful.

There are a couple of things on this subject which somehow or other ought to have attention. I probably am "spoiled" because of having lived in the Chicago area for some time when "Saturday conclaves" were common. Not only could you get what you wanted, you generally met and became acquainted with the locals you talked to. Later on, moving to smaller towns and finally to this retiree's haven, I not only have had problems in keeping up with tinkering, but also in finding parts and service.

It is this latter "service" thing that bugs me. Being on a limited budget, there are times when even a \$5 minimum order closes down a project. What stopped me a short while ago was notification by one of the big outfits that the minimum order accepted was \$25. That's pretty steep when all you need is a couple of springs. It's a problem, and I know costs are up from what they were before inflation set in — but twenty-five bucks? — *W.H. Kibbe, W4CCD, Clearwater, FL*

The World Above 50 Mc.

1515-1300

1300-2450

2300-3500

3500-5925

5450-5925

10,000-10,500

21,000-22,000

50,000-7

CONDUCTED BY BILL SMITH, * KØCER

August Aurora

SOME OF THE better auroras of the past have occurred in the month of August and the events of early August, 1972, will not be soon forgotten.

According to the National Oceanic and Atmosphere Administration (NOAA) at Boulder, Colorado the solar activity responsible for the August aurora initially appeared on the solar surface July 11. The events which followed during the sun's next rotation one month later rank collectively as one of the more severe disturbances of Cycle 20. The distinction of being the most intense magnetic storm of the cycle is reserved for the March 8, 1970 storm.

Solar Region 331, pictured herewith as a single large penumbra, produced at least five major Class X flares the first week of August. The majority of the flares occurred within 40 degrees east and west of the solar central meridian, a position perfect for particle interception on earth. At least four separate particle injections were recorded. The sources of these particles are believed to be flares on August 2 at 1800 and 2005 GMT, August 4 at 0621 GMT, and August 7 at 1500 GMT. Radio auroras can be attributed to each.

While the solar events caused joy for vhfers, utility companies had problems. The fluctuating geomagnetic field induced slow, pulsating direct ground currents to flow, entering power system transformers and transmission lines in parts of

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

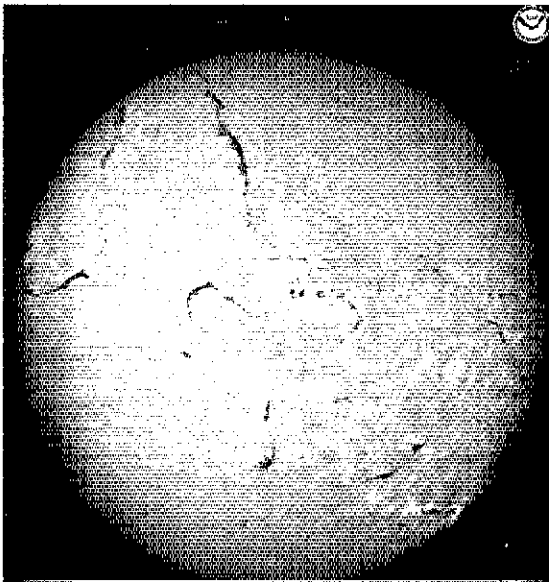
Canada and the northern United States. AT & T experienced trouble on sections of their underground coaxial cable, tripping circuit breakers and injecting noise on voice circuits.

The magnitude of the events versus the number of aurora reports received confuses me. Auroral signals were heard as far south as Waco, Texas and northern Florida, areas which seldom experience aurora propagation, but only a limited number of reports were made.

K1HTV, Meriden, Conn., first noted 144 aurora at 0322 GMT, August 4, and it was still going strong at 0800 when Rich retired. Some of his contacts were W4DFK, Sterling, Va., on ssb at 0355; WA4KDF, Tennessee, at 0417; and between 0437 and 0453 four Illinois stations and three in Michigan. WB8CXW was running but 20 watts cw. KØMQS, Iowa, was worked at 0459, an approximately 1000-mile haul. On August 5, at 0012 GMT, K1HTV worked WAØCHK, Bowling Green, Missouri, just 13 minutes after buzz signals reappeared. Other K1HTV contacts included three North Carolina stations between 0428 and 0515, and others over shorter paths. The aurora began again at 0228 GMT, August 6, during a tropo openings to Ohio. Rich's first aurora contact was VE3CRU on ssb at 0246. A mixture of aurora and tropo continued throughout the evening, with strong aurora at 0530, when K1HTV worked W9AOC, Indiana. Buzz signals faded after 0630. K1HTV worked more aurora August 9 around 1100 GMT contacting W9QXP, Ill., and KØMQS. The aurora ended at 1120.

WA1FFO, East Hartford, Conn., heard or worked 22 states on 144 MHz the evening of August 3, south to North Carolina and west to Illinois. W1JSM, N.H., had 144-MHz aurora contacts with five W9s and K4JQU, N.C. W4FJ, Richmond, says the August 4 aurora was the most extensive he has ever heard on 144. On 432 MHz, Ted worked W2AZL and says fellow Virginian K4QIF worked W2AZL, K2ARO, W3RUE and K8UQA on 432. Lack of activity appeared to be the reason that more 432 contacts weren't made.

Aurora is not common in Oklahoma, but K5BXG, Tulsa, had exceptional success beginning



In the near center of this photograph is the solar activity responsible for the August 3-5 auroral openings observed on 50 through 432 MHz.

(photo courtesy of NOAA, Boulder, Colorado)

QST for

WØLER (left) and W2AZL made the first 432-MHz meteor scatter contact August 12. The exchange required 5 hours to complete, on infrequent short bursts.

at 0415 GMT, August 4. He worked KØWLU, S.D., followed between 0419 and 0436 by contacts in Illinois, Indiana, Michigan, Ohio and Iowa, WØ-MOX, Boulder, Colorado, at 0449, and more 8s, 9s and 0s until 0734. Later the same day, GMT, Charlie began hearing aurora signals from W9UNN, Illinois, at 2151. One hour later K5BXG worked W5GVE, Waco, Texas, far removed from normal auroral paths. August 5 brought contacts with WØMOX and WØEYE, Colorado, between 0004 and 0009 GMT, followed by K4QIF and W4LTU, Va., W3RFA, Md., WA3BAO, Delaware, K4JQU, N.C., and W8AEC, W. Va., all between 0013 and 0120. That is some outstanding aurora DX, Charlie!

In Michigan, K8HWW worked buzz signals August 5 from W5SUS, Arkansas, and KØWLU, S.D., and heard W5ORH, Oklahoma City. WAØ-IQN, Boulder, worked Oklahoma, Texas and Wyoming on 50 MHz between 0110 and 0218 GMT, August 5.

KØWLU, near Sioux Falls, S.D., first observed 144 aurora at 0400 GMT, August 4, working WØRLI, Minneapolis. At 0411 Bill worked K5PZ, Oklahoma, followed by several 8s and 9s. WØEOZ, N.D., was worked at 0500. The following evening, KØWLU worked W5PZ, W5HHV and W5ORH, Oklahoma, WØEYE in Colorado, and W5SUS in Arkansas, all between 0020 and 0255 GMT. K2TXB, N.Y., was worked at 0430 and KØAWU, N.D., at 0445, to give an idea of the aurora's scope. The last aurora heard at KØWLU was around 1100 GMT, KØMOS working K1HTV.

VE3EVW, worked 144 aurora with Virginia, Iowa, Missouri and Minnesota the evening of August 4.

While aurora is our DX fun, our low-frequency brethren were wiped out. WAØQFC, manager of an amateur radio store in Minneapolis, had over 60 calls August 5 from amateurs wanting work done on their receivers. They couldn't hear a signal — so something must be wrong with the receiver!

Probably there was a 27-day repeat in late August or early September. Looking ahead, Mel Wilson, W2BOC, has placed his reputation on the line, predicting conditions favorable for aurora on September 6-7, October 21 or 24, perhaps November 1 and 15, November 20 and 25-27, January 3 and 12-15. Mel is studying the *E* events of June 8, 1972, and would appreciate detailed data from anyone observing *E* on frequencies above 50 MHz. Especially needed are specific times, what was heard, and beam headings.

432 Meteor Scatter — Finally!

After countless hours of schedules by several hardy meteor scatter buffs over the past three years, a 432-MHz meteor contact has finally been



made. W2AZL, Holmdel, New Jersey, and WØLER, Minneapolis, were able to put together enough short bursts August 12 to lay claim to the "first." Before completing the contact, they ran more than 30 hours of schedules, beginning in July and hearing something on each try.

As on previous schedules, the successful August 12 schedule began on 144 MHz for calibration purposes, exactly tripling their 144 frequencies to locate each other on 432 with precision. The 432 schedule began at 0600 GMT, and required 5 hours and 4 minutes to complete. The distance is 1000 miles. Both stations used kilowatt amplifiers and Yagi arrays. Sequences of 2, 5 and 15 seconds duration were employed to make maximum use of the infrequent bursts. WØLER received a string of confirming Rs from W2AZL at 1104 GMT.

Both W2AZL and WØLER said they appreciate the work in previous years by W4FJ and WØDRL, from whom they learned techniques which led to the contact. Congratulations to Carl and John — and the others who paved the way for what is the highest frequency meteor scatter contact on record.

1215 MHz, anyone?

1296 Tropo Record Extended

Those who predicted an extension of the 1296 tropo record this year have been proven correct. The previous record was 400 miles, shared by several stations, until May 27 when K4QIF, Hobson, Va., worked W1AJR, Newport, R.I., 420 miles.

That didn't last long. On August 16, W8YIO, near Detroit, worked WA2LTM, Cranbury, N.J., over an approximate 500-mile path. That record stood only five days. W8YIO worked K4QIF a distance of 551 miles! The same evening W2OMS, Oakhurst, N.J., also worked W8YIO.

One key to this success is the 30-foot dish at W8YIO, a military surplus item acquired by Lew for such use. Lew's transmitter runs some 50 watts



These 420-MHz ATVers are active in New Jersey and Pennsylvania. Left to right: WA2TQI, K2KUT, WA2COY, W3AEH, WA2RIH, K2MQP, K3ZKO (publisher of *A5 Magazine*), and WA3AXV.

output. Now he has the problem of locating active stations at greater distances. Any takers?

Still to be heard from, in terms of a contact, are K4NTD, Florida, and W5LDV, Texas, who are keeping a close watch on that well established tropo path, across the Gulf of Mexico, a 900-mile hop.

OVS and Operating News.

50 MHz continued active in July and August thanks to *E* and aurora. This is what was reported around the country. WA1FSZ, N.H., worked KP4 July 4, multihop to Arizona July 9 and on the 23rd to Washington 7s, plus the more usual single-hop openings. WA1DFL, Mass., says July *E* was "not as good as last year." Steve reports a nearly day-long opening July 1 for single hop, a similar opening July 2 including Colorado and Montana multihop, W6s on the 9th, 8P6FN on the 12th, VE1ASJ the 14th, Wyoming the 15th plus several more days of single hop. That's a *bad* month?

K2YFF, N.J. reports hearing a station signing VK5VP, Australia, working a WB2 at 2328 GMT, July 12. No other reports were received on this one. I'd be interested to know if, and when, the contact is confirmed. VKs are authorized only between 52 and 54 MHz.

A July 20 *E* opening allowed 38 stations in 12 states and Canada to check into the North Carolina SSB Net. WB4UJH says the net meets Thursday evenings on 50.12 at 0100 GMT. Check-ins are welcome.

Ray, K5ZMS, reports from San Antonio that 6 meters was excellent during July and August. JA1LZK, Japan, tells Ray that four Guam stations and KC6RA, Saipan, and KC6AO, on Truk are active. No fewer than 1500 JAs work 50 MHz and some of the recent DX worked from Japan includes VK7ZIF, Tasmania, DU1s EJ and JS, Philippines, VS6s AI and CN, Hong Kong, XW8AL, Laos, and VK9s in Port Moresby. JA1LZK says there is a daily gathering on 14.290 at 0700 GMT of Pacific stations interested in 50-MHz DX.

WA5IYX, also San Antonio, reports 45 openings on 24 July days, including four multihop sessions. Loggings covered 34 states, Canada and Mexico. Pat says "An average-type July." The first half of August produced *E* peaking over 90 MHz on several occasions. Pat says August 6 was the best *E* day since June 9. An interesting note from WA5IYX details a *four-minute* meteor burst 0219-0223 GMT, August 3, when he detected stations up through channel 9 TV. The fm broadcast band was jammed, and San Antonio's local channel was 4 buried in cochannel interference.

WB6RON received her license May 5 and has since worked 40 states and four countries on 6. Between 144-MHz moonbounce schedules, W6PO works 50-MHz *E*, including a July 18 opening to the East Coast. WA6HXM completed his 50 states July 18, working W3CGV, Delaware. Peter says that July was quite good, the best opening being a 6-hour affair July 31. WA6JRA found the band open on nine days between July 19 and August 6. Double hop was observed on July 22, 30, August 1, 2, and 6.

Reports of transpacific DX on 6 are now credited to a California station whose operator appears to have a distorted sense of humor.

K7ICW, Las Vegas, reports *E*s on half of the days in July, including an opening on the 15th to Vermont, New Hampshire and Maine. See how easy those W1s are, AI — after you've once worked 'em? WB8BOK, Ohio, found *E* to his liking, with his 10 watts of sideband good for 31 states. WB9EDP has worked 46 states so far in 1972. He will gladly sked VFs on scatter. WB0FVL, Minnesota, worked WA1NNW on two-way fax. WB0BBC, Kansas, agrees that July 15 was excellent. He worked Maine and Rhode Island, to reach 45 states worked. W1HDQ reports *E*s holding unusually late in August, with good single-hop observed over the final weekend of the month, mostly to Florida.

Now, for the 50-MHz WAS-watchers, new wallpaper issued through the middle of August by ARRL Headquarters includes 50-MHz certificates as follows: 106 - WB6OKK, 107 - K7ZOK (his second; he made No. 49 as W0FKY), 108 - WA6OLE (all ssb), 109 - W6PO, 110 - K6JJU, 111 - K9BDJ, 112 - WA5FPS (all ssb), 113 - K6IBY, 114 - K6QAX, 115 - WA6OZC, 116 - WA6HXM. Summer, 1972, was a banner season for *E*s DX and WAS on 6.

VE2DFO feels that August was exceptional. Don had very strong double-hop to W7 August 13, between 1600 and 1800 GMT. K7BHF, Utah, and WA7CCS and W7TYR, Oregon, both very rare states in Quebec, were worked. W7GRH W7DVB W7OI W7ZSL WA7PRG W7FN and K7GWE, all in Washington, were worked in the 2 hour session. VE2DFO runs an SB-110A feeding his 40-element 2-meter collinear on 6! The band was good to W4 and 5 during the night of the 14th.

TE Again!

The fall TE season officially got underway for 50-MHz DX enthusiasts on August 24, at 0457 GMT, when WB6KAP worked F08DR in Tahiti, after signals having been heard weakly both ways the previous day. The ZK1AA beacon was in at WB6KAP around 0700 GMT. W6ABN also heard

FO8DR weakly during the WB6KAP QSO. ZK1AA has been hearing the KH6EQI beacon regularly, since it was reactivated August 10. FO8DR has also heard it, though not as strongly or regularly.

WB6KAP supplies the following beacon information: ZK1AA, 50.1015; listens part-time on 50.104. KH6EQI, 50.104, WB6KAP, 50.013 (1st 30 seconds); listens on 50.101. FO8DR, 50.101; listens on 50.101. H19WI, 50.1, VKØZVS, 52.1. VKØGR, 53.2. VK4WT/2, 52.4. JA1IGV, 52.5. VKØMA, 53.1. VK2II, 52.2. KX6HK, 50.11. The VK information is from VK2ZTB, and is several months old. The first four listed are current, as of late August.

Mario Santangeli, 11ER

We helately report the passing of one Italy's first amateurs, and certainly one of Europe's first vhf operators, Mario Santangeli, 11ER, in April 1972. An engineer by profession, Mario was a participant in early 5-meter work reported from Europe in the 1920's. QST for December, 1926, carries incomplete reports of work by 11ER, from Milan to Tripoli, and his call appeared intermittently in the QST "Experimenter's Section" over many years. 11ER was also active on the DX bands, but retained his vhf interest to the end. He was on 144 MHz until recently, and on 56 MHz as long as the band was available in Europe.

144-MHz meteor DXers generally agree that the Perseids shower this July and August may not have been quite as productive as in some past years. Nevertheless many good contacts were made. The first call in the tabulation below is that of the reporting station.

July 24: KØWLU - VE3EMS

July 20: W6PO - WA7BBM (Arizona); WA1FEO - K4IXC (30-second burst); K5BXG - K2HLA, WA7BBM.

July 31: K1HTV - K9HMB; K5BXG - K1PXE.

Aug. 5: VE2DFO - KØMQS

Aug. 9: K5BXG - WA3GPL, VE2DFO (1330 miles); VE2DFO - K5BXG (state No. 34, cw and ssb).

Aug. 10: VE2DFO - K9HMB (ssb); KØWLU - WA3GPL (45-second burst).

Aug. 11: K1HTV - WB9CAS, WA5UNL (state No. 36); KØWLU - K2RTH (30-second burst); VE2DFO - WA5UNL (state No. 35, ssb), WAØCHK (ssb on burst in excess of 1 minute); PAØJMV - OK3CDI.

Aug. 12: WA1FFO - KØWLU, W9JDJ, WA8PIE (55-second burst); K6QEH - K5BXG, W5ORH (both on same burst); K7BBO - W6PO; K1HTV - W9JDJ, WA8LLY, WØMJS, WØRLI, WA8PIE, WA9QZE, W9YYF, W9AAG; VE2DFO - W9JDJ, WØMJS, WA8LLY, WØRLI, WA9QZE, W9YYF (all on random CQs); K4QIF - K4IXC; PAØJMV - UR2BU, SP9AL.

Aug. 13: K7BBO - WA7BBM; K4QIF - K4IXC; K5BXG - W8KPY; K1HTV - W9YYF; W3BHG - WA5UNL, KØAWU; PAØJMV - LZ1BW (no sked).

Aug. 14: WA1FFO - WA5UNL (50-second burst).

W1JSM reported working K4IXC, W4LSQ, WA5UNL and W9YYF, but no dates were given.

Hot Tip for October

A final bit of news in the meteor department: Dr. Brian Marsden, of the Smithsonian Astrophysical Observatory (see this column in May,

1967, QST, pages 75 and 78) offers some interesting information on prospects for the Giacobinids (also Draconids) October shower. This was one of the hottest on record, in 1946, with many contacts made on 50 MHz. Meteor work had not then started on 144. The shower normally has a 13-year period, but the 1959 recurrence was deflected, and little of interest developed. Now, the 1972 recurrence is given a good chance of reaching the former peak of 400/hour, October 8, at around 1545 GMT. Maximum is expected over Europe, but the shower may provide exceptionally high counts in this country, for perhaps a half hour. Short-notice scheduling is being set up for that morning, using the customary 15-second sequencing, starting in the early morning of October 8.

New ARRL Repeater Directory

Would you guess 615 different repeaters, with 970 input-output frequency combinations? That's what you'll find, along with much other useful information, in the third ARRL Repeater Directory. Send an envelope, at least 6-1/2 by 9-1/2 inches size, with 24 cents postage, with your request. This is a "best-seller," for sure!

Random 2-Meter Reports

In other 2-meter news, KØEQH/mobile near Salina, Kansas, worked WA2VCM, Auburn, N.Y., at 2130 GMT, August 2, on 146.94 simplex, and K8DEO, Cedarville, Ohio, reports hearing W1AW 2245 to 2258 GMT, August 1. Both reports concern E skip.

From the "unusual department" we draw W6PO's report of July 8. During a moonbounce schedule with DK1KO, Germany, between 1700 and 1800 GMT, Bob heard a Spanish-speaking ssb station on 144.002. Bob's 160-element collinear was tilted 70° at an azimuth of 122°. Signal fading characteristics were similar to E and moonbounce. Bob eliminated i-f feedthrough as a possible explanation. Can anyone help on the identification of the Spanish signal? W6PO recorded it on tape.

VE7BQH, Vancouver, worked W8KPY, Dayton, via the moon July 14, for state number 12. Lionel says "Let this serve notice to all midwest types, VE7BQH is closing in for the kill on WASI!"

VE3EVW will return to the Caribbean island of Montserrat in December, where he signs VP2MJ, carrying equipment for use via the Amsat satellite. Perhaps Monty could be encouraged to attempt some Caribbean-to-U.S. tropo.

A late-evening tropo opening August 15 found K1HTV, Meriden, Conn., working Michigan and Illinois. Sun-up the next morning Rich worked WØLFE and WAØCHK in Missouri, W8YIO, Michigan, and two Illinois stations, K9HMB and W9YYF. One gets the message that K1HTV misses little on 144.

220 MHz news is rather slim this month. Perhaps fall tropo will add more reports. K7BBO, Tacoma, worked WAØQLP, S.D., August 12, and W7JRG, Montana, August 13, on Perseid meteors, to reach four states on 220, no easy task from Tacoma. W5AJG, Dallas, thinks there may be some life anew in 220. He worked WSORH in neighboring Oklahoma July 18 for his fourth state. WB6NMT says moonbounce projects are underway in Kentucky, Ohio and at VE5US. Louis now stands at 9 states worked following a recent contact with K6YNB/7 in Utah, a fine 220 DX effort from California.



WA6UAM, San Jose, reports excellent tropo conditions on 220 between the Bay Area and the region around Fresno, at the end of July. W6FFE at Chowchilla, just north of Fresno, averaged better than 20 dB above the noise at San Jose and on the Peninsula. W6NRO, Fresno, worked several stations at distances of 125 miles and more, with good signals, despite the average power in use being something on the order of a few watts. Paul, WA6UAM, also says that there is something of a boom in fax activity, on and around 145.2 and 221.4 MHz, using surplus WU Deskfax units. Among those going with this mode are WA6LXX, WA6GYD, WB6LLD, WA6ARU, WA6JYG, WB6TJO, WB6ACI and WA6UAM, with more on the way. They report a drawing error in the May *QST* fax item by W7QCV. A ground shown on the "ack" switch, Fig. 3, should not be there, they say.

With upwards of 100 stations now on 220 in Northern California, nightly activity is becoming routine. Much credit for this is due WA6GYD and his 220-MHz Newsletter, and W6VMY, for making large numbers of TV-10A surplus rigs available.

432 MHz news was highlighted this month by the first meteor scatter contact on this band. On moonbounce, WA6HXW added a new state August 5 by working K2UYH, N.J., between 1930 and 2000 GMT. That contact was followed an hour later by one with Australian VK2AMW. Harley now has six states on 432.

K2UYH climbed to 15 states worked as the result of the EME contact with WA6HXW. Allen was assisted by WB2HHH and WB2IPE. K2UYH holds nightly schedules with W8YIO, near Detroit, over a 535-mile path, with contacts completed nearly every night. At Rochester, K2YCO is active regularly, working 1s, 2s, 8s and VE3s EVW and KDW.

W6FZJ, San Jose, worked W6QED, San Diego, a 400-mile path, in late July. W6QED runs 40 watts and a collinear array. W6FZJ reports a favorable increase in W6 432 activity.

K8DEO found tropo August 5 to K1PXE, Conn., and W2AZL. VE3EVW has 70 watts, and stacked 16-element Yagis. He seeks tropo schedules.

1296 MHz news needs more input, but K2YCO, Rochester, reports working W2OMS, N.J., July 17 for state number 3, after a month of schedules. K2YCO also worked K2GGA, Syracuse, and W8YIO, Detroit, several times this summer. K2UYH, Trenton, schedules W8YIO over a 535-mile haul,

K2UYH, Trenton, N.J., used this homemade 20-foot dish to work WA6HXW August 5 on 432-MHz moonbounce. The dish is fed with crossed dipoles. Allen receives 8 to 10 dB of sun noise, using a feed-mounted K5200 preamp having a noise figure of 1.5 dB. The transmitter is a pair of 4CX300s running 600 watts output.

has worked 7 states and a best DX of 262 miles, since moving to his new location.

K4QIF and W8YIO extended the 1296 record to 551 miles, August 22. Rusty, K4QIF, has yet to work anyone *closer* than 175 miles on 1296! He worked VE2L1, over 600 miles, the same night, on 432.

W3KE says VK3ATN has completed a 16-foot dish which is mounted on a 43-foot tower. The dish is fully steerable in azimuth and elevation.

Next month we will have a pictorial report on the late-August Central States VHF Conference held in Kansas City. At the conference, Ed Tilton, W1HDO, was given the Central States VHF Society's John T. Chambers Memorial Award. The plaque Award, honoring the late W6NLZ, is presented each year for outstanding contributions to the art of vhf communication. Mel Wilson, W2BOC, winner of the first Chambers Award, in 1971, made the presentation. QST

FEEDBACK

Scale templates for "A Single-Conversion 2-Meter Fm Receiver," *QST* for August 1972, p. 11, are available from ARRL Hq. for 50 cents and a large self-addressed, stamped envelope. Ready-made pc boards are available from Spectrum Laboratory, Box 5824, Tucson, AZ 85703.

Resistor R2 was omitted from the half-scale layout on page 14 of the article. R2 should be installed in place of the jumper (upper left of board pattern). Coil L2 should have the same diameter as L1, but with 4 turns and the drain of Q1 tapped one turn down from the high-impedance end. Because of possible differences in the permeability of toroid cores of a given type, check L4 with a dip meter (after installation) to make sure it tunes to 10.7 MHz within the range of trimmer C24. A one-turn closed loop of wire through the core of L4 will enable the builder to get a reading by coupling the dipper coil to the loop. Capacitor C2 is a variable, as indicated in the parts list. The arrow was omitted through a drafting error. Mixer coil L3 should be wound on a T-50-2 core instead of the T-50-3 core specified in the parts list.



CONDUCTED BY ROD NEWKIRK,* W9BRD

H o w :

Arguing with Grommethead Schultz is like picking up quicksilver barefoot. When you think you have him cornered he slips through a crack in the floor. That weird DX-and-the-weather thing of his is a good example. Every time 15 opens wide and it happens to be raining you can depend on him to nod sagely and mumble, "Like I always say, watch 21 MHz when a wet front comes through."

"Who else says so?" we retort, pointing out that we know of no authority able to link lower-atmosphere weather with significant regional short-term developments in the upper ionosphere. "My log says so," Grom insists, claiming all sorts of red-hot rainy 21-MHz DX days to prove it.

Well, the Sunday of our annual club picnic arrived warm and clear. Everybody showed up with goodies and a ton of recreational gear. Everybody but Grommethead Schultz. Someone said they got a call from him and he couldn't make it. So we had nobody around to take impossible sides of arguments but we began to have fun anyway.

Then came a little summer shower, a pleasant sprinkle to cool off the athletes among us. Next it began to rain. We mean it *rained*. Right in the middle of pitching horseshoes we almost drowned outright. It was still pouring felines and K9s when we collected our muddy toys and sloshed out of that swamp. Wet? We nearly dissolved.

Our soaked mobile receiver still worked slightly on the way back. Scanning the bands we got to 15 and there was Grommethead signing with a 9M8. Through the racket of QRN, windshield wipers and downpour we heard him also grab a VKØ, a TL8 and — oh, no! — a YI2. Then our engine conked out and we spent the next four or five drenched hours getting towed back to civilization.

The monsoon let up around nine P.M. We were miserably drying out in the shack when a knock on the door produced our hero himself, Grommethead, softly whistling "Yellow Submarine," was in fine spirits; no chills, no bites, no blisters and aches, no heartburn. "You're a picnic copout, Schultz. Just undependable and no good. But you sure hit it lucky on 15 today."

"Not really. I merely checked the band before breakfast. Five continents were rolling through S9. The sixth was only S8."

"Hah!" we cried, seizing the attack. "It wasn't raining then. Didn't rain for hours. Clear as a bell without your lousy rain and you say fifteen was amazing. Not a cloud in the sky and you admit it was DX heaven. Before the deluge. So what's with your ridiculous DX-with-rain theory now, Grom?"

This was almost worth pneumonia.
*c/o ARRL, 225 Main St., Newington, CT 06111.

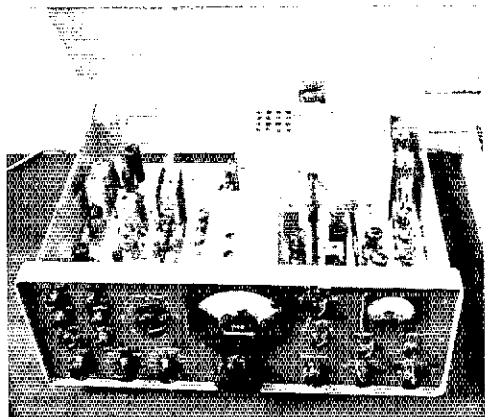
"Man, you don't copy me right," said Grommethead Schultz, fondling the QSL he was about to mail to Iraq. "Don't confuse cause and effect. I never said rain brings DX on 15. It's the other way around. I just knew this would be no day for a picnic."

† † †

W h a t :

This month's meeting of the QST DX club concerns itself with radiotelegraphic DX possibilities on 28 MHz as a new ten-meter season dawns (if any). What hath old Mama Nature wrought in her ionosphere with those recent solar fireworks you've been reading about in the pop press? Eruptions as rare as July snow in Atlanta, according to one observing authority who agreed that our sun now should be quieting down, not whooping it up. Better keep that 28-MHz array around just in case.

10 CW a few short months ago, was providing "How's" correspondents Ws 1PL 3CTE 3HNK 4YOK 6AM, Ks INOK 3TVN, Wbs 8FOS and 9DRE with such entertainment as C3IFB, CEs 3YO 6EF, COs 2BM 6AH 6JH 7AI, CPs 1AP 6FG CRs 5XX 6AL 6AT 6GF 6IK 7AW 7EY 7FM, CTs 1ID 1VX 2AZ 3AS, CXs 2GO 7CO DL8NU/OHØ, many Germans, EAs 1AB 6BD 6BJ 8BK, EIs 3CA 6V 9BG, ELs 2CB 2Y 8K, Es 5EF 5HV 5ZP 6AKZ 8FE 9RO, FB8XX, FB7s TG XT, FM7s AF WU, FY7YI, dozens of Englishmen. GC5ATJ, GL3AXI, GM3OOK, GWs 3NJW 3SFP 8UH, HAs 1KSA 1SX 5KFZ 7KLC 9KOZ, HBs 9ACPØXJL, HCs 1KP 2GG/1, HGs 5ES 7PM ØKHV, HIs 7JMP 8XGM, HKs 1QQ 3AVK 3BAE, HM1AQ, HS5ABD, Is 1ER 2CEX 2RTI, JAs in profusion, JX2HK, JY6FC, K4BZH/VP7, KC6s BF BK, KG6ALV, KH6s IJ RS, KP4s 8BN BCH DHD DJI, KR6AY, KSs 4CJ 6DY, KV4s AM CI CK EN, KX6BU, KZ5MS, LA7HC, LUs 2DKG 3FBA 9FAN, LXIs CF JT, LZs 1KBD 1KVP 2WC, OD5LX, OEs 3FFA 5OS, OHs 3YR ØAL, OKs 1AFV 1MAS 3PAF 3EE, ON8s RD VH, OX3s AB DL EN ZO, PAØs DC KJN KW TO, PE2EVO, PJs 2HT 2MI 9JT, Pys 2CCJ 6FI, PZIs AV AZ, RAs 1QAE 6LOQ 9FCA 9FFC ØLAY, RIs AGX AHP, RL7s DAL JAN, ROSOAO, SMs 3ANI 7EAN ØBDS, SPs 2AOB 6ASD, ST2SA, SUIs IM MI, SVs 1CH ØWOOD, TGs 9CD ØAA, TI2CF, TR8CQ, UAs 9AEN Ø1AAD ØBX, UB5s OMD UAQ, UE6s FAR FAX FAZ GAE, UG6AE, UH8s CS HAJ, U18AAV, UKs 3XAM 8AAC ØFAA, UL7s GAN JAB OF, UM8-NAB, UP2BAW, UQ2GQ, UV3DA, UY5AY, VKs 2GL 3AYO 3XB 4YP 6SA 9HL, VPs 1ASJ 2AA 2AAA 2AX 2GVW 2LAT 2LAW 7NY 9GK 8KE, VQ9RK, VR1s AA W, VU2AAA, WASUBJ/TF, XE1HJ, XW8EV, YBØAAO, YOs 2AOB 2BC 2BV 5LC, YU1JRS, YVs 4VAS 5CU 5CV 5CW, ZC4s BI BP CB MO MU, ZDs 3Q 8CS 8CW 8JT, ZFs 1BJ 1BT 3JJ 3JO, ZFs 1A SW, ZL1AMO, ZPSAQ, ZSs 1ACD 2RM 3AW 5BS 5FC 5KI, 3B8s CR RS,



VK5MF demonstrates that hamdom's homebrew art still flourishes Down Under. Alan's classy transceiver holds its own with the best of the factory breed. Using this gem plus homespun video monitors, a flying-spot scanner and other home-built accessories he's heading toward SSTV DXCC. VK5MF's impressive equipments have been thoroughly described in Wireless Institute of Australia's journal *Amateur Radio*.

3D6AK, 4M5KL, 4X4NJ, 5R8BF, 5T5CJ, 5Z4s MX LW, 6D1AA, 7Q7AA, 8P6s BU DR, 8F1J, 9H1s CH R, 9J2s AL GU LA ND TR XZ, 9K2BQ, 9L1VW, 9X5MV and 9Y4VU, Oops, almost forgot to credit Candian contributors VEs 2AOQ 7BAF and 7BZY for a share of this sampling. Well over a hundred countries in that bunch for somebody's 5BDXCC needs. And here's another autumn - let's go!

† † †

Where:

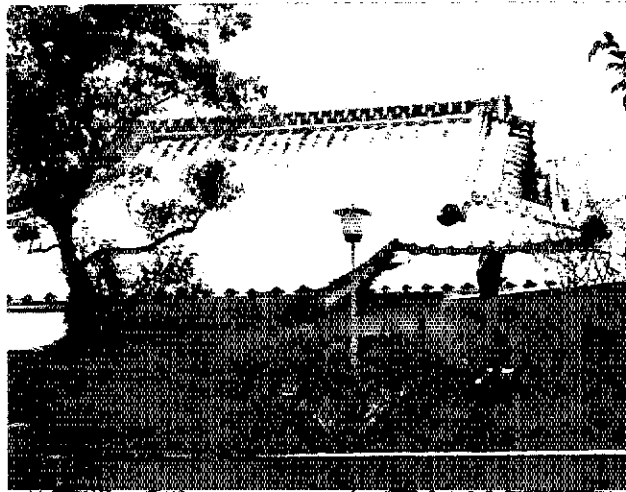
EUROPE - Gozo's amateurs become 9H4s as of August. Stations on the island of Malta remain 9H1s, and the 9H3 prefix will be used by reciprocity visitors on either island. 9H1/9H4 suffix changes are T/A, M/B, CZ/C, DA/D, DB/E, DF/F, DG/G, DH/H, DI/I and DM/J, addresses the same.

JA6MWE, a priest in Kitakyushu, displays a 3-element two band rotary and six-meter spinner atop his Buddhist temple. Ken says the January snow barely discernible aground is about as much as ever falls at this beautiful QTH of the Month. (Photos via W7FCD)

They may be QSLd via 9H1E as usual or via myself as QSL manager for Gozo Amateur Radio Society. (9H4H) . . . W6IC reports receipt of a ZA1ZA QSL from one Bob Antich, YU2BRO, Rizwelli 9, Scodeira, for a contact in April. (LIDXA) . . . OF2WR surprised me by sending s.a.e. (self-addressed envelope) plus IRC (International Reply Coupon) for my humble QSL. By the way, a courteous letter to the secretary, CRC, Box 88, Moscow, concerning tardy USSR QSLs brought me an immediate encouraging reply. (K6UGS) . . . Can't seem to pry logs loose from CT1UE . . . patience, please. (W3HNK) . . . The Box 88 bureau knows of no operator "Betty" in UK2-land. Scratch another. (K2HYM) . . . A recent European IAKU meeting recommended against oversized and overweight QSLs, also urging that each card sent via bureau have the recipient's call inscribed on both sides for ease of handling. (SN2ABG, NARS) . . . Our bureau manager points out to newer members that it can be eight to nine months or longer before one receives a replying card, much longer in some cases. Exchanging QSLs through any bureau is a fairly lengthy business. (ISWL)

ASIA - Sultanate of Oman, formerly MP4M-land, is now assigned the prefix A4 by International Telecommunications Union. (DXNS) . . . WJYRC liquidated the initial XV5AC QSL logjam by early August. (WCDXB) . . . Remind the lads that I'm still handling QSLs for 4Z4s A1 and 1B. (WA2-KWP) . . . Welcomed TA6JB's QSL via DJ9ZB fourteen months after QSO. (K4LDR) . . . The old box number is no longer required in our mailing address. Henceforth our official address is Far East Amateur Radio League (M), APO, San Francisco, CA 96525. (FEARL) . . . From my CN8II experience QSLing can be an expensive time-consuming proposition. I'll be signing an HS4 call soon, and XYL Judith will manager matters from the home QTH on the customary s.a.e.-IRC basis. (W6NYG)

AFRICA - Nigerian stations will use their commemorative SN5 prefix again this month. (NARS) . . . It appears that EL2CB's call was pirated during the '72 ARRL Test. His QSL manager states he was vacationing at the time. (K2HYM) . . . Note that ET3ZU/a operation on

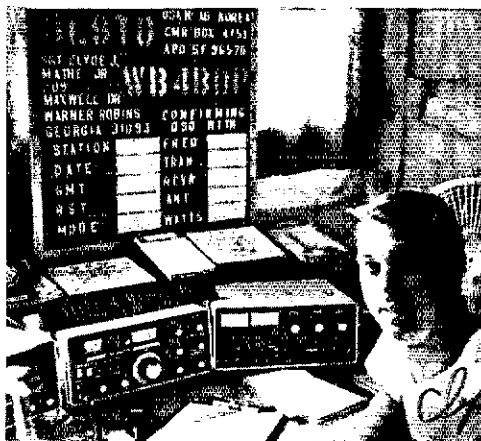


May 3-6, 1971, can be QSLd via IØIJ, but September 5-9, 1971, ET3ZU/a QSOs are confirmed direct to FT3ZU. (IØIJ) . . . Former ZSs 8L 9D and 7P8AR now resides at 4 Bay View Ave., Tamboers Kloof, Cape Town, South Africa. QSL inquiries should go direct to Ulli. (W4-BRE) . . . 9J2RO closed down in Ndola and I would like to close his QSLing as soon as possible. S.a.s.e. (self-addressed stamped envelopes) or s.a.e. plus IRCs, please. (WA1HAA)

OCEANIA - As KS6DT and 5W1AU I have replied to all QSLs received but I'm sure a few were lost in the unpredictable Samoan mails. Reapply, please, with s.a.s.e. to my Grand Rapids address. I can also state that the majority of KS6 stations do reply 100 percent to all QSLs received for valid QSOs. (WB8MZN) . . . New Zealanders will sign their ZM prefix through January of 1974 according to ZM1B11-ZL1B11. (WB9GGD) . . . QSLs for WB6CZB's KS6CY operation, late July only, can go via WB5BHN. (DXNS) . . . W5CWQ unfortunately disclaims Tonga QSL connections but my YJ8JM card came through with a U.K. postmark after a three-year wait. (K2HYM)

SOUTH AMERICA - I've responded to requests for more than 2000 QSLs in the last eighteen months. I keep almost up to date answering s.a.e. but I'm about 300 cards behind in shipments via bureaus at the moment. The backlog should be eliminated by the time this appears in print. (ZP5TT) . . . According to word from PZ1AH a bogus PZ1AJ is operating outside Surinam. (K2HYM) . . . Please note that my QSL management for CE3CR terminated some six months ago. (K6RA) . . . SM3CXS will manage SM2AGD's Easter Island QSLing, call unavailable at writing. (DXNS)

HEREABOUTS - It's a shame that only 800 W6s have s.a.s.e. on file at our ARRL QSL Bureau branch. We have recently discarded fifty percent of all deadwood QSLs including many rare beauties. This brings us to the current one-year-plus-one-day holding time. The service is free, fellows. You don't even have to be ARRL Members. *Where are your s.a.s.e.?* (W6-ITD) . . . Regarding QSLs for VP2DAJ QSOs, I can supply cards for activity in May and July 1970, also May of '72. QSLs for contacts during other periods should go to the listed VP2DAJ address. (VE3EWY) . . . WB2FVO assumes QSL management for some of WASUHR's QSL clients and indicates that Scotty's entering the military. (W1CW) . . . Maybe others are unaware as I was that VEØs are Canadian shipboard stations. (W7YF) . . . Wonder if the gang needs North Dakota as badly as they say they do. Sent out 700 cards since last August with only 110 returns. (KØALL) . . . I am Stateside QSL manager for GM3CFE, KG6AAY, PØSNG, SP5PWK and VP2LLD at 8019 Triola Ln., Houston, Texas, 77036. (J. Cline) . . . Cards keep arriving for my QSL clients bearing local QSO time: CDST, EDST,



HL9TO fired up this outfit at Osan AFB a year ago to become a familiar fixture around 14,290 kHz at 0800-1300 GMT. Chuck is due for early return to Georgia and WB4BDP.

etc. For results you gotta go Greenwich, fellows. (W5QPX) . . . Unauthorized use of the call EP8CW includes all QSOs on November 28, 1971, according to VE5NW. (W6NT) . . . Got excellent response to my "Help!" items. Apparently some of the boys get on the ball when they see their calls listed as delinquent QSLers. (K6UGS) . . . Halp! The following parenthesized brethren require helpful hints on rounding up wallpaper from holdouts mentioned: (W4WQW) CP6FG, HK4DF; (K4TXJ) CEØAE '68; (K6UGS) 9M8OEA; (KØALL) VP2VAG, 7Q7AA '71; (WA2CWX) GI3HXL's QTH; (WA3ERG) FY7YQ '70; (WB9DLO) FR7-AM/8, 1W7FD, KR6AY, 3D2AZ; (WN100T) KG4NFF, VP2AX, W9WDC/HK1, 9Q5AW; (IT-1JT) KL7OJ '66, KR6s AH and UA of '66. Any 'alp? . . . W6s 5FUI and 9DLO offer their services as QSL tenders for overbusy ops at the DX end . . . Encouraging crop of "QSLers of the Month" this month, nominations by "How's" correspondents Ws 5IB 7YF, Ks 2HYM 3QAP 6UGS 8PYD, WA2CWX, W6s 2MAN 2UFN 5CKR 5FUI 9GGD ØAAM ØCAP, WNs 2CTN and ØGTJ: A35LT, DU1OR, EAs 5BS 6BH, ELs 2CB 81, F6s 6BVS 9IQ, F8RXX, F8K8BQ, FØ8DR, G3s DYY YSK, GC3EML, GI3JIM, Gms 3JAW 5AXO, GW4NZ, HB9AMP, HC1s BL RF, IA4ONZ, KGs 4EZ 6JBO, KH6HOU, KS6DY, KV4AA, LU9EAK, LZ2ZZ, OF2s EGL WR, OH8TM, OZ2TY, PA-ØYN, PJ8WP, PYSASN, SMØCCM, SVs 1GA ØWJJ, TG9FS, TI8PE, VE8RCS, VP2LAW, VR1AA, VU2KV, WA3SMN/TF, XU1AA, YNØHSM, YS1JFE, YV5DLO, ZF1WE, ZL1BH, 3B8s CV

A51TY, left, greets VU2KV and XYL Radha near the top of the world in Timpu during Venkat's recent DXpedition to Bhutan. Despite more than the usual obstacles in such a venture A51KV scored some 800 contacts before returning to New Delhi. (Photo via W6KNH)





5H3LV is a world-wide favorite in Dar-es-Salaam also noted for DXcursions to Zanzibar as 5H1LV. Garth leaves Tanzania this month after four DXciting years in Africa.

ZS3AUF/3D6 (via VK2SI)
 ZS8L-7S9D-7P8AR (see text)
 6W8BH, P.O. Box 971, Dakar, Senegal
 7X0GA, B.P. 2, Alger, Algeria
 9Q5DX, USMM Zaire, APO, New York, NY 09662
 9V1RE, Box 3012, Singapore

A31GC (via ZL2BGU) MP4BIN (via WB2FVO)
 C31EG (to EA3QS) OK2BQ (via JA1ZZ)
 C31ED (to DL2BK) PA0SNG (see text)
 C31FK (via G3ZZQ) PJ2ELB (via VERONA)
 C31FO (to F3BW) PY1MO (via W3HINK)
 ex-CN8HJ (to W6NYG) SP5PWK (see text)
 CR8AK (via CT1CY) SP0ITU (to SP5BB)
 DU1EN (via WB2FVO) SV1GA/p (to DJ6TK)
 EL0DI (to E17CC) TT2MB (via F6BFH)
 EL2DI (via WA1LUH) TR8VE (via F6AZI)
 EP2TW (to G13HXL) VA1ND (via VF1TC)
 FT3ZU/a (see text) VP1ST (via W4VPD)
 F6BTQ (via WB9ETQ) VP2DAJ (see text)
 FM7A1/FS7 (to W5GJ) VP2LLD (see text)
 FO0CS (to K6CWM) VP2VAU (to W5GJ)
 FO0IS (to F2KO) WA3SMN/TF (via W3KHL)
 FP0CG (to K1BCG) YA1BYS (via W2RHK)
 FP0MB (via F6BFH) YA1RA (via YA1GNT)
 GM3CFS (see text) YN1FV (via F6BFH)
 HB9XMW (to WB2FSC) YN4LGS (via WA9PZU)
 HB0XMA (via WA4WME) ex-ZD8CS (to K1BTD)
 HC1ME (via WA8OKE) ZM1BII (see text)
 HC2DX/8 (to DL2CG) ZB9CF (via JA0CUV)
 HD2GRC (to HC2GRC) 5K3LR (to HK3LR)
 HD8IG (to W3ABC) 5N5ABG (see text)
 ex-HI9TO (to WB4BDP) 5U7AW (via VF2DCY)
 HS3AET (via W0Y7B) 5V7JS (via DJ1HN)
 JA4ONZ (via WN7RCC) 7X2AD (via WB2FVO)
 K5LWL/YV6 (via K5LPE) 7X7Y (via I0IJ)
 K5QHV/VQ9 (to K5QFH) 7X0WW (via WB2FVO)
 KA1DX (via WA6AHF) 8P6CSJ (via RS8)
 KG4ER (via WB2FVO) 8P6EA (to WB4LWX)
 KG6AA7 (see text) 9H4H (see text)
 KG6JBS (via W1DXB) ex-9I2RO (see text)
 KS6CD (via WB6REO) 9Y4RK (to VE3EWY)
 LA3ZK/w (to LA3ZK)

DA, 4X4DK, 4Z4IB, 8P6DT, 9U1GC, 9M6AB, 9Q5s DX and VA, plus QSL aides Ws 2PPG 3KT, Ks 1JHX 3RIY 9KLR, WAs 5G1S 8TDY, F2MO and 11PQ, all happily applauded for QSL comebacks snappier than usual. Any commendables we missed . . . Time out for specifics, now, remembering that each suggestion is necessarily either "official", complete nor accurate. Be our guest:

A2CAY, Private Bag No. 10, Serule, Botswana
 C21TL, K. Matchett, Box 32, Nauru
 C08QS, P.O. Box 5, Santiago, Cuba
 CR5AJ, H. Torres, P.O. Box 261, Sao Thome, Portuguese W. Afr.
 CR6QA, P.O. Box 336, Luanda, Angola
 CT1CY, R. Soares Hobre, Trav S. Domingos Benfica 23-1-D, Lisbon, Portugal
 CT3AR, P.O. Box 601, Funchal, Madeiras
 CT3AY, P.O. Box 605, Funchal, Madeiras
 FC6ABP, J. Filippi, P.O. Box 44, L'ile Rousse, Corscia, France
 FO8DR, P.O. Box 374, Papeete, Tahiti
 HC8GS/4, L. Saltos, Gen. Def., Tosagua, Manabi, Ecuador
 HD8IG, W3ABC/HC1 (via W3ABC)
 HG2RD, A. Koroknay, P.O. Box 147, Veszprem, Hungary
 HR1RF, c/o U.S. Embassy, Tegucigalpa, Honduras
 IA5s BZT DU TAD (via I61AD)
 JA3GZN, M. Katsusai, P.O. Box 29, Amagasaki, Hyogo 660, Japan
 JD1s AFE AFF (via JA3GZN)
 ex-KS6DT, J. Clausing, WB8MZN, 1021 Worcester Dr. NE, Grand Rapids, 49505, MI
 OA6BB, Aptdo. 1363, Arequipa, Peru
 PY0 DVG ZAA (to PY1DVG)
 PZ6AA, P.O. Box 1905, Moengo, Surinam
 PZ9AA, P.O. Box 1810, Moengo, Surinam
 SM4CIM/OH0 (via SM4CHM)
 ex-TG9s KE UZ (to W9UZC)
 VP1EO, P.O. Box 29, Stann Creek, Br. Honduras
 VP2s GWP SBA (to WB4LWX)
 VP2s KU IY MRK SN (to VE3EWY)
 VP8ME, J. Rushby, 2013 Melissa, Arlington, TX 76010
 VR4EE, J. Sapir, Box 400, Honaria, Solomons
 VII2AAA, Box 534, U.S. Embassy, New Delhi 1, India (or via W3FDU)
 W7WOX/Kure (via KH6BZF)
 WB2AMO/VP2S (to WB2AMO)
 WB6WUH/TF, J. Campbell, P.O. Box 44, Keflavik, Iceland
 WB8ABN/HK0 R. Dorsch, Jr., Box 32, Rochester, MI 48063
 YB5AAV, c/o U.S. Embassy, Sumatra, Indonesia
 YJ8DE, P.O. Box 56, Villa, New Hebrides
 ZD7BB, P.O. Box 17, St. Helena Island

Our QTH advisory committee for the preceding glossary: Ws ICW 1YL 4WFL/1 51B 6AM 6GSV 7YF 9LNQ 0EFFK, Ks 2HYM 4SD 8PYD, WAs 2CWX JERG 3HNK 5IIS, WBs 2MAN 4JFK 9GGD 0CAP, WN2CTN, Columbus Amateur Radio Association *CARAScope* (W8ZCQ), *DX News-Sheet* (G. Watts, 62 Bellmore Rd., Norwich N. 72 T, England), Far East Auxiliary Radio League (M) *News* (KA2LL), Florida DX Club *DX Report* (K4KQ), International Short Wave League *Monitor* (E. Chilvers, 1 Grove Rd., Lydney, Glos., GL15 5JE, England), Japan DX Radio Club *Bulletin* (JA3GZN), Long Island DX Association *DX Bulletin* (K2KGB), Newark News Radio Club *Bulletin* (J. Heien, 3822 Marshall Ct., Bellwood, IL 60104), Nigeria Amateur Radio Society *News* (5N2ABG), North Texas DX Association *Bulletin* (W5SZ), Northern California DX Club *DXer* (Box 608, Menlo Park, CA 94025), Southern California DX Club *Bulletin* (W6EJJ), VERON's *DXpress* (PA0s INA TO) and West Coast DX Bulletin (WA6AUD). You, too, are a committee member, you know, and your report will be appreciated. QTH data? K!

Whence:

ASIA Our Far East DX Association plans a DXpedition to Marcus island as KA1DX October 26th to November 2nd with simultaneous operation on two or three bands. Eighty and 40 meters will be used extensively. We'll be 25 kHz above the low band edges on cw except for 80, 3537 kHz. That frequency also will be used for ssb along with 7090, 14,195, 14,295, 21,245, 21,295 and 28,600 kHz. WB6CGM will lead the assault possibly accompanied by KA2s AA AS BL and others. I'll help coordinate things from our base station, KA2DX. (WA5IIS) . . . HS3AET opened up with QRP but will soon be more audible on cw and sideband with a linear and quad. (WØYZB) . . . During my thirteen months in Korea 20-meter conditions ranged from excellent to extremely poor. (HL9TO-WB4-BDP) . . . UAØSB and Irkutsk buddies talk of a Tannu Tuva tour possibly as early as the 10th of this month. They'll probably use the 4JØ prefix. (VE3CDP/W9) . . . Orientalisms via the aforementioned DX fourth estate: OR4ES accompanied a scientific expedition to Iran's desert regions this summer . . . XV5AC & Co. passed the five-kiloQSO mark easily by mid-July aided by a KWM-2, 51S-1, 4K and 70-ft.-high TH6DX. Operator Don mentions the possibility of more Cambodia QSO output when gear becomes available . . . KA1MI, 14,273 kHz at 0330 GMT, offers Minami Torishima . . . Early Bangladesh S21 calls were issued to ON5AB, VE7IR, LA6UH and HB9YC hearing those same suffixes. Another HB9 becomes S21EW. A beam and kW are reported available to Red Cross personnel in Dacca . . . Recent Japanese DXpeditions to Ogasawara stirred up a TVI-BCI-HF1-etc. hornets nest . . . EX-MP4QBK hopes to regain operating privileges from a new Qatar administration . . . UL7GW enjoys assisting Europeans with rare Asiatic DX at 1500-1700 GM . . . HS2AHC is said to be building a seaworthy boat with Spratly in mind . . . YA1s AB GJM GNT KY LM and OS keep active in or near Kabul but the last remaining YA2s are pulling the big switch. YA1GJM emceed the weekend Afghanistan net on 14,285 kHz around 1500 GMT. . . JY9GR expects to leave Jordan this month . . . UAØNT, 14,215-14,255 kHz at

4X4GV favors teleprinter DX sport in Beer Sheba, gateway to the Negev. Imanuel feeds a TH3-MK2 rotary with this businesslike installation. (Photo via K2BYB)



6D4s EB FFC and J, DXpeditionary calls belonging to XEs 3EB 1FFC and 1J, poured out 6000 Revillagigedos contacts in March to DXers in 115 countries. XE1J is shown operating. From left in the beam photo are XE1J, an assistant and XE3EB.

1200-1400 GMT, needs Del., La., Me., N.H. and the Dakotas to clinch ARRL's WAS award. . . . For the same reason MP4TDM hunts Kans., Mont., Neb., Nev., Wyo. and the Dakotas. . . . There's a VU2 net on 14,140 kHz thrice weekly at 1600 GMT . . . 4W1AF should return to the fray next month after European leave . . . K4FOK starts an 18-month Formosa sojourn and intends to radiate on 20 from Taichung by voice and code. . . . XW8DO joined Sifent Keys in a July air accident. . . . Operator Cofin of VS9MB expects to have the Maldives on tap each Tuesday and Friday around 1700 GMT near 21,280 kHz until 1973. . . . Sikkim's royalty still gets in a few DX licks as AC3PT on 20 sideband, usually 14,280-14,325 kHz around 1900-1930 GMT. . . . Far East Auxiliary Radio League president KA2QW departs Japan and KA2AA fills the remainder of KA2MU's secretarial term. New or renewed FEARL memberships are claimed by KAS 2AD (WA6CPN), 2HR (WA6OFW), 3PT (WA3SLJ), 2WW (WA1OKL), 6AY (K3JCJ), 6DD (WA8HDR), 6KQ (KH6GAU), 6PN (WB4TMJ), 6SB (WA6RBI), 9AG (W1AAG) and HL9KD (W7IOX). JA1s ACC JRZ and JH1FMT are new affiliate members.

AFRICA - My ZD8CS operations are permanently secured. I may soon be signing T12KCS. (K1BTD) . . . XYL WA2BAV and I logged some nine thousand contacts on our African tour. (WB2AQC) . . . New one? The Bantu region of Kavango plans to petition South Africa for self-rule. (W6YO) . . . ET3ZU/VS9K is an imminent Kararan threat. (IØIJ) . . . While in Tanzania I heard quite a lot of 40-meter sideband

action but nobody seems to tune split-frequency. They missed a good one! Eighty and 75 were never really good even to Europe. (5H3LV) . . . Africa tidbits courtesy literature of clubs and groups: 5X5NA should be back at it this month after his G3ZUK vacation. . . . CR5AJ, with 60 watts and a dipole, likes the low cw ends of 20 and 40. . . . New Marion isle on Jackie puts ZS2MI on 14,220 kHz at 1130-1330 GMT and is often aided by emcee CR7IK. . . . TN8BK winds up his European vacation this month. . . . OK1VJG will sign 7XØJG on several bands over a two-year Algeria stay. . . . 7Q7BC returned to G3UFI in July. . . . 5Z4s KL and LW keep an eye on Bouvet island possibilities, also 6O1-land The former is already licensed for Aldabra, Desroches and Farquhar action. Juan de Nova by December is also 5Z4KL's desire. . . . DL8ZU/6O is a Somalia item reported on 14,310 kHz in July. . . . 7Q7AF intends DXtensive 7-MHz cw doings. . . . 9J2CL edits Radio Society of Zambia's Newsletter. . . . 5H3LV logged some 1500 QSOs on his final jaunt to Zanzibar in July. . . . TJ8AD is highly interested in becoming a TLS. . . . Mauritius ARC considers firing up its HW-16 on Agalega for code cats. . . . SU1MA is reported back on sideband with new final valves. . . . Nigerian Amateur Radio Society stalwart 5N2AAJ attended the IARU Region I Conference in May. The departure of 5N2ABH reduces 5N2 availables to AAE AAJ AAK AAN AAV and ABG. Ex-9G1ED takes up station in Nigeria but fresh 5N2 tickets are unavailable. G8FAU, newly arrived in Kaduna, holds NARS membership No. 119.

OCEANIA — I've made three trips to Lord Howe isle with QRP cw since 1961 and can appreciate the woes of low power at the other end. I do keep a blacklist of misbehavers. Still hunting for crystals, especially in the 7005-7045-kHz range, for my trusty two-stage 6L6 25-watter. Lost a precious box of them on one recent portable operation. (VK5XK via W5CNU) . . . Friend KG6JBS can regularly be found near 14,025 kHz at 0900-1100 GMT. (W1DXB) . . . Watch for C21TL on 20 ssb or cw in the General subbands. Three others are intermittently active on Nauru. (WB2-MAN) . . . DU1PAR opened up on 160 in May, working JA3s AA UI, KR8s AG CF and EA near 1805 kHz the very first night of operation. (W1BB) . . . Pacific patter provided by the DX press: Papua and New Guinea eventually may become administratively one. . . . VK9JW collected more than eleven kiloQSOs from Mellish reef in July, VKs 3JW 4W 4KS and 4XY officiating. . . . Brent of VK9ZB expects to disseminate Willis cheer through next month with his FT-101 and 4BTV on 15 and 20 phone. . . . ZK1MA hopes to make Manihiki more available with a new HW-101 especially near 14,240 kHz at 0500 GMT or so. . . . 9M2WM returns to WB4KNW while KH6HCM of Kure fame is slated to swap Hawaii for Florida. . . . KH6GLU and G3NDY pushed VSSJA to about 1700 contacts in June, the former also guest-operating 9M6AB for several hundred Sabah QSOs. Ed and John found the JA curtain barely penetrable to the States. . . . Tom Christian of VR6TC visited New Zealand for corrective leg surgery this summer according to W5-ABQ. . . . VK2BCV (ex-VK9GC) may conclude Norfolk operations this month. . . . CR8AG was scheduled to leave Timor by September. . . . KH6GMP suffered serious injury in a June fall from his 40-foot tower. Careful, gang! 954

Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

Ex-1A1Z, Edward D. Papkee, Cambridge, MA
 W1H8K/W1BXX, Edgar E. Gaudet, Lynn, MA
 K1FRK, William W. Clarke, Brookfield Center, CT
 W1KOC, George J. Urlwin, Concord, NH
 W1KRM, Milton G. Godschall, East Lynn, MA
 W1KXM, Edward C. "Corky" Godney, West
 Suffield, CT
 W1MYA, Arthur L. Pike, Wethersfield, CT
 W1NJJ, Eunice K. Loyzim, Coventry, CT
 W1QG, John P. Ireland, Hyannis, MA
 K1QPQ, George J. Chulak, Stratford, CT
 W1ZBZ, Joseph DiBenedetto, Johnston, RI
 W2BLP, Rev. John J. Healy, Palmyra, NY
 W2CCK, William S. Fisher, Belleville, NJ
 W2FC, Fred G. Clayton, Sea Girt, NJ
 W2LRD, Lambert Tourison, Point Pleasant, NJ
 W4OBZ, Michael J. Kingsley, N.W. Rochelle, NY
 W42PKS, Artold C. Uepp, Kenmore, NY
 WB2YDO, Horace T. Van Sciver, Haddonfield, NJ
 K3AFM, Willard E. Flaig, Middletown, PA
 Ex-W3CXI/1, Philip H. Steinmetz, Hill, NH
 W3FLG, Norris C. Weller, Timonium, MD
 K3GTI, Harry A. Rice, Levittown, PA
 K3HHM, Jacob F. Kirk, Pittsburgh, PA
 K3OIS, Stanley H. Kiert, Pittsburgh, PA
 WN3RWI, David A. Gray, Kenneth Square, PA
 K3UDB, Fred D. Riley, Mechanicsburg, PA
 W4BVQ, Joseph J. Bradbury, Virginia Beach, VA
 WA4CST, Wilson W. Graham, Vinton, VA
 K4DJT, Henley D. Burnside, New Smyrna Beach,
 FL
 W4EE, James C. Picken, Jr., Ft. Lauderdale, FL
 WB4GEY, John W. Essock, Hallandale, FL
 WA4IEZ, Everett M. Chappell, Elkin, NC
 W4FXJ, Gilbert P. Knapp, Jr., Roanoke, VA
 W4QPM, Charles J. Hiller, Virginia Beach, VA
 WB8SWL, Edward Holmes, Culppeper, VA
 W5EHZ, Dr. Horace H. Polk, Raymond, MS
 W5GZS, Harry M. Hutchinson, Jr., Tulsa, OK
 W5IQY, John B. McHale, Dallas, TX
 WA5LGIJ, Jesse A. Hoisington, Stillwater, OK
 WA5LVJ, Charles L. Conly, Houston, TX
 W5QJA, John I. Mange, H. Houston, TX
 K5RUD, Don H. Harrison, Los Alamos, NM
 W5TO, Guy C. Bigelow, Aransas Pass, TX
 W5VE, Paul E. Curtis, San Antonio, TX
 Ex-5ZU, W. H. Tilley, Austin, TX
 W6RBC, Arthur C. Aulwurm, Oakland, CA
 WA6EXB, Elias A. Jason, Oakland, CA
 *KøHQJ, John E. Greer, Huntington Beach, CA
 W6LIV, George D. Lowe, Altadena, CA
 W6KVO, Lyle L. Carpenter, Navarro, CA
 WN6OSK, William T. Lark, Burbank, CA
 W7EOP, Mitchell S. Sullivan, Kent, WA
 ER8EZ, Anthony J. Lebaro, Youngstown, OH
 W8GAB, Ben F. Hughes, East Sparta, OH
 W8VKY, John S. Lampert, Chagrin Falls, OH
 W8YNN, William E. Tron, Dayton, OH
 WA8ZPJ, Frederick K. Gunther, Columbus, OH
 Ex-9DGB, Owen P. Halvorson, Spokane, WA
 WB9DNS, Johnston R. Blakely, Elgin, IL
 W9HJK, Jacob J. Kneeb, Ft. Wayne, IN
 W9CJA, Carlton A. Froehel, Webster Groves, MO
 W9HEL, Michael Kersulov, Webster Groves, MO
 K9IJJ, William O. Vestal, Oak Grove, MO
 W9JFD, Fred C. Brewer, Loveland, CO
 Ex-W9JHW, Rev. Ellis U. Shaffer, Ft. Dodge, IA
 K9MHX, Wayne L. Johnson, Kellerton, IA
 W9OBL, Thomas F. Nugent, Ballwin, MO
 K9CGF, Robert P. Hildebrandt, St. Paul, MN
 W9VZT, Louis L. Ewens, Moberly, MO
 KL7FHW/VK7BA, Lois L. "Sandy" Jensen,
 College Alaska
 VE6SS, Frank Applegate, Craigmyle, AB
 E12A, S. C. MacNamee, Co. Meath, Ireland
 E12R, T.J. McDonald, Waterford, Ireland
 E16W, Dr. M. E. "Santa Clara" Folan, Co. Galway,
 Ireland
 PY1CBS, Rudolf R. Pranzl, Botafogo, Brazil
 *Life Member

Operating Events

de W1YL

OCTOBER

4 **W6OWP Qualifying Run** (W6ZRJ, alternate) 10-35 wpm at 0400 GMT on 3590/7129 kHz, 10-35 wpm. This is 2100 PDS1 the night of October 3. Underline correct minute of highest speed copied, certify copy made without aid and send to ARRL for grading.

7-8 **California QSO Party, VK/ZL/Oceania phone, Massachusetts QSO Party, RSGB 21-28 MHz phone**, p. 107 September.

12 **WIAW Qualifying Run** 10-35 wpm at 0130 GMT on 1,805 3,580 7,080 14,080 21,080 28,080 50,080 and 145,588 MHz. This is 2130 EDST the night of October 11. Underline one minute of top speed copied, slate no aid used (typewriters OK), sign and mail to ARRL with your full name, call (if any) and complete mailing address.

14-15 **CD Party phone**. This is a quarterly event for League appointees and officials, notified separately by bulletin. Check with your SCM (p. 6) to see if you can qualify for an appointment. **CARTY RTTY Contest**, p. 95 Sept. **VK/ZL/Oceania CW**, p. 107 September.

18-19 **YL/AP cw**, p. 95 Sept.

21-22 **CD Party cw, Boy Scout Janiboree-on-the-Air**, midnight Friday to midnight Sunday local time. Get in touch with the Boy Scouts, invite the boys to visit your station during that time. No contest, a "conversation party" without formal reports required. However, let BSA Hq. know who participated. Address J-O-T-A, BSA, No. Brunswick, NJ 08902. Gathering points on the air include: 3590/3940 7030 7290 14070 14290 21140 21360 28190 and 28990 kHz. **CQ-WF Contest, RSGB 7 MHz Contest cw**, p. 107 Sept.

28-29 **CQ WWDX Contest, phone**.

NOVEMBER

1-2 **YL/AP phone**, p. 95 Sept.

2 **W6OWP Qualifying Run**.

4-5 **RSGB 7 MHz Contest** phone, p. 107 Sept. **Maine QSO Party**, sponsored by the Portland Amateur Wireless Assn., open to all from 1700 GMT Nov. 4 to 0300 GMT Nov. 6. All bands/modes may be used, Maine stations work any other station, outside stations work Maine only. Stations may be worked on additional bands/modes for 1 point per QSO. Maine stations send QSO no., RS(T) and county. Others use state/province/country for location. Points times states/provinces/countries for score or points times Maine counties (max. 16) for non-Maine stations. Appropriate certificates. Neat accurate logs including the participant's name, address, call and county, state, province, country should be postmarked no later than Dec. 1, 1972 and mailed to the Portland Amateur Wireless Assn., 227 Spring St., Portland, ME 04102. Suggested freqs.: cw 3535 7035 14025 21035 28035, phone 3985 7285 14285 21385 28585.

Illinois QSO Party, tenth annual, sponsored by the Radio Amateur Megacycle Soc. Inc., K9CJU, starts 2000Z Nov. 4 and ends 2400Z Nov. 5. The same station may be worked and counted for a QSO point on each band/mode. Ill. stations score 1 point per QSO with any station. Outside stations work Ill. only. To score, Ill. stations multiply total QSO points by the sum of states, including Ill., VE provinces and countries (including USA). Others use Ill. counties for mult. Bonus multipliers may be counted for working the same Ill. county. Each group of 8 contacts with the same county counts as an extra multiplier (10 QSOs = 1, 16 QSOs = 2, etc.). USA, Canada, Hawaii and Alaska count as country multipliers and Hawaii/Alaska count again as state multipliers. Ill. stations send QSO no., RS(T) and county, others substitute state/province or country for location. Look for activity near 3560 3735 3900 7060 7175 7260 14060 14275 21060 21100 21360 28060 and 28660 kHz. Appropriate certificates. Logs must clearly show dates/times in GMT, stations, exchanges, bands, modes and claimed score. A separate summary sheet should indicate single or multipl., name and address of operator in block letters, QSO points, multipliers and claimed score. Logs must be postmarked no later than Dec. 1. Send to the RAMS, 3620 N. Oleander Ave., Chicago, Ill. 60634. Include a business size s.a.s.e. with your entry if you want a summary of the contest results.

6-12 **QRP, second annual QSO Party** starts 1300 GMT Nov. 6 and ends 2300 Nov. 12, open to all. Members exchange RST, state, province or country and QRP no., non-members substitute non-member and power (in lieu of QRP no.). Suggested freqs.: 1.8-2, 3540, 7040, 14065, 21040 and 28040. Stations may be worked once per band for multiplier points. Member contacts count 2 points, non-member contacts 1 point. Power multipliers; for less than 1/2 watt power output X 15, less than 2 watts output X 10, less

than 5 watts output X 5, 5 watts or above X 1. Scoring: points X states/countries X power multiplier = score. Appropriate awards. Logs must be readable, show date/time, exchanges, bands, emission type and power used. The cover sheet should describe the equipment, show computations and include your statement that all rules were observed. Logs must be postmarked by Dec. 4 and sent to the contest chairman, Earl R. Lawler W5JLY, Rt. 2, Box 24-K, Burnet, TX 78611.

10 **WIAW Qualifying Run**.

10-11 **Trillium Contest**.

11 **Frequency Measuring Test**, open to all, begins with a callup at 0130 and 0430 GMT October 11. (Remember, this is the evening before, local time!) The periods for measurement start at 0137 (80 meters), 0145 (40 meters) and 0153 (20 meters); for the late run, 0437, 0445, and 0453, respectively. Each measuring period lasts 5 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 frequency measuring laboratory). Tell how many readings you took to form your averages. Approximate frequencies for the early run are 3530, 7030 and 14,103. Late run frequencies are 3548, 7050 and 14,057 kHz. Your report must be RECEIVED by November 22 to qualify for the QST report of the competition. WIAW will start transmitting the official readings November 23.

11-12 **SS phone**, rules this issue. **Space Net Vhf Contest** (commemorating Apollo 12) local time 6 pm to 6 pm, single or multipl. Three power classes with trophies for each. Each complete QSO counts 2 points, zip codes are the multipliers. All modes of operation except repeaters. Each contact on a different band counts, however the zip code counts just once. All stations submitting a log will receive a participation certificate. Logs must be postmarked no later than Dec. 2. Send to Tony Slapkowski, WB2MTU, Box 909, Sicklerville, NJ 08081.

DECEMBER

2-3 **Lone Star QSO Party, Telephone Pioneers QSO Party**.

9-10 **160-Meter Contest, Spanish Contest**.

31 **Straight-Key Night**.

Jan. 6-7: VHF SS

Jan. 27-28: Simulated Emergency Test

Feb. 3-4: DX Competition, phone

Feb. 3-ll: Noice Roundup

Feb. 17-18: DX Competition, cw

QST

Strays

The Royal Society of Cosmophonists (Stray, page 101, March 1971 QST) have a new certificate, "Worked All Cosmophonists," which requires only that a station work two or more of those fabulous machines, the Cosmophone, which was a complete amateur station using dual bi-lateral receiver-transmitter operation (Recent Equipment - QST, June 1958), probably well ahead of its time.

If you're eligible and interested, apply to Dave Bell, W6BVN, P.O. Box 73, Altadena, California 91101, enclosing 25 cents (foreign, 2 IRCs). By the way, membership (it's free!) in the Society is still available. So if you are an owner, former owner, or among the elite group of amateurs who really understand how those fabulous machines actually work, apply to W6BVN.

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



YL news and Views

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

What Turns Us On?

IT TAKES ONLY a flick of a finger to turn on the rig, to move the dial and "taste the band" for the type of conditions, to dip the final, and dive into the particular activity that we like best.

It can be contest operation. There is excitement when the band is hot and we are logging like catching fish in a barrel, or fighting for each and every point in the log. As we log out we hear some faint signal calling us and it turns out to be the section we were missing. We light up like a Christmas tree when we acknowledge.

For some it is the precise formality of traffic activity with rigid attention to procedure. The deftness of a net control moving us up and down like chess men. The thrill of working a crack operator with no lost time over waits, delays, or unnecessary chatter.

There is the siren song of DX and those prefixes that mean another country heard from when the QSL arrives. That challenge of reaching out to some new place and finding a common interest with someone half a world away is the one thing that many of us feel is what amateur radio is all about.

To others there is nothing quite like the high tension operating during an emergency that builds as we work in extraordinary sessions of longer hours until our throats and voices are raw and hoarse. Or, we find the code is becoming a meaningless blur as we attempt to keep open that lifeline of any community - communications between some disaster stricken area and badly needed assistance.

Cw operators begin to glow like a thousand-watt bulb at the increasingly rare sound of a hand

* YL Editor, QST. Please send all news notes to WB6BBO's home address: 1036 East Boston St., Altadena, CA 91001.

key being used. They revel in working a good fist with spacing so defined that even though the speed is above our limit there is little trouble reading it. Those voices with crisp, clear diction, and operating ease that is as comfortable as a personal visit make rag chewing as delightful as a gourmet dinner.

There is a special appeal to most of us in the Novice bands, crowded as they are. We find a certain nostalgic pleasure in working there, and in hearing a call and answering because we too have walked that road, and know what it means to have someone talk to us who is not another Novice. Hearing those familiar words "You are my first contact for YLCC," isn't amusing. It is a pleasure to send that QSL and wonder how long before the next YL will add a feminine touch to radio for that Novice.

We squeal like a fan meeting a movie star when we discover that our venture into ATV is not only working, but we actually have sent a picture 50 miles, with only eight watts and have a good report. Then we turn off into deep depression as we remember that we had our hair in rollers and probably scared everybody into switching to a new mode.

We do turn off, and fast when we run into poor operating. A CQ sent 10 times 10 won't get an answer from us. The character who chooses our net to tune and test will be indeed noted and remembered, but only because it is someone we don't want to know, or work.

The eternal lure of certificates that we haven't yet earned, the challenge of conditions that open up vhf for us to reach out farther than we ever dreamed, DX, contests, MARS, traffic, rag chewing, nets, what ever it is that turns us on, it is our special "thing." just turn the switch, and there it is waiting.



Remember the YLRL Convention? Here is the head table at the Birthday Luncheon. L-R: K7QGO, Mae Hipp, YLRL President; K6ELO, Roxanna Griggs, Convention Chairman; K6CKI, Irma Weber, Program Chairman; at the mike W6NAZ, Lenore Jensen, Mistress of Ceremonies at the Luncheon. (W2EEO photo)

QST for

For the first time at any convention there was a gal from each of the states in the MINOW Net. Back row (L-R): W7QYA, Montana; K7UVC, Idaho; K7QGO, Nevada; W7NJS (with wig) Oregon; W7WLX, Washington. Front row, seated: W7LXQ, W7HHH.



YLAP Mailing Dates Announced

The YLRL Anniversary Party logs must be postmarked no later than November 18, 1972, and be received by the custodian no later than December 3, 1972 in order to qualify for the awards. See QST, YL News and Views, September 1972 for contest dates and rules.

1972 Trillium Weekend Contest

The annual Trillium Weekend Contest will be held November 11, 1972, at 0030 GMT, through November 12, 1972, at 0030 GMT. Being the host club, the Trilliums will call "CQ TW." All other participants will call "CQ TOT." Exchange signal report, name, location; Trillium members will give their club number. Cw and phone contacts will each count 5 points. Low power multiplier of 1.25 for all transmitters running 150 watts cw, 150 watts a-m, 300 watts pep and under. Each Trillium station may be contacted twice. Example: One phone contact, and one cw contact on the same band; or, two phone contacts on different bands; or, two cw contacts on different bands; or one phone and one cw contact on different bands. Crossband operation not allowed. Cross mode operation is permitted. Logs must show date, time (GMT), RS or RST, band, mode, TOT number, as well as name, address, and claimed score.

A "bonus" of 100 points will be added for working ten (10) members of the Ontario Trilliums, and an additional 100 points for working twenty (20) members.

The non-member of TOT participating will receive a Trillium Plaque. The Ontario Trillium with the highest score will be recognized. All participants sending in a log are eligible for the "Lucky Draw" prize. Suggested frequencies: 3.855, 3.685, 7.240, 7.103, 14.280, 14.140, and 14.035 MHz. Members of TOT will operate all frequencies and modes of emission during the contest period.

All logs must be signed by the operator, and postmarked no later than December 31, 1972, and received not later than January 15, 1973. Contestants are requested to use standard log sheets or facsimiles. Send logs to the Contest Coordinator: Irene Williams, VE3BEI, 18 Montgomery Avenue, Agincourt, 742, Ontario, Canada.

Buckeye Belle Net Change

The Tuesday night Buckeye Belle Net has moved frequency to 3.980 MHz, at 8:00 eastern time on Tuesdays. Net Control station is WA8KMT, Edie Best. A Novice Net is being considered. If enough YL Novice operators are interested the frequency will be 3.7333 MHz. All those who wish to participate may indicate interest by writing K8CKI, Lillian Abbott.

K7UJV, 1972 Arizona Amateur of the Year

Helen Gibson, K7UJV, of Phoenix, Arizona, was honored as the 1972 Arizona Amateur of the Year, and presented with a plaque in recognition of her outstanding work.

Helen is one of the group that handles the phone patch at K7UGA between members of the Armed Services and their families. She is active daily in the Eyebank Net, has helped many blind persons not only to get their licenses, but also in setting up their stations set up and operating after the license was received.

A long time member of the Phoenix VHF Club, K7UJV is that club's representative in the Arizona Radio Council. YL News and Views congratulates Helen on her outstanding record of service to the public, and the well deserved honor.



When Jennie, WB4YNV, decided to join the amateur ranks the OM held a Conditional license. Not to be outdone by a YL, he now holds Extra Class. Jennie is a professional art student.



YL Nets

October is the return to full time fall and winter activities at home, as well as on the air. For the gals who have just stepped out of Novice Class, the YL Nets are a good place to become acquainted with other women operators, for the Net Directory shows a week full of Nets that can be fitted into any schedule.

Monday: Buckeye Belle, LARK, Loaded Clothesline, Alaska Lassies, Honey Bee.

Tuesday: Blueridge, Floridora, Novice, Jayhawker, MINOW, Ironing Board, Snowflake, Chix-on-Six, CLARA, Alaska Lassies, Buckeye Belles.

Wednesday: Yankee Lassie, Maritime Sparkettes, YL Welcome, Buckeye Belles, New Englanders, YL Open House, CLARA, Floridora.

Thursday: TYLRUN, TASYL, Working Girls Net, Tangle Net, PIYL, Buckeye Belles, Maritime Sparkettes.

Friday: Midwest YL, MINOW, Novice.

Saturday: Hawk Roost, Ontario Trilliums.

Sunday through Saturday: YLISSB.

There are bands and types of emission to suit everyone. Try them, you'll enjoy them all.

YLs and their OMs at the annual MINOW Net Picnic. Back row (standing L-R): K7UBC, K7PPV, K7UFY, W7GVG, W7QFR, W7LXQ, K7RRS, Jack, OM of K7RRS, K7NKZ, WA7FRO, W7NJS, W7HHH, friend of K7PVG, K7VSG, K7PVG, K7FHQ. Second row (kneeling) W7WLX, K7MFY, WN7TLI, WA7FRM, WA7KSD, WA7JFC. Front row (seated): Clarence, OM of K7TWC, Jeannie, daughter of WA7FRO/FRM, W7AZI, WA7GMX, Virginia, Mother of WA7KSD, K7NZO.

W2EEO, Madeline Greenberg

When the Greenbergs are at home it's Madeline, W2EEO, W2LH, Arthur, their daughter W2GPK, and son Martin, K2ACM. As if that weren't enough to almost call for a family "directory," they operate W2CYK (Arthur's former call) at their summer home at Wading Park, New York.

Off the air, Madeline enjoys swimming, gardening, needle point, photography, and all kinds of people. But when she's on the air, that "all kinds of people" comes first, because, says Madeline, "That's what radio is all about, people."

Licensed with Class B in 1950 (the same year that they acquired their summer home and station that is located in a DXer's dream spot), between the RCA sending and receiving stations, she soon got her Class A, and then she began to work. Madeline holds YLCC, has many citations for her public service operation in disasters and emergencies but is not a certificate hunter. She is a member of YLRL, and was formerly the Second District Chairman of that club. Also past president NYC-YLRL where she has been treasurer of this oldest of YL clubs for the past 15 years.

Recently Madeline and Art visited amateurs they had worked while on a Pacific tour. This past year Arthur was elected "Man of the Year" of their Synagogue, Congregation Hope of Israel.

Madeline is busy on 2 meter skeds with their daughter, as well as 75, and 20 meter operation.

QST

Hamfest Calendar

OCTOBER 1972

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Massachusetts - The NEDXCC Annual Meeting is Saturday October 7 at the Holiday Inn in Waltham, Mass. on Winter Street. A cocktail hour starts at 5:30 P.M. with dinner at 7:30 P.M. K9KNW is the guest speaker. Advance reservations are necessary; deadline October 2. Send \$10 check with s.a.s.e. to Jack Rosiello, K1KNQ, P.O. Box 95 Tpk. Stn., Shrewsbury MA 01545.

Michigan - The 18th Annual VHF Conference, Western Michigan University, Kalamazoo, Mich. is Saturday, October 21. Flea market, speaker from

Amsat, etc. For details write VHF Conference, P.O. Box 934, Battle Creek MI 49016.

New York - Chautauqua County FM Repeater Association is holding an auction October 15 at 11:00 A.M., Shores Acres Boat Yard, Bemis Pt. NY 14712.

Ontario - The KWARC RSO Convension is November 3, 4 at Kitchener, Ont. Meetings, exhibits, talk-in stations and ladies forums. Deposit of \$11 insures accommodations; deadline Oct. 21. Registration (OMS, \$4; YLs \$3; student hams \$2. Each \$1.50 higher at door) deadline is Oct. 31. Write KWARC, P.O. Box 812, Waterloo, ON.

Texas - The Texas YL Round-up Party for YLs, XYLs and OMs is November 3, 4 at Laquita Motel, 4023 South Walton Walker Blvd., Loop 12, Dallas, Texas. Registration deadline Oct. 15 (\$3.50); motel, single \$10; double \$12. Send reservations to Ruth Jones, K5GMI, 3440 Shady Hollow Lane, Dallas TX 75237.

Operating News

GEORGE HART, WINJM
Communications Manager
ELLEN WHITE, W1YL
Deputy Communications Mgr.
ROBERT L. WHITE, WICW, DXCC
GERALD PINARD, *Training Aids*

Getting It Right. You've heard of "murdering the King's English"? Some of us murder the ARRL's recommended operating procedures, in amateur circles just as popular an indoor support as murdering the language is among the general, saner, populace. Along lines of "some sense and some nonsense," let's look into a few horrible examples.

QRU. Most of the Q signals have an affirmative answer when used with a question mark. But the answer to QRU? is negative. Among traffic operators especially, we've heard this one murdered many times. QRU? does not mean "Are you clear of traffic?" and the affirmative reply does not mean "I am clear of traffic." It means "Do you have any messages for me?" and the answer means "I have no messages for you." So if someone gives you QRU? and you answer affirmative (not R!), he might tell you to g.a. with your traffic. Usually, however, both parties use the signal incorrectly. We're about to turn grey from hearing NCSs say QRU?, answered C by the net station, whereupon the NCS says QNX.

Roger. What this pro-word is doing in our amateur phone lexicon we don't rightly know, but it's there and it means "received." That's *all* it means. It doesn't mean yes, correct, I confirm, I agree, I will comply, or anything like that. It just means you have received the transmission completely and correctly. So if someone asks you if something is correct, if you'll be home tonight, if you'll do him a favor, don't say "That's a Roger" (yecch!). Answer the question! Similarly, on cw R means "received," nothing else!

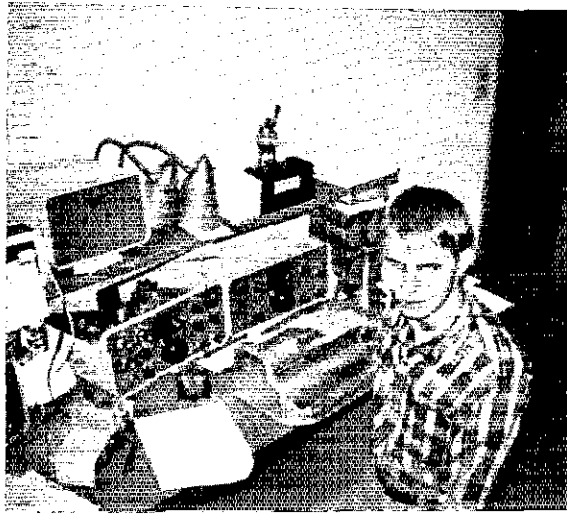
Precedences. A small thing, but one we can't seem to get across: the message precedence is not part of the number. It's a separate and distinct part of the preamble. Thus, on cw you say NR 1 R, not NR 1R, and on phone you say "Message Number 1, routine," not "message Number 1 routine." When referring to the message by number (in a service message or otherwise), leave out the precedence. *It's not a part of the number!*

"Morse" Code. According to WINF, our radio code is not the "Morse" code. Morse's code was the landline code used in the U.S. only, and it is improper to refer to the code we use as "Morse." The ARRL *Operating Manual* (p. 29) seems to bear this out. Our code is the International or Continental Code. Not Morse.

Ending Signals. It's terrible the way the ARRL ending signals are murdered! Properly used and widely understood they might avoid much QRM on our bands. Many cw stations use AR K (usually dragged out) as the ending of any transmission. It means, literally, "I am calling a specific station, only that station should answer, others keep out. Any station please answer." Now you can't get much more self-contradictory than that! You also hear AR after a CQ, which means only specific station answer (at the end of a general call to any amateur?). Phone ending signals take a beating, too. Use "over" after calling somebody, "go" after a CQ, "go" associated with "only" to a specific station.

Let's do it right, gang. There are lots of ways to express your individuality in ham radio, but

Here's ORS KØDDA (shown operating portable No. Dak. in last April's Party). Lloyd generally is active on cw from Iowa. WAØMLE says that's a braille writer Lloyd has his right hand on. The "box" and SWR bridge allow him to tune any rig without help. Not visible is an alarm clock with the face removed for telling time. Logs were transcribed from Braille to typewritten sheets after the contest. At present Lloyd has devised no way of keeping a check sheet and must rely on his memory. In a CD Party that's a real task and sometimes causes dupes. Dave (MLE) says they've been trying to come up with a system to avoid dupes but no luck so far. Your suggestions would be appreciated.



WIAW SPRING-SUMMER SCHEDULE

(April 30-October 29)

(The specific frequencies shown below are approximate and indicate general operating periods)

The ARRL *Maxim Memorial Station* welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M.-1 A.M. EDST, Saturday 7 P.M.-1:00 A.M. EDST and Sunday 3 P.M.-11:00 P.M. EDST. 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 May 29, July 4, and September 4.

Times/Days GMT	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000		←----- CW BULLETIN ¹ ----->					
0020-0100 ⁴			3.7 Nov. ⁵	14.080	14.080	7.15 Nov. ⁵	14.080
0100		←----- PHONE BULLETIN ² ----->					
0105-0130 ⁴			3.990	50.190	145.588	1.820	21.390
0130		←----- CODE PRACTICE ³ (35-15 wpm TThSat, 5-25 wpm MWFSn) DETAILS BELOW ----->					
0230-0300 ⁴			3.580		1.805		3.580
0300	RTTY BULL. ³			RTTY BULLETIN ³			
0310-0330 ⁴			3.625	14.095		14.095	3.625
0330	PHONE BULL. ³			PHONE BULLETIN ³			
0335-0400 ⁴			7.290	3.990	7.290	3.990	7.290
0400	CW BULL. ³			CW BULLETIN ³			
0420-0500 ⁴			3.7 Nov. ⁵	7.080	3.990	7.15 Nov. ⁵	3.580
1300		←----- CODE PRACTICE ³ (5-25 wpm MWF, 35-15 wpm TTh) DETAILS BELOW ----->					
1700-1800		21/28 ^{sew} ⁷	21/28 ^{ssb} ⁸	21/28 ^{sew} ⁷	21/28 ^{ssb} ⁸	21/28 ^{sew} ⁷	21/28 ^{ssb} ⁸
1800-1900		14.290	14.080	14.290	14.080	14.290	
1900-2000		7.080	7.290	14.095	7.290	7.080	
2000-2030		21/28 ^{ssb} ⁸	21/28 ^{sew} ⁷	21/28 ^{ssb} ⁸	21/28 ^{sew} ⁷	21/28 ^{ssb} ⁸	
2030		CW BULL. ¹		CW HULL. ¹			
2100-2130		7.15 Nov. ⁵	21.1 Nov. ⁵	7.15 Nov. ⁵	21.1 Nov. ⁵	7.15 Nov. ⁵	
2130		RTTY BULL. ³		RTTY BULL. ³			
2200		CPN ⁶	7.095 ⁴	3.625	14.095 ⁴	CPN ⁶	
2300			6N ⁵	RTTY BULL. ³ (CN ⁹)			
2330		←----- CODE PRACTICE (10-13-15 wpm) DETAILS BELOW ----->					

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, 21.390, 28.590, 50.190 and 145.588 MHz.
³ RTTY Bulletins sent at 850 Hz shift, repeated with 170 Hz shift, on 3.625, 7.095, 14.095, 21.095, and 28.095 MHz.
⁴ Starting time approximate, following conclusion of bulletin or code practice.
⁵ WIAW will tune the indicated bands for Novice calls, returning the call on the frequency on which called.
⁶ Participation in section traffic acts.
⁷ Operation will be on one of the following frequencies, 21.02, 21.08, 28.02, 28.08 MHz.
⁸ Operation will be on one of the following frequencies: 21.270, 21.390, 28.590 MHz.
 Maintenance Staff: W1s, Q1S, WPR, YNC.

WIAW CODE PRACTICE

WIAW 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	GMT
10-13-15	7:30 PM EDST dy 4:30 PM PDST	2330 dy
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- 9:00 AM EDST TTh 1300 TTh
20-15 6:00 AM PDST

The 0130 GMT 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 WIAW (but not over the air!), and to allow checking the accuracy of your copy on certain tapes, note the GMT dates and QST practice text: (from the issue 2 months previous) to be sent in the 0130 GMT practice on the following dates.

- Oct. 6: It Seems to Us
- Oct. 10: Correspondence
- Oct. 16: League Lines
- Oct. 26: ARPS
- Nov. 1: World Above
- Nov. 6: YL News

devising your own operating procedure isn't one of them.

That Exclamation Point Again. We are still getting letters about what we should use for an exclamation point. So far, it has been virtually impossible to match up any two of them, so we're still out at sea. A recent suggestion seems to us to have a lot of merit, though. Since so many oldsters can't get out of the habit of using MIM, even

though it's now officially a comma, let's keep right on using it, with the context determining its meaning. If it comes at the end of a sentence, it's an exclamation, since one never uses a comma there. If it's by itself, or after a single interjection (ouch! wow! hmmm! arrgh!), it's similarly an exclamation. But if it's in the middle of a sentence, it's got to be a comma. Will that get us off the hook? Sorry we ever brought it up MIM. -- WINJM.

Countries List Criteria. The ARRL Countries List is the result of some 34 years of progressive changes in DXing. The full list will not necessarily conform completely with these criteria since some of listings were set up and recognized from pre-WWII. While the general policy has remained the same, specific mileages and additional points have, over the past 13 years, been added to the criteria. The specific mileages in Point 2(2) and Point 3, mentioned in the following, have been used in considerations made in April 1960, and after. The specific mileage in Point 2(b) has been used in considerations made in April, 1963, and after. Point 4 is an additional point now being added on recommendation of the DX Advisory Committee.

Any land area in the world, with the exception of such land that would come under Point 4, can be placed in one or more of the following categories. Where the area in question meets at least one of the points in the criteria it may be considered eligible as a separate entity, i.e. a country, for our Countries List.

1. *Government/Administration:* An area by reason of Government or a distinctively separate administration constitutes a separate entity.

2. *Separation by water:* An island, or a group of islands, not having its own government or distinctively separate administration, is considered as a separate entity under the following conditions:

(a). Islands situated off shore from their governing or administrative area must be geographically separated by a minimum of 225 miles of open water. This point is concerned with islands off shore from the mainland *only*. This point is *not* concerned with islands which are part of an island group or are geographically located adjacent to an island group.

(b). Islands forming part of an island group or which are geographically located adjacent to an island, or island group, which have a common government or administration, will be considered as separate entities provided there is at least 500 miles of open water separation between the two areas in question.

3. *Separation by foreign land:* In the case of a country, such as that covered by Point 1, which has a common government or administration but which is geographically separated by land which is foreign to that country, if there is a complete separation of the country in question by a minimum of 75 miles of foreign land, the country is considered as two separate entities. This 75 miles of land is a requirement which is applicable to land areas *only*. In cases of areas made up of a chain of islands, there is no minimum requirement concerned with the separation by foreign land.

4. *Unadministered area:* Any area which is unadministered will not be eligible for consideration as a separate entity. - *WICW*

CAC and the Sweepstakes. Just recently the Contest Advisory Committee (SS sub-committee chairman WIBGD) completed a study of the

New A-1 Operators, July 1972

W1CT W5CZJ W5ITA W5ZPD W7AZG
W7GHT W8IRG WA9BVL W9JR WA9OBR
W9SDK K9SFQ W9ZIB DK8FD SP1LX
VE6YL ZS6YK.

November SS. Part of the study included a random poll of those participating last year. An attempt was made to select an equal number from each call area, mode, and power class. The returns, plus additional CAC input, resulted in a recommendation to Hq. (adopted by the Awards Committee), making permanent the exchange format used in 1971 and raising the power limitation for Class A from 150 to 200 watts dc input.

A cross section of comments and suggestions, not adopted but of general interest and worth some further comment by you, include: change the SS dates so that a free weekend appears between the phone and cw segments; create a new "Pacific" contest multiplier to include KJ6 KM6 KB6, etc. (separate from KH6); put RST back in the exchange; permit QSOs with the same stations on different bands; additional awards; change the exchange to signal report and section; rearrange the times; change the power categories to 3; incorporate an RTTY section.

The CAC welcomes your comments on these and other matters of contest interest. The committee chairman is W3GRF and members are: WIBGD W2EIF W4UQ K5TSR W6DQX WA9UCE W0HP VF2NV KH6LJ. Board liaison W4RFC, staff liaison W1YL. - *W1YL*.

DXCC Notes

Announcement is hereby made of the addition to the ARRL Countries List of *Mellish Reef*. Located at approximately 17 degrees 25 minutes South latitude and 155 degrees 52 minutes East longitude, Mellish Reef is territory belonging to Australia. This addition to the Countries List is made under Point 2(a) of the criteria. (See Operating News lead.)

Submissions for DXCC credits of confirmations for contacts with Mellish Reef may be made starting November 1, 1972. Confirmations for Mellish Reef credits received before November 1, 1972, will be returned without credit.

With this addition and the annulment and deletion which were announced in the September issue, the last position in the Honor Roll will be 312 deleted; as compared with 313 deleted in the last (September) Honor Roll listing. DXCC participants that can make the 312 deleted total may make submissions for Honor Roll credits in December.

DX CENTURY CLUB AWARDS

Radiotelephone listings follow the general-type "New Member" and "Endorsement" listings - July 1-31, 1972

New Members

WA5OYR	302	YU3TFA	139	K8VRZ	109	DL9AR	103	VE7BZC	101	SP8ALT	100
W6YUS	234	WB5BLF	137	KP4DLW	109	EA7OH	103	WB2RKK	101	VE1AHG	100
K3TUP	221	DL8EW	126	OZ5CI	108	OZ4HW	103	W4BGH	101	VE3DZV	100
PJ2VD	212	DL1NG	124	1JLSA	107	SL3BG	103	WB5BR	101	VE7BCP	100
OZ7JZ	185	DK6FT	119	WA3INW	106	W3ZBW/4	103	WA0UEK	101	W5QAM	100
VE3BMV	184	1JZMI	119	DL8UU	105	W4FLY	103	WB0BQG	101	WA3BPK	100
K8LJD	168	YU2CAW	118	K3WBJ	105	WB0CNY	103	YB3AAY	101	W5QAM	100
W7DV	168	G3VZN	117	K6UGS	105	CE3YO	102	G3DNF	100	WA5IPP	100
W7NXJ	162	DL2AA/W1	116	VE3RVD	105	OZ9HO	102	HB9AR1	100	WB5DLX	100
WA6CCK	161	K0ROF	112	W7GBL	105	WA1L1J	102	K3ZOL	100	W6RQJZ	100
W0DBC	152	WA2CWX	110	DL3BF	104	WA2RDP	102	K4JYS	100	WB9DRE	100
W4WOY	144	W6DZK	110	K6QS	104	WB5LQG	102	K7UOT	100	WB9GVW	100
ZL1IB	144	W9HC	110	W2FVJ	104	VE3DQT	101	KP4DJ	100	WA0TAS	100
WA5OYR	302	VE3BMV	153	DK6FT	111	W9HC	106	DA1SU	102	K3NEZ	100
CR7GJ	220	W7YTN	147	K2VTV	109	DK4CR	104	W1CWG	102	W2GFD	100
K2CJD	212	OZ4EZ	146	JA1ANG	108	JA6CJD	104	WA11TJ	102	W2MOY	100
OZ7JZ	178	WB2JYM	127	W90EQ	108	W3K1R	104	WB5EQO	102	WB4TPO	100
K8LJD	167	W7NXJ	120	WB5BLF	106	WB4PBE	104	W6LQY	101	WA6BCD	100
SM6BD	162					WA4TST	103			WA9TAA	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.

KH6CD	335	K6GAK	300	WA4HHW	260	W2MBU	220	K2QMF	180	WB9BGJ	160
PY1HX	335	K6HN	300	W5FL	260	W2PSU	220	K9BWO	180	CT1SH	140
Z56LW	335	ZL1ARY	300	WASRTG	260	W5LW	220	WA1JQC	180	JH1HDB	140
DL7HU	330	ZL3AB	300	W9YYG	260	W6Z7X	220	W2RHK	180	K2GBC	140
W2BHM	325	Z52RM	300	W0MAF	260	WA6JVD	220	WASWQF	180	K6BUU	140
YV5BX	325	K4CEP	290	K4AEB	250	WA6LLY	220	WASVMW	180	LA4YG	140
HB9PL	320	PY1DH	290	K4YXJ	250	W7NYO	220	WASZNY	180	VE3GHZ	140
K4MQG	320	PY2RW	290	K9VQR	250	W8FAP	220	WB5BFZ	180	WA2DNY	140
K6QH	320	WB2NYM	290	VE3GHL	250	W6PA	200	W6NPF	180	W3CFB	140
G3IOR	315	W8ZCK	290	W1EHT	250	G8QZ	200	W9AFX	180	WB4TUP	140
JA8ADQ	315	G3JOC	280	W3OLW	250	HK7UL	200	W9H1	180	WA5EMH	140
W2LNB	315	JA2PIC	280	W4WVG	250	JA1BA	200	WA9YFY	180	W91VB	140
W4ZXI	315	K6JR	280	WASUCT	250	K4NE	200	WA0PRS	180	W91JL	140
W0CPM	315	K0MAS	280	W80A	250	K8LUH	200	DL5QQ	160	WA9SVZ	140
YV5BZ	315	OP8RT	280	W48TNJ	250	OZ5CV	200	K1OME	160	W0CC	140
K4HJE	310	W3NV	280	HK3AVK	240	PY2GE	200	K6ZXS	10	K2VIV	120
K4THA	310	WA9JDT	280	JA2AH	240	W3SUV	200	VE7HO	160	OZ6AQ	120
W2NIN	310	EP2TW	270	W2DT	240	W5KFN	200	WA2BAV	160	W2GRR	120
W3BWZ	310	K6UFT	270	W4CZS	240	WA6MX	200	W4DWK	160	W4NZR	120
W0BL	310	OH2ST	270	W4DKI	240	WB6MVK	200	W5KOD	160	W4UAG	120
W0JX	305	WB2IEC	270	W4QMW	240	WA9UEK	200	WB6RKH	160	WA4VTB	120
W6FET	305	DI6RX	260	K2OHT	220	G3JFH	180	WA9AUM	160	W0BBW	120
W8DX	305	JA2KLT	260	OP1CP	220	11SZE	180	WA9ZAK	160	WA0GEW	120
K4HPR	300			W2YC	220						
EA2HX	320	CT1UF	280	K4AEB	250	ZS1DC	220	W7NYO	180	VE3FT	140
W0CPM	315	K3YBR	280	VE3GHL	250	JA1BA	200	CT17W	160	WA2DHF	140
ZL3NS	315	K6JR	280	W3HNK	250	K16HZF	200	OZ8MG	160	WB2ISJ	140
K4HJE	310	CR7IC	270	W4LXL	250	PY2GE	200	W1KSN	160	WB4MKB	140
ZL3OY	310	K3PDC	270	W6FET	250	5R6AW	200	W1RYB	160	WA5EMH	140
PY2DYI	305	K0WXX	270	W9KXK	250	VE6MJ	200	WA1JQC	160	WASVMW	140
W0JX	300	YV4QQ	270	ZL1ARY	250	W3PSU	200	WA6ROU	160	K6ZXS	140
JA8ADQ	300	YV5CIL	270	JA2AH	240	WASRTG	200	WB6RKH	160	WA8GPX	140
W1JWX	300	DL8PC	260	W4CZS	240	WA6LLY	200	W7BRU	160	WA9SVZ	140
WB1TD	300	JA2PIC	260	WA8LUC	240	WB6MVK	200	WA9ZAK	160	WB9BGJ	140
YV4UA	300	WBAB	260	WA9VGY	240	I2ADN	180	W0AUB	160	W0MAN	140
ZL3MN	300	WB2FMK	260	JA2KLT	220	K8LUH	180	YV4YL	160	G3XPM/W1	120
LA4LH	290	WB2IEC	260	K2OHT	220	K9BWO	180	HK3LT	140	K9GEL	120
JA1UCA	290	W0BN	260	W2WNW	220	VE2JH	180	K2AAC	140	VE2ITG	120
W1QQO	290	ZL3AB	260	WASUCT	220	W1TPK	180	LA4VG	140	WB5DJA	120
W3MP	290			W6ZYC	220	W5PL	180			W0BBW	120

SLM 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 signs should be included with the petition. It is advisable that a few extra full-member signatures be obtained, in case 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, AHHL (Place and date)
225 Main St., Newington, Conn. 06111

We, the undersigned full members of the AHHL 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, WLNJM, Communications Manager

Section	Closing Date	Current SCM	Present Term Ends
N.N.J.	10/9/72	L.J. Amoroso, WZZZ	12/9/72
S.Cex.	10/9/72	F.L. Urey, K5HJR	12/10/72
Mich.	10/9/72	L.J. Olinghouse, W8LBT	12/10/72
Idaho	10/9/72	D.A. Crisp, W7ZNN	12/10/72
Mid-DC	11/10/72	K.R. Medrow, W3FA	1/1/73
Miss.	11/10/72	W. Coffey, W5N'CB	1/2/73
N.H.	11/10/72	R. Mitchell, WLSWX	12/1/73
Alberta	11/10/72	D.A. Sutherland, VE61 K	1/10/73
Ark.	11/10/72	J.N. Lowrey, WA5VWH	1/11/73
S.F.	11/10/72	*T.A. Gallagher, W6NUT	
Sask.	11/10/72	*W.H. Parker, VF5CU	
Ala.	11/10/72	J.A. Brashear, Jr., WB4EKJ	1/28/73
Colo.	12/11/72	C.O. Penney, WA0HLO	2/14/73

*Acting SCM

B. Opeden, VF5BG - Sask. (resigned 6/30/72)

H. R. Littlefield, W6WLV - S.I. (resigned 7/21/72)

SCM ELECTION 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.

West Indies	P. Piza, Jr., KP4AST	7/11/72
S.C.	J.H. Abercrombie, K4HMS	8/26/72
Minn.	C. Schroeder, WA0VAS	9/11/72

Balloting results: In the San Francisco Section of the Pacific Division, Mr. Harold R. Littlefield, W6WLV and Mr. Thomas A. Gallagher, W6NUT were nominated. Mr. Littlefield received 129 votes and Mr. Gallagher received 104 votes. However, Mr. Littlefield could not accept the office because of ill health.

In the Montana Section of the Northwestern Division, Mr. Harry A. Roylance, W7RZY and Mr. Robert E. Leo, W7LR were nominated. Balloting results:

Balloting results: In the San Francisco Section of the Pacific Division, Mr. Harold R. Littlefield, W6WLV and Mr. Thomas A. Gallagher, W6NUT were nominated. Mr. Littlefield received 129 votes and Mr. Gallagher received 104 votes. However, Mr. Littlefield could not accept the office because of ill health.

In the Montana Section of the Northwestern Division, Mr. Harry A. Roylance, W7RZY and Mr. Robert E. Leo, W7LR were nominated. Mr. Roylance received 98 votes and Mr. Leo received 84 votes.

"Open" CD Party -- High-Claimed Scores

Scores are up again in this third annual July "Open" CD Party. K2KIR, who took the top cw spot in both previous parties, was displaced from his lofty position by arch-rival K2KTK operating W2AII. Dick's 373K performance marks a new cw high. On phone, W9YT manned by K9LBQ topped all other entrants by a comfortable margin. His score falls just short of the record 423K set by W6HX in last year's open party.

In past parties multipliers have been easier to come by on phone, but not so this time. With the help of K5ABV/KL7 and W6BIP/VE8 all sections except Canal Zone were represented on cw. Unfortunately phone men found these sections lacking.

Our deadlines for the CD Party scores are very tight and we are sticking close to our received deadline of the 15th of the month. Mail your entry as soon as possible after the event to insure that we get it on time.

The following high-claimed scores are those received at Hq. by August 15. From left to right are shown the call, claimed score, number of contacts, number of multipliers and operating time.

- WA1PID

W2AF (K2KTK, opr.)	K1ZND	366,120-1010-72-20
373,700-1003-74-20	W9YT (K9ZSE, opr.)	
K2KIR	367,555-1000-73-20	340,920- 947-72-20

W8UM (W8IAW, opr.)	339,085- 923-73-20	W2SZ (WB2EEL, opr.)	371,880-1033-72-20
W8SH (W8VBV, opr.)	338,925- 955-71-20	WA1JLD	367,780-1036-71-20
K4PUZ	336,330- 902-74-20	WA0TKJ	310,450- 884-70-20
W6DGH	325,440- 897-72-19	W6HX	268,560- 746-72-20
W1FBY	303,455- 873-69-17	WA5RXT	263,840- 776-68-17
WASLE	301,700- 857-70-20	K3JYZ (WA3IAQ, opr.)	237,495- 665-71-15
K6FBB	295,650- 806-73-18	W8FDU (WA3BGE, opr.)	221,200- 627-70-14
WA1PID	290,745- 816-71-19	WA3GJU	192,100- 565-68-10
K4SXD	282,100- 800-70-20	WA3RDU	190,400- 556-68-17
WA1ABW	279,650- 792-70-20	K4BAI	174,850- 531-65-14
WBRAKW	276,480- 768-72-20	K6CPH	173,880- 499-69-13
W3IN	265,305- 763-69-17	WB4SON	166,650- 501-66-16
WA91PV/7	262,345- 739-71-17	W2DKM	149,400- 446-66-
K4BAI	255,240- 702-72-18	WB4OGW	143,350- 366-61-16
W82RKK	245,305- 684-71-20	K4SXD	137,940- 412-66- 8
W6ZVC	243,780- 712-68-20	WA3PI P	133,095- 465-57-18
K7NHV/7	220,800- 633-69-17	K3HXS	130,240- 407-64-16
WA5ZWC	213,150- 603-70-17	W2JSL	129,150- 407-63-19
WA6KZI	208,250- 588-70-18	W8MRC	125,800- 365-68- 6
W7MFO	205,020- 601-68-20	WB8AYC	124,992- 409-62-15
WA2MPC	199,680- 619-64-18	W6DQK	124,285- 371-67-16
WA1NNC	199,660- 592-67-20	WA1PHD	122,670- 420-58- 9
WA2SRQ	193,920- 600-64-18	W3IN	121,550- 368-65- 8
WB4SGV	191,450- 541-70-16	WB4ONP	121,520- 427-56-12
WA6DJI/6	191,130- 554-69-20	W8P/GV/Ø	118,340- 388-61-12
WB4DGV	190,950- 563-67	WA0TAQ	118,125- 371-63-18
K6QPH	187,770- 564-66-11	K7NHV/7	117,440- 360-64- 7
WA2LAH	187,600- 554-67-11	WB2CST/2	116,870- 374-62-20
VE4EA	185,590- 550-67-15	WA6HT	112,455- 354-63-11
W5ONY/VE3	182,575- 341-67-15	KH6RS (K2SHI, opr.)	109,620- 341-63- 8
W2I VS	180,230- 533-63-15	WB0AMJ	108,120- 318-68-14
W8LT (WBKLP, opr.)	171,700- 501-68-17	W82RKK	106,020- 365-57-14
W2AZO	171,600- 523-65-20	K4PUZ	101,750- 400-50-10
K6VNX	169,510- 503-67-17	K3ANA	100,300- 336-59-10
WB2AEH	169,290- 513-66-16	W7GHT	100,040- 322-61- 9
W3GRM	167,050- 509-65-17	W01YP	92,400- 323-56- 3
K0ZXE	163,800- 500-65-18	WA4JQS	92,300- 284-65- 8
W7GHT	160,650- 453-70-15	WA1ABW	90,190- 304-58- 7
W4WHK	159,950- 452-70-17	W21UK	86,070- 295-57- 5
W5SQV	159,390- 483-66-20	W5QCG	83,700- 272-60-14
WB2REF	158,400- 495-64-20	WA2MPC	82,945- 308-53- 6
K7LTV	156,750- 468-66-17	W8NHO	76,250- 245-61- 6
KIACB	156,285- 453-69-16	K9UJL	75,640- 244-61-14
K1QHD	147,350- 417-70-16	WA2CWX	74,530- 253-58-11
WA71SP	145,520- 423-68- 9	W5QNY/VE3	72,960- 252-57- 5
K0AZJ	144,210- 414-69-12	W1LMOW	67,620- 291-46-10
WA2LUO	143,325- 436-65-13	W8DOR	66,650- 212-62-17
W8PBO	140,910- 421-66-17	WB4N0/4	66,405- 233-57-12
K1YKT/1	140,160- 432-64- 7	W8PJP	66,040- 254-52- 2
K4JM	137,920- 426-64- 9	WA0VHX	65,195- 221-59-10
W5QG7	137,025- 428-63-14	WA6NGO	64,670- 218-58-12
W2BHP	136,825- 416-65-20	VE4EA	64,310- 214-59- 5
W3GN/8	133,610- 424-62-17	WA9AUM	63,450- 229-54- 5
W01YP	130,240- 400-64- 7	W9CUU	62,930- 213-58-12
WA5WZA	125,450- 386-65-13	W6TDT	61,320- 214-56-11
W0LO	124,745- 409-61-17	W3GN/8	60,900- 203-58- 9
W3ADI	124,160- 381-64-16	W1DGL/1	59,925- 250-47-10
WRTZZ	122,220- 388-63-20	W2ZQ (K3CPF, opr.)	59,250- 237-50-12
K3HXS	121,500- 405-60-16	WA2SRQ	58,045- 241-47-10
WASZKE	120,655- 402-59-13	W5WG	58,025- 211-55-18
WSTES	116,800- 360-64-20	WALUY	56,250- 221-50- 5
WB4QNP	116,280- 401-57-13	WA2RIU	55,200- 227-48-13
WBKJAJ	114,460- 384-59-20	WB4SGV	54,960- 223-48-10
WA0MLE	114,235- 335-67- 7	W5WNU	54,860- 211-52- 6
WB9CGL	112,530- 363-62-20	WA1LWQ/1	52,785- 207-51- 5
W6NUT	111,935- 366-61- 7	WB2LQW	52,430- 211-49-20
WB4SVH	108,900- 357-60-12	WB2REE	52,250- 209-50-14
K4VEY	108,410- 287-74- 8	WA6DQ	52,205- 197-53-13
K3ANA	107,970- 350-61-10	K1AGB	52,000- 200-52-10
W4MXX/Ø	107,730- 335-63-13	W8PHTZ	51,840- 192-54-12
WA9AUM	107,665- 347-61- 7	WB2UC	50,875- 180-55- 8
K0AEM	106,500- 350-60-14	WB5DFX (W55 JMK UCT)	397,440-1104-72-20
K7QFG	104,940- 318-66-16	K5TSR (+WA3GRU)	260,750- 740-70-13
WB4HUS	103,545- 345-59-11	W1AW (K1ZND + WALPID)	232,875- 675-69-10
VE3BYD	102,125- 345-65-17	W4KCV (WB4S BAP SVH)	118,200- 394-60-12
WBSEPO	102,080- 315-64-12		
K9LGD/9	101,400- 334-60-13		
W1DGL/1	101,175- 350-57-10		
WA0TAO	100,130- 319-62-15		
K3JYZ (WA3S ECF IAO)	230,100- 704-65-15		

PHONE

W9YT (K9LBQ, opr.)
422,910-1136-74-18



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, W3DKK SEC: WA3DUM. RM: W3EEB. PAM: WA3GSM. Del. PSRR this month to WA3GSM, K3KAJ and WA3DUM. W3EEB ranked 2nd on MDD 71-72. QNS report with 328 and WA3GSM at 278 and WA3DUM at 160 made top quarter. The Del. Traffic Net is on Mon.-Fri. at 6:30 local time on 3905 kHz and looking for more Kent Co. stations. SQUJLCH, the Lower Del. Newsletter published by W3ZNF has a new format. Two-meter fm activity continues to increase with repeaters at Wilmington on 146.13-73 and Delmar on 146.22-82 and Army MARS conducting final tests on their Wilmington unit. WA3ID, WA3BAO, WA3OND/3 and W3BHG all worked K1SAG in Carolina, R.I. on 2-meter am. W3DKX presented a program, "The Amateur as a Communicator" at the First State ARC July meeting. Net reports: DFN QNI 117, CTC 42, DEPN QNI 58, QTC 2. Del. 2-meter Net QNI 20. Traffic (July) WA3QUU 306, WA3GSM 124, K3KAJ 57, W3DKX 38, WA3DUM 33, W3EEB 20, (June) K3NEZ 2.

EASTERN PENNSYLVANIA — SCM, George S. Van Dyke, Jr., W3HK — SEC: W3BF. RMs: W3EML, K3BR, K3MVO, WA3AFI, K3PIE, W3CDR. PAMS: K3BHU, WA3PLP. OBS reports from W3ID, WA3AFI, WA3QOZ, WA3JEC, WA3LWR. OVS reports from W3CL, WA3BIV, W3ZRR. OO reports from W3RFF, K3RDF, K3OIO, WA3ERC, W3ZD. RPLs: WA3OGM, W3VR, W3CUL, W3EML, WA3QOZ. PSRR: K3OIO, K3BR, WA3OGM, WA3GYT, WA3QOZ.

Net	KHz	Operates	QNT	QTC	RM/PAM
PEEN JUN	3960	M-F 5:30 P	457	208	K3BHU
PEEN Emerg	3960	Duration Emerg	1484	638	K3BR
EPA	3610	Dy 7:00 P	272	126	WA3AFI
PTTN	3610	Dy 6:30 P	149	87	WA3PLP
EPAPN JUN	3917	Dy 6:00 P	305	93	WA3PLP
EPAPN Emerg	3917	Duration Emerg	843	563	WA3PLP
EPAPN	3917	Dy 6:00 P	387	149	WA3PLP
LEN	3733	Dy 6:30 A	156	175	WA3QOZ

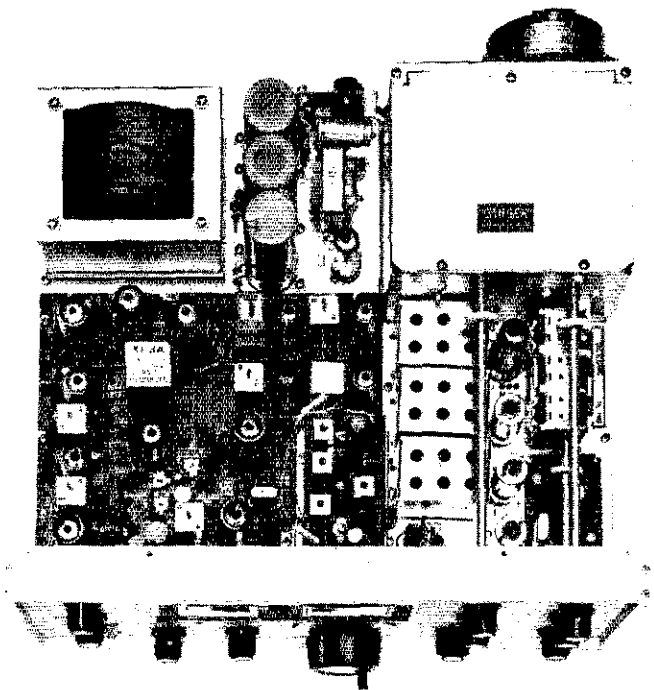
Because of the recent emergency some net reports were a little late. Above lists current month, last month and a separate listing for the emergency. WA3QOZ still putting out a very nice net bulletin. The following hams from York did yeoman duty during the flood emergency: W3AXA, K3IOB, K3BWB, K3NVI, WA3EXC, W3HYH, W3EDU, K3ZTT, K3POR. W3HUS was able to maintain contact with W3JAK/MM from ON4 through KZ5 on up to KG6. W3OU reports back to normal, only convention TUC! WA3QOZ had extended vacation in Maine, K3WEU is back in 6Y5-land, W3EML reports some of the cw lads look good for TCC positions, W3ADE broke 100K in CD first time! W3BNR in CD party first time in years, W3EU hit (this rig) by lightning, W3LC had to return early from European trip due to illness, W3LD says CD worked out well during emergency. Nearly everyone is reporting 2-meter fm activity up. Hope all the outside repairs have been completed, almost too late now. Traffic: (July) W3CUL 2404, WA3QOZ 925, W3VR 808, W3EML 622, WA3OGM 322, K3BR 230, K3OIO 93, K3PIE 75, WA3ATO 69, WA3AFI 60, WA3OFN 43, WA3GYT 40, WA3CKA 34, WA3EEC 31, K3MVO 30, W3VAP 29, WA3KWU 24, W3CBH 19, WA3MQP 19, WA3LWR 15, W3CE 11, W3HK 9, W3ADE 8, W3BDR 4, WA3BJO 2, W3BNR 2, W3EUI 1, W3GMK 1, W3HUS 1, W3ID 1, K3KNL 1, W3LC 1, W3OML 1. (June) W3CUL 1969, WA3EML/3 925, K3PIE 406.

MARYLAND-DISTRICT OF COLUMBIA — SCM, Karl R. Medrow, W3FA — SEC: K3JFD. RM: W3EZZ. PAM: W3FCS. MDD 3643 MHz daily 7 P.M. and 9:45 P.M. local time; MDCNTN 3920 MHz. TTSS 6 P.M. local time; MEPN 3920 MHz, MWFF 6 P.M., SS 1 P.M. local time. One BPL man for July WN3RCI. New

appointments: WA3IYS and WA3JSZ as Class 1 OOs. Renewals: W3GN as OVS; WA3IYS as ORS and K3STU as Class 1 OO. MDD held 62 sessions, 474 check-ins and QTC of 240. MDCNTN held 18 meetings with QTC of 26 and ANI average of 11.6. MEPN changed net managers with W3LDD taking over from K3IAG. W3EZZ reports the late MDD session almost equals the early one in all respects. W3ABC has 2 months duty in HCl, but teams up with WA3FUM to activate HDR for a rare one. WN3RME is now an Advanced under the new call of WA3SAD. W3AIO is going after all am-phone WAS. W3TIN is doing No. Carolina, WN3RCI is after that BPL medallion and an upgraded ticket. W3OKN takes his R&R in VEL. W3QU exercised the repeaters in Vt. and Maine, WN3RIY has discovered the joys of DX, WN3PRP claims his homebrew 40-meter rig is the best on the air, WA3HHK is busy with summer chores. W3FZY has an upcoming exotic trip to the Orient. WA3IYS says he is contacting deviants, and had a half in the CD party from W3EAX. W3FZY liked the party too. W3EOV has a mid-western tour napped. WA3LFU is grounded — no wheels. W3BHL says the boys are all helping the CD in Cumberland, and he is looking for Spanish-speaking OSOs no less. W3FCS is resting that back after installing that Coax. WA3MSW is that old reliable Fri. liaison with OSK a new feature. WA3PJG had fun with the Computer at Northwestern Univ. WA3PNN now retired signs WB4ATY from Fla. WB0DSL is a Senate Page for his summer thing. W3MHH was W9HSK 24 years ago and getting that old itch, it looks like nowadays nobody rebuilds — they reannance it. W3FOR says the good news is a new tri-bander on a 40-ft. crankup, the bad news is BC in 2 neighbors Hi-Fi sets. K3STU reports interesting experiences as an OO. Traffic: (July) WA3IYS 306, WN3RCI 203, W3TIN 130, W3OKN 111, WN3RIY 83, WA3LFU 75, W3EZZ 73, WA3MSW 49, WA3EHK 47, W3FCS 47, W3QU 35, W3FA 32, WA3PJG 17, W3FZY 14, W3EOV 13. (June) W3ABC 23.

SOUTHERN NEW JERSEY — SCM, Charles E. Travers, W2YPZ — SEC: W2LVW. PAM: W2EJE. RM: W2JI. W2ORS reports everything in readiness for another active "ham" season. The DVRA reports health and welfare traffic was handled during the recent hurricane period on a twenty-four hour basis. W2JI also came in for some traffic handling during Hurricane Agnes. WA2KWB began three months tour of duty with the USAF. Frank hopes to join us from a QTH in Syracuse. Recent OPS renewals were WB2SLX and W2KGM. Other station appointees are reminded to send in their certificates for endorsement as soon as they become due, earlier if possible. Stations wishing appointments as OPS should direct the request to the SCM. Those desiring an appointment as ORS should contact RM W2JI who will recommend the appointment on the basis of cw activity in the nets. Net endorsements depend upon an effort on the part of the station to make regular reports to the SCM of activity for the month. If no traffic came your way this is when a resourceful station "originates" traffic — send a birthday greeting — a holiday greeting — traffic originations keep the nets active. Traffic: W2ZO 1052, W2VUJ 277, W2JI 21, W2ZI 17, WB2SFX 13, WA2KWB 5, W2YPZ 5.

WESTERN NEW YORK — SCM, Richard M. Pitzeruse, K2ETK — Ass. SCM: Rudy M. Ehrhardt, W2PVL. SEC: W2CFP. Listing of section nets appears in Apr. station activities. The recent flood disaster in the Southern Tier spotlighted the need for trained amateurs to handle communications in such emergencies. I urge each of you to join AREC if for no other reason than to register yourself as possibly available in emergencies. Nobody is going to bug you to attend meetings, drills, or even the real thing; it's up to you, but please register. Novices interested in learning the traffic game should contact W2RUF for details on her Novice training net. Clara is devoting a great deal of time to this training and has already produced some good net operators. Congratulations to I.B.M. Explorer Post 204 BSA on becoming an ARRL affiliate. WA2EQO and WB2JNW have joined the 2-meter fm gang in Tompkins County. As WA2ELD points out, the ARRL Operating Manual answers a lot of the questions hams bring up about emergency operations. Very sorry to report the passing of W2BLP. He was very well known in WNY and one of the top OOs in the country. W2MTA reports NYS handled 373 messages with 671 check-ins in July. WA2CDV has a new SB-401 to match his SB-301 and SB-200. WA2OMN has a new Advanced ticket. Every year at this time I ask for more inputs for



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You're invited to take an inside look at Yaesu's new FTdx 570 transceiver.

What you'll see inside is quality. Construction features like a heavy-gauge, compartmented steel chassis with integral outer case, and instrument quality VFO gearing. You'll see a beautifully-arranged circuit layout, with each component identified by part number. And you'll see only the highest quality components — rated well above their operating levels.

The FTdx 570 is one of the best built rigs around. Anywhere. We built it like a tank. But like a fine watch, too.

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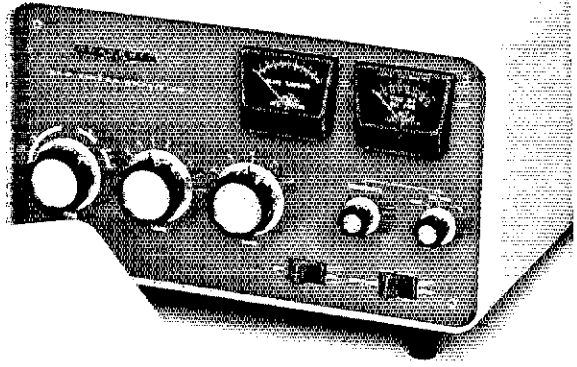
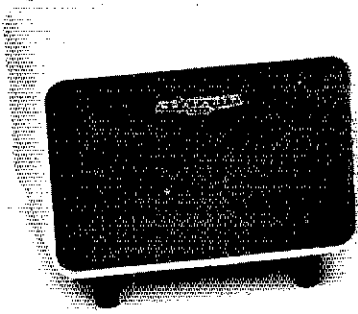
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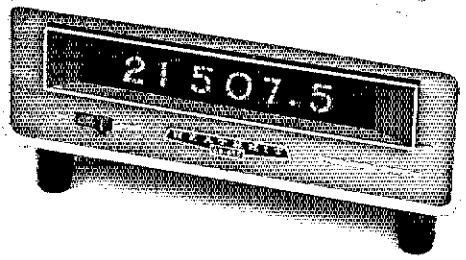
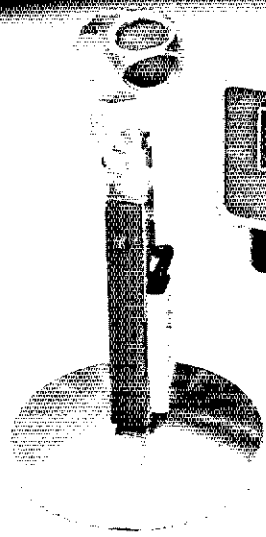
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Figure it out: the famous Heathkit SB-102 Transceiver, 385.00; SB-600 Speaker, 19.95; SB-220 Linear Amplifier, 369.95; SB-650 Digital Frequency Display, 179.95; HDP-21A Desk Mike, 29.95 (power supplies are additional extras depending on your choice of fixed or mobile operation). It all adds up to a budget pleasing 984.80 ... and the most fantastic value ever offered in a 2 kW rig (complete with digital readout) for under a thousand dollars. Here's what you get:

A) The incomparable Heathkit SB-102 80-10 Meter Transceiver ... with exceptional stability and dial linearity — the result of an all solid-state factory-assembled and aligned LMO with 1 kHz calibration. The "102" stabilizes in a fast 10 minutes, drifts less than 100 Hz per hour after initial warmup. Receiver section delivers S+N/N ratio less than 0.35 uV for 10 dB — with front panel selection of built-in 2.1 kHz SSB crystal filter or optional 400 Hz crystal filter. And there's a dial resettable to 200 Hz; 180 W PEP SSB input, 170 W CW input; switch selection of upper or lower sideband and CW; built-in sidetone for monitoring; built-in 100 kHz crystal calibrator; triple action level control to reduce clipping and distortion; built-in VOX, and complete metering. A top value leader in anybody's logbook.

- Kit SB-102, 24 lbs. **385.00***
- SBA-301-2, 400 Hz CW crystal filter, 1 lb. **22.95***
- Kit HP-23A, AC supply, 19 lbs. **51.95***
- Kit HP-13A, DC supply, 7 lbs. **69.95***
- SBA-100-1, mobile mount, 6 lbs. **15.95***

B) New Heathkit SB-650 Digital Frequency Display ... calculates and digitally displays both transmitted and received frequencies of your SB-102 Transceiver and other Heathkit SB-series amateur band receivers and transceivers — to within a tight 100 Hz accuracy! Six bright digital readout tubes, readable from up to 30 ft. away, show you exactly where you are as you tune across the 80-10 meter bands from 3 to 30 MHz. Reads kHz to five places, plus tenths of a kHz. All solid-state circuitry uses 35 ICs and six transistors. IC voltage regulator protects devices from failure due to overvoltage. Built-in memory assures non-blinking operation, and a special circuit minimizes last-digit jitter. Another "first"

you can count on ... from the hams at Heath.
Kit SB-650, 9 lbs. **179.95***

C) Heathkit SB-220 Linear Amplifier ... the rig that the competition tries to measure up to. Two conservatively rated Eimac 3-500Zs in a grounded grid circuit offer up to 2000W PEP SSB input, or a full 1 kW on both CW and RTTY. The broad-band pre-tuned pi-input delivers maximum efficiency with low distortion over 80-10 meters. Only 100 watts of driving power is needed to produce full-rated input. Features include a built-in solid-state 120/240V power supply; circuit breaker protection; zener diode regulating operating bias to reduce idling current for cooler running and extended tube life; a large quiet fan; ALC to the driving unit to prevent overdriving; front panel switch selected monitoring of grid current, relative power and high voltage.

Kit SB-220, 69 lbs. **369.95***

D) Heathkit SB-600 Communications Speaker ... offers fixed station speaker facilities, styled to match your SB-102 rig. Features an 8-ohm speaker with audio response shaped from 300 to 3000 Hz for optimum voice reproduction. Enclosure has mounting for HP-23A power supply. Measures 6½" H x 10" W x 10½" D.

Kit SB-600, 7 lbs. **19.95***

E) Ham Desk Mike ... a high impedance dynamic microphone ideally suited for use with Heathkit SB-series gear. Outstanding SSB response. Features include grip-to-talk switch with lock. Wiring diagram and cables included.

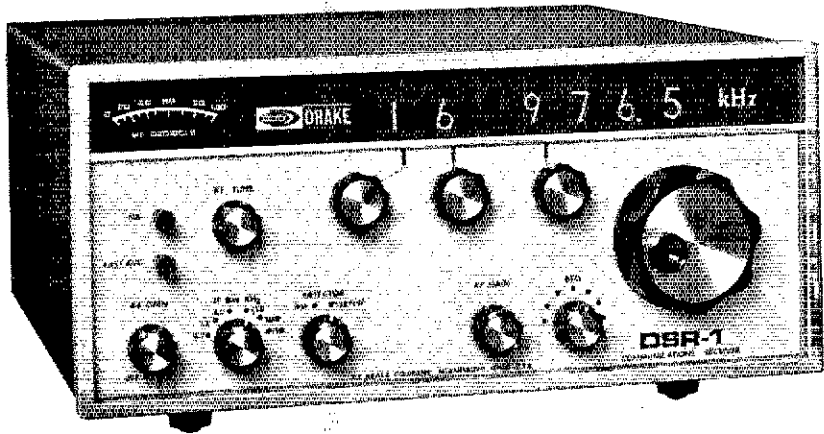
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SPECIFICATIONS • Frequency Range: 10 kHz to 30.0 MHz • Modes of Operation: USB, LSB, CW, RTTY, AM, ISB. • Frequency Readout: Complete to 100 Hz on six NIXIE tubes. • Frequency Selection: 10 MHz, 1 MHz, 0.1 MHz switch selected. 0 to 0.1 MHz continuously variable. • Frequency Stability: Frequency drift less than 200 Hz in any 8 hour period at constant ambient temperature between 0° to 40° C and constant line voltage after 1 hour warm up. • BFO: Derived from 5 MHz standard oscillator or variable ± 3 kHz from front panel. • Sensitivity: 0.01 - 0.5 MHz: Less than 4 μ V for 10 dB SINAD at 2.4 kHz SSB mode. Less than 25 μ V for 10 dB SINAD at 6 kHz AM mode with 30% modulation. 0.5 - 30 MHz: Less than 0.3 μ V for 10 dB SINAD at 2.4 kHz SSB mode. Less than 2.0 μ V for 10 dB SINAD at 6 kHz AM mode with 30% modulation. • Image Rejection: Greater than 70 dB relative to 1 μ V below 10 MHz. Greater than 60 dB relative to 1 μ V above 10 MHz. • Blocking: Greater than 100 dB relative to 1 μ V. • Crossmodulation: 70 dB relative to 1 μ V. • Intermodulation: 70 dB relative to 1 μ V. • Opposite Sideband Suppression: Greater than 60 dB at 500 Hz into the opposite sideband. • I.F. Bandwidth: 6 kHz, 2.4 kHz, 1.2 kHz, 0.4 kHz; Selectivity @ -6 dB: 6 kHz, 2.4 kHz, 1.2 kHz, 0.4 kHz; @ -60 dB: 11.5 kHz, 4.3 kHz, 2.4 kHz, 0.8 kHz; Optional filters available for other bandwidths. • Automatic Gain Control: Audio output rises less than 3 dB for RF input change of 1 μ V to 100 mV. Attack Time: 100 μ s Release Time: 750 ms (slow AGC), 25 ms (fast AGC) • Antenna Input Impedance: 10 kHz to 500 kHz 1000 ohms, 500 kHz to 30 MHz 50 ohms • Audio Output: 2 watts at 5% max. distortion into 4 ohm load. 4 ohm unbalanced and two 600 ohm balanced outputs. ISB output is one of the two 600 ohm balanced outputs. • Audio Hum and Noise: Greater than 60 dB below rated output. • Power: 115/230 volts $\pm 10\%$ single phase 50-420 Hz 15 watts. • Dimensions: 5.25 in. H x 19 in. W. x 15 in. D (13.3 cm H x 48 cm W x 38 cm D) 17 lbs. (7.7 kg)

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this column. Activity dwindles in the summer and station activities reflects it. C'mon gang! Traffic with * indicating PSHR: (July) W2FR* 390, WA2FLD* 271, W2RUF* 264, WA2ICU* 355, W2MTA* 133, W2MSM 89, W2HYM 81, W2RQF 66, W2BU* 62, K2KTK 61, K2DNN 40, WA2AYC 38, WA2MPC 32, WA2RYL 32, K2RTO 30, W2FZK 26, K2OFV 23, W2EAF 20, W2PMI 11, K2BWR 10, K2IMI 10, WA2AOG 8, WB2JNW 6, WA2OMN 6, WA2ANF 5, WB2HFG 4, (June) WA2FLD 262, W2CFP 14.

WESTERN PENNSYLVANIA - SCM, Robert E. Gawryla, W3NEM - SEC: W3KPI, PAM: K3ZNP, RMs: W3LOS, W3KUN, WA3IPU. WPA CW Net meets daily on 3585 kHz at 7:00 P.M. ESSN meets Mon. through Fri. at 6:30 P.M. on 3585 kHz. Radio Association of Erie members gave up Field Day to participate in the Agnes emergency. The Nittany ARC equipment, generators and operators also participated in the emergency. Their FD score was zero. The Foothills ARC and Chestnut Ridge ARC jointly participated in the Powder Puff Derby held in July. Western Penna. Mobileers new officers for the coming year are WA3MRC, pres.; K3CHD, vice-pres.; WA3PMT, secy-treas.; W3OFI, WA3PHY, WA3MWM, dir. The Breezeshooters ARC new officers for the coming year are K3VY, pres.; W3OFI, checker; K3CHD, treas.; W3OVM, WA3LEO, W3TZW, dir. The Etna ARC had 2200 contacts, the Brass Pounders ARC scored 1800 contacts, and Steel City ARC had 750 contacts during this year's Field Day activity. W3VUZ and K3ISO are experimenting with facsimile on 145.3 MHz and one-way transmission has been successful from VUZ to ISO. W3CDH and W3MHG will be joining VUZ and ISO very shortly. New Novices in the Indiana area are WN3RMD, WN3TID and WN3TFP. Crawford AR Society has set up a new 2-meter emergency network in the Meadville area. Steel City ARC has purchased a new six-element 15-meter beam and a three-element beam. WPA had 31 sessions in July with 316 QNI and 171 messages. PSHR for July: WA3QOR 41, W3LOS 39, W3NEM 39, W3YA 34. Traffic: W3NFM 157, W3YA 129, W3LOS 103, WA3QOR 93, W3KUN 87, W3MJ 54, K3EXE 36, K3HCT 30, K3SMB 28, WA3IYA 19, W3ALQ 18, K3ZNP 18, WA3MDY 9, WA3EJO 8, WA3PXA 6, W3SN 6, K3SJN 4, W3IDO 3, W3LOD 2, WA3PMI 2.

CENTRAL DIVISION

ILLINOIS - SCM, Edmond A. Metzger, W9PRN SEC: W9RYU, PAMs: WA9CCP and WA9PDI (vlf). RM: WA9ZUE. Cook County EC: W9HPC.

Net	Freq.	GMT/Day	Tfr.
LEN	3940	1400 Su	-
ILN	3690	0300/2330 Dy	-
NCPN	3915	1300/1800 M-S	105
IR PON	3915	2245/1430 M-F	684
II PON	145.5	0200 MWF	32
III PON	50.28	0200 M	0

WB9ADQ and XYL WN9HVO are now residents of Phoenix, Ariz. His new call is WA7TZO and can be contacted at the Motorola Semi-conductor plant at that QTH. W9CWH traded in his call after celebrating 25 years of hamming with a new call W9KV. Our sympathy to the family and friends of WA9CVY who recently joined the ranks of Silent Keys. WA9CKL won a TR-22 at Turkey Run, W9SXL has finished installation of a 45-ft. steel tower. W9LMJ and WA9BKB (and son WA9BKA) have an all ham family with their daughter now WH6HSK (Honolulu). W9USO gave an interesting talk on microwaves at the July meeting of the Chicago Suburban Radio Assn. WA9DBJ, W9QOG and WN9GKM are the new officers of the Lakeview Amateur Radio Assn. W9QET now is W9KR. New officers of the York Radio Club are K9VGN, W9PYG, WB9IDI and K9YST. WN9AED, WN9KHM, WN9KHJ, WN9KHO, WN9KHP, WN9KHR and WN9KJA are new Novices graduated from the Code and Theory classes of the Chicago Suburban Radio Assn. WA9UNR now holds a 1st class radiotelephone license. The Starlite Novice Net meets on 7160 Mon., Wed. and Sat. at 7:30 CDT. W9GRW and WN9HGG are NCSs. WA9LDH, WA9DLI, K9DQU, W9EHQ, WA9FHH, WA9RFR, WA9RII, K9RLE, WA9TMC and WA9TWW furnished mobile communications for Elmwood Park 4th of July celebration. K9DQU/WB9AIF now has a 2.5 kw alternator power plant for emergency standby use. K9UHY has over 220 DX countries with 75 watts. New appointments include: WA9RJB as OBS, K9UQN as OO and WN9FK as ORS. The Tri-Town Radio Amateurs Club, Inc. received a full page of publicity in their local Chicago Heights newspaper, on their Field Day activities. Members of the Egyptian Radio Club have been seen at many Hamfests wearing their new red fezzes - really makes them stand out and is a great publicity gag. WB9HHT and WN9GSS have started a Novice Frequency Bank in the Chicago area. A 50 cent deposit will be required for each crystal borrowed. Contact them for further

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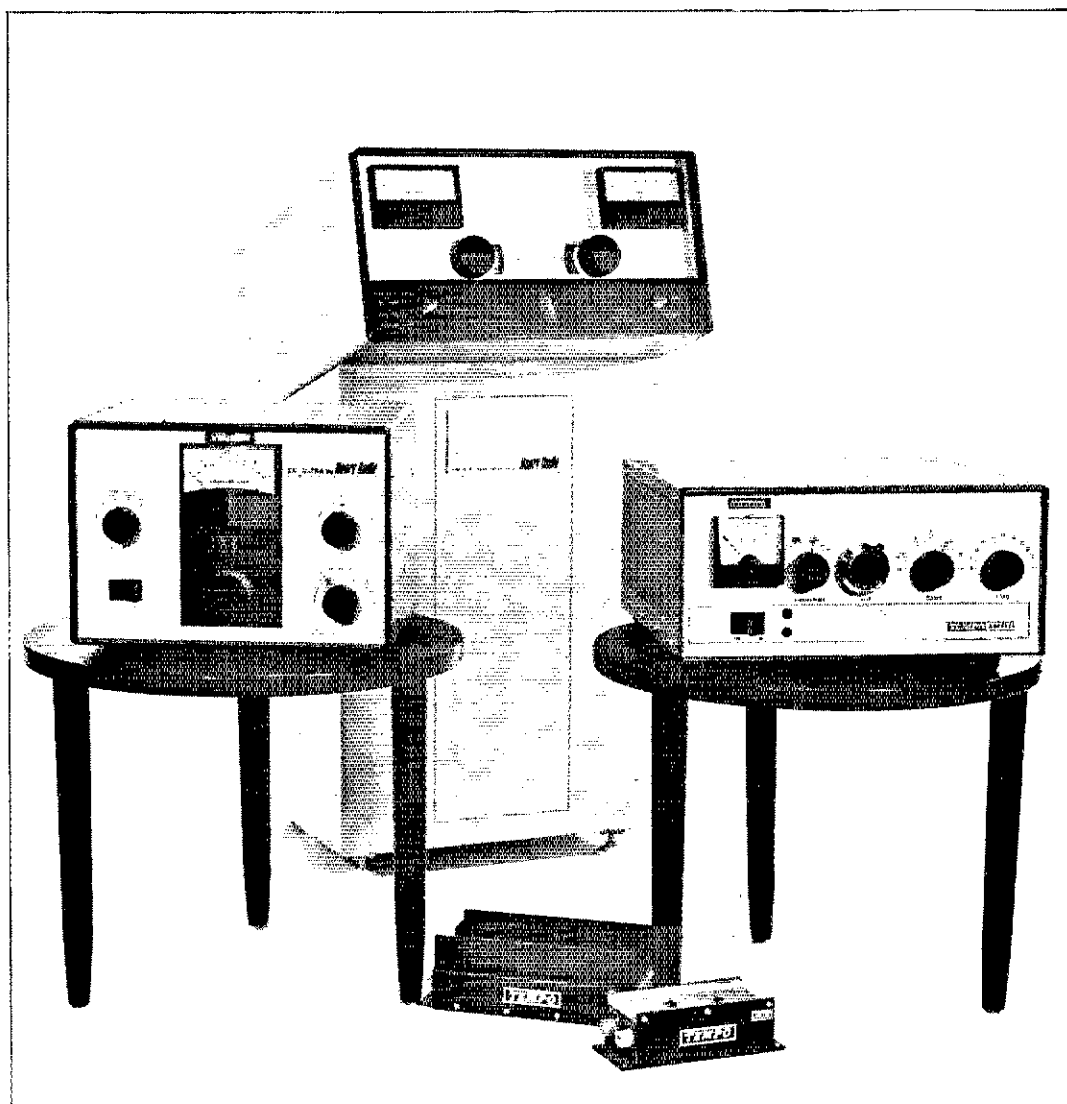
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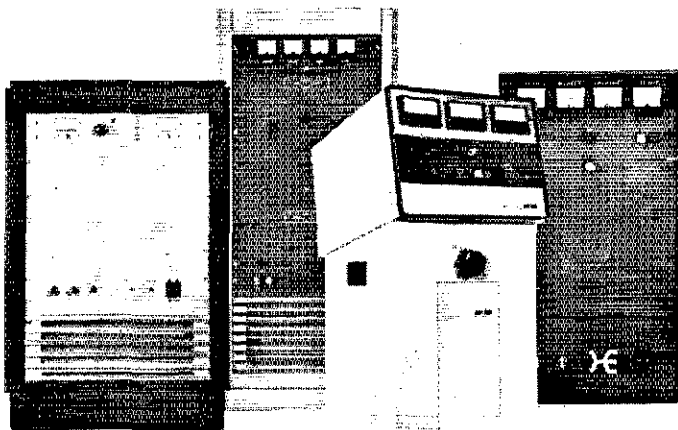


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TEMPO/6N2

The Tempo 6N2 combines most of the fine features of the 2001 for 6 and 2 meter amateur operation. The amplifier uses the same small cabinet, the same modern tubes, the same inherent quality for 2000 watts PEP input on SSB or 1000 watts input on FM or CW. The rig is completely wired in one small package with an internal solid-state power supply, built-in blower, and RF relative power indicator. PRICE: TBA

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The 8K is an 8000 watt PEP input (5000 watt nominal output) linear amplifier, covering the 3.5 to 25 MHz frequency range. It is designed for the most demanding military and commercial applications. Please write for price and specifications.

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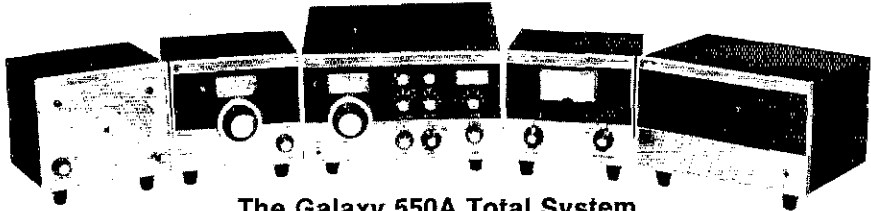
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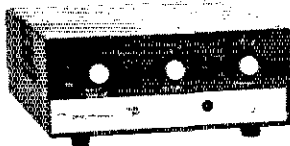
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RF550A contains high accuracy watt meter; calibrated in 400 and 4,000 watt scales; switch for forward or selected power; switch to select 5 antennas or dummy load. Order No. 857 Ham Net \$75.00

RV550A is a solid state VFO. Function switch selects the remote unit to control Receive-Transceive-Transmit frequency independently. Order No. 856 Ham Net \$95.00

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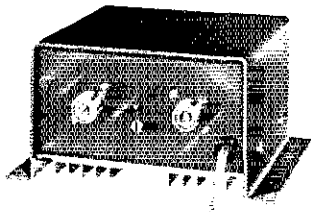


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details. Traffic: (July) WA9VGV 344, W9NXG 228, WA9ZUE 184, W9JXY 129, WA9QBR 127, W9FLF 100, W9LNO 58, WA9LDC 42, W9KR 38, WA9RTB 44, W9TAL 38, WB9AWY 16, W9PRN 10, WB9ELP 5, WA9LHU 4, K9UIY 4. (June) WA9RTB 44, WB9AWY 8.

INDIANA - SCM, William C. Johnson, W9BUQ - SFC: W9FC. RMs: WB9ANT, WB9EAY, W9FC, W9HRY. PAMs: K9CRS, WA9OHX, (vht) W9HWR, W9PMT.

Net	Freq.	Time(Z)/Days	T/c.	Mgr.
ITFeN	3910	1330-2300 Dy	470	WA9OHX
		2130 M-S		
QIN	3656	0000-0300 1by	123	WB9ANT
IPON	3910	1245-2130 Su	36	WB9AHJ
		1830 S		
IPONVHF	50.7	0100 S-M-W-Th	16	WA9ULH
	50.2	0299 Dy		
IPONCW	3740	0000 Dy	68	WB9AHJ
Hoosier VHF			36	W9PMT

With deep regret I report W9HIK, Fort Wayne, a Silent Key. IRCC annual picnic was hosted by the Tippecanoe ARC at the Lafayette Tippecanoe fair grounds on July 9. W9EWH was the outstanding amateur for Ind. FD winners are the 2-meter Michigan City ARC, 6-meter Michigan City ARC and a low band independent contest operator, IRCC fall meeting to be in Oct., details will be sent out on all Ind. nets. Amateur clubs in Ind. are invited to join IRCC, contact WB9ANT. WA9OHX reports net activity for the first 6 months; traffic 2652, check-ins 19,787, time 263.46 hours. QIN Honor Roll for June: W9QLW, WB9GVT, WB9EAY. During the Elora, Ind. Centennial K9FFY made BPL for May and June. WB9FLJ offered the services of the Hoosier Hotshot ARC for any emergency, Gibson Co. AREC reports traffic 4. Don't forget the Hoosier Hill Hamfest Oct. 8 at Soring Mill state park. TARA AREC net reports 103 check-ins, traffic 8. W9EI had 204 QSOs and 44 sections in the CD party on cw. K9IU scored 2000 QSOs for FD; top ops were WB9s DZS, GVT, BAY. QIN Honor Roll: WB9GVT, W9EHI, W9QLW, Traffic: (July) WA9OHX 146, W9HRY 135, WA9WNH 135, K9FZX 117, K9EFY 116, WB9GVT 95, WB9AHJ 87, W9BUQ 64, W9FHH 61, W9QLW 44, W9KWB 42, WB9IQI 40, W9PMT 37, WA9WJA 36, W9EL 30, WB9EBR 29, W9IBO 29, K9CBB 28, WB9FJO 27, W9RWQ 27, K9DII 22, K9JRO 22, W9DZC 20, K9YBM 19, WB9BAQ 18, WB9BAP 17, W9UFM 13, W9RTH 12, WB9FOT 11, K9KEM 11, K9RTB 11, WA9ULW 11, WA9AXF 10, WA9GJZ 10, K9RPP 10, K9LLK 8, W9HWR 6, K9PNP 5, WA9OKK 3, WA9OAD 2, W9BCP 1, K9LTG 1. (June) K9KTB 19, K9WWJ 4. (May) K9EFY 167.

WISCONSIN - SCM, Joseph A. Taylor, W9OMT - SEC: W9NGT. PAMs: K9FHI, WA9OAY, WA9OKP, WA9PKM. RMs: W9UCR, K9KSA.

Net	Freq.	Time(Z)/Days	QNT	QTC	Mgr.
WSBN	3985	2300 Dy	1047	157	K9FHI
WIN(Early)	3662	0115 Dy	203	105	W9UCR
WIN(Late)	3662	0400 Dy	77	21	WA9ZAZ
BEN	3985	1700 Dy	749	137	WA9QKP
BWN	3985	1145 M-S	349	216	WA9OAY
WSSN	3662	0100 TTS*			K9KSA
SW2RN	145.35	0130 Dy	113	5	WA9PKM
WI-PON	3925	1701 M-F	479	66	W9EMC
WI-PON	3697	2330 W	12		W9EMC
Wis RACES	3993.5	1300 Su	50		W9NRP
Wis QCWA	3985	1400 Su	85		W9NRP

*Except summer. Look for WB9EJA now on with an HW-101 from his car. The Green Bay Repeater, W9AYR reports excellent results with antennas now up over 600-feet. SEC W9NGT is doing some experimental work with Tropo Scatter. Contact W9NGT if you would like to participate. Your SCM and SEC are working on an awards program for the section - details will be forthcoming. Congrats to W9DND on renewal of ORS and WIN certificates. He also reports he has a new 60-ft. tower up. Congrats also to W9MCG for third BPL in a row. WA9MCC has a new HT-220 on 2. WA9SWX reports being able to access three repeaters from his portable location near Green Bay. We could use an OBS station to relay Official Bulletins to our phone nets. Your SCM will be happy to receive your application. We are also accepting applications for ORS and OPS. Traffic: K9CPM 285, W9ESJ 137, WA9ZAZ 133, W9MFG 121, W9UCR 109, WB9GGL 74, W9DND 62, K9FHI 60, W9AYK 40, WB9ABF 35, K9KSA 31, WB9GUG 25, WB9BRF 21, W9NRP 19, K9LGU 12, WB9FFO 9, K9UTO 9, WA9SUU 8.

DAKOTA DIVISION

MINNESOTA - SCM, Casper H. Schroeder, WA0VAS - SEC: K0LAV. RMs: W0ZHN, WA0YAH. PAMs: K0FLT, WA0HRM. A

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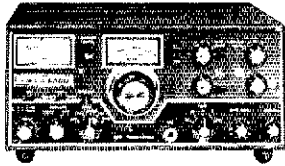
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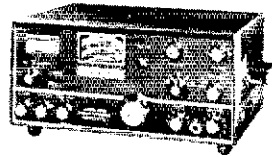
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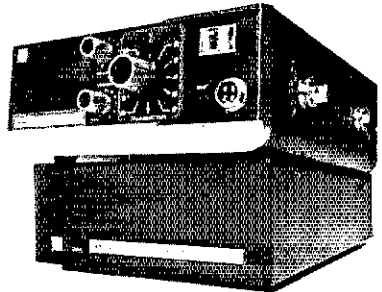
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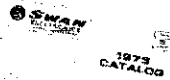


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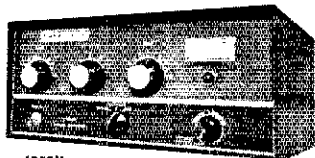
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1200X

SWAN 1200X—5 Band Linear Amplifier. 1,200 watts P.E.P. Built-in power supply **\$259.95**

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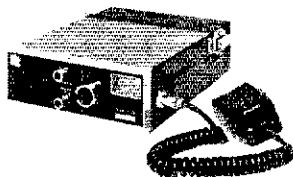
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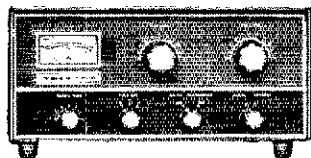


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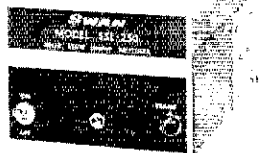


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Sioux Falls and Brookings, South Dak. Two-Meter Repeater picnic, hosted by W0WFA and WA0NLT, was held at the Hiawatha Pagent Club Grounds, Pipestone, Minn. in June. Eighteen hams and their families met for an informal eyeball and "get acquainted" visit. WA0CWW provided a frequency and deviation meter. Those attending were K0RSL, WA0KHL, K0EEZ, WA0CWW, WA0CWX, K0AYW, K0VLJ, W0SIR, WA0RNE, WA0OMK, K0YAA, WA0JLH, K0LRO, W0TKV, W0MZJ, WA0NLT, W0WFA, WA0LLG. A good time was enjoyed by all. WN0FYW has a Life Membership. Arrowhead Radio picnic at Duluth was a big success. K0ZXE has a three-element Yagi on 21 MHz up 60-ft. Traffic: WA0VAS 690, WA0YVT 181, WB0CMM 174, K0ZRD 115, WA0JTC 78, WB0DVP 52, WA0NLT 52, WA0IAW 44, WA0YAH 43, WB0DZA 42, K0ZBI 42, WB0AYE 38, K0MVF 33, K0PIZ 32, WA0URW 30, K0FLT 29, WA0VYB 28, WB0DSJ 26, WA0HRM 23, WA0VHX 20, WN0GKH 17, WA0YGE 15, K0ICG 14, WA0DCJ 12, WA0DPR 9, WA0FPL 8, WB0DHQ 7, W0UMX 6, K0ZXE 6, W0PBB 1.

NORTH DAKOTA - SCM, Harold L. Sheets, W0DM - SEC: WA0AYL. OBS: K0PVG. RM: WA0MLE. OD: W0BF. The International Hamfest was held at the Peace Garden July 8-9 with an attendance of 200. Next year the Hamfest will be held on the American side and will be promoted by WA0SJB, K0PVG and WA0RWL a representative of the younger hams of the area. WA0SUF and VE4RO were elected hams of the year by those present. Congrats. WA0RST reports the Bismarck Area RC handled all the command communications via 2-meter am for the Bismarck Centennial Parade held on July 29. Members with 2-meter equipment were K0HDA, WA0OVT, WA0MSJ, WA0RST, WA0RSS, WA0WTZ (WN01NU) with W0PHC as the base station. LA4MO visited relatives in Grand Forks also W0DM, WB0BCZ, W0GFI and WA0IVH at Northwood. WA0SUF received his Advanced Class ticket. W0DM worked portable in Minn. with the HW-101. WB0IFT has a new mike, WA0LUNA has a Motorola 80D on 2 meters while WA0AYL has a portable power supply for his Regency HR-2 in a camera case and working FB. K0GYK/Q resigned his AF commission and going into Foreign Service. WB0ATB resigned as OBS; K0PVG will carry on in that dept. Thanks Howard for a good job. EA-K0OVE and WA0PPK and family vacationed in N.D.

Net	kHz	CDT/Days	Sess.	QNI	QTC	Mgr.
Goose River	1990	0900 Su	5	63	1	W0CDO
RACES	3996.5	1830 S-S	21	527	26	WB0ATJ

Traffic: WA0MLE 133, WA0SUU 30, W0DM 14, WA0JPT 11.

SOUTH DAKOTA - SCM, Ed Gray, WA0CPX - Two meter activity is reported from Aberdeen and Pierre which adds to the growing list of towns in South Dak. where there is two meter fm activity. Your SCM attended the International Hamfest at the Peace Gardens between Manitoba and North Dakota and also got in some VE4 operation. A special thanks to the Prairie Dog Amateur Club for hosting a fine Ham Picnic for the South Dakota Amateurs. Net reports: Morning Net - QNI 529, QTC 76, NUJ Net - QNI 508, QTC 7. Early Evening Net - QNI 489, QTC 12. Late Evening Net - QNI 953, QTC 12. Traffic: W0H0J 145, K0AIE 25, W0MZI 20, W0ZWL 15, WA0FIZ 9.

DELTA DIVISION

ARKANSAS - SCM, Jimmie N. Lowrey, WA5VWH - SEC: WB5CFE. RM: WA5TLS. WN5ANK passed his General Class exam. With the winter season coming upon us now is the time to finish those remaining antenna projects and construction plans and lets see if we can't put Ark. on the map this year in as many contests and activities as possible. K5YCM now has a TH6-DXX up at 80-foot and a 2-meter beam at about 85-feet.

Net	GMT/Day	Freq.	Mgr.
Razorback	2330 Dy	3995	
DX Info	2345 M	3995	WA5YMW
OZK	0000 Dy	3790	WA5TLS
Ark Phone	1100 M-S	3937	WS5VF
Ark Teenage	2100 SS	3975	WA5ZKF
Ark P.O.	2130 M-F	3925	WS0FO
Ozark	2230 M-S	3995	WA5ZKF
CAREN	0100 F	146.34/94	WSRXU

Repeaters: WASSNO Bayetleville, 52.550/53.020, 146.16/76; WBSFKF Forrest City, 146.16/76; WASYUT Fort Smith, 146.34/94; WSDI Little Rock, 146.34/94; WSRJL Jonesboro, 146.34/94; WSZF Hot Springs, 146.28/88. Traffic: WASZKE 211, K6KCB/5 186, WBSFDP 81, WASEVW 25.

LOUISIANA - SCM, John R. Rivoire, K5AGI - Asst. SCM: Louis A. Muhleisen, Jr., WBSAEH. SEC: WASOLU. WASYOE has resigned as RM because of school. Any recommendations? K5GLA reports the move of RACES State Hq. to Baton Rouge. WBSCNM

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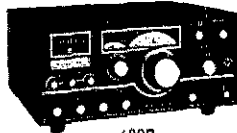
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SWAN 250C 6m Transceiver.....	429.00
NS-1 6m Noise Silencer.....	35.00
TV-2C (specify 14 or 50 Mc it).....	329.00
CYGNET 1200X Linear.....	239.00
Mark II 80-10m Linear.....	599.00
Mark 6B 6m Linear.....	599.00
117XC AC Supply w/spkr. in cabinet.....	99.00
14-117 12v DC Supply w/Cable.....	129.00
510X MARS Oscillator - less crystals.....	49.00
508 Full-Coverage VFO.....	139.00
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VX-2 Plug-in VOX.....	35.00
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14C 12v DC Module/cable ONLY.....	65.00
230XC 230v AC Supply, spkr., cabinet.....	105.00
MTK Mobile Mounting Kit.....	9.00
SS-16B Custom Crystal Lattice Filter.....	75.00
160X 160 Meter 400w Transceiver.....	429.00*
160YFO VFO for above.....	95.00
600T Transmitter 80-10m, 600w.....	535.00*
600R Receiver.....	395.00*
600R CUSTOM Receiver (with I.F., Noise Blanker and I.C. Audio filter-inst.).....	495.00*



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* Add \$60.00 for SS-16B factory installed	
600Hz CW Filter for 600R.....	\$ 22.00
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600S Speaker for 600R.....	18.00
600SP Deluxe Speaker (w/ph. patch).....	59.00
330 External Tuner for 600T, 600R.....	129.00
NB-500 I.F. Noise Blanker Kit.....	89.00
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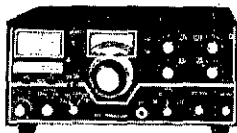
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TB-4H 4 el., 9db, 24' boom.....	129.00
MB-40H 2 el., 40m Beam.....	145.00
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Model 45 (manual switching) covers 10, 15, 20, 40 and 75 Meters.....	\$ 79.00
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BMT Bumper Mount.....	24.00
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Top Section, 6 ft. whip.....	\$ 12.00
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WHICH ANTENNA WINS THE CONTEST ?

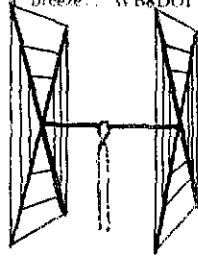
In open competition against thousands of commercial and home-brew antennas, WA1JFG won the New England championship with a Gotham beam, by a margin of 5,982 points! WB2JAM won the sectional award for the Sweepstake Contest in 1969 and 1970 with a Gotham 4-element 15-meter beam! Hundreds of unsolicited testimonials from grateful hams are our proof that Gotham antennas give you the best design, and the best materials. Forget our low prices — rely on the results of open, competitive contest. Ask yourself: Why do Gotham antennas win?

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QUADS Totally satisfied with quad. Worked DK4VJ, SM7DLH, XE1AR, DM4SEB, FL8SR, F6AUM, HK7YR in few hours. Instructions a breeze. WB8DO1

CUBICAL QUAD ANTENNAS

— these two element beams have a full wavelength driven element and a reflector (the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a fool-proof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!



10/15/20 CUBICAL QUAD SPECIFICATIONS

Elements: A full wavelength driven element and reflector for each band.

Frequencies: 14-14.4 Mc.; 21-21.45 Mc., 28-29.7 Mc.

Dimensions: About 16' square

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10' x 1 1/4" OD, 18 gauge steel, double plated, gold color.

Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

Radiating elements: Aluminum wire, tempered and plated, .064" diameter.

X Frameworks: Two 12' x 1" OD aluminum 'hi-strength' alloy tubing, with telescoping 3/8" OD tubing and dowel insulator. Plated hose clamps on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings.

Feedline: (not furnished) Single 52 ohm coaxial cable.

Now check these startling prices — note that they are much lower than even the bamboo-type:

10-15-20 CUBICAL QUAD.....	\$37.00
10-15 CUBICAL QUAD.....	32.00
15-20 CUBICAL QUAD.....	34.00
TWENTY METER CUBICAL QUAD	27.00
FIFTEEN METER CUBICAL QUAD	26.00
TEN METER CUBICAL QUAD.....	25.00

(all use single coax feedline)

BEAMS "Just a note to let you know that as a Novice, your 3-EI. 15 Beam got me RI Section Winner and New England Division Leader in Novice Round-up. See June QST, p. 57 for picture of ant. (below). Tux for a fine working piece of gear. 73s, Jay, WA1JFG"

Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new! full size (36' of tubing for each 20 meter element for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; 3/8" and 1" aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 EI 20.....	\$21	4 EI 10.....	\$20
3 EI 20.....	27*	7 EI 10.....	34*
4 EI 20.....	34*	4 EI 6.....	20
2 EI 15.....	17	8 EI 6.....	30*
3 EI 15.....	21	12 EI 2.....	27*
4 EI 15.....	27*		*20-ft. boom
5 EI 15.....	30*		

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"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, TI2FGS, W5KYJ, WIWOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWI, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4-AQL, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!

V40 vertical for 40, 20, 15,	
10, 6 meters.....	\$14.95
V80 vertical for 80, 75, 40,	
20, 15, 10, 6 meters.....	\$16.95
V160 vertical for 160, 80, 75,	
40, 20, 15, 10, 6 meters...	\$18.95

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and his new XYL, WNSHIP are setting up a Novice Crystal Bank for the Baton Rouge area. WARC has participated in FD for 19 consecutive years. Thanks for the nice welcomes to Mary and I on our FD tour of New Orleans, Metairie, Slidell, Houma and Baton Rouge. DDXA has voted to become an ARRL affiliate and JARC recently voted an honorary club membership to the SCM. MTA started its 13th annual General Class course Sept. 11. JARC graduated 9 new Novices. Recent club visits were LARC, OARC, BRARC, MTA, JARC and WARC. 15-year-old WNSFO (son of WASYFO and WASWHB) passed his General and working on his Advanced. WBSAEH, WASTTH and K5AGI represented La. at the LOs meeting in Tenn. Club poll results, survey sheets and member views were presented to the Dir. for consideration and action. BRARC sent delegates to the Jackson Hamfest, WASOLU and WBSAEH represented the La. section. OARC plans to start club house construction the first of the year. WBSAPK and oldest son, WBSDMG, have rig scheduling problems now that John's XYL, No. 2 son and daughter all passed their Novice exams. LU3AEY recently visited our section. I need volunteers to provide monthly club and member news from Strevport, Monroe/West Monroe, Lake Charles, Ruston and Alexandria. LU3EHT/W5 is being reassigned to Argentina. Traffic: WSMI 315, WASVOE 165, WSTFS 115, WASWBZ 45, WSGHP 39, WBSIC 36, WASNY 29.

MISSISSIPPI - SCM, Walker J. Coffey. W5NCB - Asst. SCM: Gene McGahey, WASJWD. SEC: WASFH. RMs: WASYZW, WBSDEK. PAMs: WSJHS, WASKEY, K5MDX. Congrats to K5IKB, asst. PON mgr., to K5YPR, asst. MSBN mgr. and to K5WZF now Extra Class. Miss. Coast ARC now has over 50 active members and crystal bank for Coast Novices. K5QBU is club pgm. chmn. WASKYB and W5PDG are on 449 fm. W5KDM has 33 states confirmed on 6; also has 2-meter fm rig with eleven-element beam at 55-ft. Glad to have our Dir. at the Jackson Hamfest which was an FB affair. Big prize winners were W5PDT, WASOGV, W5EVY. WASJWD as Asst. SCM will help us with some special projects. Glad to have WASFH on our team as SEC. Appointments: WBSAHY, WBSAHZ, WBSDCY, WBSJEB, WASFH, WBSGMP as OPS; WASFH as ORS. N. Miss. Repeater Assn. hopes to put 2-meter repeater on air soon.

Ner	Freq.	Time(Z)/Days	QNI	QTC	Mgr.
MTN	3665	2345 Dy	131	67	WASYZW
MNN	3733	2300 MWF	40	27	WBSDFK
GUSBN	3925	2330 Dy			WSJHS
CGCHN	3935	0100 Dy	1611	127	WASZQP
MSFON	3970	2345 M-S	161	35	WA0GVO/5
MSBN	3987.5	0015 Dy	986	111	WASUHH

Traffic: WBSDFK 109, W5EDT 74, WASYZW 67, W5NCB 41, WSSBM 37, WA0GVO/5 28, W5WZ 26, K5YTA 21, WBSBUE 19, KNYUW/5 12, WBSAHZ 8, W5BW 8, WBSJEB 7, WBSBKM 6.

TENNESSEE - SCM, O.D. Keaton, WA4GLS - SEC: WB4ANX. PAMs: W4PI-P, K4MQI, WA4EWW, WA4NEC, RM: W4ZJY. The Tenn. section was host for an LO meeting held at Crossville during the annual hamfest July 15 and 16. Those attending were Miss. SCM W5NCB; Ark. SCM WASVWH and SEC WBSCEL; La. SCM K5AGI and Asst. SCM WBSAEH; Tenn. SCM WA4GLS and SEC WB4ANX and many appointees and interested amateurs; Delta Division Dir. Max Arnold. Many awards were made, including the Amateur of the Year presented to WA4BXZ by the Tenn. Council of RCs; Section Traffic Award presented to W4ZJY; Section Net Participation Award presented to W4CYS; also to the winners of the 1972 Tenn. QSO party, K4PUZ 1st place Tenn.; W4YWX 1st place out-of-state; Middle Tenn. ARS; WB4KHW, K4QOK and WB4SUY, 1st place club mobile, Oak Ridge RC; W4SHK, W4YAC, 1st place portable. The Tenn. Council of RCs selected WA4NEC as chmn. of a Repeater Advisory Board to study and recommend frequency allocations and operational procedures for 2-meter fm repeaters. WA4NEC has also been appointed PAM of 2 meter activity. WA4NEC appointed W4LGY, WB4KHW as technical advisors and WA4WVW, WB4FVM, K4JAF, W4OWX and WA4HJK as field advisors to the board. It is hoped that this group can coordinate the repeater operations in a way that will allow full use of the capability, all repeater owners and operators are requested to cooperate with this board. Traffic: WB4YCV 339, W4ZJY 168, WB4USG 119, K4CNY 113, WB4NIR 87, WB4DYJ 44, WB4VZQ 40, W4PFP 28, WB4DJU 26, WA4GLS 23, WB4UHH 22, WN4VZC 20, W4WBK 17, WB4FEC 15, WB4FKI 14, WA4TWL 14, WB4ANX 10, K4SJV 7, WA4CGK 4, WB4MPJ 4, WB4UZD 2.

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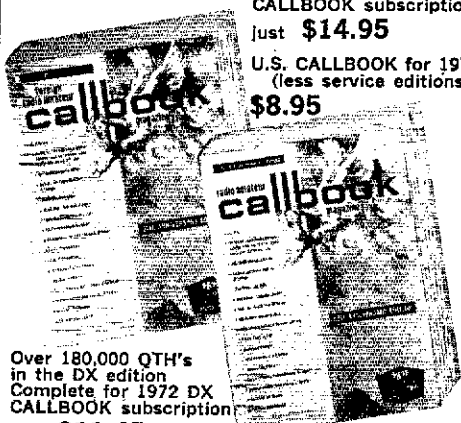
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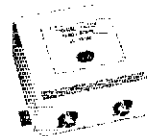
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423	100	50 U	<0.3	55	63.5	>50	LPF	5 Meter Radio Amateur	19.95
424	100	50 U	<0.3	44	57	>60	LPF	Citizen Band	12.45
425	1000	50 U	<0.3	34.0	52.0	>70	LPF	Radio Amateur TVI Filter	24.95
426	1000	70 U	<0.3	34.0	52.0	>70	LPF	Radio Amateur TVI Filter	24.95
427	1000	50 U	<0.3	55.0	63.5	>70	LPF	Radio Amateur 6 Meter Filter	29.95
419-80	100	50 U	<0.3	5.6	7.0	>45	LPF	Harmonic 80 Meter Radio Amateur	15.00
420-40	100	50 U	<0.3	11.2	14.0	>45	LPF	Harmonic 40 Meter Radio Amateur	15.00
421-20	100	50 U	<0.3	22	27.5	>45	LPF	Harmonic 20 Meter Radio Amateur	15.00
422-15	100	50 U	<0.3	30	36	>45	LPF	Harmonic 15 Meter Radio Amateur	15.00
428-80	1000	50 U	<0.3	5.6	7.0	>45	LPF	Harmonic Radio Amateur 80 Meters	24.95
429-40	1000	50 U	<0.3	11.2	14.0	>45	LPF	Harmonic Radio Amateur 40 Meters	24.95
430-20	1000	50 U	<0.3	22	27.5	>45	LPF	Harmonic Radio Amateur 20 Meters	24.95
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KRN	318	22	KVN	223	237
MKPN	535	56	KNTN	279	136
KTN	1085	146	KPON	74	48

Somerset Hamfest had a good turnout with WA4ELG walking off with first prize, Roses to WA4JQS for a fine job. KNTN is prospering under the direction of K4UNW. They continue to have respectable QNT and QTC. WA4JQS has a new 2-meter rig and a new 6-meter beam. K4AVX has been operating from ECU while attending summer school. K4TXJ is out of the hospital and sporting a new TR-22. Our nets are doing real well except for the fact that we need much more traffic on them! Add ARL 7 to each message you originate and aid the situation. Traffic: WA4JQS 254, WA4WWT 211, W4BAZ 203, K4UNW 145, WN4WCM 128, W4CID 73, WB4EOR 73, K4TXJ 64, K4MAN 58, WB4KPE 53, WB4NHO 47, WB4AUN 34, W4OXM 33, WA4AVV 32, WA4ENH 32, WA4VZZ 24, WA4FAF 22, WB4PVC 19, WN4YAF 16, WA4GHO 15, W4OYI 9, K4VAL 9, K4AVX 8, WA4MXD 8, WA4AGH 7, W4BTA 6, K4LOL 6, WB4REN 6, W4CDA 5, WB4GCV 3.

MICHIGAN - SCM, Ivory J. Olinghouse, W8ZBT - Asst. SCM: B. Peter Trembl, W8KBZ, SEC: W8MPD. RMs: W8JYA, W8WVL, W8RTN, K8KMQ, W8GLC. PAMs: K8PVC, W8AKB, W8BHQ, K8AEM, WAKWVV.

Net	Freq.	Time/Days	QNT	QTC	Sess.	Mgr.
QMN	3663	2300 Dy	596	337	62	W81YA
WSSB	3935	0000 Dy	689	109	31	K8PVC
BR/MEN	3930	2300 S-F	679	92	25	W8AKHB
UPEN	3920	2230 Dy	346	40	31	W8RHQS
GLETN	3932	0230 Dy	685	85	31	W88AXI
PON	3955	1600 Dy	790	266	31	K8LNE
PON/CW	3645	2400 M-S	175	32	26	VE3DPO
Mi.6M	50.7	0000 M-S	141	12	16	W88VKE

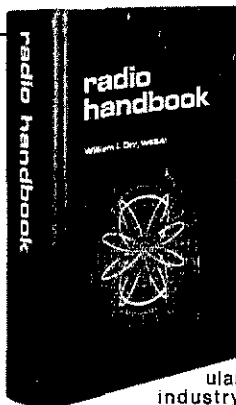
K8ZWR reports 6-Meter Weather Net 3 sessions, QNT 33, SW Mi. 2-Meter Net 5 sessions, 48 QNT with W8CVQ as Net Control. With regret I report W8AXO, W8DPE, W81UA, W8LSQ and W8WVC as Silent Keys. New mgr. for UPEN is W8RHQS. Net Control for 1P Sun. Net is W8EMC with K8VOB as alternate. W88AXI is new mgr. of GLET Net, W88CHE is asst. mgr. and W88HPZ, secy. The QMN slow net will start again in Oct. This is a good training session for newcomers and will meet 2300Z to 2330Z daily, on 3663 kHz. CMARC is keeping busy with communication for parades and contests and doing a very fine job. K8AEM had bad luck cranking up his tower and is replacing 6,2 and 432 beams and two sections of the tower. W8BWT lost his tower and antenna in a recent wind storm. W8MWW and W8MWW are new in the Burr Oak area. W88BYB has Extra Class, W8BDKQ Advanced and W88KLL General Class license, W8QQQ is planning a station at the county fair. W8BDKQ furnished communication for a local exchange student and her parents while she was in Colombia, S.A. Received a report from W88EUN from USSR by air mail. PO Net has W88BPY for Amateur of the Month and their special award to W88CUP for July. Our hats are off to the Twin Soo ARC for the very fine job they did for the Michigan State ARRL Convention. The Sat. night banquet was excellent and the entertainment was wonderful. Registration was near 500 in spite of rain on Sun. Traffic: (July) WA8WZF 432, K8KMQ 394, W88JAD 337, W81BX 182, K8LNE 179, W8GLC 127, K8DYI 118, W88IMI 103, K8PVC 93, W8ZBT 75, W8NOH 69, W88PIM 64, W88ENW 57, W88LXY 57, W88ZAV 54, W81Z 53, W8TZZ 43, W88BJP 43, W88BYB 38, W88U 35, W88O 33, W88KHB 31, W88CUP 30, W88FBC 30, K8MJK 29, W88EUN 27, W88DTJ 26, W88FLK 25, K8JED 24, W88DIS 23, W88ONZ 22, W88BJJ 21, W88VM 20, W88OJI 19, W88ACW 18, W88FXR 18, K8WRJ 18, W88NDI 11, W88TP 10, W88YXE 10, W88ZDF 9, W88AP 8, W88DCN 8, W88OBE 8, K8HGA 7, W88HOZ 7, K8AEM 6, W88FXG 6, K8GXV 6, W88UC 6, W88CUP 5, W88DIS 5, W88VIZ 5, W88DKQ 4, W88ANR 3, W88HKL 2, K8WLF 2, (June) W88LXY 26.

OHIO - SCM, William F. Clausen, W8IMI - Asst. SCM: Kenneth L. Simpson, W88TX. SEC: W80UU. RM: W88WAK. PAM: K8UBK. VHF: PAM: W88ADU.

Net	QNT	QTC	Sess.	Freq.	Time(Z)	Mgr.
OSSBN	2669	1075	82	3972.5	14.30/2245	K8UBK
BN	560	376	62	3577	2300/0200	W8WAK
OmMtrN	638	73	62	50.61	2300	W88ADU
				50.16	0100	
OSN	232	57	31	3577	2225	W8WAK
BN RTTY	79	226	24	3605	2200	W88ZU

The Ohio Novice Traffic Net meets on 3720 Sun., Tue. and Thur. at 2145Z. BPLs for July went to W88ETX, W88VYQ, K8NQW and W88CUI. W88WPO earned BPL in June. New appointees are W88KKI, ORS; K8MLO. OPS and QVS; W88FK, OVS; W88EJZ, OVS and OBS. K8COA has been appointed EC for Tuscarawas Co.

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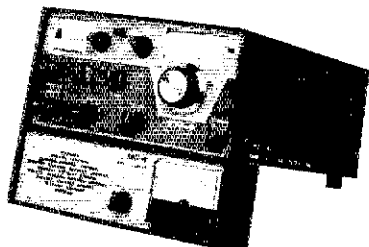
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The Talawanda High School ARC of Oxford is a new ARRL affiliate. Our appreciation to retiring ECs W8BWV, WARWVX and W8BDGN for their many hours of effort in emergency preparedness. The Ohio Traffic Net Picnic was a big success with over 100 in attendance. The Ohio Council of ARCs meet Oct. 14 in Columbus. Contact W8OUU for details. The Ohio Post Office Net meets Sun. on 3935 at 1200Z and on Tue. on 3952 at 2200Z with mgr. W8HTR, W8HFF7, mgr. of the Ohio Valley Teenage Net, reports the net is growing and now has two sessions: at 2030Z on 7275 and at 2130Z on 3965. The sixth annual Eighth Region ARPSC Conference is tentatively scheduled for Oct. 21 at Huntington, W. Va. All public service-minded hams are urged to attend. Details from host W8BNDY (SEC-W.Va.), W8CHT or W8IMI. Canton ARC's Headline reports pres. W8GVSU met with four other area club pres. to draft a letter of rebuttal to the Akron Beacon Journal to criticism of hams. Congratulations to the Westpark Radiops, now planning the celebration of their 25th year in 1973. Massillon ARC's Feedback reports former member K2SIF has returned after two years as PYZZAN, SW Ohio ARFC and Central Ohio ARFC have established nets on 146.46 MHz. Toledo area's Ham Shack Gossip advises there is a Wed. (8 P.M.) ARFC net on the K8ALB repeater with everyone invited to check in. The Apricot Net provided communications for the Cleveland Nationalities Day Parade. W8WNA was visited by SMSBVU. W8BCOA's Ham Call reports the Cincinnati FM Club ordered a new two meter repeater for .28-.88 operation. K8YOH was elected pres. of the Ohio Area Repeater Council. W8KKF reports a total of 52 operators provided communications for the recent boat races. Hardin, Marion and Wyandot counties need ECs. K8PBF reports the Van Wert ARC's annual picnic was a success. Traffic: (July) W8FTX 618, W8VYO 525, K8NOW 467, W8PMJ 399, W8MCR 276, W8BUP 260, W8WAK 212, K8IKD 203, W8OCU 202, W8YLV 195, W8IMI 186, W8HJL 163, W8HUP 146, W8MOK 142, W8BEEZ 136, W8SUS 113, W8HGH 109, W8RSD 107, W8DWL 106, W8WPU 104, K8MLO 102, W8KKI 95, W8AZM/8 92, W8NQQ 84, W8KVV 78, W8CUT 76, W8BAYC 70, W8QZK 56, W8VND 55, W8FCC 52, W8RSH 50, W8BCWD 50, W8BAL 48, W8OE 47, W8BEXD 46, W8QXQ 44, W8ADU 42, W8CHT 42, W8BCX 40, W8WEG 38, W8GOE 37, W8ID 37, W8RTGX 37, W8ODG 36, K8BPX 33, W8RJG 33, W8WVH 33, W8UPD 32, W8FAP/8 31, W8NNSI 29, W8VIT 29, W8WVKF 29, W8DH 28, W8BHL 25, K8DFD 23, K8DHJ 20, W8GRG 20, W8SYB 20, W8CTU 17, W8RFT 17, W8ARW 16, K8IDI 16, W8SCLF 14, W8BJKA 14, W8RFTW 13, W8YXB 12, W8BLAM 11, W8MIH 11, W8RGR 9, W8MHQ 9, W8STX 9, W8SIG 8, W8TV 8, W8MGC 7, W8MKZ 7, W8AJW 5, W8R1W 5, W8GRT 4, K8QYR 4, K8CKY 3. (June) W8WPU 192.

HUDSON DIVISION

EASTERN NEW YORK - SCM, Graham G. Berry, K2SJM - Asst. SCM/PAM: Kenneth Kroth, W8ZVH. SFC: W2URP. RMs: W2VYS, W22FB1. VHF PAM: W2YQU. Nets: ESS daily 2300Z on 3,590 (10 wpm); NYS: Daily at 0001Z and 0300Z on 3,675 MHz; NYS PTAEN daily at 2200Z on 3,925 MHz; NYRTTY daily at 2330Z on 3,613 MHz. New appointments: W2AEO as OPS; W22FB1 as additional RM with direct assignment for Reasselaer, Albany, Schenectady, Greene and Columbia counties; W2VYS has the rest of the section; both share other responsibilities. Sorry to report W2OBZ joined Silent Keys in July. Individual activities: W2CFF fixed rotor problems and is back. W2DFU now holds Tech license and is active on fm. W2FDG now ARRL Life Member and building receiver. W2DXM and W2EAB have appeared on local broadcast station talk show in behalf of the hobby. W2OOU at Spring Valley HS starts fall with new station. Peard River HS with new advisor, W2BRV. Overlook Mt. ARA now reorganized. Radio Week proclamations issued by Gov. Rockefeller went also to Albany ARA. Activity reports still trickling in from June-July flood alert and emergency operations from all over area. At least three section clubs canceled FD '72 operation because of emergency activity; no word from others. W2RAU showing saun-DX novelty to area clubs at up-coming meetings after previewing at Yonkers ARA. W2YQU raising new antenna farm and now active on most bands. Division Convention committee reports at end of July that banquet is almost 1/2 sold out. Better move fast if you're planning to come to Tarrytown Oct. 21, 22 - hope to see many section members there one or both days. First PSHR listing for W2JCN/L. Now that NY-Penna. flood emergency is past, if you have any specific recommendations for "the next time" send 'em along to WINJM at Hq. - still not too late for compilation in final report. Attention all clubs: both ARRL films available through W2CFF in N.J., coordinator for the Hudson Council film library. Please report future cw theory classes as soon as possible to K2SJO for inclusion

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NEW YORK CITY AND LONG ISLAND - SCM, Fred J. Brunjes, K2IDG - SEC: K2HTX. RM: WB2LZN. HF PAM: WA2UWA. VHF PAM: WB2ROF.

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Clear House	3925 kHz	1100 Dy	WA2VYT Mgr.
Mic Farad	3925 kHz	1300 Ex. Su	
East U.S.	3686 kHz	0001 Nightly	
All Svc.	3925 kHz	1300 Dy	W2GF Mgr.
NYSTPTEN	3925 kHz	1800 Dy	K2VCZ Mgr.

*Section nets; all times are local. As you will note, a change in the column heading has taken place in that WB2LZN has been appointed RM. An encouraging increase of cw net activity has again warranted an RM only appointment for this section. I am hopeful this activity will continue to be on the increase so that we may again have the tremendous activity we have had in the past. NLI has much need for stations to check in from the five boroughs of the city to help clear the large amount of traffic received. The Tu-Boro Radio Club will hold a "Worked Tu-Boro" Contest on Oct. 29, with a certificate given for 5 or more contacts with members. Check 145.62 (RTTY), 7037 (cw), 29.50 (am) plus local fm channels. Send logs to WB2LZN. W2PF reports a summer schedule of beach "contacts" in lieu of a hot radio shack! W2FVS has returned from 3 weeks of enjoying the sights of France, and WA2GTK returned from 4 weeks of the wilds of Mexico. Congratulations to WB2SLI who recently received his EE degree from Clemson Univ. W2HAE is reported to be a grandpa for the third time. Congratulations! WN2BDA, 11 year old son of WA2BOB, has passed his General Class exam and is awaiting his license so he can "stretch out" on the bands! WB2BOH has recently received his General Class license, and was "signed up" as an ARRL member on a recent trip to ARRL Hq. and WIAW. The AREC/RACES hq. station of Smithtown, L.I. is now in full operation. Those interested in Public Service activity in the Smithtown Township area, should contact EC WB2GUB for Smithtown area, WA2VDA and WA2KDB have been appointed asst. ECs in the Western Suffolk area. Additional appointments in this area are: WB2IQG, asst. EC vhf and WB2AZT, asst. EC 10 meters. Somebody is hard at work at the Lackfield ARC, as they are reporting 99% AREC membership. It appears WA2HMM has much persuasiveness; he has had a very successful AREC membership drive going on! W2ANT has been appointed OBS for vhf fm RTTY. Primary frequency will be 146.70 fm, with a time of 2000 local time (2100 secondary). Hope you all have planned on attending the Hudson Division Convention Oct. 21 and 22. If you don't make it, don't blame me for not keeping you informed. If you don't take time out to attend this convention with its excellent programs and displays, you have only yourself to blame for missing out! Advanced publicity has been given regarding the program make-up, so you can't use the excuse "I didn't know what was there on what day." See you there! Congratulations to W2GKZ and WB2LZN on earning BPL for July! Traffic: W2GKZ 796, W2OE 587, WB2LZN 533, WA2CX 266, WB2SLI 153, WB2QYV 147, W2EC 137, W2FVS 73, WA2GLP 62, WA2PLI 40, WA2LLG 36, WB2BYV 34, WA2GTK 29, WA2HMM 24, WB2CHY 23, WA2MDX 14, K2JFE 10, W2PF 8, W2DBQ 5, WA2LJS 4.

NORTHERN NEW JERSEY - SCM, Louis J. Amoroso, W2ZZ - SEC: K2KDG. RMs: WA2UOO and WA2BAN. PAMs: K2KDG and WA2TAF.

Net	kHz	Time(PM)/Days	Sess.	QNI	Tfc.	Mgr.
NJN	3695	7:00 Dy	31	406	306	WA2UOO
NJN	3695	10:00 Dy	31	199	45	WA2UOO
NJSN	3740	8:00 Su	4	12	2	WA2FVH
NJEPTN	3950	6:00 Dy	31	509	187	WA2FAK
PVTEN	145710	7:30 Dy				K2KDG

New appointments: WA2QJU as QRS and OPS. Renewal: WA2UDT as QVS. WA2UOO had an excellent turnout for the NJN picnic. A good time was had by all. W2WOJ reports he has solved his 80-meter problems. K2ZFI vacationed in Mich. Welcome to WA2QJU who has moved into the section from NLI. NNI is well represented at W6UF with WA2DNB, pres.; WB2FHH, secy.-treas.; WA2YKQ, tech. dir. WB2CST enjoyed the July Open CD party. NNI was well represented with a good turnout. ARRL pres. W2TUK and Hudson Division Dir. K2SJO were among the many who attended the annual NJDXA picnic at the W2OEH QTH. If anyone is interested in joining Army MARS, contact W2TFM. W2NHZ helped many stations work the Mellish Reef DXpedition for a new country. W2PEV is planning to put up a new quad for a full project.

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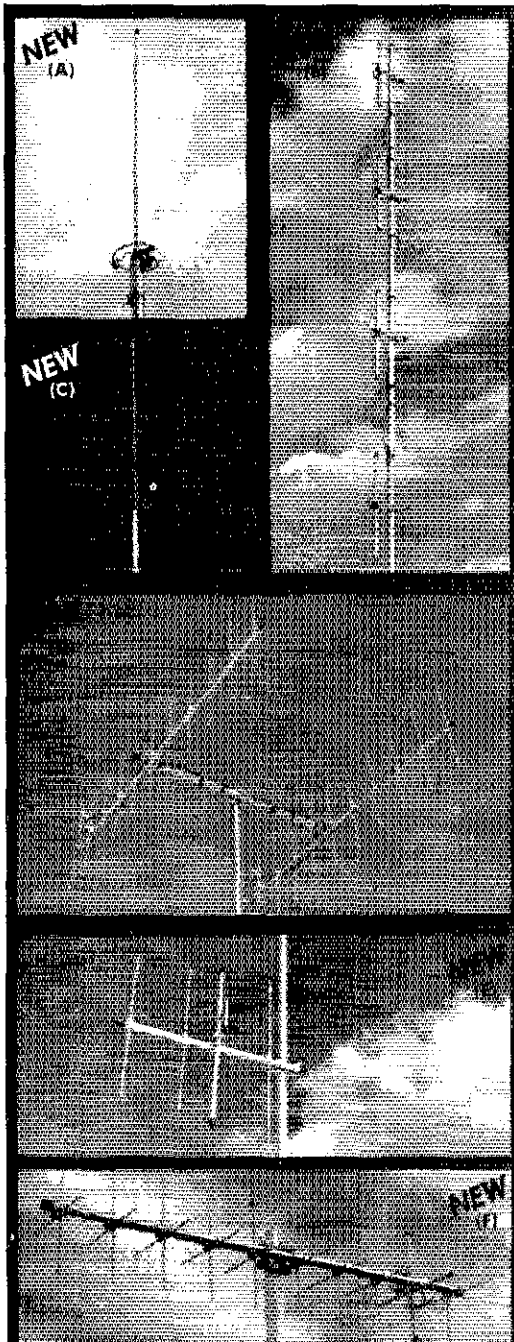
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AR-6	100 watts	50-54 MHz	18.50

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AFM-44D	1000 watts	435-450 MHz	38.50

(C) **FM MOBILE:** Fiberglass 1/2 wave professional mobile antenna for roof or trunk mount. Superior strength, power handling and performance.

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(D) **11 ELEMENT YAGIS:** The standard of comparison in VHF communications, now cut for 2 meter FM and vertical polarization.

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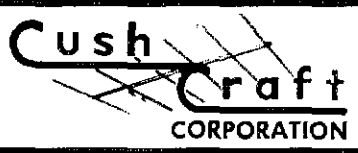
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WA2UOO reports he is looking for stations in Bergen, Hunterdon, Middlesex, Ocean, Somerset and Warren counties. If you live in any of the above counties and think you would enjoy traffic handling, please contact him or your SCM. WA2CCF has tickets for the Hudson Division Convention at Tarrytown. Hope we see you there. We have openings for all appointments. If you are interested please write and we will send along the necessary information Traffic: WR2RKK 466, WB2AEH 329, WB2NOM 273, WB2DDO 257, W2CU 162, WA2UOO 149, WA2EUO 132, WA2NLP 91, WA2SRQ 85, W2ZFP 69, WA2FVH 52, WA2CCF 30, WB2CST 29, WB2CFT 20, W2ZZ 19, W2CVW 13, WA2CAK 10, WB2IKL 5, WA2QUJ 5, WB2KNS 4, WA2QNT 4, K2ZFT 3, K2EQP 2, WR2WNZ 2, W2ABL 1, W2WOJ 1.

MIDWEST DIVISION

IOWA - SCM, Al Culbert, KØYVU - SEC: KØLVB. The Tall Corn Net (TLCN) had a fine get-together July 9 at the QTH of KØAZJ in Marion with 11 members present plus families. Usual talk session, pawing over AZJ's rig, good food, and baseball games with teams captained by the SCM and SEC. WØEMA is moving back to the Cedar Rapids area. WØEIT is modernizing an old HRO with solid state devices. Pleased to hear the good representation of the section during recent Open CD Party. Congratulations to WNØERM (brother of WAØZVF) on passing his General Class exam. Another repeater is on the air from Des Moines, this one sponsored by the Greater Des Moines FM Club whose officials are WBØAAM, pres.; WBØFXL, vice-pres.; WAØSXC, secy.-treas.; WAØBSW as trustee of the station. This will be a 146.22/146.82 auto-patch repeater, but I have no information regarding access at this time. New ORS appointees: WAØTAQ and WAØZVF. Congratulations to the Heelan Amateur Radio Klub of Sioux City and the Cyclone Amateur Radio Club at Iowa State Univ, on becoming ARRL affiliates. New officers of the Story County ARC are KØLKH, pres.; WBØBOY, vice-pres.; WØEMA, secy.; KØQKH, treas.; WAØEYG, comm. mgr. KØJGI reports the use of 2 meters to relay the results of the recent Iowa Primary Election in Wapello County, with WAØJCE, WAØUPS, WAØOLC and KØJGI manning the equipment. WAØRCU reports that the 2-meter operators in the Fort Dodge area held a steak cookout on July 23 at the Hydro-Electric Park in Fort Dodge. Noon Phone Net: QNI 1389, QTC 101, TLCN QNI 137, QTC 74. Traffic: WØLCX 408, KØDDA 127, KØOOD 102, WAØAUX 98, KØAZJ 90, WØIO 53, WØMOQ 47, WBØAAM 26, KØYVU 11, KØJGI 8, WAØTAQ 8, WAØZVF 5, WAØEFN 2, WAØYJW 1.

KANSAS - SCM, Robert M. Summers, KØBXF - SEC: WØBGX. PAMS: KØJMF, WBØBCL. RM: KØMRI. VHF PAM: WAØTRO. SEC KØLPE has resigned on Doctors orders. Effective Aug. 15, 1972, WØBGX is our new SEC. WØRBO reports the Plainville repeater WAØVWR is operating, receiving on 146.28 and repeating on 146.88, WØPB attended the Central Nebr. ARC annual steak fry. KØGZP says it's cold in SE. Kans. I recently sat in on the Missouri-Kans. Handicap net which meets Sat. at 3 P.M. about 3.915 MHz, WØFKW is net mgr. Stan is asking for a representative from clubs in the 2 states to help get the news of other ham activity to the ears of blind amateurs within our midst. If your club has a bulletin, see that Stan receives a copy. July net activity: MMM 1887 QNI, 60 QTC, 106 calls or phone patches completed in 93 hours. KSBN QTC 66 with 763 QNI in 26 sessions. KPN 203 QNI, 10 QTC in 17 sessions. OKS in 62 sessions had 432 QNI and 128 QTC. Kans. Weather Net reports WØFHT is the Wx. Man of the Month. They had a QNI of 482 and QTC 15 in 31 sessions. Kans. EC net met 3 times with 24 QNI. Zone AREC activity seems a bit light this month. KØMRI won the little Kans. Amateur of the Year for 1972. Jim received the Raymond L. Baker WØFNS Memorial Trophy at the Concordia Hamfest in Aug. Traffic: WØHI 194, WØINH 184, KØMRI 156, KØPSD 82, KØIMF 75, KØBKE 72, WAØLLC 55, WØBGX 41, WØGCI 31, KØLPE 24, WBØBIY 16, WØPP 16, WAØTAS 16, WØRBO 14, WBØDOX 12, WAØYMK 10, WØBCI 9, WØPCZR 9, WØMCH 7, WAØSEV 5, WAØOWH 4, WA2HSP/Ø 3, WØFDJ 3, WBØHZE 1.

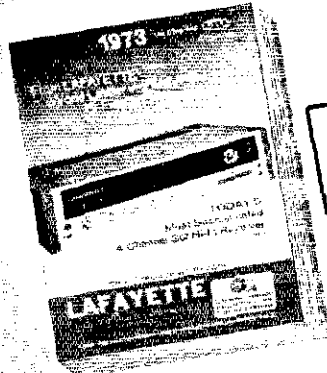
MISSOURI - SCM, Robert J. Peavler, WØBV - SEC: WØENW. With deep regret I report WØCH (ex-9CH), KØJAY and WØLCO as Silent Keys.

Net	Freq.	Time(Z)	Days	Sess.	QNI	QTC	Mgr.
HNN	7280	1705	M-F	21	432	32	WAØLUPA
MoSSB	3963	2300	M-S	26	1036	78	KØHNE
MON	3585	0000	Dy	28	88	66	KØAEM
MON2	3585	0245	Dy	26	71	44	KØAEM
WEN	7280	0030	M	5	22	2	KØBIX
MSN	3703	2330	Tu	8	21	7	KØBIX
		0030	M				
PHD	50.45	0030	T	5	91	10	WAØKUH

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540	70W per driver amp	2.04
550	Precision 728 voltage reg.	1.17
555	timer 2 seconds to 1 hour	1.18
558	Dual 741 (mini DIP)	3.25
560	Phase lock loops (A)	3.25
561	Phase lock loops (A)	3.25
562	Phase lock loops (A)	3.25
565	Phase lock loops (A)	3.25
566	Function generator (A)	3.25
567	Yoke decoder (A)	3.10
595	Four quadrant multiplier	3.10
702C	Hi-gain, DC amp, TO-5	2 for 1.00
703C	RF-IF, amp, 14 ckts, TO-5	1.00
709C	Operational amp (A)	3.9
710C	Differential amp (A)	3.9
711C	Dual 711, comp (A)	3.9
723C	Voltage regulator (A)	.95
741C	Frequency compensator 709	.71
747C	Dual 741C, TO-5	1.00
748C	Free, adl, 748C (A)	.49
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739-739	Dual stereo preamp	1.98
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SN7409	.29
SN7410	.21
SN7411	.25
SN7413	.50
SN7416	.48
SN7417	.48
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SN7473	.44	SN74152	1.25
SN7474	.49	SN74153	1.25
SN7475	.71	SN74154	1.55
SN7476	.44	SN74155	1.39
SN7480	.65	SN74156	1.39
SN7481	1.10	SN74157	1.25
SN7482	.85	SN74158	1.48
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SN7490	.69	SN74162	1.79
SN7491	1.10	SN74163	1.79
SN7492	.71	SN74180	1.10
SN7493	.71	SN74181	4.50
SN7494	1.10	SN74182	1.10
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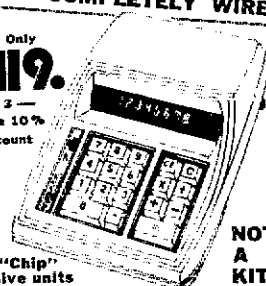
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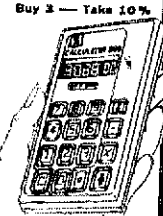
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These nets will meet one hour later GMT with the shift to Standard Time in Oct. KØBIX reports the formation of the Warrensburg CW Net with charter members WAØDKS, WBØFOM, WAØZES, KØZJS and KØBIX; the net meets at 8 P.M. Mon. on 28.5 MHz. KØGKZ has been appointed QRP ARC International Representative for the Zero call area; Steve welcomes correspondence from both members and non members. KØONK was a featured guest on KCMW in Warrensburg, where she made a broadcast about the audio reader service. WAØIZG, osteopathic physician and professor at Kirksville College of Osteopathic Medicine, was honored by the National Board of Examiners for his contribution to licensing tests administered by the Board. Congratulations to: WNØFNG, who passed General Class exam; and to new Novice WNØHWL, XYI of KØRPH. Traffic: KØONK 1539, WØBV 163, KØAFM 161, KØBIX 110, WØUD 62, WBØCXN 43, WAØWOC 36, WØGBJ 10, WAØKKUH 5.

NEBRASKA - SCM, V.A. Cashion, KØOAL - Asst. SCM: Velma Sayer, WAØGHZ, SEC: KØODF. New appointment: WAØDHU as EC. Endorsements: WØIRZ as PAM; WAØUGC and WØDOU as FCs; WØYFR and WAØIXD as OPSs.

Net	Freq.	GMT/Day	QNT	QTC	Mgr.
NSN I	3982	0030 Dy	754	12	WAØLOY
NEB	3590	0215 Dy			WØFOB
NMN	3982	1230 Dy	1211	20	WAØJUE
WNN	3950	1300 M-S	575	23	WØNIK
AREC	3982	1330 Su	204	1	WØIRZ
CHN	3980	1730 Dy	1050	43	WAØGHZ
DEN	3980	2030 M-F			WAØAUX
NSN II	3982	2330 Dy	801	10	WAØLOY

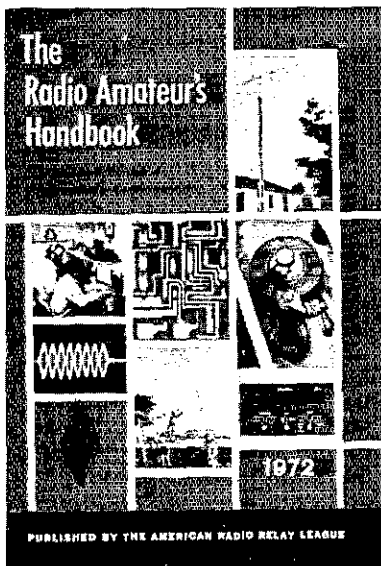
CNARC steak-fry successful with 152 registered amateurs and total attendance over 150. New Novices are WNØGWT, WNØGWS, WNØGXT. Congrats to WAØQEX making PSHR July. Lincoln RC used call KTØNEB at State Fair. Lincoln RC repeater WAØVWD operates 146.16-146.76 MHz. WNØGTJ needs crystals to start crystal bank for Nebr., Kans., Mo. and Ia. WAØZQD assigned to radar site in northern Minn. Box Butte Co. 2-meter AREC net reports June QNT 15, QTC 1; July QNT 21. Gov. Exon proclaimed Oct. 15-Nov. 30 as Nebr. Amateur Radio Days. WAØROA has portable station at Nebr. Dept. of Roads bldg. - would appreciate reports of severe road conditions this winter. WAØGAT was pictured in local newspaper with article on his participation during Rapid City flood. He also was interviewed by local TV station. WØERN building new shack. KØHNT and WØDJO had rig trouble but all is well now. Speedy recovery to WØTYB in Denver hospital. Traffic: (July) WØLOD 106, WAØSCP 83, WAØCBI 26, WØHOP 26, WØSGA 14, WØHTA 8, KØDGW 7, WAØPCC 7, WAØGHZ 5, WØLJO 5, WØNIK 5, KØOAL 5, WØYFR 5, WAØBOK 4, WØDMY 4, WØFOB 4, WAØYGZ 4, WØEWF 3, KØJEN 3, WAØEEL 2, WAØLOY 2, KØODF 2, WAØZQC 2, WAØUJZ 1. (June) WØGEO 37, WAØQEX 28, WAØJH 12, KØHNT 4.

NEW ENGLAND DIVISION

CONNECTICUT SCM, John McNassor, WIGVT SEC: WIHHR, RM: K1EIR, PAM: K1YGS. VHF PAM: K1SXF.

Net	Freq.	Time/Days	Sess.	QNT	QTC
CN	3640	1900 Dy	62	614	358
		2200			
CPN	3965	1800 M-S	31	644	195
		1000 Su			
VHF 2	145.90	2200 M-S	21	90	22
VHF 6	50.6	2100 M-S	21	102	33

High QNT: CN - WIEFW, WIKDO, WAIGFH, WIMPW, K1EIR and W1EJ. CPN - WIGVT, WIMPW, WA1NCK, WA1NLB and K1YGS. SEC WIHHR suggests an AREC drill for all areas. Who can report the greatest activity? Contest is open to all! Director W1QV urges clubs to warn of potential violation of FCC regulations prohibiting the use of amateur stations for pecuniary interest - phone-patch, auto-patch and repeater station misuse (even unintentional) could result in restrictive regulations. With sincere regret we add W1KXM to the list of Silent Keys - Corky was well known to many amateurs. Conn. Wireless Assn. new officers: W1ECH, pres.; W1RHH, vice-pres.; W1SG, secy.; W1BDI, treas.; W1BGD, comm. mgr. Murphy's Marauders held FB Picnic - also Tri-City ARC. K1YGS sent new CPN roster to members. W1ENZ and K1MOU provide activity for the Worked All Conn. Towns Award by providing a base station and a mobile unit covering hard to get towns, contact them or K1RJH for information. Congratulations to: WA1MNM for Advanced Class; WA1OIO for General Class and W1MPW for High QNT on both CN and CPN! Public service is a basic yardstick for measuring the value of amateur radio; by improving your ability you will be able to contribute your share! Traffic: WIEFW 484,



*** QUESTIONS ***

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Where can I find a circuit for a low noise two-meter converter?

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How do I wind a bifilar choke?

*** ANSWERS ***

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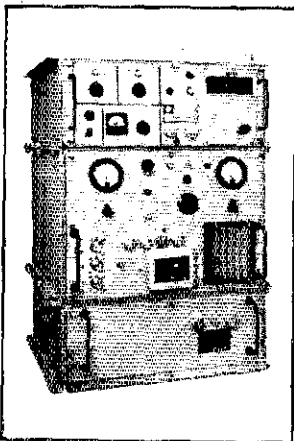
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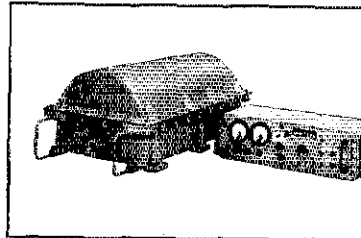
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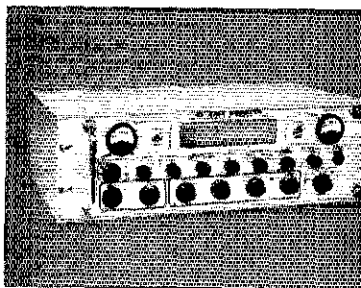
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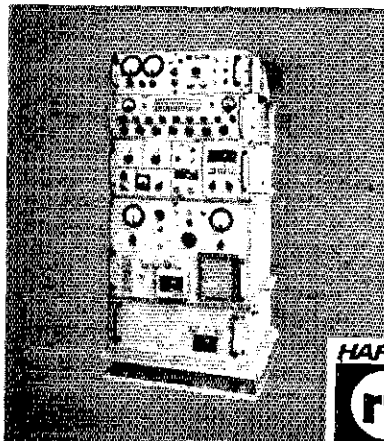
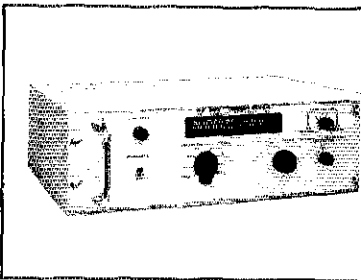


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WA1GFH 129, WAINLD 127, WA1KVI 106, WIMPW 104, W1BFY 100, WA1FCM 81, W1CTI 73, WA1GGN 65, K1YGS 58, K1SKF 51, W1KV 44, WA1OPG 44, W1AW 37, W1GVT 35, W1RML 29, WA1QLS 24, WAINCK 20, WAINYU 14, WA1PHF 14, W1QV 9, W1CUH 7, WA1MTZ 4, W1BDI 3, WA1OPB 3.

EASTERN MASSACHUSETTS - SCM, Frank L. Baker, W1ALP - SEC W1AOG received reports from: W1s BAB, LE; K1s DZG, ZUP; W1s DXI, QEK. We need ECs for many cities and towns, write either of us, W1QG, W1DOP are Silent Keys, V02GD mobilized around these parts. W1ARU is on 75. WAINRV has 134 counties confirmed. W1TIV on 75 on the Cape. WA1EYY has some 2-meter fm rigs on the way. WA1PZI active on the air. W1DMD on 75 some and 80 cw. K1KTH active on several bands, Ex-W1EEE now is W7IUZ. DL2AA/W1 doing phone patch work and his XYL is DK6CX/W1 very active on YL ssb system 14332 kHz daily, also on 2-meter fm. WA1HHH-HII have 2 more calls in their QTH: W1QNV-QNW. W1NF doing some late DXing at night. W1VN now in Chelmsford. W1ANB has his old call back, ex-W1QD. W1s JWQ, CDW, OTF members of the Middlesex ARC were on a taped show for Amateur Radio on station WROR-FM. WA1GZQ has a new QTH in Lawrence and is mobile. WA1OML in Maine for vacation on 2 fm. WA1OZI high power rig for 2, and a colinear for 6. W1MHJ has TA-33 back up again. WA1PDM has Advance ticket and has new Tempo 1. WIPL still very busy at work. Appointments endorsed: W1AYG, W1SR/W1MTQ, K1KTH as OOS; K1CLM as ORS; WA1DEC, WA1DAE as OPS. W1ALT is new EC for Brewster. W1QMZ is a new ORS. K1WYF back with Holiday Inns in Memphis, Tenn. K1AMP, W1MCI, W1KP are on 2-meter fm, W1KP on a trip to Ore. W1CMU went to Newfoundland, W1BIY up in VE-Land, W1AYG on many bands. WA1QKC now in Albany, NY; he was EL6C for a year. WA1DFL received County Award No. 10; 500 counties all on 6 phone, Massasoit ARA held a meeting and showed some films, W1E1F retired from the Post Office. K1UIW, WA1EZB, WA1GGR are on 2-meter fm. Many of our gang went to the OOTC luncheon in Portland, ME. New Novices: W1s QMM, QMQ, QNB, QNL, QNX, QNY, QPL, QOR, QOS, QPI, QPE, QPD, QPJ, QPK; W1s QNQ, QNE, QNN, QNQ, QPA, QOO, QPM, QOV; let's hear from you.

Net	Freq.	Time/Days	QNT	QTC	Mgr.
EMN	3660	1900/2300 Dy	432	207	W1QYY
EM2MN	145.8	1900 Dy	116	118	WA1OWQ
NEEPN	3945	0830 Su	107	5	K1EPL
6MBCN*	50.85	1930 M-F	43		K1OKE

*June, WA1NCV, WA1PBU on 2. The following got together for a luncheon for W1NCK before he left for Calif., W1s NWZ, JHY, GPZ, MOJ, TT, AAC, PKV, ALP; WA1s MZF, GAE. Traffic: (July) W1PEX 416, WA1MSK 190, WAIMYA 127, WA1OWQ 126, W1CE 71, W1ABC 56, K1PRB 49, WA1OML 30, WAINRT 25, WA1OZI 25, WA1QJ 19, W1AOG 16, W1MHJ 7, WA1FE 6, WA1QAH 5, WA1PDM 4, WA1FNM 2, W1LE 2, W1MKN 1, WIPL 1. (June) W1CE 119, K1PRB 58, WA1OMM 23, WA1DJC 20, W1MHJ 20, WA1FNM 9.

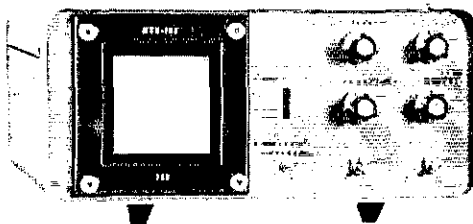
MAINE - SCM, Peter E. Sterling, K1TEV - SEC: K1CLF, PAM; WA1PEN. RM: W1B1G. The New England Chapter of the OOTC held a luncheon July 22 at Howard Johnson's Restaurant. Invited were members of the QCWA and Barnyard Net members and their friends. A good time was had by all. New officers for the Northeast Area Barnyard Net are: W1SFS, mgr.; W1CTR, asst. mgr.; W1E1Y, chief op. W1TDC had a very nice get together at Kezar Lake. I would like to see some good participation in the Maine QSO Party coming up the week end of Nov. 4-5. Get your rigs fired up for the contest. New hams in Maine are WA1QMU, WA1QPB. K1MTJ has worked Ind, on aurora for state no. 25. K1GAX now is 2-meter fm mobile. The WA1KGP repeater has changed frequency from 34/94 to 28/88. Northeast Area Barnyard Net reports 26 sessions, 734 check-ins, 2 traffic for July. Traffic: WA2QNT/1 43, K1GUP/1 37, K1TEV 7, W1NMMW 5.

VERMONT - SCM, James H. Viele, W1BRG -

Net	Freq.	Time(Z)/Days	QNT	QTC	Mgr.
VTPQ	3909	2100 Su	77	12	K1BQB
Carrier	3932	1300 M-S	460	18	W2QWP
VTSB	3909	2200 M-S	377	77	K1YGI
		1130 Su			
Green Mt.	3932	2130 M-S			W1JLZ
NHVT	3685	2300 Dy	94	87	W1UGR

Welcome new amateur WA1QPN in Newport. Congrats to W1N1P now WA1PIJ Advanced Class in So. Burlington; WA2COO/1 now WA1QOP in Plainfield. K1IUS went to Boston for Advanced and Extra Class exam and is portable in Westmore for the summertime. DJ1US was portable here and submitted activity report for the month. Must be a first for the section. Traffic: K1BQB 117, K1YGI 36, K1OXD 33, DJ1US/1 22.

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WESTERN MASSACHUSETTS - SCM, Percy C. Noble, W1BVR - SEC: WA1DNB, CW RM: W1DVW. UHF/VHF PAM: W1KZS. WMEN held 5 sessions with WA1DNB, W1STR and W1KZS as NCS, QNI was 42 and traffic 9. WA1DNB, W1CSF, K1FUG and WA1LGU were active during a severe rain and wind storm in the vicinity of Belchertown. WMN held 31 sessions with a QNI of 169 and a traffic total of 144. Top five in attendance were W1BVR, W1TM, W1STR, W1DVW and W1ZPB. W1KZS has an 1100 watt motor generator and 12 volt emergency power. K1JVM, WA1NXJ and WA1LUX are NCS for the 2-meter repeater on Greylock. Among those checking in are those on bikes, on motorcycles, on foot; one checked in while in the bathtub and another while mowing his lawn. WA1LGU handled much H & W traffic during the Pa. and N.Y. disaster. W1JH, WA1LNF and family visited 11 countries during the summer. W1ZPB is very active on RTTY nets. From the WM AREC Repeater Assn.: Repeater WA1KHC had a QNI of 28 during an alert during Hurricane Agnes. They now have reciprocal agreements with Pioneer Valley repeater KGQ 19/79 and with Torrington 25/85. No other bulletins received this month so report is short. We would appreciate activity reports from many more of you. Traffic: (July) WA1LPJ 138, W1BVR 125, W1ZPB 82, W1DVW 81, W1TM 60, WA1LNF 38, WA1LGU 30, W1KK 22, WA1MJE 3. (June) WA1LNF 56.

NORTHWESTERN DIVISION

ALASKA - SCM, Kenneth R. Klopff, KL7EVO - KL7EWH, died July 27, 1972 in Fairbanks of Cancer. Sandy, 58 years old adopted Alaska as her home in 1959. She became a ham shortly thereafter homesteading next to Ruel and Nancy (her daughter) Dittman's homestead near College. Sandy was a known Alaska writer and had also worked in various capacities at the Univ. of Alaska. During the 1967 Fairbanks Flood she turned in such an outstanding communications performance she was appointed EC and holding this appointment was largely the creator and founder of the Northern Regions Emergency Communications System (NOREC). Her authorship of a bill in the legislature was an early precursor to what has now become the Alaska Department of Environmental Conservation.

IDAHO - SCM, Donald A. Crisp, W7ZNN - K7ENE reports excellent coverage from the 2-meter repeater located on 9019 foot high Garns mountain in Southeastern Idaho. The repeater frequencies are 146.34 in and 146.94 out. K7ENE uses a 450 MHz link to control the 35 watt repeater. Over 150 hams registered for the WIMU Hamfest that was held at Mack's Inn, Idaho, Aug. 4, 5, 6. W7DWE is net control for the S.E. Idaho FM Assn. CD net which is held each Tue. at 0300 GMT using the Garns Mountain repeater. Plans are progressing for the formation of an Idaho section CW net. If you are interested in participating in this net, contact K7NHV, W7GHT, W7IUO or W7ZNN. FARM Net report: 31 sessions, 1163 check-ins, 110 traffic. Traffic: W7GHT 216, W7IY 33, WA7BDD 31, W7ZNN 19.

MONTANA - SCM, Harry A. Roylance, W7RZY - A.S. SCM: Bertha A. Roylance, K7CHA. SEC: W7TYN. PAM: WA7IZR. Montana Traffic Net for July had 837 check-ins, 21 sessions and 27 pieces of traffic handled. W7EKB has a new SB-301, W7JPD is now a Life Member of ARRL. W7YB repeater is on the air on 16-76 and covering a large area of southern Mont. This now makes 5 repeaters using 34-94 and 16-76. Plans are being made for another repeater on Kings Hill and one at the radar site in the Judith mountains. K7LDZ was elected pres. of the Glacier-Waterton Hamfest for 1973 and WA7JQS is vice-pres. Utah will host the WIMU Hamfest for '73 with W7MXZ holding the job of pres. WA7OBH has been appointed OO. Plans were made for the fourth VHF meeting and was held in Helena on Sept. 23. WA7HAG is enjoying an extended vacation traveling in Mont. and Idaho. W7AER, W7DXG and WA7GVT are on two meters in Glendive. Traffic: W7ISA 121, W7EKB 81, WA7JQS 63, W7LKB 31, WA7OBH 14, WA7IZR 8.

OREGON - SCM, Dale T. Justice, K7WWR - SEC: W7HLF. RM: K7GGQ. PAM: K7ROZ. K7THO and WA7OTZ are on 6 meters from Bend and Madras, respectively. WA7QAU, WA7QAY, WA7OML and WN7RTA are practicing the art of handling traffic on NSN. W7IJJ is using a new Gladdin 25 on 2 fm. WN7OVE has become WA7UBJ, with the help of the EARS group. WN7SVV copies 13 and 15 wpm on the EARS practice net (3710 kHz Tue. and Thurs. at 9 P.M.). Traffic: (July) K7NTS 142, K7OUF 113, WA7IFS 66, WA7MOK 19, W7HLE 16, W7LT 12, W7MLJ 10, W7IWN 6, K7WWR 6, WA7KRH 4, K7QFG 2. (June) WA7KRH 3.

WASHINGTON - SCM, Arthur Henning, W7PI - SEC: W7UWT. RM: W7GYF. PAMs: W7GVC, W7MCW. VHF PAMs: K7BRC.

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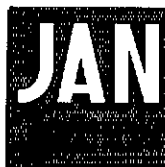
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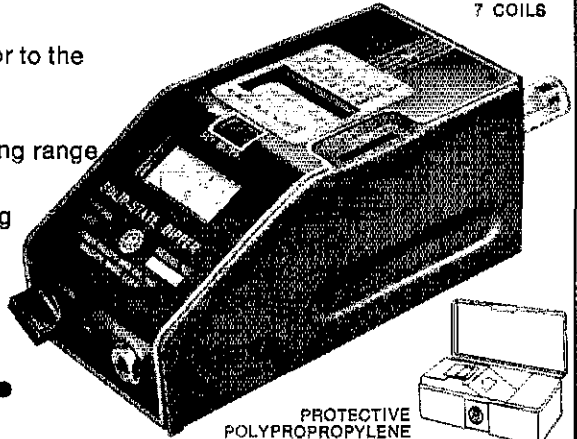
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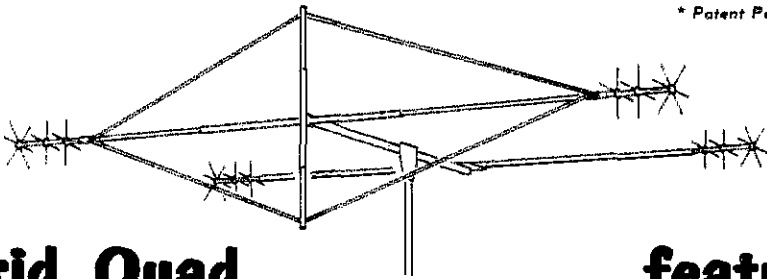
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K7LRD, New appointment: W7EXM as OO. New RN7 mgr. is W7KZ of Olympia succeeding W7BQ.

Net	Freq.	Time(Z)	QNT	QTC	Sess.	Mgr.
WSN	3590	0145	223	76	31	W7GYF
NSN	3700	0200	275	82	31	WA7OCV
NTN	3970	1830	1082	93	31	K7VAS
NWSSB	3945	0130	985	53	31	K7KPC
AREC	3930	1700 Su	51	3	5	W7UWT

Island County AREC through W7UMX club station at Naval Air Station Whidbey Island played very important part in Rapid City Disaster. They worked around the clock with local and Seattle Red Cross, CD workers and handled over 5000 phone calls and 1129 Health and Welfare messages. Among outstanding ops were WAIDRH, WBSABU and WA7NQX - a really fantastic job well done and shows what a well organized AREC group can do. W7GVC has new 2-meter rig. WA7LQV elected ARRL Life Member. K7ZDK/7 Island County EC now has 150 countries. AREC Pierce County led by K7CZF, EC, joined with Explorer Scouts in search for lost plane near Sequim. Appointment holders please send me your certificate for endorsement and renewal and don't forget that monthly activity report which is required to retain appointment. Local 2-meter FAX net time moved to Tue. 8 P.M.; 145.80 kHz. WA7LQQ becoming active in net and traffic operations. K7BBO is trying to add Utah, Ariz. on 2 meters and 222 on upcoming Meteor Showers - wants Nev. and Colo. on 2-meter scatter. HAMS of Everett provided PA system for 4th of July ceremonies for City of Everett. EC W7IEU doing FB job as NCS on WSN CW net. Traffic: (July) W7BA 521, W7KZ 222, W7PI 172, K7VAS 132, W7BQ 110, K7OZA 68, W7MCW 53, W7APS 52, K7OXL 38, W7BUN 25, W7AXT 24, W7GVC 19, WA7KNW 17, W7IEU 16, W7BZ 13, W7TTYZ 12, W7AIB 9, WA7LQQ 9, WA7LOV 8, K7BBO 7, W7YGU 7, WA7ELI 2, WA7GVB 1. (June) WA7LQQ 6, K7LRD 5, W7AIB 2.

PACIFIC DIVISION

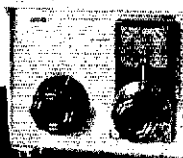
EAST BAY - SCM, Paul J. Parker, WB6DHH - Traffic: W6IPW 65, WB6VEW 25, WB6 HH 4.

HAWAII - SCM, Lee R. Wical, KH6BZF - SEC: KH6BZF, RM: KH6AD. PAM: KH6GJN. VHF PAM: KH6GRU, QSL Mgr.: KH6DO. SRC: KH6FOX. ECs: KH6s GPQ, BAS, HHG and BZF. W3KVS and XYL, K4II and JR1INZ were recently in town for some sun and surf. KH6HJV worked his 100th for DXCC snagging FM7WW. KH6ers GJN, MV and HJM recently returned from the Confusion Net banquet in San Diego. KH6MV came back with a Caslon 24-hour day-date-time digital clock. Following changes to local nets:

Net	Freq.	Times (GMT)	Days
Confusion (Patches)	21.400	0001	All
Friendly	7.290	2030	M-F
Pacific Interisland and Micronesia	14.305	0800	All
Pandoras Box	14.277	0430	All
S.E. Asia	14.320	1230	All
Pupule	7.288	0630	All

Notification that the Pacific and Micronesia nets merged was welcomed and should serve the Pacific area better. KH6HOG sold his 402BA 40-meter to KH6RVS. KH6GQW has his Tribander back in business. KH6DQ and family vacationed in XE-Land. KH6GQW reports that the 50th State Hamfest/Picnic was a success. A Yaesu FT-2F Transceiver went to KH6BRN; KH6GRW the Hy-Gain 2-meter antenna and KH6KH the Tempo swr/watt meter, KH6HHI mgr. of Island Electronics Lafayette Radio outlet displayed a new Signal One, CX-7. Another display was the Gertsche/Singermetrics model FM-10C, KH6HLK originator of this year's gathering received high praise for its success and vowed to promote a bigger and better event next time. This gathering was the initial event for Hawaii's Amateur Radio Week as proclaimed by Gov. John A. Burns and culminated with ARRL's FD efforts. WA6RNF returned for 60 day TDY on Fort Island and active on the 2-meter repeaters. Also new on 2 meters WA5IOD, WA7TFT, KH6GMM, KH6BHJ, KH6BTY. K4IEX and family passed through on their way to KX6-Land. KH6AD reports the Honolulu ARC has moved their meeting place to the Kaimuki Library the 3rd Mon. every month at 7:30 P.M. Mark your calendar. Oct. 21-22, '72 ARRL Hudson Division Convention at the Hilton Inn, Tarrytown, N.Y. Traffic: (June) KH6BZF 10, KH6AD 1, KH6AHQ 1, KH6AN 1, KØDAS/KH6 1, KH6ETG 1, KH6GMP 1, KH6GQW 1, KH6HCM 1, KH6RS 1.

NEVADA - SCM, Leonard M. Norman, W7PBV - SEC: L.L. Mike Blain, WA7BEU. The WA7BEU family had daily radio contact



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with friends while on a two weeks vacation in the Northwest. WA7QZB appointed as OO and OPS. W7ILX was voted Senior Citizen of the Month for handling cw traffic for the Senior Citizens of Las Vegas. W7YKN working on SSTV and RTTY looking for someone in Reno to run some experiments with. W7OYQ moved into new GTH. K7ICS sold his ranch, living in small city apartment. off the air for awhile. K7GQD/W6RAY/77 enjoying his retirement. K7YVN and K7ZAU each have a new set of wheels for their mobile rigs. WA7SOJ now living in W6-Land returned to Nev. for a few days. W7PRM is vacationing in the northwestern states. K7UGE fm repeater is now located in Angles Peak west of Las Vegas and getting a good work out by tourist in the Reno/Carson City area. Traffic: W7ILX 33.

SACRAMENTO VALLEY - SCM, John F. Mtnke, III, W6KYA - The RAMS held their annual July 4 campout at Crystal Peak in northeastern Sierra County. Those amateurs who helped out on the recent flood disaster in Isleton were treated to a very nice steak dinner by the Red Cross. K6SG had a ball working old friends in the July CD Party. As usual, the summer months are very slow - that's why the column is very short. Please send me some news items, even if it's such as your mother-in-law and XYL got their licenses and took over your rig. Traffic: (July) W6KYA 2. (Apr.) K6YZU 9.

SAN JOAQUIN VALLEY - SCM, Ralph Saroyan, W6JPU - The Madera Amateur Radio Club meets on the first Tue. of each month, at the Madera Court House. All amateurs in that area are invited to attend. W6GRV is experimenting with integrated circuits with great gusto. W6BWM is on 2 meters fm. W6PSQ is building a 20-meter beam for DX work. W6GEZR is active on 2 meters fm. Ex-W6LJQ has moved back to Fresno. K6GZM and WA6FL are experimenting with minipower on 2 meters fm. W6IRV, WA6HIN, WA6HAC and W6JPU were at the Sierra Hamfest in Reno on Aug. 5, 1972. WA6HDD has a 100-ft. tower and a 1H6-DXX beam. WA6HDH has a Yaesu FTDX-500. OH12BMD and WA6HDH operated FD and got 960 points. OH12BMD has left for Finland and has regular skeds with WA6HDH. WB6URJ is heard on 2 meters fm. WB6SJR is heard on 6 meters ssb. WA6CPP is putting up a phased array on 40 meters. WB6UFT has moved to the S.F. area. WA6HJP vacationed in Canada. W6UBK is vacationing in Canada and was mobiling on 40 ssb. W6LCM is heard on 75 ssb. W6JXY has a new 2-meter fm rig. Traffic: WA6CPP 12.

SANTA CLARA VALLEY - SCM, James A. Hauser, WA6LFA - SEC: WA6RXB. RM: W6BVB. W6AUC reports lots of phone net activity and also phone patch schedules with Alaska and Hawaii. W6AUM has received his thousand miles per watt certificate for a 1 milliwatt contact on 1296. Congrats Paul we understand that it is the first one issued for 1296. Heard on the cw nets W6BVB, W6YBV, W6NW, W6KZJ, W6JOU, WA6HAD, W6RFF and W6DEF who is also busy with AREC. nets. Bulletin schedule: W6ZRJ each Thur. evening as follows: CW 15 to 20 wpm, 7:30 P local, 3590 and 7129 kHz; SSB, 8:30 P Local, 3815 kHz; RTTY, 850 Hz shift, 9:00 P Local, 3615 kHz. SCV Nets.

Net	Type	Freq.	Local Time/Days
NCN	NTS	3630 kHz	7:30 PM Dy
SPFCS	AREC	146 MHz	7:45 PM M
SCV	AREC	146 MHz	8:00 PM T

Traffic: (July) W6YBV 199, W6NW 156, W6AUC 117, W6DEF 104, W6KZJ 64, W6JOU 31, W6RFF 25, WA6HAD 21, W6BVB 4. (June) WA6KKF 3.

ROANOKE DIVISION

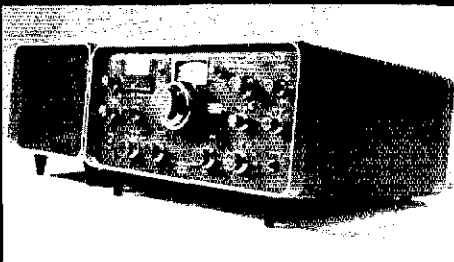
NORTH CAROLINA - SCM, Chuck Brydges, W4WXZ - SEC: W4EYN. PAM: WB4JMG. Improvements in license class include K4SWB to Advanced and WB4PRE dropped the "N" from his. WA4JCS is going for Extra. Lots of vacations this month but nets active. NC Novice Net on 37.25 at 8 P.M. having nightly sessions and issuing Section Net Certifications. WB4TNC is trying to keep Novice net going so give him QNL. WB4VBM putting together real fine CNE reports. W4WXZ ran emergency phone-patch for hospital ship HOPE docked off Brazil. WA4KWC has new tribander perking as does WXZ. The Central NC TC Net, through W4EXU repeater, meeting daily and now has teletype repeater, freqs. 146.10 in, 146.70 out. CNCTN is also sending members a fine procedure manual and K4GHR keeps this group well informed. K4GHR also reports 10 new Novices as result of Rowan ARS conducted classes. Congrats and thanks for the "new blood." W4ACY attended the W.Va. State Convention at Jacksons Mill. K4JO actively seeking contacts on VHF. The Raleigh ARS assisted the Highway Patrol on

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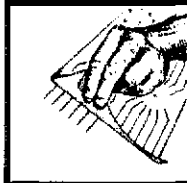
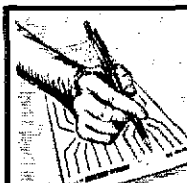


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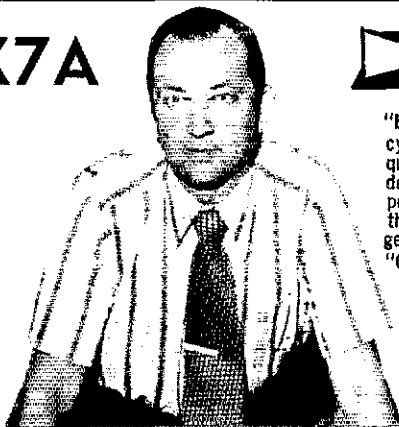
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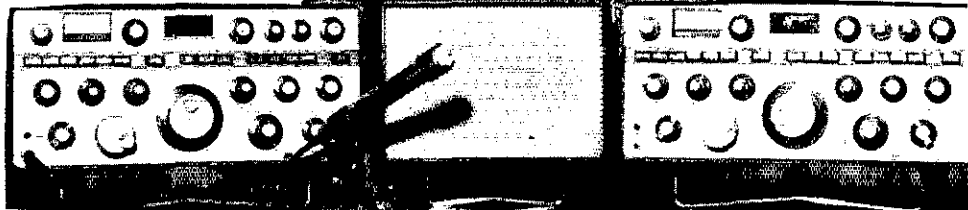


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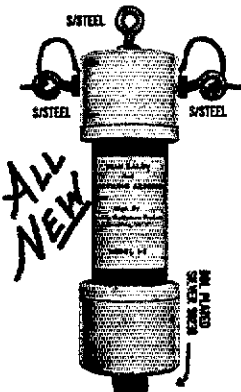
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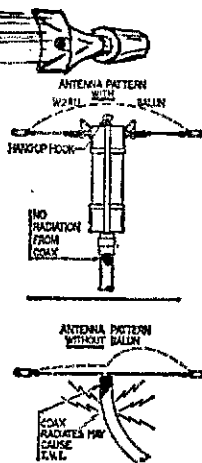
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relaying information and planned to assist the Tarheel Sports car Club during their rally by providing communications. RARS also assisted in Gov. Scott's congratulations on centennial at Flora, Ind. The Buncombe County ARC is laying plans to revise their club constitution. Is yours up to date? Having all in order makes for happy members! I would like to request all NC amateurs to voice their opinions in writing regarding possible future call-sign proposals. Comments should be sent to the FCC as well as the League. Traffic: (July) W4EVN 154, WB4VBM 88, K4MC 55, W4QFO 38, K4VBG 25, WA4YVY 18, W4ACY 13, K4GHR 9, WB4JMG 9, K4TTN 6, K4EZH 3, WB4BGL 1, (June) WB4SPC 37, K4EZH 6, K4GHR 6.

VIRGINIA - SCM, Robert J. Slagle, K4GR - Asst. SCM; A.E. Martin, Jr., W4THV. SEC: WA4PBG. Ass't. SECs: WA4JJF, WB4CVY. RMs: WA4EUL, WB4NNO, KØPIV/4, W4SHJ, PAM: WA4FGC. WA4GLO and W4YG have a nice special ham radio spot on local TV and are working on another. K4FEY has new Swan 350. W2GHK is chmn. No. Va. Convention Committee. W4IUJ back from Europe as is K4FSS. WN4WVY passed General. New Va. KYL WB4PNY strong on traffic. SEC WA4PBG touring SW U.S. this month. Shenandoah Valley ARC's hamfest at Winchester best yet. Director, W4KFC was there and gave us a report on meeting of Executive Committee and the Board. New General, WB4WLK. K4LMB blew power supply but now back on. OOs W4HU and K2HBA/4 finding too much business. W4KAO still working too much. WB4DRB in Israel for a month. W8VDA/4 reports nothing witty this month. WN4AJW has 16 states on 15 watts and working on transmitter and General with WB4JTT. WB4PWP pumping gas more than hamming. W4MK reports activity light. KØPIV/4 still fighting other interests. W4LQO back from vacation. WA4EPH back in Richmond and is on the air. WB4SKT specializing in Novice Nets. W4JUJ's counties 2611, WA4WQG 3029. W4HIR settled on eastern shore. WB4KIT now on 2 fm. SB-102 of WB4RZV working fine. WB4GMC new QLF Editor for SEVWA.

Net	KHz	Time/Days
Virginia Salt Mine Net	3947	0715/1630 M-F
Virginia Sideband Net	3935	1800/2200 Dy
Virginia Slow Net	3680	1830 Dy
Virginia Fast Net	3680	1900 Dy
Virginia Fone Net	3947	1930 Dy
Virginia RTTY Net	3625	2000 Dy
Virginia Post Office Net	3905	2215 T

Traffic: (July) W4YZC 256, K4KNP 214, W8VDA/4 183, KØPIV/4 129, WA4FGC 88, W4UQ 78, W4TE 73, WB4KIT 50, K4GR 49, WB4PNY/4 46, WA4JJF 39, W4HIR 37, WB4DRB 33, WA4PBG 30, WB4SKT 29, WA2BEX/4 27, K4FEY 27, K4VIG 27, WB4KBJ 23, W4KFC 23, W4FOV 18, WB4RZV 14, WB4FDT 13, WB4PWP 12, W4THV 11, K4LMB 7, WA4WQG 7, W4MK 6, K2HBA/4 3, W4LQO 3. (June) WB4PNY/4 137, K4FEY 38, WA2BEX/4 32, WB4FDT 23, WA4WQG 12.

WEST VIRGINIA - SCM, Donald B. Morris, W8JM - SEC: WA8NDY. RM: W8BBG. PAMs: W8DUW, W8FYD, K8CHW. Phone Net Mgr.: W8BMV. WVN CW Net: 3570 at 0001Z daily. Phone Net, 2300Z on 3989 daily. RACES-CD Net Sun. at 1200Z and 1700Z on 3997.5 kHz. Remember West Va. State Radio Council Meeting, Oct. 14 at Parkersburg. Dates for 1973 West Va. State ARRL Convention at Jackson's Mill are June 30 to July 1. K8VAH and K8UZX held Novice radio classes in the Parkersburg area and following new amateurs are W8MWS, W8MTP, W8MYK, W8MWC, W8NLI. They report ARRL training aids quite helpful. WB8JW has new keyer and would like to see more traffic. W8NES has new TR-22 and likes vhf fm. CW Net with 98 stations passed 29 messages and the Phone Net with 413 stations handled 114 messages. W8BMV made PSHR. W8HAX new asst. EC for Marion County. W8JM received YL-RL 100 certificate. WA8YCD now has Advanced Class license. Traffic: W8CYB 78, W8BMV 46, WB8JW 34, W8JWX 19, WA8YCD 19, W8NES 16, WA8POS 14, W8JM 8, WA8OKG 8, W8KJ 7, W8BBG 5, W8DXF 4, W8EKG 4, WA8YWK 3, W8AEC 2, WA8FRO 2, WA8LFV 2, WA8NDY 2, W8VVA 2, W8IMX 1, W8KWL 1, WA8THX 1, K8ZDY 1.

ROCKY MOUNTAIN DIVISION

COLORADO - SCM, Clyde O. Penney, WAØHLQ - SEC: WAØQOY. RM: WØLRN. PAMs: WØAWG, KØCNV, WØLRW, WAØWYP. CCN held its annual picnic on July 23, and a good time was enjoyed by all. WØAXW is a new member of the SSN. We welcome WØLAE back after a brief stay in the hospital. WAØNFO also back from the hospital, is a regular NCS on Tue. for the CCN, and an alternate NCS for the Colo. Emergency Phone Net on Sun.

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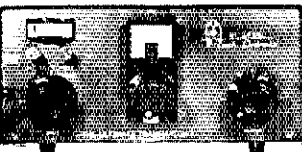
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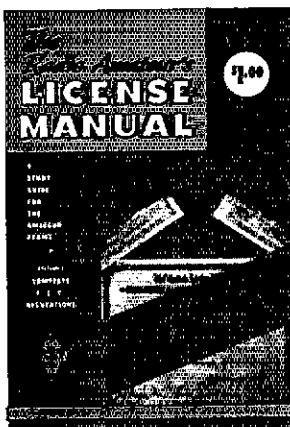
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mornings. We are also pleased to welcome K0EPD back to the local nets following his sojourn in the hospital. W0MSV has worked 57 countries with low power and an indoor dipole. Congratulations to WN0HMP who recently received her General Class ticket, and to WA0ZWA who recently received his Extra Class license. A total of 53 out-of-state visitors used the RMRL 34/94 fm repeater services in the period from June 22 to July 15. Net traffic for July: Columbine QNI 796, QTC 71, informals 118, 26 sessions. CCN QNI 278, QTC 116, 31 sessions. CTN QNI 294, QTC 22, informals 72, time 589 minutes. Hi-Noon QNI 998, QTC 63, informals 121, time 936 minutes. Traffic: (July) W0WYX 370, W0LQ 165, W0IW 94, W2TPV/0 93, WB0CCB 88, WB0DNY 76, WA0ZWA 58, WA0SIG 53, K0JSP 50, WB0AXW 44, W0SIN 42, W0LRW 34, W0LK 23, WA0ZPP 23, WA0TMA 22, K0TIV 20, W0KFH 16, WB0HCK 15, WB0DRG 14, W0LAE 12, WA0NFO 8, K0GEZ 7, W0BY 5, W4MXU/0 1, WA0HLO 1. (June) WA0SIG 12, WA0NFO 9.

NEW MEXICO - SCM, James R. Prine, W5NUI - The new PAM is W5MYM. He replaces W5NON to whom we wish the best in his new FAA post in Fort Worth. I am most pleased to have received inquiries about available ARRL appointments. Any member wishing to serve is always welcome and I will do my best to find a slot to utilize your talents. K3RHR made back-pack trip with the Boy Scouts into the Pecos Wilderness with a 5-watt battery rig originating health and welfare, re supply and fish catch messages. A considerable number of new 2-meter fm rigs are active. W5PTQ and WA5FLG report keying Mt. Taylor 146.34/94 from Alamogordo. Traffic: W5UH 176, K5MAT 79, W5MYM 42, W5RE 41, W5DAD 32, W5DMG 25, W5NON 21, W5PDY 19, WA5BLI 8, WB8JNI/5 7, WA5OHT 6. W5SMY 1.

UTAH - SCM, Carroll F. Soper, K7SOT - SEC: W7WKF, RM: W7OCX. It is with regret that I must report WA7BRB as a Silent Key. John will be missed by all amateurs and especially the personnel in military services in the Far East - he handled thousands of phone patches for them. The VHI Society repeater is now operating under the call of WA7KZO, 146.34 in, 146.94 MHz. W7FLI has received his Advanced Class license. The Utah Amateur Radio Club held their annual steak try the first week in July, with a good attendance and great steaks. Traffic: W7OCX 50, W7IQI 25, K7CLO 9, WA7HCD 4, WA7MEL 2.

WYOMING - SCM, Wayne M. Moore, W7CQL - SEC: K7NQX. If you were not able to attend the 1972 hamfest in Thermopolis, you missed a very fine affair. W7VB did an excellent job in seeing that we had one of the best hamfests ever. It looks like the 1973 affair may be held in Riverton with WA7OEC as chmn. Make your plans now to attend - the third week end in July. It was voted at the hamfest to form a repeater advisory group with one representative from each repeater area. I have been asked to act as secy. of the committee. If you plan a new repeater in your area, send your questions, etc. to me and I will see that the committee is informed. I notice a lot of new Novice licenses issued lately. Please give these newcomers encouragement and actual help so they will want to advance their license grade. Traffic: K7VWA 95, K7WRS 17, WA7HB 12, WA7NHP 9, K7WNF 6, WA7OEC 3, K7RFL 3, W7SQT 2.

SOUTHEASTERN DIVISION

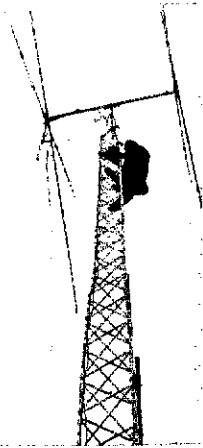
ALABAMA - SCM, James A. Brashear, Jr., WB4EKJ - SEC: W4DGH, RM: W4HFU, PAM: W4WLG. It is with deep regret that I report K4VMU, XYL of K4KQN, as a Silent Key. K4UMD reports he is handling quite a few phone patches on 3.965 and is active on 2 meters. He also reports the touch-tone auto-patch on the Birmingham repeater (1.6/7.6) is working real good. A group in Anniston are setting up a repeater on Chena mountain - it will work on 107.70. Congratulations to W4TFK on becoming a Life Member of ARRL. The NM of AENO, WB4WUS, substituted as OBS for WA4AZC while he was on vacation. WB4SVX reports the Dothan 2-meter repeater, K4HAB, is very active, 347.76, tone access. WB4SVH reports the Tuscaloosa ARC station, W4KCO, participated in the open CD party. He also reported the TARC received a nice donation from the Birmingham ARC for the "lost generator" fund. K4OWC gave an interesting talk to Huntsville ARC members on 2-meter repeaters and operations. Does anyone have any ideas on how best to determine the section FD winner? Net activity on section nets is low with respect to number of QNI and QTC. Novices are reminded that the ALA Training Net meets daily at 2330Z on 3.725 and the Huntsville ARC has a limited supply of crystals for that frequency. The AENB meets daily at 0100Z on 3.575. The AENM meets daily at 0030Z on 3.965. During periods of DST these nets meet one hour earlier. Welcome to the following hams: WA4ATS, WB4ALF, WB4ATX; WN4s ANA, APW, APP, APV, APO, ARC, AQA, APO, APM, APS, APZ, APY, ASP, ASU,

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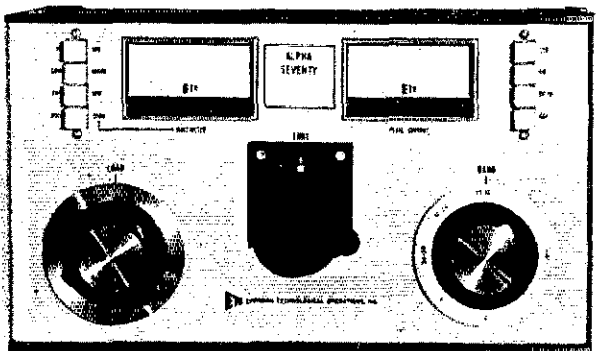
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ASV, ATE, AUX, AUZ, AVR, AVS, AWA. Appointed WA4VEK as EC. Endorsed: WB4SVH, W4GET as ECs; WB4SVH as OBS and ORS. Traffic: (July) WB4SVH 159, WB4FKJ 141, K4AOZ 73, WB4JMH 68, WB4SON 32, K4HJM 12, WB4WJUS 10, WB4THU 9, K4BSK 4, WB4SVX 2, WB4NLK 1, (June) WB4SON 64, WB4NLK 43, WB4THU 8.

EASTERN FLORIDA SCM, Regis K. Kramer, W4ILE - SEC:
 W4IYT, Asst. SEC: W4SMK. RM: WB4OMG. PAMs: W4OGX 75, W4SDR 40. I am pleased to report that traffic activity and likewise, station activity reports, continue their upward trends over comparable periods a year ago. The OTs are doing magnificent jobs. while the newcomers and transferees from other sections are supplying real enthusiasm and Esprit De Corps in our Communication Dept. affairs. WA4WV is new Editor of the Fla. RTTY Society Bulletin. WA2AFL/4 has had a seige of receiver trouble - ditto for W4ILE. Welcome to new traffic reporters WB4NJI and WB4HPR who perform on the Volusia County Emergency Net. K4SCL, FAST Net Mgr. appointed WB4AIK as his asst. WA4OHO back at home QTH in St. Pete. and will be going back to W4AQL for final 3 quarters in Sept. '73. W4UWP moves back to Miami. W4YW is a new "reportee." Congrats to new LMs W4BRB and W4HER. WB44HIS made BPL, 954 points by RTTY QSP for WB4USA to W3CUL/W3VR. WB4OYA is supplying WD4USA/WR4USA convention QSLs. Thanks OM! WB4JPZ doing outstanding job in South Dade Homestead area for RACES. USAF MARS on 2 meters with NTS connections through the FAST Net 3940 and FMTN on 7254. WN4UNV working diligently on General. QNIs Q4TN. W4OZF erecting a 50-ft. tower. W4YOX combining hamming and camping with his VW and is available for any "on location" emergency communication needs phone or cw. WB4QAA and WB4WHK IXpeditioned to PEI July 8-11 with the DOT giving them VE1 calls on real short notice. WB4HJW rebuilding shack. K4NE CD partied 44.7K, plus QNing the OGN and 7 day week enders net. K4FAC is no longer in JAX - now in Miami for SBT Co. It is rumored WB4SMA will be attending MIT. K4HLC is QRL County hunting. W4DO "eyeballed" PA0WF and PA0TJ on trip to Europe. Gold Coast FM Emergency Net meets at 8:00 P.M. on Mon, 22/82 Boca Repeater. WA4WNE is NCS and looking for alternate. The Fla. Newsletter by W4WPD lists 54 members and looking for new prospects. Shirley reports YL officers: W4WPD, pres.; K4HSC, vice-pres.; W4BAV, secy.; K4WXS, treas., with W4BIL, K4RNS, WB4PEL, WB4WPZ and W4HRC also holding offices. Nice going gals! New appointees: OPS: WA4FJA; ORSs: K4GJ and W4DFP. New EC WA4ESS Okeschobee. Traffic: (July) WB4HIS 954, WD4USA 638, WA4IJH 453, K4SCL 433, WB4AIW 329, WB4NCH 295, WA4SCK 283, W4HFF 150, W4SDR 148, WA4NBT/4 123, WB4PNG 108, W4ILE 98, WB4SQA 97, WB4OMG 90, W4DVO 73, WB4GHD 72, WB4HJW 70, WB4FLW 65, WB4WHK 65, WRBZY/4 62, WB4AID 55, W4NGR 52, W4YPA 52, WB4ONR 46, K4GJ 44, K4BLM 43, WB4SKJ 43, W4BM 35, K4NF 35, K4QG 35, WA4HDH 34, WB4PTH 34, WA4FJA 33, W4IAD 33, WB4WYX 33, W43FRV/4 28, WB4UOC 28, W4LA 25, W4LSR 24, WB4QVO 24, K0ECG/4 24, W4IYT 23, K4EBE 22, K4EYN 21, WB4SMA 21, W4DFP 19, W4GUJ 19, WB4HKP 19, WB4ADL 17, WB4IYJ 17, W4DQS 16, WA4OHO 16, WB4WIQ 16, W4GDK 15, W4OGX 15, WA2AFL/4 12, K4EZE 12, W4OOH 11, W4SMK 11, WA4VZF 11, K4GFW 9, W4LDM 9, WB4NJI 9, W4NTE 9, W4EH 8, K4HLC 8, W4VLK 8, W4ZAK 8, WA2HHO/4 7, W4UNV 7, WA4ESS 6, W4TJM 6, WA4BGW 5, WB4HPR 5, WB4OOH 5, WN4ZSE 5, K4IWT 4, W4YOX 4, K4SJJ 2, (June) WA2AFL/4 12, K4GFW 6, W4DO 2.

GEORGIA - SCM, A.J. Garrison. WA4WQU - Asst. SCM; John T. Laney, IH. K4BAI. SEC: WA4VWV. RMs: K4BAI, WB4SPB.

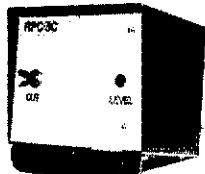
Net	Freq.	Time(2)/Days	QNT	QTC	Mgr.
GSN	3595	0200/1050/2300	Dy 784	247	K4BAI
GTN	3718	2200 Dy	---	---	WB4SPB
Ga. SSB	3975	0000 Dy	765	72	WB4DMO

Vice-Director, W4DQD attended the ARRL Board of Directors meeting in Hartford on July 19-20. W4LRR reports that W4LYG, WB4GTB and W4BGH are operating AFSK and Facsimile on 2 meters. We're happy to have WB4RUA back after 2 weeks summer camp at Fort Stewart, Ga. New officers for the Columbus, Georgia Radio Club are K4VGI, pres.; W4AHA, vice-pres.; K4CVH, secy.-treas. The Greater Atlanta UHF club has a new UHF repeater in operation in Atlanta. The call is WB4QGF, input 444.5, output 449.5. Anyone desiring information on the repeater or the club contact W4LRR. Traffic: (June) WB4RUA 202, K4BAI 92, W4AMB

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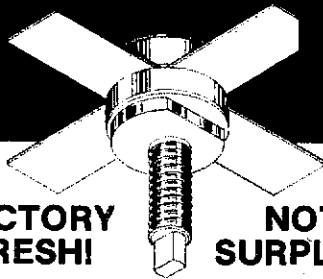
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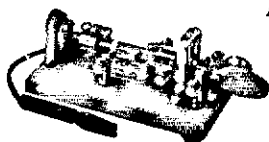
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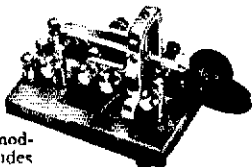


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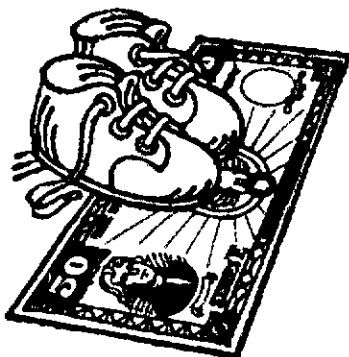


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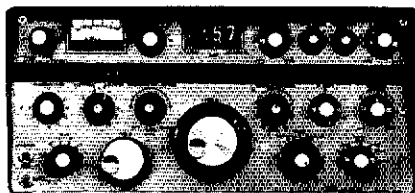
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WEST INDIES - SCM, Pedro J. Piza, Jr., KP4AST - SEC: KP4CB. 6-meter activity has increased. Keep it up boys. KP4s ANG, DHC, BJB, BKR, BOL, DHP, ACH, AFK, AYY, DBK, JM, BRR, AOQ, DCW, ES and AST are among the most active stations. We have been getting good band openings into the states and South America, so get your 6-meter rig back on the air. KV4FZ organized an expedition to Aves Island. KP4BBK returned from Ecuador. KP4AIG is very active from Ponce on all bands. KP4BOL passed his General Class exam and he is waiting for his ticket. For EC appointment contact KP4CB; for others contact me. Traffic: KP4WT 245.

WESTERN FLORIDA - SCM, Frank M. Butler, Jr., W4RKH - SEC: W4IKB, RM: K4LAN, RTTY: W4WEB, PAM: WA4IZM, VHF: WB4KGW.

Net	kHz	Time(Z)/Days	Sess.	QNI	QTC
WFPN	3957	2300 Dy	31	454	50
QFN	3651	0000/0300 Dy	62	-	-

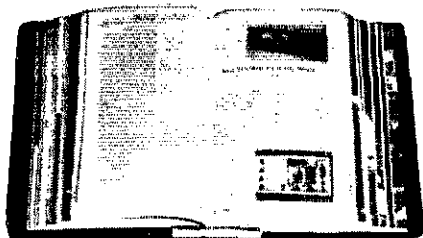
Pensacola: W4UBN and W0EXD/4 received their Extra Class tickets. K0BAD/4 edits the RN5 Bulletin. WN4YTP is active on QFTN. The FFARA fish fry at W4ETE's QTH drew a big crowd. W0EXD/4 operated from the Prubitof Islands. WB4KGW is looking for tuning units for the APR-4 to expand his vhf coverage. WA4JNA has TVI with his 1/2-watt 6-meter rig. WB4ZPC is building the MK-II fm receiver. WB9AIU/4 is conducting a transistor theory course. The fm repeater has two new receiver sites in the mill-Cablevision tower and Montclair water tank. Several fmers are going to 146.52 as a new simplex frequency. Fort Walton: W4HD a Silent Key this month. He was first pres. of EARS, in 1949. New hams in the area include WA4AKI, K4YTE, WA5EDN and K0QVP. WB4NHH has a nice signal on WFPN. WB4SFU is new socy. of PARC, Panama City: The WB4QER repeater is back on .34/.76, with 300 watts power. Quincy: K4QDN was appointed EC for Gadsden County. Crawfordville: WN4ZQC is active on QFTN. Traffic: (July) K0BAD/4 186, K4VFF 136, W4AGB 12, W4RKH 8, WN4ZQC 8. (June) K4VFF 223.

SOUTHWESTERN DIVISION

ARIZONA - SCM, Gary M. Hamman, W7CAF - RM: K7NHL, PAM: W7UJX. The Ft. Tutuill Hamfest was attended by approximately 360 people. The transmitter hunt was won by K7PRS. Although W7YWF experienced bad luck in June by having extensive damage to his new house from high winds, his luck at the hamfest was good enough for him to walk off the a portable color TV. Other major prizes went to W7EFO, W7QZX, K7ESA and WA7SAJ. The Arizona Ham of the Year was awarded to K7LUV by K7KEQ. The SW Division Convention is Oct. 20 to 22 at Santa Maria. Contact W7CAF for more information. K7GPZ became a Silent Key on Aug. 9. He held SEC and Asst. Dir, appointments and currently was editor of the Scottsdale ARC SARC-SPARC and acting chief operator of WA7UGA. He was a key person in the organizing of the Scottsdale ARC, the Amateur Radio Council of Ariz. and the Ariz. RACES group. K7GPZ will be greatly missed but not soon forgotten. K7RDH is spending several weeks operating from G3DME. WA7KBN is visiting his home country of Ireland. Stations earning Section Net Certificates were: K7GLA, WA7HII, WA7IXC, WA7JCK, WA7KQE, K7MTZ, WA7NHQ, K7NTG, K7RLT. Traffic: K7NTG 124, K7MTZ 115, W7PG 48, WA7QVN 26, K7RDH 22, W7CAF 14, K7RLT 12, WA7KQE 9, K7EMM 5, K7ABW 3, WA7JCK 3, W7LLO 1.

LOS ANGELES - SCM, Eugene H. Violino, W6INH - RMs: W6LYY and WB6ZVC. The AREC group for the fifth year assisted the West Covina Police and Chamber of Commerce in their 4th of July parade. Over 30 members gave of their time and helped. WA6OQL showing up on SCN again after being QRI because of work schedule. WB6YIZ signing portable for time being between QTH's. The Northrop Radio Club has become an ARRL affiliate. WB6WU and W6CFM reported a very successful Field Day for the club. The TRW/ARC had a QSO party Aug. 5 between members and other affiliated clubs. W6DDB was guest speaker at the Associated Radio Amateurs of Long Beach. Pres, W6LAE out of the hospital. WB6NOU and WA6TMV supplied the portable electrical equipment for the Palisades Club during Field Day. WA6FHR and WA6DFQ were the Field Day chefs this time. K6IUS was comm. corr. for the

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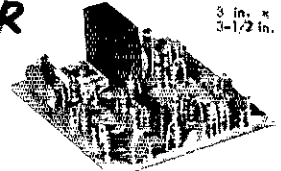


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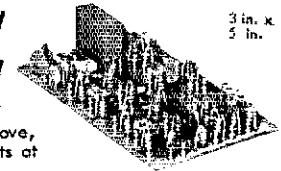
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BAJA 500 official Road Race during June. The Ramona Radio Club members visited Dick Martin's cabin at Big Bear Lake. Summer is slowing down many of the nets as is usual, but the regulars are still in there. K6BUU sporting new linear and really going after the DX now. W6USY reports that retirement is wonderful. K6UYK back on SCN after vacationing in Germany. WA6AIJ outdid himself on the CD activity recently making big score. WB6HDJ has passed the 20 wpm test from WIAW and now going for 25 wpm. New West San Gabriel Valley EC is WB6IDO. The Long Beach group is looking for a new club meeting area. W6AGK has been active on QCWA net and also has some towers he wants to sell or trade. W6LYC very active on 20 meters with cw skeds. W6KMJ recovering from heart trouble in the hospital. Things are slow during this season with vacations and the summer hot spell. Traffic: WB6BBO 579, W6INH 261, WB6KJ 85, W6QAE 62, WA6ZKI 52, W6LYY 43, W6IVC 36, W6USY 36, W6OEO 22, W6BZY 17, K6UYK 14, W6GOLD 12, WA6DHM 7, W6DGH 6, W6HUJ 6, W6FD 2, WB6KXC 2.

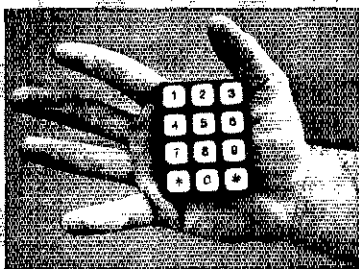
ORANGE - SCM, William L. Weise, W6CPB - Asst. SCM: Richard W. Birbeck, K6CID. SEC: WA6TVA. PAM: K6YCL. RMs: WB6AKR, W6BNX. The incoming reports were excellent. Keep up the good work. WB6ZOK/6 expects delivery soon of a new 18AVT/WB and will be active on SCN/SCNT/MTN, Autonetics Radio Club, WB6YPX (AFC6YPX) continues its excellent phone patching service for personnel stationed in Vietnam and Thailand, averaging over 3000 patches per month. Congrats to all amateurs who participate. W6BUK attended the All Ariz. Hamfest at Ft. Tuthill July 29, 30. Graham enjoyed meeting many of his old friends. About 35 League Officials and members of the Orange, LA, and San Diego sections met in Anaheim July 22 for lunch and to say their 73s to W6MNY and WB6CQR who resigned as SCM and SEC. Both were awarded plaques for their outstanding service to the Orange section and amateur radio. W6CPB, Acting SCM and WA6TVA new SEC were introduced. 35 AREC and Santiago Communications members, with American Red Cross officials, conducted a three hour SET on July 15. The emergency was fires in several canyons in the Santa Ana Mts. Some members are continuing with communications checks from the mountains to improve repeater locations and two way communications to and from several of the areas. PSHR: W6MNY 45, WA6TVA 50, WB6JOT 42, WB6AKR 27, W6CPB 14. Traffic: WB6VTK 305, W6WRJ 145, W6ISC 59, W6MNY 49, WA6YWS 42, WB6AKR 21, K6GGS 12, WA6TVA 12, W6QBD 5.

SAN DIEGO - SCM, Paul C. Thompson, W6SRS - Asst. SCM: Art Smith, W6INL. SEC: W6TAI. The upcoming convention for the Southwestern Division will be an event that you will not want to miss. Make plans to attend in Oct. at the Santa Maria Convention Center. WB6ODR has been elected to serve as the chmn. of the organizing committee for the San Diego sponsored convention in 1974. Your help will be needed to support this event. Contact Bob as soon as possible. Clubs: North Shores had sessions on noise bridges and phone patching. El Cajon had W6DEY, former FCC member, as guest speaker. Aug. was a big month for picnics - El Cajon, Palomar and coming soon will be North Shores. SDDX holds meetings at Convair Gun Club. SDFM is in the process of changing to .04-.64 for the Otay Repeater. Palomar RC has net on 13-73 Sun. mornings. Station activities: K6BTO built a thirteen-element Yagi for 1250 MHz and is in QSO with W6CMQ. W6VNO is on TCC and PAN. New station 1 for TCC is WB6VKV who replaced W6MNY. W6DEY divides his time between checking RFI complaints in the Vista area and checking frequencies for AREC. Election of QCWA officers held Sept. 10 at Vacation Village. PSHR: W6BGF 42, WA6AMK 39, WB6VKV 34. Traffic: W6BGF 352, W6VNO 333, WA6AMK 201, WB6VKV 193, WB6HMY 107, W6DEY 25, W6SRS 6, K6PM 1, W6TAI 1.

SANTA BARBARA - SCM, D. Paul Gagnon, WA6DEI - SEC: W6JTA. RM: W6UJ. PAM: K6EVQ. W6DM keeps phone patch skeds with the Tracking ship USS Wheeling using his new Signal One. WN6MLJ testing a new homebrew 2-watt rig. W6MQF had Hytower up in time for the July CD parties. WB6TAM and WB6BOQ are doing a fine job as NCS on the Ventura Co. 2-meter AREC net. WA6PFF and the Antique Radio Collectors had a showing in Santa Barbara. K6VBX has new Swan 1210A on 2 meters. W6IDU has completed an ST-5 RTTY TU. Bob also has Hustler up and is working DX. K6PHT joined AMSAT and is waiting for the launch of Oscar-6. WA6KRA has a new twenty-element 2-meter beam on a 70-ft. tower and covers the whole section through 3 repeaters. WA6TMQ qualified for Japan's JCC 100 award.

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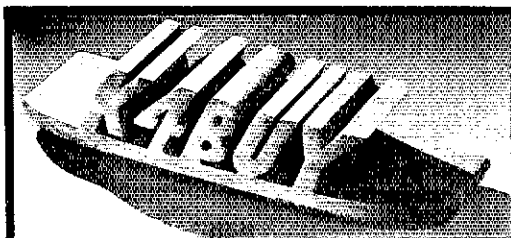
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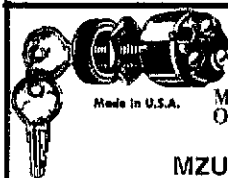
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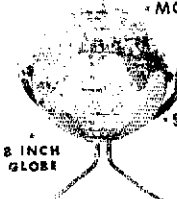
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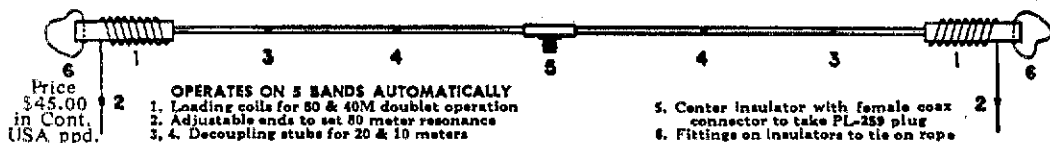
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SBARC had talk by Raytheon Reps on IC applications. New appointees: WA6MBZ, ORS; WB6PGK, OPS; WB6UAX, OO, WB6WVY was mobile on a bicycle at the Santa Maria picnic and worked phone patches through the repeater. Other Satellite club members who worked hard to make it a fine picnic were WB6LDW, WB6GRW, K6YHK, W6DKQ and WA6IDO. Over 150 people attended. WA6PMJ working 2-meter DX from Baywood. WA6DEI has been appointed Asst. Dir. for the SW Division. Section net certificates this month to WB6LDW, WB6WVY, WA6DKY and WA6MBZ. New officers of the Tri-Counties Radio Council are K6LEVO, chmn.; W6UEI, vice-chmn.; W6IDU, secy-treas. Keep in mind the Division Convention in Santa Maria Oct. 21 and 22. Hope to see you there. It will be a good one! PSHR: WA6DEI. Traffic: WA6DEI 168, W6JTA 159, WA6MBZ 120, WA6TMO 6, WA6KRA 4, WN6MLJ 3, WA6PTT 2.

WEST GULF DIVISION

NORTHERN TEXAS - SCM, L.E. Gene Harrison, W5LR - Asst. SCM: Frank A. Sewell, Sr., W5IZU. Asst. SEC: WA5KHE. PAM: W5BOO. RM: W5QGZ. It is with regret we learn of WA5VJW's resignation. Ruth turned in an exemplary job as SEC. W5TI has OO problems; all clear now. FD messages received from W5FC/3, KC Club FTW, K5LIB, Temple, RWK, Arlington ARC, Garland ARC. RWK recently formed TVI committee, if interested call Dick 231-6031. KC Club FTW extends congrats to WBSHMG and WBSBCL on new call and all operation 2 meters. WA5VX/VJW plan move to the country. W5PHT in Europe. W5LUJ, RWK reports 20 open to Europe, long path to Asia starts early mornings. Geo. Baker now W5YR. W5EYB advises NTex members W2TUK, ARRL Pres. will attend Texoma in Oct., so prepare questions now. Please note that you may join AREC without being member of League. Public Service responsibilities are most worthwhile. Club sponsored schools are on increase in Lubbock and Garland. Contact WA5WZO, SCM plus Dir. attended recent Tyler QCWA outing. Many notables showed up including W5YZ, W5HT, W5IZU, W5YZ, W5NC, plus W5CNO. Garland ARC further reports WA5MVT worked Dallas from KC4-Land and W5QOP lost 70-ft. tower in recent breeze. WA5VKH new DARC pres. would appreciate hearing personally from each DARC member. Other officers are WA5BNW, K5ADV, WA5WDW and W5QGZ. Sister Mary Lufkin interested in Comm. Dept. work. WIAW sends good signal into Tex. on 14290 so copy OBS here. SCM unable to attend Tex. VHF-FM Soc. meeting in Austin. Hope you have read OBS No. 383. Better read it and keep up. Call book address changes have been mailed each certified ARRL Club NoTex. Thanks to W5EYB and K5HZR. Irving ARC has cw identifier on 2 meters. W5NT Dallas "griped" to Hq. and was "heard" about transistor questions being unrealistic. Congrats Chuck. First NoTex SCM election in years in progress when you read this. Traffic: (July) W5TI 144, W5LR 22, WBSBFX 8, W5IZU 6. (June) WA5VJW 48.

OKLAHOMA - SCM, Cecil C. Cash, W5PML - Asst. SCM: Joseph M. Schlosser. WA5IMO. SEC: WA5FSN. RM: W5RB. PAMs: W5MFX, WA5WHV, K5DLE and WA5ZRU. K5LMG Class IV OO reports his 80-meter transmitter still down for a special switch, hope it gets in soon, we need you on the OLZ net. K5OCX has a new SB-650 frequency display so if you want to know how the calibration is on your equipment just check into OLZ and Bill will be able to tell you. W55FIK reports activity on several nets, thanks Carl for a job well done. Is my face red! Seems that a few months ago I received some info about Larry Petty (call unknown now) and Gary Rheuark K5QNM, it seems that Gary got listed as W55GLY, which may or may not be Larry's call, and Larry got listed as K5QNM which is really Gary's call. Straightened out or more confused? I am not really sure myself. Congrats to WA5TWM on his first phone. WBSBUM on his second phone and also his amateur Advanced. Congrats also to new Tech. W5HMI and new Novices W55HJT, W55HLR and W55HOB. Code and theory classes running full force at Lawton and Muskogee. Remember the Lake Texoma Hamarama the last week end in Oct. (Oct. 27, 28 and 29) that's this month as you read this article. Traffic: K5TEY 488, W5RB 111, W5MFX 29, K5OCX 18, K5OTM 15, W5FKI 14, WA5WRC 14, WBSAZS 12, W5PML 12, W5SUG 12, K5WPP 11, WA5FSN 10, WBSWCX 9, WA5OUV 4.

SOUTHERN TEXAS - SCM, E. Lee Urey, K5HZR - SEC: K5HXR. PAM: W5KLV. RM: W5ABO. Congratulations to new RM W5ABO. W55SF resigned because of increased work at NASA. ORS WBSBWW and OPS WA5YXS still grinding out new Novices at TSARC. Houston ARC News back in circulation with WA5BTO as editor. OVS WBSFNS says he passed code exam for General and

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annual N.B. Radio Week trip to Miscou Island using the call VA1ND, again set up by VE1TC. Participants included VE1s AMB, AHM, FP, IN, ANH, AC1, AEU, AMR and several jr. ops. Congratulations to VE1ANH, VO1DJ, VO2AW, PB and VO2RE on new Advanced certificates. The Newfoundland HAM-EN-ANY is now history. Feed back from Field Day indicates that if VO1CA or XYL are present extra guys are needed on the antennae. The Humber's Field Day was well attended by VO1s DL, HA, MI, GS, JZ, ID, GC, HL, HF, GZ, JQ and CQ. Visitors included VO1CV, VO1HO and VO1KB. APN reports QNI 16, QTC 34 in 21 sessions. Traffic: VE1RO 54, VE1ARB 35, VE1AMR 24.

ONTARIO - SCM, Holland H. Shepherd, VE3DV - Effective Sept. 1, Asst. SCM VE3EWD will once again take over the appointment of SEC. Ed will have the tough job of organizing Ont. amateurs in a town/city responsibility instead of the county-wide system of previous years. The new system hinges on the following premise: the average amateur will react most positively to local abnormal situations; urban areas should receive priority because of the increased risk of property damage and lives lost in built up areas; reestablish the fact that the Canada Emergency Measures Organization, a Federal agency, has responsibility to coordinate all aid and assistance in abnormal situations ranging from floods, forest fires and landslides to hurricanes, snowstorms, industrial accidents and missing person searches; the main mode of operation for amateur emergency work will be fm on 2 meters using repeaters and simplex. VE3DVH, VE3BRN and VE8YE are recent registers in the Ont. ARRL. All Ont. amateurs are urged to give VE3EWD your active support in his efforts to provide Ont. with a workable emergency communication system. Congrats to VE3DXY, VE3ESH, VE3BEO, VE3MW and Harry Kennedy of the St. Lawrence college in Kingston for the fine job they did during '71/'72 winter months in teaching amateur radio to the following successful candidates: VE3CPK, VE3DMS, VE3DWA, VE3DXC and VE3FMF. Each year at this particular time I express my thanks and appreciation to the solid core of trafficmen who keep our nets active during the summer doldrums. This year is no exception but I do wish to single out W3OKN for his individual efforts in maintaining our liaison to the EAN. Thanks Merle. Traffic: (July) VE3DPO 89, VE3AIA 57, VE3SB 53, VE3DU 38, WA8ETS/VE3 33, VE3GJG 33, VE3ATR 30, VE3FQZ 28, VE3BPC 24. (June) VE3EWD 54, VE3AIA 44, VE3DOC 22.

QUEBEC - SCM, Joe Unsworth, VE2ALE - VE2s AKM, BOQ, ALE, UY, DIX, DM, BQN, AWE, BU, JO, AWO, CN, BDM supplied extra communications for search of lost girl in Ile Perrot, Que. VE2s AMQ, DP, SW are the more active mobile stations in the Three Rivers area. VE2DBN received VE2MO members at his summer QTH at Lake Claire. VE2AVP and family spent vacation at parents QTH in Rawdon and was heard regular via VE2RM. VE2OJ hopes to complete ham shack and put up new sky hooks during Sept. vacation. 2DM once again down in Barbados. VE2HI away for a while and dearly missed on the P.L. net. The Plattsburg repeater now is WA2NVT in memory of Dave Stuart. Conference was held between VE2RM and W2DZN on inter-communication between repeaters using the 450 MHz frequencies. VE2a IS and GA vacationed near Portland, using the 450 MHz frequencies. VE2s IS and GA vacationed near Portland, appeared to be better this summer - all the rain improved antenna ground systems. VE2BRP mentions he will be moving to VE7-Land, sorry to see you leave us and good luck, Mike. VE2DFE changed call to VE2AS and new call VE2BKK, and VE2BRW picked VE2BSQs Trio TR-7100 vhf transceiver and very active. VE2ALE once again on midnight shift work so reduce activity on the QR net. Traffic: VE2DR 57, VE2EC 27, VE2DLG 24, VE2LV 18, VE2OJ 12, VE2UY 5, VE2ALE 2.

SASKATCHEWAN - SCM, William H. Parker, VE5CU - A big thanks for a job well done to our retiring SCM, VE5BO. Barry carries on as EC for the Prince Albert and northern region; also liaison officer for the joint Holy Family and Victoria Union Hospital Disaster Committee to the EMO. Yours truly, VE5CU is now Safety Officer for the City of Saskatoon and will be working in close cooperation with the EMO. May we have bigger and better SET exercises in the future. VE5JB reports activity on 7.175 is increasing. PAM VE5DN is ably handling the ARRL Fone Net. Thanks fellas. VE5SC and VE5GL have the cw net under control. VE5XG and Lake Net doing a noble chore for those in the northern lake areas. FB. VE5JI still snowed under with QSL cards. Not sure but think we might have somewhat of a record for VE5-Land in that we have quite a few White Caners licensed this year. Hope everyone enjoyed their summer holidays. Traffic: VE5GL 35, VE5BO 15, VE5DN 12, VE5HP 11, VE5GF 6, VE5RE 4, VE5CU 3, VE5PD 3, VE5HE 2, VE5SN 2, VE5KS 1, VE5XG 1.



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QS-10-72

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QST June 1924 to date, 47 years. Good condition, all covers \$125. WA4YG 420 18th Ave N, Jacksonville Beach FL 32250

QST-CQ's '73 magazines from 1960-1968. Some in binders, make offer. SASE for list. K3AHN 3117 Jeffrey Rd. Baltimore MD 21208

FROM the estate of W1KXM (Corkey) the following items are offered. Collins 32S-3 with 516P-2 power supply, 75S-3, 312B-4 station control. All reasonable offers considered. Contact Fred C. Gedney, K1BGG, 410 Hale St. Suffield CT 06076 (203) 668-5490 evenings only

MAKE me an offer for my old QSTs, CQs, or IRE Proceedings QSTs: Late teens to present, early years incomplete, later year solid; CQs: '45 to '66, some solid years; IRE Proceedings: Misc copies, teens through late '30s. Some "year books." W1CUT, 11 Mokawir Dr. Unionville CT 06086

IDYLIC Island Montserrat VP2M share with refined docto modern house constant sea breeze \$75 weekly. Feel free to use ham equipment with 65 foot tower, hquard, 18 AVQ, 1200 V linear, HW 101, HW 100, excellent propagation. Jack Beveridge VP2MZ 60 Amsterdam Toronto 374 Ontario Canada Tel 416-755-2117

HEATH SB-110A six meter xcvr with ac supply/speaker, \$275 Alec Steingart, WB2MZF, Johns Hopkins University Box 214 Baltimore MD 21218

160 to 190 KHz. The experimenters QRP Band, MiniHandbook with facts, Receiving, transmitting, antenna dope, etc. \$1.7 postpaid. Ken Cornell, Box 721 Westfield NJ 07091

RANGER II, factory wired, and HQ160 receiver with manuals \$225. Separate offers considered. W0DKX/4 2941 Kedron Ct. Winston Salem NC 27106

CONTACT us for new or reconditioned Collins, Kenwood, Tempo-Oue, Drake, Galaxy, Hy-Gain, Mosley, Henry linear, towers, antennas, rotators, other equipment. We try to meet any need and to give you the best service, best price, best terms, top trade-in. Write for price lists. Try us, Henry Radio Butler MO 64730

FOR SALE or Swap, Hammarlund HQ100 courier transceiver, Heath DX35 transmitter cassette pocket recorder, Kenneth Hand, Bridgexhampton LI NY 11932

WANTED: Mint FT101 or Swan 270 Ken Mudd 414 Kenwick Galesburg IL 61401

WANTED: SB 401 state price, condition WA5BCB Box 30141 New Orleans LA 70130

HW-16, one year old with 8 crystals, and Heath speaker, excellent condition #80 Roger Young Route 1 Ferry IA 50220

SELL: Heathkit Marauder HX10 Excellent condition with spare crystals and tubes #165 FOB J.P. Gehegan W86DZN 4750 Conrad Ave, San Diego CA 92117

GALAXY V Mk2, ac power supply, speaker console, all in excellent condition. Make offer. Bob Holdefer 805 S. Dayton Knoxville IA 50138 (815) 842-3272

DON and Bob new guaranteed buys. SBE144 (249.00L) 209.95; SBE450; (399.97L) 339.00; Gladding 25 212.80 with ac 255.00; Standard SR826M 299.95; Motorola HEP170 Epoxy Diode 2.5A/1000V 39c; Ham-am 99; TR44 59.95; Mosley CL33 10.00; CL36 14c; Hy-Gain 716DXX 139.00; Hy-Gain 109.95; 400 Rotor 179.00; 204BA 129.00; Caton 672B/FT60L 13.95; KY65 Code ID 8.95; write quote note. Prices collect. Mastercharge. BAC. Full warranty. Madison Electronics, 1508 McKinney, Houston TX 77002 (713) 224-2668

SELL a recent AR-15. Bought August 1971, will ship in an unopened carton after servicing and alignment from Heath. Reason for selling is to buy AR-1500. Price \$300 plus shipping Barry Warren, WB2ZOA, 21 Westover Rd Troy NY 518-272-4914

HEATH, new HW22A PWRHW13A spkr SWRMeter Hustler whip mike #175, J. Bright 131 Nugent St. New Hyde Park LI NY 11040

LONESOME Drake 2B and Heath Marauder looking for home. \$375 firm, worth looking into. Rick McMillen 4109 Concord Milwaukee OR 97222

APACHE #90, HQ-110 #95, ARC-5 3-6 MHz rev #10, Vhf FM fixed tuned, four with extra IF section #20, (2) HF FM fixed tuned revs #7.50 ea. You ship. Certified check or money order. K6GFB Box 3 Escalon CA 95320

HEATH DX-60B xmtz works like a dream \$50. John Wyncott WA9WHL Rm SW 360, Wiley Hall, Purdue University, W Lafayette IN 47906

WANTED: Johnson 275W matchbox. Send quote. Carson, Box 10 Dunedin FL 33528

NOVICES: Hammarlund HQ-110 \$100. Heath DX-60B \$80. Both #150. 80-40-15 Meter Crystals supplied. Realistic DX-150 \$60. Dan Schreckengost 166 Johnson Street Cory PA 16407

KWM-2, ac and dc supplies, mobile mount, station control and 30L-1. All mint condition. James E. Farmer 501 Cactus Dr. Hurst TX 76053

COLLEGE Expenses force sale: Late Swan 350 and ac supply with spkr. Xtal CW, cw sidetone, manual and cables. \$250 and you pay postage. Barry Woodworth WA3GVQ/3 Box 39 RD 2 Cedar Manor Elizabethtown PA 17022

SELL: Heathkit HW-12A with mobile power supply, mike and speaker. Also HG 10-B VFO with ac power supply. All in excellent to very good condition and wired by expert. Best reasonable offer. WALLY, 71 Canonchet Dr. Portsmouth RI 02871 Tel: (401) 68309755

HAMMARLUND HQ-110AC-VHF, receives 160 thru 2 meters #175. WA8LWX, Rob Wilder, 263 Wren Way Medina OH 44256

WANTED: Buy or borrow manual or schematic RME 6900. C. Young WN35VF Yardley PA 19067

SELL Heath HR10B with calibrator excellent condition \$70 WA2SIS 100 Bradford Hgts Rd. Syracuse NY 13224

FTDX-560, Mike, speaker, new finals \$400. W3MBO 2004 North 61 St. Philadelphia PA 19151

NEED design for transistor regulated 230 VDC 40 Mill power supply. Fred Tucker W8YBS 6122 E. Pierson Rd. Flint MI 48506

DRAKE TR-3: ac and dc power supplies. Excellent condition. \$350. Marc Snyder, 7415 Richards Rd. Melrose Park PA 19126

CLEAN SB-200 works good, \$180 FOB. Pair 4-400As plugged in/out, make offer. G. Steinert, 1212 Linda Lee Dr. San Angelo TX 76901

SELL: SB-101, SB-600, HP-28A, #360; SB-220, #350; SB-500, #245. Ham-am and cable, #95; 80 foot self supporting tower, #175. K8HKQ, Route 2, Hillsdale, MI 48242 (517) 439-9286

DRAKE Receiver R-4B mint condition \$325. Hallcrafters Trans HT-40 75W, \$20; Knight SWR Meter, \$10; Low Pass Filter Drake 1K watts, \$12; 2 way Mobil Trans, Rec Motorola converter to 2 meters with phone patch 12V, Model U4366T, \$100. John W. Randall, WB4LIF, 5361 Trousdale Dr. Nashville TN 37220

SELL: Instructograph, like new, with oscitr, and 16 tapes 0-25 W2W 44.50 pp Cont. U.S. Send \$5 Bal COD R.E. Smith WB9IGZ 1405 Brdy St. Lamar MO 64759

QST 1/46 thru 12/64, CQ 1/55 thru 12/64 complete, perfect, make offer, W8EYU 1456 Rotheringham, Rochester MI 48063

WANTED Swan Model 508 external VFO, send price. Herb Hofer, 176 N Lime Sarasota FL 33577

SIGNAL/One/Alpha-77: CK7 factory modified to CX7A \$1395, CX7A used less than three months \$1750, new \$2395, 77 new \$1795, demonstrator \$1595, Payne Radio, Box 525 Springfield WI 53172 days (615) 384-5873, nights (615) 384-5643

VACUUM variable, remote operation 20-650 MMFD, 10,000 volts, Perfect condition, \$35. Bud low pass filter, Excellent, \$8. Collins 75A3, 800 Cycle filter at \$5. W9WAM, Kansas City MO 64138 (816) 358-1148

WANTED: Rebuilt WW-II VHF Direction finding station SCR-575. Need following. All Bendix, rack mounted, green, British air ministry crown: switching panel PN-6, Dynamotor PE-100, Fuse Panel PN-15, junction box JB-45 control panel PN-25, desk unit PN-1, Dynamotor PE-94, fuse panel PN-5, telegraph key J-44, antenna equipment RC-153, Tungar battery charger and panel, type WRB35B1. Give condition and price. John Elwood, W7GAQ/8 Box 1243 Lancaster CA 93534

SELL: Robot Monitor and Camera, \$775. Mint condition. Five months old. Extra lenses. W6KPR 41809 22nd St. West Quartz Hill CA 93534 (805) 943-4566

WANTED to Buy: Collins 75B-3 Receiver Harlow Blain 272 Hermosa Dr. Bakersfield CA 93305

HW-16, like new, \$90. Will include xtals. WA2BNJ, Alan Mankofsky, 75 Park Terrace East NYC NY 10034 (212) 869-8855

SELL: Drake R-4 T4-KMS-4 AC-4, 10xtals and manuals, all perfect recently factory aligned new finals also Johnson Valiant and manual good condition also RME Model 69 .55 to 32.0 Mhz receiver Series No. 534 and manual good condition. Best reasonable offer FOB Dennis Vaughn 806 Park Ave. Ladysmith WI 54848

SALE No Trades: SB400, #180, Warrior, #160, HQ 170 with speaker, #175, offer? Dick Sloan W6NOQ, 3700 Christmas Tree Ln. Bakersfield CA 93306

HEATH Marauder, HX-10, perfect condition, \$100; Turner 4X SSB mike, \$10; Bu #10: Tower (33 ft) rotor and beam, \$80; Bob Weaver WA1FPH 26 Alma Rock Rd. Stamford CT 06903

DRAKE R4 with speaker and nine broadcasting crystals extra. Very good conditions. \$250. Call A. Guimaraes (609) 587-3648

TEST instruments reasonably priced: EICO-360 Sweep Generator with leads, \$75. Heath: AG-10 Audio Signal Generator, \$25. IG-102 RF Generator, \$15 AM-2 SWR Bridge \$10. CO-1 Code Oscillator, \$5 HP-23 AC power supply, \$25. ID-22 Electronic Switch, \$15. IT-12 Signal Tracer, \$15. IM-22 Audio Analyzer, \$35 IG-12 Scope, \$35. R.B. Cooper, W8AQA 132 Guild Gr. Rapids MI 49505

CLEGG 22'er 2 meter Transceiver with microphone #115. Sandy Kass 289 Richmond Ave, Massapequa NY 11758 (516) 541-6415

R-390A Excellent condition, \$400. FOB, W5SLF, 342 Mahota Dr. San Antonio TX 78227

SWAN 1210A FM-2 All accessories four crystals, new condition ac power and 12 volt dc, \$290. W2TQ

SELL: Heath SB300, cw, am filters \$210; Model QF1 Q Multiplier \$6; Ameco Pre-Amp Transceiver type #50; all plus shipping costs. Cliff Ryan, W4BWEY, 1445 Homestead Metairie LA 70005 Phone (504) 834-6703

FOR SALE: SB-100 and manual, \$150. WB4LXK Box 17552 Tampa FL 33612

HAM-M with Mosley Quad, \$100. Zachary Botwinick, 253-42 87th Dr. Bellerose NY 11426

GERTSCH Heterodyne Frequency Meter FM-3/PS-3, 20 to 1,000 MHz, like new, \$250 (cost \$800). H. Cervantes, 34 Johnson Rd. Binghamton NY 13905

2 CHANNEL G.E. Pocketmate, 2-1/4 X 7 X 3/4 in, easy conv. to 2M. First \$150 MO takes. Ken Prouty, WB4SPD, Greensboro NC 27407

FAIR cash offers considered for the following: MN-4, \$70. Galaxy V Mark II, ac supply nice, \$250. RV, Remote VFO, \$48. National NC-2, 816, NCX-6, \$50. Package, \$179. Hallcrafters HT-32, \$160. HT-37, \$145. SK-101 Mark II, \$125. EICO 753, Tube Type, HB supply needs work, \$80. Heath Seneca with EICO MOD, \$99. Heath 6 and 2 converters for sb receivers, \$20 each. Motorola HT-100 unmodified no accessories, \$175. Heath HW-16 Immaculate, \$85. John M. Fearon 6434 Goldridge Rd. NW Atlanta GA 30328

FOR SALE: SB101 and HP23 AC/PS. Good condition. Spare tubes and relay. \$325 FOB. Richard S. Long, WA4JID 7344 SW 9th Ct. Plantation FL 33314

HEATH HW-16, mint condition, 6 xtals, #85. Cornell Dubilier AR-22B rotor, control and cable, plus 106 ft. R357/cw \$20. WA2EYD, Paul Kershaw, 27 Pine Ridge Greenville NY 11548

HOOSIER Electronics. Your ham headquarters of the Midwest. Individual personal service by experienced and active hams. Factory authorized dealers for the finest ham gear on the market. Drake, Regency, Standard, Hy-Gain, Ten-Tec, Galaxy, Cush-Craft, and accessories. Write today for our quote and try our personal, friendly Hoosier service. We accept Master-Charge and Bank Americard. Hoosier Electronics, R.R. 25 Box 403 Terre Haute IN 47802

WANTED to buy: Model T1200 or T1200A-Motorola remote control unit, G.W. Heffernan, Civil Defense Director City Hall Manitowoc WI 54220

WANTED: Hunter bandit linear amplifier 2000B must be clean and sound. W8CN PO Box 129 Lake Forest IL 60045

LIKE new Drake Markler Luxury Transceiver \$200 FOB Yoakum TX K6QJS Cecil Rowan PO Box 14 77995

WANTED: General coverage Receiver, Sell or trade: GE, ST 2 A. 5 inch Oscilloscope, ATR, 6-12 Volt Battery Eliminator, Hickok Pattern Generator 620, Fred Wiedenroth, Madison Lake MN 56063

EZ-WAY Tower for sale GPRBX-60-3 60 ft tilt over with ground post. You take down excellent. Best offer. Cost new over \$770. Moving. KZ7HH Richard Gelman 2196 Smith St Merrick NY 11566 Day 212-FL-4400 Nites 516-887-3410

WHOLE station for sale includes: Yaesu FT Dx 400 w spkr, Shure 444-T mdc, Ham-M rotor, 60' Rohn tower, TA 33 J, RG8U and guy wires, HD-15 phone patch, All less than one year old, in excellent condition. \$825 will consider breaking up station. K10GA A.P. Milone, 19 Mt. Vernon St. West Roxbury, MA 02132 (617) 325-0082

SALE: Complete station. DX60 xmtr; HG-10 VFO; Collins 75A1 rcvr; Ameco preamp; Turner mixer; DK60G relay. All in good working condition with manuals. \$200 shipped collect. WA7NKW, 1305 Hammond Lane, Toppensish, WA 98948

SALE: SB-301, SB-401, HW14 and HP23A Power Supply \$75. All with Manuals and Factory Service. Excellent Condition. If taken as a package will include SB600 Speaker and HDP-21A SSB Mic. Making room for RTTY equipment in a crowded shack. R.B. Cooper, W8AQA.

FOUR youngsters in College really hurts! Complete single antenna station in absolute mint condition. Hammarlund HK-50/HXL-1, 1600 watt PEP transmitter, Collins 75S-3B receiver. Includes deluxe mahogany control console with built-in remote antenna selection, 24-hour clock, broadcast VU meter, antenna rotor controls and Bird Model 43 wattmeter. The works for only \$900. Bill Bliss W8DTP, 3024 Cardinal Place Lynchburg VA 24505 (703) 384-3125 A beautiful three hour drive from the Nation's Capital

HQ-180A General Coverage, \$260. Galaxy V Mk II 400 Watts Pep with ac and dc supplies, VOX, and Hamcat with 15 and 20 meter resonators \$295. All in perfect operating condition. You ship. Bill Winstead, Route 3 Box 396 Philadelphia MS 39350 601-856-5404

FOR SALE: Complete two meter am station with HQ145C Receiver. Write for detailed list, \$200, Bob Aberle, W2QFP, 33 Falcon Dr. Hauppauge NY 11787

SELL: Hy-Gain tri-bander TH-3, coax, \$80, VTYM, \$20, IBM typewriter, \$325; BC-610, make offer, KW amp chassis, parts, \$36, K4GVV, 3009 Springhill, Mobile AL 36607

HEATH: SB-301 with all filters, \$260, SB-401 with crystal pack, \$250 SB-600, \$15 all three \$485, Johnson 275 W match box \$40, EIC 717 Keyer, \$40, Brown Bros. CTL paddle/key, \$37; Astatic 10D with stand \$25 all mint condition, lists professionally assembled, William Wallace, K8HYV 156 South Bellbrook Rd. Xenia OH 45385

FOR SALE: Heath Marauder HX10 10m-30m SSB exciter plus HEATH SB200 1200 watt PEP linear. Swap for SB220 or \$350. NY and NJ only. No shipping. W2OKR (212) YU1-4136

FOR SALE: Hallicrafters HT-44 and PS-120 ac supply; HT-41; RME690D. Best offer takes any or all. Sam, WA5MKP, Box 149 Corinth MS 38834

TRANSPONDER Unit APX25, \$250 Ampax two inch Video tape recording head assembly catalog no. 1211358-40, best offer. Joseph Korin, W2CCKQ 2934 Windermere Rd. Scherectady NY 12304

SELL IC-2F 2 mtr FM rcvr excellent condition. Ready for Mobile WA8UTK 1758 Bunkerhill D Columbus OH 43220

GALAXY FM-210 transceiver with mike, ac supply/power booster, ten crystals, mobile mount. Local, \$100; 1 ship, \$100. Hammarlund HQ-129X general coverage, \$75, you pay UPS. Perry, 12 Rick Dr. Florence MA 01060

LOW overhead, low prices, FM-SSB, L.M. Communications, 516 Chapman Hamburg NY 14075

HEATHKIT HX-10 Marauder SSB Transmitter. Excellent, \$12. Hallicrafters SX-71 Receiver. Recently aligned, \$50. J. Lindholm, W1DGL, 66 Sherbrooke St. Bristol CT 06010

WANTED: 1 GHz, 2 GHz RF Generator, WA2EKE (716-223-4500)

FOR SALE: KW oil filled capacitors (2), new Westinghouse, 4000V, 25 mid, 1 amp. Each \$20. K1VOL

SELL: Heath DX-100B, SB-10, HR-10B. All in perfect shape and operation with manuals. Going transferred. Best offer over \$175 takes it, or make offer for any. Certified Check. You ship. Guy R. Williams, RD 4 Corry PA 16407

DRAKE L-4B amplifier. Ten months old and like new, \$600. Tel. 203-653-5433- K1PNL

WANTED: Cygnus, HQ 215, SPH-4. Sell: KWM-2, \$16F2. WABAAO, Box 335 LaGrange TX 78945

DRAKE TR6 MS4 AD4 SER 165, Manual mint, will ship WB9AUL, 112 California St. Carterville IL 62918

FOR SALE Drake 2-C 2-CS mint \$175 Heathkit DX-60, good! \$45 everything for \$210 or best offer WNTSIM, Box 65 Newton UT 84327 You ship!

SB34, Plus Mobile Ant., Bumper Mount, 80-40-20-15 Resonators all \$210 DX60B excellent condition. \$65 201-635-5490, WA2-HDG Wal

WANTED: Collins linear, 30S-1 W2BZV

NRW HQ-215, Postpaid, W1KO, all circuit, Handover MA 02339

SELL: Gonset GC-105 2 meter Communicator in fair condition, \$75. NC 300 Receiver in fair condition, \$80 you ship. D.R. Berkley 1019 Sheridan St Corona CA 91720

COLLINS KWM-1, 516F-1 AC supply, 312-2 speaker console (with remote patch and wattmeter, Superb condition, \$425. Dr. Colton Tullen, K2EXQ, Physics Department County College of Morris Dover NJ 07801

TRADE even L-4B good condition good tubes power supply cable and manual. Want SB-220 good condition. Will not ship. Trader may ship or pick up. K9AJ Dallas PA 18612. 717-333-4502

FOR SALE: Heathkit SB102 Transceiver, SB-600 speaker HP-23A AC Supply, and HDP-21A microphones. All in excellent condition. Used only 20 hours. Seven months old. Complete \$485. K2ZT, 20 Harts Hill Parkway Whitesboro NY 13492 Tel. 516-785-7448

COLLEGE expense must sell SSTV Robot Monitor, \$449 WA0QHL Brechenridge MI 56520 643-4947

CRYSTALS Airmail: QST Novice Special, active, accurate, FT-243, Five or more (Band mix okay), Our frequency choice (scattered) 40M-15M, \$1.25 each, 80M, \$1.65, Your choice 40M-15M, \$1.39, 80M, \$1.69. Less than five, 40M-15M, \$1.50, 80M, \$1.75. Novice QRM Dodger Package, three FT-243 plus minus three kilocycles your center frequency, 80M, \$4.95, 40M-15M, \$3.95. Airmail 15c crystal, 1st class 10c. General Purpose: FT-243 01% 3500-6500 kilocycles crystal. Free folder sheet. Your crystal shop since 1933 Bob Woods, WOLPS, C-W Crystals, Marshfield MO 65706

8-2 METER Station, TX-62, VFO-621, HQ-170-A, Ameco 2-meter Converter, Ameco 6-meter Pre-amp, Dow-Key Relay, halo antenna. Like new. \$320 or trade for Swan 250-C, W8OIV, Gary Ritchie 1303 East Dairmoor Cleveland OH 44131

WANT: Good BC-344 (150 to 1500KC) Rev. Sell: Model LM-4 Freq Meter with book, \$20 FOB, W2TB

COLLINS 51J Receiver good condition \$200, Collins 3221 Transmitter Svc. \$132, \$125, Clarence Fry W3KQP RD 1 Downingtown PA 19338

HEATH HW101 with CW filter and HP23A \$300; Hammarlund HQ170, \$100; Hunter Bandit 2000A Linear, \$225; Philip Schwebler, W9BGQ 4536 N60ST, Milwaukee WI 53218

SB-10, \$40; Knight VFO \$10; B&W Model 380 TR switch, \$5. E-W3HNE, 1450 Pathfinder Ln. McLean VA 22101

SELL QST from 1924 to 1969 inclusive, some in binders. Make offer, W9US Route 4 Box 296 AAA Phineland WI 54501

WANTED: Late Collins Gear, very good condition: 328-2, 316F-2, 312B-3, 312E-1, 628-1, also 200 Hz Crystal Filter, 300 Hz Mech. filter, and case for KWM-2 or 30L-1, all or Part Bob W8BHC, 1201 Town Creek 274 Austin TX 78741

GLOBE Hi-Bander, 6-2 Mtr 50 watts A-M. Instruction book. Perfect, \$49.95. LA-1 linear amplifier, 30-6 mtr, 420 W, PEP, 5 W drive. Instruction book. Perfect, \$39.95. Both sets postpaid anywhere USA, W5OE 4721 Harvey Rd Fort Worth TX 76113

SELL: Dumont scope, 5 in., 304H, with manual, \$60; surplus Navy scope, 3 in., OS8C/U, with schem, \$50; Keithley RMS Voltmeter, 124R with manual, \$100; Receivers with schem, BC-348-R, modified to 120VAC, \$75; Hallicrafters R-274/FR, \$395, R-391/UR, \$750; RTTY audio TR, CV-60/UR, with schem, \$70; gas driven alternator, 2.5KW, 120VAC, 1 ph, 60 cye., \$250; microswitches, 230 pcs., 5A-125VAC, SPDL, 60c each, \$5 doz. All excellent, prices FOB Nanticoke, Stan Gritsevich, 11 New Fine St. Nanticoke PA 18634 (717) 735-3190

HEATHKITS professionally wired, guaranteed. David Shaver 65DTX Rt. 2 Box 767-G San Jose CA 95131 408-263-2635

SSTV Now Available. HCV-1B Camera \$325, HCV-2A Monitor \$315. Specifications Available upon request. Thomas Electronics and Engineering Co., Inc., PO Box 572 Hendersonville TN 37071

HEATH SB-100, HP-23 Supply, SB-600 speaker, EV-638 mike \$300; TX-1, \$100; all manuals, W8BHOH, 5661 Cerulean Ave Garden Grove CA 92646

SALE: SB-101, CW filter, PS speaker, Good, 1 ship, \$325 K94JL, PO Box 219 APO 09845

HW-16 for sale, \$85 or best offer. Mint condition. Also surplus lists. Will ship in 48 states. Mark, WA2SHR 25 Villa Place Eatontown NJ 07724

COLLINS 75B-1, Excellent condition, \$260. Call 918-932-1969 Mike Quillin 1717 S. Darlington Tulsa OK 74112

BRAND new, HyGain 18AVT-WB, unused, \$65, shipped WB60DM 3164 Ellington Circle Sacramento CA 95825

WANTED: BC-348 Tech Manual, Prints, Series E-M-P, or CLR-2, using 41 tube in Output, A.E. Keel, 9421 Hardy Kansas City MO 64138

R-4 RECENTLY factory aligned with manual plus MS-4, both no scratches \$269. John Gilbert, K9PQG, 2213D Fish Hatcher Rd. Madison WI 53713

BACK to Photography: sell, Viking II and VFO \$40; TX-8 WPS, \$75. Lots more! Stamp for list. WA4WE, 17511 NW 47th Ave. Opa Locks FL 33054

HOSS Trader Ed Moory says he will not be undersold on Cash deals! Shop around for your best price and then call or write the Hoss before you buy! New Regency HR-212 two meter FM transceiver, 20 watts, amateur net, \$259; factory authorized dealer for new Drake Collins Galaxy and Hallcrafters. Write for quote! New Rohn 50 ft. foldover tower, prepaid, \$239; new Mosley CL-33 and demo Ham-M rotor, \$212; used equipment: HT-37, \$169; TR-4 with 34NB, \$499; R-4-B, \$349; HR-2A, \$189; Ham-M, \$85; 2-B, \$169. Write for used list, Ed Moory Electronics Co., PO Box 506 DeWitt AR 72042 Tel. 501-946-2820

MUSEUM of modern art needs 1947 model S-40 Hallcrafters communications receiver for exhibition. Donors credited. Write Susana Torre, Museum of Modern Art, 11 West 53rd St. New York City NY 10019 or call (212) 966-7230

SELL QST 1930 thru 1970, \$50 plus shipping. W9KV, 706 N. Elmhurst Mt Prospect IL 60056

REALISTIC DX-150 a general coverage receiver. Excellent condition. \$90. WN10UM 17 Fenwick Rd. Manchester CT 06040

AMECO Model PLF Pre-amplifier (FET), 1.8 to 54 MHz range. \$22. (212) 376-4842

WANT Johnson Matchbox, Johnson VFO Model 122, W3DGU

DRAKE T-4X, AC-4, \$315; 2-C, 2-AC, 2-CQ, \$210. All excellent, manuals, original cartons. Will ship. Mark Schlenker, WA9UOD, 6314 Larch Hall, ISU Ames IA 50010

COLLECTORS item Hallcrafters receiver Model S-15 Sky-Challenger 1937 in good condition, functioning and appearance. Original instructions. Best offer. F. Thiede W2EC, 8 Nathan Hale Dr. Seauket NY 11783

SR400 new \$500, mint used, \$400, Robert DuRohf, 350 Carol Court Highland Cl. IL 60035

BEAM TA-33 Jr., \$47.50. Rotor, AR22-R, \$24.75. Tower, Tele-Vue steel, 30 foot two section, crankdown, hinged base, \$44.50. Gotham 20 meter quad, unused, \$21.50. Solid state power supply, 250 ma., \$37.50. Hy-Gain Balun, 1:1, \$14.50. Johnson 250-38 TR switch, \$19.50. Saxton 100 foot RG8U foam, with connectors, unused, on carrying reel, \$14.75. Heath AM-1 Antenna Impedance Meter, \$10.75. General Electric 12 inches high-fidelity speaker, Model G-502, 25 watts, \$12.50. Two 12 inch speakers, in wall housings, \$12.50 each. Beam, rotor and tower use four years. Prefer local deal. Shipping extra. W2BE 516-888-2168

HALLCRAFTERS HT-41 linear, Xtra finals, relay. Mint. \$150. Dave, 617-784-5613

SELL: Meters, xtals, 850 ma. Swinging chokes, Tubes, NRI Course, VTYM's, power supplies, G/C amplifiers. Other items. W3PQK, 615 Market st. South Williamsport PA 17707

DRAKE 2-C with cal. and speaker 230. Heath DX60B 70. Will sell separately and take best offer on both. Joe Seigel, Great Neck NY 11020 call 516-487-8134

WANTED: HW-101 xceiver with or without power supply. K1PNS 24 Rockwood Dr Waterford CT 06385

QST's full years 1929-1971. Reasonable. Write for list and prices. WINCD.

IBM Standard electric typewriter, Model B, good condition. \$125. K3MNJ, 8361 Langdon St. Philadelphia PA 19152

FOR SALE: HR-10 DX-60A, HG-10B. Mint, \$120. Can't ship. Xmtz might need final work. Send for details. WA1ISX

WANTED: Telrex 15 M 532 and 20 M 536. Must be unused in original crates. W9FJO George Sensibar, 985 Forest Glencoe IL 60022 (312) 835-4138

MECHANICAL Filter 1.8 kHz for 75A4, \$40 or will trade for 800 hertz for 75A4. K9ZHD 2921 Indiana Joplin MO 64801

FOR SALE: Heath Model HW-16 very clean, no bugs \$90 with 8 crystals and key WB5FTE 405-321-0455. Will ship 2841 Butler Dr. Norman OK 73069

SALE: Heath Apache, \$90. SSB adaptor SB-10, \$60. Hammarlund HQ-170, \$160. 40 foot tower with rotor and 2-element quad. \$65. WA2RZE, Dave, 9 Jacobs Ln. Scotch Plains NJ 07076

SELL: QST's odd issues 1931-35, nearly complete 1936-71, Radio April 1939, CQ Sep 1946, January 1949, Electronics May 1936, '73 1963-65, Scientific American 1859, two 450THs. Mrs. Fabian, 115 E. Summerbell Elon College NC 27244

FOR SALE: Hallcrafters SX-117, HT-44, PS-150-120 little used, \$375. PMR-7 with ac and dc power supplies, \$50; Ameco TK-86, \$20; Heathkit Mariner RFD Receiver MB-18, \$90; H. Ostrowski, 3729 Country Ridge Charlotte NC 28211 (704) 364-3474

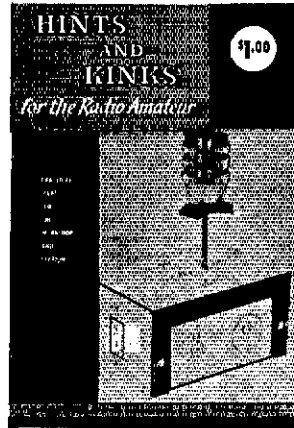
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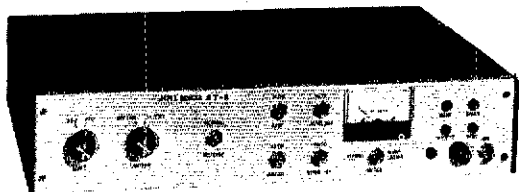
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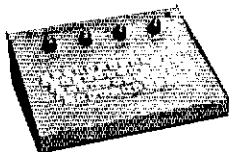
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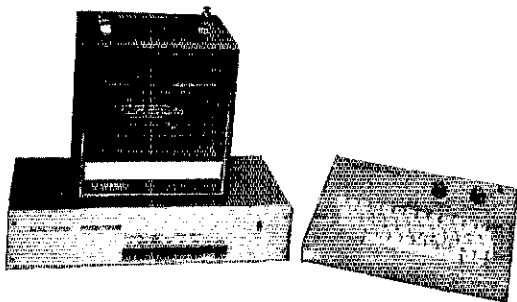
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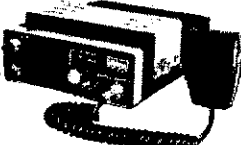
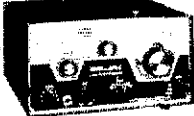


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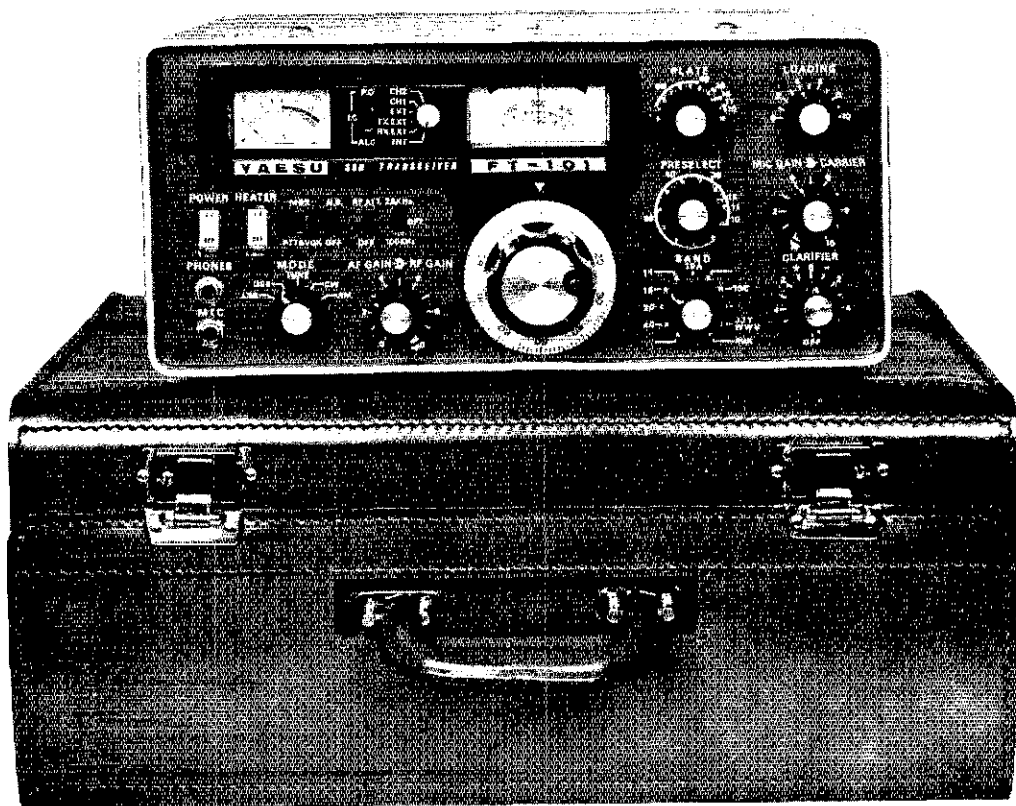
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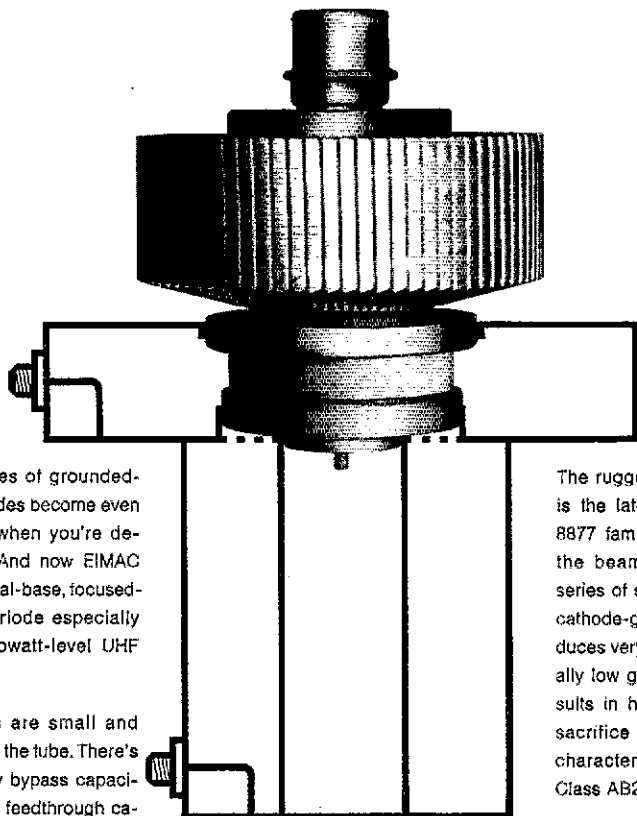
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